



NCIA Regional Noise Management Plan (RNMP)

Annual Report (covering the 2015 Calendar Year)

Prepared for the

Albert Energy Regulator (AER)

And

The Alberta Utilities Commission (AUC)

March 2017

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NCIA Regional Noise Management Plan (RNMP)  
Annual Report to the Alberta Energy Regulator (AER) and  
The Alberta Utilities Commission (AUC)  
2016 (covering the calendar year 2015)

## 1 Executive Summary

NCIA completed field validation measurements for the Regional Noise Model (RNM) in 2015. These results are compared to the updated Regional Noise Model of June 2015 (see Section 3).

As reported on in last year's annual report, a number of NCIA member site level noise models were updated or added in 2013 and 2014, mostly due to expansions or changes at these facilities, and those were included in an update to the RNM and its outputs beginning in 2014 and ending in June of 2015. It is this updated RNM that is used for comparison of measured results going forward.

Measured versus modeled results are shown in Table 5 and Figure 2 below. This figure shows all of the data that has been measured since 2011 and also the model predictions in terms of ranges. The measured data are compared to the predicted results from the latest Regional Noise Model (RNM) available at the time that the comparison was made. A discussion of these results is presented in Section 4 of this report.

Figure 3 below also shows the measured data by location on a time scale. It is evident from this Figure that there are no trends (either up or down) in the sound levels of the measured data over time.

## 2 AER Audits of NCIA Member Facilities

- No Audits by AER were conducted in 2015.

## 3 Regional Noise Model Update

- All updates to the model were captured in the last annual report.
- The next anticipated update to the model will take place in 2018.
- Tables 1 to 3 are reproduced from the last annual report and show the current state of the site level models that make up the NCIA Regional Noise Model.

**Table 1**  
**Site Noise Models in Regional Noise Model Prepared by SLR**

Company	Plant / Unit	Model Date
Agrium	Redwater Fertilizer Operations Plant	December 7, 2001 & January 21, 2008
Air Liquide	Cogeneration Unit	June, 1998
Cenovus	Bruderheim Operations	March, 2010
Dow Chemical Canada	Ethylene; Fractionator; Polyethylene I, II & III; Ethylene Oxide / Ethylene Glycol; Ethane Storage; Power & Utilities; Cogeneration plants	December 15, 2014
Maxim Power Corp. (non NCIA member)	Deerland Peaking Station	July, 2008
North West Redwater Partnership	Sturgeon Refinery (3 units)	November 22, 2007
Pembina Pipeline (formerly Provident Energy)	Redwater Fractionation & Storage Facility	January 17, 2003
Shell Canada	Refinery; Upgrader (base plant and expansion plant); Cogen	September, 2014
Shell Chemicals	Styrene; MEG	March 19, 2009
<u>Sherritt Fort Saskatchewan Integrated Site:</u>		
Agrium	Nitrogen production	January 17, 2003
Corefco	Metal production	February 13, 2006 *
Sherritt International	Metal production	February 13, 2006
Oerlikon-Metco (formerly Sultzer-Metco)	Chemical preparation	February 13, 2006
Umicore	Metal products	February 13, 2006 *
Smith & Nephew	Surgical appliances	February 13, 2006 *
Keyera Fort Saskatchewan	Fractionation and storage	March, 2014
Plains Midstream	Fractionation and storage	March, 2014

\* integrated into Sherritt model

**Table 2**  
**Site Noise Models in Regional Noise Model Prepared by Others**

Company	Plant / Unit	Acoustical Consultant	Model Date
Access Pipelines	Sturgeon Terminal	FFA	July 21, 2010
Value Creation (formerly BA Energy)	Oilsands Upgrader	RWDI	May, 2004
Suncor (formerly Petro Canada)	Fort Hills Sturgeon Upgrader	RWDI	September 3, 2008
Pembina Pipeline	Expansion	Stantec	June 27, 2013
Sasol	Gas to Liquids Plant	Stantec / RWDI	May, 2013

**Table 3**  
**Heartland Plants where Basic Noise Models were Built**

Plant / Unit	Process	Data Provided	Model Data
<b><u>NCIA MEMBER COMPANIES</u></b>			
Aux Sable Canada *	Off Gas Plant	Sound Power Levels	September 2, 2010
Aux Sable Canada *	Extraction Plant	Sound Power Levels	September 2, 2010
Plains Midstream (formerly BP Canada Energy) <sup>1</sup>	Fractionation and Storage Complex	Fence line Measurements	March 2, 2010
Evonik Canada Inc.	Hydrogen Peroxide Plant	Fenceline Measurements	June 11, 2010
Keyera Energy	Fractionation and Storage Complex	Fenceline Measurements	March 2, 2011
Chemtrade Logistics (formerly Marsulex Inc.) **	Central Service Center	Diagnostic Measurements	September 21, 2010
Chemtrade Logistics (formerly Marsulex Inc.) **	Sulfides Facility	Diagnostic Measurements	September 21, 2010
Praxair Canada Inc.	Air Separation Plant	Fence line Measurements	June 11, 2010
Praxair Canada Inc.	Carbon Dioxide Plant	Fence line Measurements	June 11, 2010
<b><u>NON-MEMBER COMPANIES</u></b>			
ATCO Midstream	Liquid Extraction Plant	Sound Power Levels	June 23 2011
Smith & Nephew	Pharmaceuticals	Sound Power Levels	June 23, 2011

\* based on PWL's delivered by the facility's acoustical specialist

\*\* became Chemtrade after 2012 assessment date

<sup>1</sup> 2012 database replaced with a detailed database in 2015 model update

#### 4 2015 Monitoring results for Regional Noise Model

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 ten (10) predetermined locations within the AIH (see Figure 1 below). An additional noise monitoring, spanning three (3) 48-hour periods, was conducted at an 11th monitoring location (referred to as Location 12) as an independent control/reference point. The noise monitoring were conducted in support of the NCIA's Regional Noise Management Plan. In addition, the results from the noise monitoring will be used to validate 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 (8-10) and August (7-9; 9-11), 2015 by P. Froment, B.Sc., P.L.(Eng.).

As part of the study, a total of thirteen (13) 48-hour noise monitorings were conducted throughout the AIH. It was found that the isolated LeqNight broadband and 1/3 octave band Leq sound levels were similar to those measured in the 2014 Noise Survey. Unlike the 2014 Noise Survey the weather conditions fluctuated more greatly in regards to the wind speed and direction. As a result, there was a greater variance in the noise levels between the two night-time periods for several of the noise monitoring locations.

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. Lastly, the noise levels from train passages were again prevalent at all locations and tended to dominate the noise climate as they passed through.

In comparison to the 2014 Noise Survey there were a greater number of passages with an increase in average train length throughout the night-time periods. The complete Field Monitoring Report can be found in Appendix 1 of this report. Sampling locations are shown in Table 4 and Figure 2 below.

Measured versus modeled results are shown in Table 5 and Figure 2 below. This figure shows all of the data that has been measured since 2011 and also the model predictions in terms of ranges. The measured data are compared to the predicted results from the latest Regional Noise Model (RNM) available at the time that the comparison was made. The 2011, 2012 and 2013 measured results are compared to the predicted results for the 2012 RNM. The 2014 and 2015 measured results are compared to the predicted results for the 2015 RNM.

The upper and lower limits of the predicted ranges shown in the figures (black bars for the 2012 RNM and blue bars for the 2015 RNM) were determined by running the RNM using variations in the meteorological conditions. The details of this process was outlined in last year's annual report.

Focusing on the 2015 results (Table 5 and Figure 2 below) one will note that for locations 1a, 2, 3a, and 4b the model is slightly over predicting the noise levels in those areas. For location 4b, we now know that the Shell Scotford model is over predicting noise levels somewhat (based on new on-site measurements for the site model) and that will be corrected in the 2018 Regional Noise Model update. This may be what we are seeing in this regard.

For location 6, as we have seen in previous years, the model is under predicting the noise level in this area. This is being investigated by Agrium as it suggests that the Agrium Redwater site model may be under predicting noise levels in that area.

For location 8b, the model is over predicting the noise levels and this requires some investigation. This area is near the Pembina site and there has been a lot of construction in this area over the past year or so.

Overall, with 79 data points (measured since 2011), we find that 43 of those measured results are within the ranges that the RNM would predict; 26 are below the ranges that the RNM would predict (meaning the RNM over predicts the noise levels); and 10 are above the ranges that the RNM would predict (meaning the RNM under predicts the noise levels). Looking at this data from a magnitude of difference perspective, location 6 and 8 are the only two that suggest further follow up as per above.

There are no obvious trends in the data to suggest that noise levels in the area are either increasing or decreasing due to industrial operations over time (see Figure 3 below).

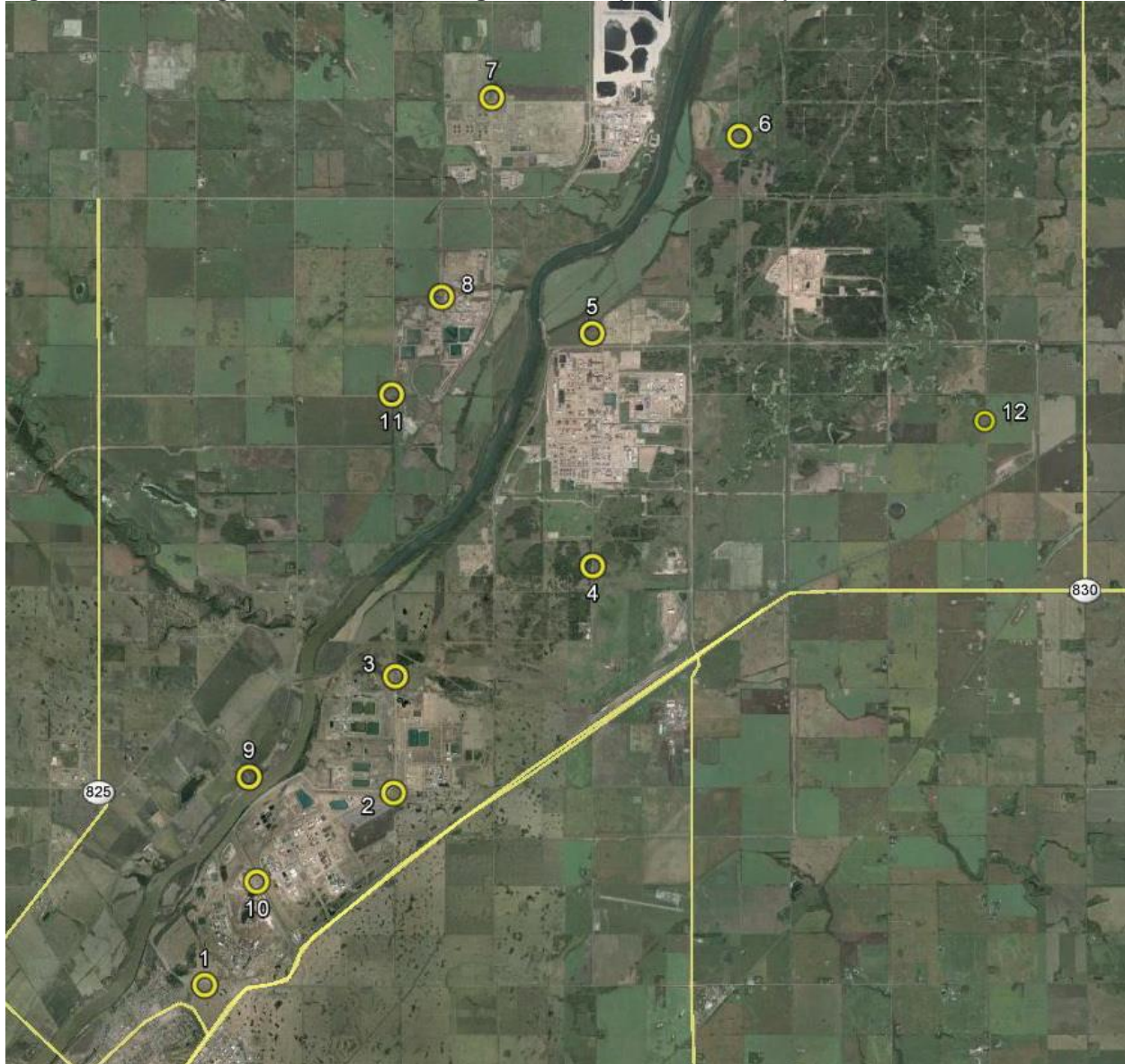
**Table 4  
Monitoring Location Details**

Location No.	UTM Coordinates (approximate)		Description
	Easting (m)	Northing (m)	
1a	355040	5954162	2 m north of 100 Ave, and 520 m northwest of Highway 15 near Mel Martin's Transfer Facility and approximately 550 m southwest of the Agrium Fort Saskatchewan Facility.
2	358261	5957223	90 m southeast of 125 Street and 1 km north of Highway 15 Near bend in River Road where it becomes 125 Street, between Dow and Keyera facilities.
3a	358353	5959156	6 m east of 125 Street and 220 m north of Petrogas facility. This location was changed from the 2012 noise monitoring location in an effort to better quantify the contributions of the facilities north of the Dow facility.
4b	361665	5960870	1.2 km south of the south fence line of the Shell Scotford site and 1.6 km east of 130 Street; 490 m south of the entrance to the electrical substation to the northwest.
5	361777	5964711	200 m north of Township Road 560A and 5 m east of Range Road 215, at 300 m north of the north fence line of the Shell Scotford facility.
6	364322	5967894	1.0 km north of Township Road 562 and 3 m east of Range Road 213A, 1.6 km East of Agrium Redwater facility.
7			Not measured in 2015 due to construction activities on North West Redwater Partnership site.
8b	359330	5965387	1.6 km south of highway 643 and 800 m east of Range Road 221, 5 m north of the north fence line for the Pembina/InterPipeline facility.
9	355872	5957574	5 m southwest of the intersection of Lamoureux Drive & Godbout Avenue, 1.3 km northwest of the Dow facility and 1.4 km west of the Keyera facility.
10	355925	5955818	30 m west of 119 Street and 12 m north of the access road to Agrium Fort Saskatchewan, 750 m northeast of the Agrium facility and 180 m west of the Dow fence line.
11	358430	5963804	3 m northwest of Intersection of Range Road 221 and Township Road 560, 1.7 km southwest of Pembina/Williams facility.
12a	368223	5963070	Independent control/reference point. It was located 15 m east of Range Road 211 and 450 m south of Township Road 560. Approximately 1.6 km west of Highway 830 and 2.7 km north of Highway 15.

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



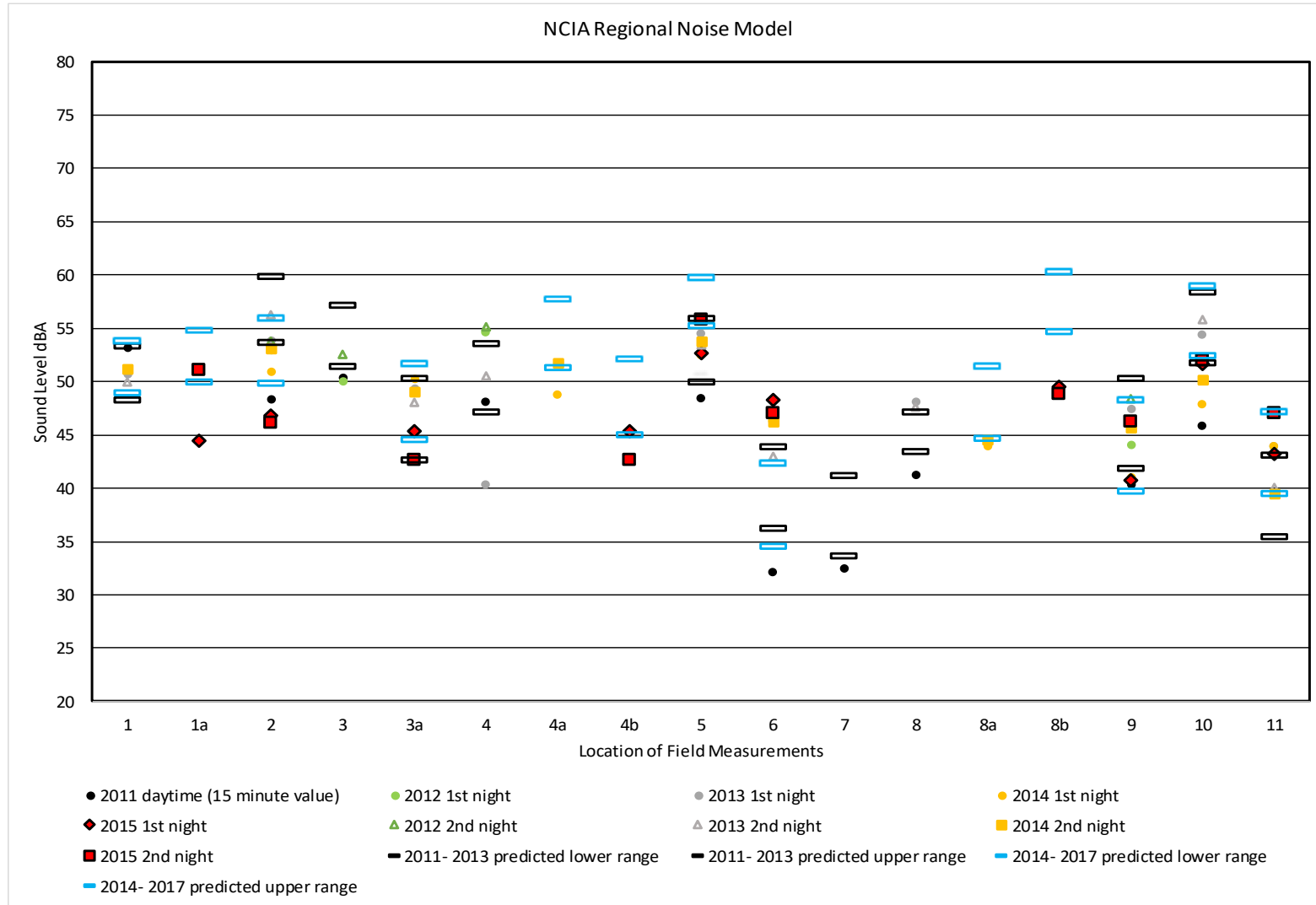
Figure 1: NCIA Regional Noise Monitoring Locations (as per Table 4)



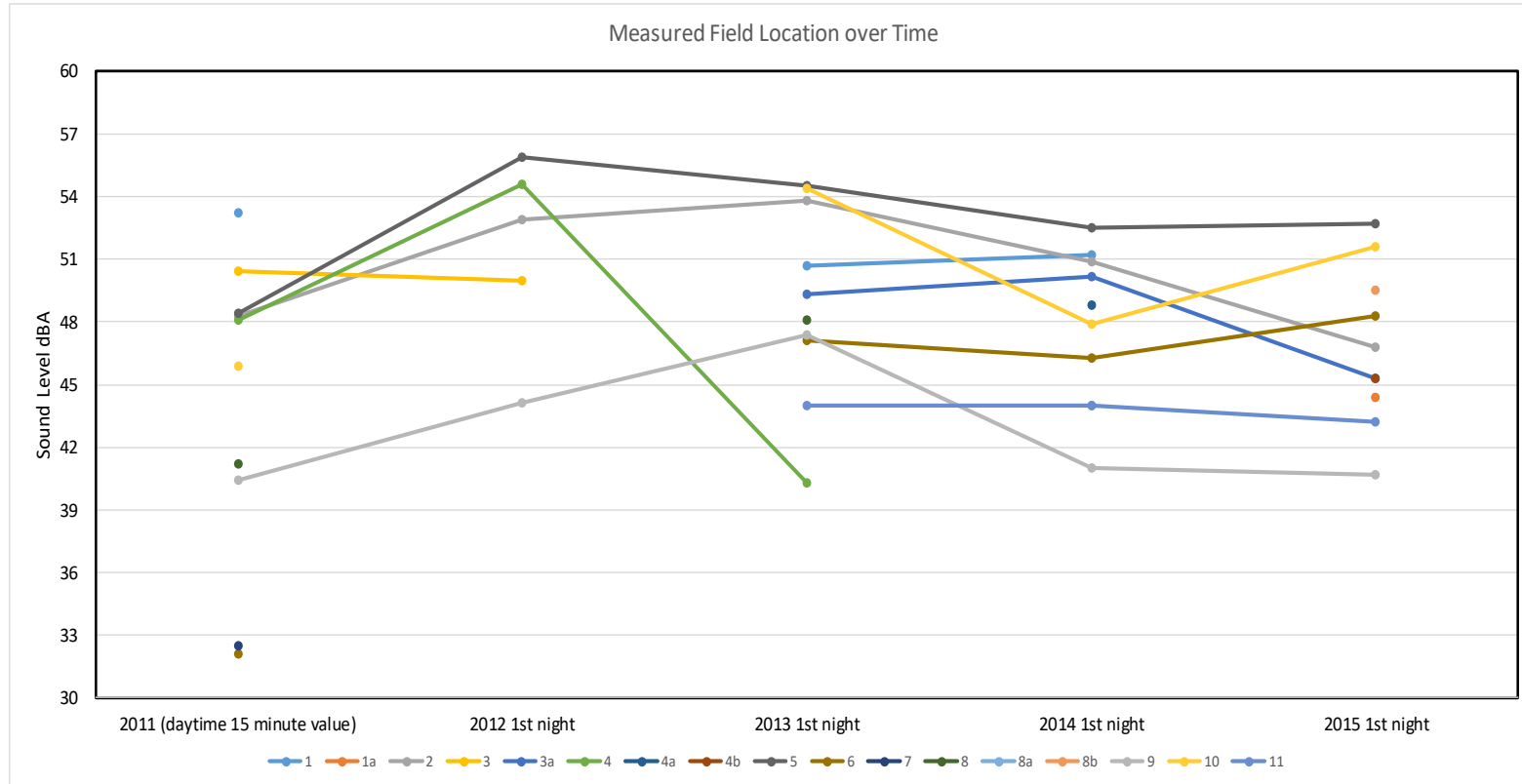
**Table 5**  
**Comparison of Measured versus Modelled results**

Location	Predicted Sound Level (RNM 2015)		Measured Sound Level (2015)	
	Temperature Lapse Condition	Temperature Inversion Condition	First Night	Second Night
1a	50	54.8	44.4	51.1
2	49.8	55.9	46.8	46.1
3a	44.6	51.6	45.3	42.7
4b	45	52.1	45.3	42.7
5	55.2	59.8	52.7	55.8
6	34.5	42.3	48.3	47
8b	54.7	60.3	49.5	48.8
9	39.7	48.3	40.7	46.2
10	52.4	59	51.6	52
11	39.5	47.2	43.2	47

**Figure 2: Predicted Range versus Measured Sound Levels**



**Figure 3: Measured Data by Location and Date**



## 5 NCIA Member Compliance

Table 6 summarizes the compliance requirements for NCIA member and non-member companies' vis a vis the NCIA RNMP.

**Table 6**  
**Compliance Requirements for NCIA Member Companies**

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

As of this date, Table 7 summarizes the NCIA member companies and their status with respect to Table 5 above.

**Table 7**  
**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 2015 (Appendix 2)	Developed a Site Noise Management Plan
Access Pipeline	AER regulated under Noise Control Directive 038.	Yes	Not Yet
Agrium Fort Saskatchewan	Not regulated	Yes	Yes
Agrium Redwater	Not regulated	Yes	Yes
Air Liquide Canada	Not regulated	Yes	Partly
ATCO Power	Heartland facility <u>not operational</u> .	Yes	Partly
Aux Sable Canada	Regulated under Section 11 of the OSCA and therefore D-038.	Yes	Yes

NCIA Member <sup>1</sup>	AER Regulated Status for Noise Control Directive 038	Filed an Annual Update with NCIA for 2015 (Appendix 2)	Developed a Site Noise Management Plan
<b>Cenovus</b>	Not regulated	No	Not Yet
<b>Chemtrade West</b>	Not regulated	Yes	Yes
<b>Dow Chemical Canada</b>	Regulated under D-038 Operator No. 0F05	Yes	Yes
<b>Enbridge Pipelines</b>	Is regulated	No	Yes
<b>Evonik</b>	Not regulated	Yes	Partly
Fort Hills Energy Partnership	<u>Not operational</u> but will be regulated Operator No. OXP9	No	Not Yet
<b>Keyera Corp.</b>	Regulated under D-038 Operator No. A5W1 LSD - 02-14-055-22W4 Facility No. F-12695	Yes	Yes
<b>ME Global</b>	Not regulated	Included with Dow's submission	Yes
North West Redwater Partnership	<u>Not operational</u> but will be regulated. LSD - E1/2-18-56-21-W4M	Yes	Not Yet
<b>Oerlikon Metco (Canada)</b>	Not regulated	Yes	Yes
<b>Pembina NGL Corporation</b>	Regulated under D-038	Yes	Yes
<b>Plains Midstream Canada</b>	Regulated under D-038 Operator No. 60 LSD - 14-55-22 W4M Facility No. 12699	Yes	Yes
<b>Praxair Canada</b>	Not regulated	Yes	Partly
<b>Shell Chemicals</b>	Not regulated	Yes	Yes
<b>Shell Refinery</b>	Regulated under Section 11 of the OSCA and therefore Noise Control Directive 038. AER Approval No. 11640.	Yes	Yes
<b>Shell Upgrader</b>	AER Approval No. 8522 regulated under D-038.	Yes	Yes
<b>Sherritt International</b>	Not regulated	Yes	Yes

NCIA Member <sup>1</sup>	AER Regulated Status for Noise Control Directive 038	Filed an Annual Update with NCIA for 2015 (Appendix 2)	Developed a Site Noise Management Plan
<b>Umicore Canada</b>	Not Regulated	Yes	Yes
Value Creation	<u>Not operational</u> , but will be regulated.	Yes	Not Yet

<sup>1</sup> **Bold** type in the above table signifies that these members have operational assets on the ground within Alberta's Industrial Heartland. Non-bold type means these companies are members, but do not have operational assets, at this time, in the region and were therefore not required to complete the annual input form, although some did provide updates on their projects.

## 6 Regional Noise Model

### 6.1 *Improvements/Corrective Actions implemented in 2015 (Appendix 2)*

1. Agrium - Agrium Redwater's Nitric Acid Unit is noted to be experiencing axial kickback which may have also contributed to elevated Environmental Noise level. In result, and in conjunction with the upcoming operating approval renewal application, Agrium Redwater has contracted SLR to update the site noise model and confirm the sources of elevated noise so that appropriate abatement strategies can be considered.
2. Aux Sable Canada - In 2015 new pumps were installed and commissioned. These changes are expected to have minimal impact on sound emissions and have been assessed by Patching Associates in May 2016, the results of the assessment including an updated noise model will be available in July 2016.
3. Plains Midstream Canada - Construction activities continued on with the Phase 1 & 2 Expansion project in 2015. This development began with the final construction of a new facility brine pond, drilling of new storage caverns, installation of associated infrastructure to support the cavern development, construction of new NGL storage facility, and earthworks and infrastructure installation for a new rail loading terminal. The expansion has resulted in the site conducting a noise impact assessment which was subsequently used to update the Regional Noise Model in 2015.
4. Shell - In 2014 the Chemicals, Refinery, Upgrader, and Expansion model updates were 100% completed. Some of these updates were included in the 2015 RNM update. Site noise models for all 4 sites is complete and will be updated in the 2018 RNM update. Theoretical model was developed for Debottleneck project.

### 6.2 *Other Items for Follow-up Based on 2015 Field Measurements*

1. Discrepancy between measured versus predicted sound levels at monitoring location #4, #6 and #8. It should be noted that we now understand that the Shell Scotford model is over

predicting the noise levels from the site (based on new site level noise measurements) which have resulted in a change in the site model. This change will be captured in the next Regional Noise Model update in 2018.

2. With respect to location 6, this will be addressed by Agrium Redwater as part of site model update, that was planned for 2016 (see 6.3 below) and will be captured in the 2018 RNM update.
3. With respect to location 8, this may be due to activities at the Pembina site or at the North West Redwater Partnership site. Further investigation is warranted.

### **6.3      *Next Steps for 2016/2017***

1. Agrium - Agrium Redwater is in the process of planning and purchasing silencers for the Phos 30 # Steam Vents. Actual implementation of the silencers would occur in conjunction with the Boiler #2 replacement as a complete steam outage is required in both cases. As stated above, the site noise model will be updated in 2016. It is reasonable to anticipate that the next site modeling activity may be considered upon implementation of all the aforementioned projects stated above.
2. Aux Sable Canada - Aux Sable plans to upgrade one cooler unit on site. This will result in some minor noise impacts and the noise model will be updated once the new fans are specified. The updated noise model will be available fall 2016.
3. Keyera - Construction of a second Fractionation unit also took place during 2015, with expected commissioning and operation commencing in the spring of 2016. Once the addition is complete there will be a requirement to update the site noise model, which is expected to be completed in 2016.
4. Shell - Two projects will have an impact on noise: Refinery Debottleneck Project and Quest (CO2 capture). Site model update will be done for Quest in 2016. Chemical Plant site model will be updated in 2016. Debottleneck Project will start-up in 2017. Debottleneck Project will require our site model update. This will happen in 2017 -2018. These changes will be captured in the 2018 RNM update.
5. Gather information from members to begin the 2018 RNM update.



## **APPENDIX 1**

### *2015 Field Validation Monitoring Report*



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## 2015 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

**aci Project #: 15-025**

**December 03, 2015**

## Executive Summary

**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 ten (10) pre-specified locations within the AIH<sup>1</sup>. An additional noise monitoring, spanning three (3) 48-hour periods, was conducted at an 11<sup>th</sup> monitoring location (referred to as Location 12) as an independent control/reference point. The noise monitoring were conducted in support of the NCIA's Regional Noise Management Plan. In addition, the results from these noise monitoring 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 and August, 2015 by P. Froment, B.Sc., P.L.(Eng.).

As part of the study, a total of thirteen (13) 48-hour noise monitorings were conducted throughout the Alberta's Industrial Heartland. It was found that the isolated  $L_{eq}Night^2$  broadband and 1/3 octave band  $L_{eq}$  sound levels were similar to those measured in the 2014 Noise Survey. Unlike the 2014 Noise Survey the weather conditions fluctuated more greatly in regards to the wind speed and direction. As a result, there was a greater variance in the noise levels between the two night-time periods for several of the noise monitoring locations.

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. Lastly, the noise levels from train passages were again prevalent at all locations and tended to dominate the noise climate as they passed through. In comparison to the 2014 Noise Survey there were a greater number of passages with an increase in average train length throughout the night-time periods.

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<sup>1</sup> Initially in 2013, there were 11 locations plus the 12th (control) location. In 2014 & 2015, only 10 locations were used plus the control location due to construction activity at Location 7.

<sup>2</sup> The term  $L_{eq}$  represents the energy equivalent sound level. This is a measure of the equivalent sound level for a specified period of time accounting for fluctuations.

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## **1.0 Introduction**

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 ten (10) pre-specified locations within the AIH<sup>1</sup>. An additional noise monitoring, spanning three (3) 48-hour periods, was conducted at an 11<sup>th</sup> monitoring location (referred to as Location 12) as an independent control/reference point. The noise monitoring were conducted in support of the NCIA's Regional Noise Management Plan. In addition, the results from these noise monitoring 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 and August, 2015 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 [Figure 1](#). 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 (with the exception of 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.

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<sup>1</sup> Initially in 2013, there were 11 locations plus the 12th (control) location. In 2014 & 2015, only 10 locations were used in addition to the control location due to construction activity at Location 7.



### 3.0 Measurement Methods

As part of the study, a total of thirteen (13) 48-hour noise monitorings were conducted at 11 locations<sup>1</sup> throughout the AIH, as indicated in [Figure 2](#). Similarly to the 2014 Noise Survey<sup>2</sup>, a noise monitoring was **not** conducted at Noise Monitor Location 7 due to the current construction activities at the Northwest Redwater Partnership (NWR) refinery. All noise monitoring locations were identical to those conducted during the 2014 Noise Survey with the exception of noise monitor Location 1, Location 4, Location 8 and Location 12. The following is a brief discussion of the relocation of these monitoring locations:

- Location 1: Due to issues with the road shoulder at the 2014 noise monitoring location the noise monitor was relocated approximately 60 m east.
- Location 4: Due to variances between the Regional Noise Model and previous noise monitoring results (2013 & 2014 Noise Survey) the noise monitor was relocated approximately 625 m south of the 2014 noise monitoring location. At this location the noise monitor was at a higher elevation (in comparison to previous years) and also had better line-of-sight to the Shell Scotford facility.
- Location 8: Due to construction along the north side of Township Road 561 noise monitor Location 8 was relocated approximately 550 m east of the 2014 noise monitoring location. This placed the noise monitor in a location that was away from construction activities.
- Location 12 (Control): Noise monitor Location 12 was relocated approximately 2 km southeast of the 2014 noise monitoring location due to heavy rail activity at noise monitor Location 12 during the 2014 noise monitoring periods. The new location was chosen based on its relative distance from any major facility<sup>3</sup> that could otherwise influence its results. This location was also ensured to be within the boundaries of the Regional Noise Model.

The noise monitorings were 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>4</sup>. In particular, the chosen noise monitoring periods avoided any major shut-downs or outages that could

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<sup>1</sup> Once again, please note that three (3) 48-hour monitoring were conducted at Monitoring Location 12.

<sup>2</sup> This refers to the the report, “2014 *Environmental Noise Survey for the Regional Noise Model Annual Field Validation Monitoring*” prepared for the NCIA by aci Acoustical Consultants Inc. on October 27, 2014.

<sup>3</sup> This location is approximately 2.3 km northeast of the most major industrial facility, the ATCO Natural Gas Slat Cavern Storage Site.

<sup>4</sup> This was verified by all of the various company representatives.

adversely affect the “typical” noise levels (either louder or quieter) from a given facility. In addition, the monitorings were conducted in summer conditions (i.e. no snow cover) with little or no precipitation and, if possible, low wind-speeds. Each noise monitoring was accompanied by a 48-hour digital audio recording for more detailed post process analysis. Two (2) local weather monitoring stations were also used for the first 48-hour time monitoring period while three (3) local weather monitoring stations were used for the last 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.

#### 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 [Appendix I](#) for a detailed description of the measurement equipment used and for all calibration records.

**Table 1. Noise Monitoring Locations with Start and End Times**

Monitoring Location	UTM Coordinates <sup>1</sup> (Approximate)		Start Time	End Time
	Easting (m)	Northing (m)		
1	355040	5954162	8/07/15 09:40	8/09/15 09:40
2	358261	5957223	8/09/15 09:30	8/11/15 09:30
3	358353	5959156	8/09/15 09:30	8/11/15 09:30
4	361665	5960870	8/07/15 08:35	8/09/15 08:35
5	361777	5964711	8/07/15 08:10	8/09/15 08:10
6	364322	5967894	8/07/15 07:45	8/09/15 07:45
7	N/A for 2015			
8	359330	5965387	7/08/15 15:00	7/10/15 15:00
9	355872	5957574	8/09/15 11:00	8/11/15 11:00
10	355925	5955818	8/07/15 09:15	8/09/15 09:15
11	358430	5963804	7/08/15 15:00	7/10/15 15:00
12	368223	5963070	7/08/15 17:00	7/10/15 17:00
12			8/07/15 07:00	8/09/15 07:00
12			8/09/15 10:00	8/11/15 10:00

##### 4.1. Noise Monitor Location 1

The noise monitor at Location 1 was located approximately 2 m north of 100 Avenue, 350 m west of 114 Street and approximately 520 m northwest of Highway 15 as indicated in [Figure 2](#) and [Figure 3](#). This put the noise monitor approximately 550 m southwest of the Agrium Fort Saskatchewan Facility. This was 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 Agrium Fort Saskatchewan Facility. There was no significant vegetation between the noise monitor and the Agrium facility to the northeast.

<sup>1</sup> The UTM Coordinates have been updated to reflect the modified 2015 noise monitor locations.

#### 4.2. Noise Monitor Location 2

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 [Figure 2](#) and [Figure 4](#). 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 aforementioned facilities.

#### 4.3. Noise Monitor Location 3

The noise monitor at Location 3 was located approximately 6 m east of 125 Street and approximately 220 m north of the entrance to the Petrogas entrance as indicated in [Figure 2](#) and [Figure 5](#). This put the noise monitor approximately 270 m northwest of the Petrogas facility and approximately 650 m east of the Plains Midstream Facility. At this location, there was no direct line-of-sight to any of the permanent facilities due to the topography of the area. However, in comparison the 2014 Noise Survey, a new construction site was operating to the northwest of this location during the noise monitoring period. As a result, the noise monitor had direct line-of-sight to the new construction site. There was no significant vegetation between the noise monitor and the aforementioned facilities.

#### 4.4. Noise Monitor Location 4

The noise monitor at Location 4 was located approximately 1.2 km south of the south fence line of the Shell Scotford site and approximately 1.6 km east of 130 Street as indicated in [Figure 2](#) and [Figure 6](#). This put the noise monitor at 490 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.

#### 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 [Figure 1](#) and [Figure 7](#). 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 Agrium Redwater facility and is the northernmost noise monitoring location found within the AIH. Due to favorable topography between the noise monitor and Agrium there was direct line-of-sight to the Agrium site through a small row of deciduous trees across the road. There was no significant vegetation between the noise monitor and the Agrium facility. Note also that a weather monitor was placed at this location, adjacent to the noise monitor for the August 7 – 9 & August 9 – 11, 2015 noise monitoring periods.

#### 4.7. Noise Monitor Location 7

As previously mentioned a noise monitoring was not conducted at this location due to construction noise nearby.

#### 4.8. Noise Monitor Location 8

The noise monitor at Location 8 was located approximately 1.6 km south of Highway 643 (eastbound) and 800 m east of Range Road 221 as indicated in [Figure 2](#) and [Figure 9](#). This put the noise monitor approximately 10 m north and 5 m west of the northern fence line for the Pembina/Williams facility. At this location, there was direct line-of-sight to the Pembina/Williams site. In addition, as previously mentioned, the noise monitor had direct line-of-sight to construction site along the north side of Township Road 561. There was no significant vegetation between the noise monitor and the aforementioned facilities.

#### 4.9. 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 1.3 km northwest of the major structures at the Dow facility and approximately 1.4 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.

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<sup>1</sup> This was particularly observable during the night-time period.

#### 4.10. 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 Agrium Fort Saskatchewan facility as indicated in [Figure 2](#) and [Figure 11](#). This put the noise monitor approximately 750 northeast of the major structures at the Agrium facility and approximately 180 m west of the west fence-line of the Dow facility. There was direct line-of-sight to the Dow facility but not to the Agrium facility (due to the topography of the area). There was no significant vegetation between the noise monitor and the aforementioned facilities. Note also that a weather monitor was placed at this location, adjacent to the noise monitor for the August 7 – 9 & August 9 – 11, 2015 noise monitoring periods.

#### 4.11. Noise Monitor Location 11

The noise monitor at Location 11 was located approximately 3 m northwest of the intersection of Range Road 221 and Township Road 560 as indicated in [Figure 2](#) and [Figure 12](#). This put the noise monitor approximately 1.7 km southwest of the major structures at the Pembina/Williams facility and approximately 330 m west of the Pembina/Williams rail yard. At this location, there was direct line-of-sight to the Pembina/Williams facility but not to the rail yard (due to the topography of the area). There was no significant vegetation between the noise monitor and the aforementioned facilities. Note also that a weather monitor was placed near this location for the July 8 – 10, 2015 noise monitoring period.

#### 4.12. 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, adjacent to the noise monitor for the July 8 – 10, August 7 - 9 & August 9 – 11, 2015 noise monitoring periods.

## 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:

- $L_{eq}Day$**  - Measured over the day-time (07:00 – 22:00)
  
- $L_{eq}Night$**  - Measured over the night-time (22:00 – 07:00)
  
- $L_{10}$**  - Sound level that was exceeded only 10% of the time.  
- Good measure of intermittent or intrusive noise
  
- $L_{50}$**  - Sound level that was exceeded 50% of the time (arithmetic average)  
- Good to compare to  $L_{eq}$  to determine steadiness of noise
  
- $L_{90}$**  - sound level that was exceeded 90% of the time  
- Good indicator of typical “ambient” noise levels

For further information refer to [Appendix II](#) for a description of the acoustical terminology and [Appendix III](#) for a list of common noise sources and their associated noise levels.

## 6.0 Results and Discussion

### 6.1. Environmental Noise Monitorings

The results of the thirteen (13) 48-hour noise monitorings can be found in Table 2<sup>1</sup> and are presented in [Figures 14 – 116](#). 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 noise monitorings can be found in [Appendix IV](#). Each event that was 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.

**Table 2.  $L_{eq}$  24-Hour Results**

Noise 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
	$L_{eq}$ Day (dBA)	$L_{eq}$ Night (dBA)		$L_{eq}$ Day (dBA)	$L_{eq}$ Night (dBA)		$L_{eq}$ Day (dBA)
1	60.9	54.5	44.4	56.5	54.8	51.1	51.9
2	48.5	49.6	46.8	51.0	50.3	46.1	54.2
3	51.1	50.1	45.3	56.9	50.8	42.7	63.4
4	49.5	45.7	45.3	52.2	44.1	42.7	52.2
5	54.0	53.0	52.7	56.5	56.0	55.8	55.8
6	51.5	50.4	48.3	49.5	48.4	47.0	50.3
7	N/A for 2014						
8	54.9	49.9	49.5	57.1	49.9	48.8	66.9
9	49.3	48.8	40.7	52.5	49.8	46.2	51.0
10	56.8	53.9	51.6	56.9	54.6	52.0	54.5
11	50.2	50.3	43.2	51.0	50.7	47.0	52.6
12 (Period 1)	57.6	44.9	30.4	57.3	53.2	30.3	49.8
12 (Period 2)	47.8	42.0	30.6	45.3	45.8	36.5	N/A
12 (Period 3)	44.7	42.2	33.0	48.4	41.8	32.2	49.8

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

<sup>2</sup> The data provided in the 15-second  $L_{eq}$  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>3</sup> Isolated and Non-isolated values are presented.



### 6.1.1. Noise Monitoring Location 1

The results of the noise monitoring conducted at Location 1 are provided in Table 2 and in [Figures 14 - 21](#). The isolated  $L_{eq}Night$  values from Table 2 and the traces found in [Figures 14 – 17](#) indicate relatively consistent noise levels for the August 7 - 8, 2015 night-time period<sup>1</sup> (though significantly lower in comparison to previous years) and more varying noise levels during the August 8 - 9, 2015 night-time period. In particular, there is a relatively significant decrease in the noise levels between approximately 01:00 – 02:30.

The 1/3 octave band  $L_{eq}$  sound levels found in [Figures 20 - 21](#) are relatively broadband with a decrease in the higher frequencies (2 kHz and above) and an elevated peak in the 25 Hz band, which is consistent with the 2014 Noise Survey.

The elevated noise levels for the August 8 – 9, 2015 night-time period, in comparison to the August 7 - 8, 2015 night-time period, were subjectively apparent during the site visit and are consistent with the results of the 2014 Noise Survey in which the  $L_{eq}Night$  values were 51.2 dBA. In addition the subjective observations made on-site were also consistent with previous years in that the noise was noted as being low in frequency and emanating from the facilities to the northeast. Therefore, based on the results of previous noise surveys and assuming that no significant modifications have been completed at any of the major facilities within close proximity of this monitoring location, the August 8 – 9, 2015  $L_{eq}Night$  noise level of 51.1 dBA is most likely indicative of the 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 - 29](#). The isolated  $L_{eq}Night$  values and the traces found in [Figures 22 – 25](#) indicate relatively consistent noise levels throughout both night-time periods (a difference of 0.7 dBA between both nights). There was however, one significant increase of short duration from approximately 01:15 – 1:45 on the night of August 10 – 11, 2015. Based on subjective observations made from the audio recording and from the 1/3 octave band data, the increase in noise level could be attributed to the rail yard found to the south-southwest of the monitor (shown as being removed/isolated in [Figure 23](#)). In addition, as noted within [Appendix IV](#) there were several other periods in which noise from the rail line to the south

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<sup>1</sup> It should be noted that the data was completely removed between 05:30 – 07:00 on the morning of August 8, due to the number of vehicle passages (several per minute) during that time period.

was the dominant source. The 1/3 octave figures indicate relatively broadband noise levels, particularly in the mid-frequency bands, with elevated noise levels in the lower (below 100 Hz) frequency bands. This is consistent with the 2014 Noise Survey.

The results for Location 2 vary from the  $L_{eq}Night$  2014 Noise Survey noise levels, 50.9 dBA & 53.1 dBA, respectively. Based on subjective observations made on-site and on the weather conditions during both night-time periods (northwest to west), the lower measured noise levels in 2015 could potentially be attributed to wind conditions which reduced the noise contributions from the facilities to east.

### 6.1.3. Noise Monitoring Location 3

The results of the noise monitoring conducted at Location 3 are provided in Table 2 and in [Figures 30 - 37](#). The isolated  $L_{eq}Night$  values and the traces found in [Figures 30 – 33](#) indicate relatively consistent noise levels throughout both night-time periods. In addition, with the exception of brief time period during the August 9 – 10, 2015 night-time period, there was very little fluctuation in the isolated A-weighted noise levels for both night-time periods. This is also true for the isolated  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  values in [Figures 34 - 35](#) which indicate very little fluctuation in the noise levels. However, one significant difference that can be noted in the [Figures 32 - 35](#) is the difference between the isolated and non-isolated values. As indicated in [Appendix IV](#), the “non-typical” noise events were primarily from rail and vehicle activity near the noise monitor. The increase in vehicular traffic can be attributed to the new construction site to the northwest of Location 3. In addition, the increase in rail activity at Location 3, in comparison to the 2014 Noise Survey, was also observed at several other noise monitoring locations, particularly during the isolation analysis.

The 1/3 octave band spectral data is consistent between all noise monitoring periods and indicates elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases.

The results for Location 3 vary from the  $L_{eq}Night$  2014 Noise Survey noise levels, 50.2 dBA & 49.1 dBA, respectively. Based on subjective observations made on-site and on the weather conditions during both night-time periods (northwest to west), the lower measured noise levels in 2015 could potentially be attributed to wind conditions which reduced the noise contributions from the facilities to southeast.

#### 6.1.4. Noise Monitoring Location 4

The results of the noise monitoring conducted at Location 4 are provided in Table 2 and in [Figures 38 - 45](#).

The isolated  $L_{eq}$ Night values from Table 2 and the traces found in [Figures 38 – 41](#) indicate varying noise levels for both night-time periods. In particular, there is a relatively significant decrease in the noise levels between approximately 01:00 – 02:30 during the August 7 – 8, 2015 night-time period. In reviewing the weather conditions, found in [Appendix V](#), there were no parameters (wind speed, wind direction, etc.) that would account for the variance in noise levels (8 – 10 dBA).

The 1/3 octave band spectral data is consistent between both noise monitoring periods and indicates elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases. As anticipated, and consistent with the 2014 Noise Survey<sup>1</sup>, the facilities to the north are the dominant noise sources for this noise monitoring location.

#### 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 46 - 53](#). The isolated  $L_{eq}$ Night values and the traces found in [Figures 46 – 49](#) indicate relatively consistent noise levels throughout both night-time periods. This is further confirmed in [Figures 50 – 51](#) where there is very little difference between the  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  values which indicates that noise levels were relatively steady and are reflective of typical noise levels. The stability of the measured noise levels can be attributed to the proximity of the noise monitor to the facilities to the south which was the most dominant noise source. The 1/3 octave band  $L_{eq}$  sound levels indicate elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases. These results are very consistent with the results of the 2014 Noise Survey.

#### 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 54 - 61](#).

The isolated  $L_{eq}$ Night values from Table 2 and the traces found in [Figures 54 – 57](#) indicate varying noise levels for both night-time periods. In particular, there is a relatively significant increase in the noise levels after 02:00 during the August 8 – 9, 2015 night-time period. In reviewing the weather conditions,

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<sup>1</sup> A comparison to the 2014 measured noise levels cannot be made due to the relocation of the noise monitor.

found in [Appendix V](#), there were no parameters (wind speed, wind direction, etc.) that would account for the variance in noise levels (8 – 10dBA). When comparing to 2014 Noise Survey, in which both night-time periods resulted in  $L_{eq}$ Night noise levels of 46.3 dBA, it is anticipated that the higher noise levels that occurred during the August 8 – 9, 2015 night-time period are more likely indicative of the noise climate of this area. These higher values also corroborate with the results of the August 7 – 8, 2015 night-time period.

The noise was subjectively broadband across all frequencies which is consistent with the 1/3 octave band  $L_{eq}$  traces and with the results from the 2014 Noise Survey.

Lastly, the subjective dominant noise sources at this location were from the facilities to the west, which is consistent with the 2014 Noise Survey.

#### 6.1.7. Noise Monitoring Location 7

As previously mentioned a noise monitoring was not conducted at this location due to the nearby construction activity.

#### 6.1.8. Noise Monitoring Location 8

The results of the noise monitoring conducted at Location 8 are provided in Table 2 and in [Figures 62 - 69](#). The isolated  $L_{eq}$ Night values and the traces found in [Figures 62 – 65](#) indicate relatively consistent noise levels for each night-time period. In addition there was only a small difference of 0.7 dBA between the two night-time periods. The consistency of the noise climate at this location is further confirmed in [Figures 66 – 67](#) where there is very little difference between the isolated  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  values which indicates that noise levels were relatively steady and are reflective of typical noise levels. The stability of the measured noise levels can be attributed to the proximity of the noise monitor to the facilities to the south which were subjectively the most dominant noise sources.

The 1/3 octave band spectral data is consistent between all noise monitoring periods and indicates elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases.

#### 6.1.9. Noise Monitoring Location 9

The results of the noise monitoring conducted at Location 9 are provided in Table 2 and in [Figures 70 - 77](#). The isolated  $L_{eq}$ Night values and the traces found in [Figures 70 – 73](#) indicate relatively consistent noise levels throughout both night-time periods. In addition, the relative shape of the

15-second  $L_{eq}$  traces and the 1/3 octave band  $L_{eq}$  sound levels are consistent between the two night-time periods. However, the  $L_{eq}$ Night values differ by 5.6 dBA. The difference between the two night-time periods could potentially be attributed to the varying weather conditions, however in reviewing the weather conditions, found in [Appendix V](#), there are no apparent difference between parameters (wind speed, wind direction, etc.) that can account for the variance. The 2014 Survey had a similar occurrence in which the two night night-time periods differed by 4.7 dBA however in this case the discrepancy could be attributed to the varying wind directions.

Similarly to the 2014 Noise Survey, the noise climate was dominated from noise sources originating from the east side of the River<sup>1</sup>. Subjectively, the noise was not emanating from one given direction (i.e. directly east) but instead seemed to span from the southeast to the northeast. The 1/3 octave band  $L_{eq}$  sound levels indicate elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases. This is consistent with the results of the 2014 Noise Survey.

#### 6.1.10. Noise Monitoring Location 10

The results of the noise monitoring conducted at Location 10 are provided in Table 2 and in [Figures 78 - 85](#). The isolated  $L_{eq}$ Night values and the traces found in [Figures 78 – 81](#) indicate relatively consistent noise levels, particularly for the August 8 – 9, 2015 night-time period. The consistency of the noise climate at this location is further confirmed in [Figures 80 – 83](#) where there is very little difference between the isolated  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  values which indicates that noise levels were relatively steady and are reflective of typical noise levels.

Similarly to the 2014 Noise Survey, during all site visits it was noted that not one site dominated the noise climate of the area. Instead noise was distinctly audible from each the various surrounding facilities and was more prominent when any particular facility was upwind from the noise monitoring location. The 1/3 octave band  $L_{eq}$  sound levels indicate elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases with a significant reduction beyond the 5 kHz.

#### 6.1.11. Noise Monitoring Location 11

The results of the noise monitoring conducted at Location 11 are provided in Table 2 and in [Figures 86 - 93](#). The isolated  $L_{eq}$ Night values from Table 2 and the traces found in [Figures 86-89](#)

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<sup>1</sup> When ignoring the vehicle pass-by's and train passages.

indicate varying noise levels for both night-time periods. In particular, there is a relatively significant increase in the noise levels from the start to the end of the July 8 – 9, 2015 night-time period. In reviewing the weather conditions, found in [Appendix V](#), there are no apparent difference between parameters (wind speed, wind direction, etc.) that can account for the variance. Therefore it is anticipated that the increase can be attributed to the operations of the facilities to the northeast of this location in addition to the rail activities east.

Similarly to the 2014 Noise Survey, the  $L_{10}$  values in [Figures 90 – 91](#) indicate short intermittent events which can be directly attributed to the train whistles near the noise monitor. Subjectively, the noise arriving at this monitoring location (when excluding rail activity) was relatively broadband with the mid/high frequencies coming from the northeast while noise in the lower frequency bands was difficult to localize. The 1/3 octave band  $L_{eq}$  sound levels indicate elevated noise levels in the lower frequency bands that gradually decrease as the frequency increases. The contribution of the train and the 1/3 octave band  $L_{eq}$  sound levels are consistent with the 2014 Noise Survey.

#### 6.1.12. Noise Monitoring Location 12

The results of the noise monitoring conducted at Location 12 are provided in Table 2 and in [Figures 94 - 116](#). As previously mentioned, this location was the independent control/reference point. Therefore, the results from this location span three (3) 48-hour monitoring periods. In addition, it should be noted that this noise monitoring location was relocated approximately 2 km southeast of the 2014 noise monitoring location.

For all night-time periods there is a significant difference between the non-isolated  $L_{eq}$ Night noise levels in comparison to the isolated  $L_{eq}$ Night noise levels for all night-time periods. This can be attributed to the new 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. This was consistent for all night-time periods.

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 that gradually decrease as the frequency increases. This is consistent with subjective observations made on-

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

site which indicated low frequency noise coming from the general direction of the major AIH facilities to the southwest.

## 6.2. General Subjective Observations for Noise Monitorings

- Due to different meteorological conditions during the 2015 noise monitoring periods, the isolated  $L_{eq}$ Night broadband sound levels varied from those measured in the 2014 Noise Survey.
- However, despite the varying meteorological conditions, the trace of the 1/3 octave band  $L_{eq}$  sound levels were similar to those measured in the 2014 Noise Survey.
- Similar to previous years, the noise arriving at most monitor locations consisted primarily of low frequency components that gradually decreased in noise level as the frequency increased.
- Despite the noise being relatively low in frequency, none of the sites indicated any specific low frequency tonal components.
- The noise from train passages were prevalent at all locations and tended to dominate the noise climate as they passed through, particularly when there were train whistles. Based on the isolation analysis and in comparison to the 2014 Noise Survey, there were a greater number of rail passages in 2015 with an increase in average train length throughout the night-time periods.
- As previously mentioned, the weather conditions fluctuated more significantly in regards to the wind speed and direction. As a result, there was a greater variance in the noise levels between the two night-time periods for a several of the noise monitoring locations in comparison to the 2014 Noise Survey.

### 6.3. Night-time Weather Conditions

As previously mentioned, with the exception of the July 8 – 10, 2015 noise monitoring period<sup>1</sup>, 3 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. All weather data are presented in [Appendix V](#)<sup>2</sup>. A brief discussion of each night-time period can be found below. The wind speeds during certain night-time periods were in excess of the limits of AER Directive 038. However, through the use of the audio files and the 1/3 octave band  $L_{eq}$  sound levels, all instances of high wind speeds that influenced the noise monitoring results were isolated (i.e. removed). Therefore, the results found within Table 2 are considered valid.

#### 6.3.1. July 8 – 9, 2015

##### Weather Monitor near R-11

The wind conditions during the night-time period were considered high (primarily just above or below 10 km/hr) and from the west. The temperature ranged from 14°C to 24°C and the relative humidity ranged from approximately 46% - 92%. The barometric pressure was consistent and relatively flat at approximately 93 kPa. Lastly, there was no precipitation.

##### Weather Monitor at R-12

The wind conditions during the night-time period were considered moderate (primarily below 10 km/hr) and from the south-southwest. The temperature ranged from 12°C to 22°C and the relative humidity ranged from approximately 55% - 86%. The barometric pressure was consistent and relatively flat at approximately 93 kPa. Lastly, there was no precipitation.

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<sup>1</sup> Two weather monitors were used for this noise monitoring period.

<sup>2</sup> Rainfall only occurring during the night-time period (for all noise monitoring periods) therefore only the night-time rainfall rate data has been included for the rainfall rate figures found in [Appendix V](#).



6.3.2. July 9 – 10, 2015Weather Monitor near R-11

The wind conditions during the night-time period were considered high (primarily just above or below 10 km/hr) with the exception of a few short durations in which the wind increased to above 20 km/hr. The wind was primarily from the north. The temperature ranged from 16°C to 27°C and the relative humidity ranged from approximately 30% - 87%. The barometric pressure was consistent and relatively flat at approximately 93 kPa. Lastly, there was less than 1.0 mm/hr of precipitation between 4:30 – 4:40. As a result, this would have a minimal impact of the results.

Weather Monitor at R-12

The wind conditions during the night-time period were considered moderate (primarily just above or below 10 km/hr) with the exception of a short duration in which the wind increased to above 15 km/hr. The wind was primarily from the north. The temperature ranged from 13°C to 25°C and the relative humidity ranged from approximately 37% - 88%. The barometric pressure was consistent and relatively flat at approximately 93 kPa. Lastly, there was less than 1.0 mm/hr of precipitation between 4:50 – 5:00. As a result, this would have a minimal impact of the results.

### 6.3.3. August 7 – 8, 2015

#### Weather Monitor at R-06

The wind was relatively calm (primarily below 5 km/hr) from varying directions<sup>1</sup> throughout the entire night-time period. The temperature was relatively consistent and ranged from 13°C to 16°C while the humidity ranged from 70% – 90%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was less than 1.0 mm/hr of precipitation between 4:02 – 4:10. As a result, this would have a minimal impact of the results.

#### Weather Monitor at R-10

The wind was relatively calm (primarily below 5 km/hr) and from the northwest at the start of the night-time period (22:00). The wind remained calm throughout the entire night-time period only exceeding 5 km/hr for short durations. The wind direction varied throughout the night-time period but was primarily from the south-southeast. The temperature was relatively consistent and ranged from 14°C to 18°C while the humidity ranged from 70% – 85%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was no precipitation.

#### Weather Monitor at R-12

The wind was relatively calm (approximately 5 km/hr) and from the west at the start of the night-time period (22:00). The wind speed increased to above 5 km/hr (and briefly over 10 km/hr for a short duration) between approximately 04:30 – 06:00 and remained from the west creating downwind conditions for R-12 relative to the AIH facilities to the west. After 06:00 the wind calmed to below 5 km/hr. The temperature was relatively consistent and ranged from 10°C to 16°C while the humidity ranged from 68% – 90%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was no precipitation.

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<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.

#### 6.3.4. August 8 – 9, 2015

##### Weather Monitor at R-06

The wind conditions during the night-time period were considered moderate (primarily between 5 - 10 km/hr). The wind was primarily from the east – northeast and remained from this direction for the duration of the night-time period. The temperature ranged from 11°C to 18°C and the relative humidity ranged from approximately 65% - 94%. The barometric pressure was consistent and relatively flat at approximately 93 kPa. Lastly, there was no precipitation during the night-time period.

##### Weather Monitor at R-10

The wind conditions during the start of night-time period were considered moderate (primarily between 5 - 10 km/hr) and from the east. The wind calmed (at or below 5 km/hr) after approximately 02:00 and then shifted to the north-northeast for the remainder of the night-time period. The temperature was relatively consistent and ranged from 12°C to 18°C while the humidity ranged from 64% – 92%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was no precipitation.

##### Weather Monitor at R-12

The wind was moderate (between 5 – 10 km/hr) and from the south at the start of the night-time period. The wind calmed to below 5 km/hr before increasing again to between 5 – 10 km/hr. The wind shifted from several directions before remaining primarily from the southeast after 02:30 until 07:00. The temperature ranged from 9°C to 18°C while the humidity ranged from 62% – 92%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was no precipitation.

### 6.3.5. August 9 – 10, 2015

#### Weather Monitor at R-06

The wind conditions at the start of the night-time period were considered high (primarily above 10 km/hr) and from the north with a short duration in which the wind increased to above 15 km/hr. The wind shifted to the west between 00:30 – 01:30 and remained high before calming after 02:00. The wind remained calm (primarily below 5 km/hr) until the end of the night-time period. The temperature ranged from 11°C to 29°C and the relative humidity ranged from approximately 62% - 94%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was less than 1.0 mm/hr of precipitation between 1:38 – 1:44. As a result, this would have a minimal impact of the results.

#### Weather Monitor at R-10

The wind conditions at the start of the night-time period were considered high (primarily above 10 km/hr) and from the north with a short duration in which the wind increased to above 15 km/hr. The wind shifted to the west between 00:20 – 01:20 and remained high before calming after 02:00. The wind continued to calm until approximately 04:00 until it was primarily below 5 km/hr until the end of the night-time period. The temperature was relatively consistent and ranged from 13°C to 19°C and the relative humidity ranged from approximately 62% - 92%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was less than 1.0 mm/hr of precipitation between 1:08 – 1:14. As a result, this would have a minimal impact of the results.

#### Weather Monitor at R-12

The wind conditions at this location varied more significantly than the other two locations. In particular, the wind speeds increased and decreased throughout the entire night-time period. The weather conditions (wind speed and direction) stabilized after approximately 04:00 and remained calm (approximately 5 km/hr) and from the northwest for the remainder of the night-time period. The temperature ranged from 8°C to 19°C and the relative humidity ranged from approximately 60% - 92%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was less than 1.0 mm/hr of precipitation between 1:08 – 1:14. Lastly, there was no precipitation.

### 6.3.6. August 10 – 11, 2015

#### Weather Monitor at R-06

The wind conditions during the night-time period were primarily calm to moderate (between 5 - 10 km/hr). The wind was primarily from the south (ranging from southwest to southeast) for a majority of the night-time period. The temperature ranged from 13°C to 22°C and the relative humidity ranged from approximately 50% - 87%. The barometric pressure was consistent and relatively flat at approximately 93 kPa. Lastly, there was no precipitation during the night-time period.

#### Weather Monitor at R-10

The wind conditions for the night-time period were considered moderate (primarily between 5 - 10 km/hr) with brief periods in which the wind exceeded 10 km/hr. The wind was primarily from the west-northwest though there were brief periods in which the wind shifted from other directions. The temperature was relatively consistent and ranged from 13°C to 22°C while the humidity ranged from 47% – 88%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was no precipitation.

#### Weather Monitor at R-12

The wind conditions during the night-time period were primarily calm to moderate (between 5 - 10 km/hr). The wind was primarily from the north for a majority of the night-time period<sup>1</sup>. The temperature ranged from 10°C to 21°C and the relative humidity ranged from approximately 60% - 90%. The barometric pressure was consistent and relatively flat at approximately 94 kPa. Lastly, there was no precipitation during the night-time period.

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<sup>1</sup> The wind direction measured from R-06 and R-12 seem to be in argument with each other however, through the use of pictures of both weather monitors, the direction of the weather vane was verified to be in the correct position at both locations.

## **7.0 Conclusion**

As part of the study, a total of thirteen (13) 48-hour noise monitorings were conducted throughout the Alberta's Industrial Heartland. It was found that the isolated  $L_{eq}$ Night broadband and 1/3 octave band  $L_{eq}$  sound levels were similar to those measured in the 2014 Noise Survey. Unlike the 2014 Noise Survey the weather conditions fluctuated more greatly in regards to the wind speed and direction. As a result, there was a greater variance in the noise levels between the two night-time periods for several of the noise monitoring locations.

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. Lastly, the noise levels from train passages were again prevalent at all locations and tended to dominate the noise climate as they passed through. In comparison to the 2014 Noise Survey there were a greater number of passages with an increase in average train length throughout the night-time periods.

## 8.0 References

- *Environmental Noise Survey for the Regional Noise Model Annual Field Validation Monitoring*, prepared for the NCIA by aci Acoustical Consultants Inc., October 28, 2014.
- 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.

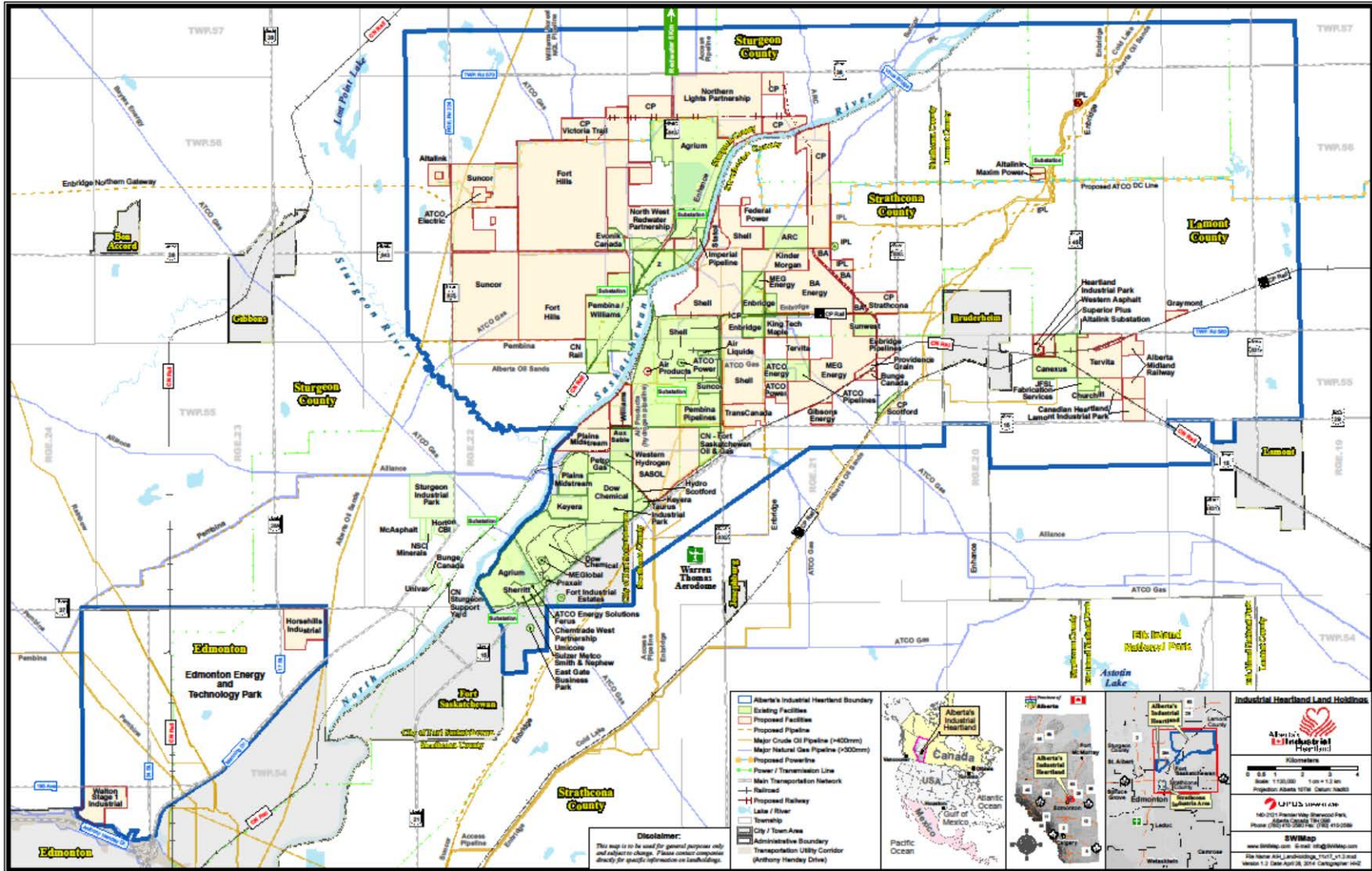
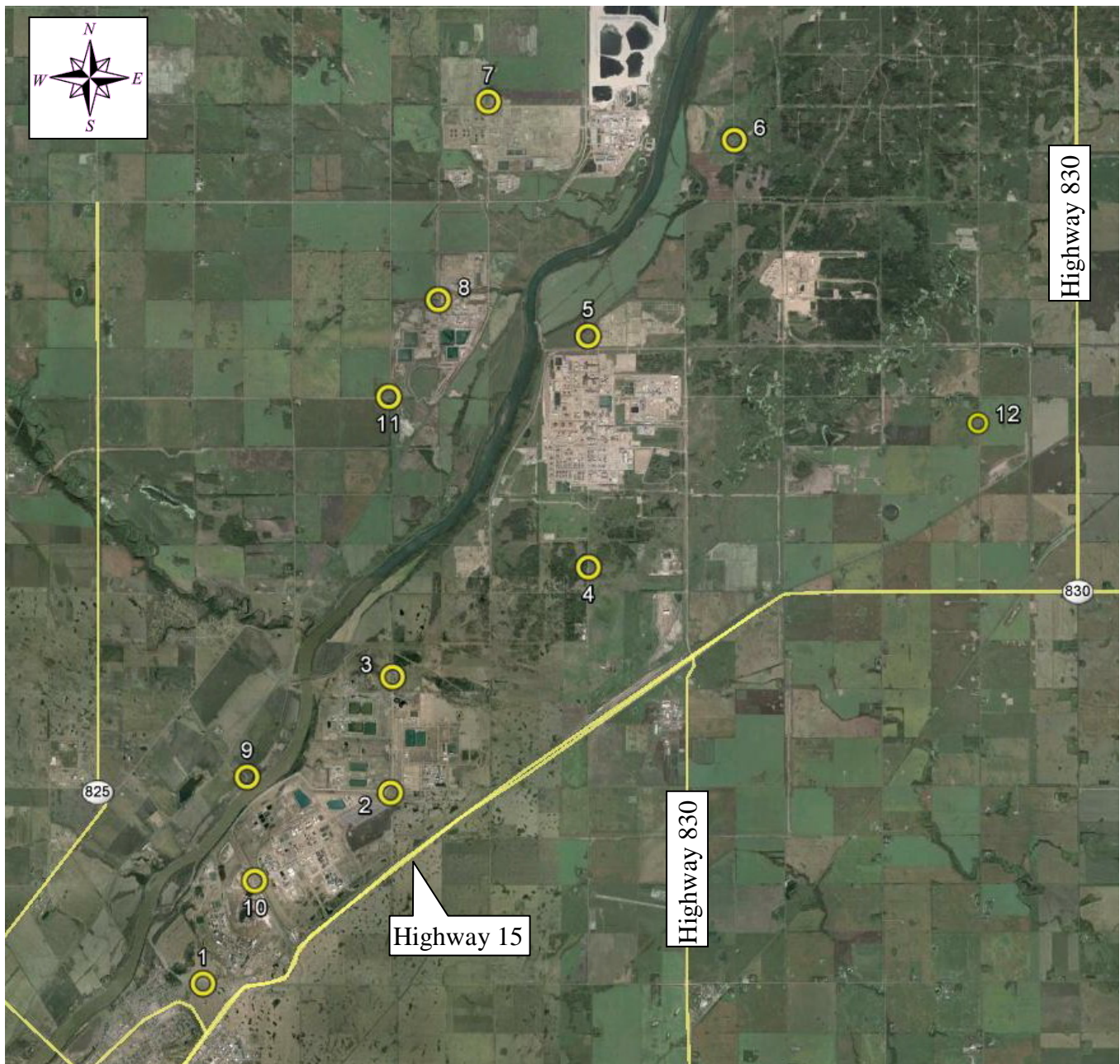


Figure 1. Study Area



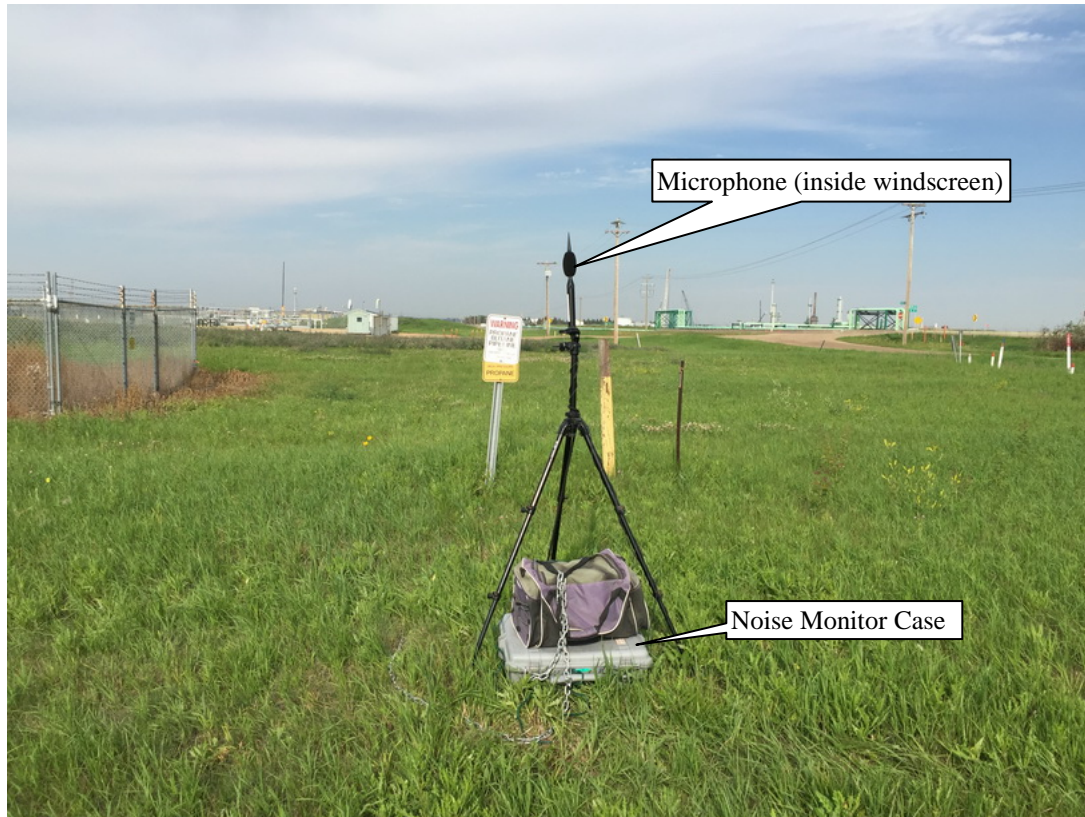


**Figure 2. 2015 Study Area (With Noise Monitoring Locations)<sup>1</sup>**

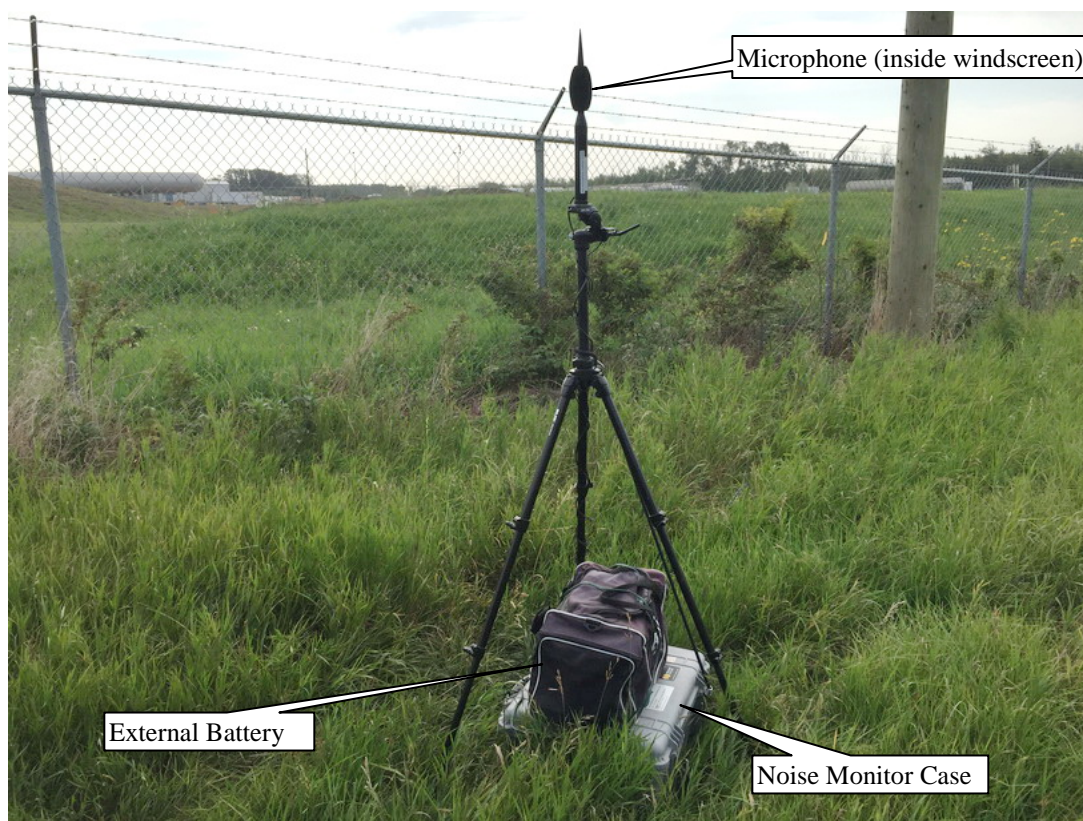
<sup>1</sup> Note that Location #7 was not included as a noise monitoring was not conducted at this location.



**Figure 3. Noise Monitor #1**



**Figure 4. Noise Monitor #2**



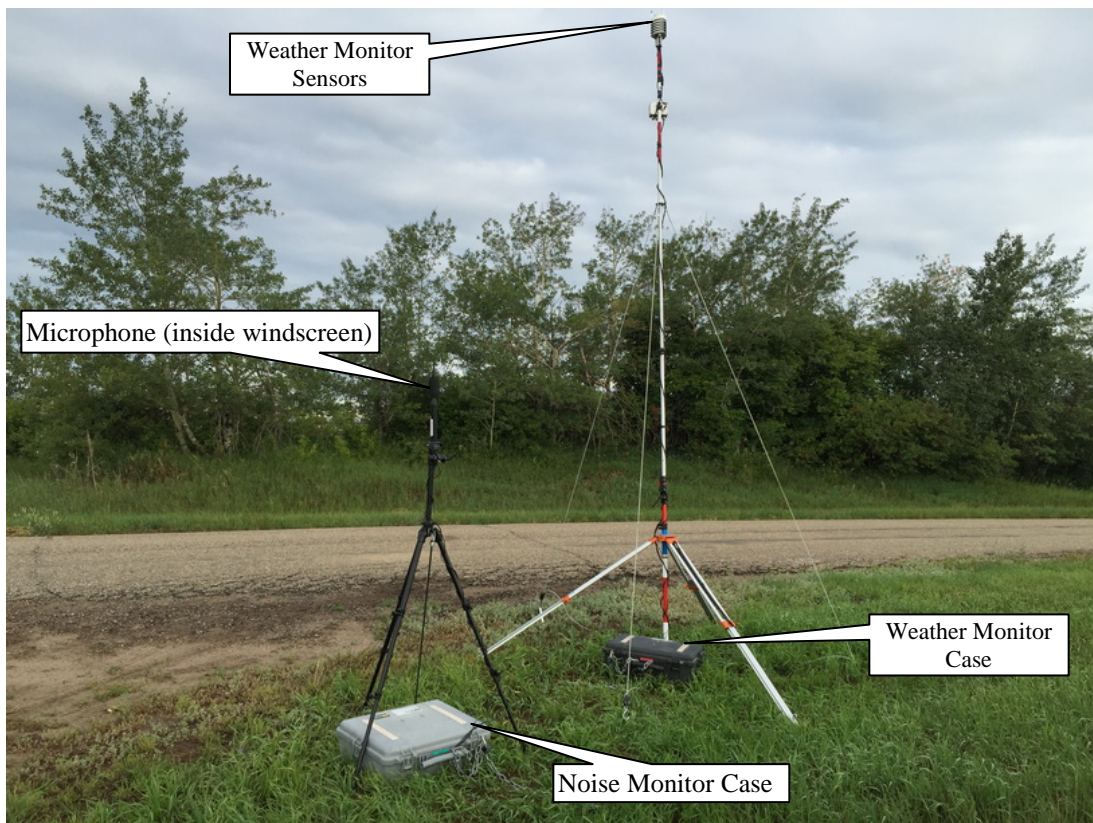
**Figure 5. Noise Monitor #3**



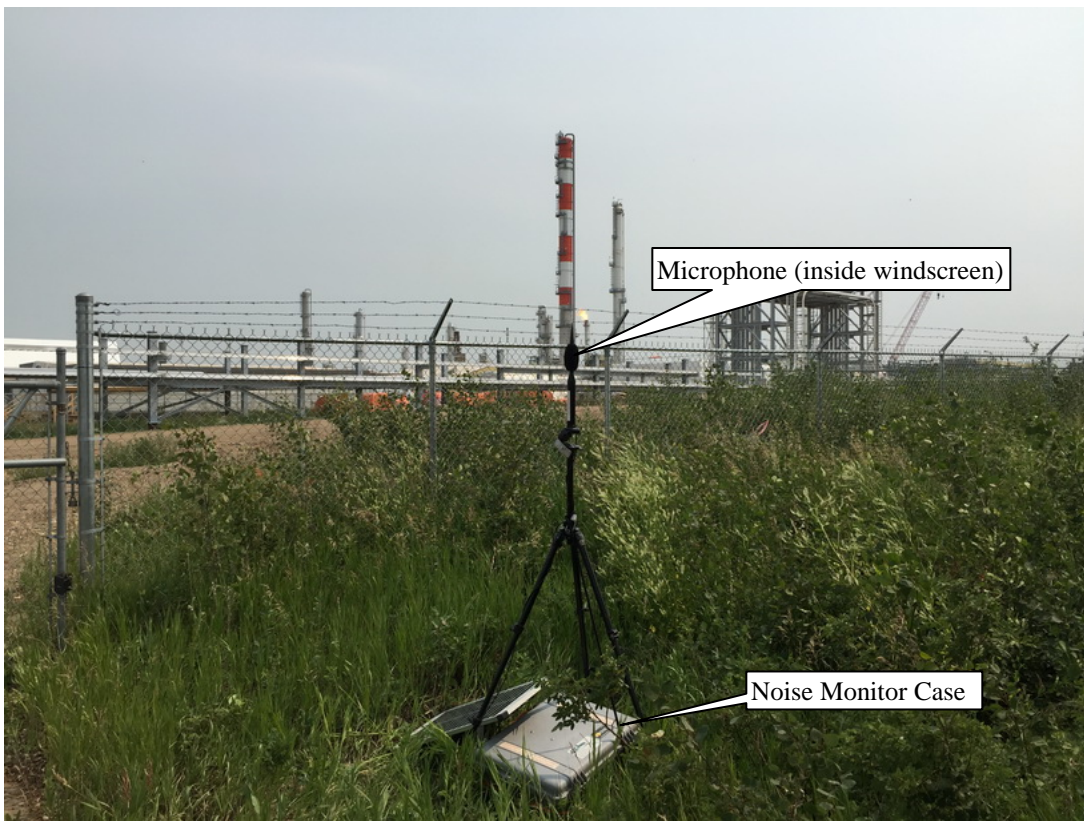
**Figure 6. Noise Monitor #4**



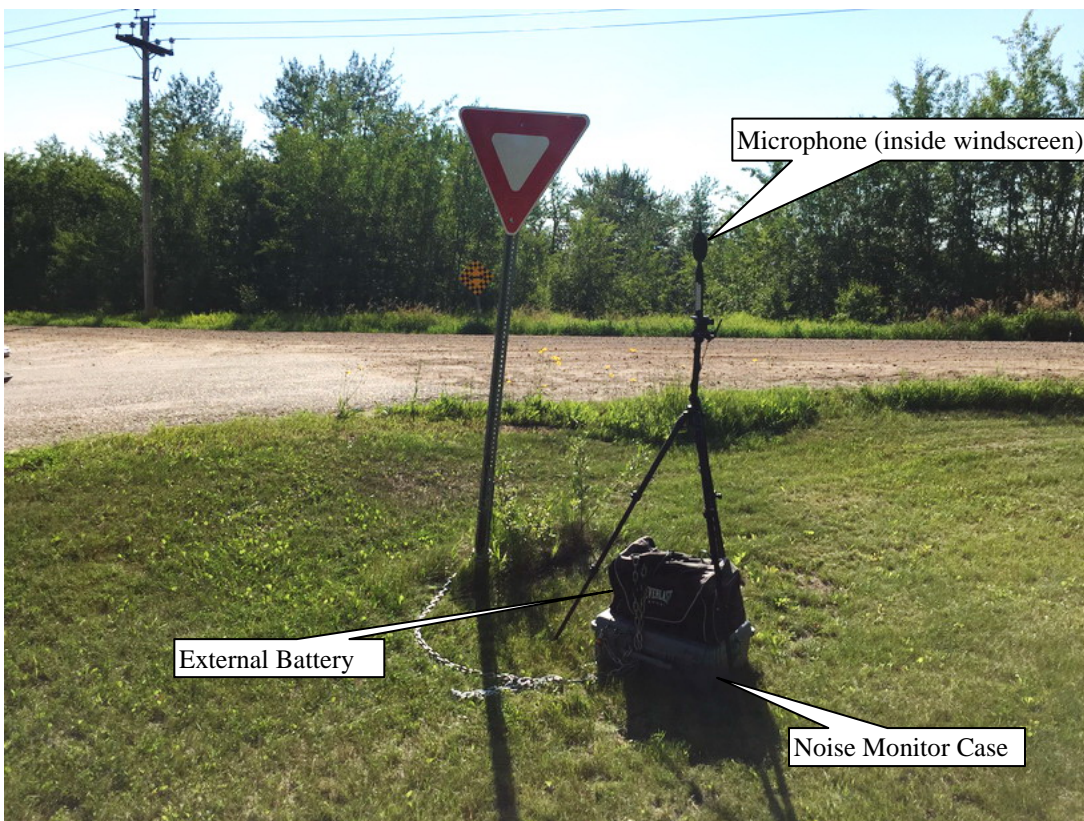
**Figure 7. Noise Monitor #5**



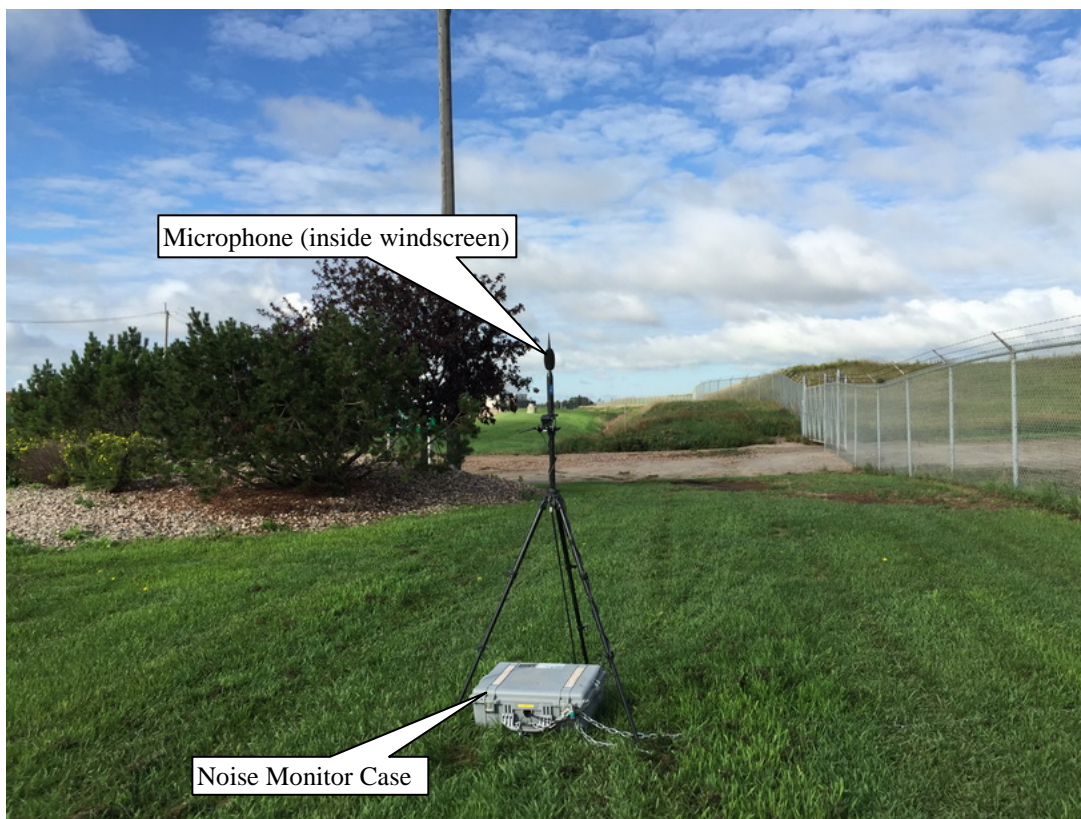
**Figure 8. Noise Monitor #6 (With Weather Monitor)**



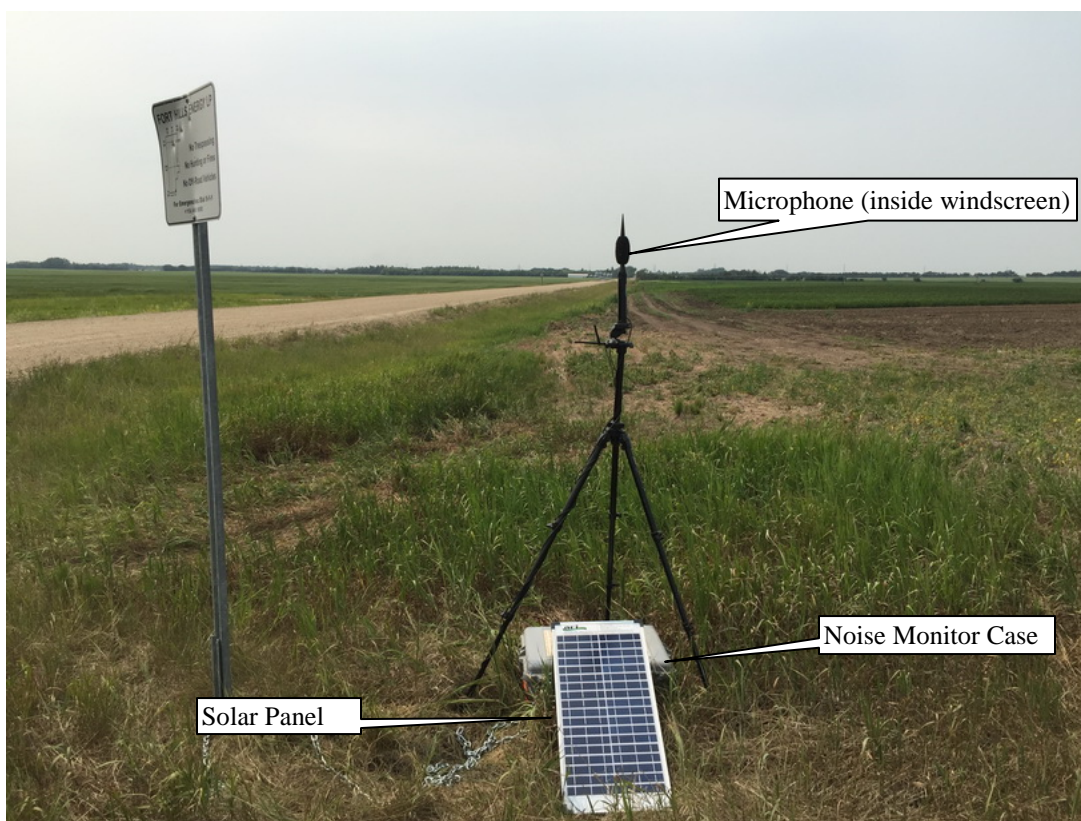
**Figure 9. Noise Monitor #8**



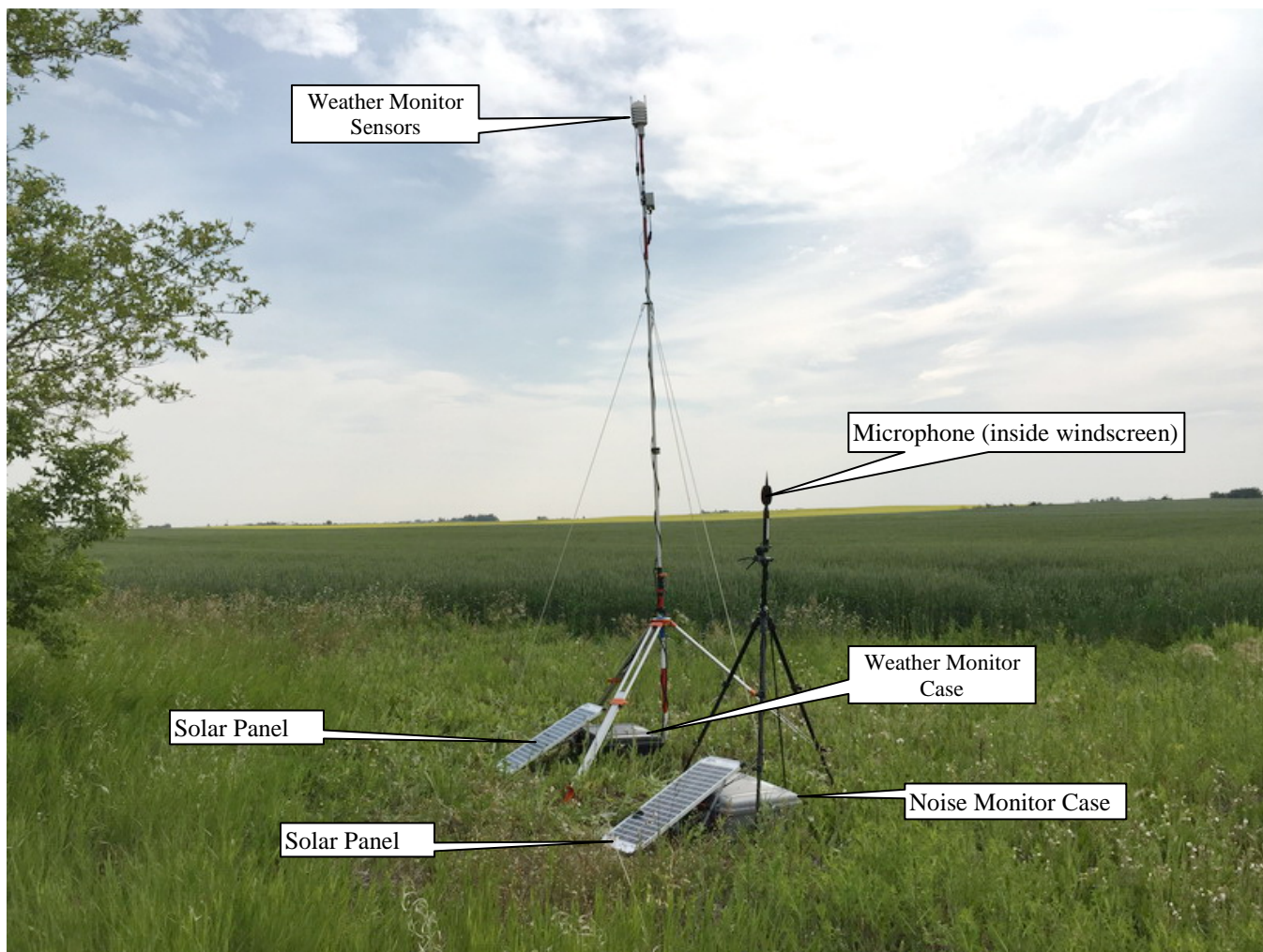
**Figure 10. Noise Monitor #9**



**Figure 11. Noise Monitor #10**

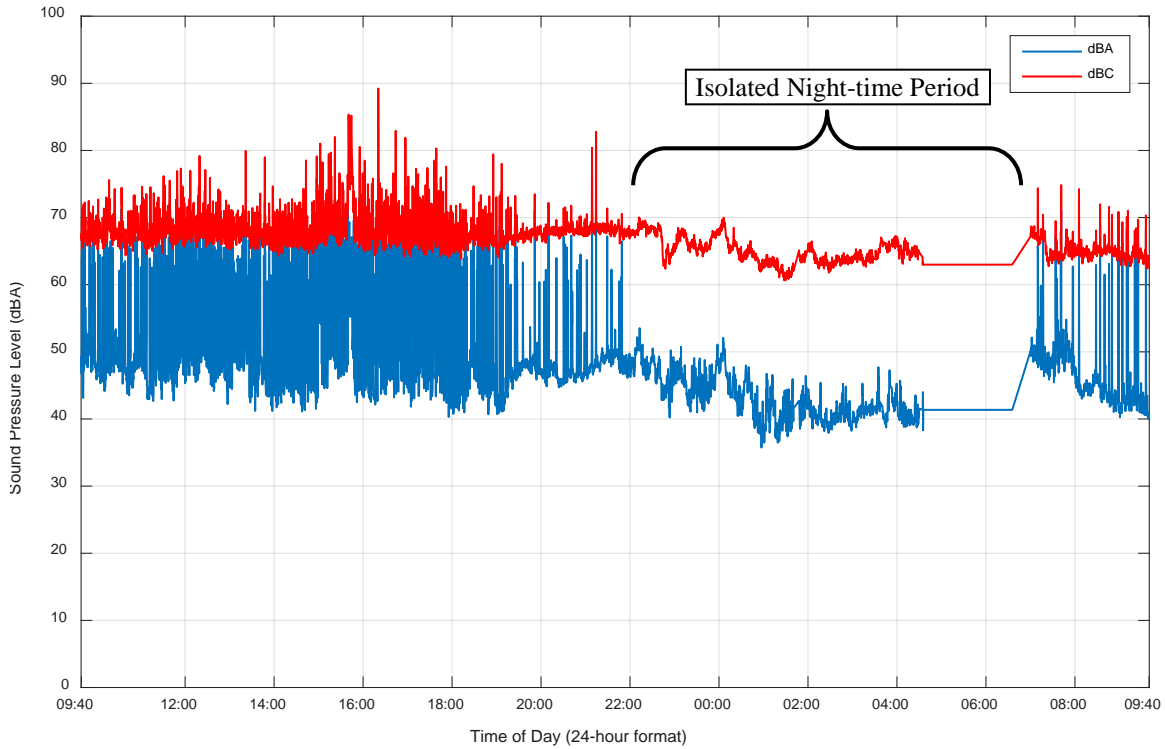


**Figure 12. Noise Monitor #11**

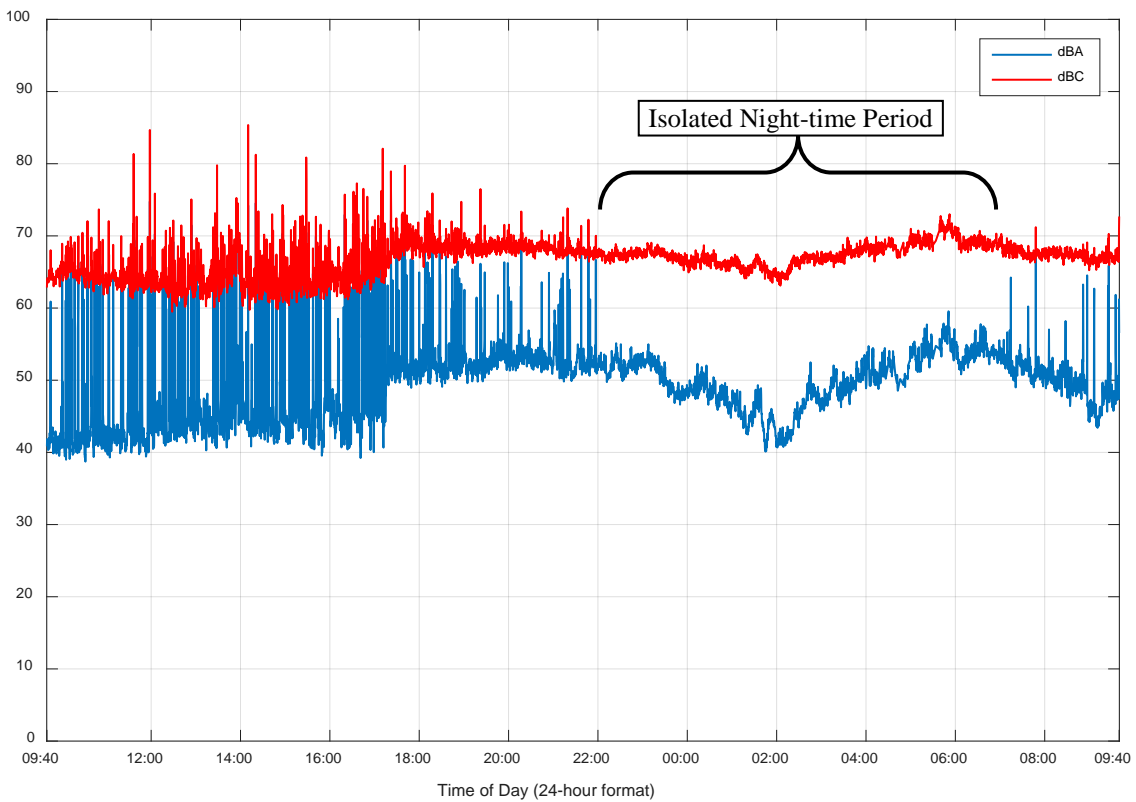


**Figure 13. Noise Monitor #12 (With Weather Monitor)**

Noise Monitor #1



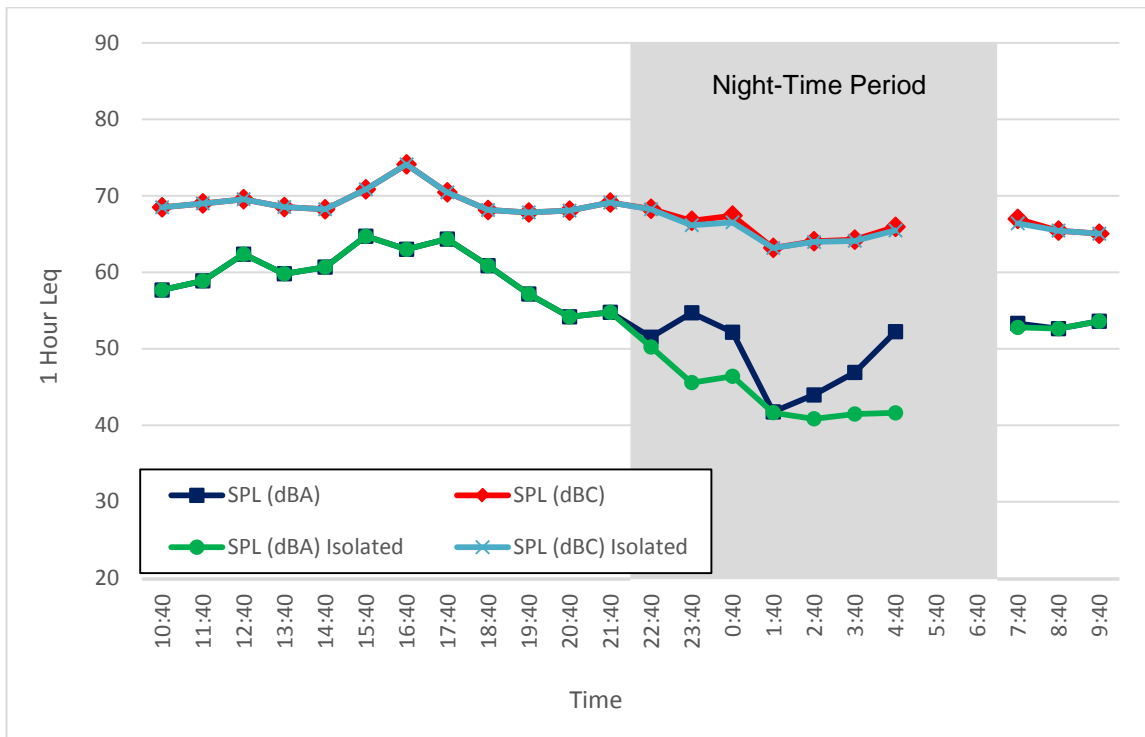
**Figure 14. Noise Monitor #1, 15-Second  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



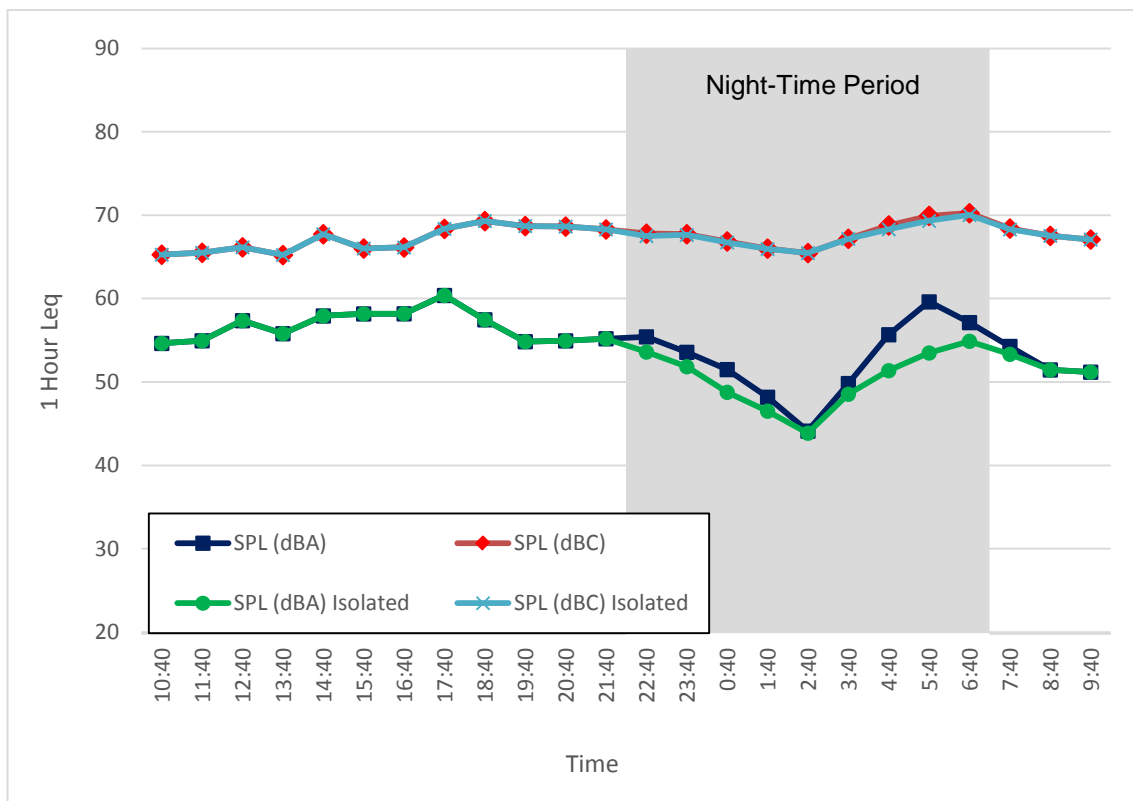
**Figure 15. Noise Monitor #1, 15-Second  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**



Noise Monitor #1

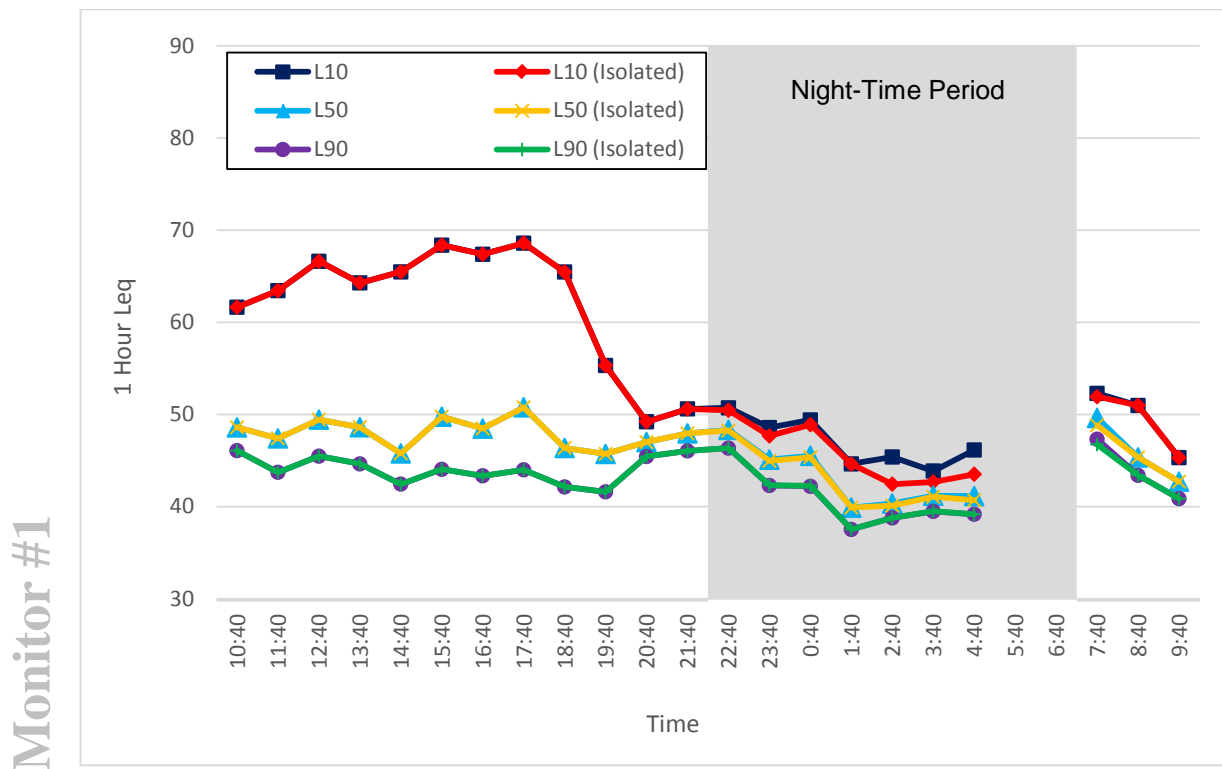


**Figure 16. Noise Monitor #1, 1-Hour  $L_{eq}$  Sound Levels (August 7 - 8, 2015)<sup>1</sup>**

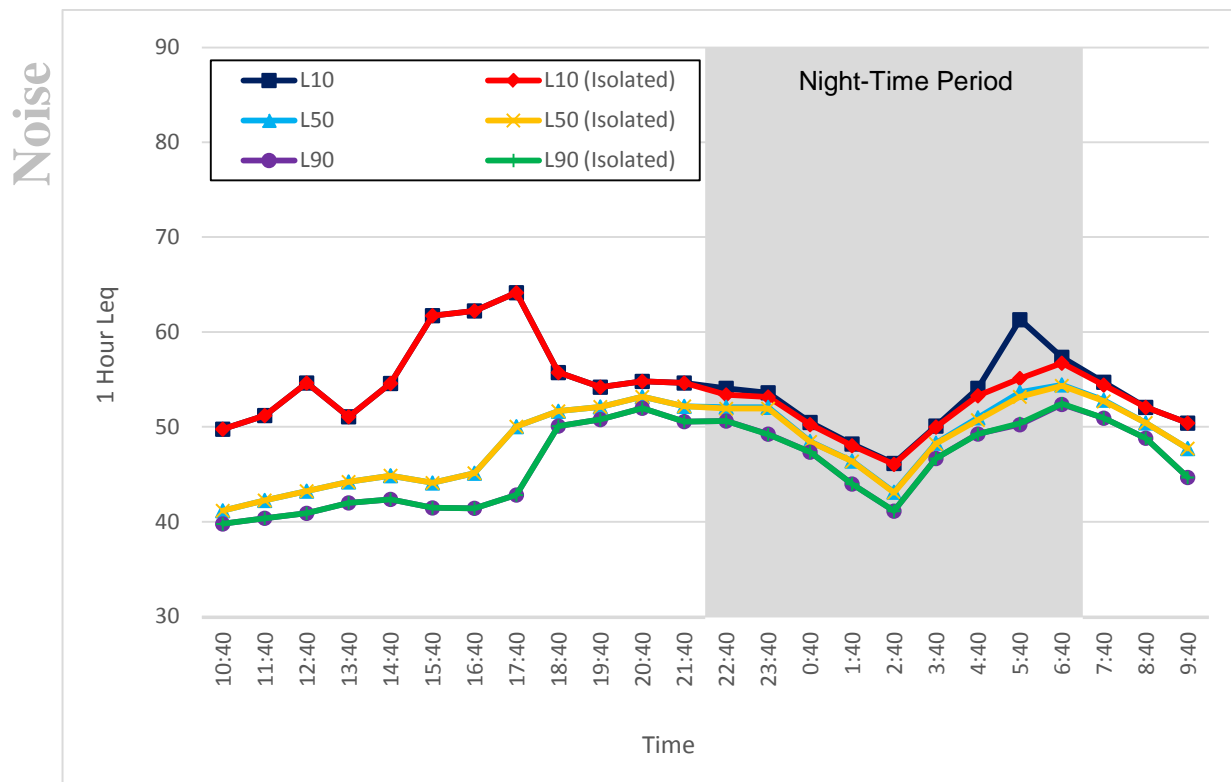


**Figure 17. Noise Monitor #1, 1-Hour  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

<sup>1</sup> Again, it should be noted that data from 05:40 to 07:00 was entirely removed due to traffic along the adjacent road.



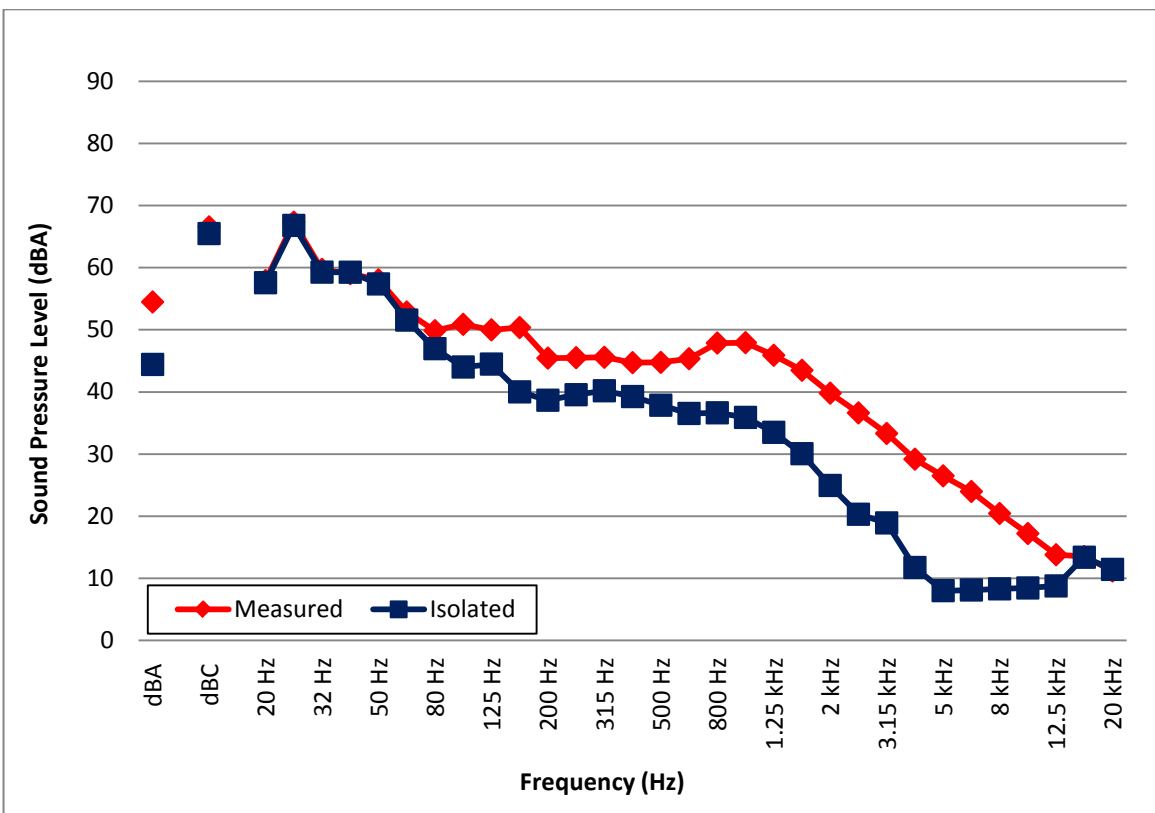
**Figure 18. Noise Monitor #1, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 7 - 8, 2015)<sup>1</sup>**



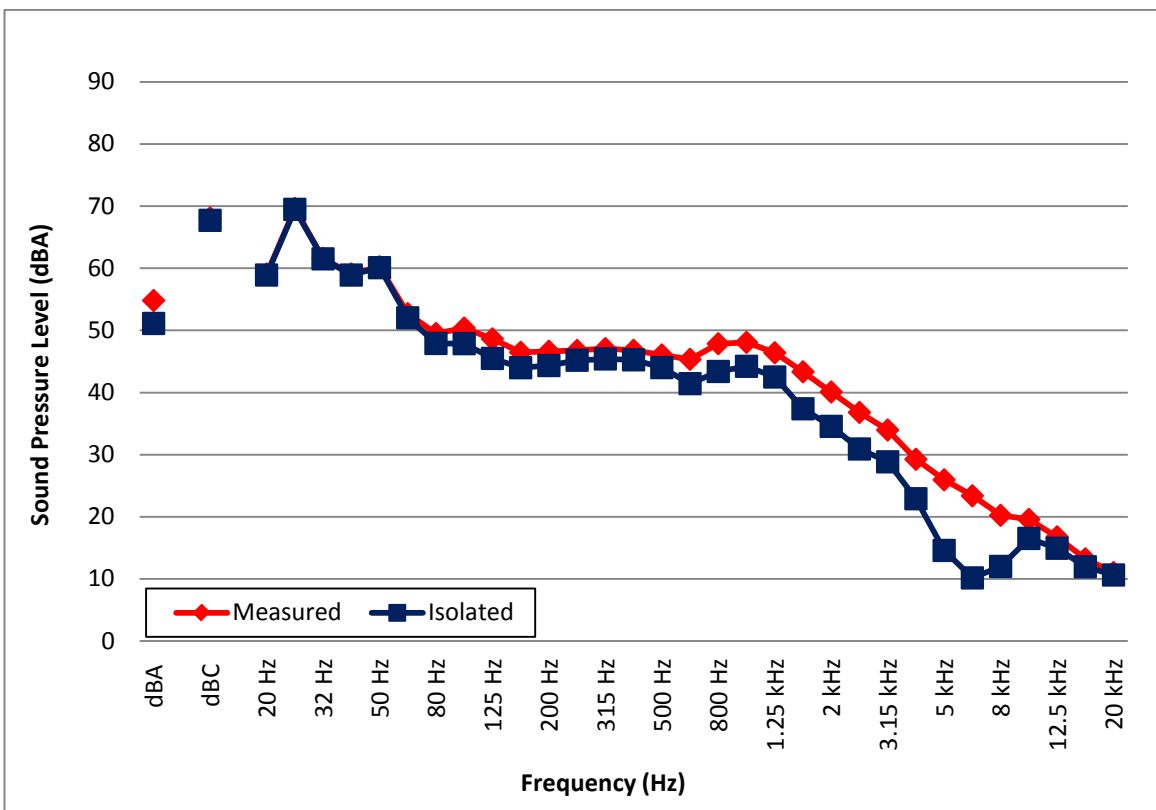
**Figure 19. Noise Monitor #1, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 8 - 9, 2015)**

<sup>1</sup> Again, it should be noted that data from 05:40 to 07:00 was entirely removed due to traffic along the adjacent road.

Noise Monitor #1

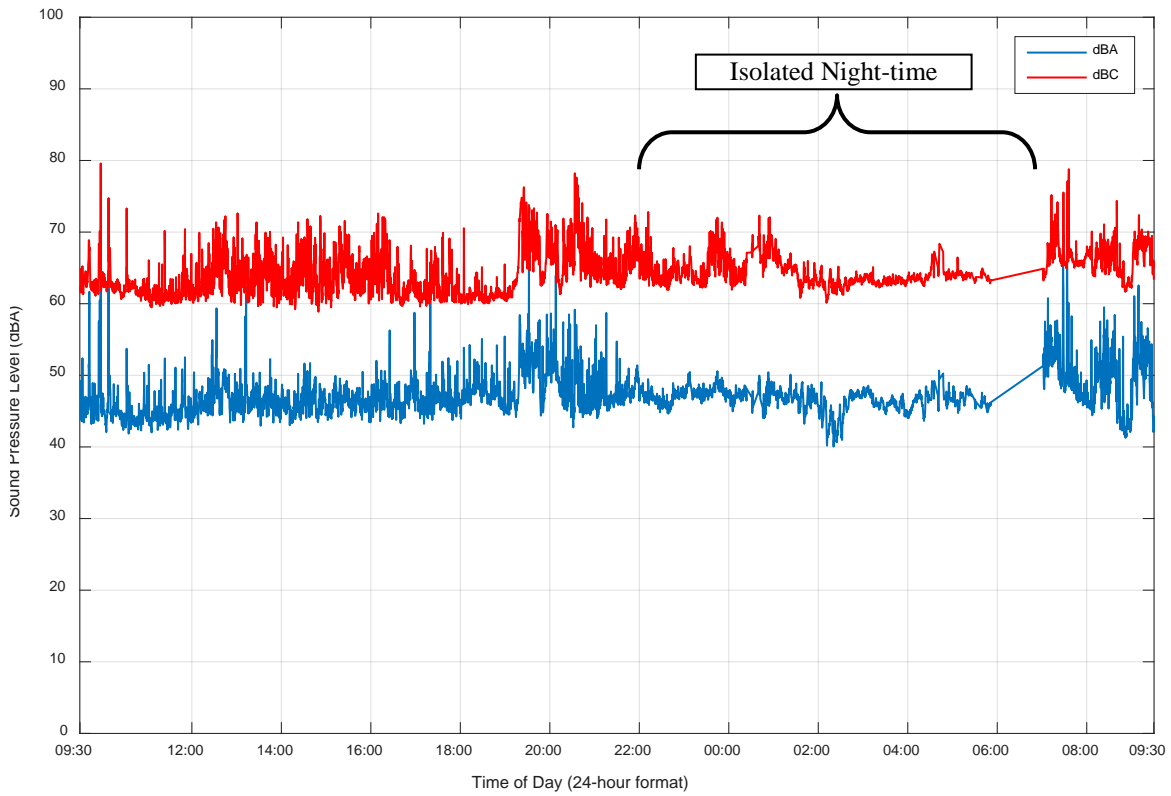


**Figure 20. Noise Monitor #1, 1/3 Octave  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

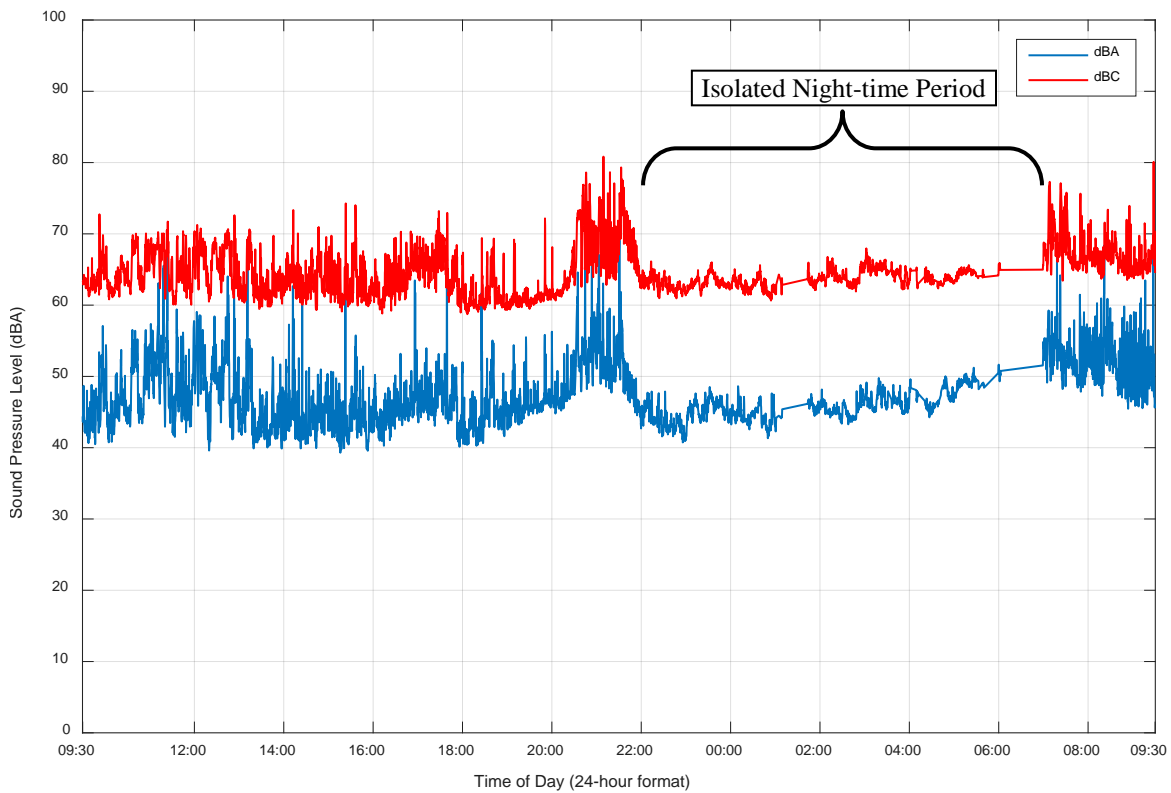


**Figure 21. Noise Monitor #1, 1/3 Octave  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #2

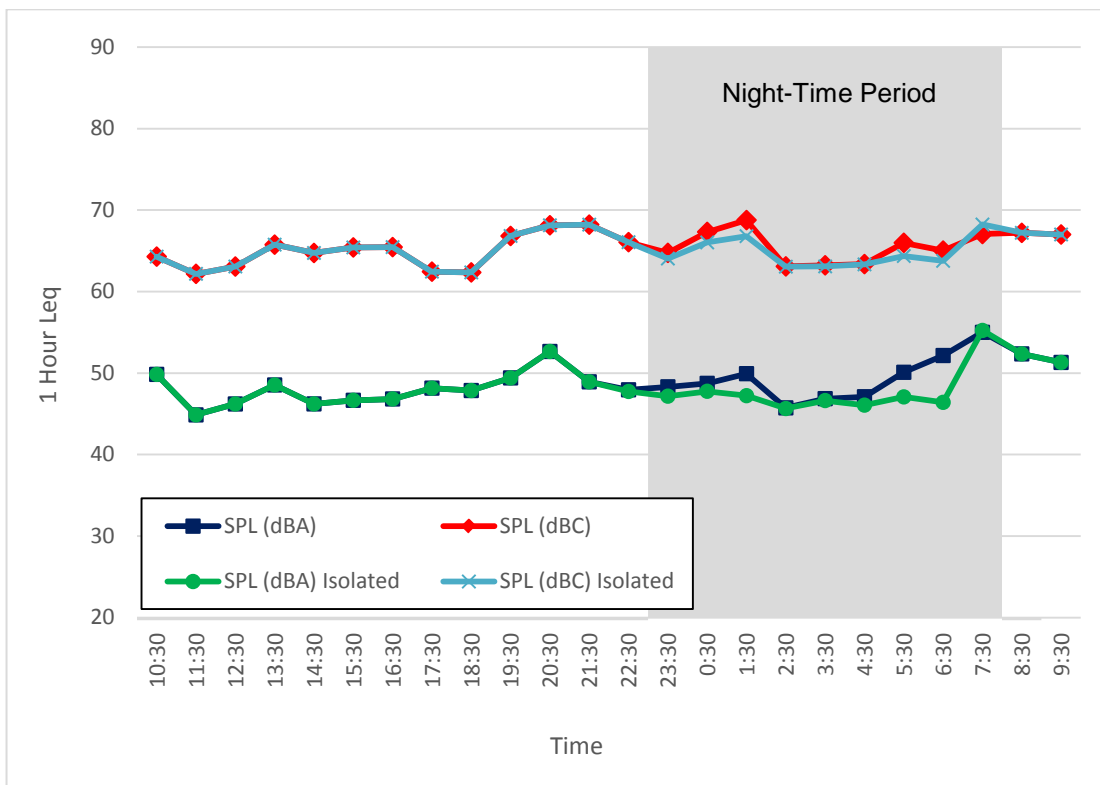


**Figure 22. Noise Monitor #2, 15-Second  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**

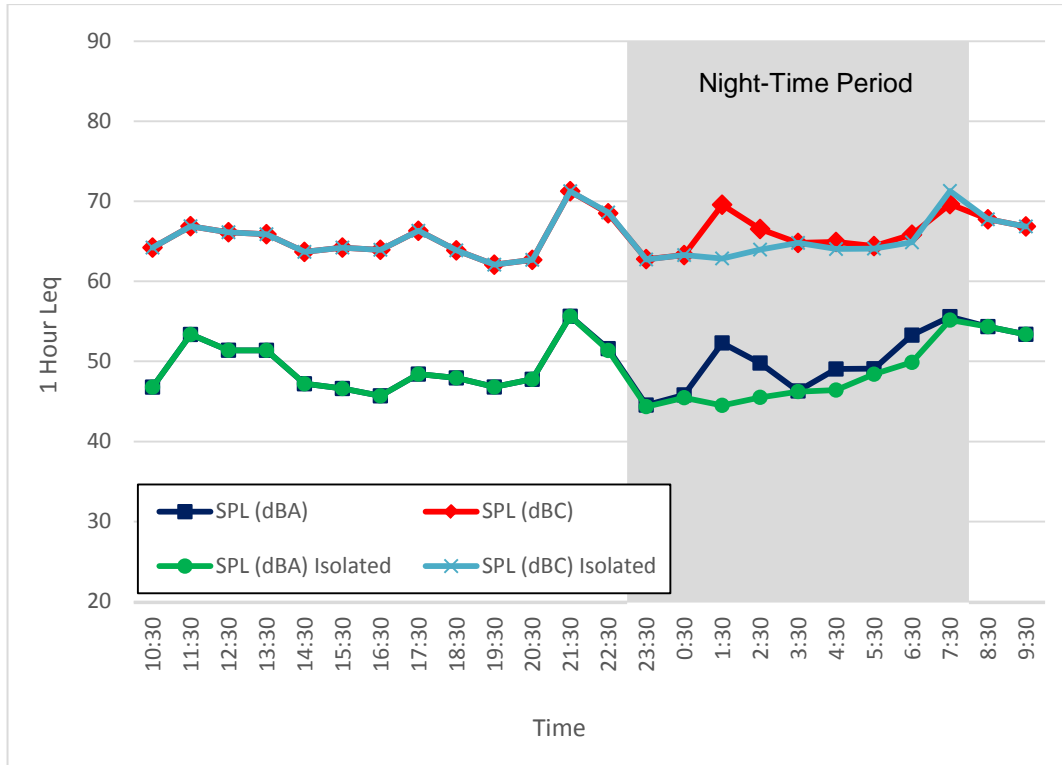


**Figure 23. Noise Monitor #2, 15-Second  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Noise Monitor #2



**Figure 24. Noise Monitor #2, 1-Hour  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



**Figure 25. Noise Monitor #2, 1-Hour  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Monitor #2

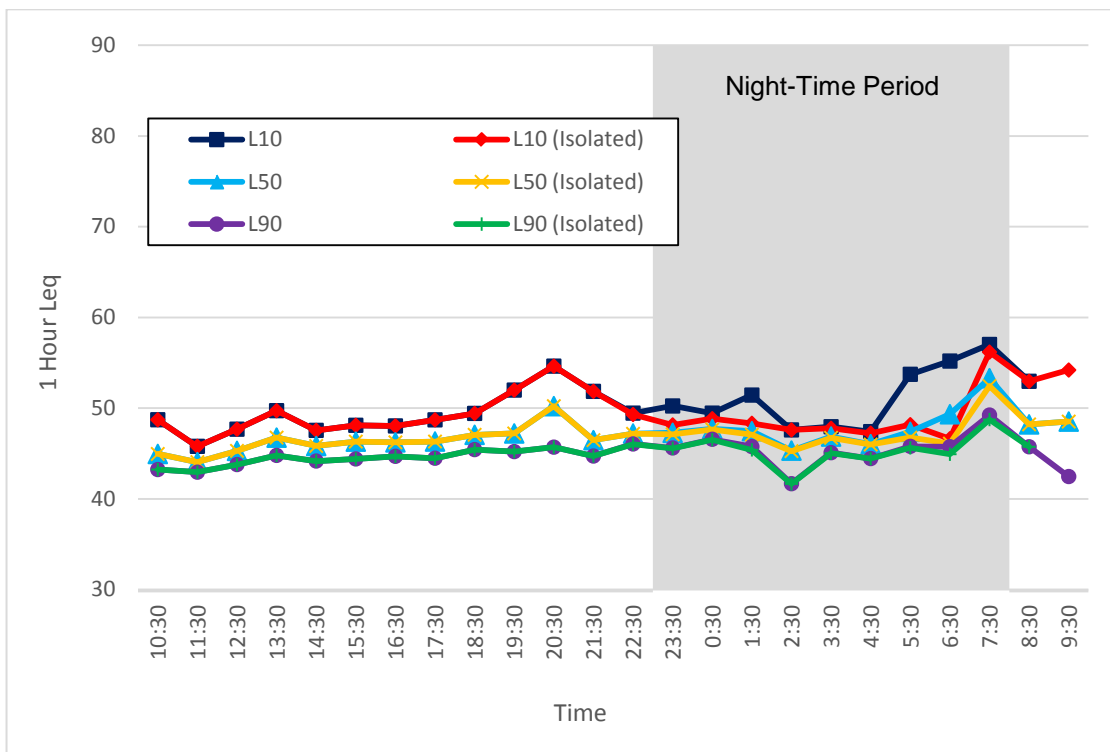


Figure 26. Noise Monitor #2, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 9 - 10, 2015)

Noise

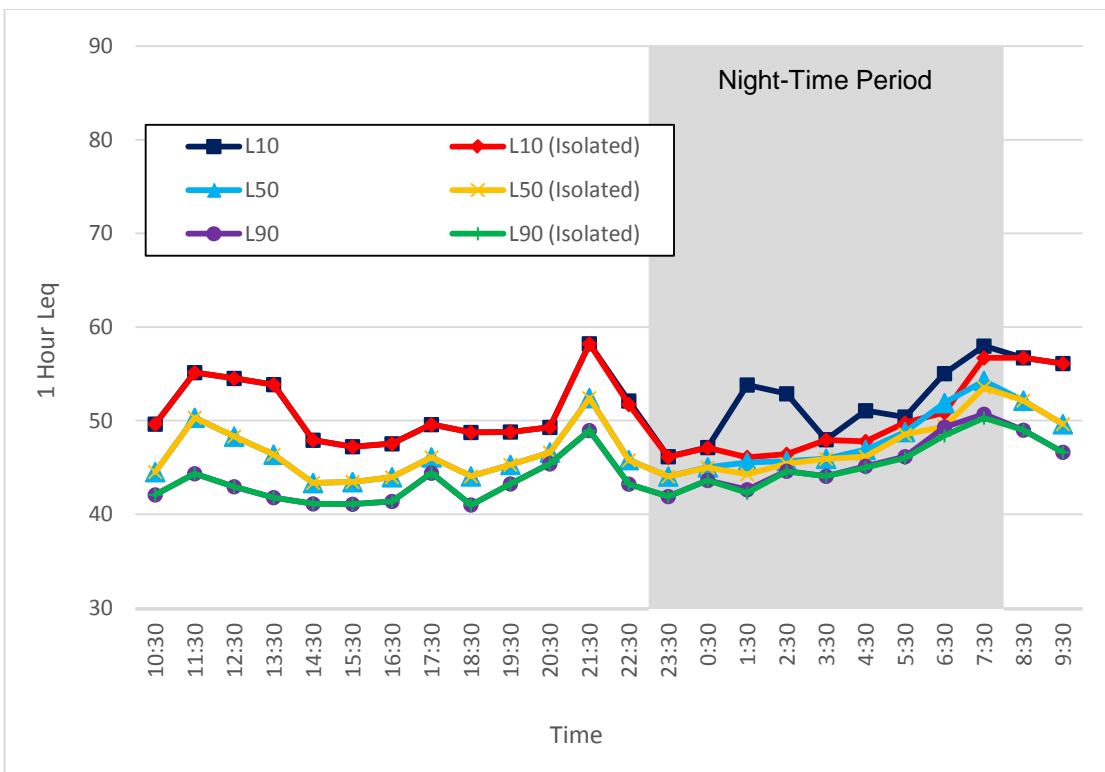
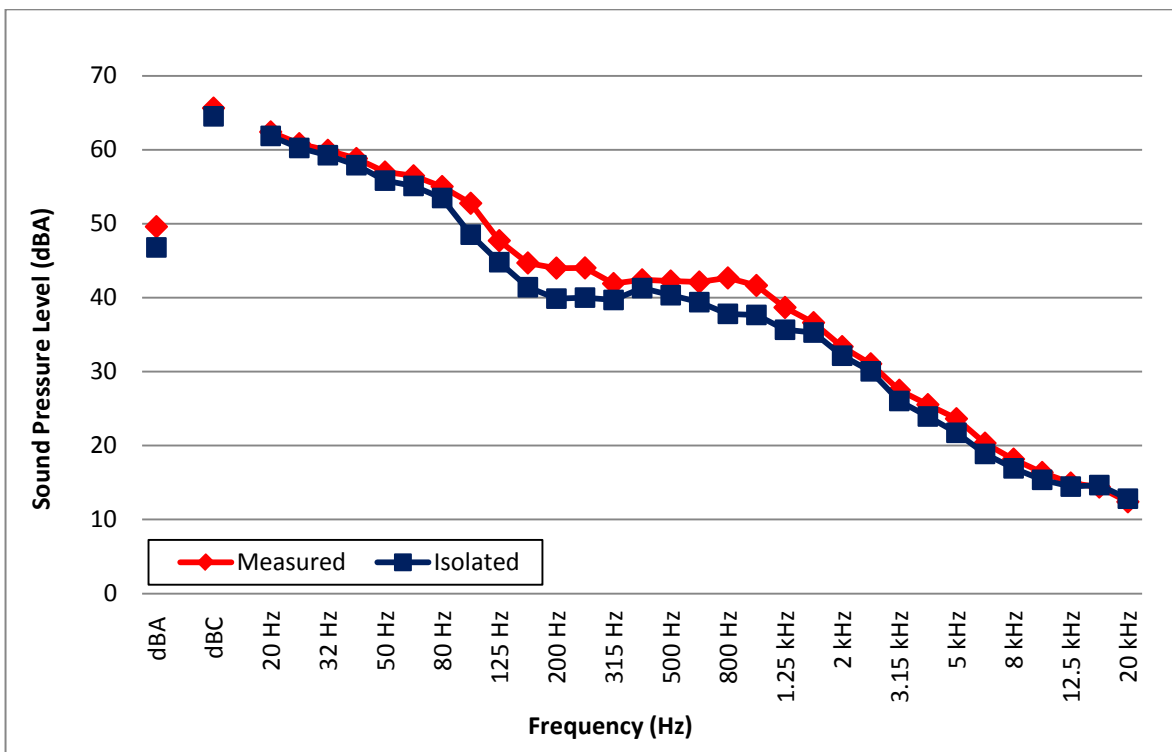
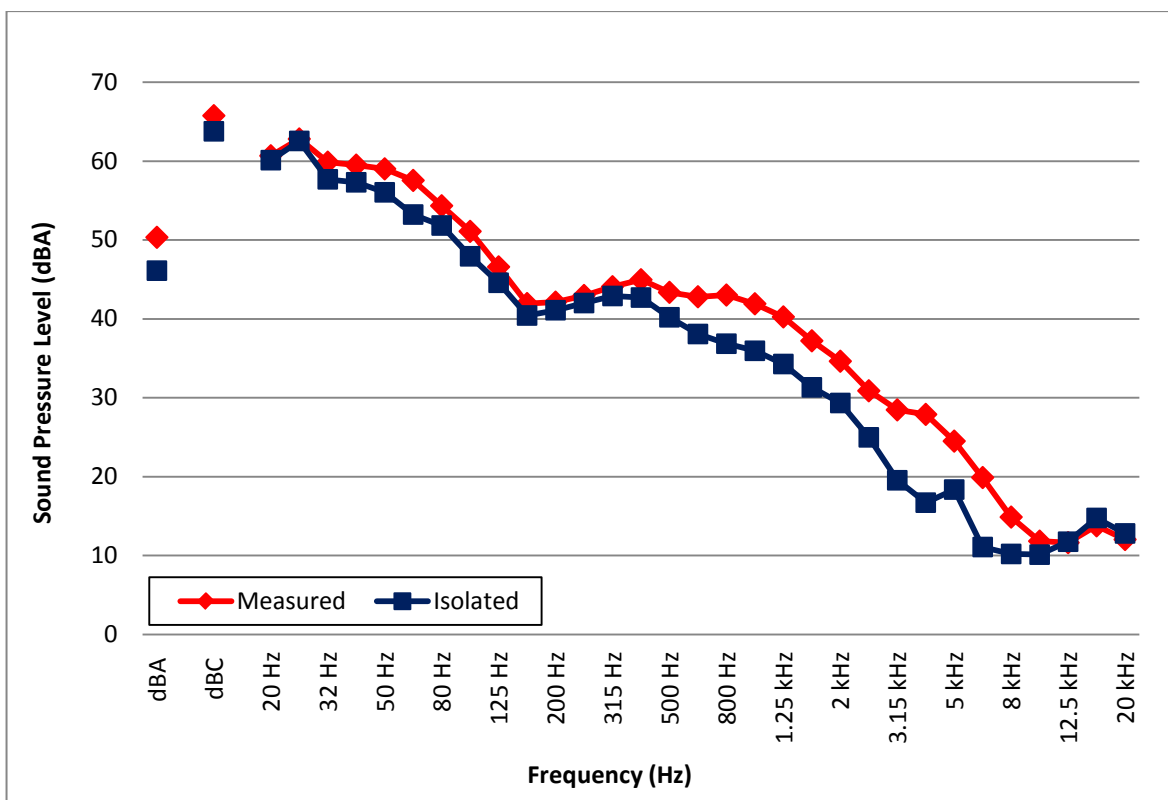


Figure 27. Noise Monitor #2, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 10 - 11, 2015)

Noise Monitor #2

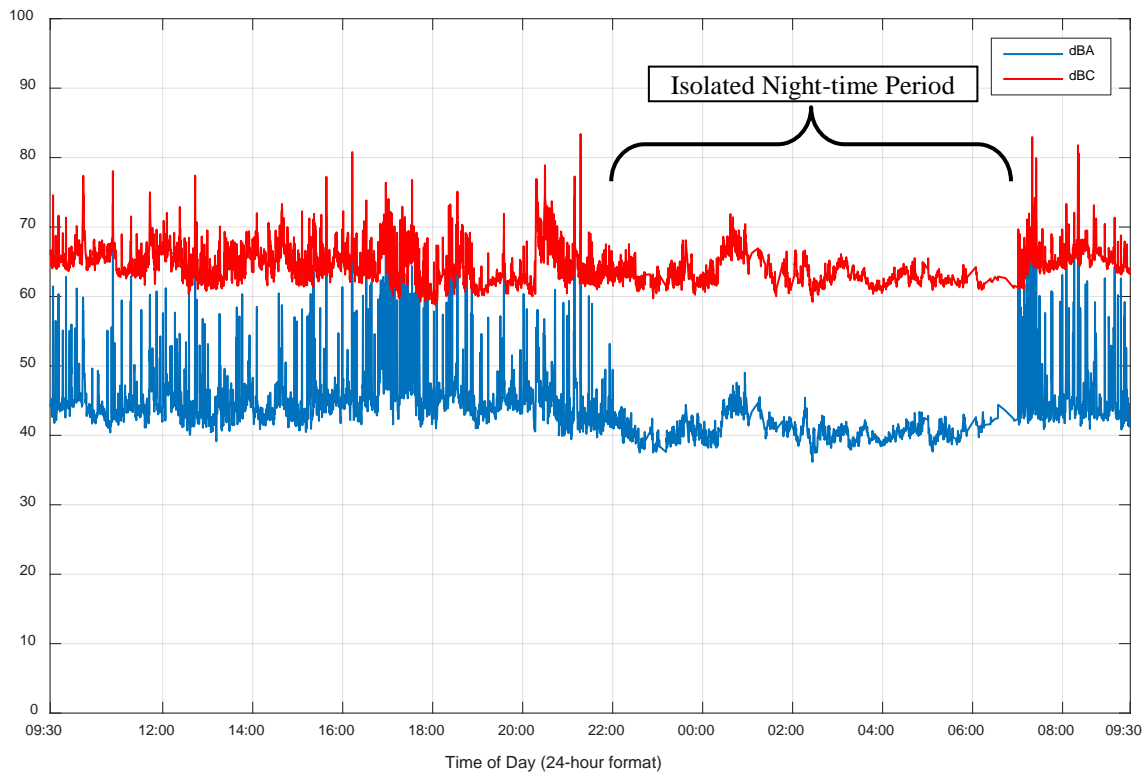


**Figure 28. Noise Monitor #2, 1/3 Octave  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**

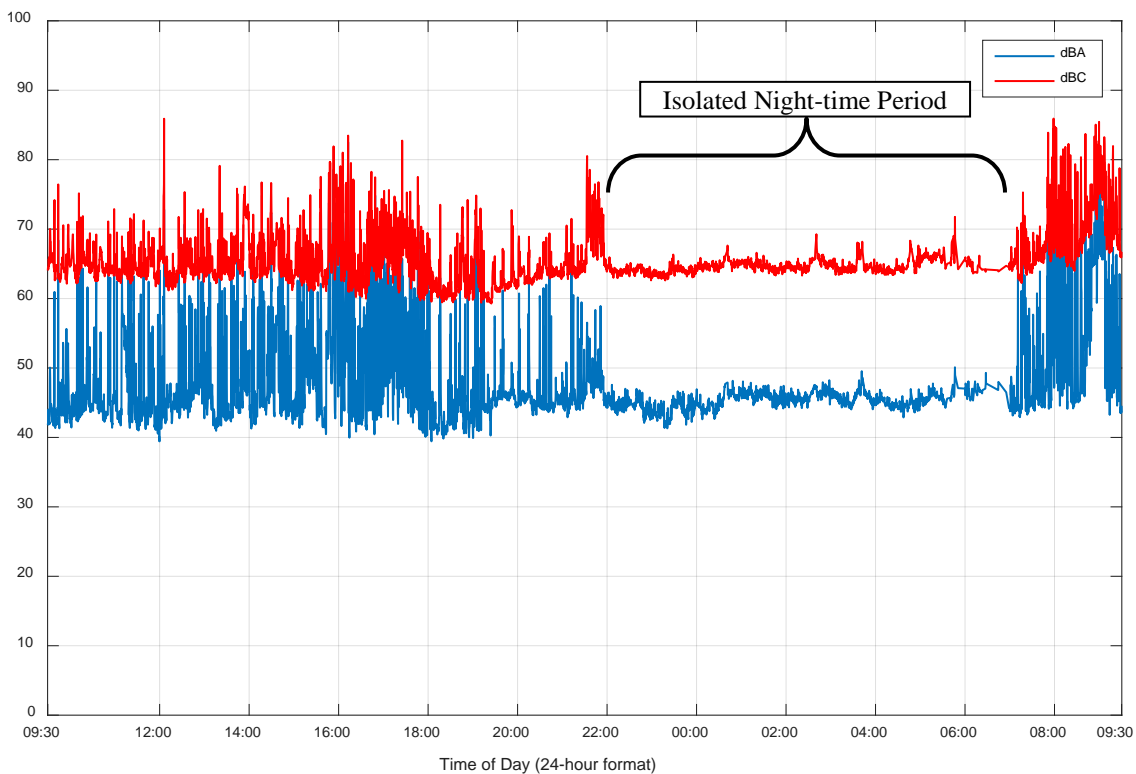


**Figure 29. Noise Monitor #2, 1/3 Octave  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Noise Monitor #3



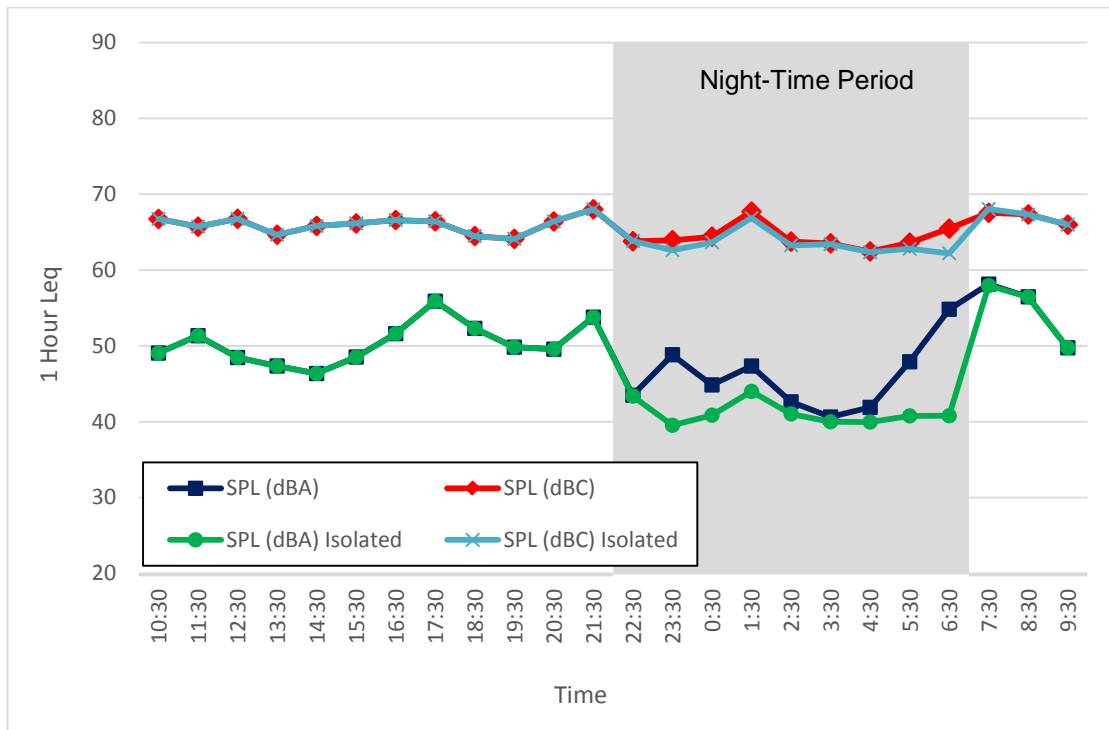
**Figure 30. Noise Monitor #3, 15-Second  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



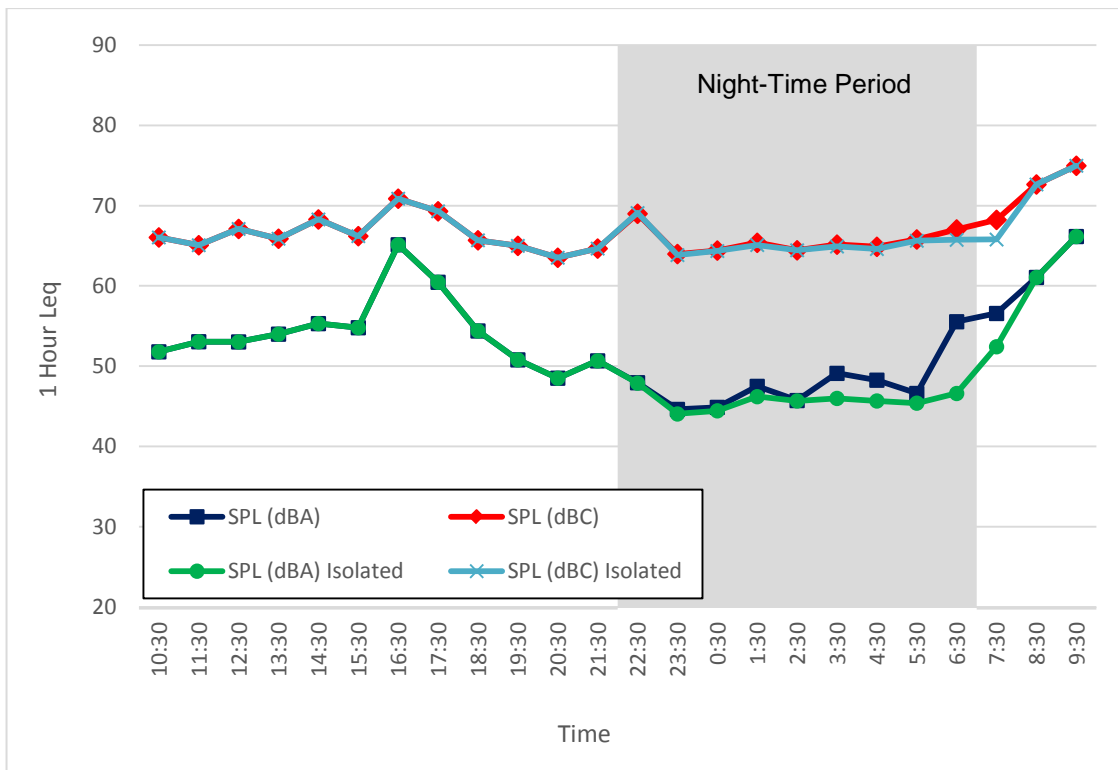
**Figure 31. Noise Monitor #3, 15-Second  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**



Noise Monitor #3



**Figure 32. Noise Monitor #3, 1-Hour  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



**Figure 33. Noise Monitor #3, 1-Hour  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Monitor #3

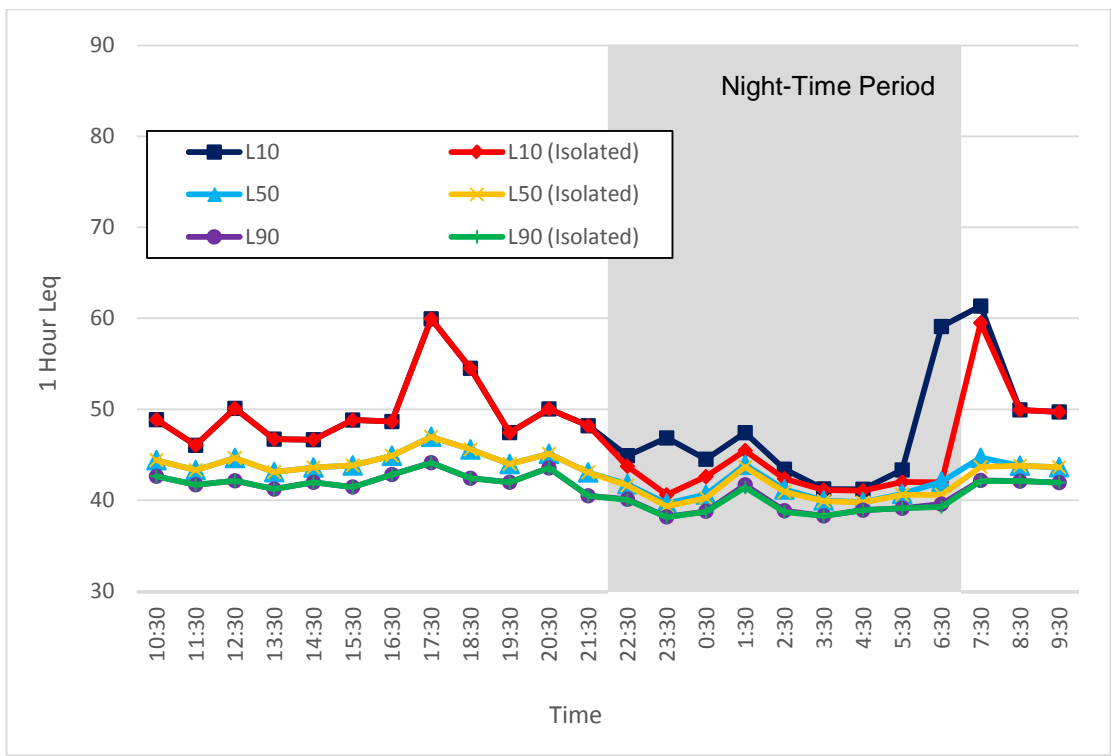


Figure 34. Noise Monitor #3, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 9 - 10, 2015)

Noise

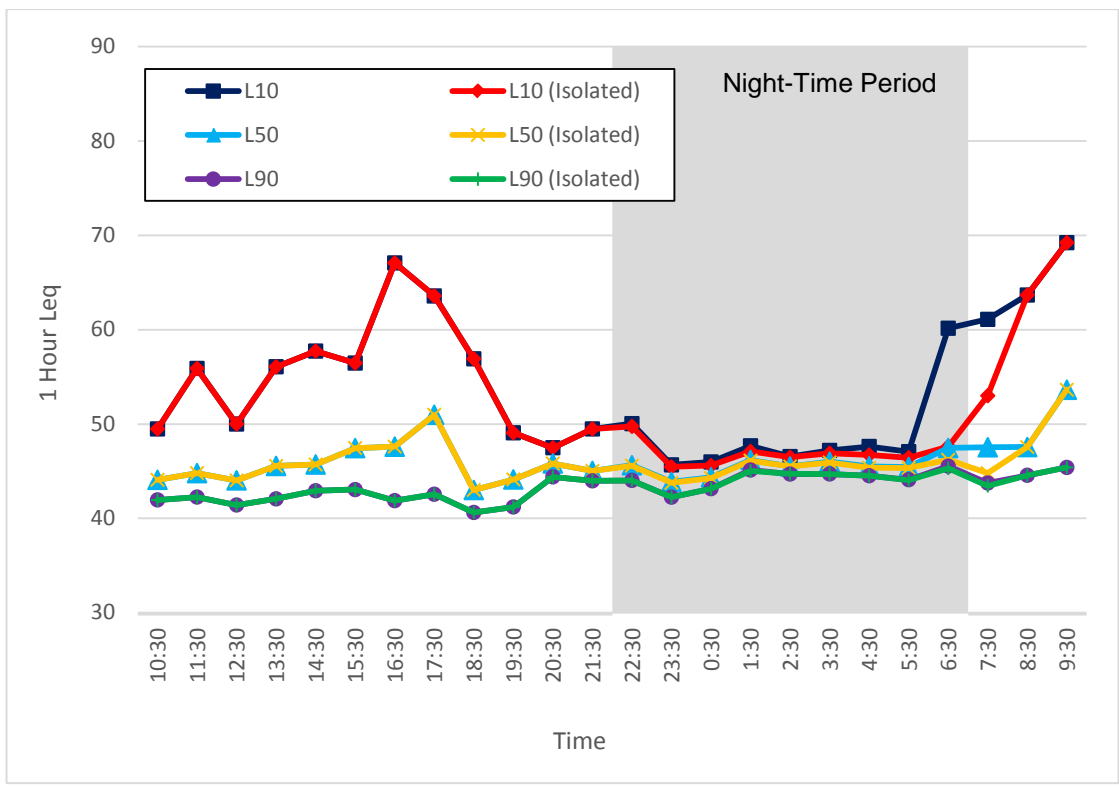
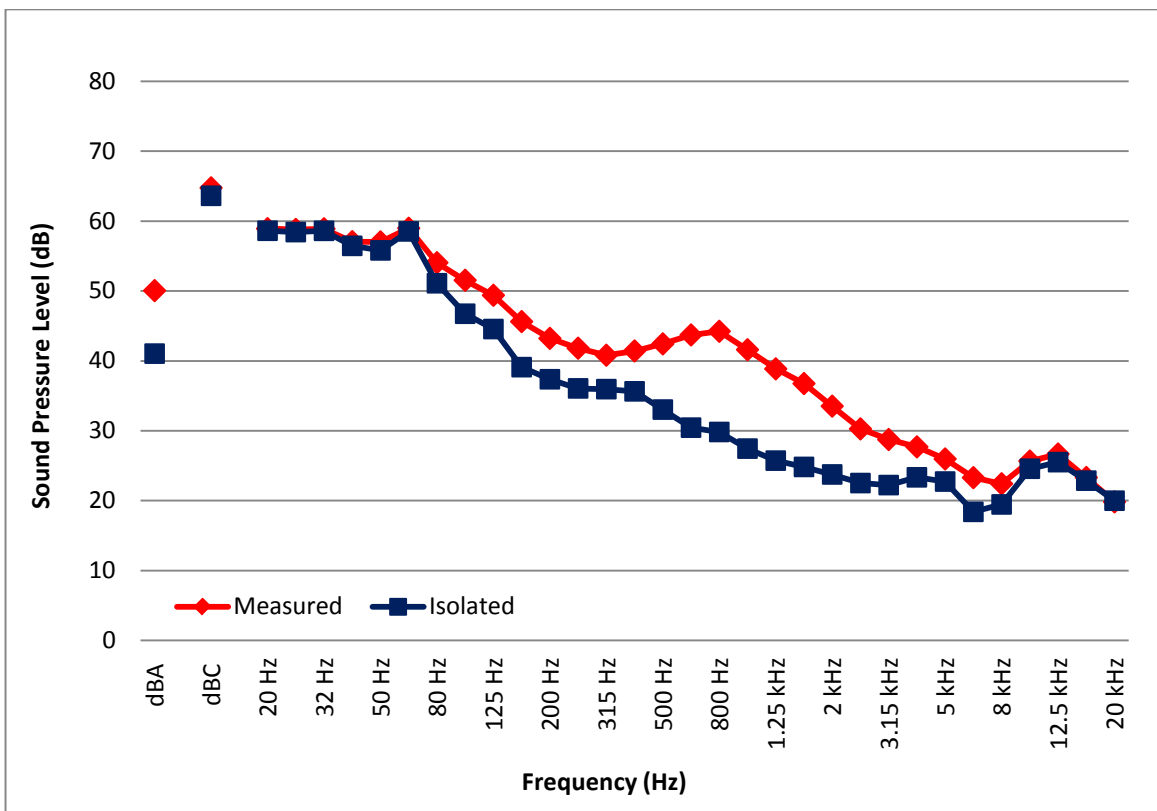
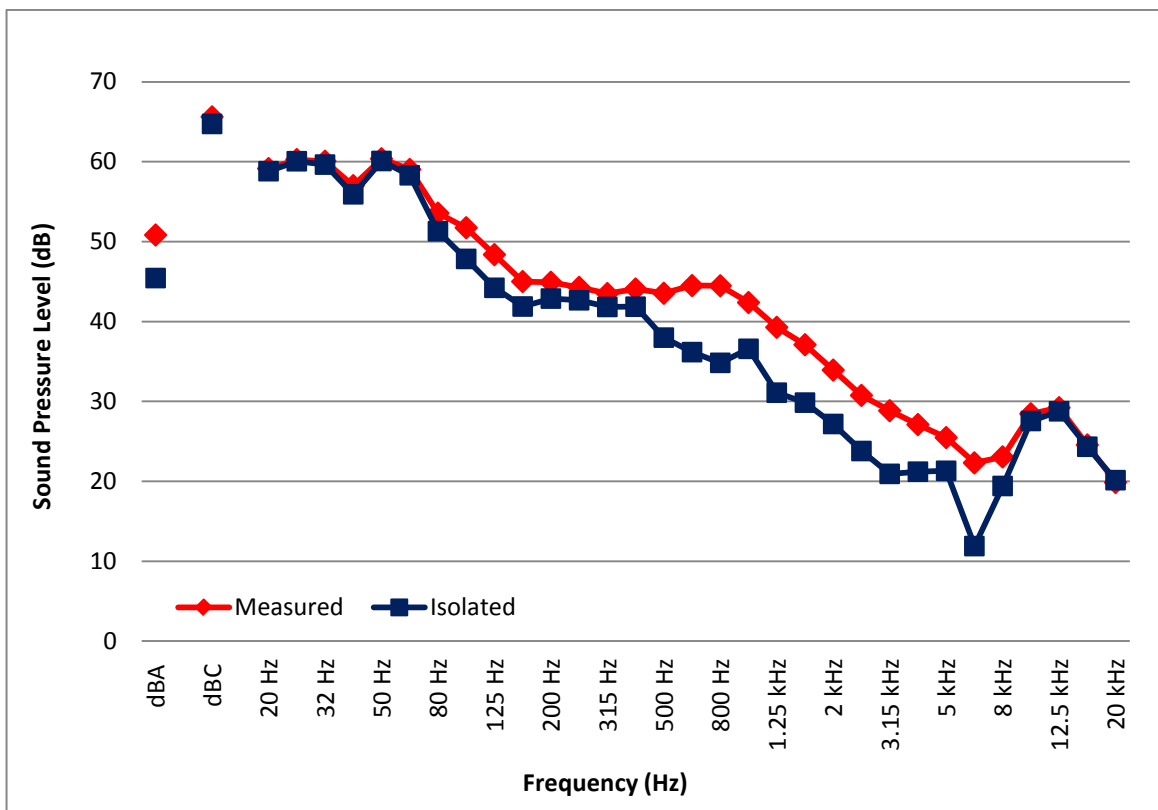


Figure 35. Noise Monitor #3, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 10 - 11, 2015)

Noise Monitor #3

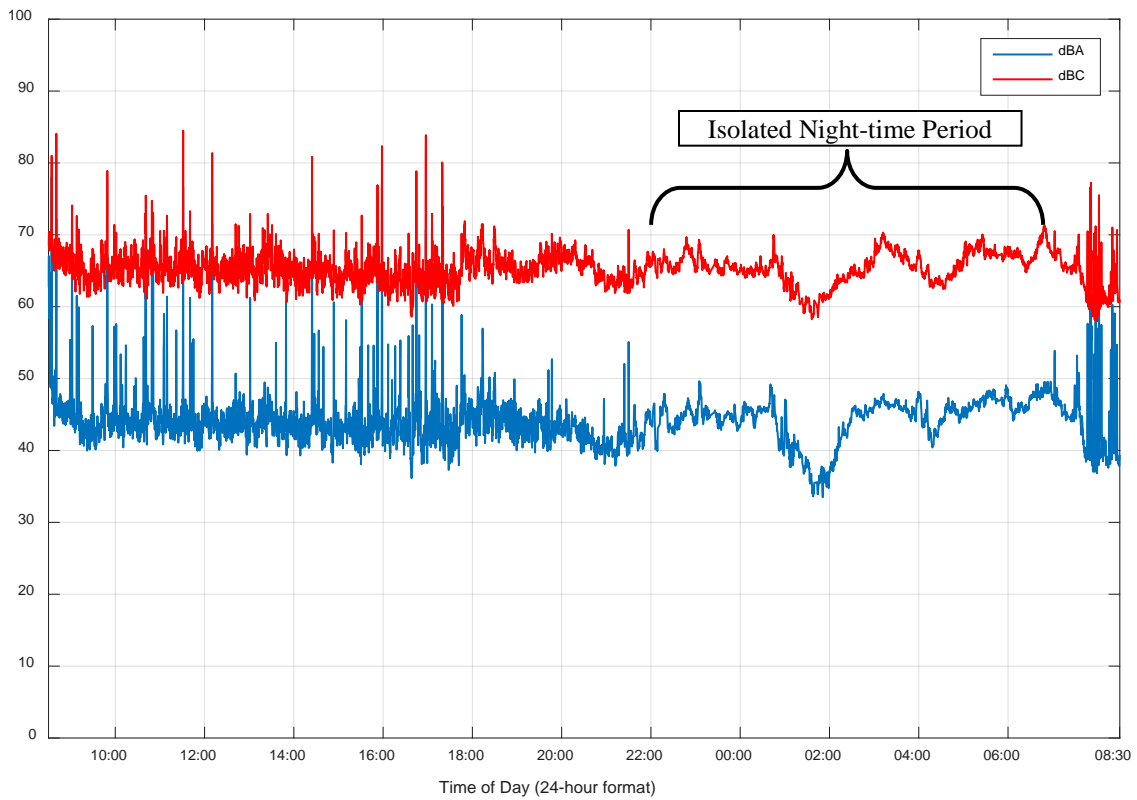


**Figure 36. Noise Monitor #3, 1/3 Octave  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**

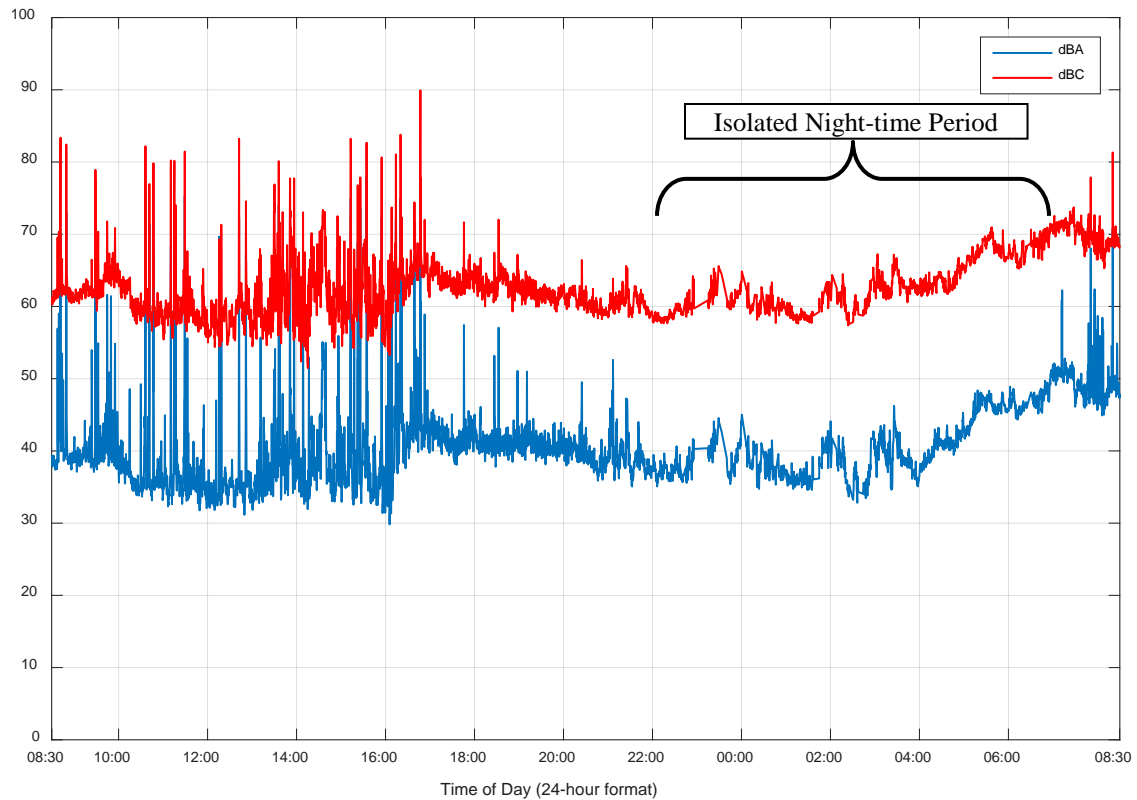


**Figure 37. Noise Monitor #3, 1/3 Octave  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Noise Monitor #4

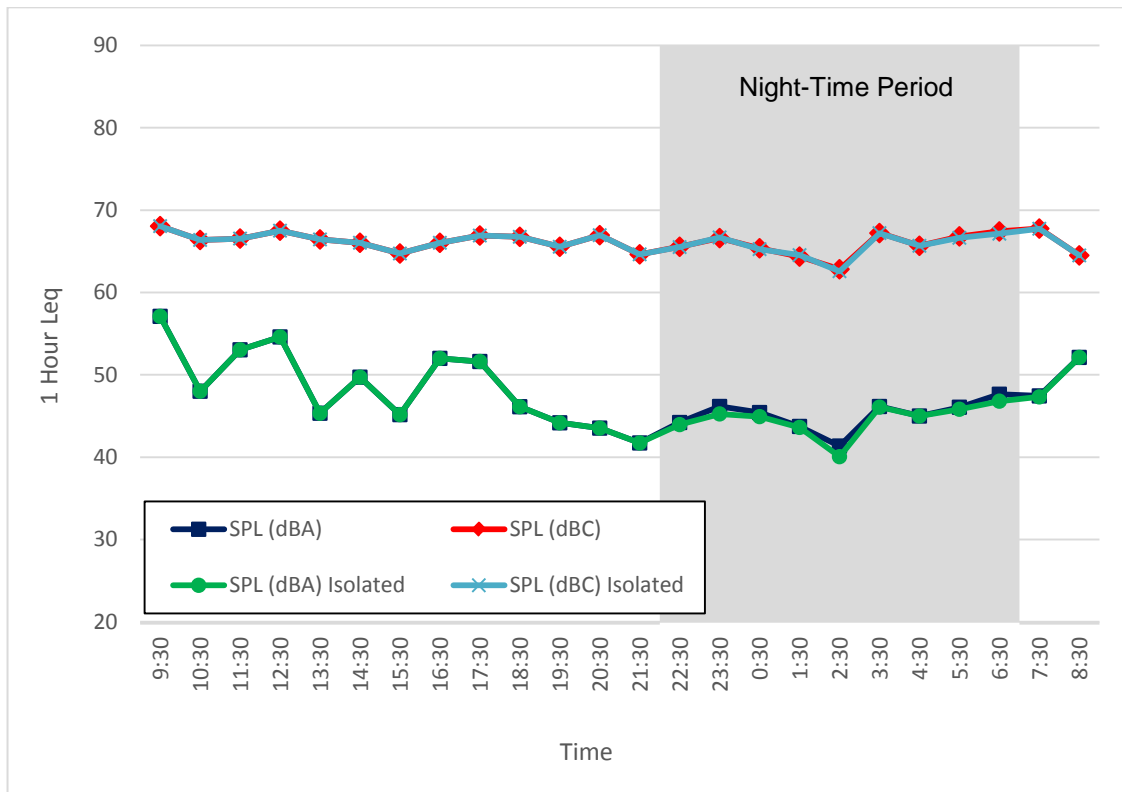


**Figure 38. Noise Monitor #4, 15-Second  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

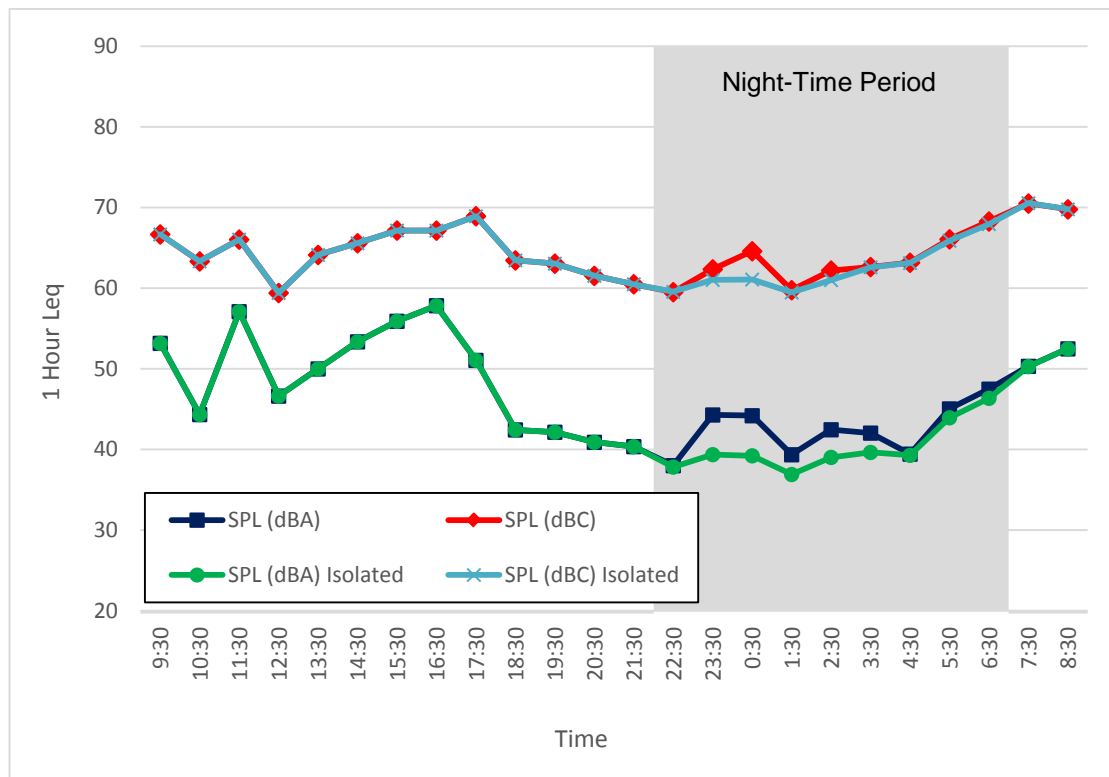


**Figure 39. Noise Monitor #4, 15-Second  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #4



**Figure 40. Noise Monitor #4, 1-Hour  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



**Figure 41. Noise Monitor #4, 1-Hour  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Monitor #4

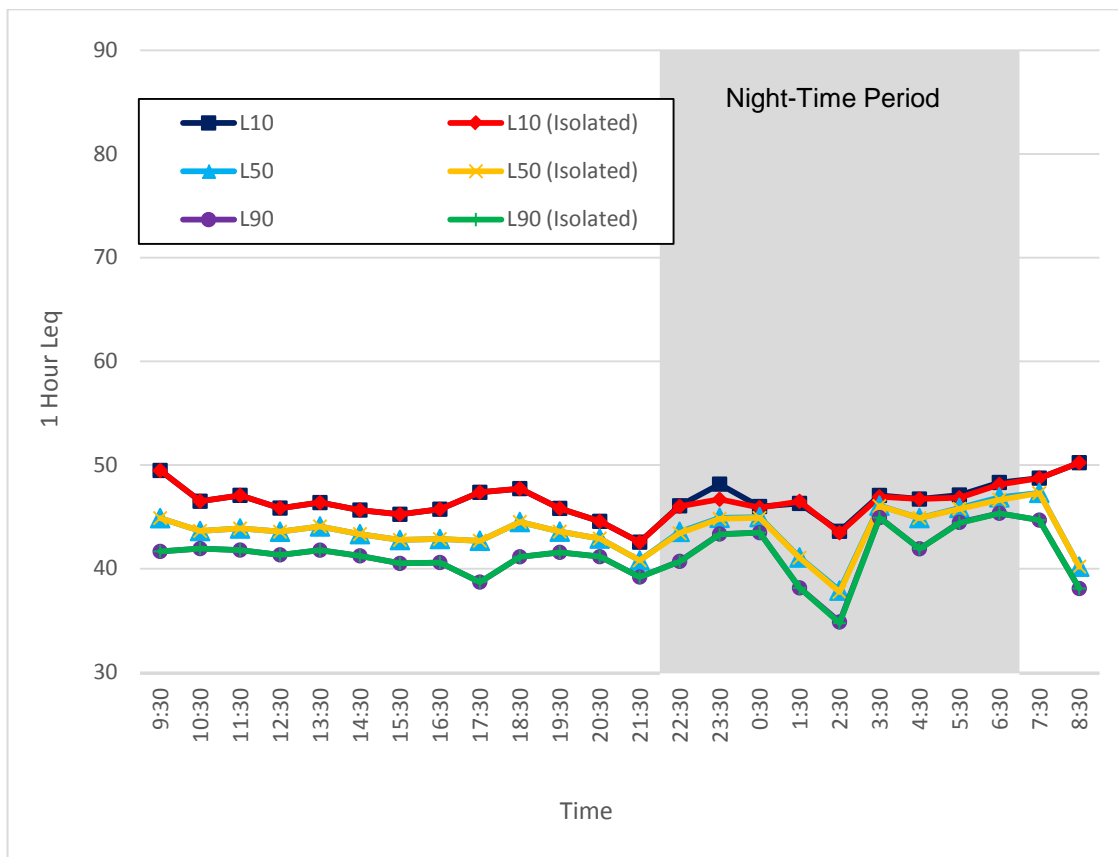


Figure 42. Noise Monitor #4, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 7 - 8, 2015)

Noise

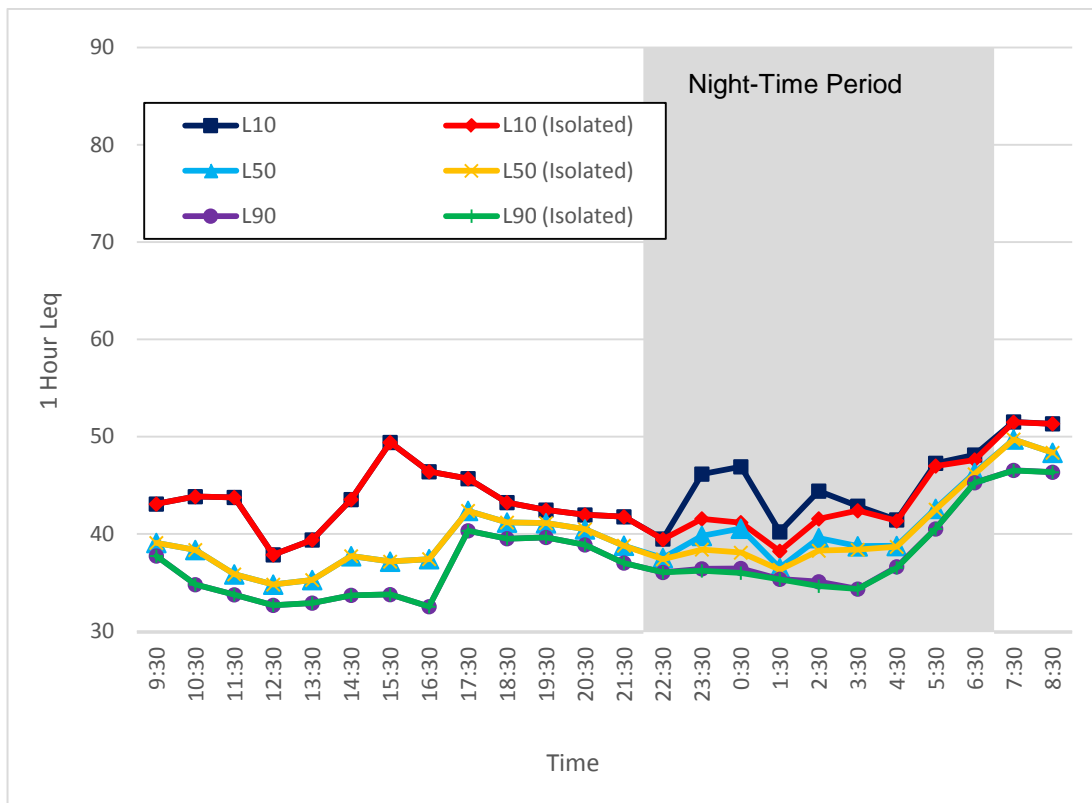
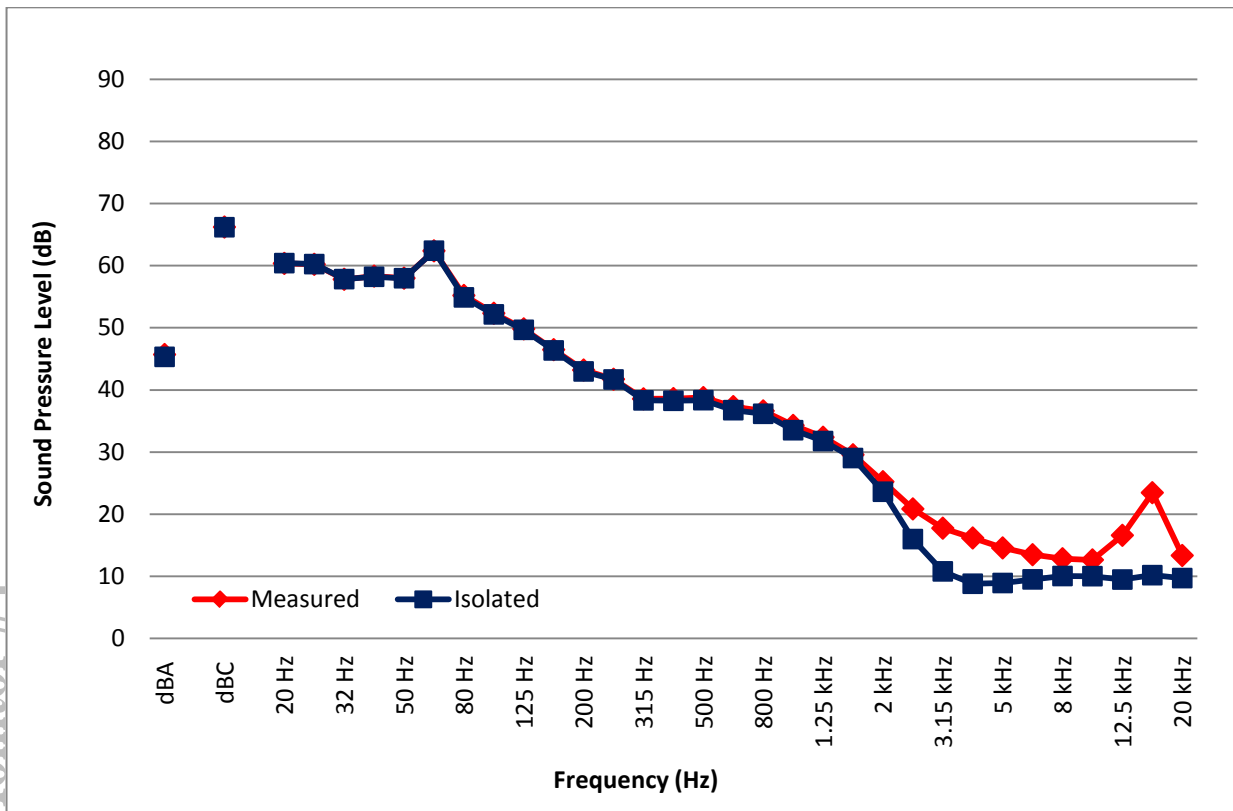
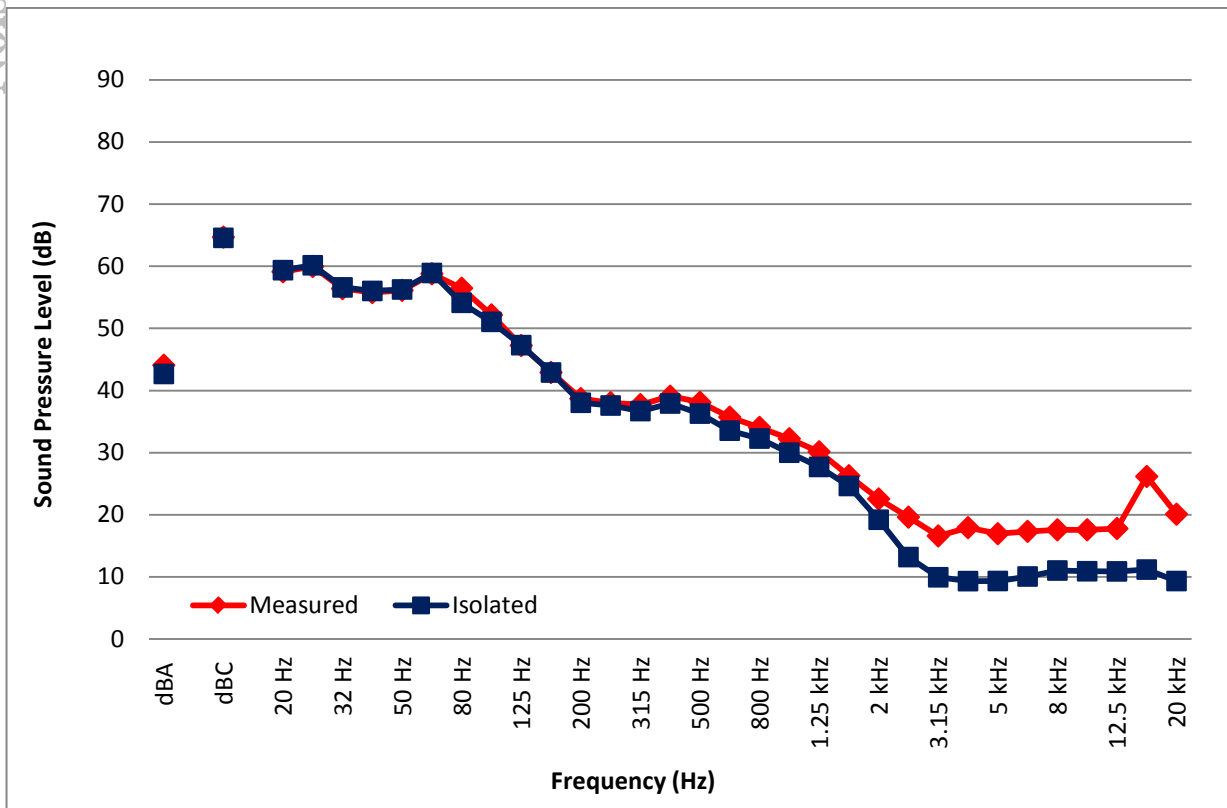


Figure 43. Noise Monitor #4, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 8 - 9, 2015)

Noise Monitor #4

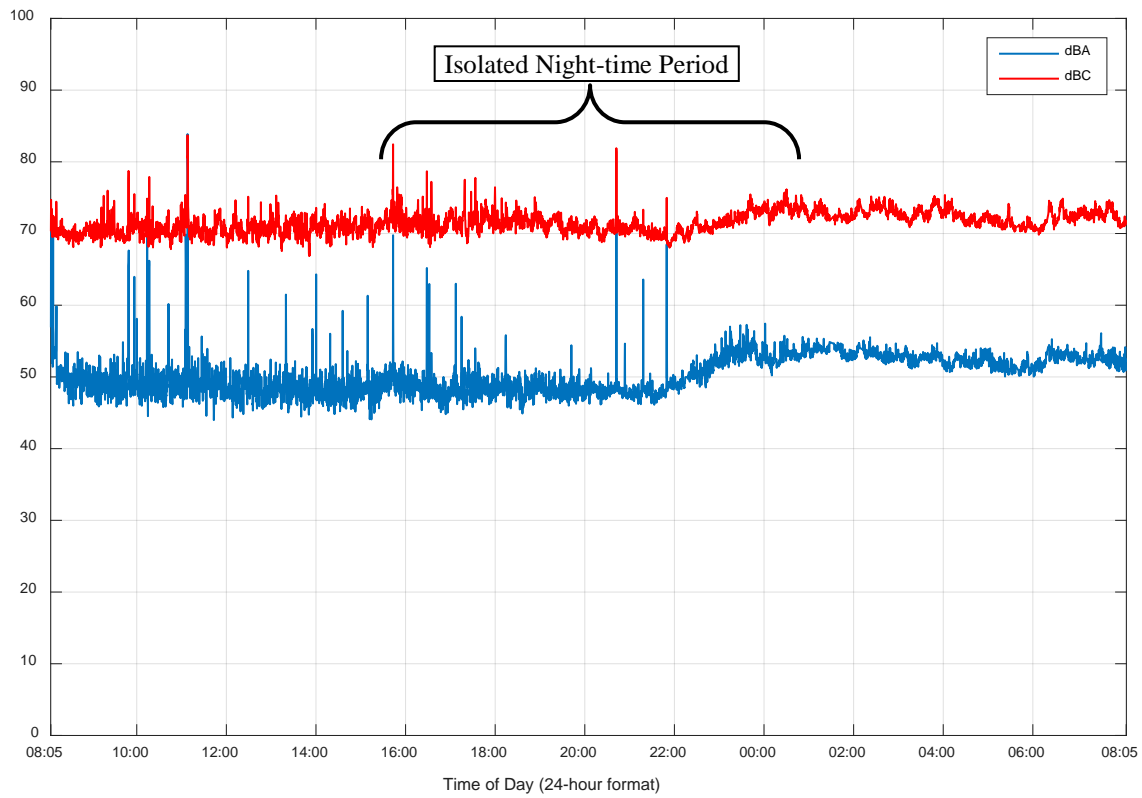


**Figure 44. Noise Monitor #4, 1/3 Octave  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

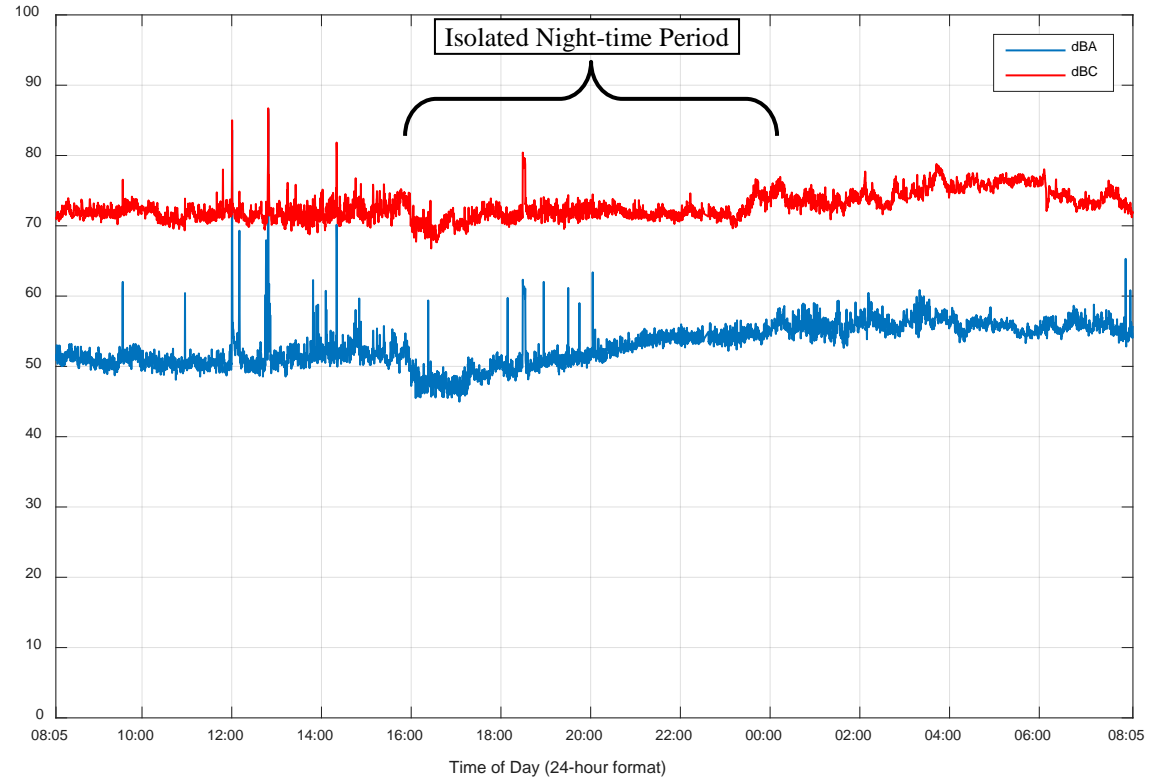


**Figure 45. Noise Monitor #4, 1/3 Octave  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #5



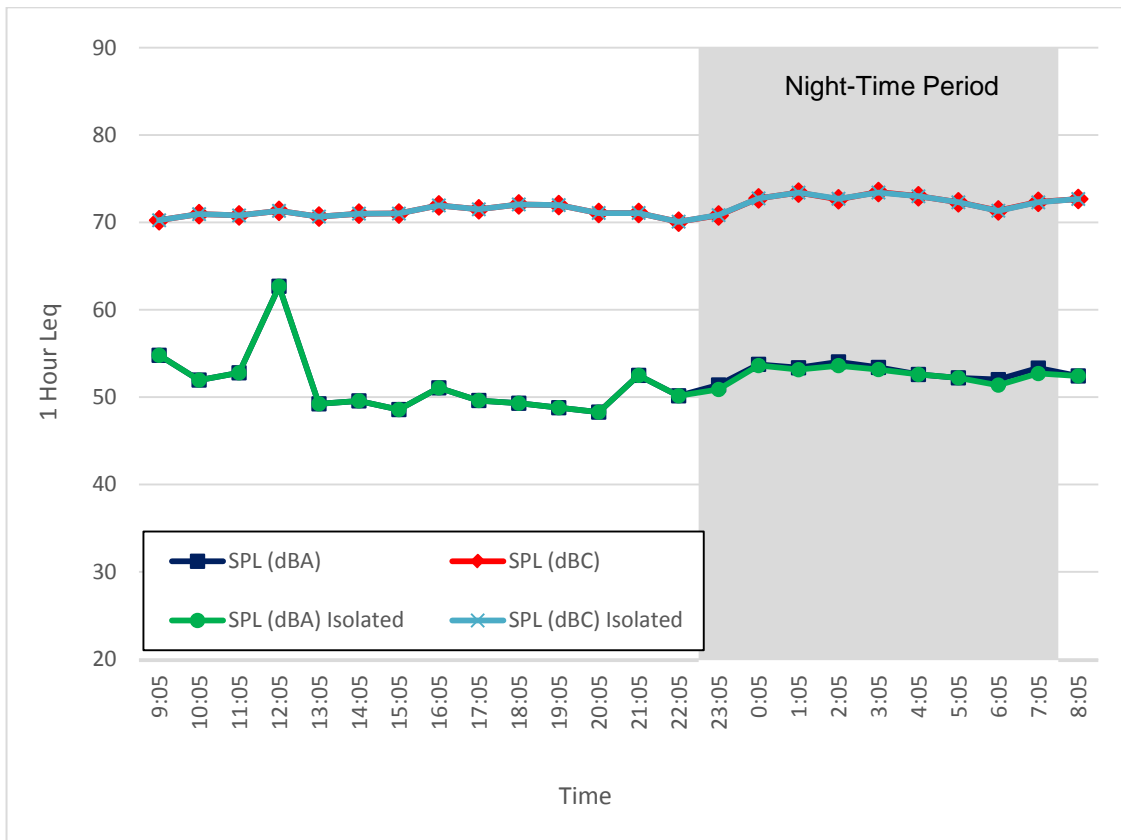
**Figure 46. Noise Monitor #5, 15-Second  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



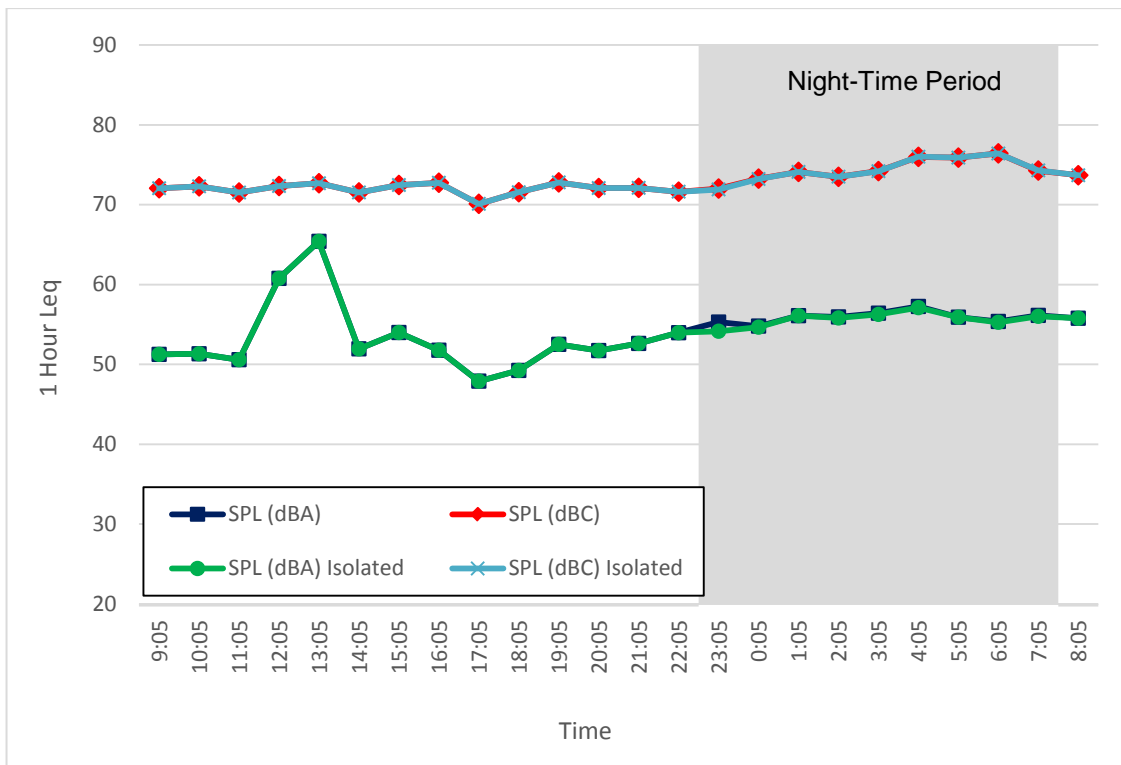
**Figure 47. Noise Monitor #5, 15-Second  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**



Noise Monitor #5

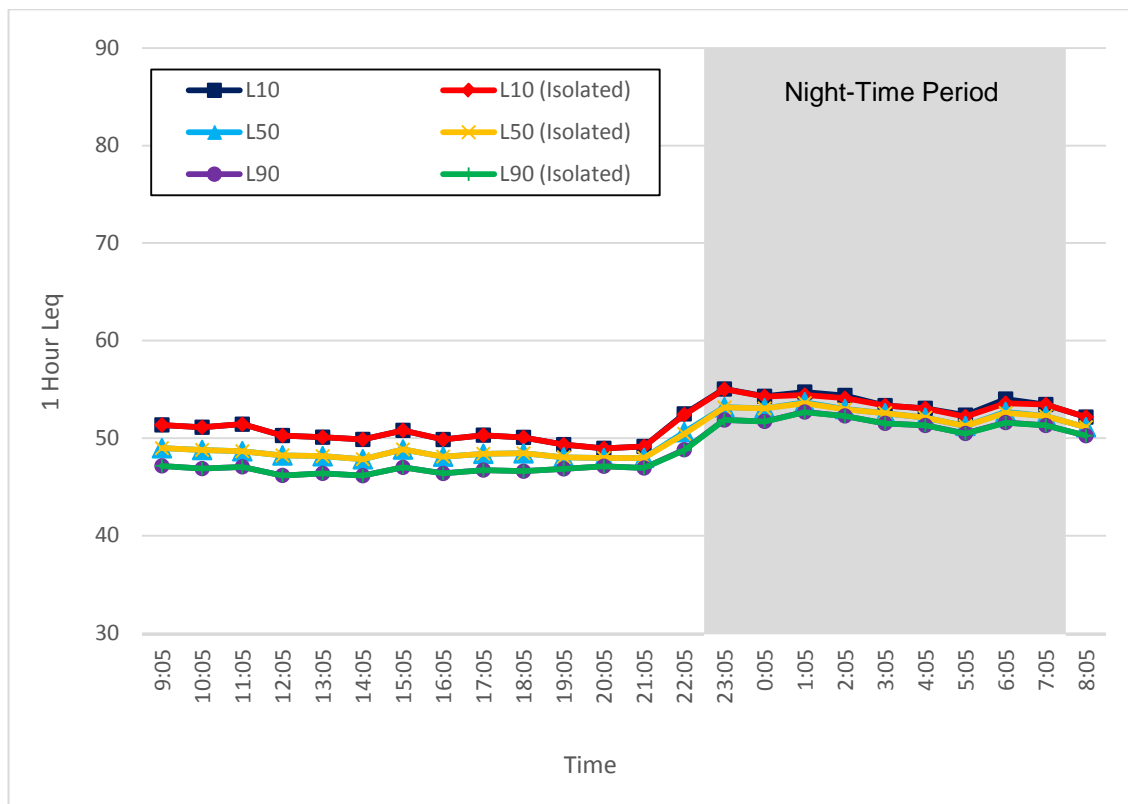


**Figure 48. Noise Monitor #5, 1-Hour  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



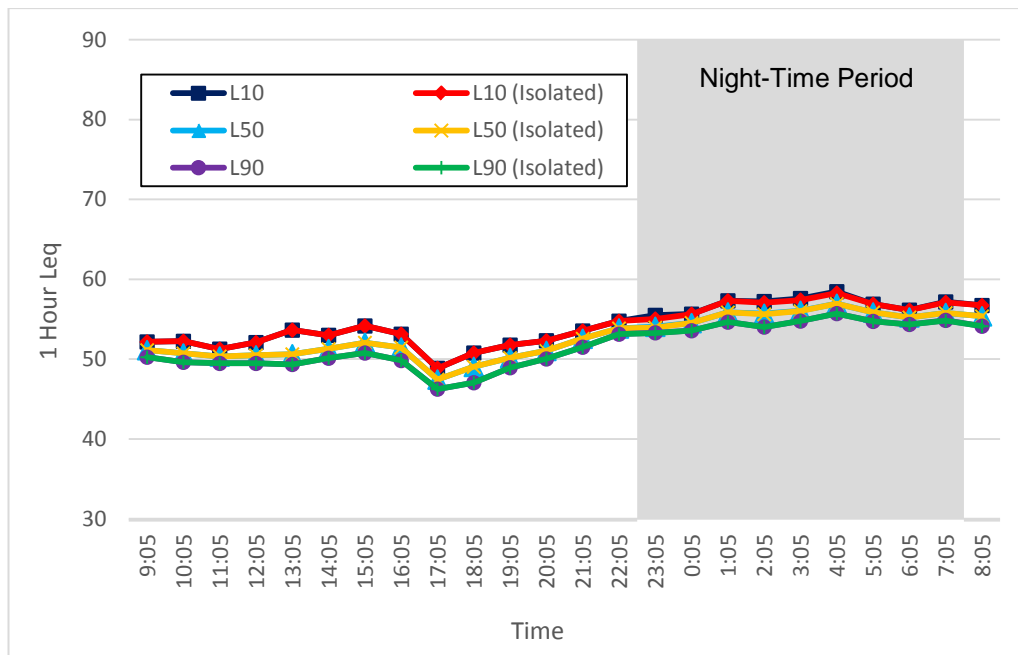
**Figure 49. Noise Monitor #5, 1-Hour  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Monitor #5



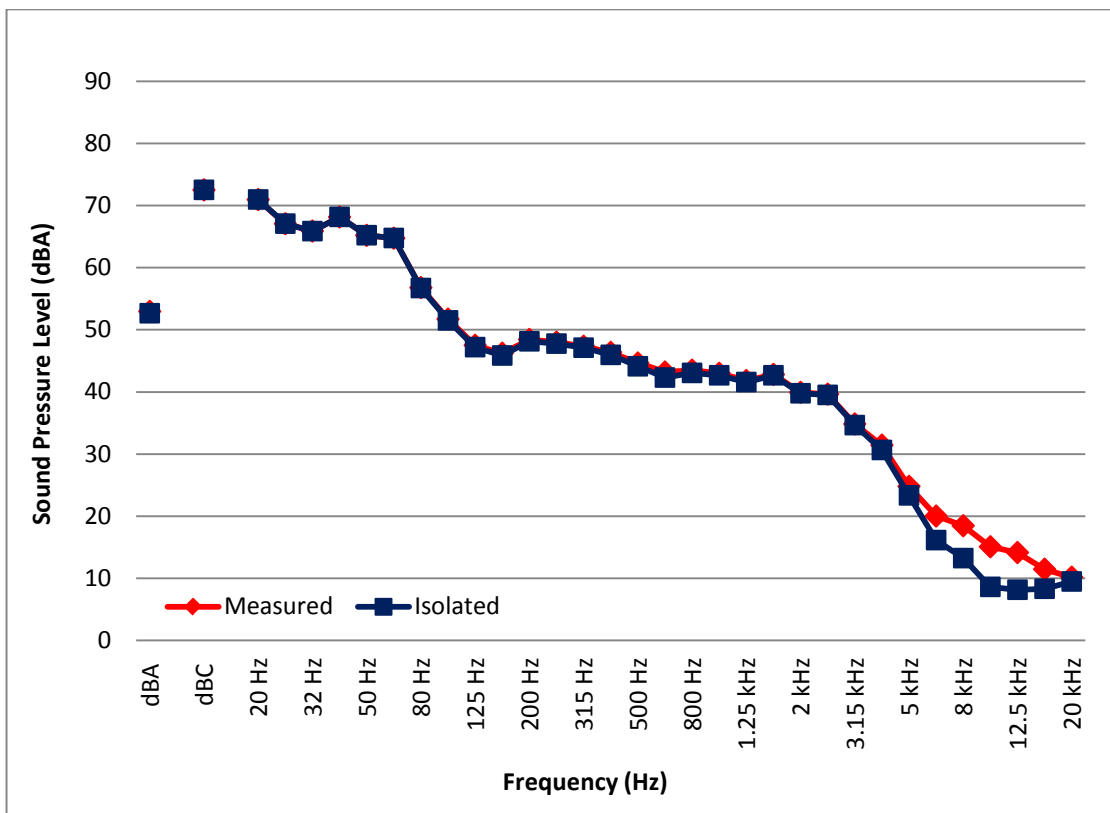
**Figure 50. Noise Monitor #5, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 7 - 8, 2015)**

Noise

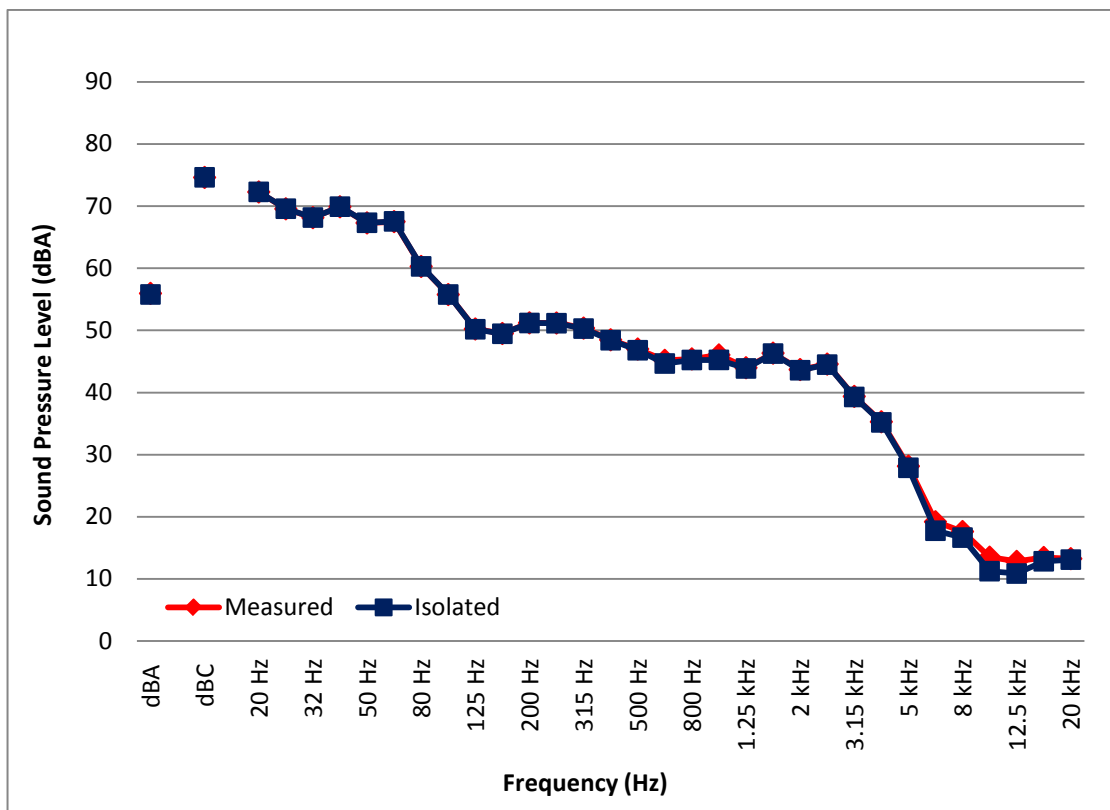


**Figure 51. Noise Monitor #5, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 8 - 9, 2015)**

Noise Monitor #5

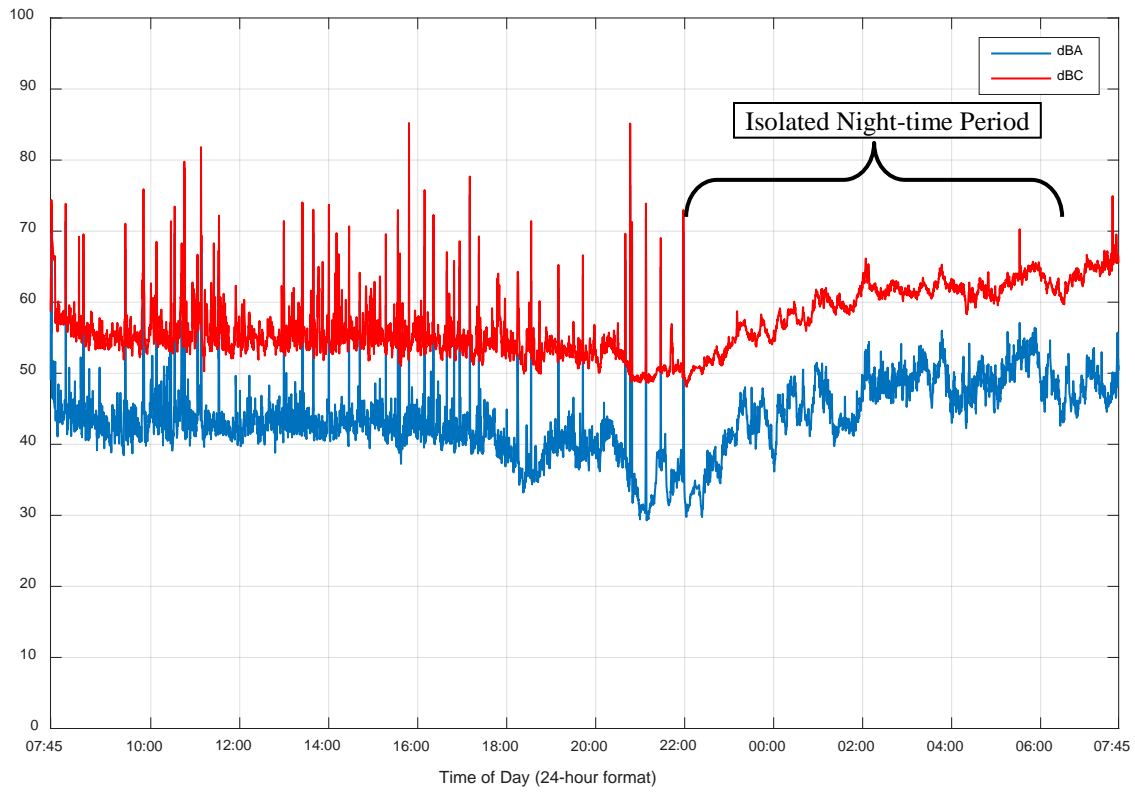


**Figure 52. Noise Monitor #5, 1/3 Octave  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

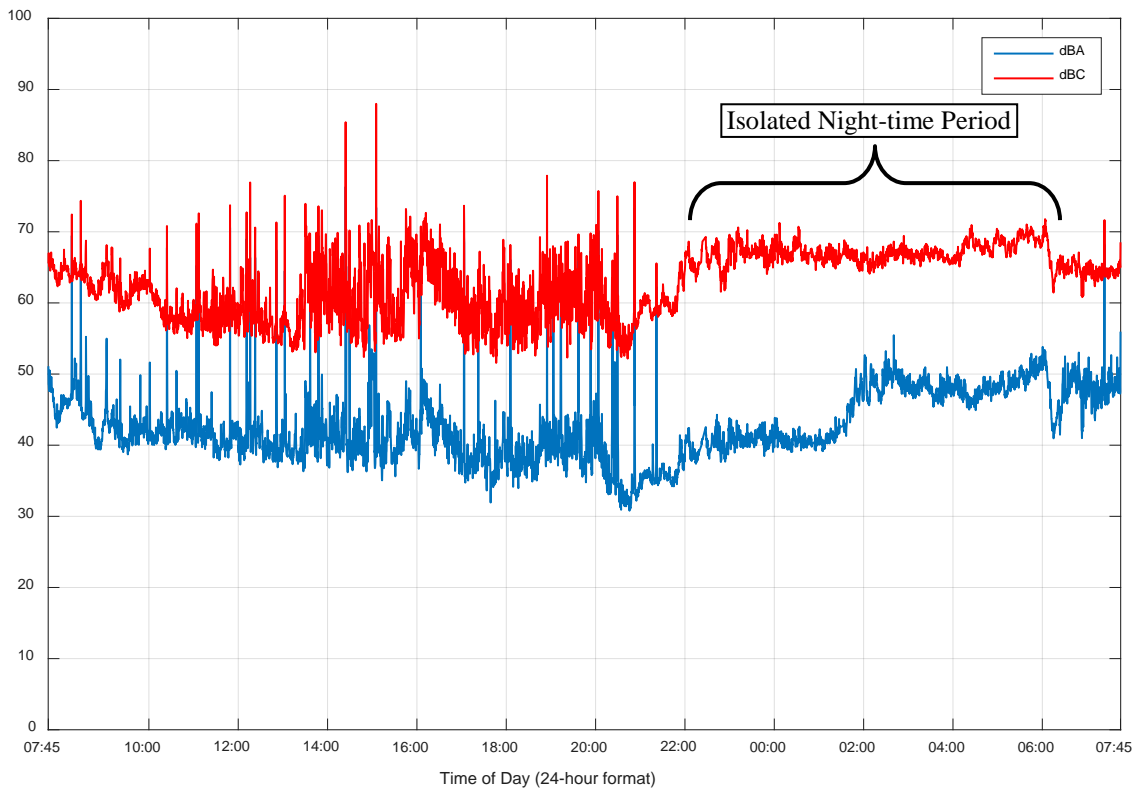


**Figure 53. Noise Monitor #5, 1/3 Octave  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #6

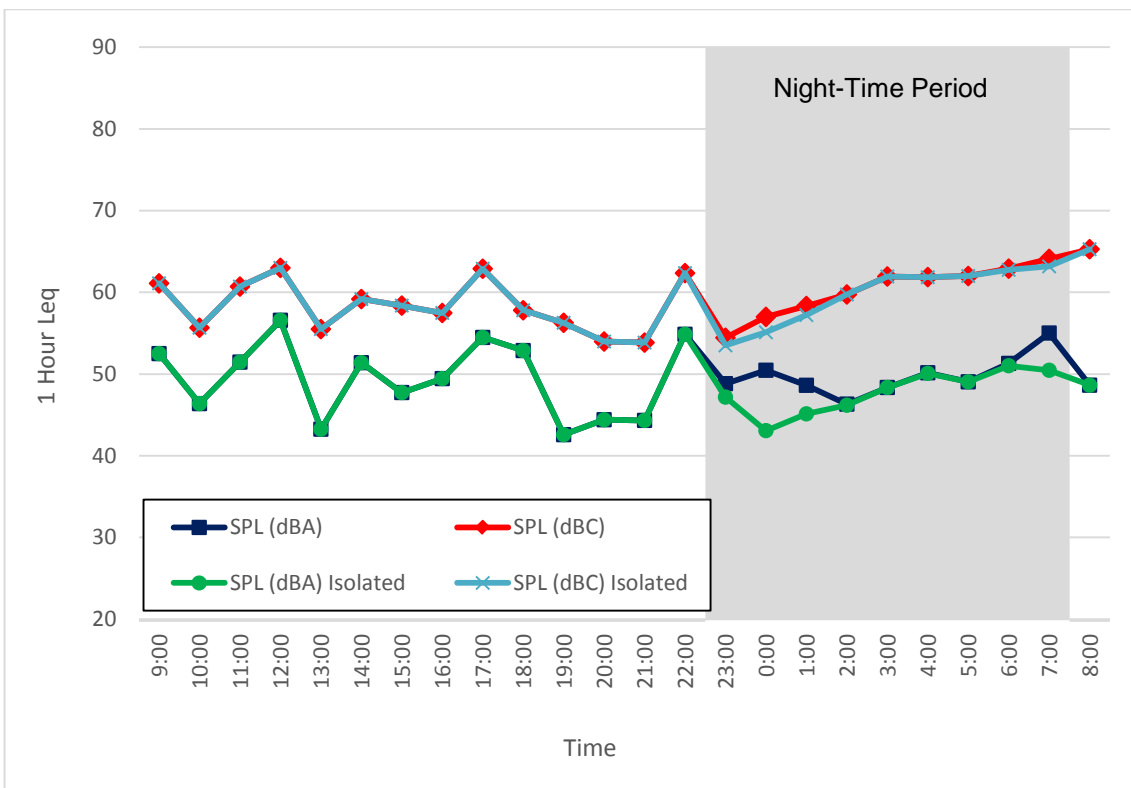


**Figure 54. Noise Monitor #6, 15-Second  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

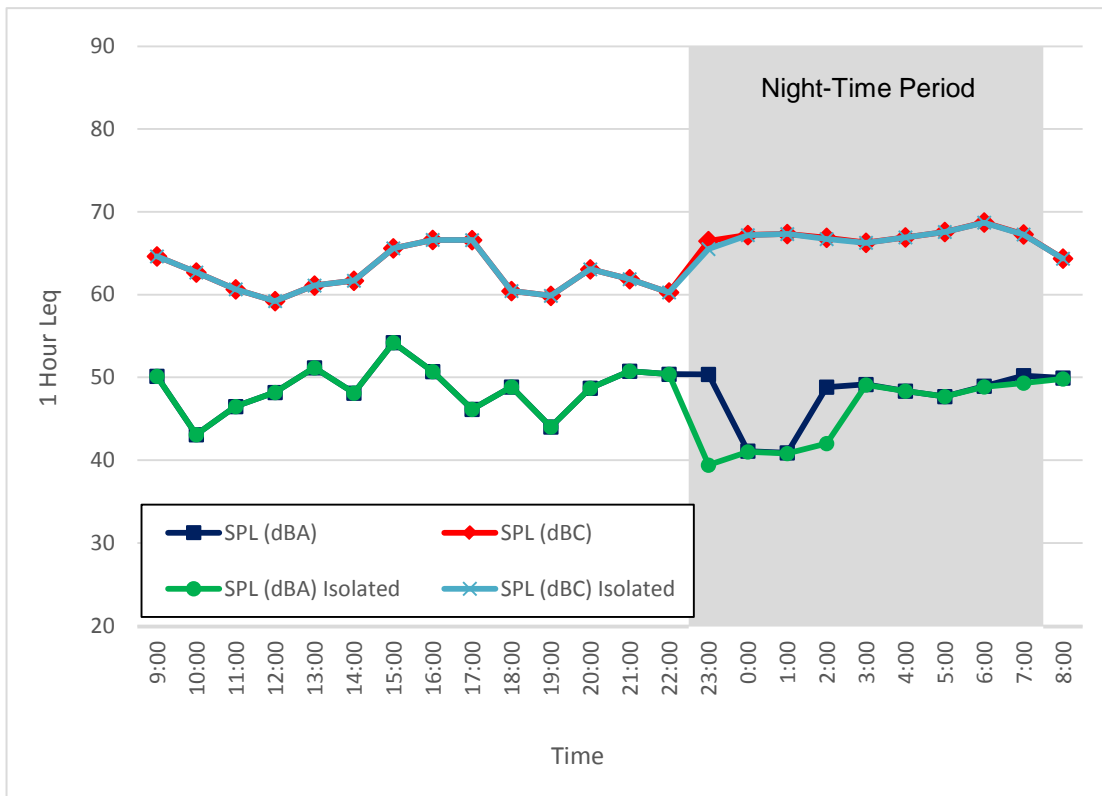


**Figure 55. Noise Monitor #6, 15-Second  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #6



**Figure 56. Noise Monitor #6, 1-Hour  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



**Figure 57. Noise Monitor #6, 1-Hour  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Monitor #6

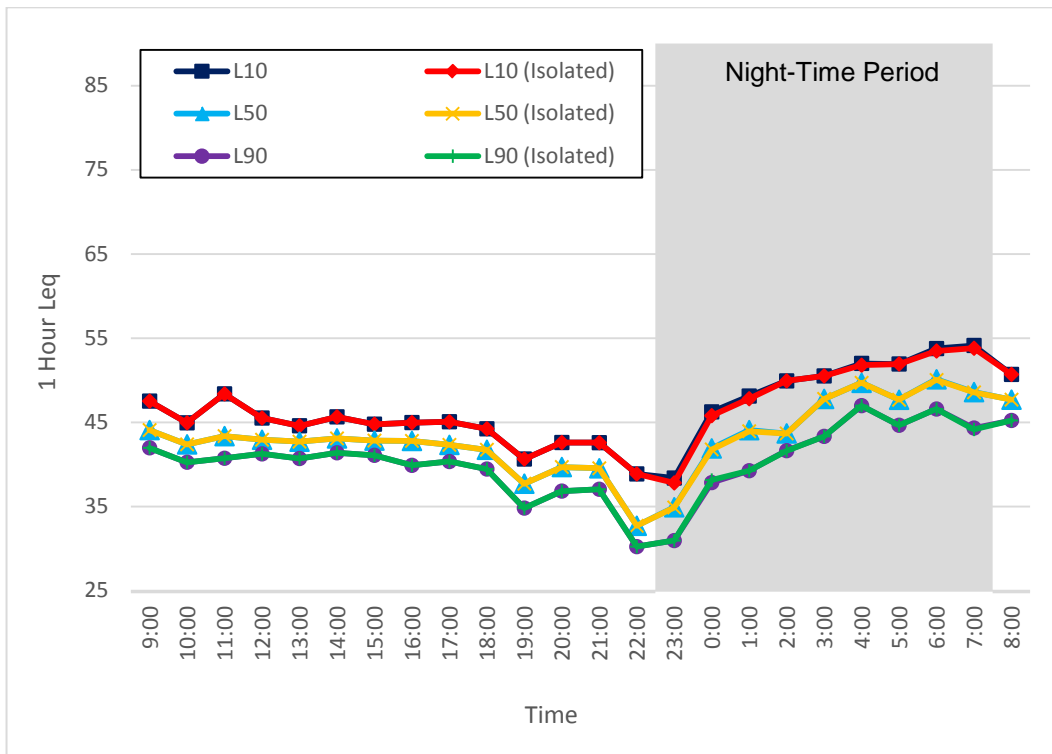


Figure 58. Noise Monitor #6, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 7 - 8, 2015)

Noise

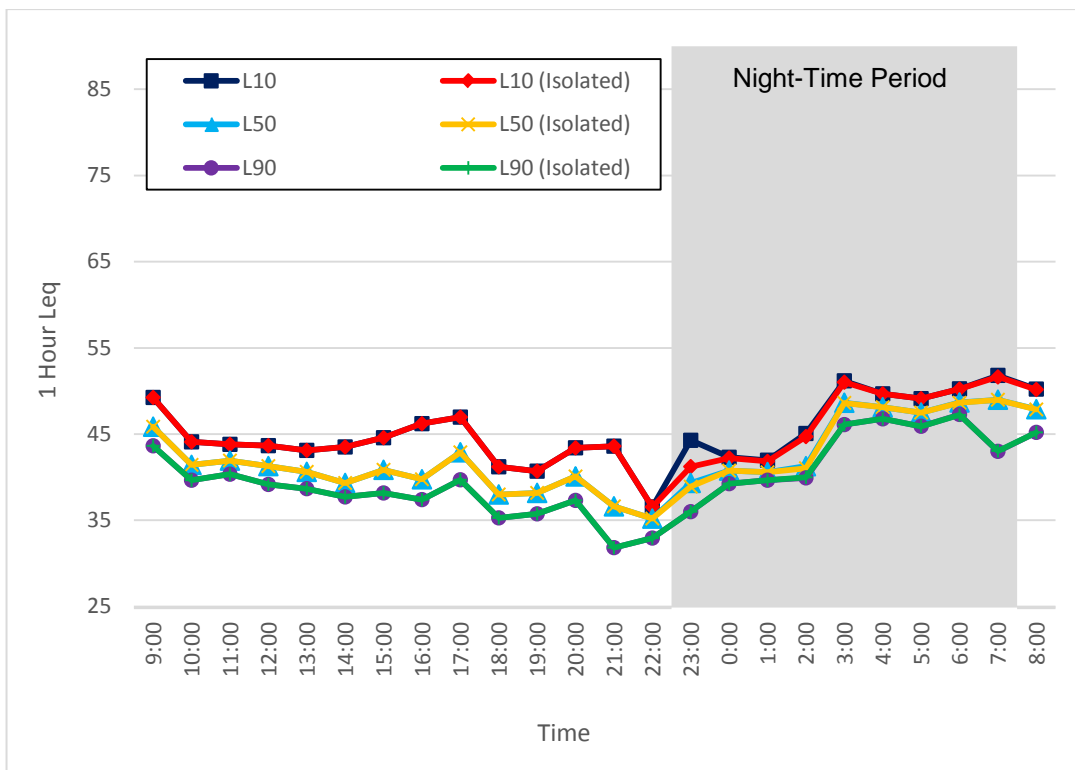
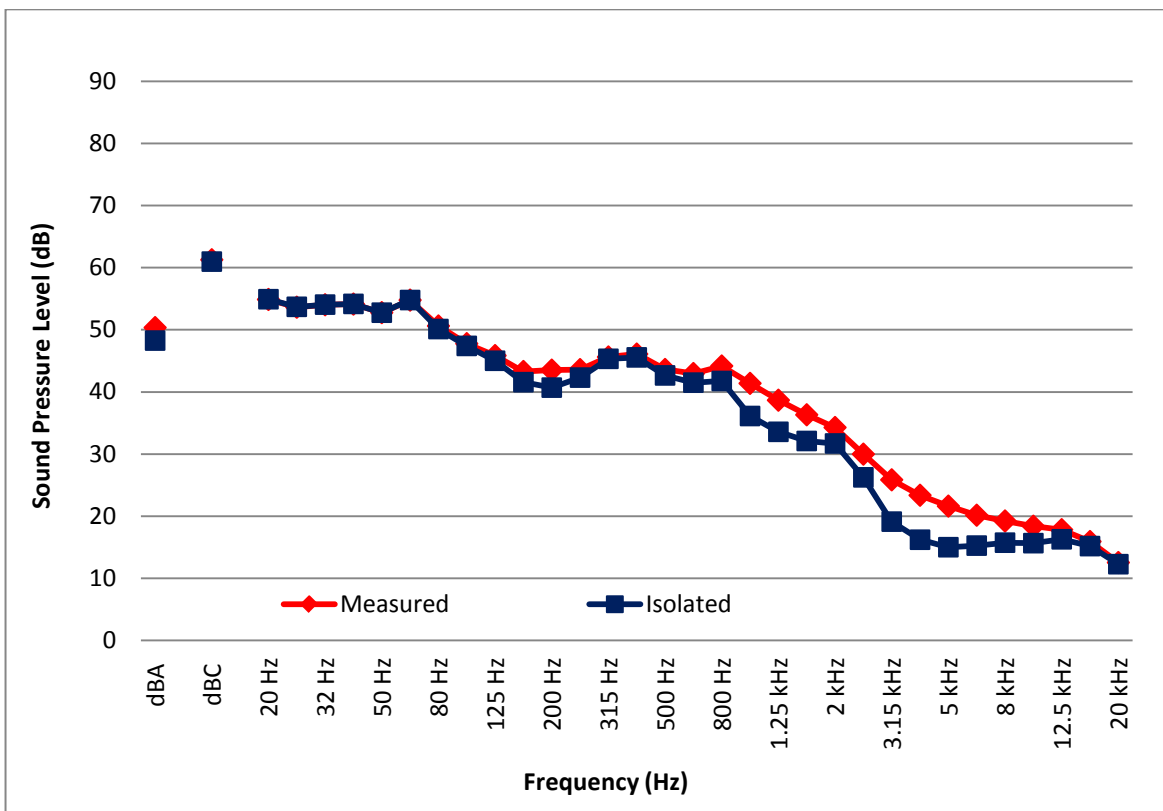
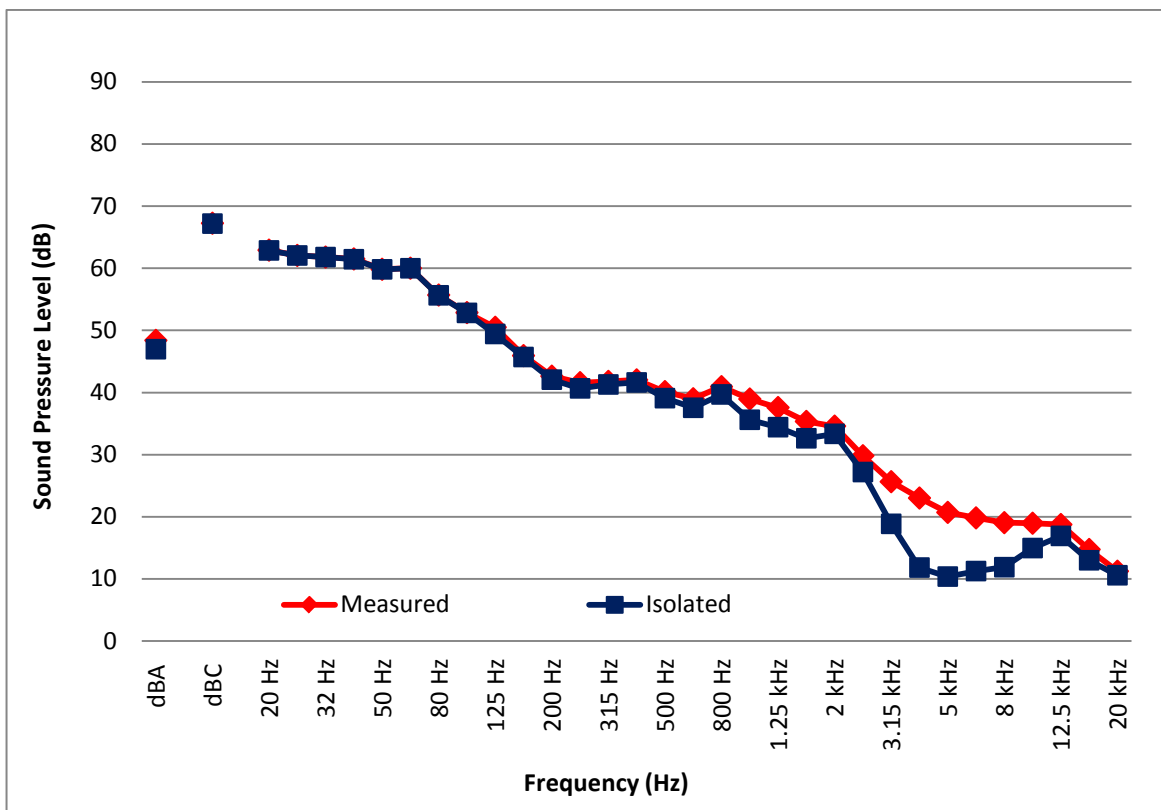


Figure 59. Noise Monitor #6, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 8 - 9, 2015)

Noise Monitor #6

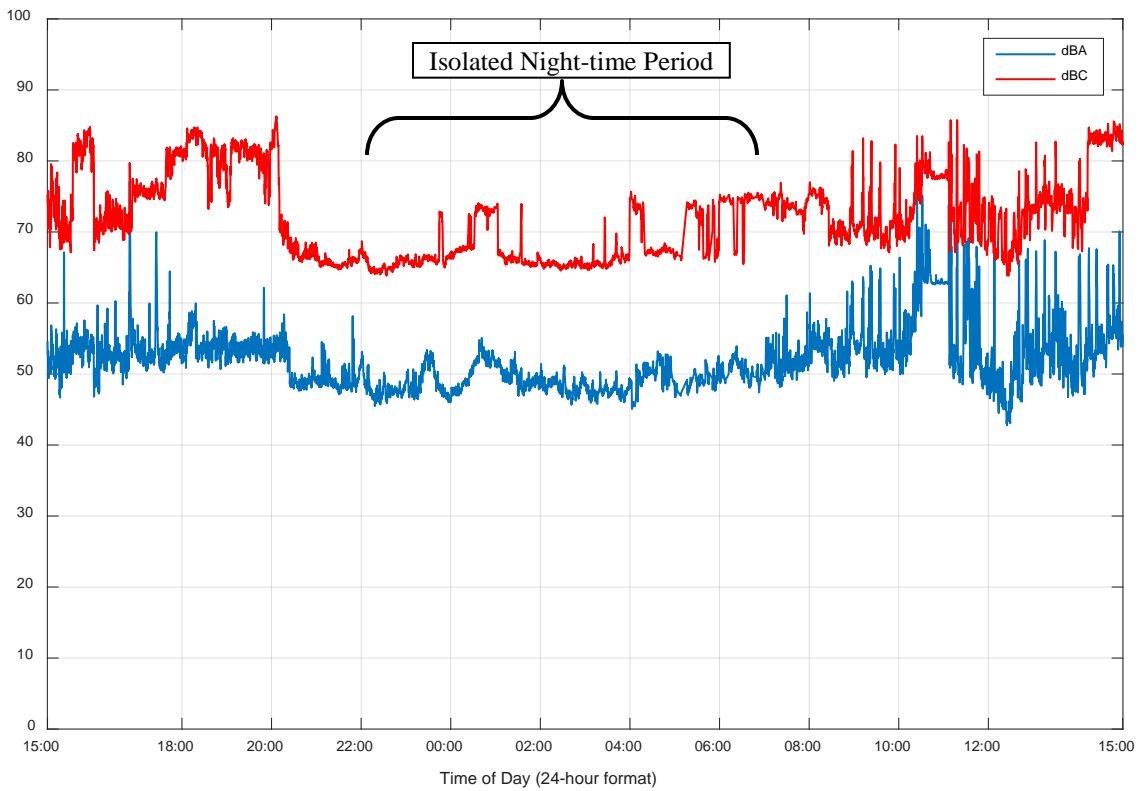


**Figure 60. Noise Monitor #6, 1/3 Octave  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

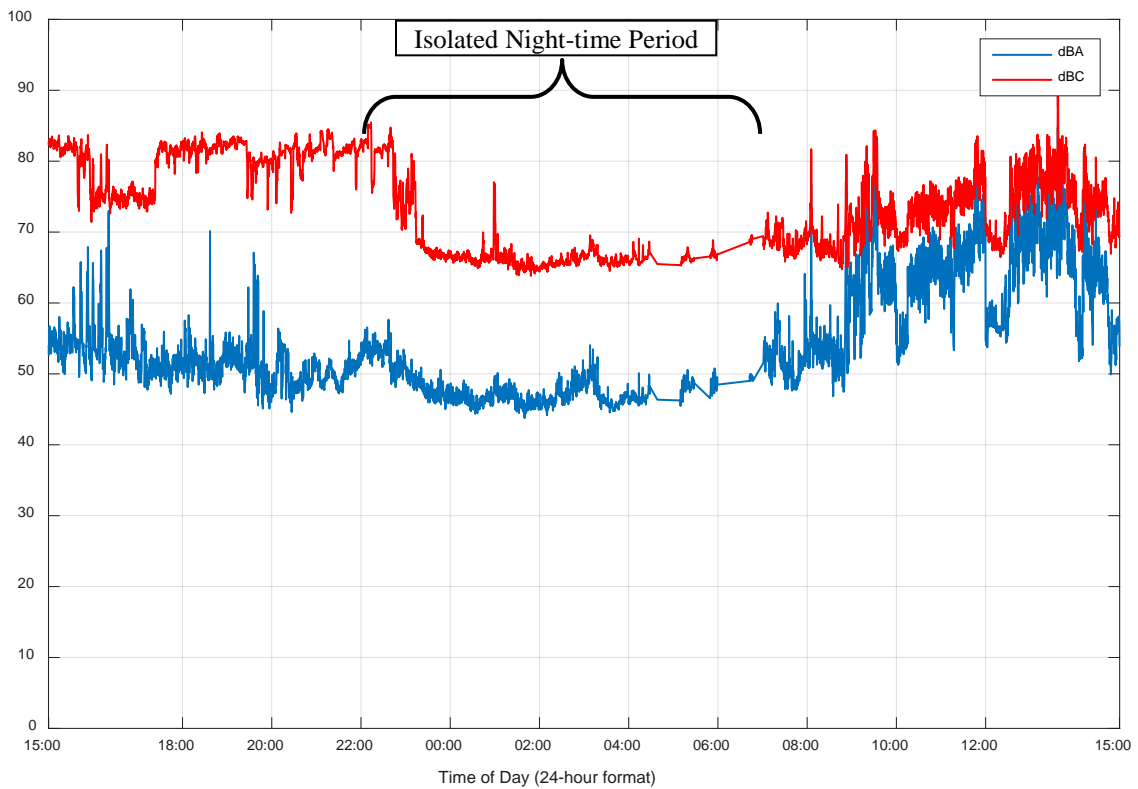


**Figure 61. Noise Monitor #6, 1/3 Octave  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #8



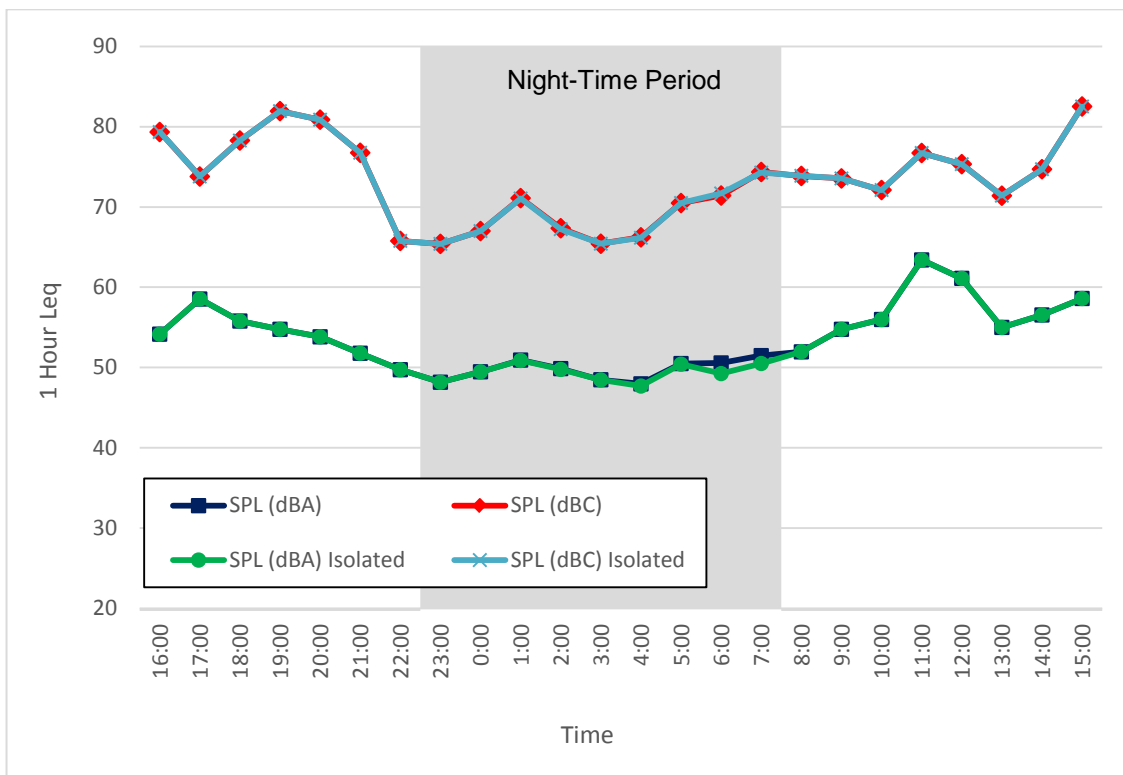
**Figure 62. Noise Monitor #8, 15-Second  $L_{eq}$  Sound Levels (July 8 – 9, 2015)**



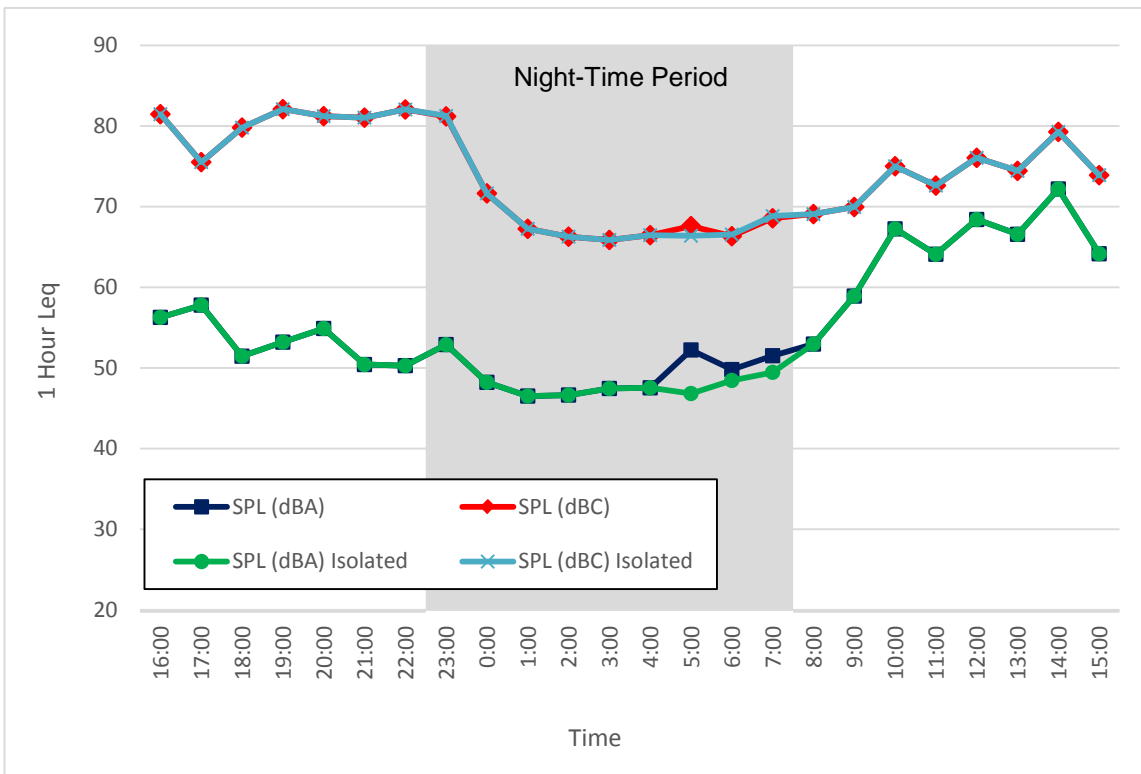
**Figure 63. Noise Monitor #8, 15-Second  $L_{eq}$  Sound Levels (July 9 – 10, 2015)**



Noise Monitor #8



**Figure 64. Noise Monitor #8, 1-Hour Leq Sound Levels (July 8 – 9, 2015)**



**Figure 65. Noise Monitor #8, 1-Hour Leq Sound Levels (July 9 – 10, 2015)**

Monitor #8

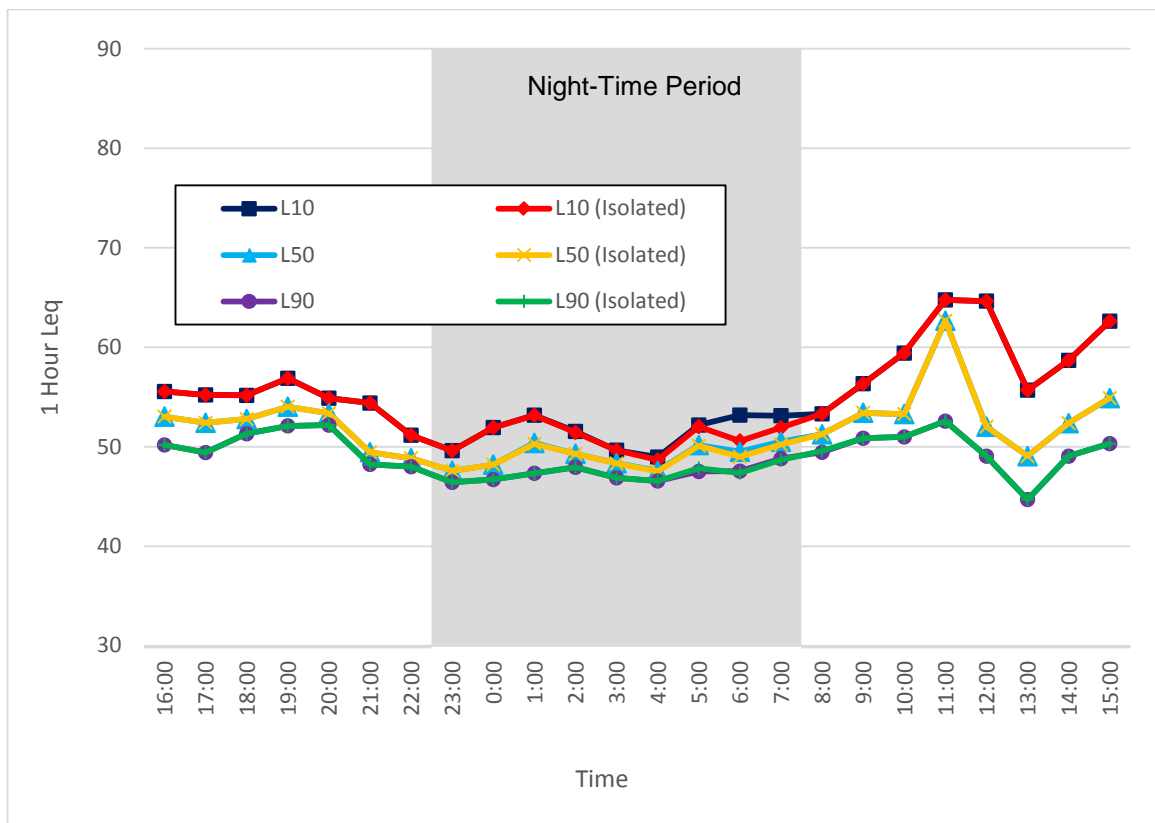


Figure 66. Noise Monitor #8, 1-Hour  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$   $L_{eq}$  Sound Levels (July 8 – 9, 2015)

Noise

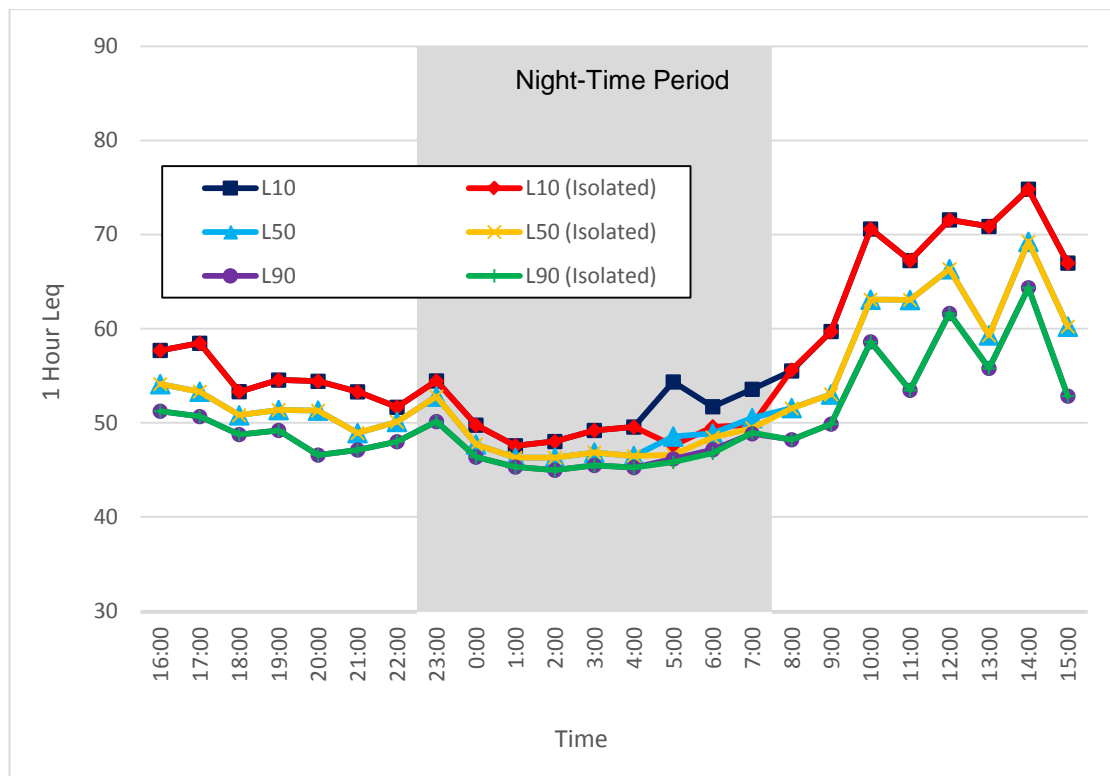
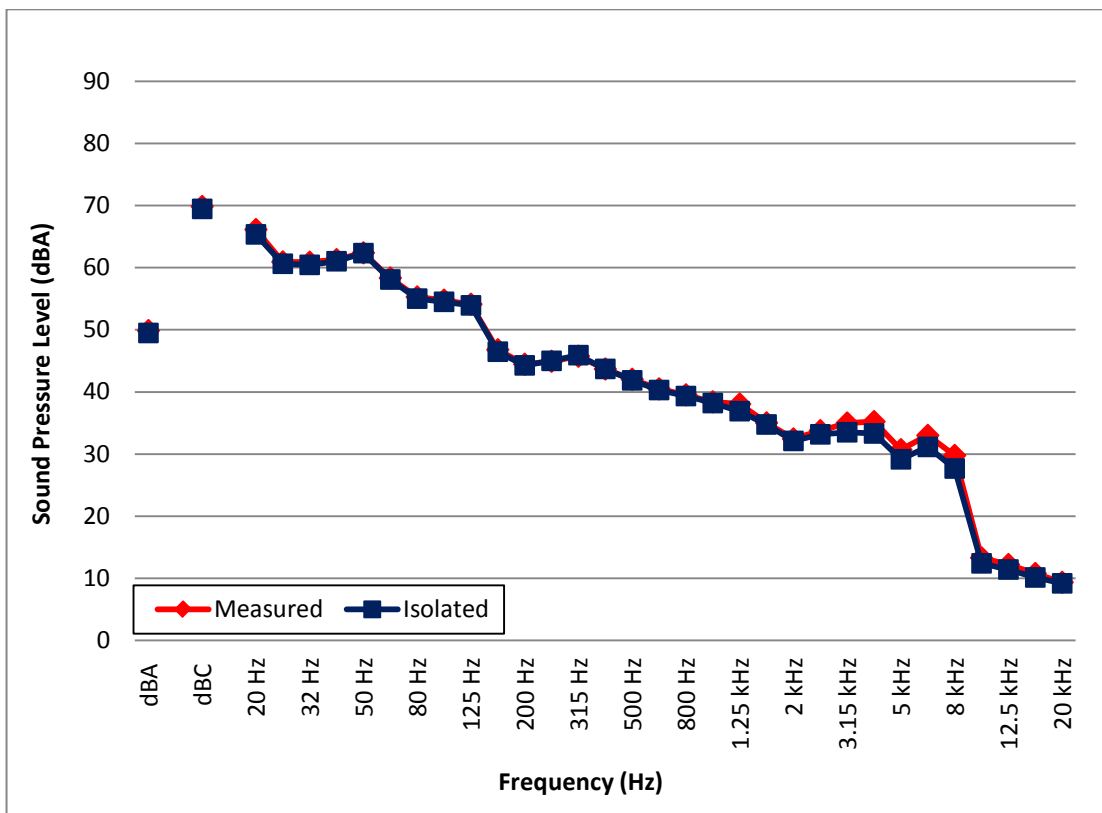
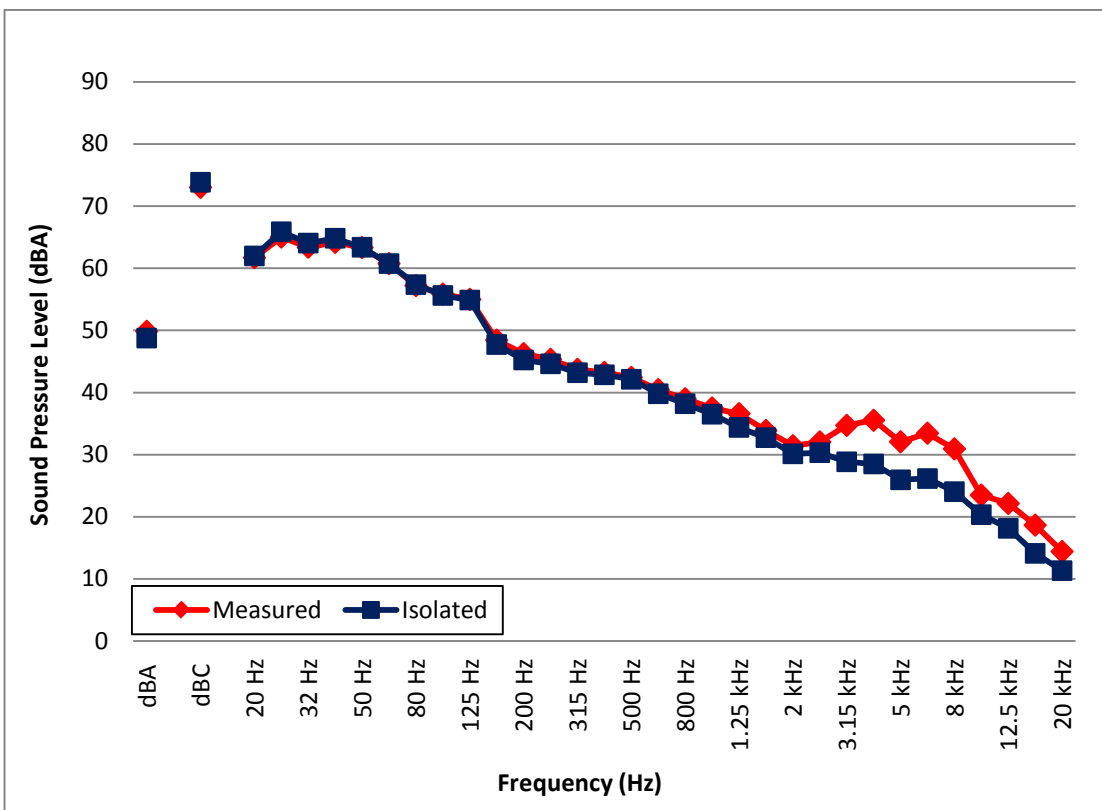


Figure 67. Noise Monitor #8, 1-Hour  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$   $L_{eq}$  Sound Levels (July 9 – 10, 2015)

Noise Monitor #8

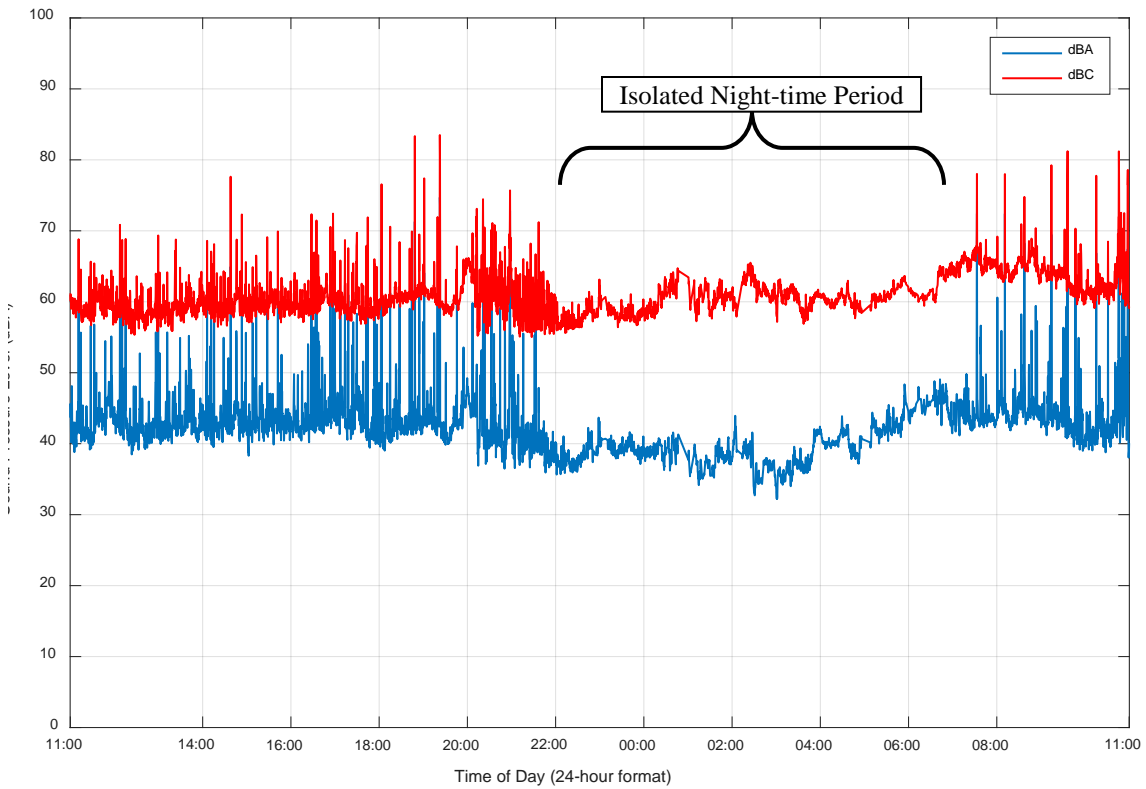


**Figure 68. Noise Monitor #8, 1/3 Octave  $L_{eq}$  Sound Levels (July 8 – 9, 2015)**

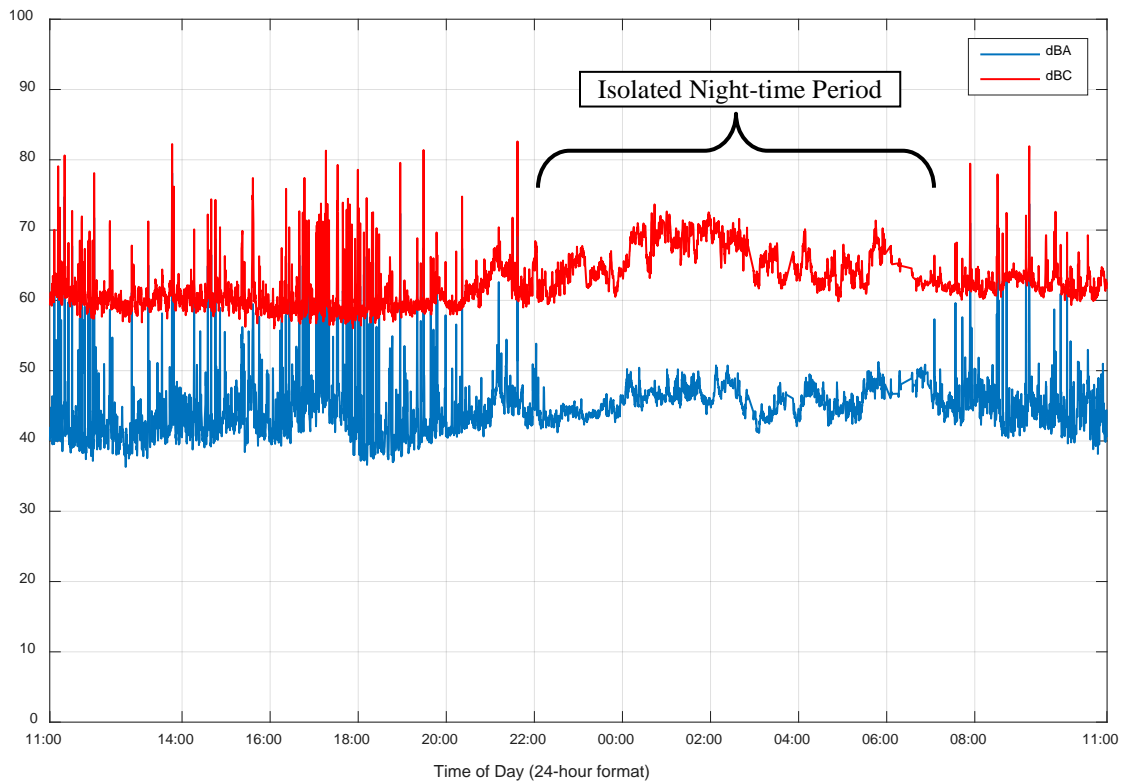


**Figure 69. Noise Monitor #8, 1/3 Octave  $L_{eq}$  Sound Levels (July 9 – 10, 2015)**

Noise Monitor #9

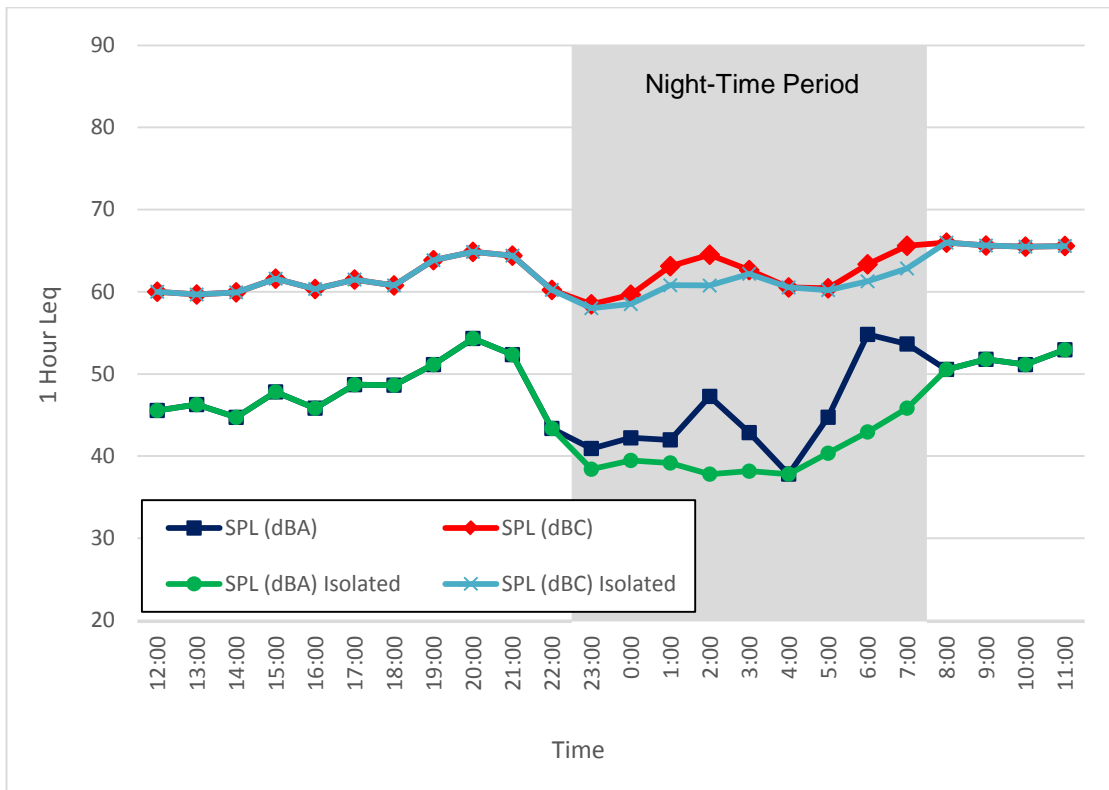


**Figure 70. Noise Monitor #9, 15-Second  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**

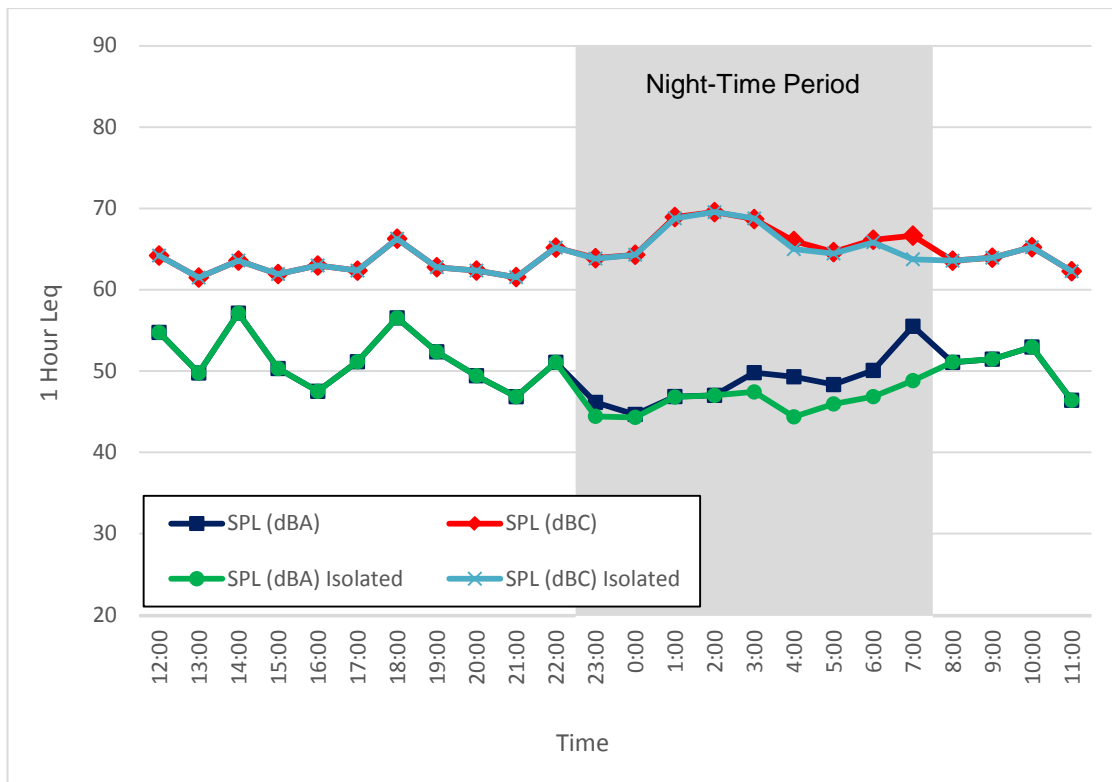


**Figure 71. Noise Monitor #9, 15-Second  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

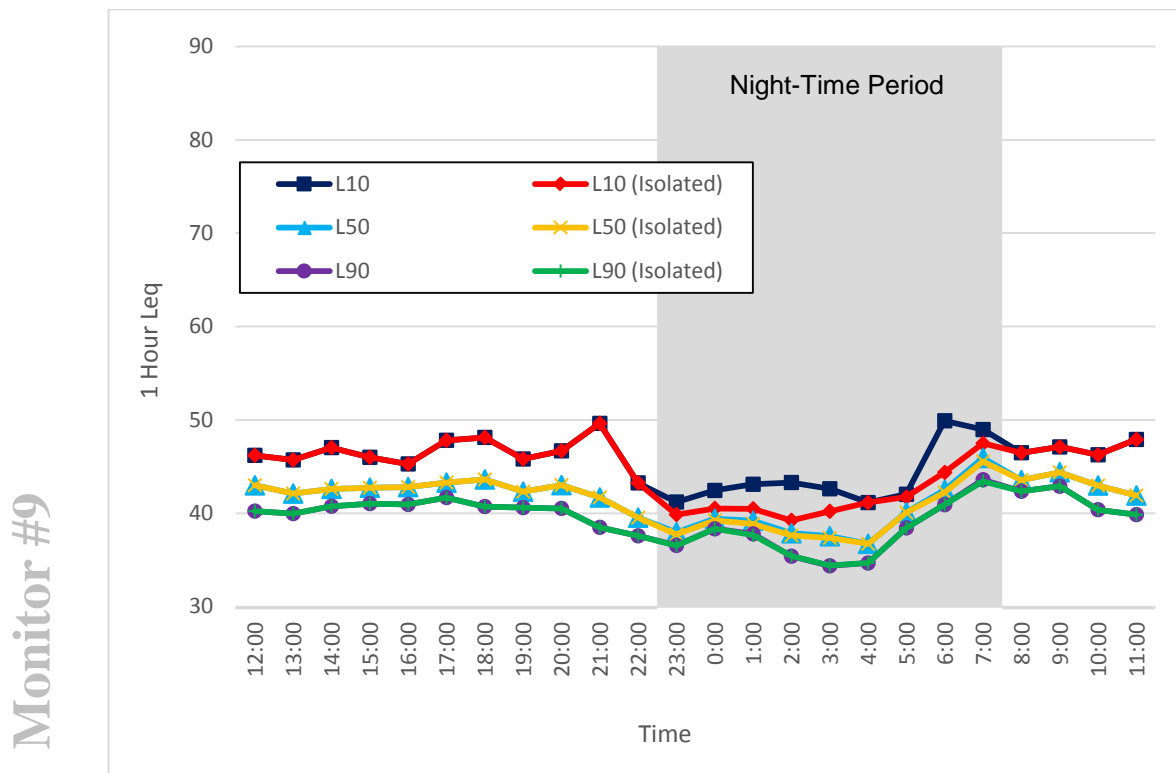
Noise Monitor #9



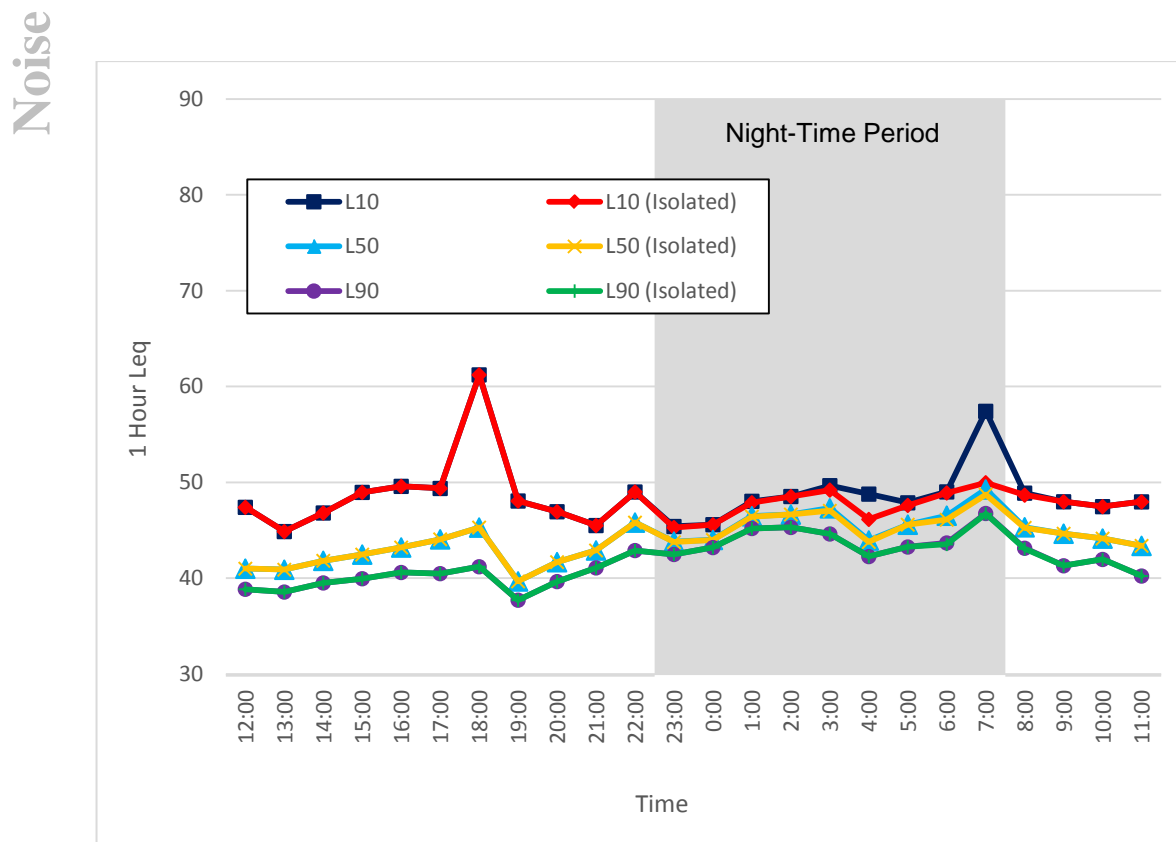
**Figure 72. Noise Monitor #9, 1-Hour  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



**Figure 73. Noise Monitor #9, 1-Hour  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

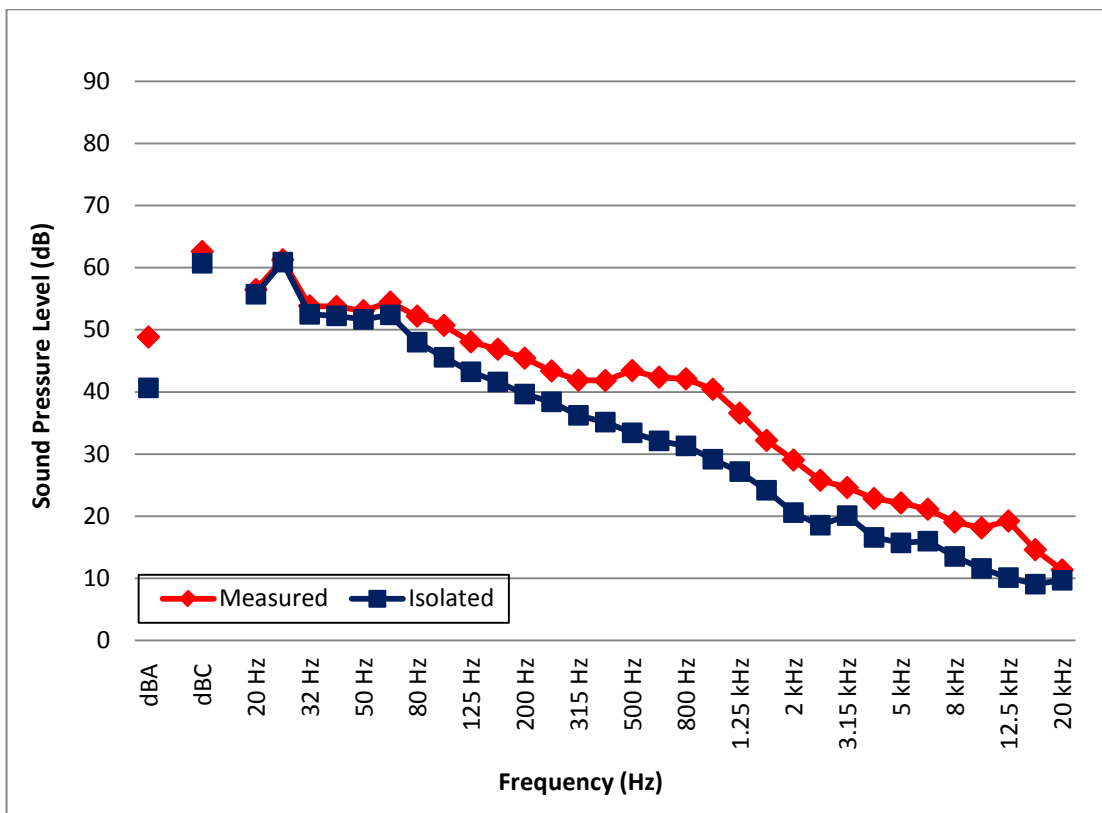


**Figure 74. Noise Monitor #9, 1-Hour  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$   $L_{eq}$  Sound Levels (August 9 - 10, 2015)**

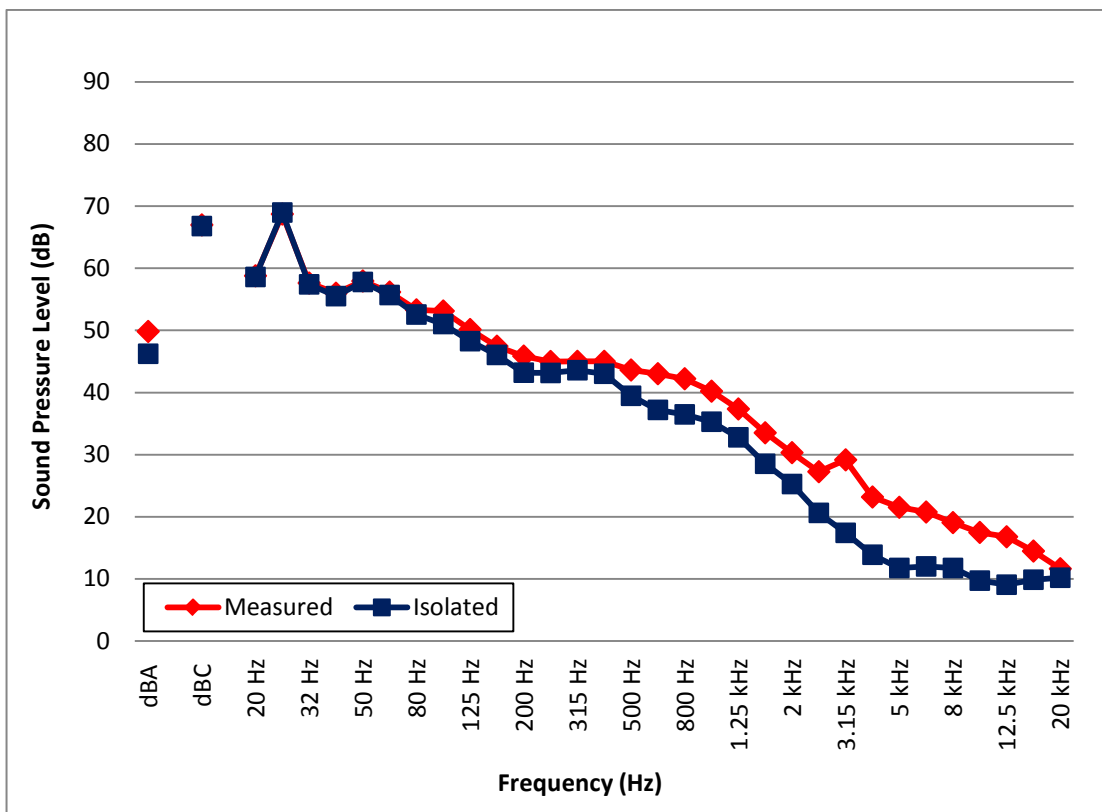


**Figure 75. Noise Monitor #9, 1-Hour  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$   $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Noise Monitor #9

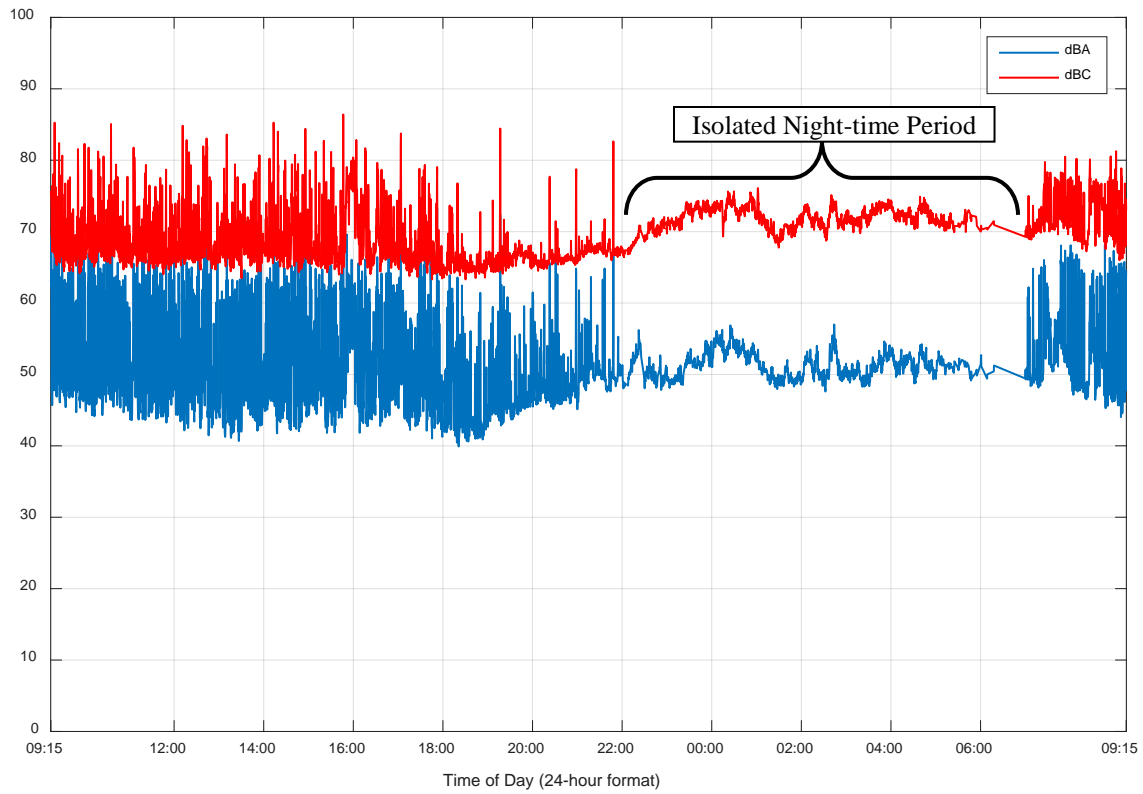


**Figure 76. Noise Monitor #9, 1/3 Octave  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**

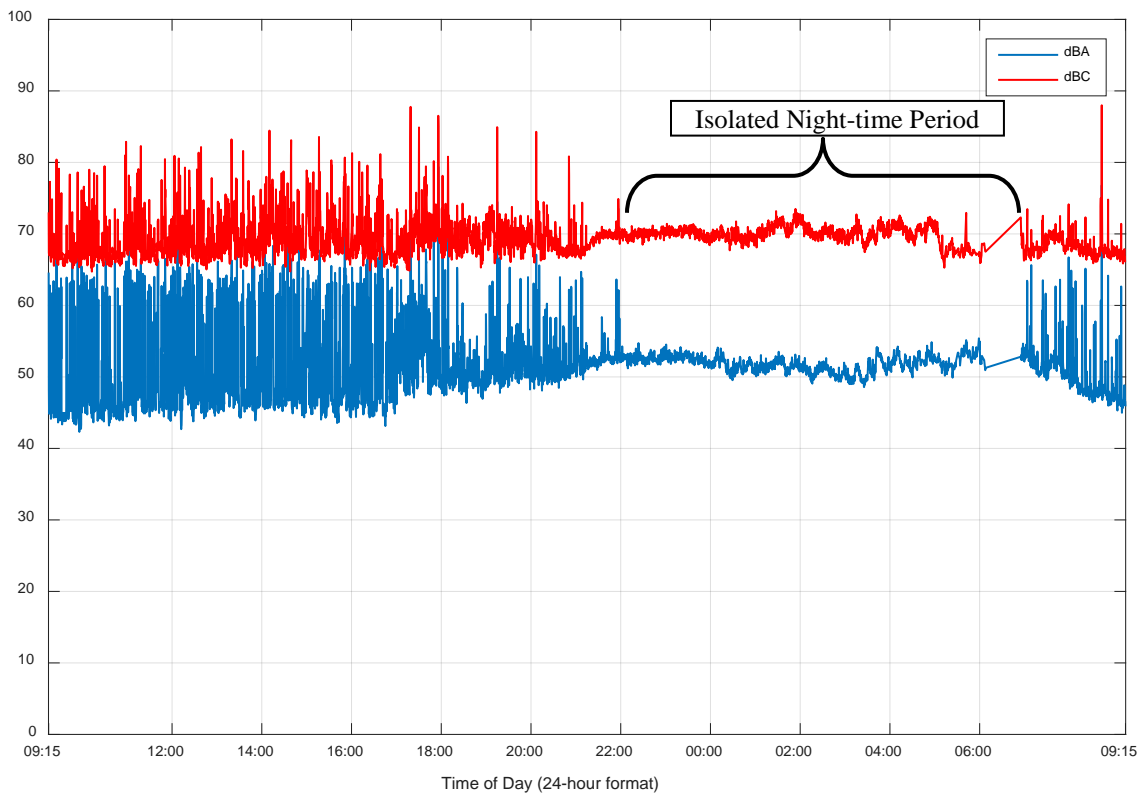


**Figure 77. Noise Monitor #9, 1/3 Octave  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Noise Monitor #10



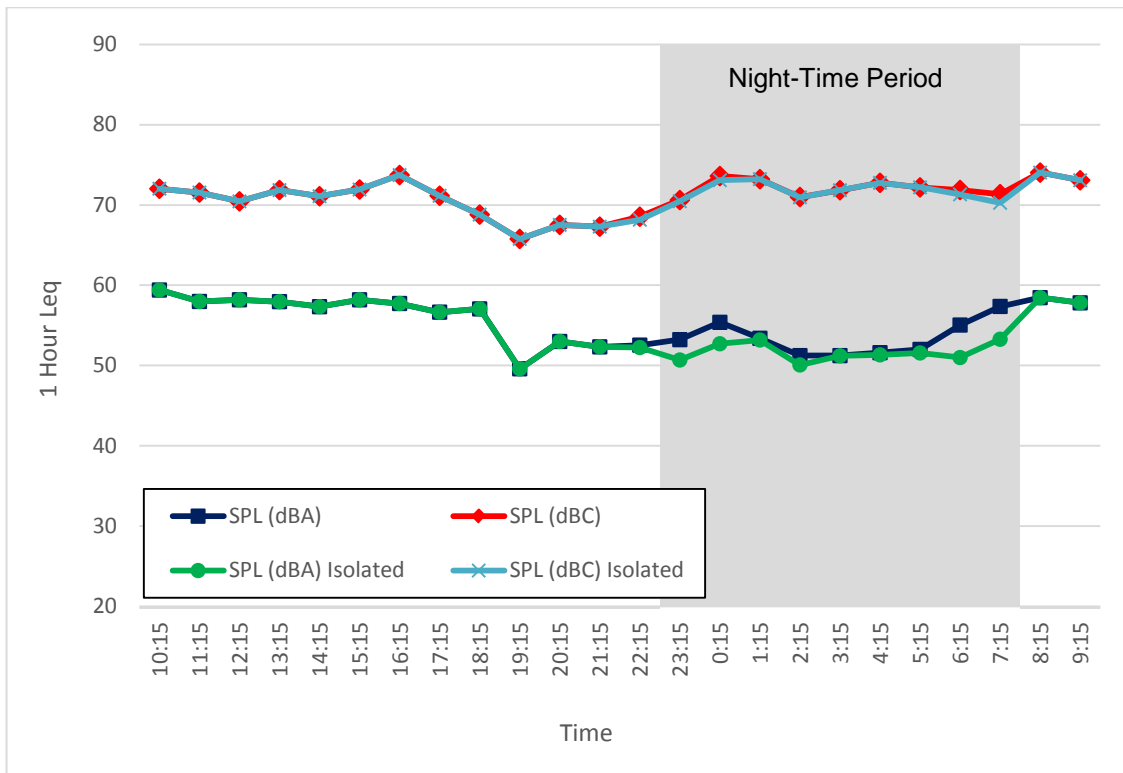
**Figure 78. Noise Monitor #10, 15-Second  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



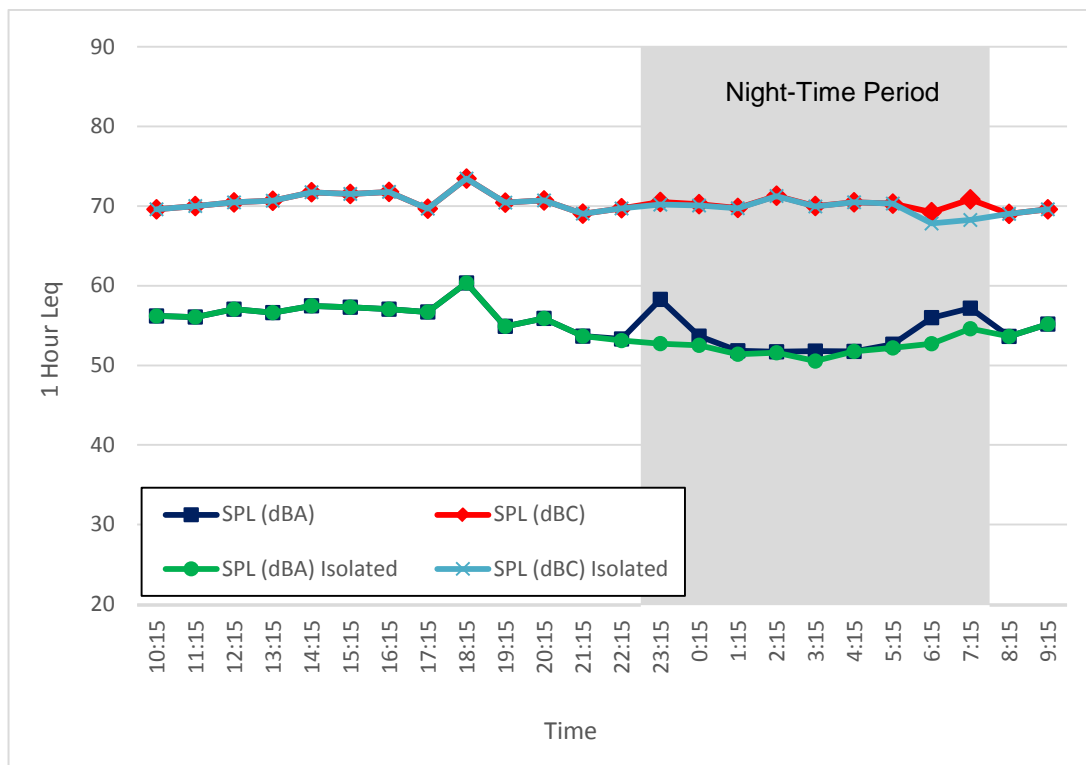
**Figure 79. Noise Monitor #10, 15-Second  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**



Noise Monitor #10

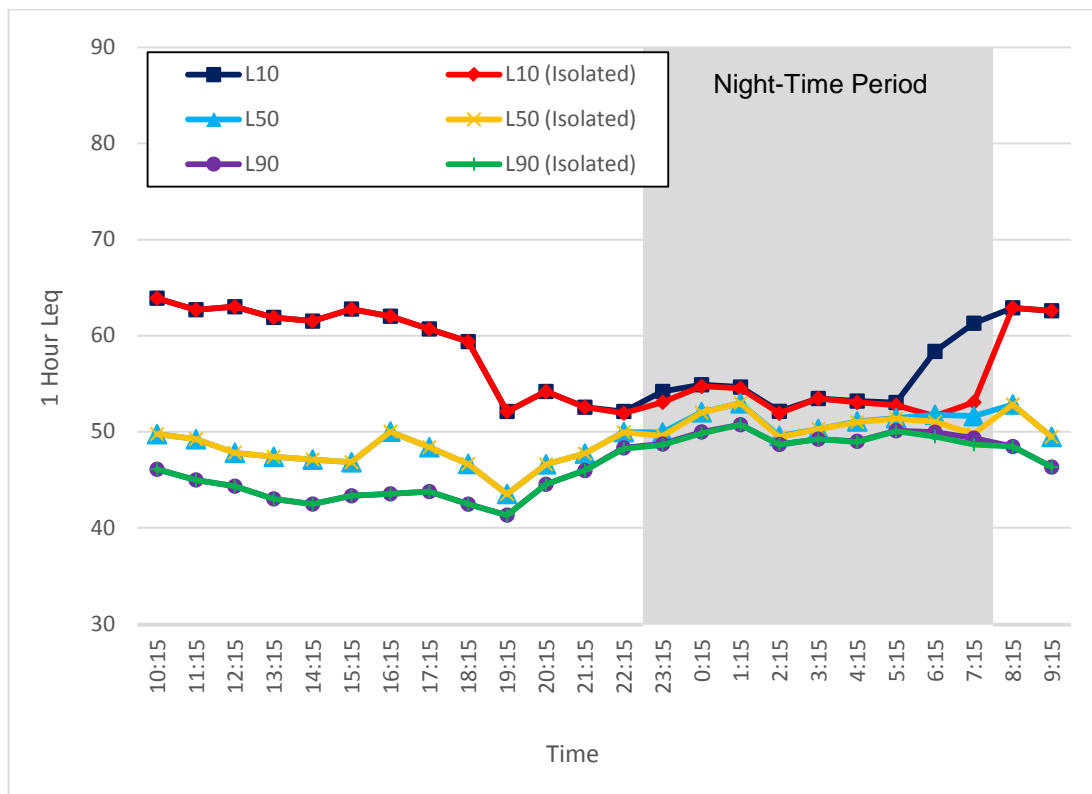


**Figure 80. Noise Monitor #10, 1-Hour  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



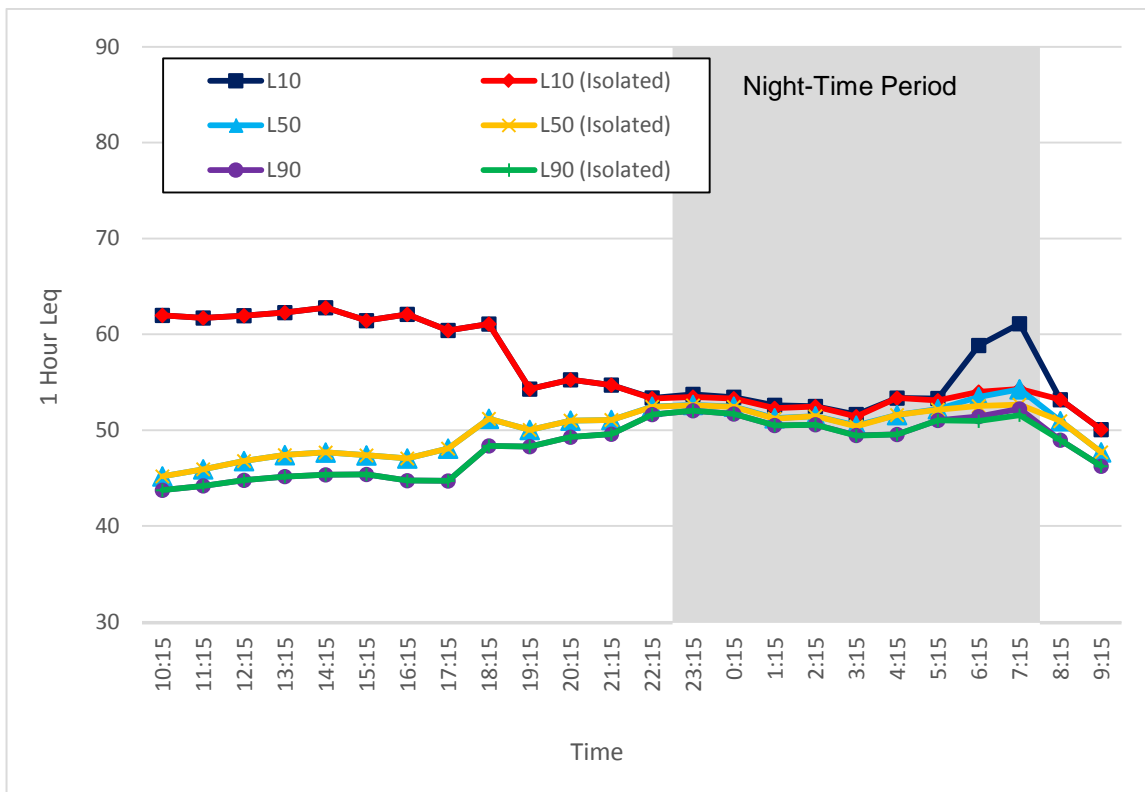
**Figure 81. Noise Monitor #10, 1-Hour  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Monitor #10



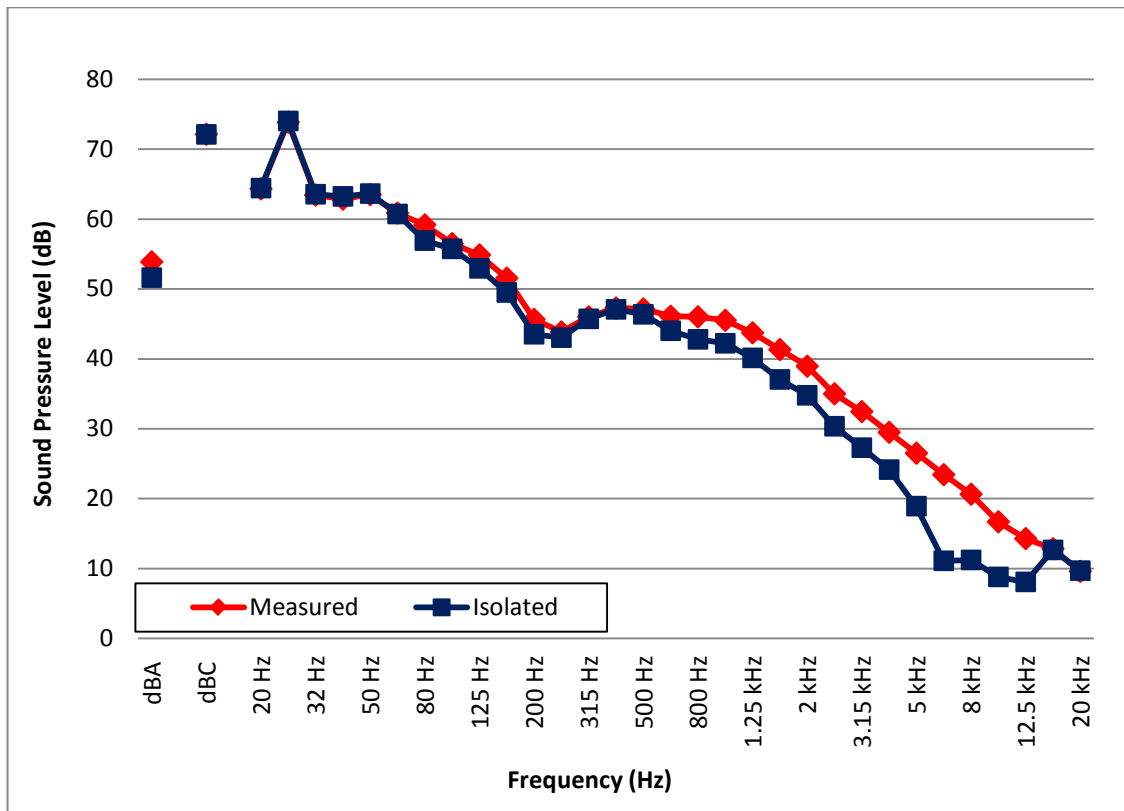
**Figure 82. Noise Monitor #10, 1-Hour  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$   $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

Noise

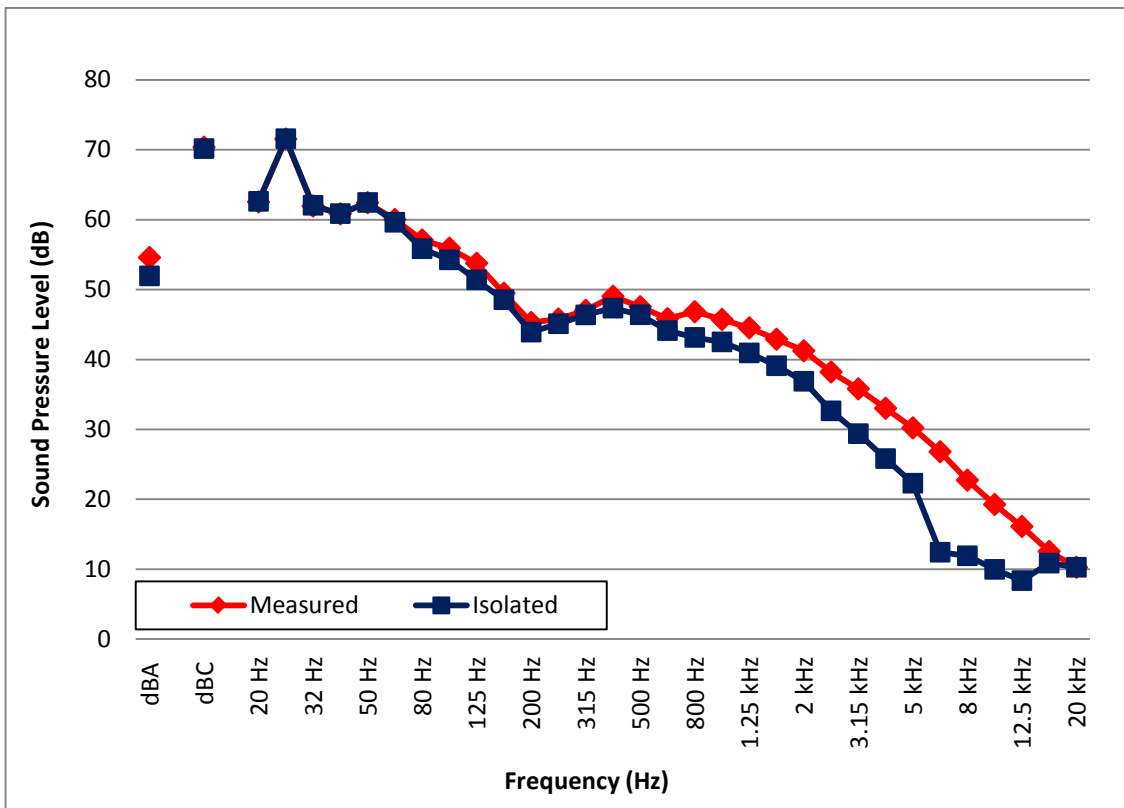


**Figure 83. Noise Monitor #10, 1-Hour  $L_{10}$ ,  $L_{50}$ ,  $L_{90}$   $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #10

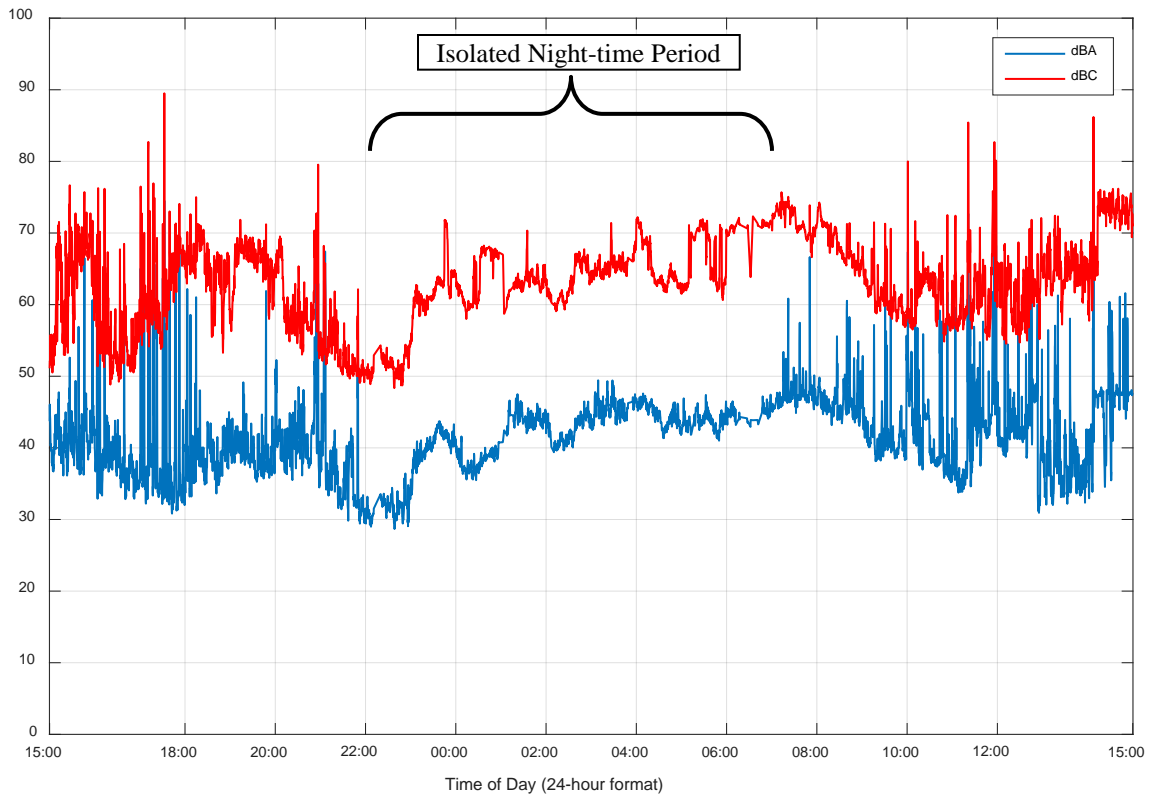


**Figure 84. Noise Monitor #10, 1/3 Octave  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

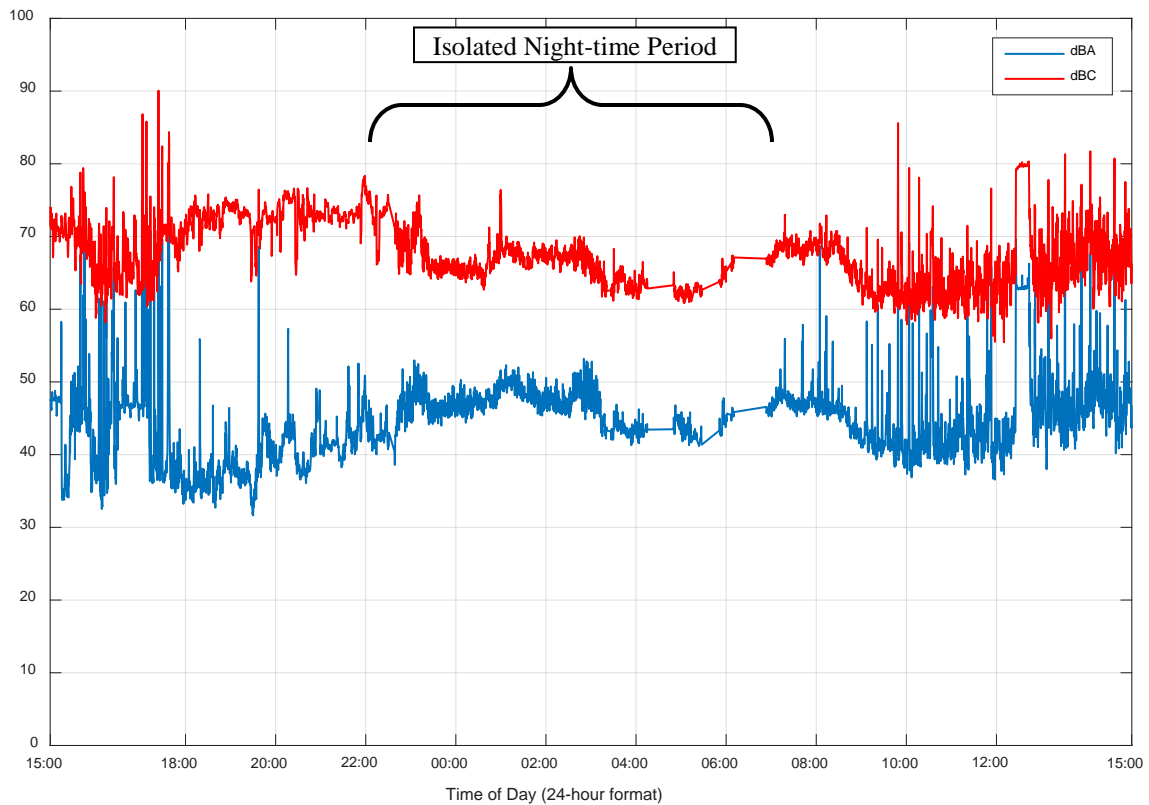


**Figure 85. Noise Monitor #10, 1/3 Octave  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #11

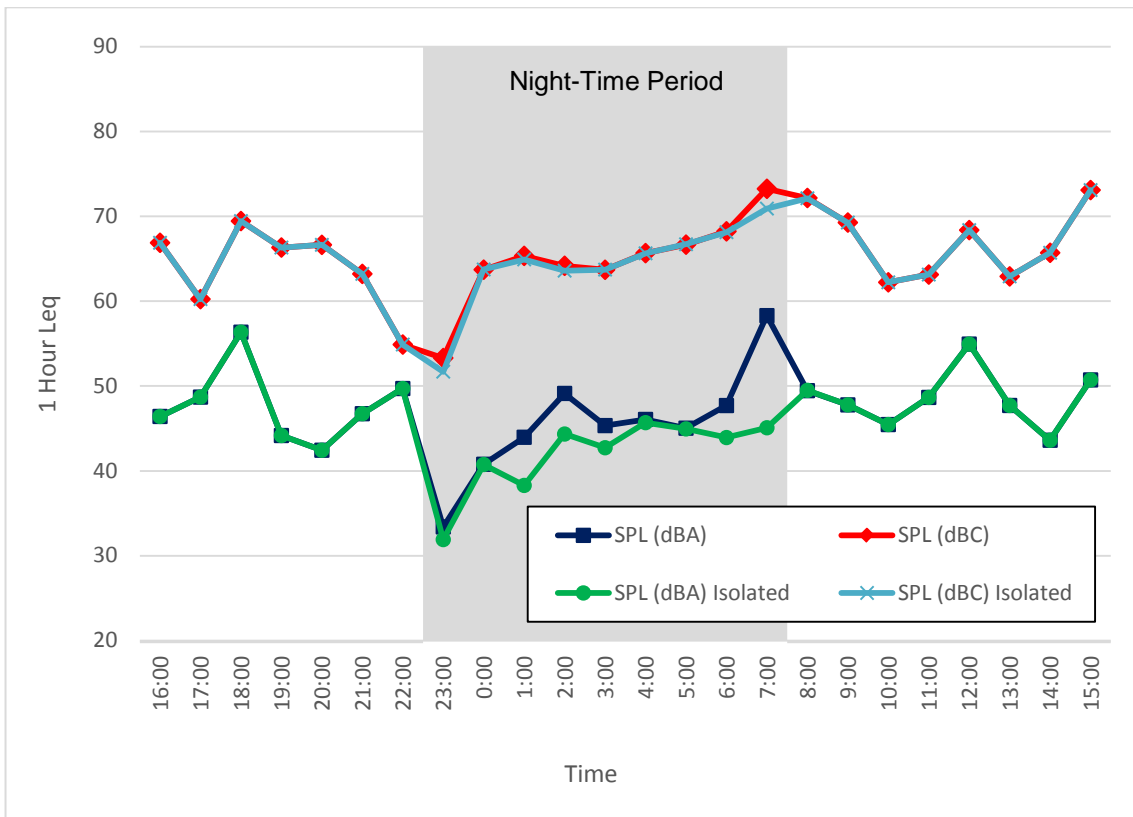


**Figure 86. Noise Monitor #11, 15-Second  $L_{eq}$  Sound Levels (July 8 - 9, 2015)**

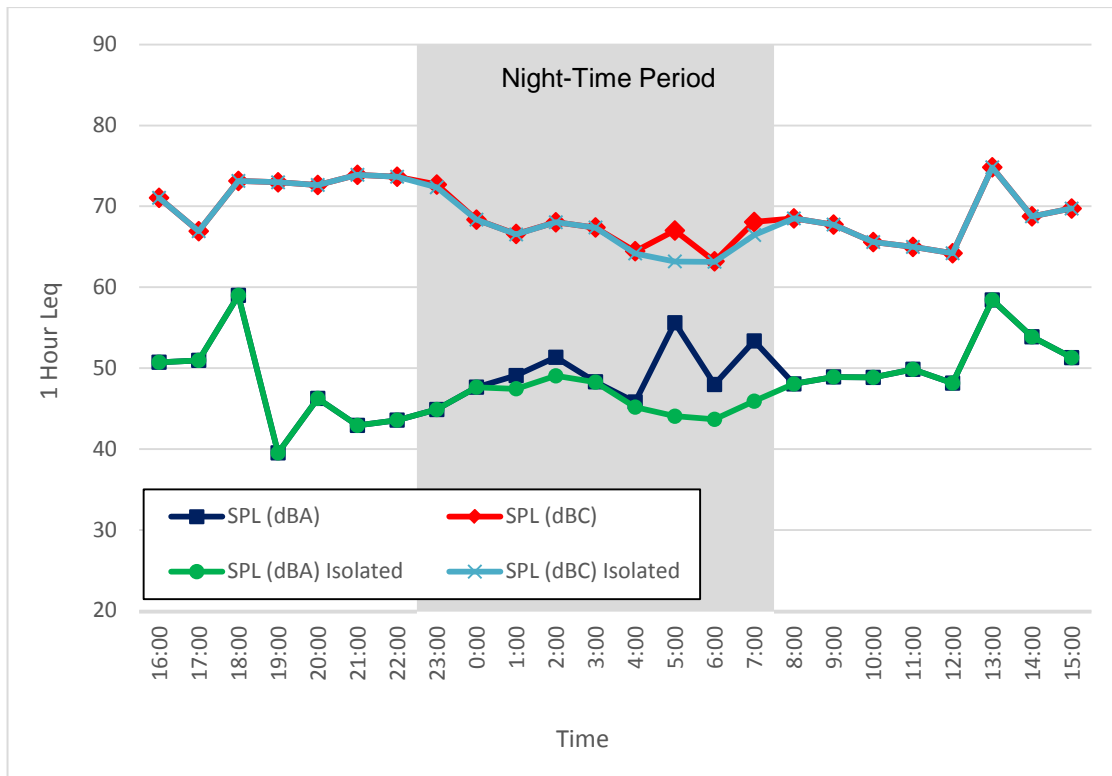


**Figure 87. Noise Monitor #11, 15-Second  $L_{eq}$  Sound Levels (July 9 - 10, 2015)**

Noise Monitor #11



**Figure 88. Noise Monitor #11, 1-Hour  $L_{eq}$  Sound Levels (July 8 - 9, 2015)**



**Figure 89. Noise Monitor #11, 1-Hour  $L_{eq}$  Sound Levels (July 9 - 10, 2015)**

Monitor #11

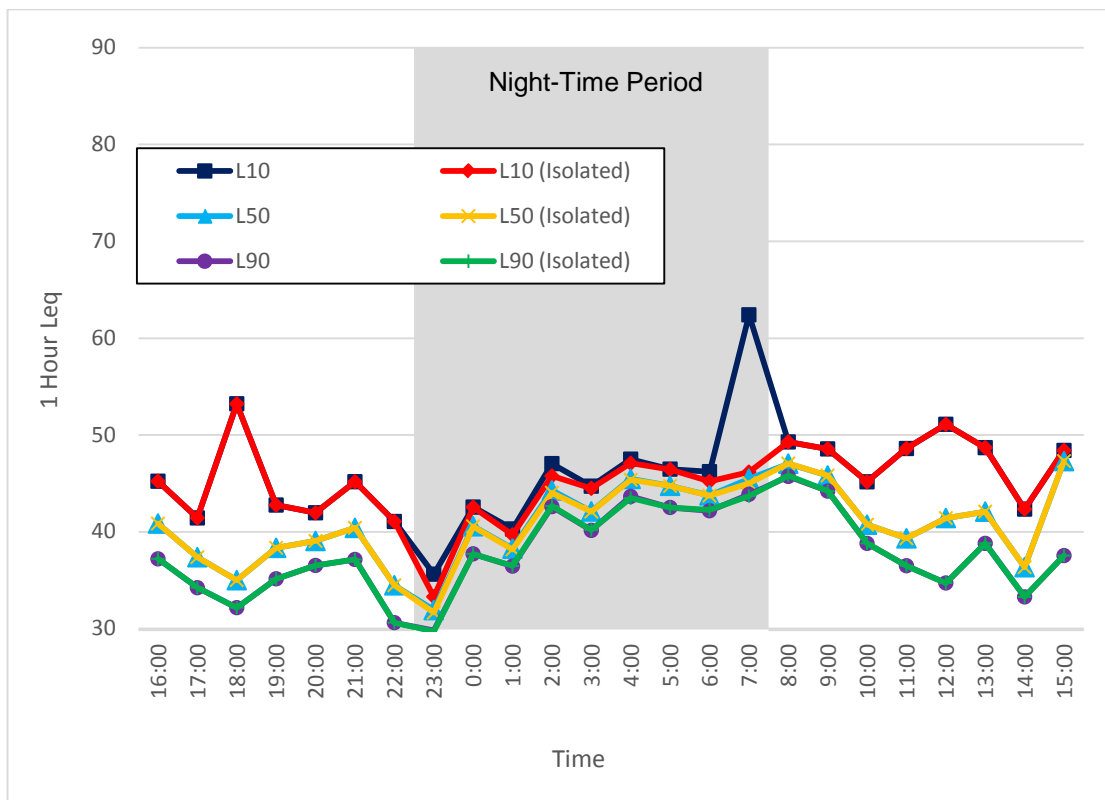


Figure 90. Noise Monitor #11, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 8 - 9, 2015)

Noise

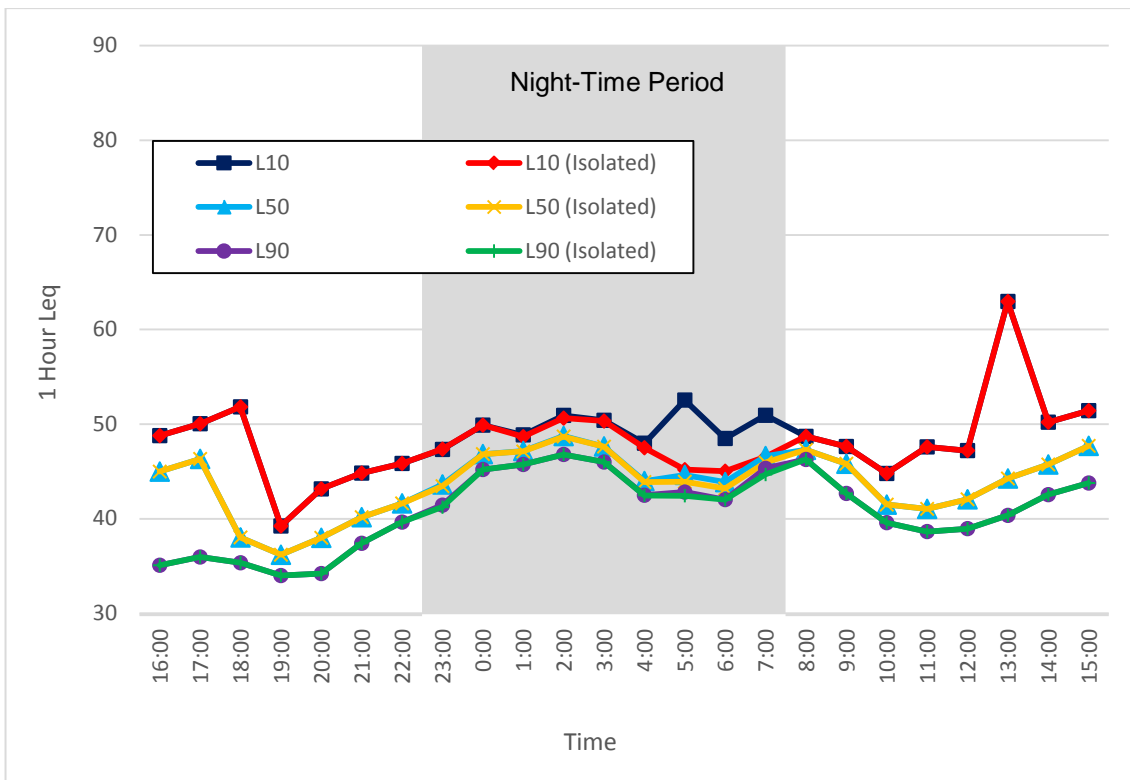
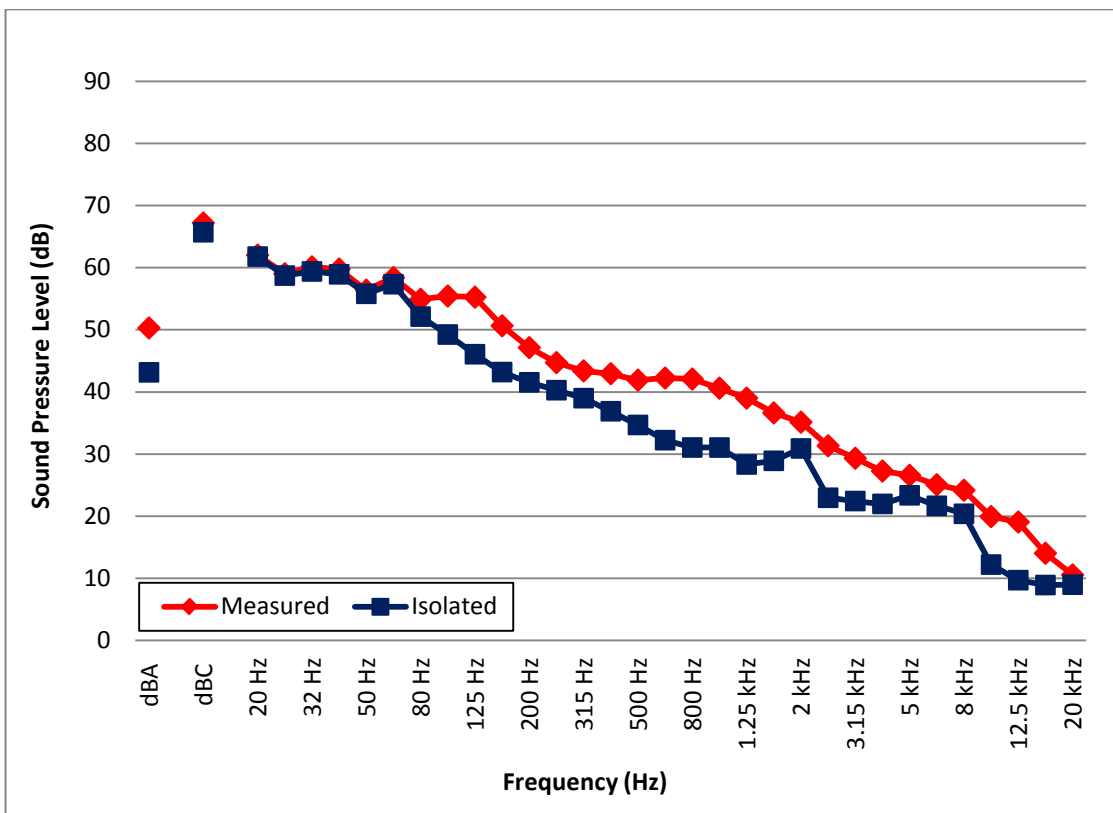
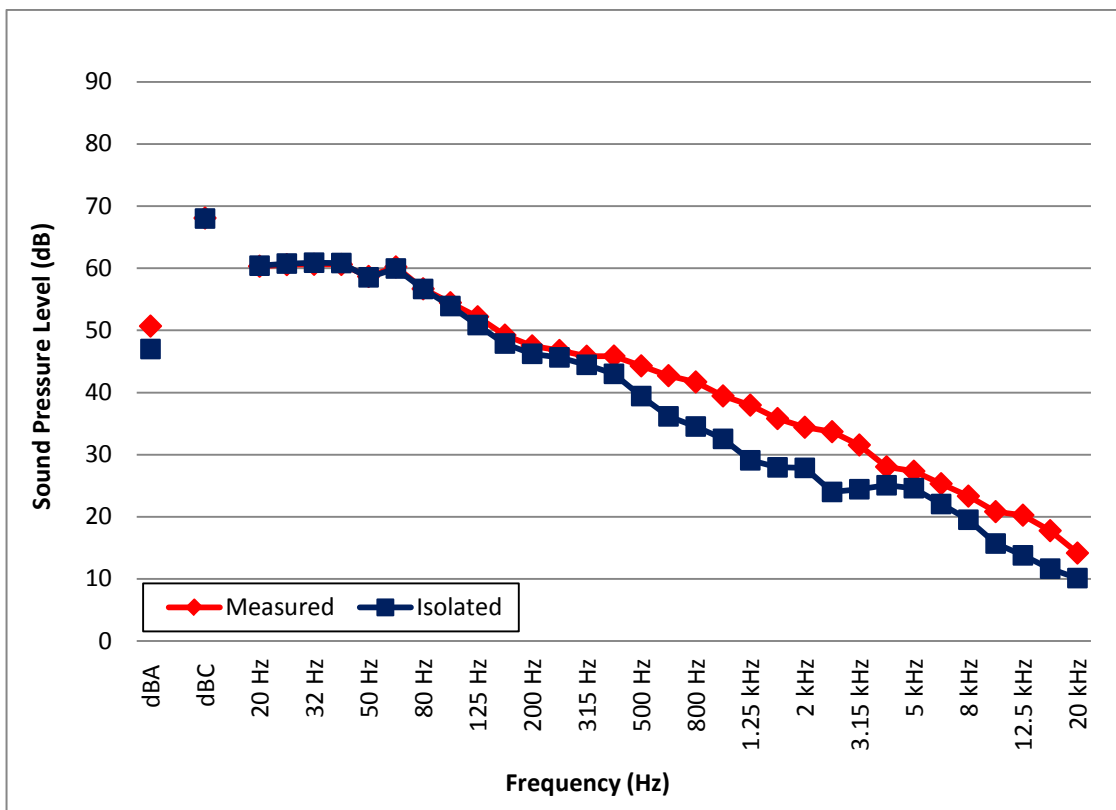


Figure 91. Noise Monitor #11, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 9 - 10, 2015)

Noise Monitor #11

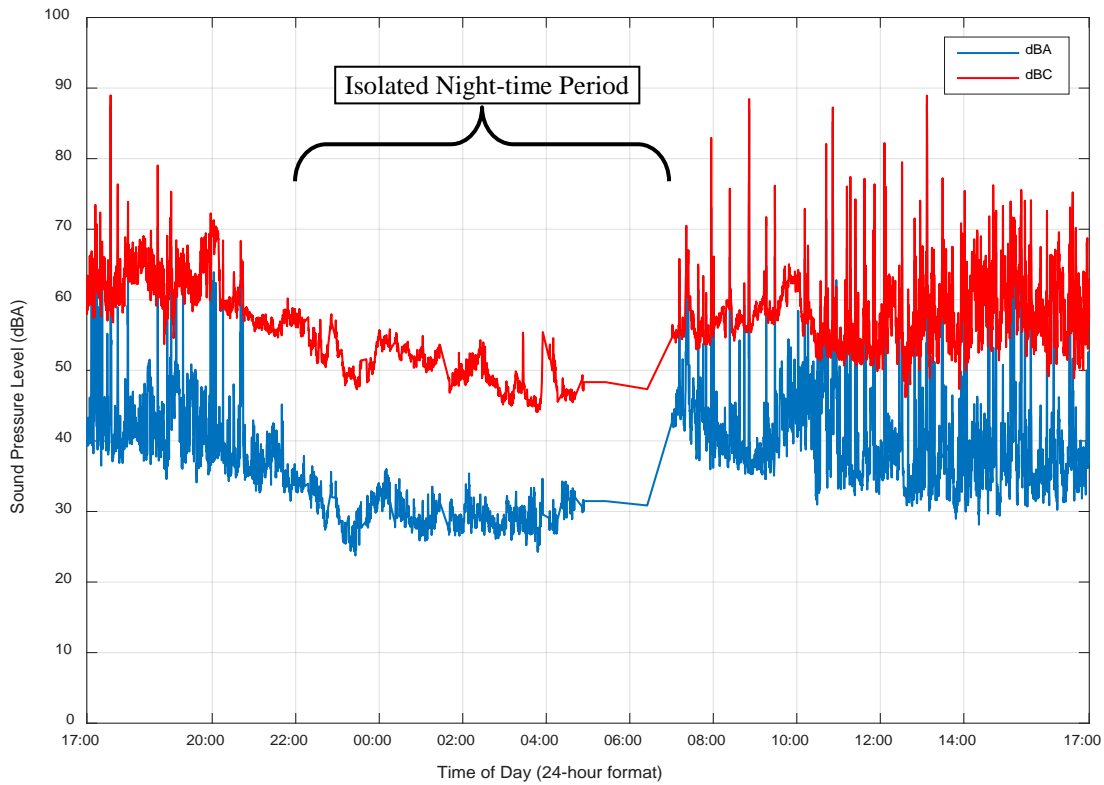


**Figure 92. Noise Monitor #11, 1/3 Octave  $L_{eq}$  Sound Levels (July 8 - 9, 2015)**

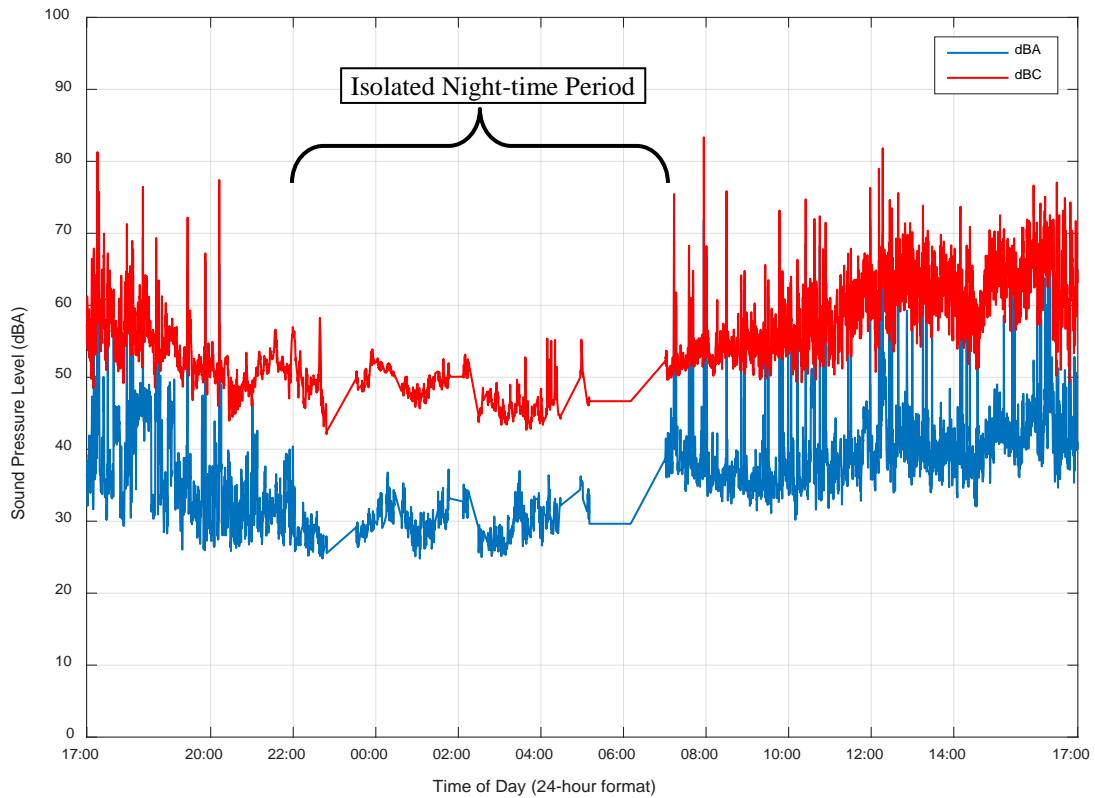


**Figure 93. Noise Monitor #11, 1/3 Octave  $L_{eq}$  Sound Levels (July 9 - 10, 2015)**

Noise Monitor #12



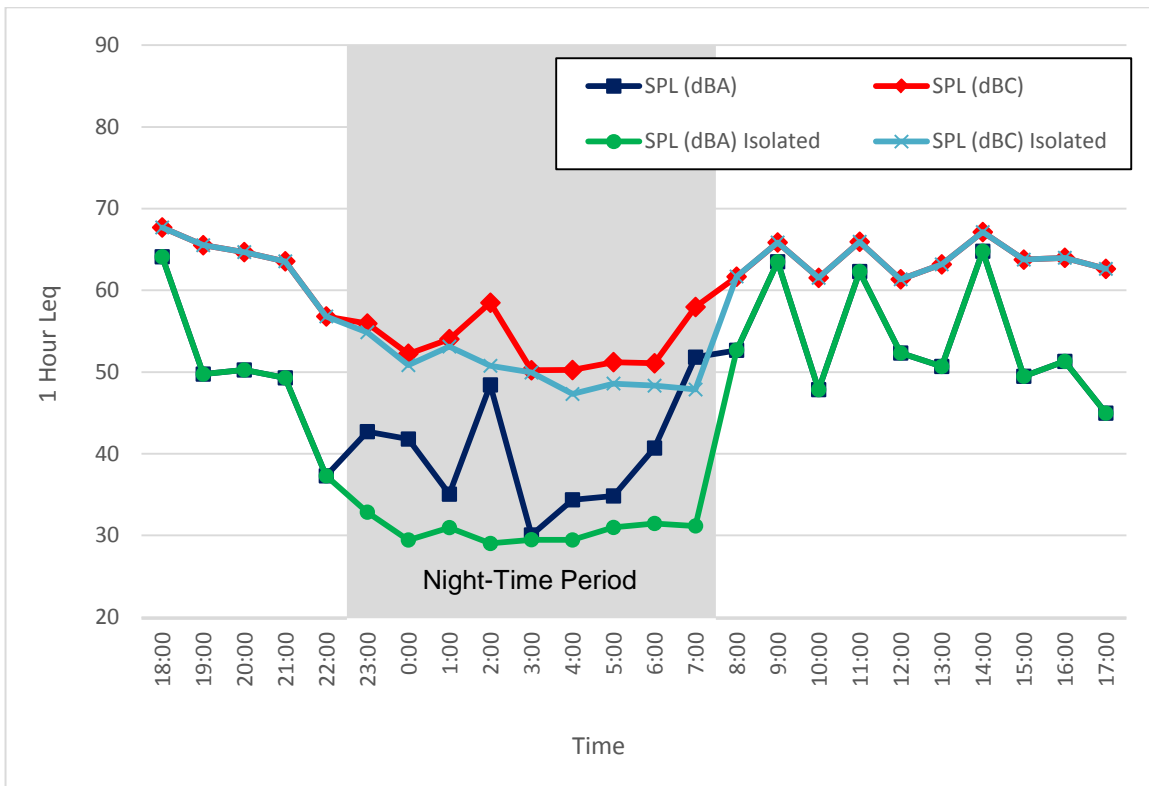
**Figure 94. Noise Monitor #12, 15-Second  $L_{eq}$  Sound Levels (July 8 - 9, 2015)**



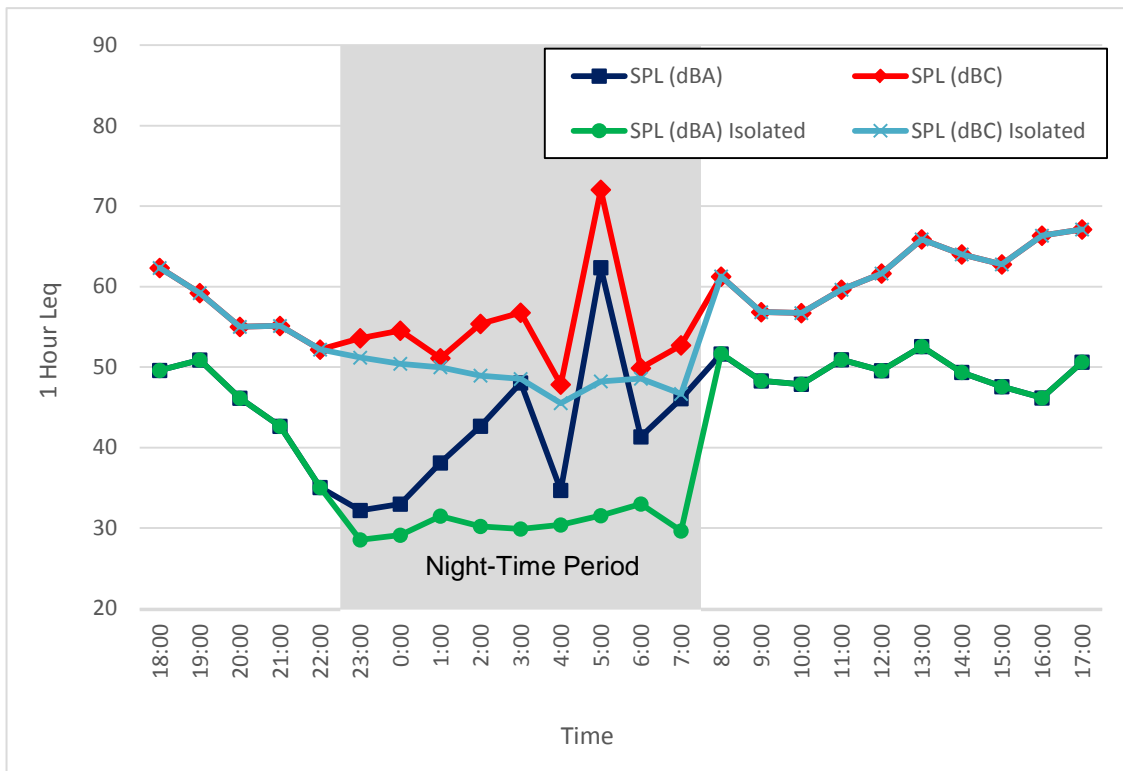
**Figure 95. Noise Monitor #12, 15-Second  $L_{eq}$  Sound Levels (July 9 - 10, 2015)**



Noise Monitor #12



**Figure 96. Noise Monitor #12, 1-Hour  $L_{eq}$  Sound Levels (July 8 - 9, 2015)**



**Figure 97. Noise Monitor #12, 1-Hour  $L_{eq}$  Sound Levels (July 9 - 10, 2015)**

Monitor #12

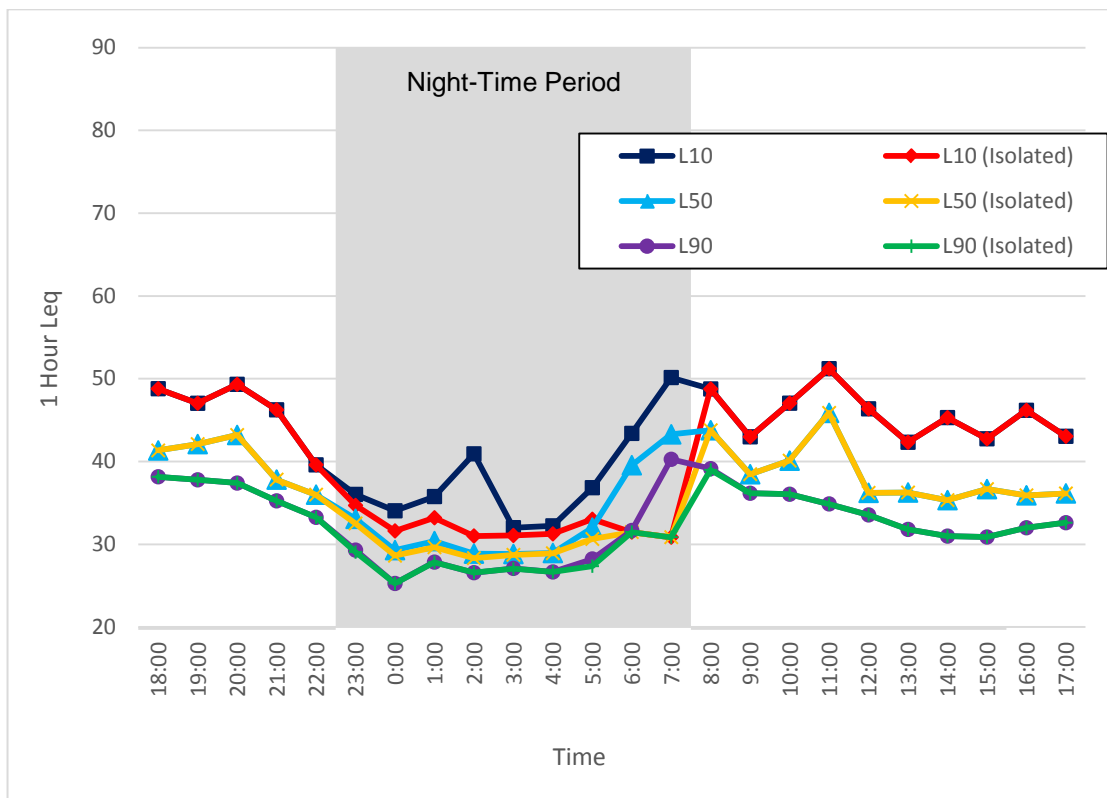


Figure 98. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 8 - 9, 2015)

Noise

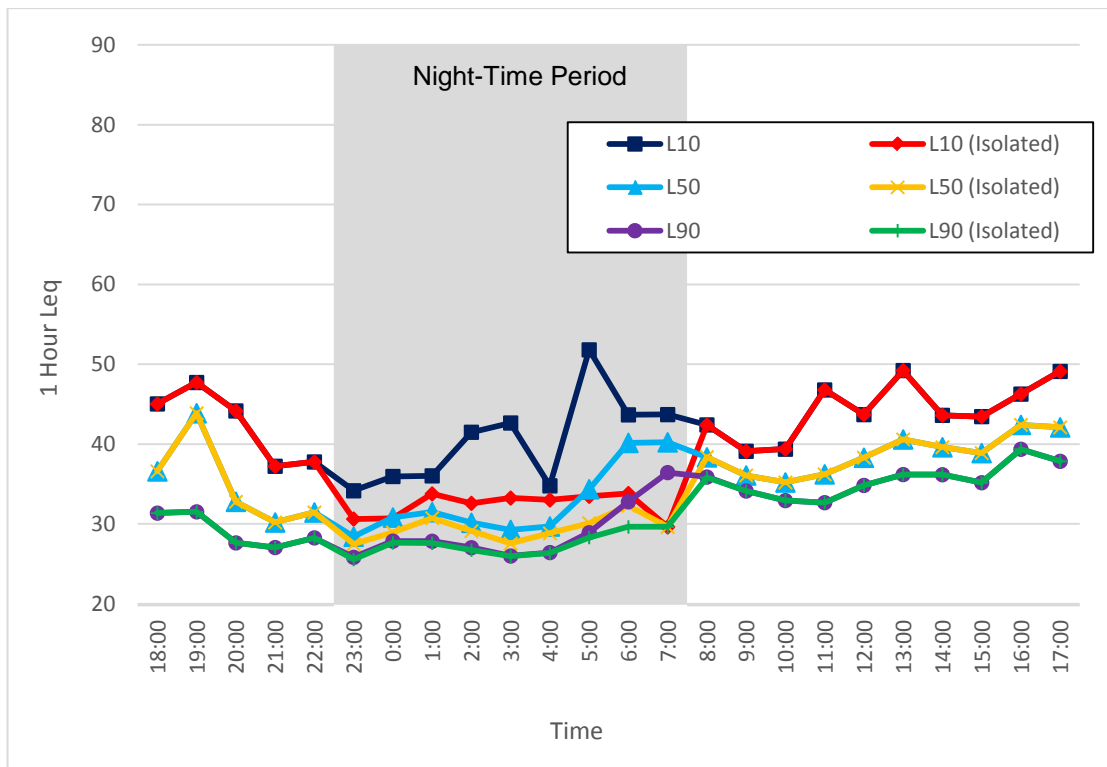
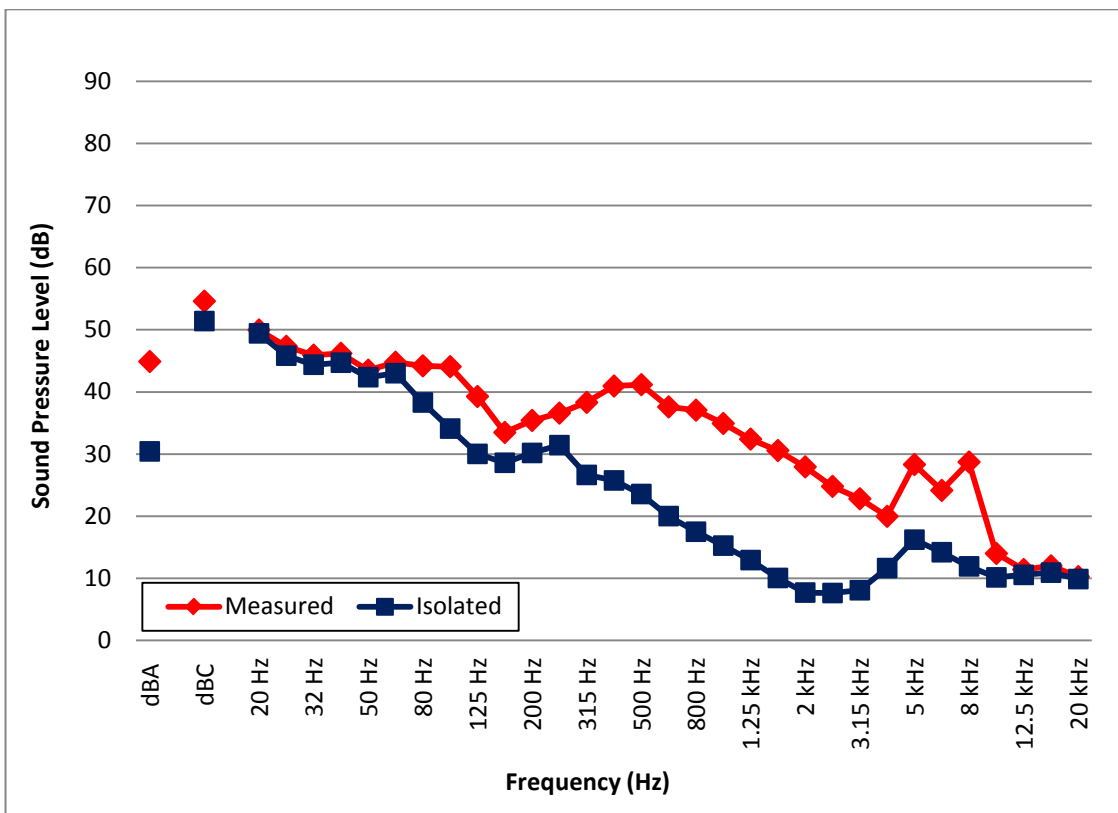
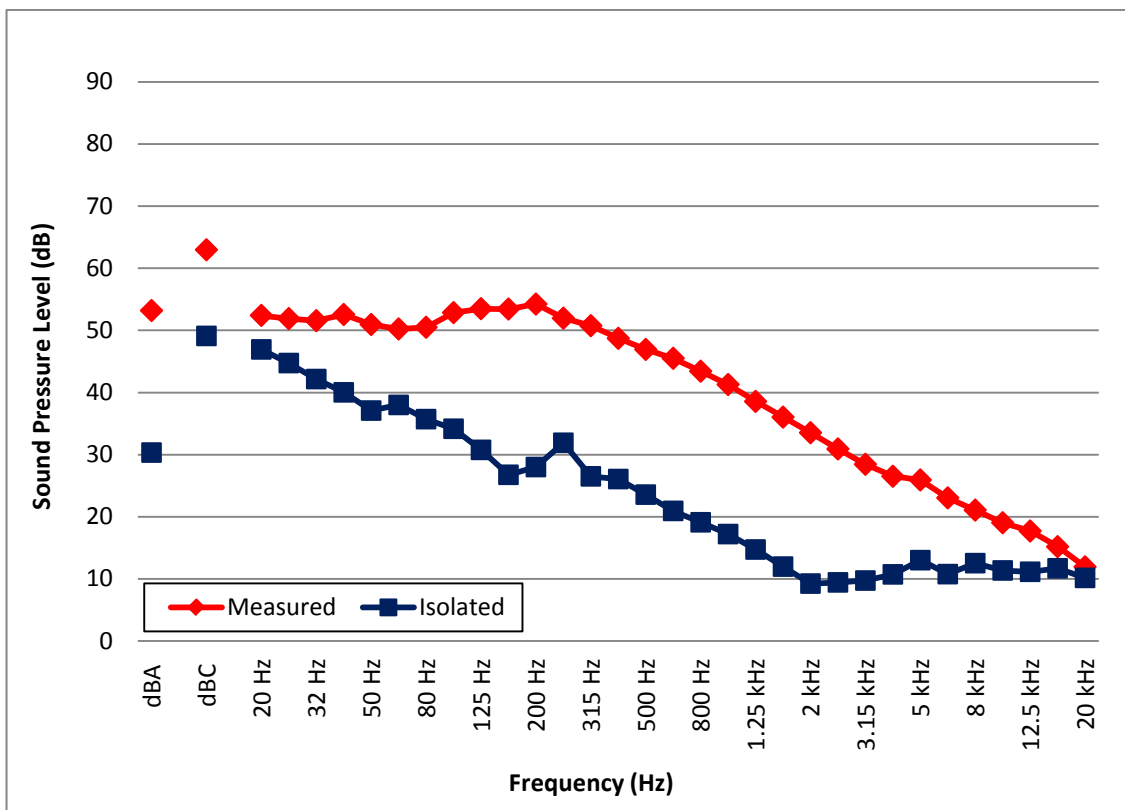


Figure 99. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (July 9 - 10, 2015)

Noise Monitor #12

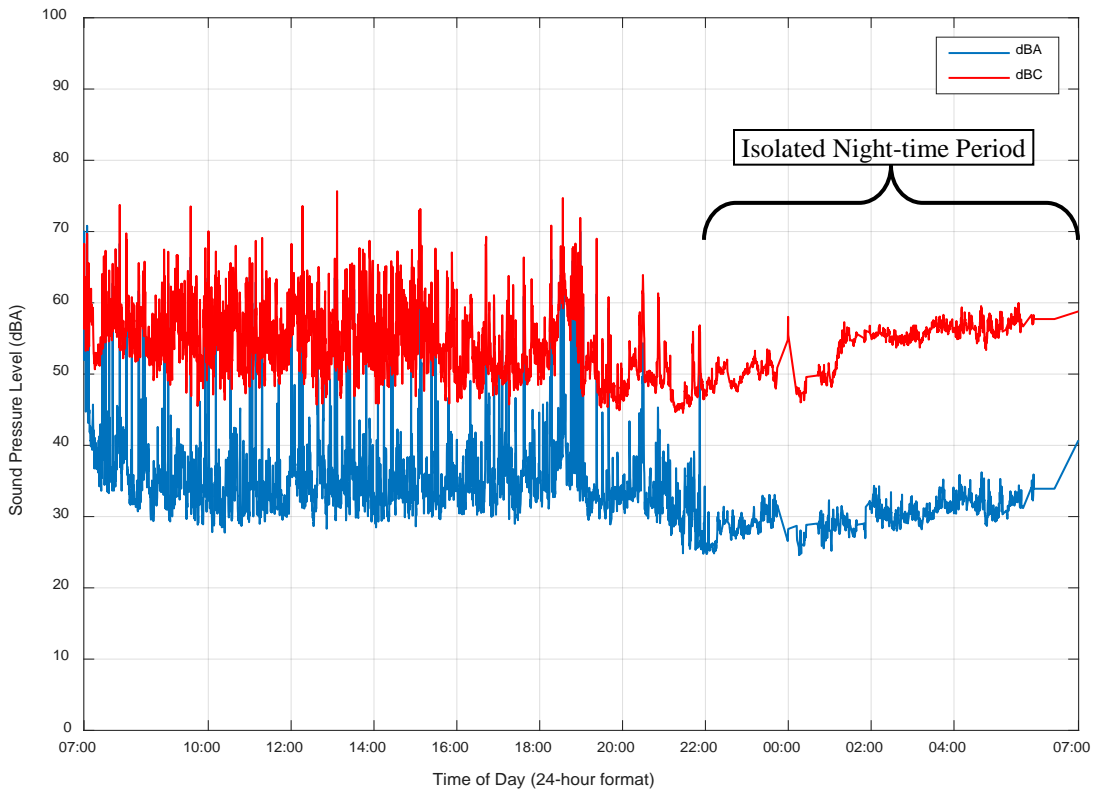


**Figure 100. Noise Monitor #12, 1/3 Octave  $L_{eq}$  Sound Levels (July 8 - 9, 2015)**

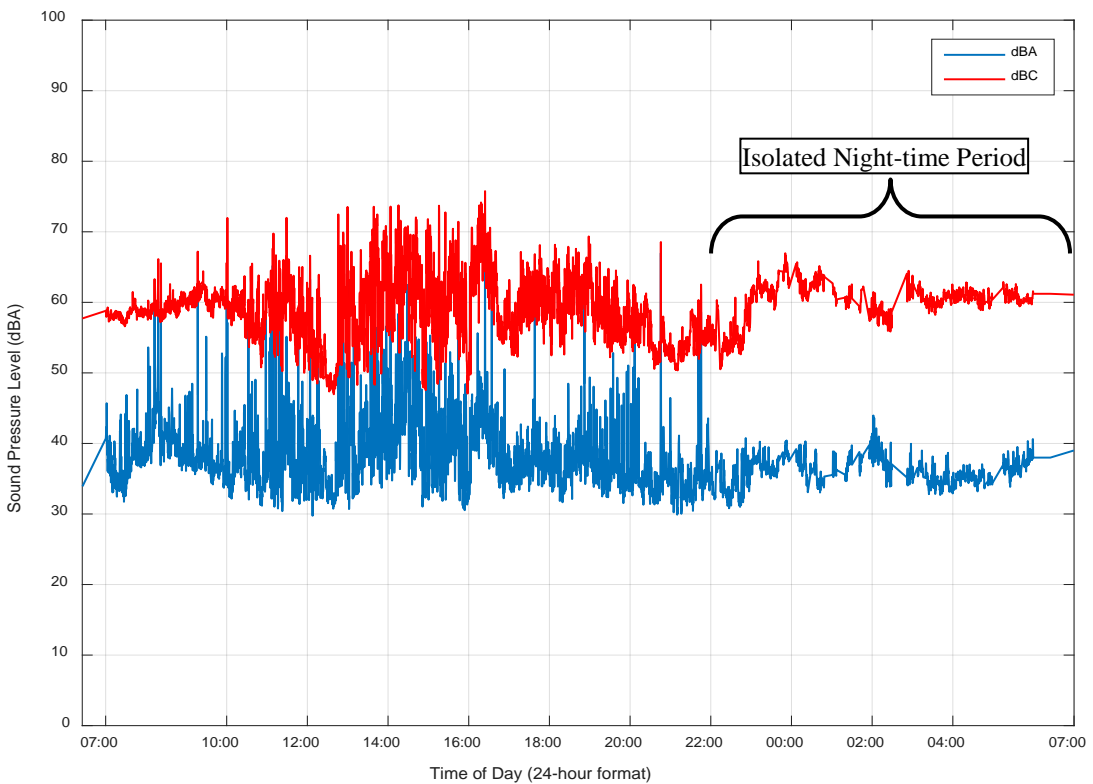


**Figure 100. Noise Monitor #12, 1/3 Octave  $L_{eq}$  Sound Levels (July 9 - 10, 2015)**

Noise Monitor #12

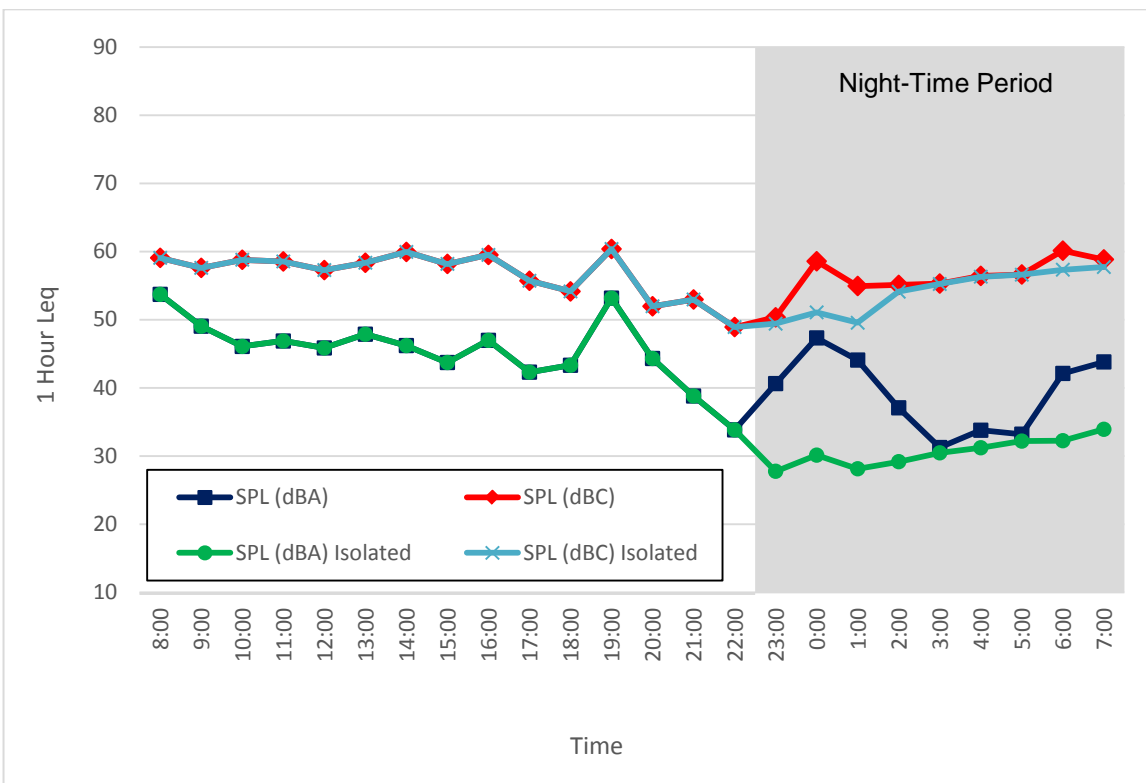


**Figure 101. Noise Monitor #12, 15-Second  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

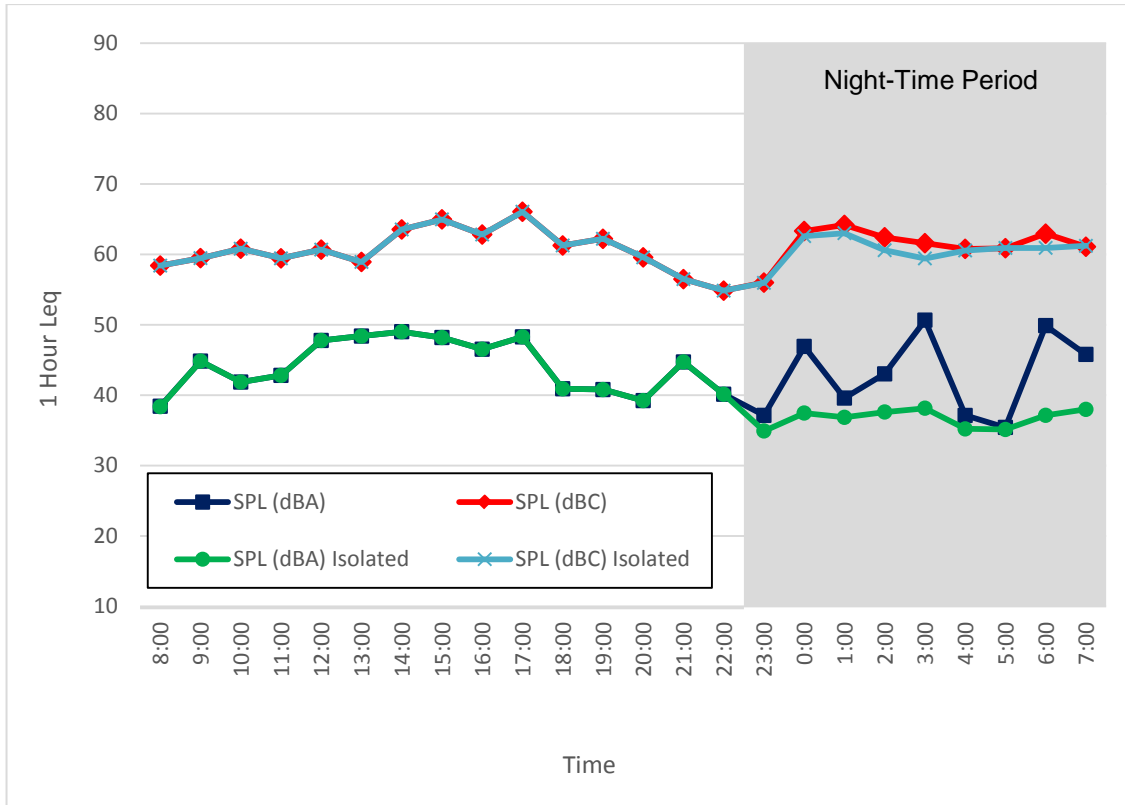


**Figure 102. Noise Monitor #12, 15-Second  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #12



**Figure 103. Noise Monitor #12, 1-Hour  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**



**Figure 104. Noise Monitor #12, 1-Hour  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Monitor #12

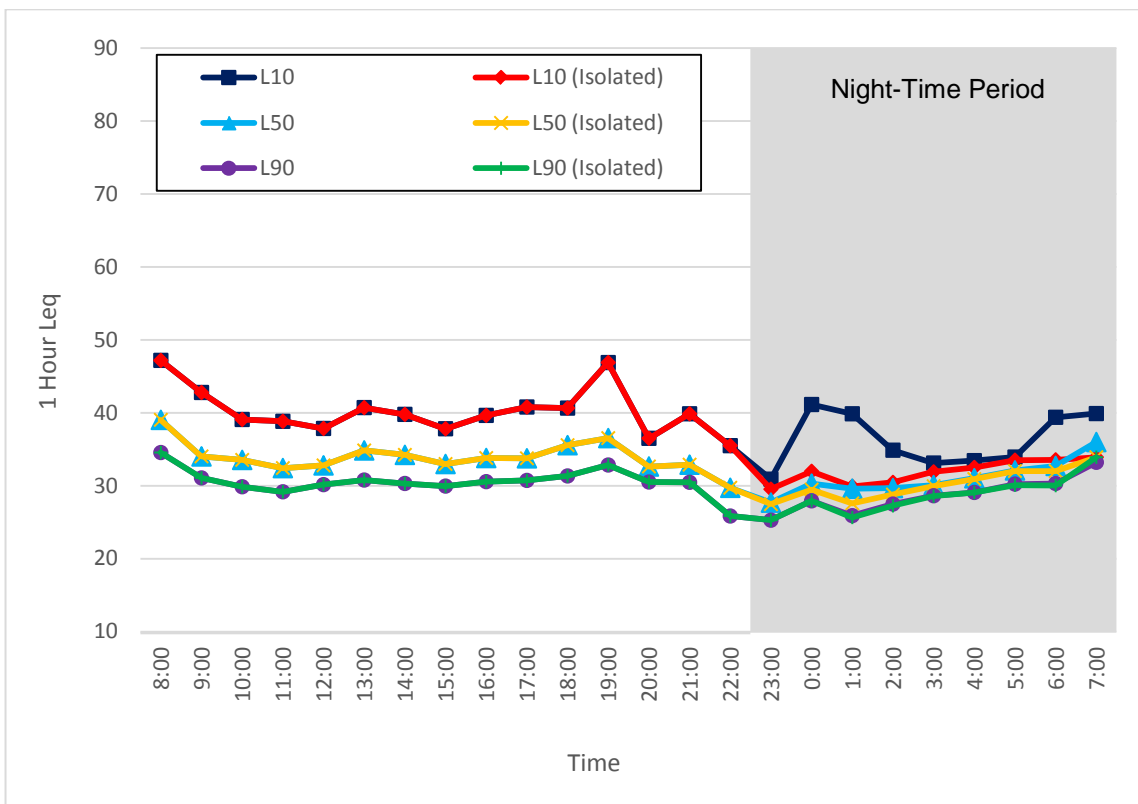


Figure 105. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> Leq Sound Levels (August 7 - 8, 2015)

Noise

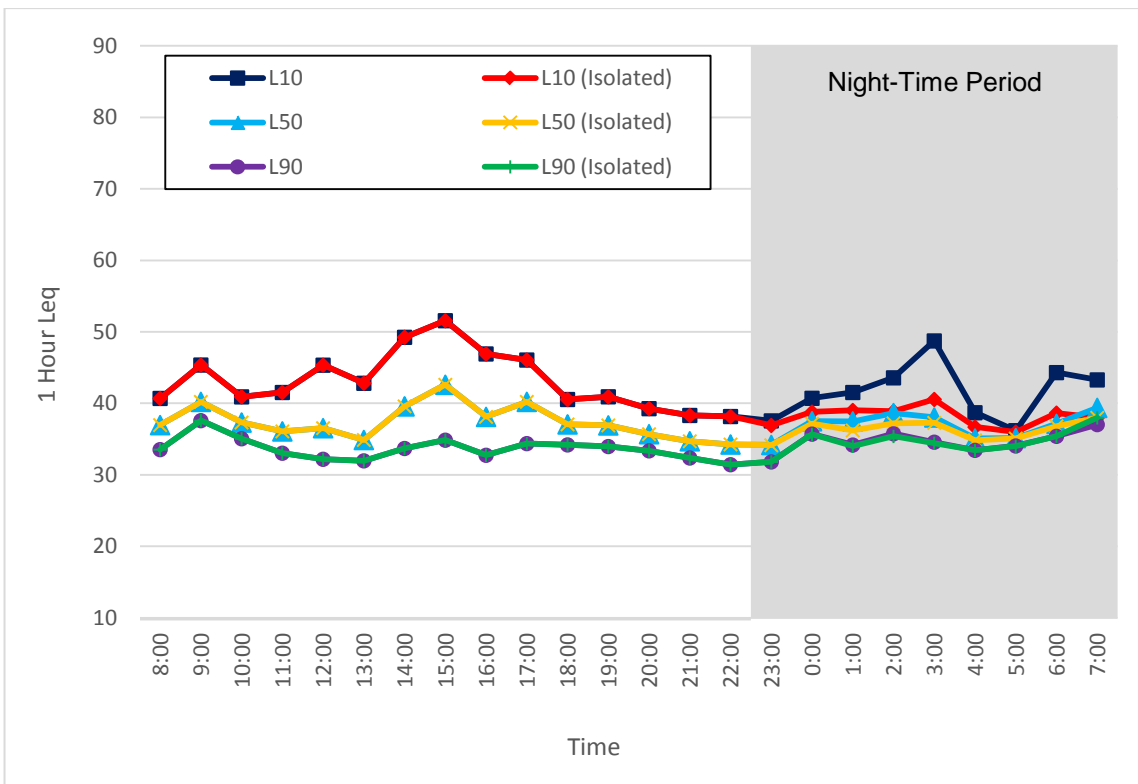
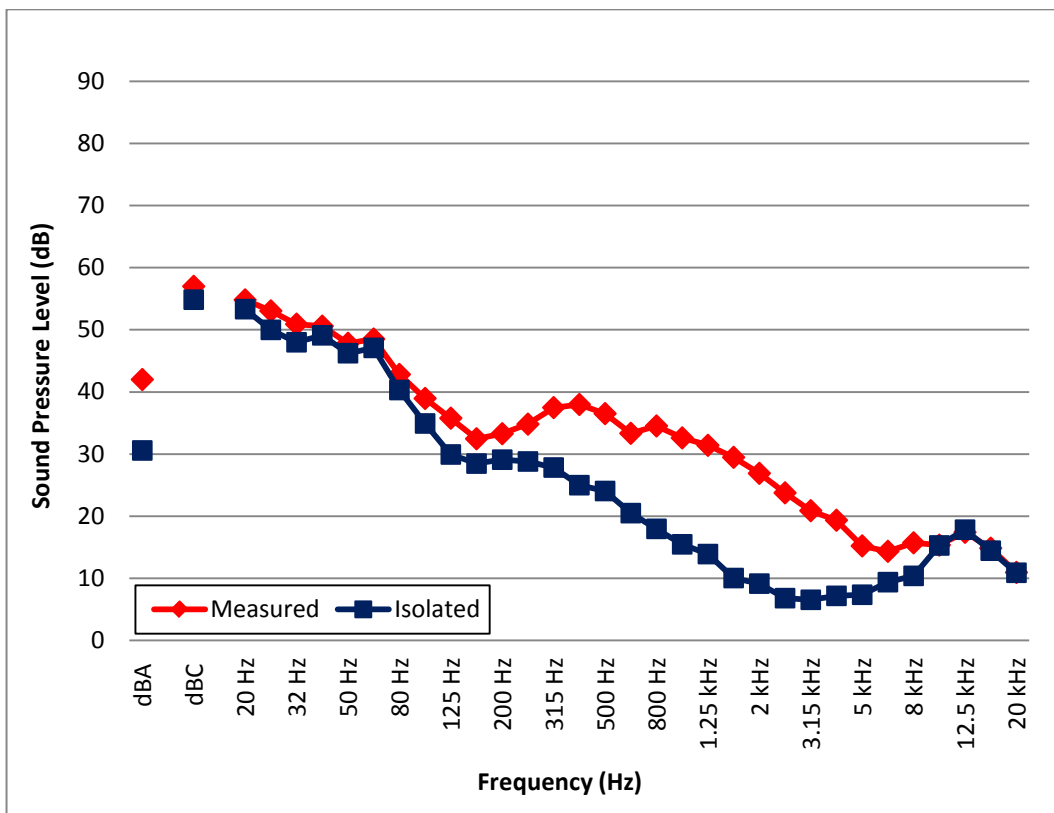
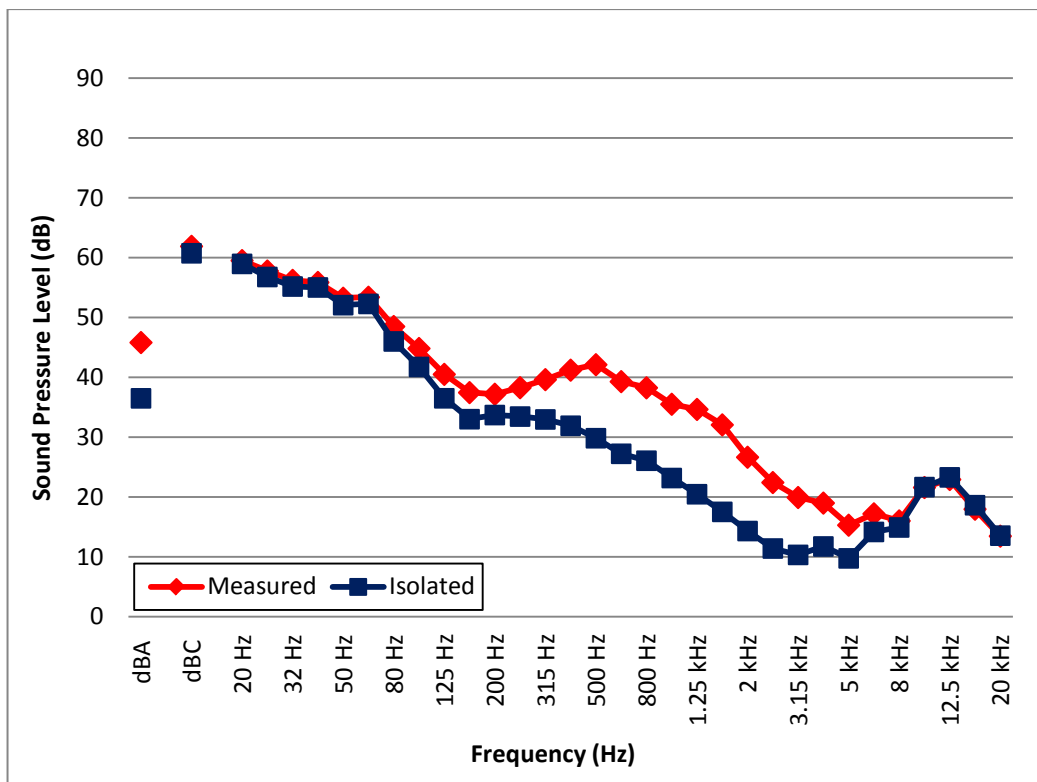


Figure 106. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> Leq Sound Levels (August 8 - 9, 2015)

Noise Monitor #12

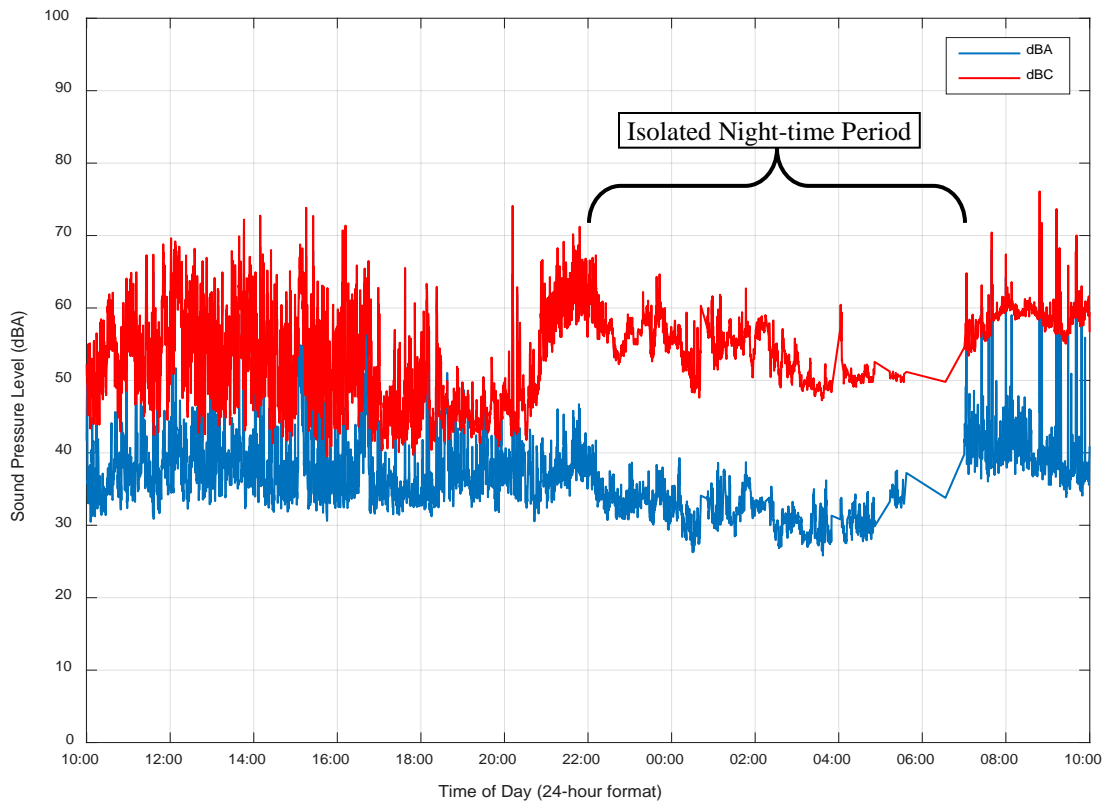


**Figure 107. Noise Monitor #12, 1/3 Octave  $L_{eq}$  Sound Levels (August 7 - 8, 2015)**

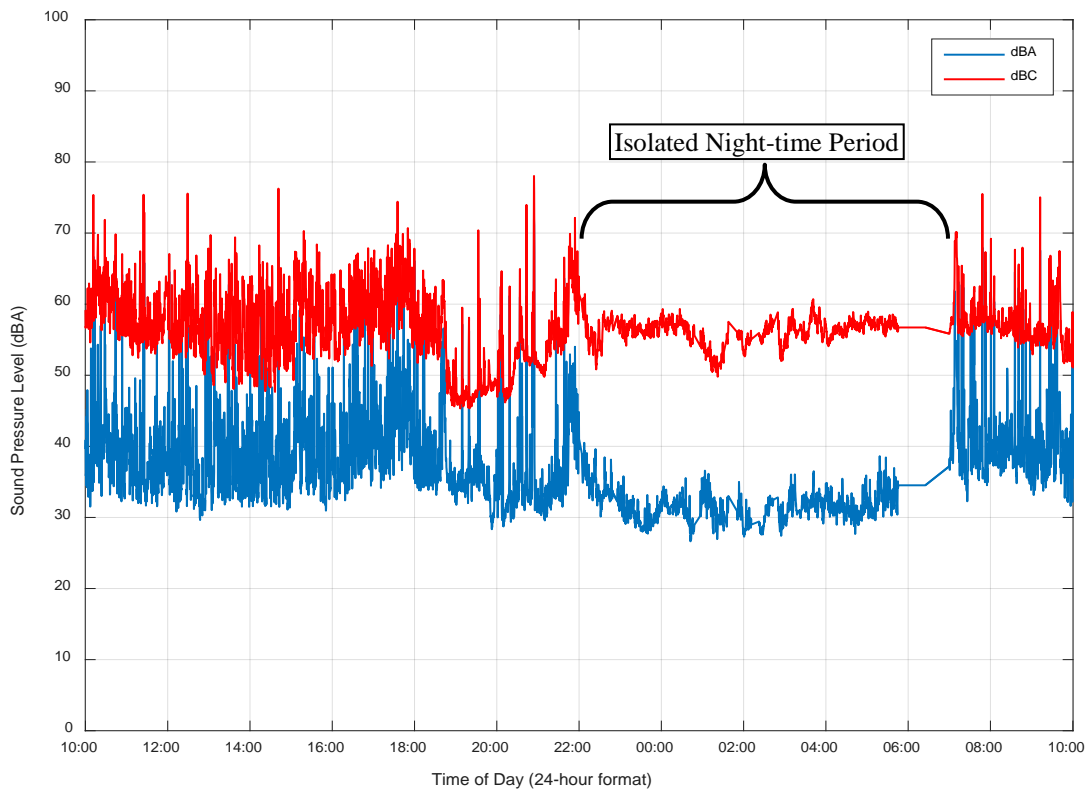


**Figure 108. Noise Monitor #12, 1/3 Octave  $L_{eq}$  Sound Levels (August 8 - 9, 2015)**

Noise Monitor #12



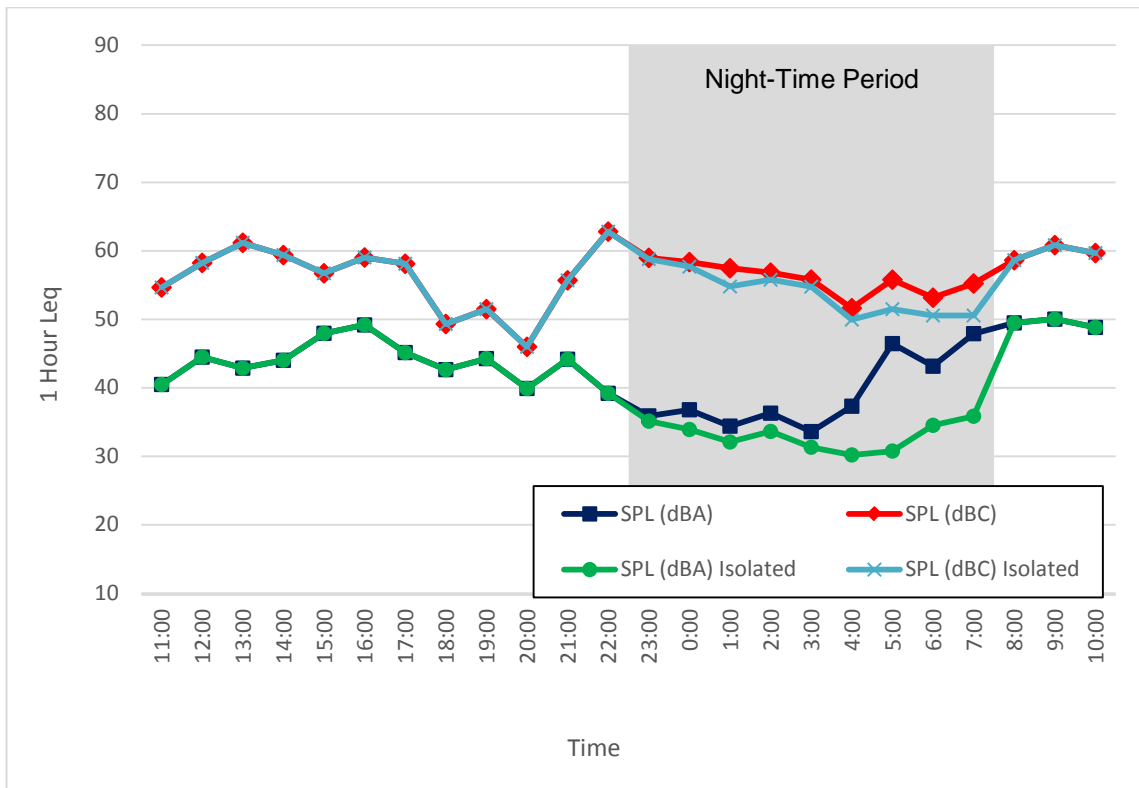
**Figure 109. Noise Monitor #12, 15-Second  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



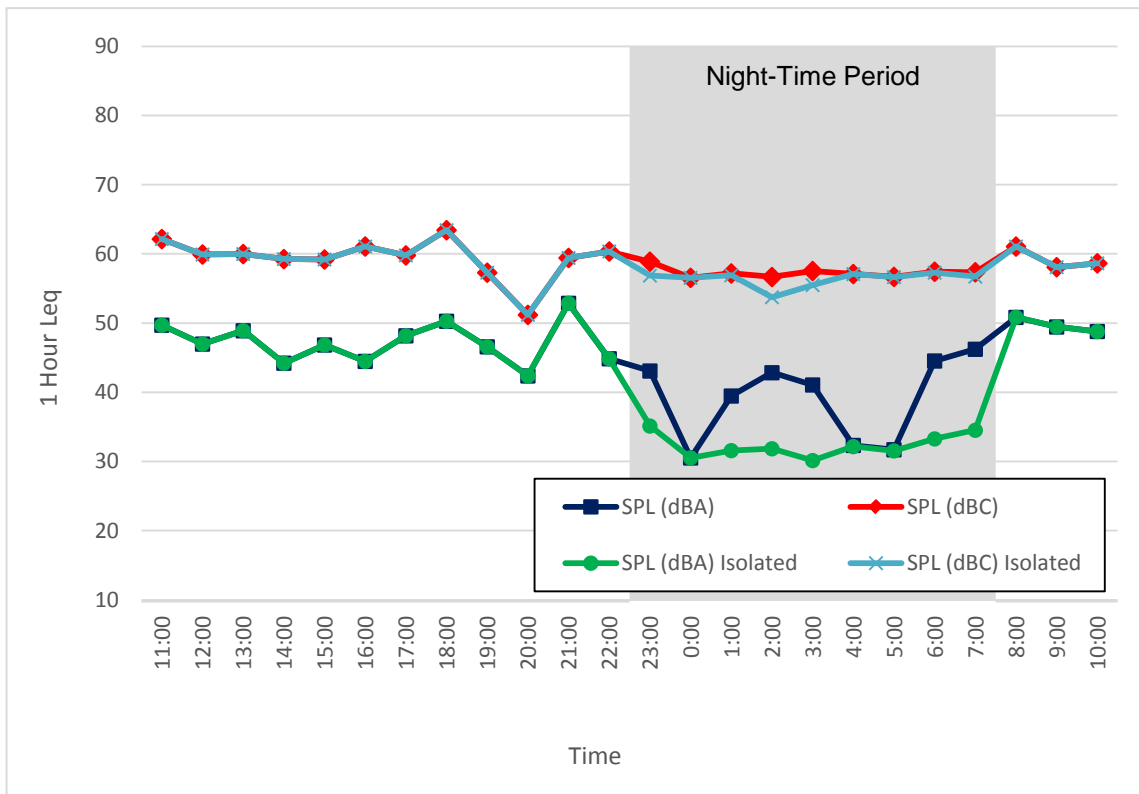
**Figure 110. Noise Monitor #12, 15-Second  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**



Noise Monitor #12



**Figure 111. Noise Monitor #12, 1-Hour  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



**Figure 112. Noise Monitor #12, 1-Hour  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

Monitor #12

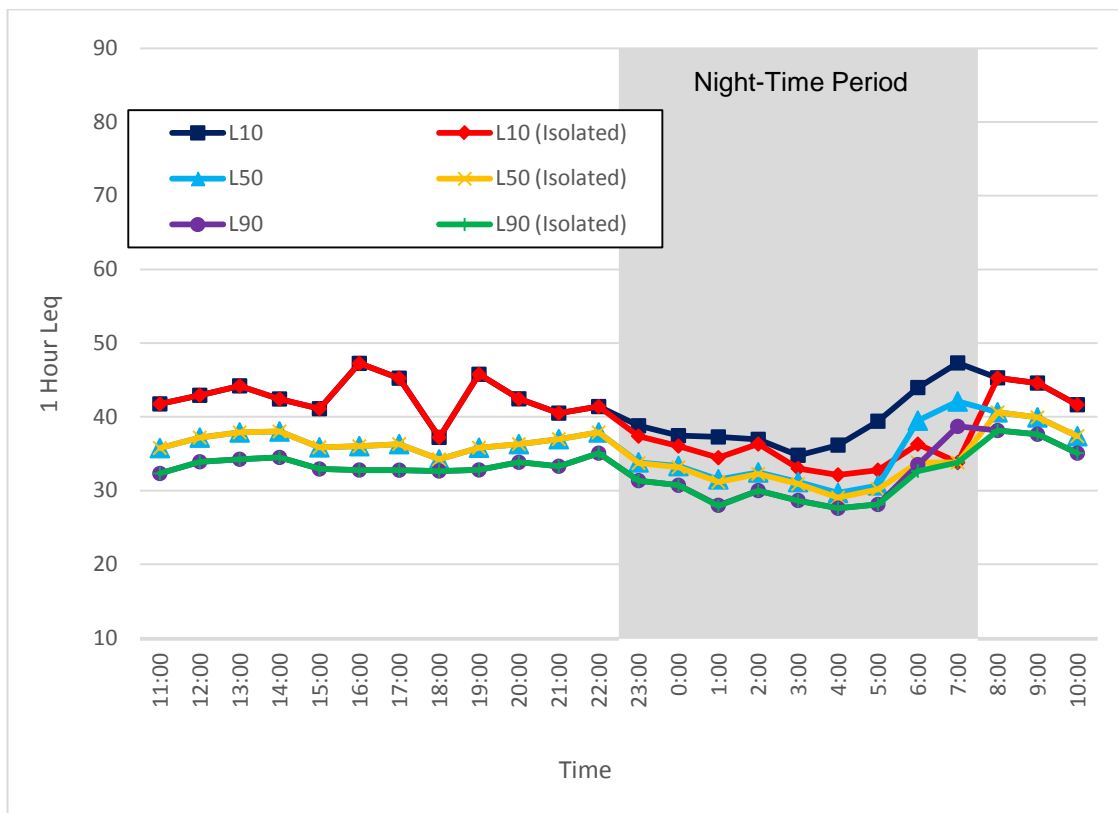


Figure 113. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 9 - 10, 2015)

Noise

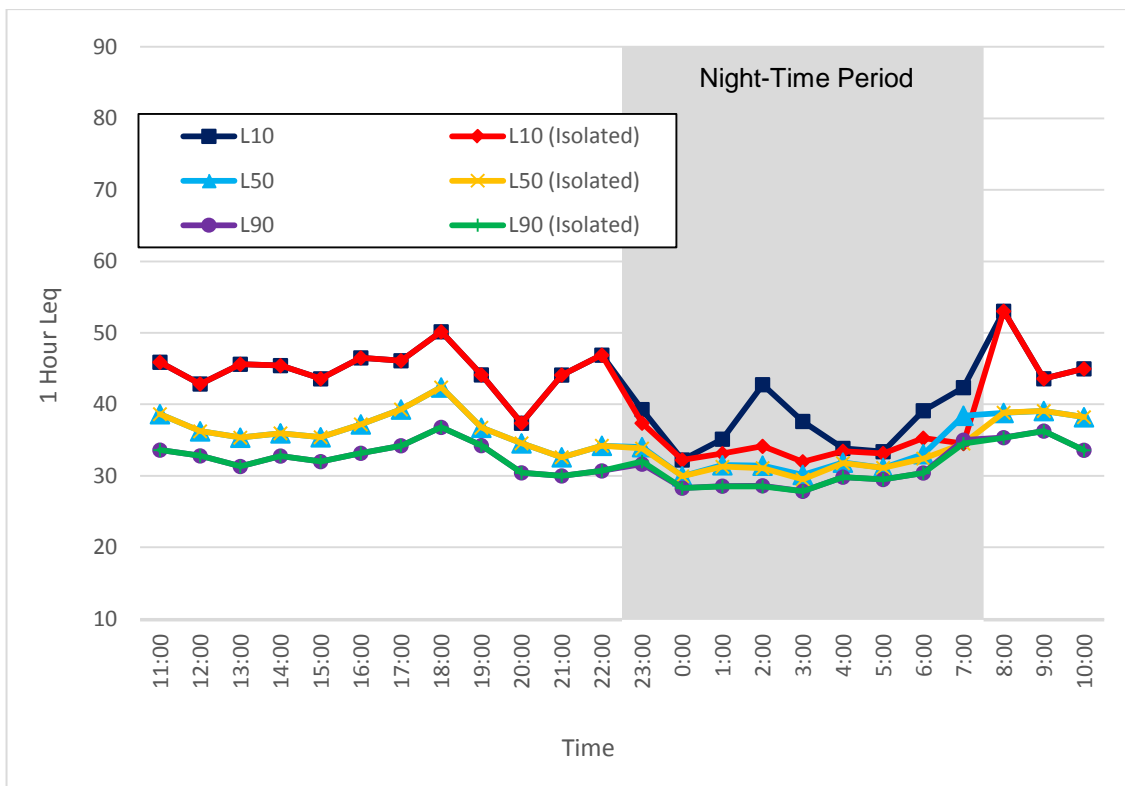
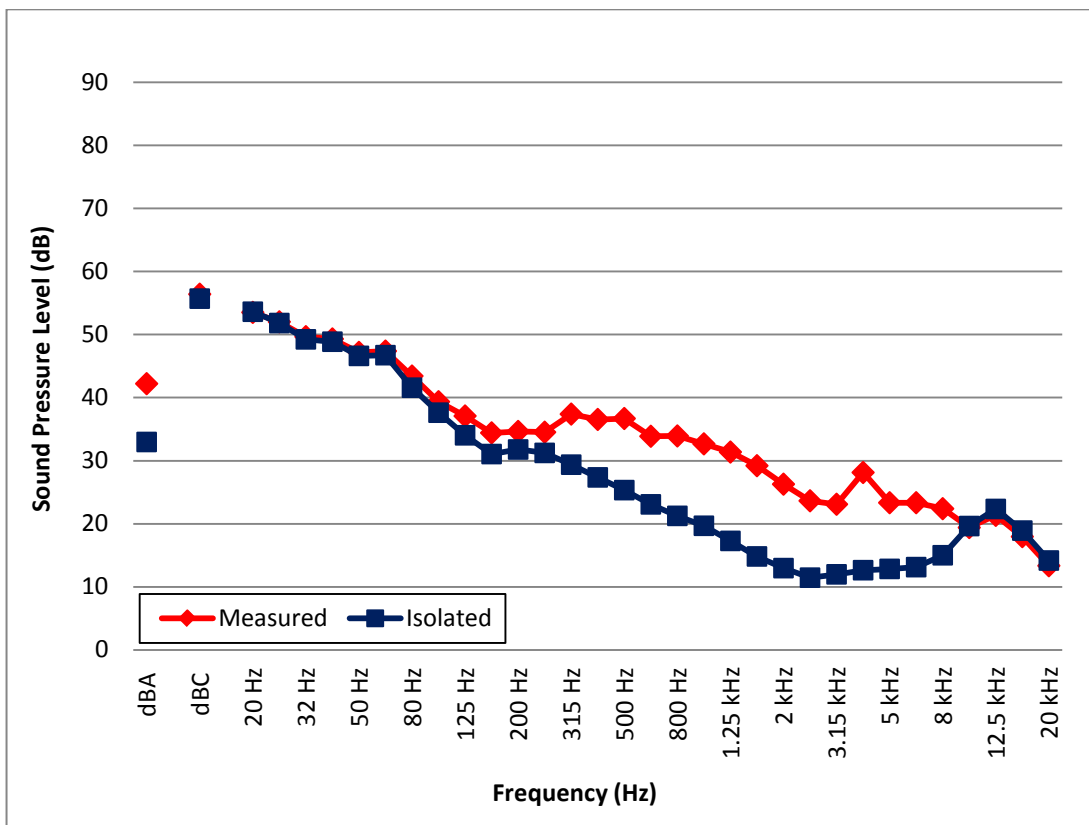
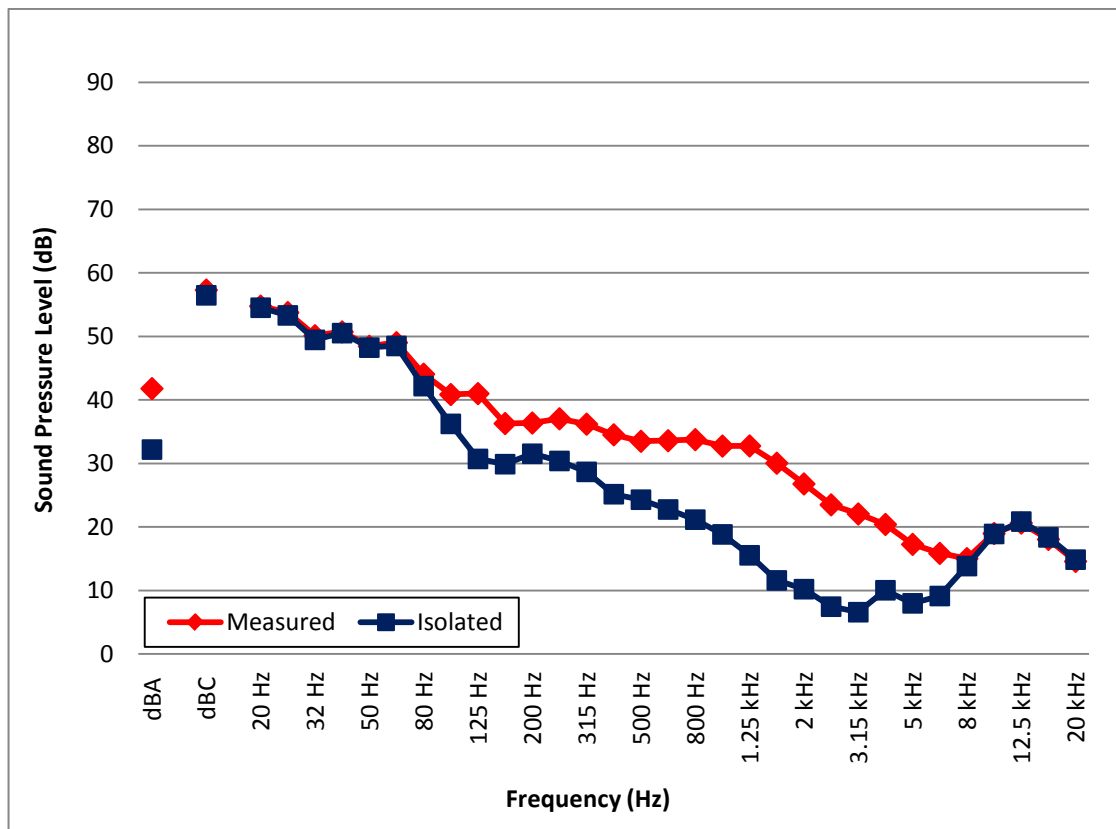


Figure 114. Noise Monitor #12, 1-Hour L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub> L<sub>eq</sub> Sound Levels (August 10 - 11, 2015)

Noise Monitor #12



**Figure 115. Noise Monitor #12, 1/3 Octave  $L_{eq}$  Sound Levels (August 9 - 10, 2015)**



**Figure 116. Noise Monitor #12, 1/3 Octave  $L_{eq}$  Sound Levels (August 10 - 11, 2015)**

## **Appendix I MEASUREMENT EQUIPMENT USED**

### **Noise Monitors**

The environmental noise monitoring equipment used consisted of Brüel and Kjær Type 2250/2270 Precision Integrating Sound Level Meters enclosed in environmental cases with a tripods, weather protective microphone hoods, and (in some cases) external batteries. The systems 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 meters conform 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 meters, pre-amplifiers and microphones were certified on July 07, 2015 / December 15, 2014 / December 15, 2014 / October 8, 2014 / October 8, 2014 / October 9, 2014 / October 9, 2014 and the calibrators (type B&K 4231) were certified on August 17, 2015 / October 06, 2014 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 Monitors**

Each weather monitoring system 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.

**Record of Calibration Results**

Description	Date	Time	Pre / Post	Calibration Level	Calibrator Model	Serial Number
Monitor #1	August 7, 2015	09:35	Pre	93.9 dBA	B&K 4231	2642956
Monitor #1	August 9, 2014	09:40	Post	93.8 dBA	B&K 4231	2642956
Monitor #2	August 9, 2015	09:15	Pre	93.9 dBA	B&K 4231	2642956
Monitor #2	August 11, 2015	09:35	Post	93.9 dBA	B&K 4231	2642956
Monitor #3	August 9, 2015	09:05	Pre	93.9 dBA	B&K 4231	2642956
Monitor #3	August 11, 2015	09:50	Post	93.9 dBA	B&K 4231	2642956
Monitor #4	August 7, 2015	08:35	Pre	93.9 dBA	B&K 4231	2642956
Monitor #4	August 9, 2015	08:35	Post	93.8 dBA	B&K 4231	2642956
Monitor #5	August 7, 2015	08:10	Pre	93.9 dBA	B&K 4231	2642956
Monitor #5	August 9, 2015	08:15	Post	93.8 dBA	B&K 4231	2642956
Monitor #6	August 7, 2015	07:45	Pre	93.9 dBA	B&K 4231	2642956
Monitor #6	August 9, 2015	07:50	Post	93.8 dBA	B&K 4231	2642956
Monitor #8	July 8, 2015	14:55	Pre	93.9 dBA	B&K 4231	2575493
Monitor #8	July 10, 2015	16:30	Post	93.9 dBA	B&K 4231	2575493
Monitor #9	August 9, 2015	11:00	Pre	93.9 dBA	B&K 4231	2642956
Monitor #9	August 11, 2015	11:45	Post	93.8 dBA	B&K 4231	2642956
Monitor #10	August 7, 2015	09:15	Pre	93.9 dBA	B&K 4231	2642956
Monitor #10	August 9, 2015	09:25	Post	93.8 dBA	B&K 4231	2642956
Monitor #11	July 8, 2015	14:20	Pre	93.9 dBA	B&K 4231	2575493
Monitor #11	July 10, 2015	16:45	Post	93.9 dBA	B&K 4231	2575493
Monitor #12a	July 8, 2015	14:50	Pre	93.9 dBA	B&K 4231	2575493
Monitor #12a	July 10, 2015	17:50	Post	93.9 dBA	B&K 4231	2575493
Monitor #12b	August 7, 2015	07:00	Pre	93.9 dBA	B&K 4231	2642956
Monitor #12b	August 11, 2015	11:05	Post	93.8 dBA	B&K 4231	2642956

**B&K 2250 Unit #1 SLM Calibration Certificate**

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCCL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

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## Calibration Certificate No.34214

**Instrument:** Sound Level Meter  
**Model:** 2250  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2488495  
**Tested with:** Microphone 4189 s/n 2471133  
Preamplifier ZC0032 s/n 3271  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 7/7/2015 **Cal Due:**

<b>Status:</b>	Received	Sent
<b>In tolerance:</b>	X	X
<b>Out of tolerance:</b>		
<b>See comments:</b>		

**Contains non-accredited tests:** \_\_\_ Yes X No  
**Calibration service:** \_\_\_ Basic X Standard  
**Address:** 5031 - 210 Street  
Edmonton, Alberta  
CANADA T6M 0A8

**Tested in accordance with the following procedures and standards:**  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2015	Scantek, Inc./ NVLAP	Jul 2, 2016
DS-360-SRS	Function Generator	61646	Nov 11, 2014	ACR Env./ A2LA	Nov 11, 2015
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 11, 2014	ACR Env. / A2LA	Nov 11, 2015
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).**

**Environmental conditions:**

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.1	100.41	42.3

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature		Signature	
Date	7/07/2015	Date	7/7/2015

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory. This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.  
Document stored Z:\Calibration Lab\SLM 2015\BNK2250\_2488495\_M1.doc Page 1 of 2

**B&K 2250 Unit #1 Microphone Calibration Certificate**

**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.34215**

**Instrument:** Microphone  
**Model:** 4189  
**Manufacturer:** Brüel & Kjær  
**Serial number:** 2471133  
**Composed of:**

**Date Calibrated:** 7/7/2015    **Cal Due:**  
**Status:**                      **Received**                      **Sent**  
**In tolerance:**                      **X**                                      **X**  
**Out of tolerance:**                      \_\_\_\_\_  
**See comments:** \_\_\_\_\_  
**Contains non-accredited tests:** \_\_\_Yes **X** No  
**Address:** 5031 - 210 Street  
Edmonton, Alberta  
CANADA T6M 0A8

**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Tested in accordance with the following procedures and standards:**  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

**Instrumentation used for calibration:** N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2015	Scantek, Inc./ NVLAP	Jul 2, 2016
DS-360-SRS	Function Generator	61646	Nov 11, 2014	ACR Env./ A2LA	Nov11, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 11, 2014	ACR Env./ A2LA	Nov 11, 2015
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015
1203-Norsonic	Preamplifier	14059	Jan 5, 2015	Scantek, Inc./ NVLAP	Jan 5, 2016
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

**Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)**

<b>Calibrated by:</b>	Valentia Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	7/07/2015	Date	7/7/2015

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**B&K 2270 Unit #2 SLM Calibration Certificate**

**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32877**

**Instrument:** Sound Level Meter  
**Model:** 2270  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 3002718  
**Tested with:** Microphone 4189 s/n 2850742  
Preamplifier ZC0032 s/n 18754  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 12/15/2014 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

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**See comments:**  
**Contains non-accredited tests:**  Yes  No  
**Calibration service:**  Basic  Standard  
**Address:** 5031 - 210 Street  
Edmonton, Alberta  
CANADA T6M 0A8

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 11, 2014	ACR Env./ A2LA	Nov11, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 11, 2014	ACR Env. / A2LA	Nov 11, 2015
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.0 °C	100.329 kPa	42.4 %RH

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	12/15/2014	Date	12/15/2014

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**B&K 2270 Unit #2 Microphone Calibration Certificate**

**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32878**

Instrument: **Microphone**  
Model: **4189**  
Manufacturer: **Brüel & Kjær**  
Serial number: **2850742**  
Composed of:

Date Calibrated: **12/13/2014** Cal Due:  
Status: 

Received	Sent
<b>X</b>	<b>X</b>

  
In tolerance: 

<b>X</b>	<b>X</b>
----------	----------

  
Out of tolerance:  
See comments:

Customer: **ACI Acoustical Consultants Inc.**

Address: **5031 - 210 Street  
Edmonton, Alberta  
CANADA T6M 0A8**

Tel/Fax: **780-414-6373 / -6376**

Tested in accordance with the following procedures and standards:  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 11, 2014	ACR Env./ A2LA	Nov11, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 11, 2014	ACR Env. / A2LA	Nov 11, 2015
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Valentin Buzduga	Authorized signatory:	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	12/13/2014	Date	12/13/2014

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**B&K 4231 Unit #2 Calibrator Calibration Certificate**

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.34410**

**Instrument:** Acoustical Calibrator  
**Model:** 4231  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2575493  
**Class (IEC 60942):** 1  
**Barometer type:**  
**Barometer s/n:**

**Date Calibrated:** 8/17/2015 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

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**See comments:**

--	--

  
**Contains non-accredited tests:**    Yes    X    No

**Customer:** Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Address:** 5031 - 210 Street  
Edmonton, Alberta  
Canada T6M 0A8

**Tested in accordance with the following procedures and standards:**  
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 1/16/2015

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	31052	Oct 7, 2014	Scantek, Inc./ NVLAP	Oct 7, 2015
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 1, 2014	ACR Env. / A2LA	Oct 1, 2015
HM30-Thommen	Meteo Station	1040170/39633	Oct 3, 2014	ACR Env./ A2LA	Oct 3, 2015
8903-HP	Audio Analyzer	2514A05691	Dec 12, 2013	ACR Env. / A2LA	Dec 12, 2016
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	906763	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015
1203-Norsonic	Preamplifier	14052	Aug 22, 2014	Scantek, Inc./ NVLAP	Aug 22, 2015

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)**

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	8/17/2015	Date	8/17/2015

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This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.  
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**B&K 2270 Unit #3 SLM Calibration Certificates**

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCCL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

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Calibration Certificate No.32879

**Instrument:** Sound Level Meter  
**Model:** 2270  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 3002730  
**Tested with:** Microphone 4189 s/n 2850741  
Preamplifier ZC0032 s/n 18750  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 12/15/2014 **Cal Due:**

<b>Status:</b>	Received	Sent
<b>In tolerance:</b>	X	X
<b>Out of tolerance:</b>		

**See comments:**

**Contains non-accredited tests:** \_\_\_ Yes  No

**Calibration service:** \_\_\_ Basic  Standard

**Address:** 5031 - 210 Street  
Edmonton, Alberta  
CANADA T6M 0A8

**Tested in accordance with the following procedures and standards:**  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	
				Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 11, 2014	ACR Env./ A2LA	Nov 11, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 11, 2014	ACR Env./ A2LA	Nov 11, 2015
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).**

**Environmental conditions:**

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.9 °C	100.384 kPa	44.1 %RH


<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature		Signature	
Date	12/15/2014	Date	12/15/2014

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**B&K 2270 Unit #3 Microphone Calibration Certificates**

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCCL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

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## Calibration Certificate No.32880

**Instrument:** Microphone  
**Model:** 4189  
**Manufacturer:** Brüel & Kjær  
**Serial number:** 2850741  
**Composed of:**

**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 12/13/2014 **Cal Due:**

<b>Status:</b>	<b>Received</b>	<b>Sent</b>
<b>In tolerance:</b>	X	X
<b>Out of tolerance:</b>		
<b>See comments:</b>		

**Contains non-accredited tests:**  Yes  No

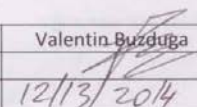

**Address:** 5031 - 210 Street  
Edmonton, Alberta  
CANADA T6M 0A8

**Tested in accordance with the following procedures and standards:**  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

**Instrumentation used for calibration:** N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	
				Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 11, 2014	ACR Env./ A2LA	Nov11, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 11, 2014	ACR Env. / A2LA	Nov 11, 2015
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

**Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)**

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature		Signature	
Date	12/13/2014	Date	12/13/2014

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**B&K 2270 Unit #4 SLM Calibration Certificate**

**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32426**

**Instrument:** Sound Level Meter  
**Model:** 2270  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2644639  
**Tested with:** Microphone 4189 s/n 2643219  
Preamplifier ZC0032 s/n 8255  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 10/8/2014 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

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**See comments:**  
**Contains non-accredited tests:** \_\_\_ Yes X No  
**Calibration service:** \_\_\_ Basic X Standard  
**Address:** 5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env./ A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.4 °C	100.009 kPa	54.1 %RH

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/08/2014	Date	10/9/2014

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

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32427**

Instrument: **Microphone**  
Model: **4189**  
Manufacturer: **Brüel & Kjær**  
Serial number: **2643219**  
Composed of:

Date Calibrated: **10/3/2014** Cal Due:  
Status: 

Received	Sent
X	X

  
In tolerance: 

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Out of tolerance: 

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See comments: 

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Customer: **ACI Acoustical Consultants Inc.**  
Tel/Fax: **780-414-6373 / -6376**

Contains non-accredited tests:    Yes    No  
Address: **5031 - 210 Street, Edmonton**  
**Alberta, CANADA T6M 0A8**

Tested in accordance with the following procedures and standards:  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env. / A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1m	Validated July 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Valentin Buzduga	Authorized signatory:	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/03/2014	Date	10/19/2014

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**B&K 4231 Unit #4 Calibrator Calibration Certificate**

**Scantek, Inc.**  
CALIBRATION LABORATORY



ISO 17025: 2005, ANSI/NCCL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP Lab Code: 200625-0

**Calibration Certificate No.32435**

*Instrument:* **Acoustical Calibrator**  
*Model:* **4231**  
*Manufacturer:* **Brüel and Kjær**  
*Serial number:* **2642956**  
*Class (IEC 60942):* **1**  
*Barometer type:*  
*Barometer s/n:*

*Date Calibrated:* **10/6/2014** *Cal Due:*  
*Status:*

Received	Sent
X	X

  
*In tolerance:*  
*Out of tolerance:*  
*See comments:*  
*Contains non-accredited tests:*    Yes X No

*Customer:* **ACI Acoustical Consultants Inc.**  
*Tel/Fax:* **780-414-6373 / -6376**

*Address:* **5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8**

**Tested in accordance with the following procedures and standards:**  
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env. / A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
8903A-HP	Audio Analyzer	2514A05691	Dec 12, 2013	ACR Env./ A2LA	Dec 12, 2016
PC Program 1018 Norsonic	Calibration software	v.6.1c	Validated July 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	906763	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)**

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/06/2014	Date	10/9/2014

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**B&K 2250 Unit #5 SLM Calibration Certificate**

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCCL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32428**

**Instrument:** Sound Level Meter  
**Model:** 2250  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2722894  
**Tested with:** Microphone 4189 s/n 2719777  
Preamplifier ZC0032 s/n 13895  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 10/8/2014 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
---	---

  
**Out of tolerance:**

--	--

  
**See comments:**  
**Contains non-accredited tests:**  Yes  No  
**Calibration service:**  Basic  Standard  
**Address:** 5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env./ A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.3 °C	99.964 kPa	45.0 %RH

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/08/2014	Date	10/9/2014


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**B&K 2250 Unit #5 Microphone Calibration Certificate**

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

---

Calibration Certificate No.32429

*Instrument:* **Microphone**

*Model:* **4189**

*Manufacturer:* **Brüel & Kjær**

*Serial number:* **2719777**

*Composed of:*

*Date Calibrated:* **10/3/2014**    *Cal Due:*

<i>Status:</i>	<b>Received</b>	<b>Sent</b>
<i>In tolerance:</i>	<b>X</b>	<b>X</b>
<i>Out of tolerance:</i>		
<i>See comments:</i>		

*Contains non-accredited tests:*    Yes    No

*Customer:* **ACI Acoustical Consultants Inc.**

*Tel/Fax:* **780-414-6373 / -6376**

*Address:* **5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8**

**Tested in accordance with the following procedures and standards:**  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

**Instrumentation used for calibration:** N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
4838-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
D5-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env./ A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1m	Validated July 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

**Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)**

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature		Signature	
Date	10/03/2014	Date	10/9/2014

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

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32430**

**Instrument:** Sound Level Meter  
**Model:** 2250  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2661161  
**Tested with:** Microphone 4189 s/n 2650730  
Preamplifier ZC0032 s/n 9935  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 10/9/2014 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
---	---

  
**Out of tolerance:**

--	--

  
**See comments:**  
**Contains non-accredited tests:**  Yes  No  
**Calibration service:**  Basic  Standard  
**Address:** 5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env. / A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.9 °C	100.694 kPa	45.5 %RH


Calibrated by:	Valentin Buzduga	Authorized signatory:	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/09/2014	Date	10/9/2014

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

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

---

## Calibration Certificate No.32431

**Instrument:** Microphone  
**Model:** 4189  
**Manufacturer:** Brüel & Kjær  
**Serial number:** 2650730  
**Composed of:**

**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 10/3/2014    **Cal Due:**

<b>Status:</b>	<b>Received</b>	<b>Sent</b>
<b>In tolerance:</b>	X	X
<b>Out of tolerance:</b>		
<b>See comments:</b>		

**Contains non-accredited tests:** \_\_\_Yes X No

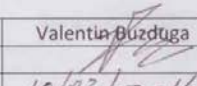
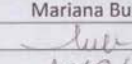
**Address:** 5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8

**Tested in accordance with the following procedures and standards:**  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

**Instrumentation used for calibration:** N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env./ A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1m	Validated July 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

**Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)**

<b>Calibrated by:</b>	Valentia Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature		Signature	
Date	10/03/2014	Date	10/19/2014

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**B&K 2250 Unit #7 SLM Calibration Certificate**

**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCCL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32432**

**Instrument:** Sound Level Meter  
**Model:** 2250  
**Manufacturer:** Brüel and Kjær  
**Serial number:** 2722859  
**Tested with:** Microphone 4189 s/n 2710791  
Preamplifier ZC0032 s/n 13398  
**Type (class):** 1  
**Customer:** ACI Acoustical Consultants Inc.  
**Tel/Fax:** 780-414-6373 / -6376

**Date Calibrated:** 10/9/2014 **Cal Due:**  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

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**See comments:**  
**Contains non-accredited tests:**  Yes  No  
**Calibration service:**  Basic  Standard  
**Address:** 5031 - 210 Street, Edmonton  
Alberta, CANADA T6M 0A8

**Tested in accordance with the following procedures and standards:**  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env. / A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).**

**Environmental conditions:**

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.0 °C	100.630 kPa	42.7 %RH

<b>Calibrated by:</b>	Valentin Buzduga	<b>Authorized signatory:</b>	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/09/2014	Date	10/09/2014

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**B&K 2250 Unit #7 Microphone Calibration Certificate**

**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)



NVLAP Lab Code: 200625-0

**Calibration Certificate No.32433**

Instrument: **Microphone**  
Model: **4189**  
Manufacturer: **Brüel & Kjær**  
Serial number: **2710791**  
Composed of:

Date Calibrated: **10/3/2014** Cal Due:  
Status: 

Received	Sent
X	X

  
In tolerance: 

X	X
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Out of tolerance: 

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See comments: 

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Contains non-accredited tests:    Yes X No  
Address: **5031 - 210 Street, Edmonton**  
**Alberta, CANADA T6M 0A8**

Customer: **ACI Acoustical Consultants Inc.**  
Tel/Fax: **780-414-6373 / -6376**

Tested in accordance with the following procedures and standards:  
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jul 2, 2014	Scantek, Inc./ NVLAP	Jul 2, 2015
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 22, 2013	ACR Env./ A2LA	Nov 22, 2014
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Mar 17, 2014	ACR Env./ A2LA	Sep 17, 2015
PC Program 1017 Norsonic	Calibration software	v.6.1m	Validated July 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	14059	Jan 2, 2014	Scantek, Inc./ NVLAP	Jan 2, 2015
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Valentin Buzduga	Authorized signatory:	Mariana Buzduga
Signature	<i>[Signature]</i>	Signature	<i>[Signature]</i>
Date	10/03/2014	Date	10/9/2014

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

### **Sound Pressure Level**

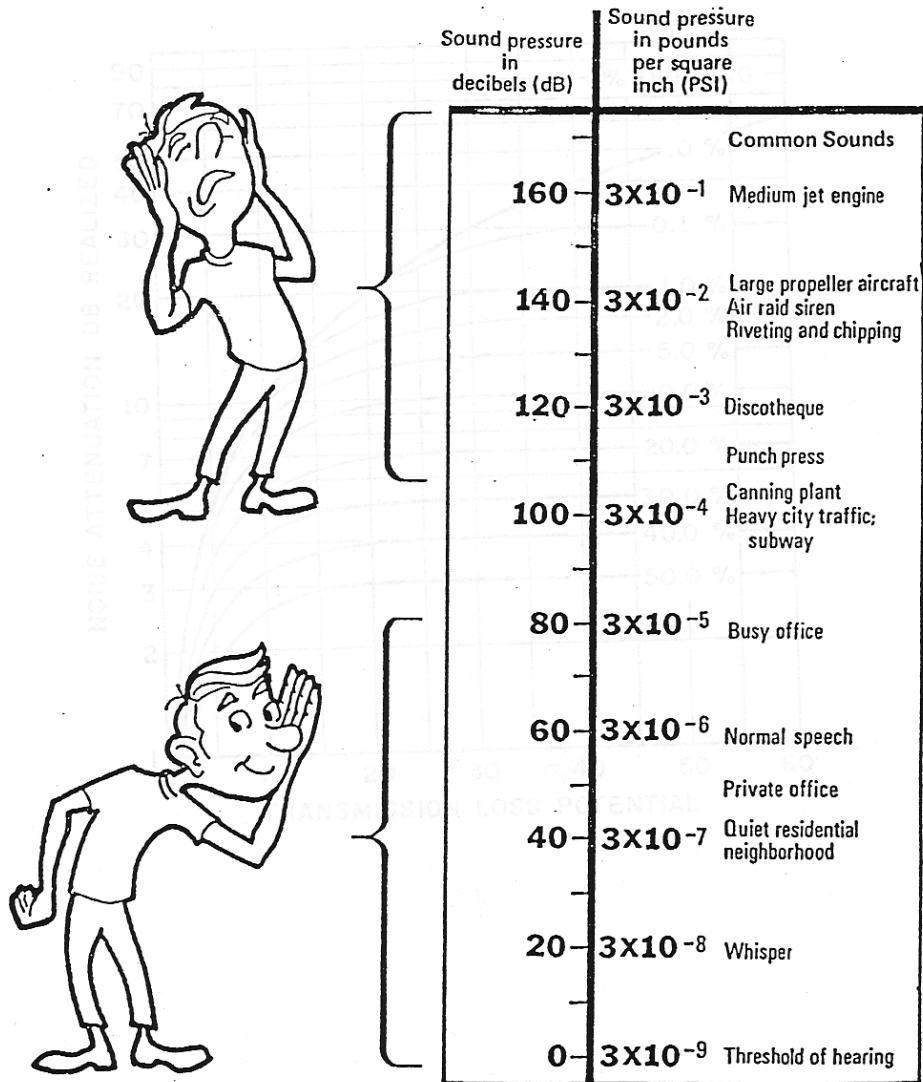
Sound pressure is initially measured in Pascal's (Pa). Humans can hear several orders of magnitude in sound pressure levels, so a more convenient scale is used. This scale is known as the decibel (dB) scale, named after Alexander Graham Bell (telephone guy). It is a base 10 logarithmic scale. When we 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 ( $P_{ref} = 2 \times 10^{-5}$  Pa = 20  $\mu$ Pa)

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**

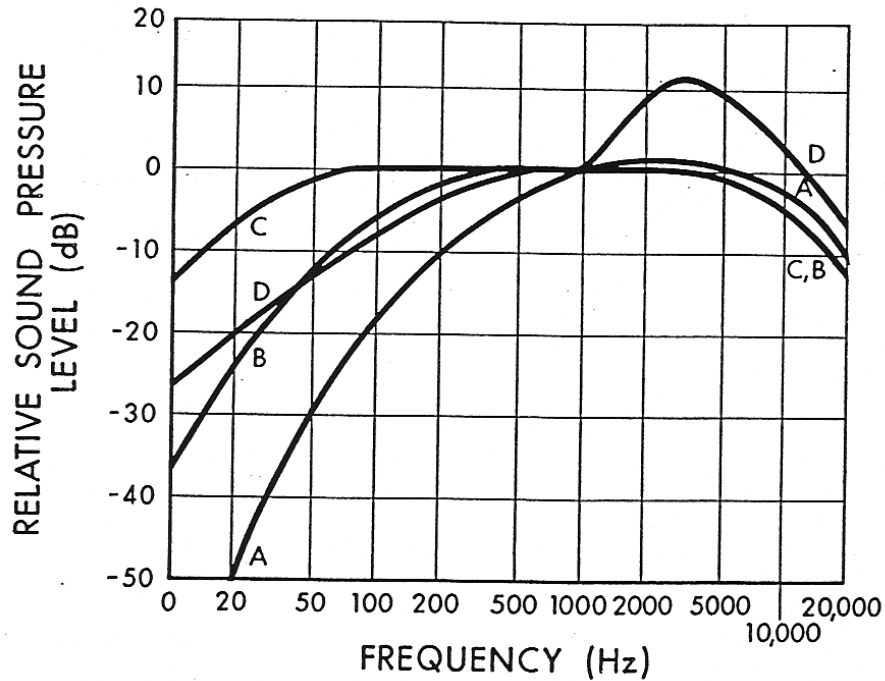
The range of frequencies audible to the human ear ranges from approximately 20 Hz to 20 kHz. Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency 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:

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



Human hearing is most sensitive at approximately 3500 Hz which corresponds to the ¼ 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:

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

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

- $L_{eq24}$             - Measured over a 24-hour period
- $L_{eqNight}$         - Measured over the night-time (typically 22:00 – 07:00)
- $L_{eqDay}$             - Measured over the day-time (typically 07:00 – 22:00)
- $L_{DN}$                 - Same as  $L_{eq24}$  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.

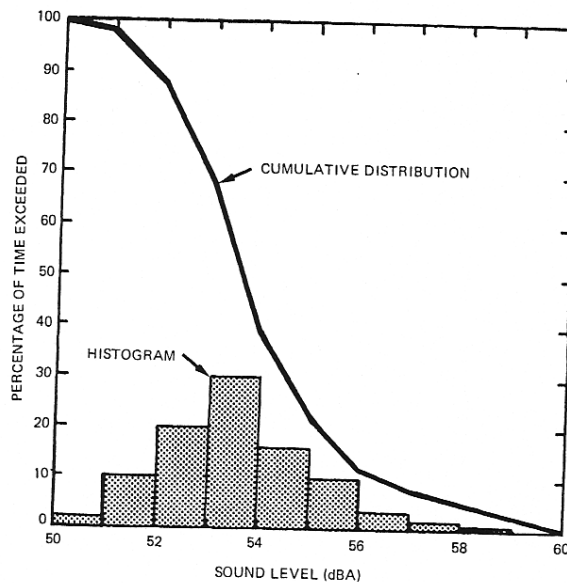


Figure 16.6 Statistically processed community noise showing histogram and cumulative distribution of A weighted sound levels.

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

The most common statistical descriptors are:

- $L_{\min}$  - minimum sound level measured
- $L_{01}$  - sound level that was exceeded only 1% of the time
- $L_{10}$  - sound level that was exceeded only 10% of the time.
  - Good measure of intermittent or intrusive noise
  - Good measure of Traffic Noise
- $L_{50}$  - sound level that was exceeded 50% of the time (arithmetic average)
  - Good to compare to  $L_{eq}$  to determine steadiness of noise
- $L_{90}$  - sound level that was exceeded 90% of the time
  - Good indicator of typical “ambient” noise levels
- $L_{99}$  - sound level that was exceeded 99% of the time
- $L_{\max}$  - 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

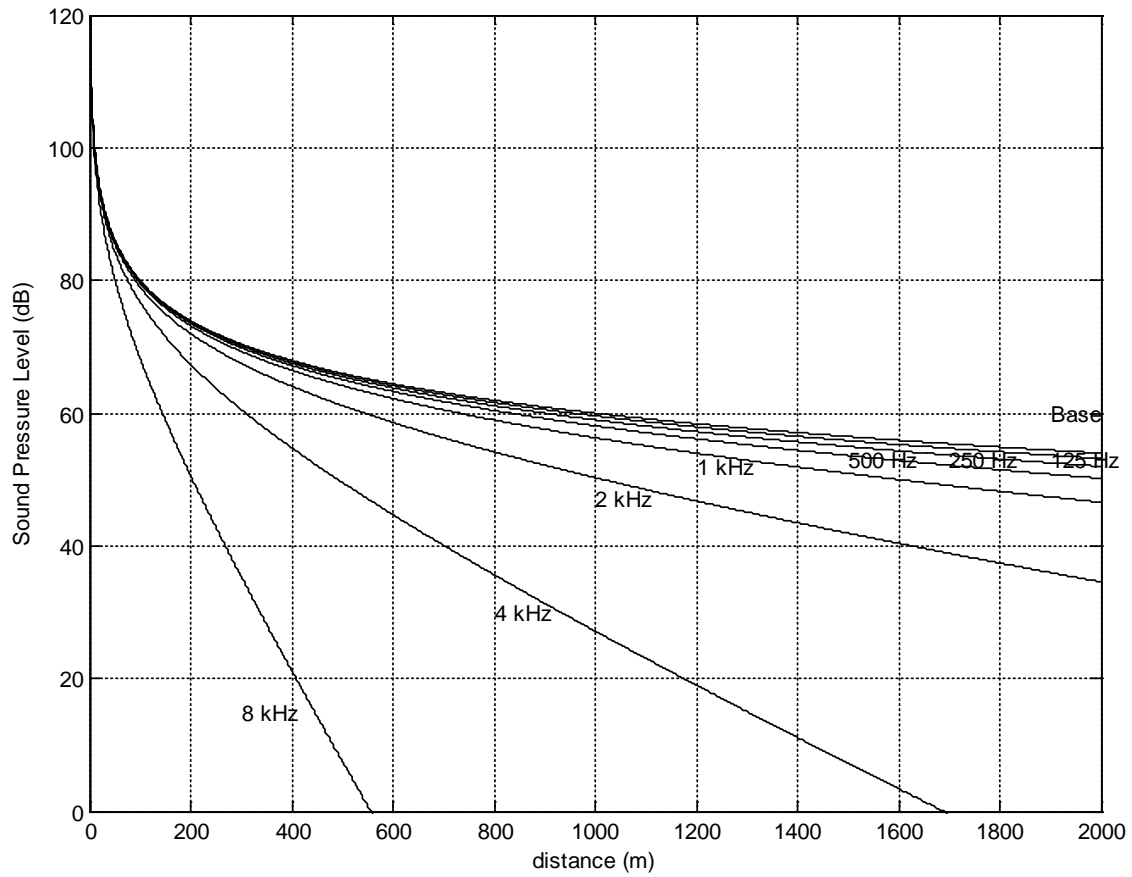
As sound transmits through a medium, there is an attenuation (or dissipation of acoustic energy) which can be attributed to three mechanisms:

- 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 °C	Relative Humidity (%)	Frequency (Hz)					
		125	250	500	1000	2000	4000
30	20	0.06	0.18	0.37	0.64	1.40	4.40
	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	20	0.07	0.15	0.27	0.62	1.90	6.70
	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
10	20	0.06	0.11	0.29	0.94	3.20	9.00
	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)**



**Atmospheric Absorption at 10°C and 70% RH**

## 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  $\pm 10$ dB are possible depending on gradient of temperature and distance from source.

### Rain

- 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.

### Summary

- 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.

Topography

- 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

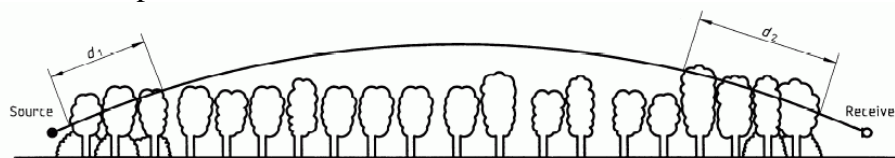
- Can be an effective absorber due to large area covered
- Only effective at low height above ground. Does not affect sound transmitted direct from source to receiver if there is line of sight.
- Typically less absorption than atmospheric absorption when there is line of sight.
- Approximate rule of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

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

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 —  $d_t = d_1 + d_2$   
 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  $d_t$  through the foliage**

**Table A.1 — Attenuation of an octave band of noise due to propagation a distance  $d_t$  through dense foliage**

Propagation distance $d_t$ m	Nominal midband frequency Hz							
	63	125	250	500	1 000	2 000	4 000	8 000
$10 \leq d_t \leq 20$	Attenuation, dB: 0    0    1    1    1    1    2    3							
$20 \leq d_t \leq 200$	Attenuation, dB/m: 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)

<b>Source<sup>1</sup></b>	<b>Sound Level ( dBA)</b>
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>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)

<b>Source<sup>1</sup></b>	<b>Sound level at 3 feet (dBA)</b>
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>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
8/07/15 22:06	8/07/15 22:06	0.75	Loud Vehicle Passby
8/07/15 22:08	8/07/15 22:08	0.75	Loud Vehicle Passby
8/07/15 22:18	8/07/15 22:19	1.25	Sirens
8/07/15 22:19	8/07/15 22:20	0.75	Loud Vehicle Passby
8/07/15 22:29	8/07/15 22:30	1	Loud Vehicle Passby
8/07/15 22:41	8/07/15 22:42	0.75	Loud Vehicle Passby
8/07/15 22:44	8/07/15 22:45	1	Loud Vehicle Passby
8/07/15 22:46	8/07/15 22:47	1.25	Loud Vehicle Passby
8/07/15 22:51	8/07/15 22:52	1	Loud Vehicle Passby
8/07/15 23:14	8/07/15 23:15	1	Loud Vehicle Passby
8/07/15 23:31	8/07/15 23:33	1.5	Loud Vehicle Passby
8/07/15 23:34	8/07/15 23:35	0.75	Loud Vehicle Passby
8/07/15 23:44	8/07/15 23:45	1	Loud Vehicle Passby
8/07/15 23:51	8/07/15 23:52	1	Loud Vehicle Passby
8/07/15 23:55	8/07/15 23:56	0.75	Loud Vehicle Passby
8/08/15 00:08	8/08/15 00:09	1	Loud Vehicle Passby
8/08/15 00:10	8/08/15 00:11	1	Loud Vehicle Passby
8/08/15 00:16	8/08/15 00:17	1.25	Loud Vehicle Passby
8/08/15 00:24	8/08/15 00:25	1	Loud Vehicle Passby
8/08/15 00:50	8/08/15 00:51	0.75	Loud Vehicle Passby
8/08/15 01:40	8/08/15 01:48	7.25	Train Passby
8/08/15 01:58	8/08/15 01:59	1	Loud Vehicle Passby
8/08/15 02:56	8/08/15 02:58	1.5	Loud Vehicle Passby
8/08/15 03:28	8/08/15 03:31	2.75	Loud Vehicle Passby
8/08/15 03:37	8/08/15 03:38	1	Loud Vehicle Passby
8/08/15 03:39	8/08/15 03:40	1.25	Loud Vehicle Passby
8/08/15 03:41	8/08/15 03:43	2	Loud Vehicle Passby
8/08/15 03:51	8/08/15 03:53	2.25	Train Passby
8/08/15 04:15	8/08/15 04:16	1	Loud Vehicle Passby
8/08/15 04:30	8/08/15 04:34	4.25	Loud Vehicle Passby
8/08/15 04:35	8/08/15 04:42	6.25	Loud Vehicle Passby
8/08/15 04:42	8/08/15 04:43	1.25	Loud Vehicle Passby
8/08/15 04:43	8/08/15 04:44	1.5	Loud Vehicle Passby
8/08/15 04:44	8/08/15 05:27	42.75	Traffic Noise
8/08/15 05:27	8/08/15 05:29	2	Loud Vehicle Passby
8/08/15 05:29	8/08/15 05:30	0.75	Loud Vehicle Passby
8/08/15 05:30	8/08/15 05:31	0.75	Loud Vehicle Passby
8/08/15 05:31	8/08/15 06:19	48	Traffic Noise
8/08/15 06:19	8/08/15 07:00	41	Traffic Noise

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

Start Time	End Time	Duration (min)	Reason
8/08/15 22:01	8/08/15 22:03	1.25	Loud Vehicle Passby
8/08/15 22:06	8/08/15 22:07	1.25	Loud Vehicle Passby
8/08/15 22:11	8/08/15 22:11	0.75	Loud Vehicle Passby
8/08/15 22:20	8/08/15 22:20	0.75	Loud Vehicle Passby
8/08/15 22:21	8/08/15 22:22	0.75	Loud Vehicle Passby
8/08/15 22:27	8/08/15 22:27	0.75	Loud Vehicle Passby
8/08/15 22:36	8/08/15 22:37	0.75	Loud Vehicle Passby
8/08/15 22:42	8/08/15 22:43	0.75	Loud Vehicle Passby
8/08/15 23:03	8/08/15 23:05	1.25	Loud Vehicle Passby
8/08/15 23:06	8/08/15 23:07	0.75	Loud Vehicle Passby
8/08/15 23:08	8/08/15 23:08	0.5	Loud Vehicle Passby
8/08/15 23:13	8/08/15 23:15	2.5	Loud Vehicle Passby
8/08/15 23:44	8/08/15 23:45	1	Loud Vehicle Passby
8/09/15 00:03	8/09/15 00:04	1	Loud Vehicle Passby
8/09/15 00:06	8/09/15 00:07	1	Loud Vehicle Passby
8/09/15 00:14	8/09/15 00:16	1.25	Loud Vehicle Passby
8/09/15 00:47	8/09/15 00:48	1	Loud Vehicle Passby
8/09/15 01:07	8/09/15 01:08	1	Loud Vehicle Passby
8/09/15 01:13	8/09/15 01:14	1	Loud Vehicle Passby
8/09/15 01:52	8/09/15 01:52	0.75	Loud Vehicle Passby
8/09/15 02:39	8/09/15 02:40	1	Loud Vehicle Passby
8/09/15 03:18	8/09/15 03:19	1	Loud Vehicle Passby
8/09/15 03:24	8/09/15 03:24	0.75	Loud Vehicle Passby
8/09/15 04:14	8/09/15 04:15	1	Loud Vehicle Passby
8/09/15 04:17	8/09/15 04:18	0.75	Loud Vehicle Passby
8/09/15 04:26	8/09/15 04:29	3	Loud Vehicle Passby
8/09/15 04:33	8/09/15 04:34	1	Loud Vehicle Passby
8/09/15 04:35	8/09/15 04:36	0.75	Loud Vehicle Passby
8/09/15 04:37	8/09/15 04:39	1.75	Loud Vehicle Passby
8/09/15 04:40	8/09/15 04:41	1.25	Loud Vehicle Passby
8/09/15 04:43	8/09/15 04:44	1	Loud Vehicle Passby
8/09/15 04:44	8/09/15 04:45	1.75	Loud Vehicle Passby
8/09/15 04:46	8/09/15 04:50	4	Loud Vehicle Passby
8/09/15 04:50	8/09/15 04:51	1	Loud Vehicle Passby
8/09/15 04:53	8/09/15 04:54	0.75	Loud Vehicle Passby
8/09/15 04:54	8/09/15 04:55	1	Loud Vehicle Passby
8/09/15 04:57	8/09/15 04:58	1.25	Loud Vehicle Passby
8/09/15 05:01	8/09/15 05:02	0.75	Loud Vehicle Passby
8/09/15 05:15	8/09/15 05:16	0.75	Loud Vehicle Passby
8/09/15 05:17	8/09/15 05:18	0.75	Loud Vehicle Passby

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

Start Time	End Time	Duration (min)	Reason
8/09/15 05:30	8/09/15 05:33	3.5	Loud Vehicle Passby
8/09/15 05:34	8/09/15 05:38	4.75	Loud Vehicle Passby
8/09/15 05:45	8/09/15 05:46	1	Loud Vehicle Passby
8/09/15 05:53	8/09/15 05:55	1.5	Loud Vehicle Passby
8/09/15 06:00	8/09/15 06:01	1	Loud Vehicle Passby
8/09/15 06:06	8/09/15 06:07	1	Loud Vehicle Passby
8/09/15 06:08	8/09/15 06:10	2	Loud Vehicle Passby
8/09/15 06:22	8/09/15 06:23	1.25	Loud Vehicle Passby
8/09/15 06:24	8/09/15 06:24	0.75	Loud Vehicle Passby
8/09/15 06:28	8/09/15 06:29	0.75	Loud Vehicle Passby
8/09/15 06:46	8/09/15 06:49	2.25	Loud Vehicle Passby
8/09/15 06:53	8/09/15 06:54	1.25	Loud Vehicle Passby
8/09/15 07:00	8/09/15 07:00	0.75	Loud Vehicle Passby
<b>Total Night #1</b>		<b>188</b>	
<b>Total Night #2</b>		<b>67</b>	
<b>Total Data</b>		<b>255</b>	

**Data Removal Noise Monitoring Location #2**

Start Time	End Time	Duration (min)	Reason
8/09/15 22:03	8/09/15 22:04	1.2	Loud Vehicle Passby
8/09/15 22:29	8/09/15 22:30	1.0	Train Passby
8/09/15 22:52	8/09/15 22:53	1.0	Train Passby
8/09/15 22:54	8/09/15 22:55	0.7	Train Passby
8/09/15 22:56	8/09/15 22:57	1.0	Train Passby
8/09/15 23:04	8/09/15 23:05	1.2	Train Passby
8/09/15 23:06	8/09/15 23:07	1.2	Train Passby
8/09/15 23:08	8/09/15 23:09	1.0	Train Passby
8/09/15 23:09	8/09/15 23:10	1.2	Train Passby
8/09/15 23:14	8/09/15 23:15	1.5	Train Passby
8/09/15 23:36	8/09/15 23:36	0.7	Train Passby
8/10/15 00:00	8/10/15 00:00	0.5	Loud Vehicle Passby
8/10/15 00:11	8/10/15 00:11	1.0	Loud Vehicle Passby
8/10/15 00:24	8/10/15 00:25	1.0	Train Passby
8/10/15 00:25	8/10/15 00:30	5.5	Excessive Wind Noise
8/10/15 00:32	8/10/15 00:39	6.7	Excessive Wind Noise
8/10/15 00:42	8/10/15 00:45	3.0	Loud Vehicle Passby
8/10/15 00:55	8/10/15 00:56	1.0	Loud Vehicle Passby
8/10/15 00:58	8/10/15 00:59	1.7	Loud Vehicle Passby
8/10/15 01:01	8/10/15 01:02	1.2	Loud Vehicle Passby
8/10/15 01:04	8/10/15 01:05	1.0	Loud Vehicle Passby
8/10/15 01:05	8/10/15 01:06	0.7	Loud Vehicle Passby
8/10/15 01:07	8/10/15 01:07	0.7	Loud Vehicle Passby
8/10/15 01:09	8/10/15 01:10	1.0	Loud Vehicle Passby
8/10/15 01:12	8/10/15 01:13	1.2	Loud Vehicle Passby
8/10/15 01:18	8/10/15 01:18	1.0	Loud Vehicle Passby
8/10/15 01:20	8/10/15 01:21	0.7	Loud Vehicle Passby
8/10/15 01:25	8/10/15 01:26	1.0	Loud Vehicle Passby
8/10/15 01:44	8/10/15 01:45	1.2	Train Passby
8/10/15 03:09	8/10/15 03:09	0.7	Train Passby
8/10/15 03:10	8/10/15 03:12	1.5	Train Passby
8/10/15 03:16	8/10/15 03:17	1.5	Train Passby
8/10/15 03:40	8/10/15 03:42	1.5	Train Passby
8/10/15 03:49	8/10/15 03:50	1.2	Loud Vehicle Passby
8/10/15 04:29	8/10/15 04:30	1.5	Loud Vehicle Passby
8/10/15 04:32	8/10/15 04:34	2.0	Train Passby
8/10/15 04:35	8/10/15 04:40	4.7	Train Passby
8/10/15 04:42	8/10/15 04:47	4.7	Train Passby
8/10/15 04:49	8/10/15 04:50	1.2	Train Passby
8/10/15 04:56	8/10/15 04:57	1.2	Train Passby

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

Start Time	End Time	Duration (min)	Reason
8/10/15 04:59	8/10/15 05:00	1.2	Loud Vehicle Passby
8/10/15 05:04	8/10/15 05:05	1.2	Loud Vehicle Passby
8/10/15 05:13	8/10/15 05:13	0.7	Loud Vehicle Passby
8/10/15 05:20	8/10/15 05:21	1.2	Loud Vehicle Passby
8/10/15 05:24	8/10/15 05:25	1.2	Loud Vehicle Passby
8/10/15 05:26	8/10/15 05:29	3.2	Train Passby
8/10/15 05:31	8/10/15 05:38	6.7	Loud Vehicle Passby
8/10/15 05:40	8/10/15 05:42	2.2	Loud Vehicle Passby
8/10/15 05:43	8/10/15 05:46	3.2	Loud Vehicle Passby
8/10/15 05:48	8/10/15 05:50	2.5	Loud Vehicle Passby
8/10/15 05:51	8/10/15 06:02	11.5	Loud Vehicle Passby
8/10/15 06:03	8/10/15 07:01	58.7	Vehicle Traffic (Very Apparent)
8/10/15 22:06	8/10/15 22:07	1.2	Loud Vehicle Passby
8/10/15 22:19	8/10/15 22:20	1.2	Loud Vehicle Passby
8/10/15 22:30	8/10/15 22:31	1.2	Loud Vehicle Passby
8/10/15 22:33	8/10/15 22:33	0.7	Loud Vehicle Passby
8/10/15 22:41	8/10/15 22:42	1.0	Loud Vehicle Passby
8/11/15 00:20	8/11/15 00:21	1.5	Loud Vehicle Passby
8/11/15 00:42	8/11/15 00:43	1.0	Loud Vehicle Passby
8/11/15 01:01	8/11/15 01:04	3.2	Train Passby
8/11/15 01:05	8/11/15 01:07	3.0	Train Passby
8/11/15 01:09	8/11/15 01:14	5.5	Train Passby
8/11/15 01:15	8/11/15 01:16	1.5	Train Passby
8/11/15 01:16	8/11/15 01:43	27.0	Train Passby
8/11/15 02:33	8/11/15 02:33	0.5	Train Passby
8/11/15 03:09	8/11/15 03:09	0.7	Loud Vehicle Passby
8/11/15 03:32	8/11/15 03:35	4.0	Train Passby
8/11/15 03:41	8/11/15 03:42	1.5	Train Passby
8/11/15 03:44	8/11/15 03:45	0.7	Train Passby
8/11/15 03:51	8/11/15 03:52	1.2	Train Passby
8/11/15 03:55	8/11/15 03:56	1.5	Train Passby
8/11/15 04:02	8/11/15 04:09	7.5	Train Passby
8/11/15 04:11	8/11/15 04:20	9.2	Train Passby
8/11/15 04:34	8/11/15 04:37	3.2	Train Passby
8/11/15 04:40	8/11/15 04:41	1.7	Train Passby
8/11/15 04:43	8/11/15 04:44	1.7	Loud Vehicle Passby
8/11/15 04:50	8/11/15 04:51	1.2	Train Passby
8/11/15 05:01	8/11/15 05:02	1.2	Loud Vehicle Passby
8/11/15 05:10	8/11/15 05:12	2.0	Loud Vehicle Passby
8/11/15 05:21	8/11/15 05:22	1.2	Loud Vehicle Passby



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

Start Time	End Time	Duration (min)	Reason
8/11/15 05:27	8/11/15 05:28	1.2	Loud Vehicle Passby
8/11/15 05:30	8/11/15 05:32	2.5	Loud Vehicle Passby
8/11/15 05:33	8/11/15 05:38	5.0	Train Passby
8/11/15 05:40	8/11/15 05:48	7.7	Loud Vehicle Passby
8/11/15 05:48	8/11/15 05:59	11.2	Loud Vehicle Passby
8/11/15 06:03	8/11/15 06:59	56.2	Traffic Noise and Rail Noise
<b>Total Night #1</b>		<b>157</b>	
<b>Total Night #2</b>		<b>171</b>	
<b>Total Data</b>		<b>327</b>	

**Data Removal Noise Monitoring Location #3**

Start Time	End Time	Duration (min)	Reason
8/09/15 22:01	8/09/15 22:02	1.3	Unknown
8/09/15 22:03	8/09/15 22:04	0.6	Unknown
8/09/15 22:05	8/09/15 22:07	1.3	Unknown
8/09/15 22:31	8/09/15 22:32	1.1	Loud Vehicle Passby
8/09/15 22:44	8/09/15 22:50	6.1	Train Passby
8/09/15 22:55	8/09/15 22:56	1.1	Loud Vehicle Passby
8/09/15 23:03	8/09/15 23:10	7.8	Train Passby
8/09/15 23:19	8/09/15 23:19	0.1	Train Passby
8/09/15 23:19	8/09/15 23:20	0.3	Train Passby
8/09/15 23:37	8/09/15 23:38	0.6	Loud Vehicle Passby
8/09/15 23:38	8/09/15 23:41	2.8	Train Passby
8/09/15 23:42	8/09/15 23:43	1.1	Excessive Wind Noise
8/09/15 23:51	8/09/15 23:51	0.6	Train Passby
8/09/15 23:58	8/09/15 23:59	1.1	Loud Vehicle Passby
8/10/15 00:09	8/10/15 00:10	1.3	Train Passby
8/10/15 00:13	8/10/15 00:14	0.6	Train Passby
8/10/15 00:15	8/10/15 00:15	0.3	Train Passby
8/10/15 00:21	8/10/15 00:23	2.6	Train Passby
8/10/15 00:28	8/10/15 00:30	1.8	Excessive Wind Noise
8/10/15 00:42	8/10/15 00:43	0.8	Excessive Wind Noise
8/10/15 00:53	8/10/15 00:54	1.1	Excessive Wind Noise
8/10/15 00:58	8/10/15 01:00	1.8	Unknown
8/10/15 01:01	8/10/15 01:05	3.6	Excessive Wind Noise
8/10/15 01:05	8/10/15 01:06	1.1	Thunder
8/10/15 01:07	8/10/15 01:13	6.6	rain fall
8/10/15 01:18	8/10/15 01:22	3.8	Thunder
8/10/15 01:22	8/10/15 01:23	0.6	Excessive Wind Noise
8/10/15 01:26	8/10/15 01:26	0.8	Thunder
8/10/15 01:38	8/10/15 01:46	7.6	Unknown (Machinery)
8/10/15 01:58	8/10/15 02:01	3.6	Machinery Noise
8/10/15 02:08	8/10/15 02:09	1.3	Loud Vehicle Passby
8/10/15 03:18	8/10/15 03:20	1.8	Loud Vehicle Passby
8/10/15 03:23	8/10/15 03:25	1.3	Site Visit
8/10/15 03:43	8/10/15 03:44	1.1	Train Passby
8/10/15 03:48	8/10/15 03:49	1.1	Loud Vehicle Passby
8/10/15 04:11	8/10/15 04:12	1.1	Loud Vehicle Passby
8/10/15 04:28	8/10/15 04:30	1.6	Train Passby
8/10/15 04:45	8/10/15 04:45	0.3	Machinery Noise
8/10/15 04:56	8/10/15 05:00	4.3	Train Passby
8/10/15 05:03	8/10/15 05:04	0.8	Train Passby

**Data Removal Noise Monitoring Location #3 Cont.**

Start Time	End Time	Duration (min)	Reason
8/10/15 05:07	8/10/15 05:08	0.8	Train Whistle
8/10/15 05:09	8/10/15 05:09	0.1	Train Whistle
8/10/15 05:11	8/10/15 05:11	0.6	Train Whistle
8/10/15 05:28	8/10/15 05:28	0.1	Loud Vehicle Passby
8/10/15 05:29	8/10/15 05:30	1.1	Loud Vehicle Passby
8/10/15 05:34	8/10/15 05:37	3.3	Loud Vehicle Passby
8/10/15 05:37	8/10/15 05:38	1.1	Loud Vehicle Passby
8/10/15 05:42	8/10/15 05:43	1.1	Loud Vehicle Passby
8/10/15 05:43	8/10/15 05:44	0.6	Excessive Bird Noise
8/10/15 05:45	8/10/15 05:46	1.1	Loud Vehicle Passby
8/10/15 05:49	8/10/15 05:50	0.6	Loud Vehicle Passby
8/10/15 05:51	8/10/15 05:51	0.8	Loud Vehicle Passby
8/10/15 05:52	8/10/15 06:04	11.6	Loud Vehicle Passby
8/10/15 06:06	8/10/15 06:07	1.3	Loud Vehicle Passby
8/10/15 06:11	8/10/15 06:12	1.1	Loud Vehicle Passby
8/10/15 06:12	8/10/15 06:13	1.1	Loud Vehicle Passby
8/10/15 06:15	8/10/15 06:23	8.1	Loud Vehicle Passby
8/10/15 06:24	8/10/15 06:25	1.3	Loud Vehicle Passby
8/10/15 06:26	8/10/15 06:29	3.6	Loud Vehicle Passby
8/10/15 06:30	8/10/15 06:33	3.3	Loud Vehicle Passby
8/10/15 06:34	8/10/15 06:43	9.6	Loud Vehicle Passby
8/10/15 06:44	8/10/15 06:54	10.6	Loud Vehicle Passby
8/10/15 06:55	8/10/15 07:00	5.1	Loud Vehicle Passby
8/10/15 22:01	8/10/15 22:02	1.1	Loud Vehicle Passby
8/10/15 22:04	8/10/15 22:05	0.6	Loud Vehicle Passby
8/10/15 22:32	8/10/15 22:33	1.3	Loud Vehicle Passby
8/10/15 22:33	8/10/15 22:34	1.3	Site Visit
8/10/15 23:58	8/10/15 23:59	1.1	Train Passby
8/11/15 00:02	8/11/15 00:03	0.8	Train Passby
8/11/15 00:18	8/11/15 00:20	2.6	Machinery Noise
8/11/15 00:38	8/11/15 00:41	2.6	Train Passby
8/11/15 00:43	8/11/15 00:45	2.1	Train Whistle
8/11/15 00:51	8/11/15 00:53	1.3	Train Whistle
8/11/15 00:55	8/11/15 00:55	0.3	Train Passby
8/11/15 01:42	8/11/15 01:43	0.8	Train Passby
8/11/15 02:32	8/11/15 02:33	1.3	Train Passby
8/11/15 02:36	8/11/15 02:37	1.3	Train Passby
8/11/15 02:39	8/11/15 02:40	1.1	Train Whistle
8/11/15 02:52	8/11/15 02:52	0.1	Train Whistle
8/11/15 03:31	8/11/15 03:31	0.1	Train Whistle

**Data Removal Noise Monitoring Location #3 Cont.**

Start Time	End Time	Duration (min)	Reason
8/11/15 03:31	8/11/15 03:31	0.1	Train Whistle
8/11/15 03:36	8/11/15 03:37	0.8	Train Whistle
8/11/15 03:40	8/11/15 03:41	1.1	Train Whistle
8/11/15 03:43	8/11/15 03:44	1.1	Loud Vehicle Passby
8/11/15 03:50	8/11/15 03:51	1.1	Train Passby
8/11/15 04:07	8/11/15 04:07	0.8	Loud Vehicle Passby
8/11/15 04:39	8/11/15 04:41	1.8	Machinery Noise
8/11/15 04:44	8/11/15 04:46	1.3	Loud Vehicle Passby
8/11/15 04:48	8/11/15 04:50	1.8	Train Passby
8/11/15 05:12	8/11/15 05:12	0.1	Loud Vehicle Passby
8/11/15 05:12	8/11/15 05:13	1.1	Loud Vehicle Passby
8/11/15 05:23	8/11/15 05:23	0.1	Loud Vehicle Passby
8/11/15 05:23	8/11/15 05:24	1.1	Loud Vehicle Passby
8/11/15 05:32	8/11/15 05:33	1.3	Loud Vehicle Passby
8/11/15 05:34	8/11/15 05:35	1.8	Loud Vehicle Passby
8/11/15 05:36	8/11/15 05:40	3.8	Loud Vehicle Passby
8/11/15 05:42	8/11/15 05:43	1.1	Loud Vehicle Passby
8/11/15 05:47	8/11/15 05:50	3.1	Loud Vehicle Passby
8/11/15 05:51	8/11/15 06:00	9.1	Loud Vehicle Passby
8/11/15 06:01	8/11/15 06:02	1.3	Loud Vehicle Passby
8/11/15 06:05	8/11/15 06:06	1.1	Loud Vehicle Passby
8/11/15 06:07	8/11/15 06:08	1.3	Loud Vehicle Passby
8/11/15 06:11	8/11/15 06:13	2.3	Loud Vehicle Passby
8/11/15 06:14	8/11/15 06:16	2.1	Loud Vehicle Passby
8/11/15 06:17	8/11/15 06:18	1.3	Loud Vehicle Passby
8/11/15 06:20	8/11/15 06:22	2.8	Loud Vehicle Passby
8/11/15 06:23	8/11/15 06:27	3.6	Loud Vehicle Passby
8/11/15 06:28	8/11/15 06:42	14.1	Loud Vehicle Passby
8/11/15 06:42	8/11/15 06:43	0.6	Loud Vehicle Passby
8/11/15 06:43	8/11/15 06:44	0.8	Loud Vehicle Passby
8/11/15 06:45	8/11/15 06:52	7.8	Loud Vehicle Passby
8/11/15 06:53	8/11/15 06:55	2.1	Loud Vehicle Passby
8/11/15 06:55	8/11/15 06:58	3.3	Loud Vehicle Passby
<b>Total Night #1</b>		<b>146</b>	
<b>Total Night #2</b>		<b>96</b>	
<b>Total Data</b>		<b>242</b>	

**Data Removal Noise Monitoring Location #4**

Start Time	End Time	Duration (min)	Reason
8/07/15 22:06	8/07/15 22:07	1.5	Train Whistle
8/07/15 22:09	8/07/15 22:11	2.2	Train Passby
8/07/15 22:26	8/07/15 22:26	0.2	Train Whistle
8/07/15 22:26	8/07/15 22:28	2.2	Train Whistle
8/07/15 22:39	8/07/15 22:40	1.0	Train Whistle
8/07/15 22:41	8/07/15 22:42	1.2	Train Whistle
8/07/15 23:14	8/07/15 23:15	1.0	Train Whistle
8/07/15 23:19	8/07/15 23:25	6.2	Train Passby
8/07/15 23:26	8/07/15 23:27	1.0	Train Whistle
8/07/15 23:33	8/07/15 23:34	1.0	Train Whistle
8/07/15 23:39	8/07/15 23:39	0.7	Train Whistle
8/07/15 23:44	8/07/15 23:46	1.5	Train Whistle
8/07/15 23:57	8/07/15 23:58	1.7	Train Whistle
8/08/15 01:18	8/08/15 01:19	1.2	Train Whistle
8/08/15 01:20	8/08/15 01:22	2.5	Monitor Check
8/08/15 01:23	8/08/15 01:24	1.2	Train Whistle
8/08/15 01:39	8/08/15 01:43	3.5	Train Passby
8/08/15 01:44	8/08/15 01:46	1.5	Train Passby
8/08/15 01:47	8/08/15 01:48	1.2	Loud Vehicle Passby
8/08/15 01:53	8/08/15 01:54	1.0	Loud Vehicle Passby
8/08/15 01:57	8/08/15 01:57	0.5	Train Passby
8/08/15 02:21	8/08/15 02:23	1.5	Train Passby
8/08/15 02:43	8/08/15 02:43	1.0	Train Whistle
8/08/15 03:23	8/08/15 03:24	2.0	Train Whistle
8/08/15 05:09	8/08/15 05:10	1.2	Train Whistle
8/08/15 05:15	8/08/15 05:16	1.2	Train Passby
8/08/15 05:24	8/08/15 05:25	1.5	Train Passby
8/08/15 05:45	8/08/15 05:46	1.0	Train Passby
8/08/15 05:47	8/08/15 05:51	4.2	Train Passby
8/08/15 06:55	8/08/15 06:56	1.0	Loud Vehicle Passby
8/08/15 22:02	8/08/15 22:03	1.0	Loud Vehicle Passby
8/08/15 22:17	8/08/15 22:19	1.5	Loud Vehicle Passby
8/08/15 22:20	8/08/15 22:21	1.0	Loud Vehicle Passby
8/08/15 22:41	8/08/15 22:44	3.2	Site Visit
8/08/15 22:48	8/08/15 22:49	1.7	Loud Vehicle Passby
8/08/15 22:50	8/08/15 22:52	1.5	Aircraft Flyover
8/08/15 22:56	8/08/15 22:56	0.7	Loud Vehicle Passby
8/08/15 22:57	8/08/15 22:57	0.2	Loud Vehicle Passby
8/08/15 22:57	8/08/15 23:14	17.7	Irregular Activity (???)
8/08/15 23:16	8/08/15 23:17	0.7	Train Whistle

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

Start Time	End Time	Duration (min)	Reason
8/08/15 23:22	8/08/15 23:22	0.5	Hlghway Noise
8/08/15 23:25	8/08/15 23:26	2.0	Train Passby
8/08/15 23:27	8/08/15 23:29	2.0	Train Passby
8/08/15 23:29	8/08/15 23:33	3.5	Train Passby
8/08/15 23:33	8/08/15 23:40	6.7	Train Passby
8/08/15 23:47	8/08/15 23:48	1.2	Train Whistle
8/08/15 23:51	8/08/15 23:53	1.5	Train Passby
8/08/15 23:56	8/08/15 23:57	1.7	Train Passby
8/09/15 00:00	8/09/15 00:06	6.2	Train Passby
8/09/15 00:09	8/09/15 00:11	1.7	Train Passby
8/09/15 00:12	8/09/15 00:14	2.2	Train Passby
8/09/15 00:16	8/09/15 00:17	1.5	Low Frequency Engine Noise
8/09/15 00:18	8/09/15 00:19	1.7	Low Frequency Engine Noise
8/09/15 00:24	8/09/15 00:25	1.0	Train Passby
8/09/15 00:27	8/09/15 00:30	3.5	Low Frequency Engine Noise
8/09/15 00:31	8/09/15 00:32	0.5	Low Frequency Engine Noise
8/09/15 00:43	8/09/15 00:44	2.0	Train Passby
8/09/15 00:45	8/09/15 00:45	0.5	Train Passby
8/09/15 00:47	8/09/15 00:49	2.5	Low Frequency Engine Noise
8/09/15 00:51	8/09/15 00:52	1.2	Loud Vehicle Passby
8/09/15 00:57	8/09/15 00:58	1.2	Monitor Check
8/09/15 00:59	8/09/15 00:59	1.0	Monitor Check
8/09/15 01:32	8/09/15 01:33	1.0	Train Whistle
8/09/15 01:37	8/09/15 01:44	7.7	Train Passby
8/09/15 01:45	8/09/15 01:47	2.5	Low Frequency Engine Noise
8/09/15 01:49	8/09/15 01:49	0.2	Low Frequency Engine Noise
8/09/15 01:49	8/09/15 01:50	0.7	Loud Vehicle Passby
8/09/15 01:50	8/09/15 01:54	3.5	Low Frequency Engine Noise
8/09/15 02:02	8/09/15 02:08	6.0	Low Frequency Engine Noise
8/09/15 02:12	8/09/15 02:13	1.2	Loud Vehicle Passby
8/09/15 02:15	8/09/15 02:15	1.0	Train Passby
8/09/15 02:20	8/09/15 02:21	1.2	Low Frequency Engine Noise
8/09/15 02:25	8/09/15 02:30	5.0	Train Passby
8/09/15 02:38	8/09/15 02:43	6.0	Train Passby
8/09/15 02:55	8/09/15 02:57	2.5	Train Passby
8/09/15 03:27	8/09/15 03:28	1.0	Loud Vehicle Passby
8/09/15 03:29	8/09/15 03:30	1.5	Loud Vehicle Passby
8/09/15 03:31	8/09/15 03:31	0.7	Low Frequency Engine Noise
8/09/15 03:40	8/09/15 03:42	2.0	Aircraft Flyover
8/09/15 05:25	8/09/15 05:27	1.5	Train Passby

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

Start Time	End Time	Duration (min)	Reason
8/09/15 05:53	8/09/15 05:54	1.2	Train Passby
8/09/15 06:22	8/09/15 06:23	1.2	Train Passby
8/09/15 06:24	8/09/15 06:30	5.5	Train Passby
8/09/15 06:31	8/09/15 06:32	1.2	Train Passby
8/09/15 06:52	8/09/15 06:53	0.7	Train Whistle
<b>Total Night #1</b>		<b>48</b>	
<b>Total Night #2</b>		<b>129</b>	
<b>Total Data</b>		<b>176</b>	

**Data Removal Noise Monitoring Location #5**

Start Time	End Time	Duration (min)	Reason
8/08/15 22:14	8/08/15 22:17	3.1	Loud Vehicle Passby
8/08/15 22:31	8/08/15 22:33	1.8	Train Whistle
8/08/15 23:23	8/08/15 23:23	0.6	Loud Vehicle Passby
8/09/15 00:12	8/09/15 00:12	0.3	Loud Vehicle Passby
8/09/15 00:15	8/09/15 00:16	0.8	Loud Vehicle Passby
8/09/15 00:19	8/09/15 00:19	0.8	Loud Vehicle Passby
8/09/15 01:28	8/09/15 01:33	5.3	Train Passby
8/09/15 01:35	8/09/15 01:36	0.8	Train Whistle
8/09/15 01:38	8/09/15 01:39	0.8	Train Whistle
8/09/15 02:08	8/09/15 02:12	3.6	Train Passby
8/09/15 05:37	8/09/15 05:40	3.8	Site Visit
8/09/15 05:50	8/09/15 05:51	0.8	Loud Vehicle Passby
8/09/15 06:05	8/09/15 06:06	1.1	Loud Vehicle Passby
8/09/15 06:18	8/09/15 06:20	1.6	Loud Vehicle Passby
8/09/15 06:26	8/09/15 06:27	0.8	Excessive Bird Noise
8/09/15 06:34	8/09/15 06:35	0.8	Loud Vehicle Passby
8/09/15 06:40	8/09/15 06:40	0.3	Excessive Bird Noise
8/09/15 06:43	8/09/15 06:44	1.1	Loud Vehicle Passby
8/09/15 22:20	8/09/15 22:21	0.8	Coyote
8/09/15 22:31	8/09/15 22:37	5.8	Monitor Check
8/09/15 23:39	8/09/15 23:40	0.8	Loud Vehicle Passby
8/09/15 23:46	8/09/15 23:47	0.8	Loud Vehicle Passby
8/10/15 01:15	8/10/15 01:16	1.3	Train Whistle
8/10/15 01:18	8/10/15 01:18	0.8	Train Whistle
8/10/15 03:03	8/10/15 03:06	3.3	Train Passby
8/10/15 03:49	8/10/15 03:49	0.6	Loud Vehicle Passby
8/10/15 05:51	8/10/15 05:51	0.1	Loud Vehicle Passby
8/10/15 05:51	8/10/15 05:52	0.6	Loud Vehicle Passby
8/10/15 06:47	8/10/15 06:48	1.1	Loud Vehicle Passby
<b>Total Night #1</b>		<b>28</b>	
<b>Total Night #2</b>		<b>16</b>	
<b>Total Data</b>		<b>44</b>	



**Data Removal Noise Monitoring Location #6**

Start Time	End Time	Duration (min)	Reason
8/07/15 22:09	8/07/15 22:11	2.2	Loud Vehicle Passby
8/07/15 22:14	8/07/15 22:16	2.0	Loud Vehicle Passby
8/07/15 22:16	8/07/15 22:19	2.7	Loud Vehicle Passby
8/07/15 22:47	8/07/15 22:48	1.0	Coyotes
8/07/15 23:05	8/07/15 23:07	2.0	Loud Vehicle Passby
8/07/15 23:27	8/07/15 23:28	1.0	Loud Vehicle Passby
8/07/15 23:42	8/07/15 23:43	1.2	Loud Vehicle Passby
8/07/15 23:47	8/07/15 23:48	1.2	Loud Vehicle Passby
8/08/15 00:25	8/08/15 00:26	1.5	Loud Vehicle Passby
8/08/15 01:39	8/08/15 01:40	1.5	Train Passby
8/08/15 03:39	8/08/15 03:40	1.2	Horn
8/08/15 05:26	8/08/15 05:28	1.7	Loud Vehicle Passby
8/08/15 06:11	8/08/15 06:12	1.5	Loud Vehicle Passby
8/08/15 06:13	8/08/15 06:14	1.2	Loud Vehicle Passby
8/08/15 06:39	8/08/15 06:40	1.2	Loud Vehicle Passby
8/08/15 06:41	8/08/15 06:42	1.2	Loud Vehicle Passby
8/08/15 22:01	8/08/15 22:03	2.0	Loud Vehicle Passby
8/08/15 22:19	8/08/15 22:21	2.5	Site Visit
8/08/15 22:23	8/08/15 22:27	4.2	Train Passby
8/08/15 22:33	8/08/15 22:34	1.0	Train Whistle
8/08/15 22:35	8/08/15 22:35	1.0	Train Whistle
8/08/15 22:36	8/08/15 22:37	1.2	Train Passby
8/08/15 22:40	8/08/15 22:41	1.0	Train Passby
8/08/15 23:31	8/08/15 23:32	1.0	Train Passby
8/09/15 00:04	8/09/15 00:05	1.2	Train Passby
8/09/15 00:47	8/09/15 00:48	1.7	Loud Vehicle Passby
8/09/15 00:51	8/09/15 00:53	3.0	Loud Vehicle Passby
8/09/15 01:16	8/09/15 01:17	1.0	Train Passby
8/09/15 01:28	8/09/15 01:32	4.2	Train Passby
8/09/15 02:11	8/09/15 02:12	0.5	Train Passby
8/09/15 05:32	8/09/15 05:32	0.7	Loud Vehicle Passby
8/09/15 05:52	8/09/15 05:54	1.7	Loud Vehicle Passby
8/09/15 06:16	8/09/15 06:17	1.5	Train Whistle
8/09/15 06:49	8/09/15 06:50	1.0	Unknown
<b>Total Night #1</b>		<b>24</b>	
<b>Total Night #2</b>		<b>30</b>	
<b>Total Data</b>		<b>55</b>	

**Data Removal Noise Monitoring Location #8**

Start Time	End Time	Duration (min)	Reason
7/10/15 00:54	7/10/15 00:54	0.3	Loud Vehicle Passby
7/10/15 00:59	7/10/15 01:00	0.5	Train Whistle
7/10/15 01:06	7/10/15 01:06	0.3	Train Whistle
7/10/15 02:21	7/10/15 02:21	0.0	Train Whistle
7/10/15 03:49	7/10/15 03:51	2.5	Train Passby
7/10/15 03:52	7/10/15 03:53	0.8	Train Passby
7/10/15 03:54	7/10/15 03:54	0.3	Train Whistle
7/10/15 04:03	7/10/15 04:03	0.5	Activity on Site
7/10/15 04:06	7/10/15 04:06	0.5	Backup beeper from site
7/10/15 04:07	7/10/15 04:07	0.5	Backup beeper from site
7/10/15 04:28	7/10/15 04:29	1.3	Backup beepers
7/10/15 04:32	7/10/15 04:33	1.0	backup beeper
7/10/15 04:55	7/10/15 04:57	1.8	Excessive Bird Noise
7/10/15 04:58	7/10/15 04:59	0.8	Excessive Bird Noise
7/10/15 05:03	7/10/15 05:07	4.5	Excessive Bird Noise
7/10/15 05:09	7/10/15 05:16	7.3	Excessive Bird Noise
7/10/15 05:23	7/10/15 05:26	2.8	Excessive Bird Noise
7/10/15 05:30	7/10/15 05:30	0.5	Excessive Bird Noise
7/10/15 05:32	7/10/15 05:33	0.3	Excessive Bird Noise
7/10/15 05:39	7/10/15 05:40	1.8	Excessive Bird Noise
7/10/15 05:46	7/10/15 05:50	4.0	Excessive Bird Noise
7/10/15 06:06	7/10/15 06:07	1.0	Site activity
7/10/15 06:08	7/10/15 06:11	3.3	Excessive Bird Noise
7/10/15 06:13	7/10/15 06:13	0.3	Excessive Bird Noise
7/10/15 06:16	7/10/15 06:16	0.5	Excessive Bird Noise
7/10/15 06:19	7/10/15 06:19	0.8	Excessive Bird Noise
7/10/15 06:20	7/10/15 06:21	1.0	Excessive Bird Noise
7/10/15 06:26	7/10/15 06:27	1.8	Excessive Bird Noise
7/10/15 06:45	7/10/15 06:49	4.0	Excessive Bird Noise
7/10/15 06:54	7/10/15 06:54	0.5	Excessive Bird Noise
7/10/15 06:57	7/10/15 07:00	2.3	Excessive Bird Noise
7/10/15 22:43	7/10/15 22:44	0.8	Loud Vehicle Passby
7/11/15 04:11	7/11/15 04:11	0.8	Thunder
7/11/15 04:15	7/11/15 04:16	1.3	THunder
7/11/15 04:19	7/11/15 04:20	1.0	Site PA
7/11/15 04:21	7/11/15 04:22	0.5	Thunder
7/11/15 04:23	7/11/15 04:24	0.5	Thunder
7/11/15 04:25	7/11/15 04:26	1.0	Thunder
7/11/15 04:28	7/11/15 04:38	9.5	Excessive Bird Noise
7/11/15 04:38	7/11/15 05:06	27.8	Excessive Bird Noise

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

Start Time	End Time	Duration (min)	Reason
7/11/15 05:06	7/11/15 05:09	2.5	Excessive Bird Noise
7/11/15 05:24	7/11/15 05:25	1.0	Site PA
7/11/15 05:28	7/11/15 05:49	20.8	Excessive Bird Noise
7/11/15 05:59	7/11/15 06:42	42.5	Activity on site
7/11/15 06:47	7/11/15 07:00	13.5	On site activity
<b>Total Night #1</b>		<b>48</b>	
<b>Total Night #2</b>		<b>124</b>	
<b>Total Data</b>		<b>172</b>	

**Data Removal Noise Monitoring Location #9**

Start Time	End Time	Duration (min)	Reason
8/09/15 22:04	8/09/15 22:05	1.2	Loud Vehicle Passby
8/09/15 22:15	8/09/15 22:16	1.2	Aircraft Flyover
8/09/15 22:46	8/09/15 22:47	1.2	Train Passby
8/09/15 22:52	8/09/15 22:53	1.7	Train Passby
8/09/15 22:54	8/09/15 22:55	1.2	Train Passby
8/09/15 22:58	8/09/15 22:58	0.2	Train Passby
8/09/15 22:58	8/09/15 22:58	0.2	Train Passby
8/09/15 23:02	8/09/15 23:04	1.7	Train Passby
8/09/15 23:04	8/09/15 23:07	3.2	Train Passby
8/09/15 23:08	8/09/15 23:10	2.7	Train Passby
8/09/15 23:31	8/09/15 23:31	0.2	Loud Vehicle Passby
8/09/15 23:32	8/09/15 23:32	0.2	Loud Vehicle Passby
8/09/15 23:48	8/09/15 23:49	1.5	Loud Vehicle Passby
8/10/15 00:22	8/10/15 00:22	0.2	Excessive Wind Noise
8/10/15 00:22	8/10/15 00:23	1.5	Excessive Wind Noise
8/10/15 00:25	8/10/15 00:26	1.2	Train Passby
8/10/15 00:31	8/10/15 00:32	2.0	Thunder
8/10/15 00:40	8/10/15 00:41	1.0	Thunder
8/10/15 00:42	8/10/15 00:43	1.2	Thunder
8/10/15 00:44	8/10/15 00:45	0.7	Thunder
8/10/15 00:47	8/10/15 01:00	13.7	Thunder
8/10/15 01:01	8/10/15 01:02	1.2	Thunder
8/10/15 01:04	8/10/15 01:08	4.2	Excessive Rain Noise
8/10/15 01:09	8/10/15 01:10	1.2	Thunder
8/10/15 01:11	8/10/15 01:11	0.2	Thunder
8/10/15 01:12	8/10/15 01:12	1.0	Thunder
8/10/15 01:18	8/10/15 01:19	1.2	Thunder
8/10/15 01:20	8/10/15 01:21	1.5	Thunder
8/10/15 01:22	8/10/15 01:23	1.0	Thunder
8/10/15 01:25	8/10/15 01:26	2.0	Thunder
8/10/15 01:30	8/10/15 01:32	1.7	Thunder
8/10/15 01:44	8/10/15 01:45	1.5	Train Passby
8/10/15 02:07	8/10/15 02:13	6.7	Train Passby
8/10/15 02:37	8/10/15 02:38	1.5	Site Visit
8/10/15 02:41	8/10/15 02:42	1.2	Site Visit
8/10/15 04:29	8/10/15 04:30	0.7	Train Passby
8/10/15 04:40	8/10/15 04:40	1.0	Loud Vehicle Passby
8/10/15 04:48	8/10/15 04:49	1.7	Aircraft Flyover
8/10/15 04:56	8/10/15 05:07	11.5	Train Passby
8/10/15 05:21	8/10/15 05:22	1.0	Loud Vehicle Passby

**Data Removal Noise Monitoring Location #9 Cont.**

Start Time	End Time	Duration (min)	Reason
8/10/15 05:23	8/10/15 05:24	0.7	Loud Vehicle Passby
8/10/15 05:24	8/10/15 05:25	1.5	Aircraft Flyover
8/10/15 05:26	8/10/15 05:26	1.0	Loud Vehicle Passby
8/10/15 05:37	8/10/15 05:38	1.2	Loud Vehicle Passby
8/10/15 05:42	8/10/15 05:43	1.7	Loud Vehicle Passby
8/10/15 05:46	8/10/15 05:47	1.0	Loud Vehicle Passby
8/10/15 05:48	8/10/15 05:49	1.2	Loud Vehicle Passby
8/10/15 05:51	8/10/15 05:52	1.0	Loud Vehicle Passby
8/10/15 05:55	8/10/15 05:56	0.7	Loud Vehicle Passby
8/10/15 05:57	8/10/15 05:59	2.5	Loud Vehicle Passby
8/10/15 06:00	8/10/15 06:01	1.5	Loud Vehicle Passby
8/10/15 06:04	8/10/15 06:04	0.7	Loud Vehicle Passby
8/10/15 06:06	8/10/15 06:08	2.2	Loud Vehicle Passby
8/10/15 06:09	8/10/15 06:10	1.2	Loud Vehicle Passby
8/10/15 06:10	8/10/15 06:12	2.2	Loud Vehicle Passby
8/10/15 06:14	8/10/15 06:15	1.0	Loud Vehicle Passby
8/10/15 06:15	8/10/15 06:16	1.0	Loud Vehicle Passby
8/10/15 06:17	8/10/15 06:18	1.0	Loud Vehicle Passby
8/10/15 06:22	8/10/15 06:24	1.7	Loud Vehicle Passby
8/10/15 06:25	8/10/15 06:26	1.0	Loud Vehicle Passby
8/10/15 06:27	8/10/15 06:28	1.0	Loud Vehicle Passby
8/10/15 06:29	8/10/15 06:32	3.2	Loud Vehicle Passby
8/10/15 06:38	8/10/15 06:39	0.7	Loud Vehicle Passby
8/10/15 06:43	8/10/15 06:44	0.7	Loud Vehicle Passby
8/10/15 22:20	8/10/15 22:20	0.7	Train Passby
8/10/15 22:36	8/10/15 22:37	0.7	Loud Vehicle Passby
8/10/15 22:43	8/10/15 22:44	1.0	Loud Vehicle Passby
8/10/15 23:09	8/10/15 23:10	1.0	Loud Vehicle Passby
8/10/15 23:12	8/10/15 23:13	0.7	Site Visit
8/10/15 23:15	8/10/15 23:16	0.7	Loud Vehicle Passby
8/11/15 00:54	8/11/15 00:56	2.2	Train Passby
8/11/15 02:51	8/11/15 02:58	6.7	Train Passby
8/11/15 03:43	8/11/15 03:52	8.7	Train Passby
8/11/15 04:36	8/11/15 04:38	1.7	Loud Vehicle Passby
8/11/15 04:57	8/11/15 04:57	0.2	Loud Vehicle Passby
8/11/15 04:58	8/11/15 04:58	0.7	Loud Vehicle Passby
8/11/15 05:20	8/11/15 05:21	1.2	Train Passby
8/11/15 05:27	8/11/15 05:28	1.2	Loud Vehicle Passby
8/11/15 05:30	8/11/15 05:30	1.0	Loud Vehicle Passby
8/11/15 05:45	8/11/15 05:46	1.0	Loud Vehicle Passby

**Data Removal Noise Monitoring Location #9 Cont.**

Start Time	End Time	Duration (min)	Reason
8/11/15 05:46	8/11/15 05:46	0.5	Loud Vehicle Passby
8/11/15 05:58	8/11/15 06:05	7.2	Loud Vehicle Passby
8/11/15 06:07	8/11/15 06:15	8.2	Loud Vehicle Passby
8/11/15 06:19	8/11/15 06:33	14.2	Vehicles and Train
8/11/15 06:36	8/11/15 06:39	3.5	Loud Vehicle Passby
8/11/15 06:44	8/11/15 06:45	1.2	Loud Vehicle Passby
8/11/15 06:53	8/11/15 06:55	2.7	Excessive Bird Noise
8/11/15 06:56	8/11/15 06:58	2.7	Loud Vehicle Passby
<b>Total Night #1</b>		<b>110</b>	
<b>Total Night #2</b>		<b>69</b>	
<b>Total Data</b>		<b>180</b>	

**Data Removal Noise Monitoring Location #10**

Start Time	End Time	Duration (min)	Reason
8/07/15 22:04	8/07/15 22:07	3.4	Loud Vehicle Passby
8/07/15 22:16	8/07/15 22:17	0.9	Loud Vehicle Passby
8/07/15 22:20	8/07/15 22:21	1.4	Loud Vehicle Passby
8/07/15 22:25	8/07/15 22:29	3.9	Loud Vehicle Passby
8/07/15 22:34	8/07/15 22:34	0.9	Loud Vehicle Passby
8/07/15 22:47	8/07/15 22:49	1.6	Loud Vehicle Passby
8/07/15 22:57	8/07/15 22:58	1.4	Loud Vehicle Passby
8/07/15 23:04	8/07/15 23:05	0.9	Loud Vehicle Passby
8/07/15 23:07	8/07/15 23:08	1.1	Loud Vehicle Passby
8/07/15 23:12	8/07/15 23:13	0.6	Loud Vehicle Passby
8/07/15 23:22	8/07/15 23:24	2.4	Loud Vehicle Passby
8/07/15 23:35	8/07/15 23:36	0.9	Loud Vehicle Passby
8/07/15 23:38	8/07/15 23:39	0.9	Loud Vehicle Passby
8/07/15 23:45	8/07/15 23:46	0.9	Loud Vehicle Passby
8/08/15 00:02	8/08/15 00:02	0.9	Loud Vehicle Passby
8/08/15 01:00	8/08/15 01:01	0.9	Loud Vehicle Passby
8/08/15 01:12	8/08/15 01:12	0.6	Loud Vehicle Passby
8/08/15 01:24	8/08/15 01:25	0.9	Loud Vehicle Passby
8/08/15 01:36	8/08/15 01:37	0.9	Loud Vehicle Passby
8/08/15 01:38	8/08/15 01:39	1.1	Train Passby
8/08/15 01:40	8/08/15 01:41	0.9	Loud Vehicle Passby
8/08/15 01:48	8/08/15 01:48	0.6	Loud Vehicle Passby
8/08/15 01:56	8/08/15 01:57	1.1	Loud Vehicle Passby
8/08/15 02:14	8/08/15 02:14	0.6	Loud Vehicle Passby
8/08/15 02:57	8/08/15 02:58	0.4	Loud Vehicle Passby
8/08/15 03:45	8/08/15 03:45	0.6	Loud Vehicle Passby
8/08/15 03:53	8/08/15 03:54	0.9	Loud Vehicle Passby
8/08/15 04:12	8/08/15 04:13	0.9	Loud Vehicle Passby
8/08/15 04:35	8/08/15 04:36	0.6	Loud Vehicle Passby
8/08/15 04:39	8/08/15 04:39	0.4	Loud Vehicle Passby
8/08/15 04:57	8/08/15 04:57	0.9	Loud Vehicle Passby
8/08/15 04:59	8/08/15 04:59	0.9	Loud Vehicle Passby
8/08/15 05:02	8/08/15 05:02	0.9	Loud Vehicle Passby
8/08/15 05:04	8/08/15 05:04	0.9	Loud Vehicle Passby
8/08/15 05:15	8/08/15 05:16	1.4	Loud Vehicle Passby
8/08/15 05:20	8/08/15 05:21	1.4	Loud Vehicle Passby
8/08/15 05:21	8/08/15 05:22	0.9	Loud Vehicle Passby
8/08/15 05:25	8/08/15 05:29	4.4	Loud Vehicle Passby
8/08/15 05:30	8/08/15 05:31	0.6	Loud Vehicle Passby
8/08/15 05:32	8/08/15 05:33	1.4	Loud Vehicle Passby

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

Start Time	End Time	Duration (min)	Reason
8/08/15 05:33	8/08/15 05:35	1.6	Loud Vehicle Passby
8/08/15 05:35	8/08/15 05:37	1.6	Loud Vehicle Passby
8/08/15 05:37	8/08/15 05:38	1.1	Loud Vehicle Passby
8/08/15 05:42	8/08/15 05:43	1.6	Loud Vehicle Passby
8/08/15 05:44	8/08/15 05:46	1.9	Loud Vehicle Passby
8/08/15 05:48	8/08/15 05:53	5.6	Loud Vehicle Passby
8/08/15 05:55	8/08/15 06:00	4.9	Loud Vehicle Passby
8/08/15 06:01	8/08/15 06:01	0.1	Loud Vehicle Passby
8/08/15 06:01	8/08/15 06:08	7.1	Loud Vehicle Passby
8/08/15 06:09	8/08/15 06:17	8.4	Loud Vehicle Passby
8/08/15 06:18	8/08/15 06:49	31.6	Loud Vehicle Passby
8/08/15 06:50	8/08/15 06:59	9.9	Loud Vehicle Passby
8/08/15 22:03	8/08/15 22:04	0.4	Train Passby
8/08/15 22:06	8/08/15 22:06	0.6	Train Passby
8/08/15 22:15	8/08/15 22:15	0.6	Train Passby
8/08/15 22:40	8/08/15 22:41	0.6	Loud Vehicle Passby
8/08/15 22:43	8/08/15 22:44	0.6	Loud Vehicle Passby
8/08/15 22:47	8/08/15 22:47	0.6	Loud Vehicle Passby
8/08/15 22:48	8/08/15 22:49	0.9	Loud Vehicle Passby
8/08/15 22:50	8/08/15 22:51	1.4	Loud Vehicle Passby
8/08/15 23:09	8/08/15 23:10	1.1	Loud Vehicle Passby
8/08/15 23:26	8/08/15 23:27	1.4	Loud Vehicle Passby
8/08/15 23:30	8/08/15 23:30	0.6	Loud Vehicle Passby
8/08/15 23:40	8/08/15 23:41	0.9	Loud Vehicle Passby
8/09/15 00:17	8/09/15 00:18	1.4	Loud Vehicle Passby
8/09/15 00:19	8/09/15 00:19	0.9	Loud Vehicle Passby
8/09/15 00:26	8/09/15 00:27	0.9	Loud Vehicle Passby
8/09/15 00:37	8/09/15 00:38	0.6	Loud Vehicle Passby
8/09/15 01:30	8/09/15 01:30	0.6	Loud Vehicle Passby
8/09/15 02:31	8/09/15 02:32	0.4	Loud Vehicle Passby
8/09/15 02:36	8/09/15 02:36	0.1	Loud Vehicle Passby
8/09/15 02:38	8/09/15 02:39	0.6	Loud Vehicle Passby
8/09/15 02:45	8/09/15 02:46	0.9	Loud Vehicle Passby
8/09/15 02:56	8/09/15 02:58	1.4	Loud Vehicle Passby
8/09/15 03:09	8/09/15 03:10	0.9	Loud Vehicle Passby
8/09/15 04:41	8/09/15 04:42	0.6	Loud Vehicle Passby
8/09/15 04:43	8/09/15 04:44	1.6	Loud Vehicle Passby
8/09/15 04:54	8/09/15 04:55	0.6	Loud Vehicle Passby
8/09/15 05:11	8/09/15 05:12	0.6	Loud Vehicle Passby
8/09/15 05:14	8/09/15 05:15	1.4	Loud Vehicle Passby



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

Start Time	End Time	Duration (min)	Reason
8/09/15 05:17	8/09/15 05:18	0.9	Loud Vehicle Passby
8/09/15 05:20	8/09/15 05:20	0.6	Loud Vehicle Passby
8/09/15 05:21	8/09/15 05:22	1.1	Loud Vehicle Passby
8/09/15 05:26	8/09/15 05:27	0.9	Loud Vehicle Passby
8/09/15 05:28	8/09/15 05:30	1.9	Loud Vehicle Passby
8/09/15 05:32	8/09/15 05:33	1.4	Loud Vehicle Passby
8/09/15 05:34	8/09/15 05:35	1.1	Loud Vehicle Passby
8/09/15 05:35	8/09/15 05:35	0.6	Loud Vehicle Passby
8/09/15 05:37	8/09/15 05:38	1.1	Loud Vehicle Passby
8/09/15 05:40	8/09/15 05:41	0.9	Loud Vehicle Passby
8/09/15 05:41	8/09/15 05:41	0.6	Loud Vehicle Passby
8/09/15 05:43	8/09/15 05:44	0.6	Loud Vehicle Passby
8/09/15 05:45	8/09/15 05:46	0.6	Loud Vehicle Passby
8/09/15 05:46	8/09/15 05:46	0.1	Loud Vehicle Passby
8/09/15 05:48	8/09/15 05:49	1.1	Loud Vehicle Passby
8/09/15 05:49	8/09/15 05:50	0.6	Loud Vehicle Passby
8/09/15 05:51	8/09/15 05:52	0.6	Loud Vehicle Passby
8/09/15 05:52	8/09/15 05:53	1.1	Loud Vehicle Passby
8/09/15 05:54	8/09/15 05:55	1.1	Loud Vehicle Passby
8/09/15 05:56	8/09/15 05:57	1.9	Loud Vehicle Passby
8/09/15 05:58	8/09/15 05:58	0.6	Loud Vehicle Passby
8/09/15 06:01	8/09/15 06:02	1.1	Loud Vehicle Passby
8/09/15 06:03	8/09/15 06:05	2.4	Loud Vehicle Passby
8/09/15 06:06	8/09/15 06:07	1.1	Loud Vehicle Passby
8/09/15 06:08	8/09/15 06:54	46.9	Frequent Vehicle Passby's
<b>Total Night #1</b>		<b>171</b>	
<b>Total Night #2</b>		<b>148</b>	
<b>Total Data</b>		<b>319</b>	

**Data Removal Noise Monitoring Location #11**

Start Time	End Time	Duration (min)	Reason
7/08/15 22:11	7/08/15 22:19	8.7	Excessive Wind Noise
7/08/15 22:21	7/08/15 22:22	0.7	Loud Vehicle Passby
7/08/15 23:52	7/08/15 23:52	0.7	Train Noise
7/09/15 00:14	7/09/15 00:15	1.5	Rail Noise
7/09/15 00:41	7/09/15 00:44	3.2	Train Passby
7/09/15 00:57	7/09/15 00:58	1.2	Loud Vehicle Passby
7/09/15 00:58	7/09/15 01:02	3.7	Train Passby
7/09/15 01:03	7/09/15 01:04	1.2	Train Passby
7/09/15 01:04	7/09/15 01:07	3.2	Train Passby
7/09/15 01:12	7/09/15 01:16	4.2	Train Passby
7/09/15 01:29	7/09/15 01:32	3.0	Train Passby
7/09/15 02:07	7/09/15 02:10	3.2	Loud Vehicle Passby
7/09/15 03:49	7/09/15 03:54	5.7	Train Passby
7/09/15 04:23	7/09/15 04:24	0.7	Train Noise
7/09/15 04:32	7/09/15 04:33	1.0	Train Noise
7/09/15 05:11	7/09/15 05:12	1.2	Excessive Bird Noise
7/09/15 05:13	7/09/15 05:16	3.7	Excessive Bird Noise
7/09/15 05:19	7/09/15 05:20	1.7	Loud Vehicle Passby
7/09/15 05:41	7/09/15 05:42	1.2	Excessive Bird Noise
7/09/15 05:44	7/09/15 05:45	1.0	Loud Vehicle Passby
7/09/15 05:48	7/09/15 05:49	1.7	Excessive Bird Noise
7/09/15 06:03	7/09/15 06:04	1.7	Loud Vehicle Passby
7/09/15 06:12	7/09/15 06:16	4.0	Loud Vehicle Passby
7/09/15 06:17	7/09/15 06:27	9.5	Loud Vehicle Passby
7/09/15 06:28	7/09/15 06:31	3.2	Loud Vehicle Passby
7/09/15 06:32	7/09/15 06:34	2.7	Loud Vehicle Passby
7/09/15 06:35	7/09/15 06:41	6.0	Loud Vehicle Passby
7/09/15 06:42	7/09/15 06:46	4.7	Loud Vehicle Passby
7/09/15 07:04	7/09/15 07:05	1.5	Train Whistle
7/09/15 22:31	7/09/15 22:38	7.0	Train Passby
7/10/15 00:41	7/10/15 00:43	1.7	Loud Vehicle Passby
7/10/15 00:48	7/10/15 00:49	1.0	Train Whistle
7/10/15 01:09	7/10/15 01:09	1.0	Train Whistle
7/10/15 01:17	7/10/15 01:17	1.0	Train Whistle
7/10/15 01:32	7/10/15 01:33	1.5	Train Whistle
7/10/15 01:33	7/10/15 01:34	1.2	Train Whistle
7/10/15 02:29	7/10/15 02:30	1.2	Train Whistle
7/10/15 03:21	7/10/15 03:22	1.0	Site Visit
7/10/15 03:22	7/10/15 03:26	4.2	Site Visit
7/10/15 04:06	7/10/15 04:06	1.0	Site Activity

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

Start Time	End Time	Duration (min)	Reason
7/10/15 04:11	7/10/15 04:12	1.5	Thunder
7/10/15 04:13	7/10/15 04:14	0.7	Thunder
7/10/15 04:15	7/10/15 04:49	34.2	Storm
7/10/15 04:53	7/10/15 04:55	1.7	Excessive Bird Noise
7/10/15 05:13	7/10/15 05:16	3.0	Loud Vehicle Passby
7/10/15 05:21	7/10/15 05:23	2.2	Site PA
7/10/15 05:24	7/10/15 05:25	1.5	Site PA
7/10/15 05:27	7/10/15 05:31	4.2	Excessive Bird Noise
7/10/15 05:32	7/10/15 05:50	18.7	Excessive Bird Noise
7/10/15 06:01	7/10/15 06:06	5.5	Excessive Bird Noise
7/10/15 06:10	7/10/15 06:53	43.0	Birds/Vehicle Passby's
<b>Total Night #1</b>		<b>86</b>	
<b>Total Night #2</b>		<b>138</b>	
<b>Total Data</b>		<b>224</b>	

**Data Removal Noise Monitoring Location #12 (First Monitoring Period)**

Start Time	End Time	Duration (min)	Reason
7/09/15 22:05	7/09/15 22:06	1.0	Train Whistle
7/09/15 22:13	7/09/15 22:17	4.8	Birds/Sirens from Highway
7/09/15 22:19	7/09/15 22:21	1.8	Excessive Bird Noise
7/09/15 22:46	7/09/15 22:49	2.8	Loud Vehicle Passby
7/09/15 22:52	7/09/15 22:57	5.0	Excessive Bird Noise
7/09/15 23:03	7/09/15 23:05	2.0	Loud Vehicle Passby
7/09/15 23:09	7/09/15 23:10	1.0	Loud Vehicle Passby
7/09/15 23:13	7/09/15 23:16	2.3	Loud Vehicle Passby
7/09/15 23:21	7/09/15 23:22	0.8	Loud Vehicle Passby
7/09/15 23:34	7/09/15 23:41	6.3	Train Passby
7/09/15 23:50	7/09/15 23:51	0.5	Loud Vehicle Passby
7/10/15 00:00	7/10/15 00:02	1.5	Train Passby
7/10/15 00:11	7/10/15 00:12	0.8	Loud Vehicle Passby
7/10/15 00:14	7/10/15 00:15	0.8	Loud Vehicle Passby
7/10/15 00:16	7/10/15 00:22	6.0	Site Visit
7/10/15 00:27	7/10/15 00:28	1.3	Loud Vehicle Passby
7/10/15 00:47	7/10/15 00:49	1.8	Loud Vehicle Passby
7/10/15 01:11	7/10/15 01:13	1.8	Train Passby
7/10/15 01:23	7/10/15 01:25	1.8	Loud Vehicle Passby
7/10/15 01:27	7/10/15 01:39	11.3	Train Passby
7/10/15 01:46	7/10/15 01:47	1.5	Loud Vehicle Passby
7/10/15 01:52	7/10/15 01:54	1.8	Loud Vehicle Passby
7/10/15 02:26	7/10/15 02:27	1.3	Excessive Wind Noise
7/10/15 02:40	7/10/15 02:42	1.5	Excessive Wind Noise
7/10/15 02:44	7/10/15 02:45	0.8	Loud Vehicle Passby
7/10/15 02:54	7/10/15 02:55	1.8	Loud Vehicle Passby
7/10/15 03:55	7/10/15 04:04	8.8	Train Passby
7/10/15 04:05	7/10/15 04:08	2.8	Train Passby
7/10/15 04:16	7/10/15 04:21	5.3	Excessive Bird Noise
7/10/15 04:31	7/10/15 04:34	2.8	Excessive Bird Noise
7/10/15 04:41	7/10/15 04:41	0.0	Excessive Bird Noise
7/10/15 04:41	7/10/15 04:51	9.8	Excessive Bird Noise
7/10/15 04:54	7/10/15 07:00	126.3	Morning Chorus
7/10/15 22:04	7/10/15 22:05	1.3	Excessive Bird Noise
7/10/15 22:11	7/10/15 22:13	2.0	Excessive Bird Noise
7/10/15 22:23	7/10/15 22:24	1.0	Loud Vehicle Passby
7/10/15 22:30	7/10/15 22:32	2.3	Loud Vehicle Passby
7/10/15 22:41	7/10/15 22:42	0.5	Excessive Bird Noise
7/10/15 22:44	7/10/15 22:47	3.0	Excessive Wind Noise
7/10/15 22:49	7/10/15 23:31	42.0	Excessive Wind Noise

**Data Removal Noise Monitoring Location #12 (First Monitoring Period) Cont.**

Start Time	End Time	Duration (min)	Reason
7/10/15 23:34	7/10/15 23:36	2.0	Loud Vehicle Passby
7/10/15 23:37	7/10/15 23:39	2.3	Loud Vehicle Passby
7/10/15 23:51	7/10/15 23:53	2.3	Loud Vehicle Passby
7/10/15 23:58	7/11/15 00:01	3.8	Loud Vehicle Passby
7/11/15 00:09	7/11/15 00:12	3.3	Train Passby
7/11/15 00:13	7/11/15 00:15	1.8	Loud Vehicle Passby
7/11/15 00:27	7/11/15 00:28	1.0	Train Whistle
7/11/15 00:29	7/11/15 00:37	8.0	Train Passby
7/11/15 00:49	7/11/15 00:50	1.3	Loud Vehicle Passby
7/11/15 00:58	7/11/15 01:00	1.5	Aircraft Flyover
7/11/15 01:07	7/11/15 01:09	2.5	Loud Vehicle Passby
7/11/15 01:14	7/11/15 01:15	0.8	Train Passby
7/11/15 01:26	7/11/15 01:30	3.5	Loud Vehicle Passby
7/11/15 01:34	7/11/15 01:35	0.5	Train Whistle
7/11/15 01:46	7/11/15 01:48	1.8	Train Passby
7/11/15 01:49	7/11/15 02:06	17.5	Train Passby
7/11/15 02:15	7/11/15 02:25	10.3	Train Passby
7/11/15 02:25	7/11/15 02:28	3.3	Loud Vehicle Passby
7/11/15 02:34	7/11/15 02:35	1.3	Aircraft Flyover
7/11/15 02:36	7/11/15 02:36	0.0	Loud Vehicle Passby
7/11/15 02:37	7/11/15 02:42	5.0	Loud Vehicle Passby
7/11/15 02:49	7/11/15 02:51	2.3	Loud Vehicle Passby
7/11/15 03:41	7/11/15 03:44	2.8	Loud Vehicle Passby
7/11/15 03:47	7/11/15 03:49	2.5	Loud Vehicle Passby
7/11/15 03:52	7/11/15 03:55	3.5	Loud Vehicle Passby
7/11/15 04:04	7/11/15 04:07	2.8	Loud Vehicle Passby
7/11/15 04:11	7/11/15 04:12	0.5	Excessive Wind Noise
7/11/15 04:13	7/11/15 04:14	0.8	Excessive Wind Noise
7/11/15 04:15	7/11/15 04:17	1.8	Excessive Wind Noise
7/11/15 04:18	7/11/15 04:19	1.3	Excessive Wind Noise
7/11/15 04:22	7/11/15 04:22	0.5	Excessive Wind Noise
7/11/15 04:24	7/11/15 04:24	0.8	Excessive Wind Noise
7/11/15 04:25	7/11/15 04:26	1.0	Excessive Wind Noise
7/11/15 04:27	7/11/15 04:28	0.8	Excessive Wind Noise
7/11/15 04:29	7/11/15 04:29	0.3	Excessive Wind Noise
7/11/15 04:57	7/11/15 04:57	0.3	Excessive Wind Noise
7/11/15 04:59	7/11/15 05:00	1.5	Loud Vehicle Passby
7/11/15 05:01	7/11/15 05:05	3.5	Loud Vehicle Passby
7/11/15 05:05	7/11/15 05:06	1.5	Excessive Bird Noise
7/11/15 05:10	7/11/15 07:00	109.5	Morning Chorus

**Data Removal Noise Monitoring Location #12 (First Monitoring Period) Cont.**

Start Time	End Time	Duration (min)	Reason
		<b>Total Night #1</b>	<b>219</b>
		<b>Total Night #2</b>	<b>291</b>
		<b>Total Data</b>	<b>510</b>

**Data Removal Noise Monitoring Location #12 (Second Monitoring Period)**

Start Time	End Time	Duration (min)	Reason
8/07/15 22:23	8/07/15 22:25	2.1	Train Whistles
8/07/15 22:28	8/07/15 22:31	2.6	Loud Vehicle Passby
8/07/15 22:32	8/07/15 22:34	2.3	Train Passby
8/07/15 22:35	8/07/15 22:35	0.6	Train Whistle
8/07/15 22:42	8/07/15 22:43	1.1	Train Passby
8/07/15 22:47	8/07/15 22:48	1.8	Loud Vehicle Passby
8/07/15 23:04	8/07/15 23:07	3.6	Aircraft Flyover
8/07/15 23:13	8/07/15 23:14	1.3	Loud Vehicle Passby
8/07/15 23:25	8/07/15 23:27	1.6	Train Whistle
8/07/15 23:28	8/07/15 23:29	0.8	Train Whistle
8/07/15 23:35	8/07/15 23:36	0.8	Train Whistle
8/07/15 23:44	8/07/15 23:46	2.1	Loud Vehicle Passby
8/07/15 23:46	8/07/15 23:59	12.6	Train Passby
8/08/15 00:00	8/08/15 00:12	11.8	Train Passby
8/08/15 00:13	8/08/15 00:15	2.1	Loud Vehicle Passby
8/08/15 00:19	8/08/15 00:22	3.1	Train Whistles
8/08/15 00:26	8/08/15 00:42	16.1	Train Passby
8/08/15 00:42	8/08/15 00:43	0.8	Train Whistle
8/08/15 00:59	8/08/15 01:01	1.8	Loud Vehicle Passby
8/08/15 01:02	8/08/15 01:03	0.6	Loud Vehicle Passby
8/08/15 01:15	8/08/15 01:16	0.8	Train Whistle
8/08/15 01:18	8/08/15 01:19	1.1	Train Whistle
8/08/15 01:25	8/08/15 01:26	1.3	Train Whistle
8/08/15 01:29	8/08/15 01:33	4.1	Train Whistles
8/08/15 01:36	8/08/15 01:37	1.1	Train Whistle
8/08/15 01:39	8/08/15 01:49	10.1	Train Passby
8/08/15 01:52	8/08/15 01:57	4.8	Train Passby
8/08/15 01:58	8/08/15 02:00	1.6	Train Passby
8/08/15 02:01	8/08/15 02:02	1.1	Train Passby
8/08/15 02:05	8/08/15 02:06	1.6	Train Passby
8/08/15 02:09	8/08/15 02:10	0.8	Train Whistle
8/08/15 02:13	8/08/15 02:15	1.8	Train Whistle
8/08/15 03:07	8/08/15 03:08	0.6	Train Whistle
8/08/15 03:16	8/08/15 03:18	1.8	Train Passby
8/08/15 03:25	8/08/15 03:26	1.1	Train Whistle
8/08/15 03:31	8/08/15 03:33	2.1	Train Whistle
8/08/15 03:56	8/08/15 03:57	1.3	Train Whistle
8/08/15 04:17	8/08/15 04:17	0.6	Train Whistle
8/08/15 04:19	8/08/15 04:21	2.1	Loud Vehicle Passby
8/08/15 04:27	8/08/15 04:30	2.6	Train Whistle

**Data Removal Noise Monitoring Location #12 (Second Monitoring Period) Cont.**

Start Time	End Time	Duration (min)	Reason
8/08/15 04:58	8/08/15 04:59	1.1	Loud Vehicle Passby
8/08/15 05:10	8/08/15 05:15	5.1	Train Passby
8/08/15 05:19	8/08/15 05:20	1.1	Site Visit
8/08/15 05:25	8/08/15 05:26	1.6	Train Whistle
8/08/15 05:38	8/08/15 05:39	1.6	Excessive Bird Noise
8/08/15 05:40	8/08/15 05:52	11.8	Vehicle Passby/Train Noise
8/08/15 05:55	8/08/15 07:00	64.3	Morning Chorus/Vehicle Passby's
8/08/15 22:04	8/08/15 22:05	0.8	Unknown
8/08/15 22:07	8/08/15 22:08	1.3	Loud Vehicle Passby
8/08/15 22:11	8/08/15 22:13	2.3	Loud Vehicle Passby
8/08/15 23:05	8/08/15 23:06	1.6	Loud Vehicle Passby
8/08/15 23:35	8/08/15 23:36	1.6	Loud Vehicle Passby
8/08/15 23:41	8/08/15 23:47	5.3	Train Passby
8/08/15 23:56	8/09/15 00:06	10.6	Train Passby
8/09/15 00:14	8/09/15 00:14	0.1	Rail Activity
8/09/15 00:15	8/09/15 00:15	0.3	Rail Activity
8/09/15 00:24	8/09/15 00:27	3.3	Rail Activity
8/09/15 00:29	8/09/15 00:31	2.1	Rail Activity
8/09/15 00:31	8/09/15 00:33	2.1	Rail Activity
8/09/15 00:44	8/09/15 00:46	1.6	Train Passby
8/09/15 00:49	8/09/15 01:01	12.1	Train Passby
8/09/15 01:07	8/09/15 01:19	12.3	Train Passby
8/09/15 01:22	8/09/15 01:23	0.8	Rail Activity
8/09/15 01:30	8/09/15 01:40	10.6	Rail Activity
8/09/15 01:44	8/09/15 01:46	1.8	Rail Activity
8/09/15 01:47	8/09/15 01:55	8.6	Rail Activity
8/09/15 02:17	8/09/15 02:18	1.1	Rail Activity
8/09/15 02:29	8/09/15 02:51	22.3	Train Passby
8/09/15 03:01	8/09/15 03:07	5.3	Train Whistles
8/09/15 03:08	8/09/15 03:10	1.3	Train Whistles
8/09/15 03:16	8/09/15 03:18	2.6	Train Whistles
8/09/15 03:55	8/09/15 03:57	1.6	Train Whistles
8/09/15 04:47	8/09/15 04:51	4.1	Aircraft Flyover
8/09/15 04:59	8/09/15 05:14	15.3	Train Passby
8/09/15 05:42	8/09/15 05:44	2.8	Train Whistles
8/09/15 05:47	8/09/15 05:48	1.3	Train Whistles
8/09/15 05:55	8/09/15 05:56	1.6	Loud Vehicle Passby
8/09/15 06:00	8/09/15 07:06	66.6	Morning Chorus



**Data Removal Noise Monitoring Location #12 (Second Monitoring Period) Cont.**

Start Time	End Time	Duration (min)	Reason
		<b>Total Night #1</b>	<b>100</b>
		<b>Total Night #2</b>	<b>303</b>
		<b>Total Data</b>	<b>403</b>

**Data Removal Noise Monitoring Location #12 (Third Monitoring Period)**

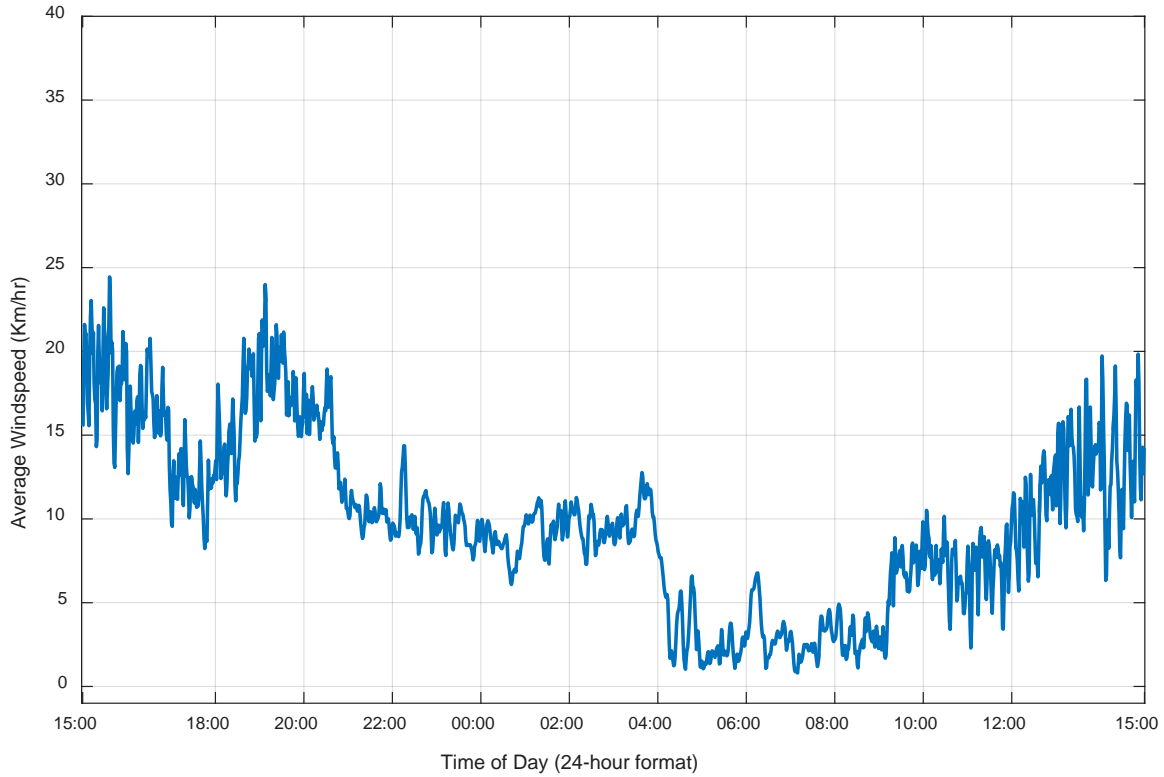
Start Time	End Time	Duration (min)	Reason
8/09/15 22:00	8/09/15 22:00	0.0	Excessive Wind Noise
8/09/15 22:03	8/09/15 22:04	0.5	Excessive Wind Noise
8/09/15 22:32	8/09/15 22:32	0.8	Loud Vehicle Passby
8/09/15 22:35	8/09/15 22:36	0.8	Loud Vehicle Passby
8/09/15 22:45	8/09/15 22:46	1.3	Train Passby
8/09/15 23:12	8/09/15 23:14	1.8	Train Whistles
8/09/15 23:19	8/09/15 23:22	2.3	Aircraft Flyover
8/09/15 23:40	8/09/15 23:40	0.5	Train Whistles
8/09/15 23:45	8/09/15 23:46	1.5	Train Whistles
8/10/15 00:42	8/10/15 00:49	7.5	Excessive Wind Noise
8/10/15 00:50	8/10/15 00:51	1.3	Excessive Wind Noise
8/10/15 00:54	8/10/15 00:56	2.0	Loud Vehicle Passby
8/10/15 01:02	8/10/15 01:03	0.8	Excessive Wind Noise
8/10/15 01:13	8/10/15 01:14	1.0	Excessive Wind Noise
8/10/15 01:17	8/10/15 01:18	0.8	Train Passby
8/10/15 01:19	8/10/15 01:19	0.5	Thunder
8/10/15 01:20	8/10/15 01:22	1.5	Train Whistles
8/10/15 01:26	8/10/15 01:27	1.3	Thunder
8/10/15 01:33	8/10/15 01:34	1.0	Train Passby
8/10/15 02:01	8/10/15 02:02	1.0	Aircraft Flyover
8/10/15 02:15	8/10/15 02:19	4.3	Thunder
8/10/15 02:20	8/10/15 02:21	0.5	Train Passby
8/10/15 02:23	8/10/15 02:25	1.8	Loud Vehicle Passby
8/10/15 02:41	8/10/15 02:41	0.8	Train Whistles
8/10/15 03:11	8/10/15 03:12	1.0	Loud Vehicle Passby
8/10/15 03:12	8/10/15 03:13	1.0	Loud Vehicle Passby
8/10/15 03:21	8/10/15 03:22	1.0	Loud Vehicle Passby
8/10/15 03:27	8/10/15 03:28	1.3	Loud Vehicle Passby
8/10/15 03:50	8/10/15 04:02	12.0	Site Visit
8/10/15 04:05	8/10/15 04:06	1.5	Loud Vehicle Passby
8/10/15 04:12	8/10/15 04:14	2.3	Train Passby
8/10/15 04:37	8/10/15 04:39	1.3	Loud Vehicle Passby
8/10/15 04:51	8/10/15 05:13	21.3	Train Passby
8/10/15 05:14	8/10/15 05:16	2.3	Loud Vehicle Passby
8/10/15 05:19	8/10/15 05:21	2.0	Loud Vehicle Passby
8/10/15 05:25	8/10/15 05:28	3.0	Train Passby
8/10/15 05:30	8/10/15 05:31	1.5	Train Passby
8/10/15 05:34	8/10/15 05:37	3.0	Train Passby
8/10/15 05:37	8/10/15 07:00	82.5	Morning Chorus
8/10/15 22:00	8/10/15 22:02	1.8	Loud Vehicle Passby

**Data Removal Noise Monitoring Location #12 (Third Monitoring Period) Cont.**

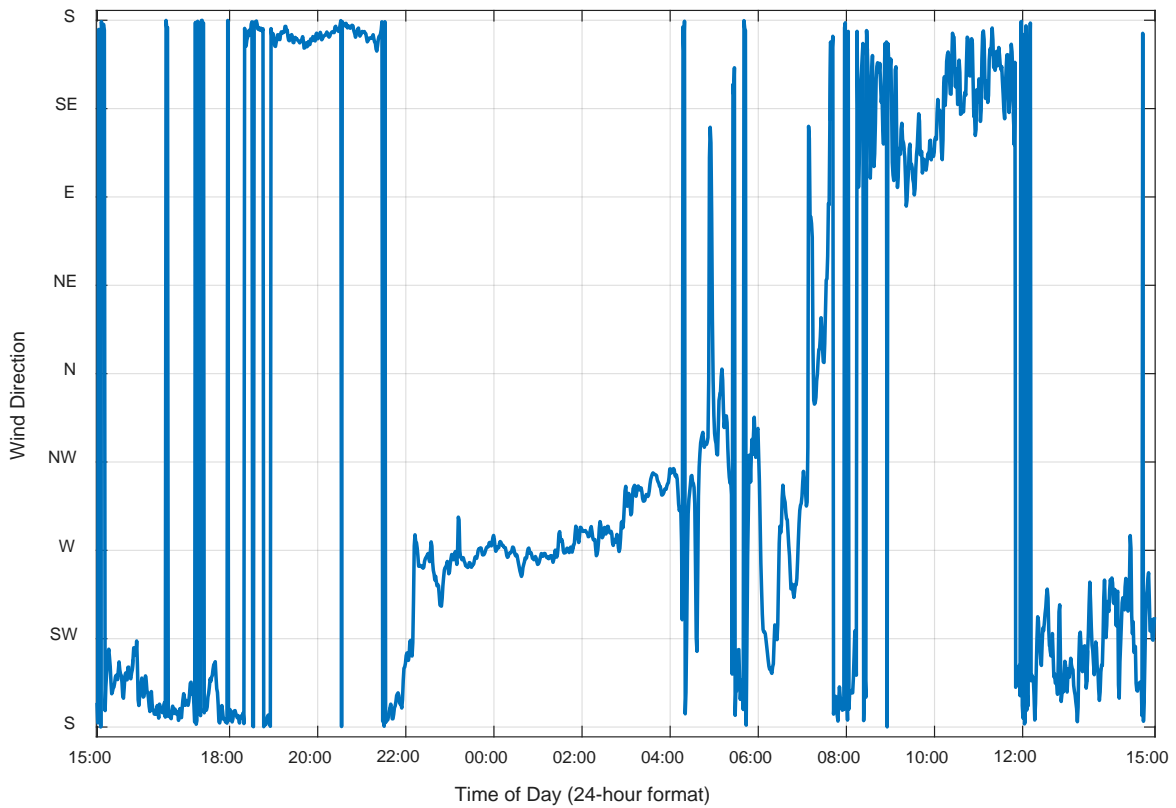
Start Time	End Time	Duration (min)	Reason
8/10/15 22:02	8/10/15 22:03	1.5	Loud Vehicle Passby
8/10/15 22:04	8/10/15 22:05	1.0	Thunder
8/10/15 22:13	8/10/15 22:13	0.8	Excessive Bird Noise
8/10/15 22:43	8/10/15 22:44	1.3	Loud Vehicle Passby
8/10/15 22:49	8/10/15 22:55	6.0	Site Visit
8/11/15 00:04	8/11/15 00:05	0.8	Loud Vehicle Passby
8/11/15 00:06	8/11/15 00:06	0.5	Loud Vehicle Passby
8/11/15 00:13	8/11/15 00:15	2.3	Loud Vehicle Passby
8/11/15 00:44	8/11/15 00:45	1.3	Loud Vehicle Passby
8/11/15 00:48	8/11/15 00:56	8.3	Train Passby
8/11/15 00:57	8/11/15 00:58	0.8	Train Passby
8/11/15 01:23	8/11/15 01:25	2.0	Train Whistles
8/11/15 01:31	8/11/15 01:35	3.5	Train Passby
8/11/15 01:38	8/11/15 01:50	12.5	Train Passby
8/11/15 02:11	8/11/15 02:22	10.8	Train Passby
8/11/15 02:43	8/11/15 02:49	6.3	Train Passby
8/11/15 03:18	8/11/15 03:21	2.8	Loud Vehicle Passby
8/11/15 04:34	8/11/15 04:36	1.5	Aircraft Flyover
8/11/15 05:09	8/11/15 05:10	1.5	Loud Vehicle Passby
8/11/15 05:13	8/11/15 05:14	1.8	Loud Vehicle Passby
8/11/15 05:45	8/11/15 05:45	0.0	Loud Vehicle Passby
8/11/15 05:46	8/11/15 07:00	74.0	Morning Chorus
<b>Total Night #1</b>		<b>173</b>	
<b>Total Night #2</b>		<b>143</b>	
<b>Total Data</b>		<b>316</b>	

**Appendix V WEATHER DATA**

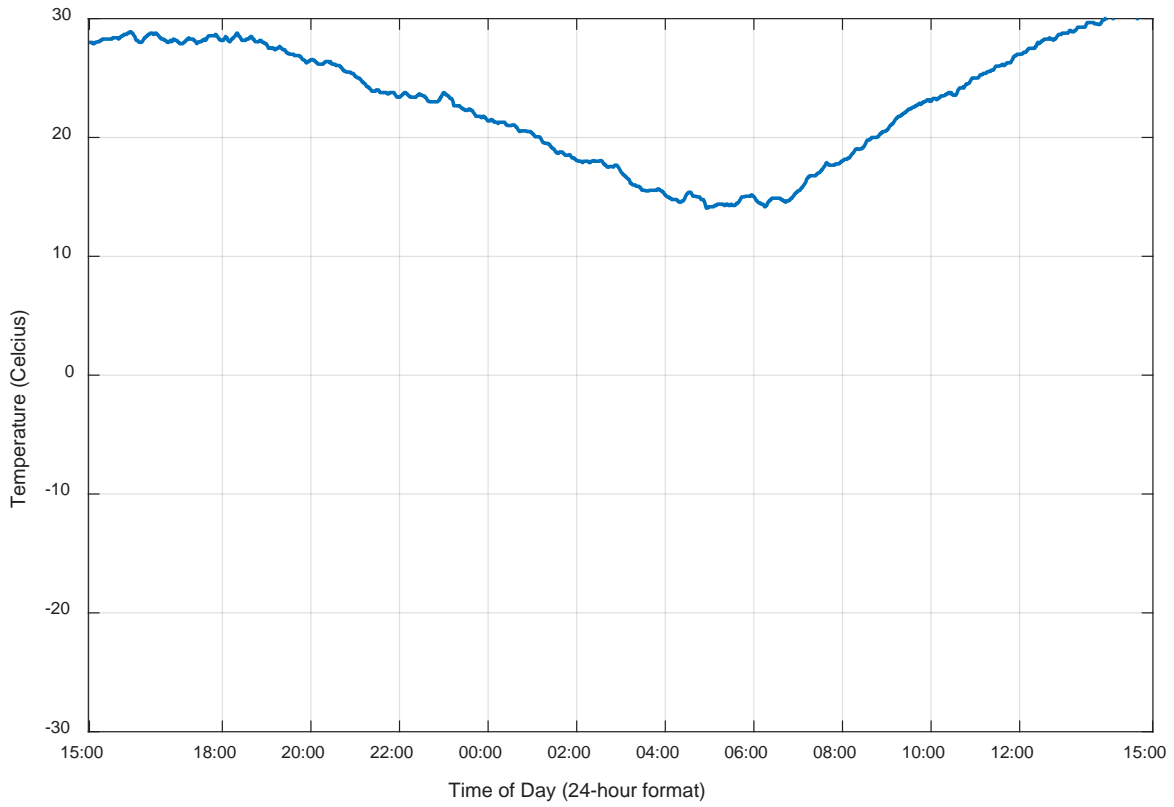
**July 8 - 9, 2014 Weather Data**



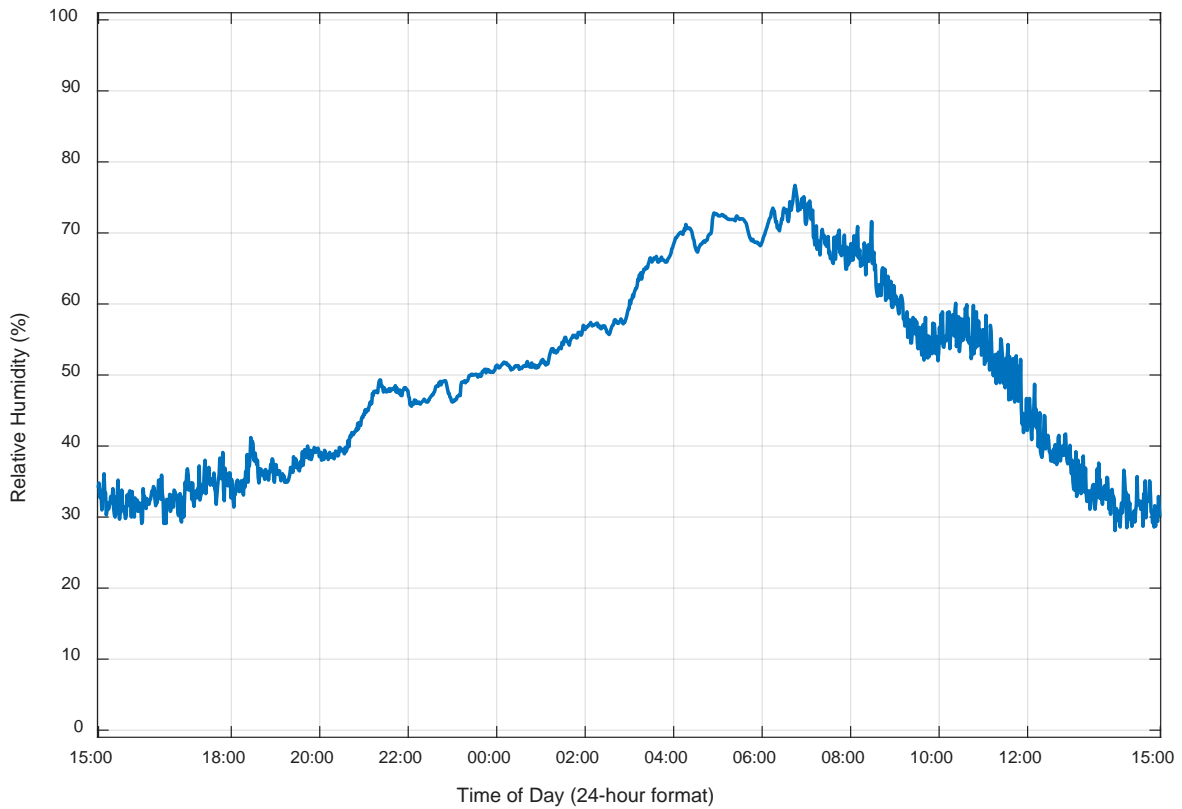
**Monitored Wind Speed (July 8 – 9, 2015) at Noise Monitor Location 11**



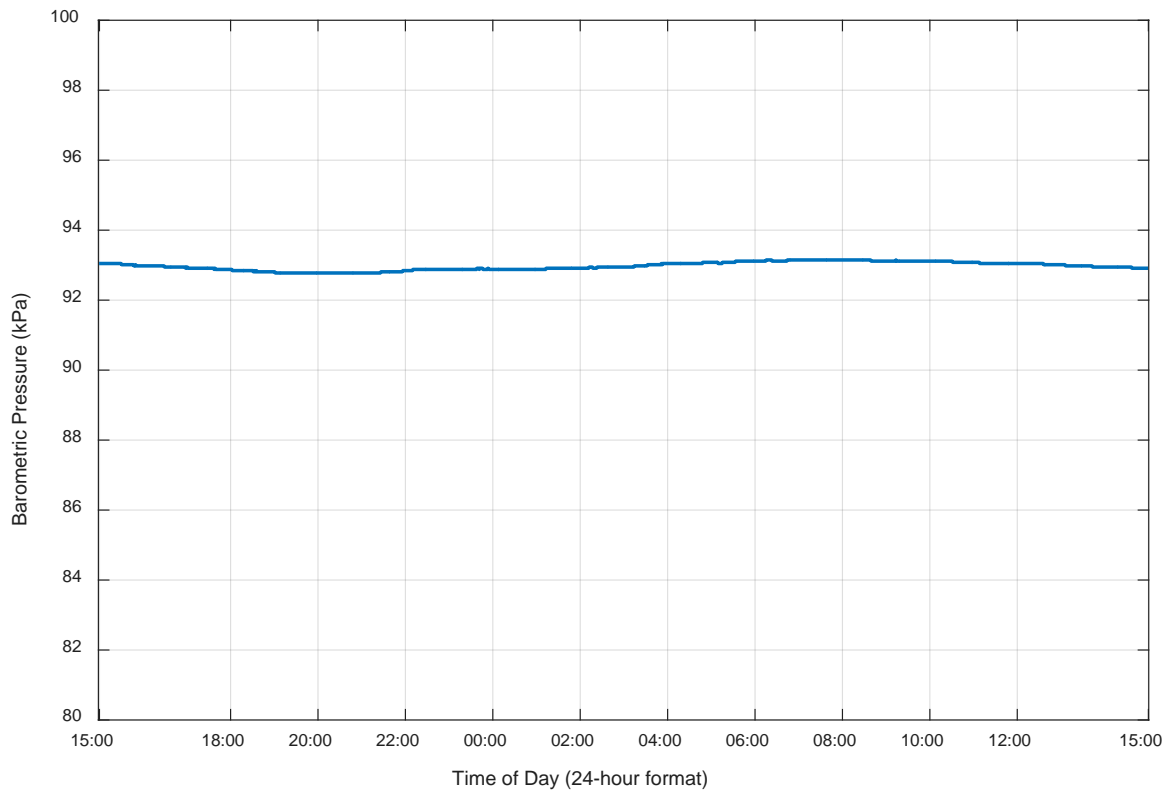
**Monitored Wind Direction (July 8 – 9, 2015) at Noise Monitor Location 11**



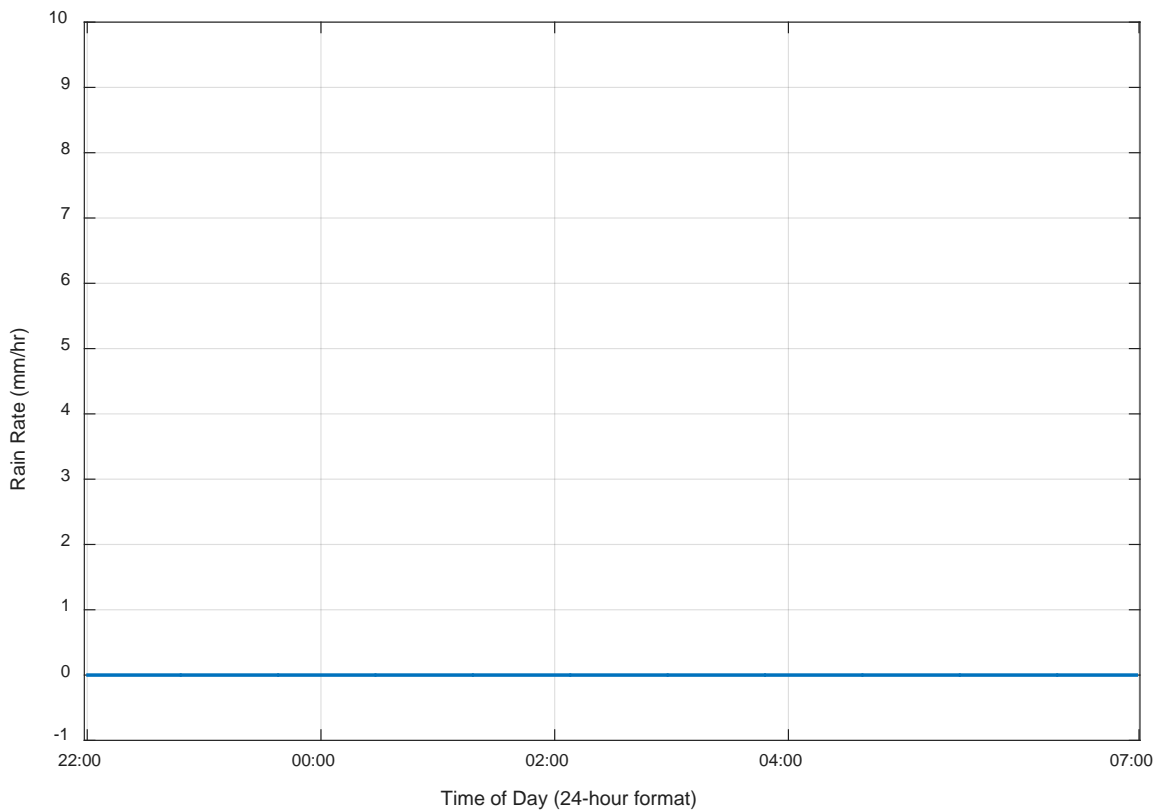
**Monitored Temperature (July 8 – 9, 2015) at Noise Monitor Location 11**



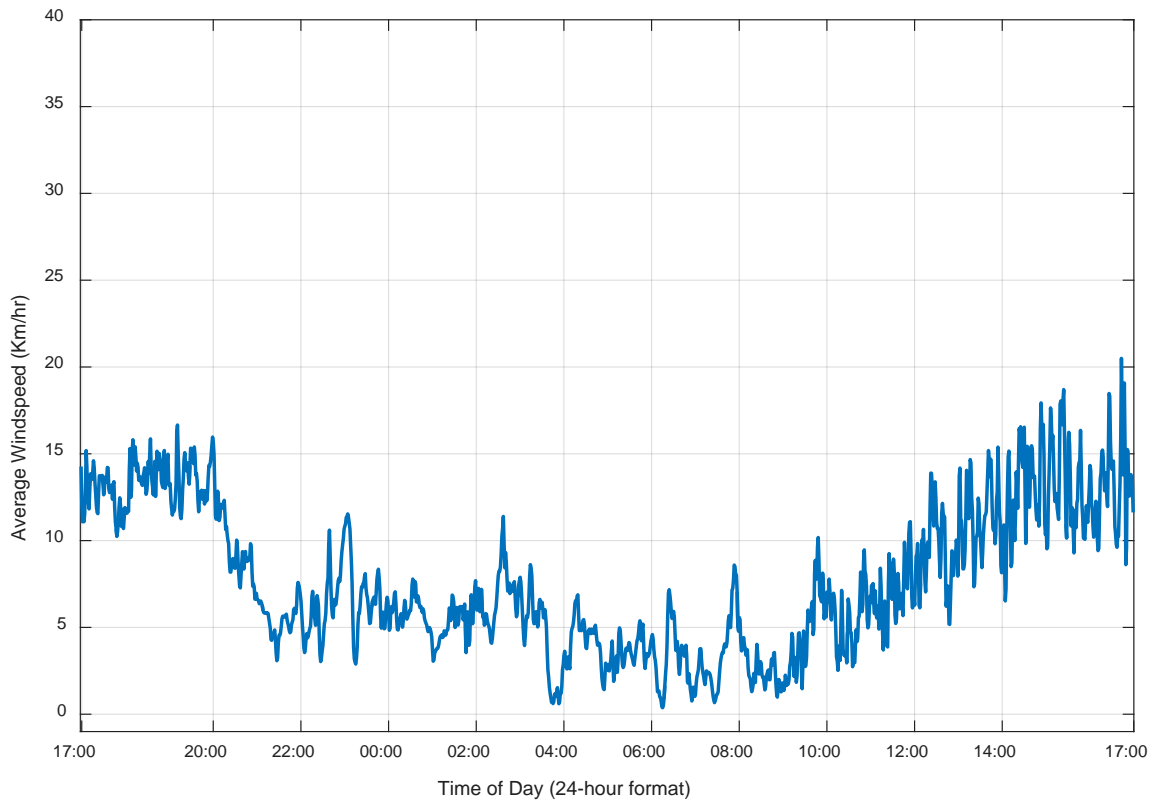
**Monitored Humidity (July 8 – 9, 2015) at Noise Monitor Location 11**



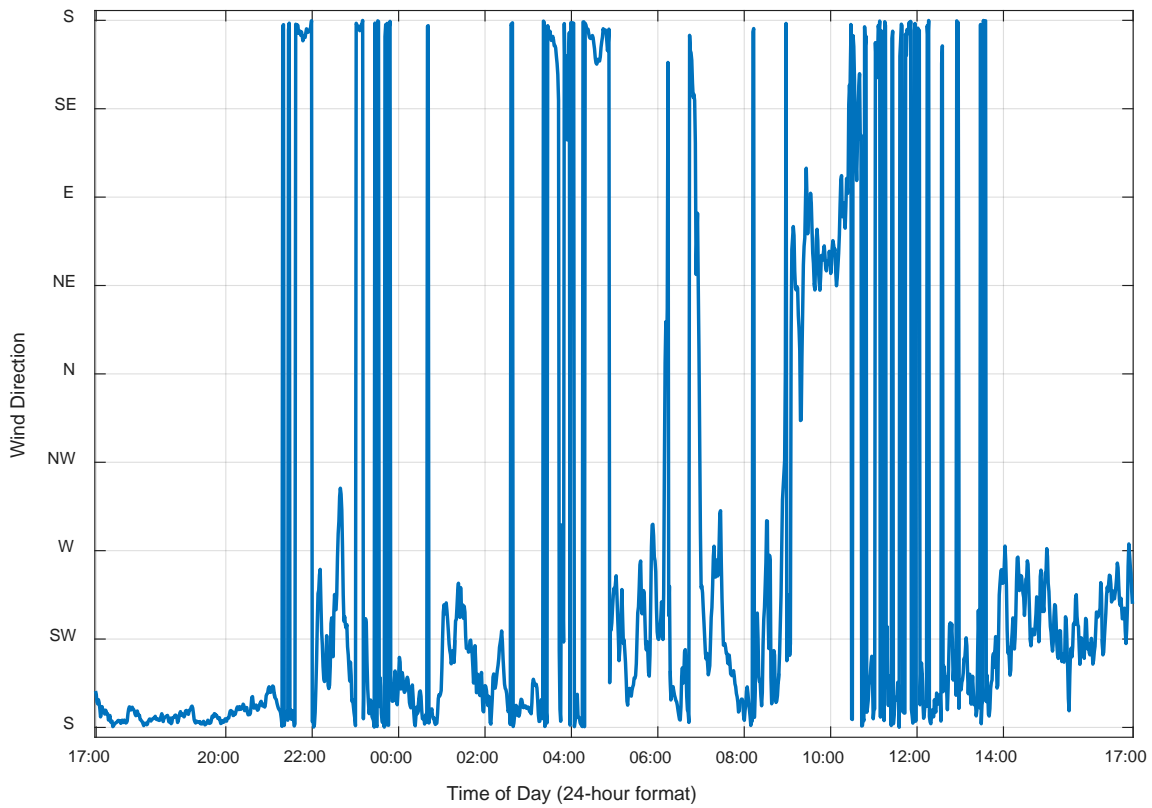
**Monitored Barometric Pressure (July 8 – 9, 2015) at Noise Monitor Location 11**



**Night-time Monitored Rain Rate (July 8 – 9, 2015) at Noise Monitor Location 11**

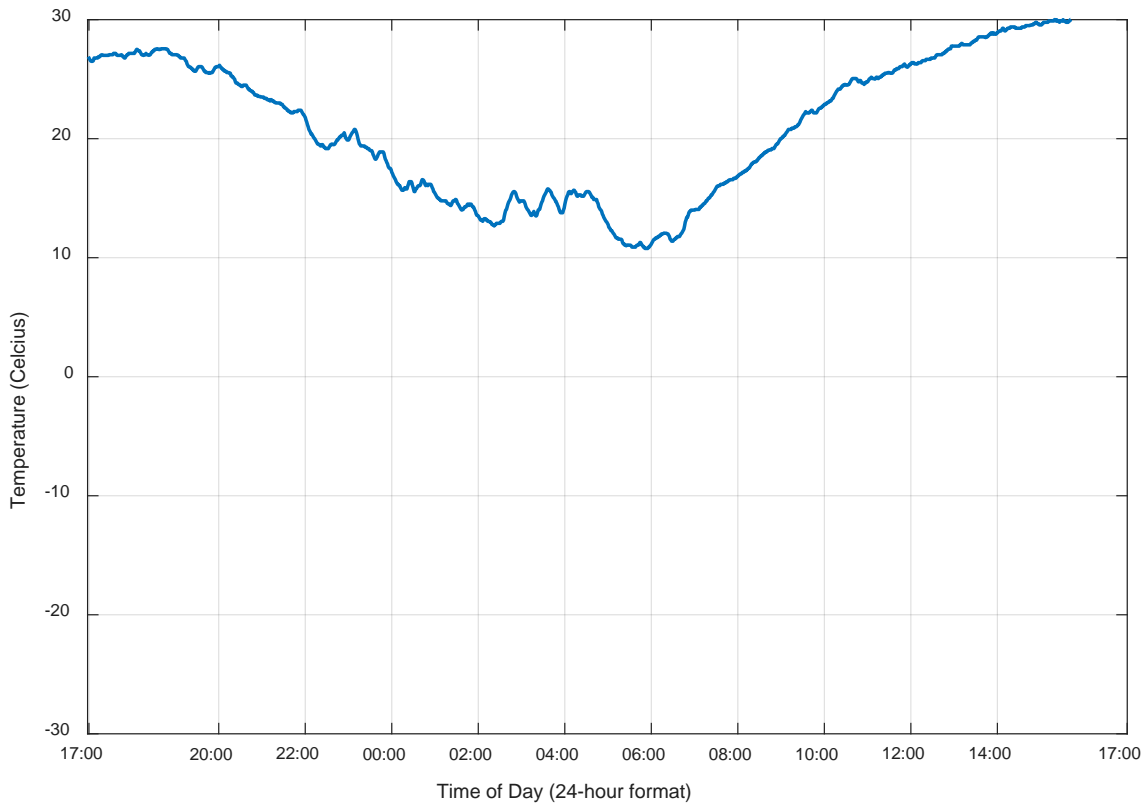


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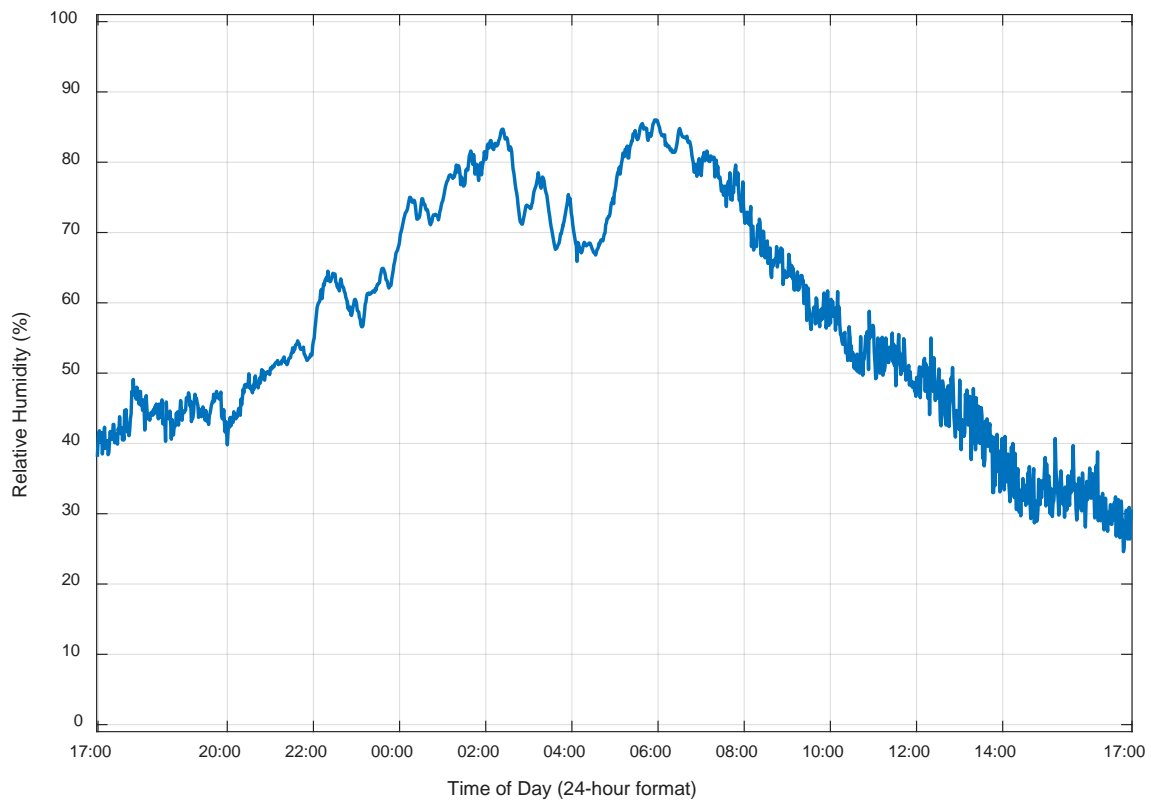


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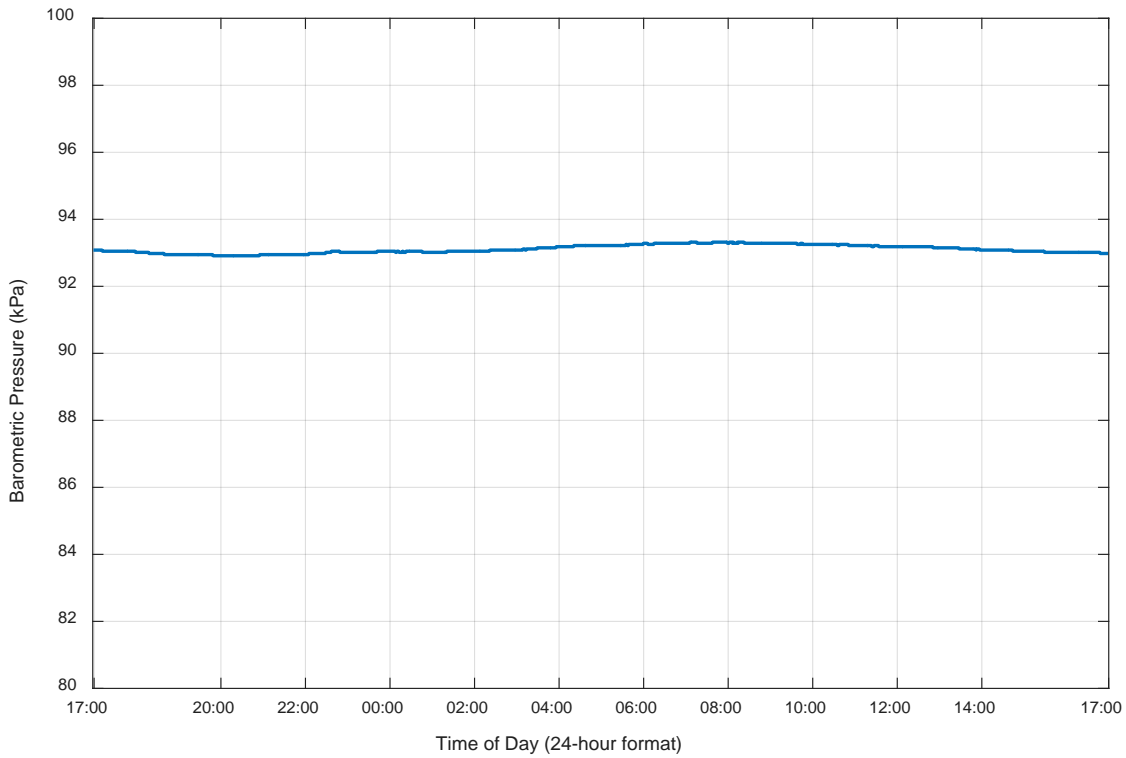




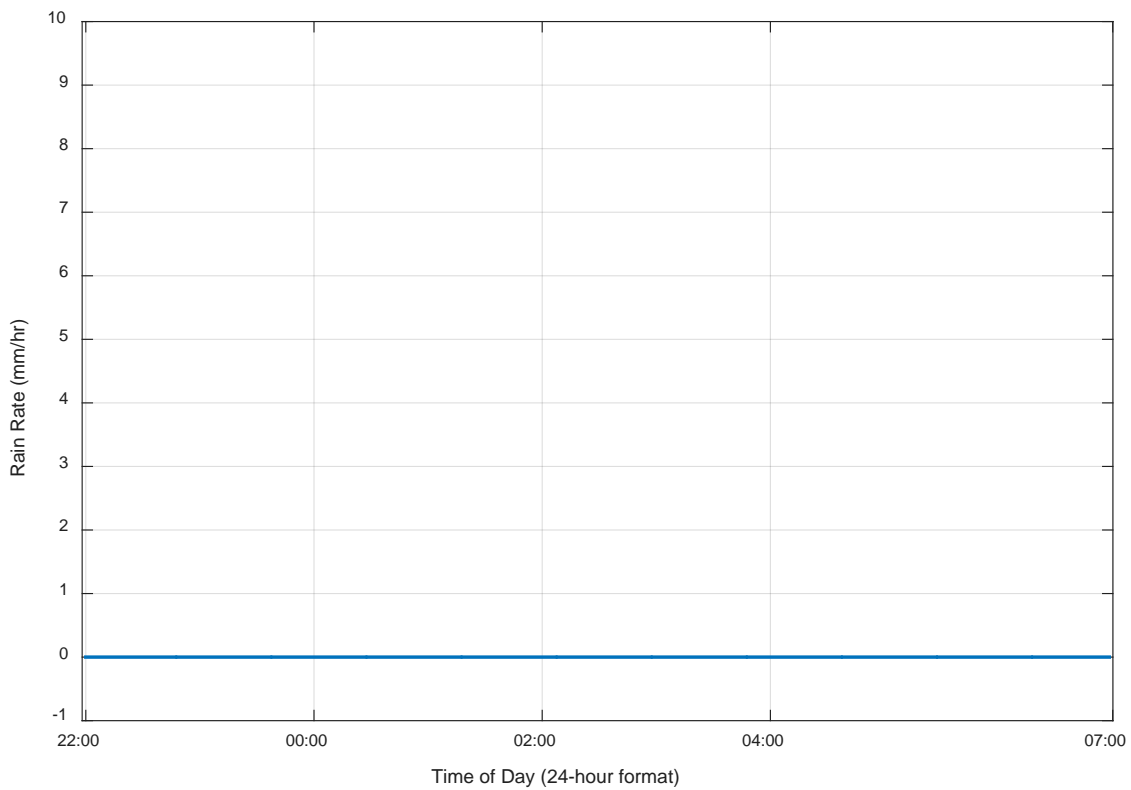
**Monitored Temperature (July 8 – 9, 2015) at Noise Monitor Location 12**



**Monitored Humidity (July 8 – 9, 2015) at Noise Monitor Location 12**

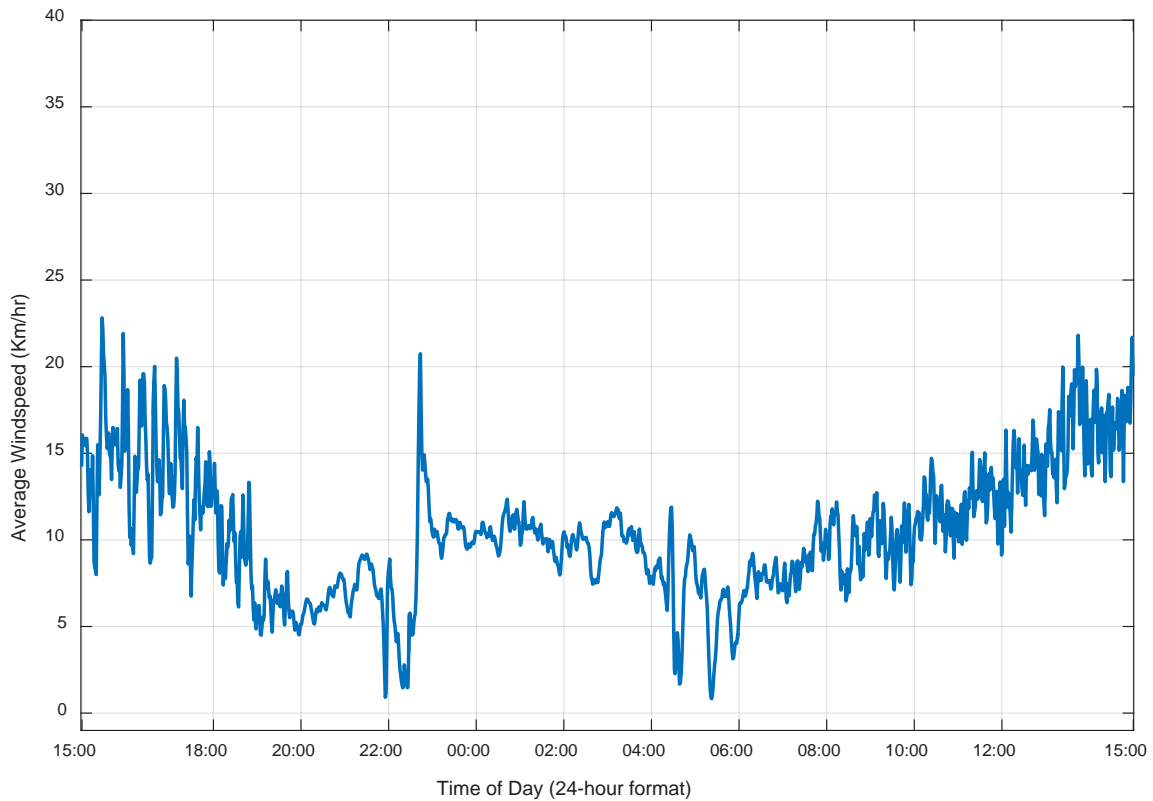


**Monitored Barometric Pressure (July 8 – 9, 2015) at Noise Monitor Location 12**

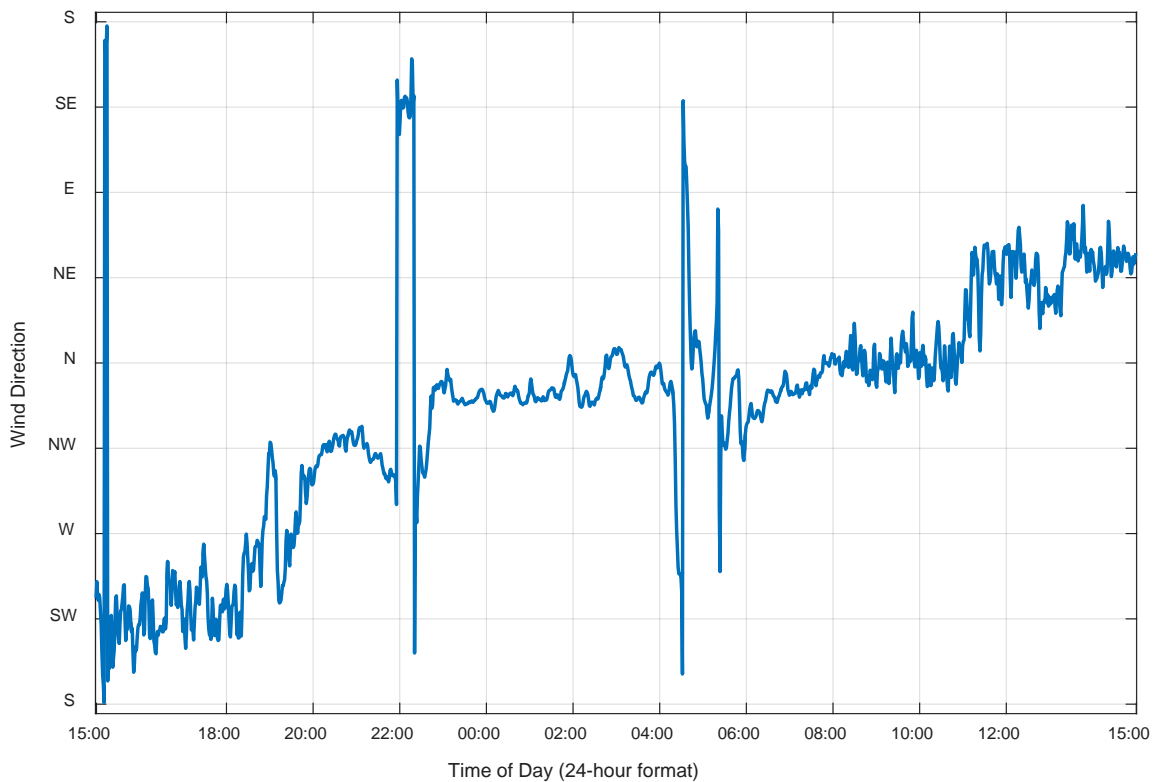


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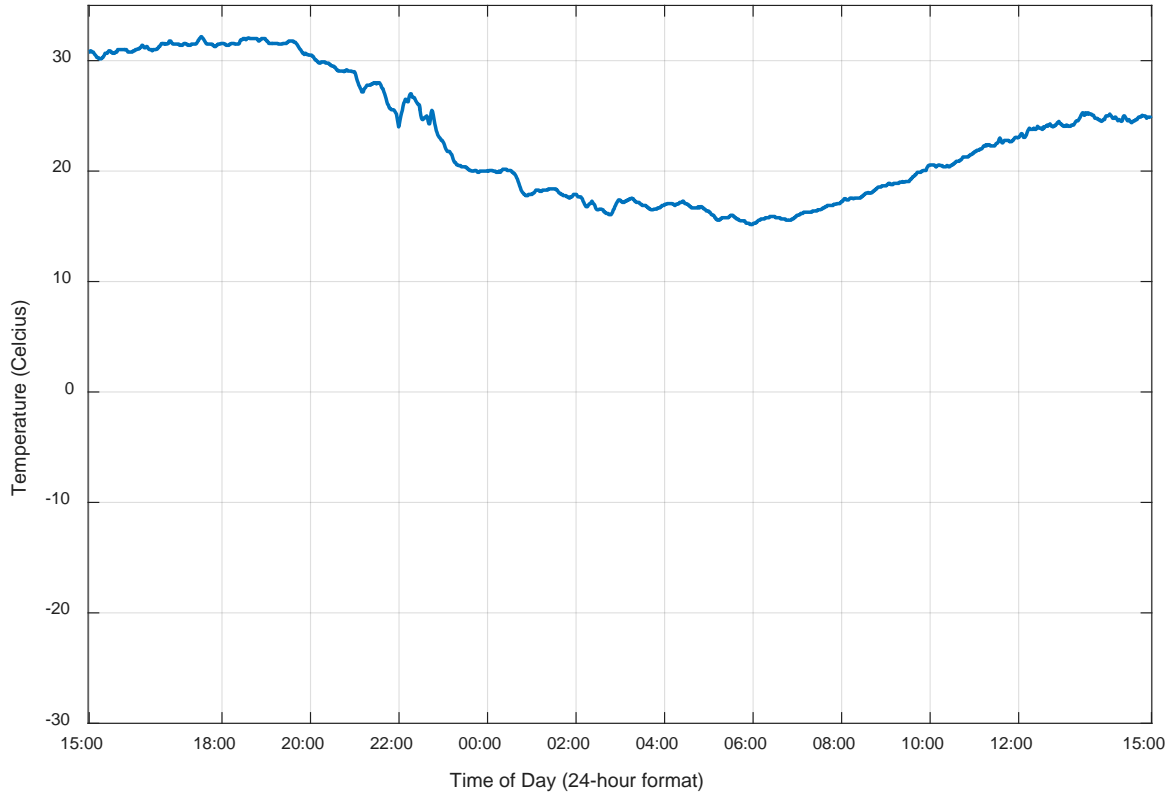
**July 9 – 10, 2015 Weather Data**



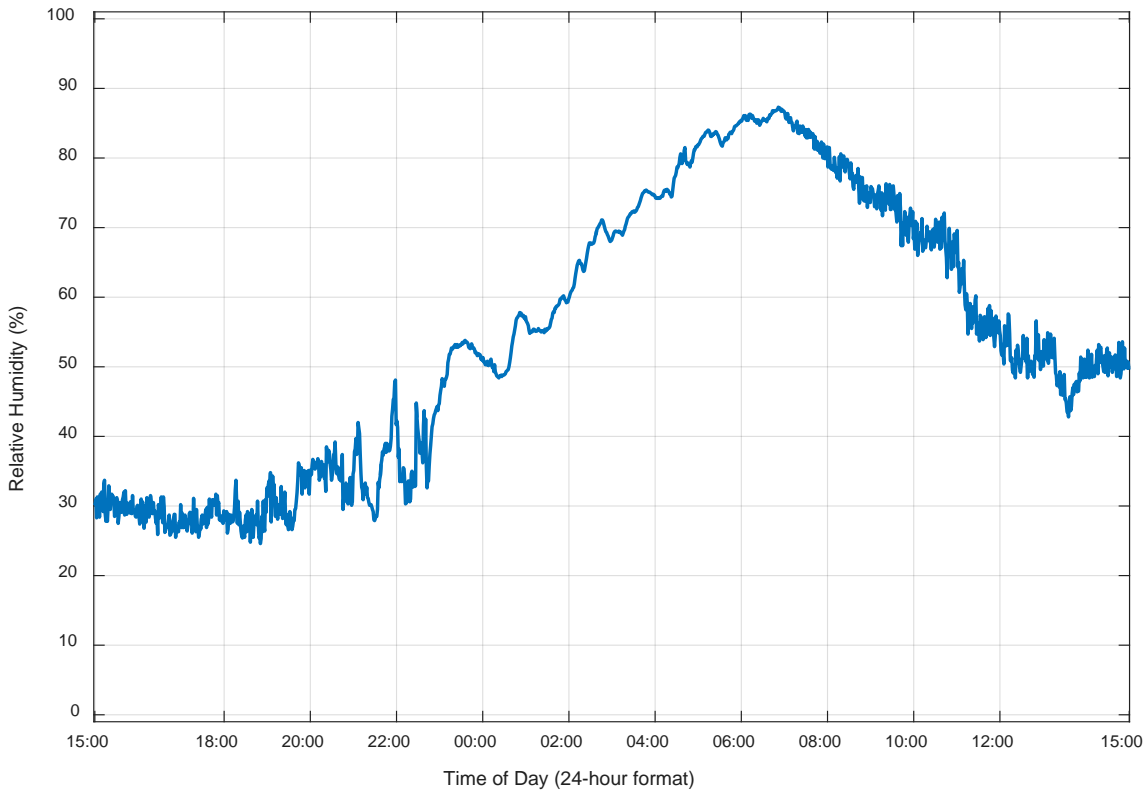
**Monitored Wind Speed (July 9 – 10, 2015) at Noise Monitor Location 11**



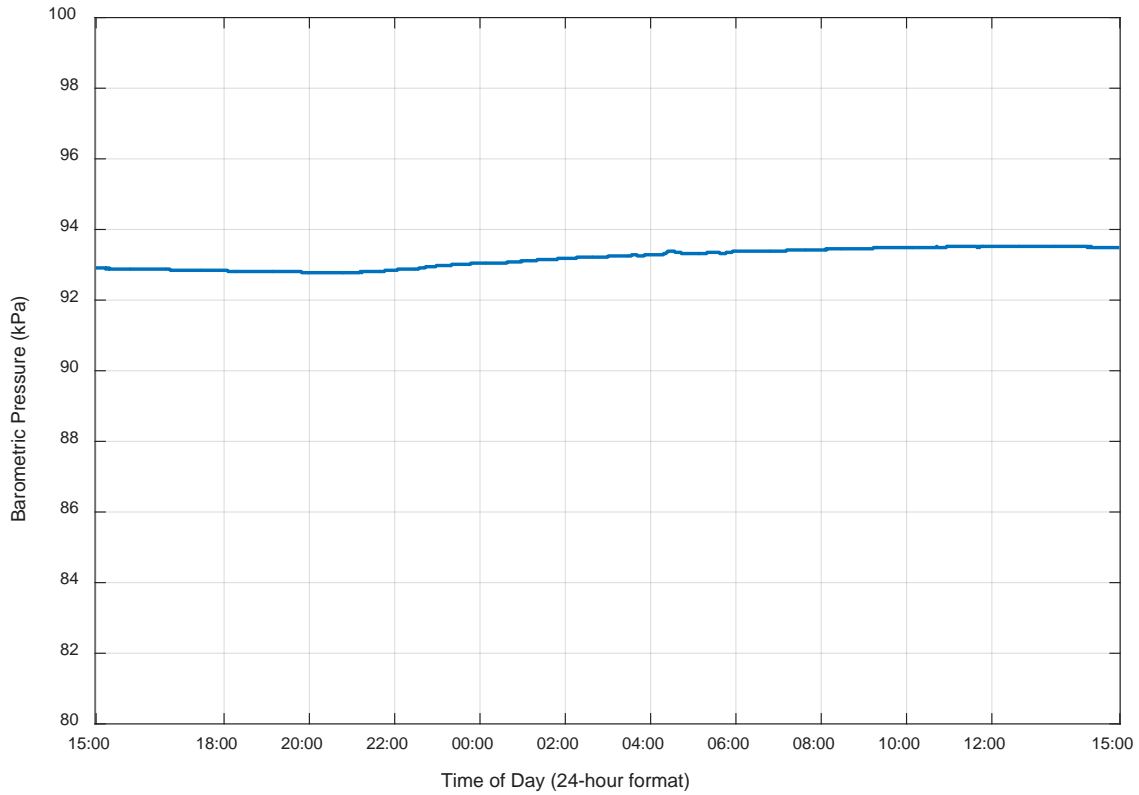
**Monitored Wind Direction (July 9 – 10, 2015) at Noise Monitor Location 11**



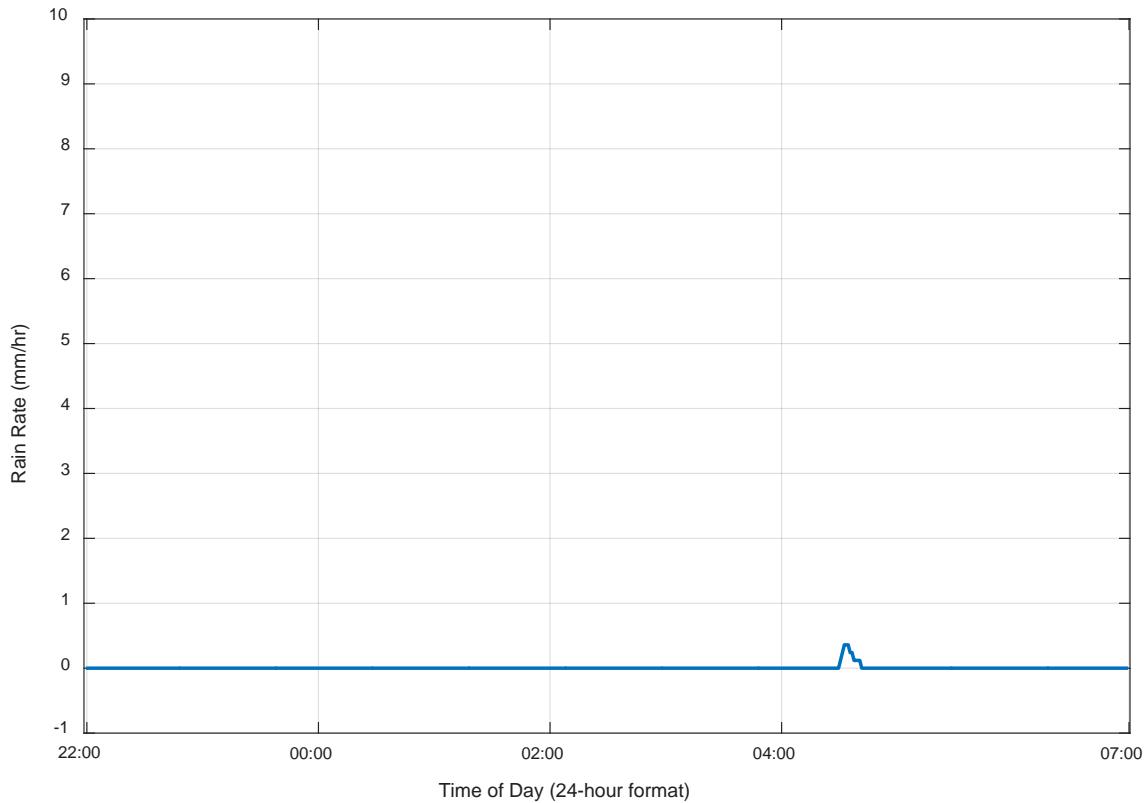
**Monitored Temperature (July 9 – 10, 2015) at Noise Monitor Location 11**



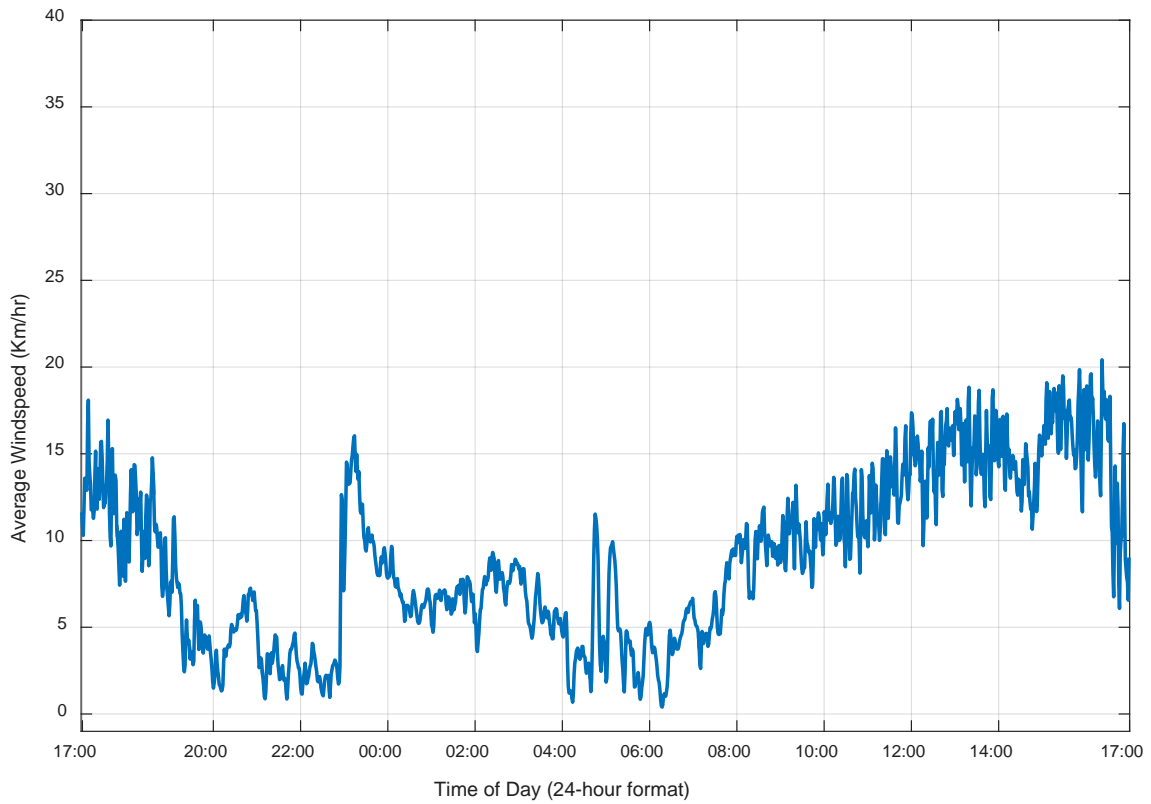
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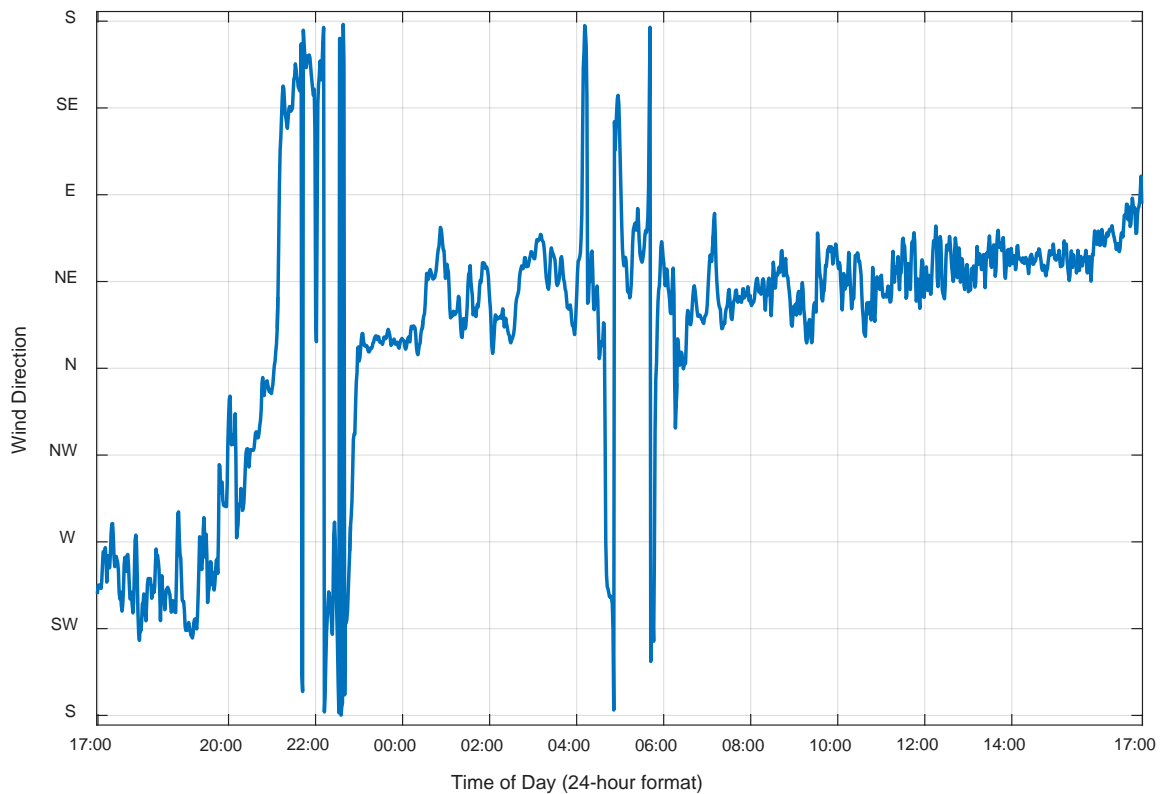
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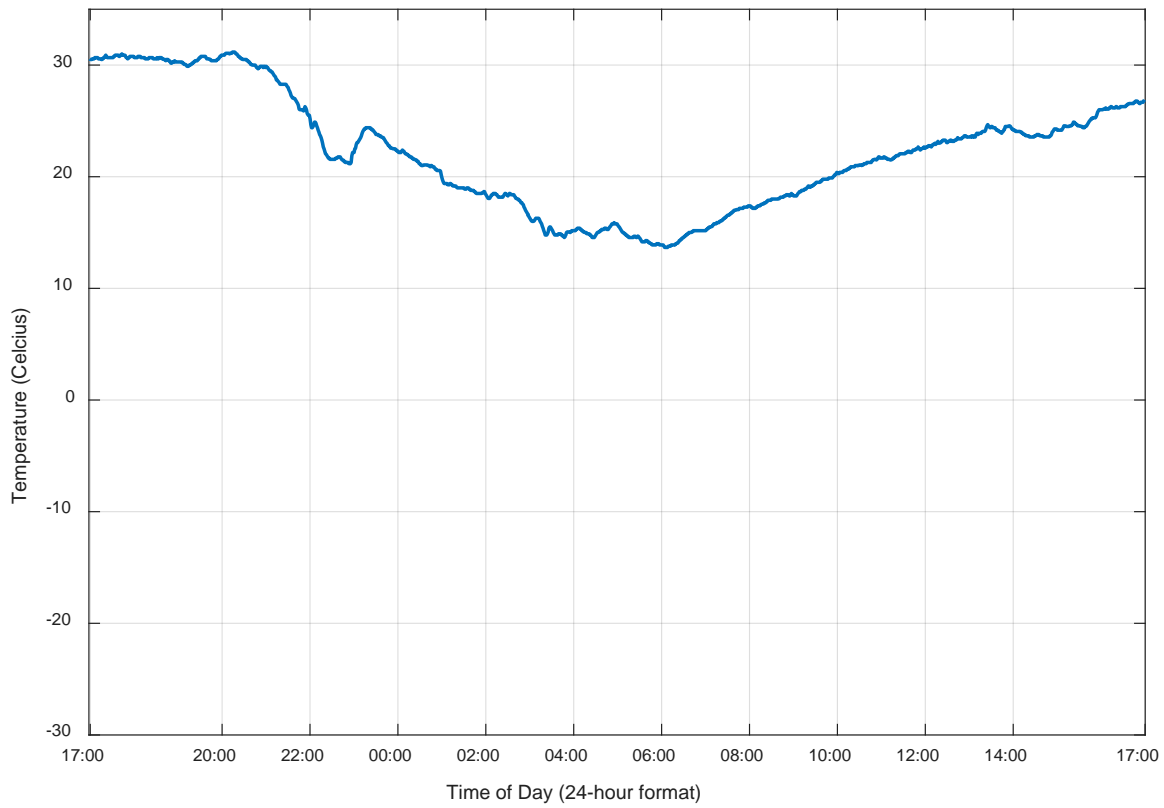
**Night-time Monitored Rain Rate (July 9 – 10, 2015) at Noise Monitor Location 11**



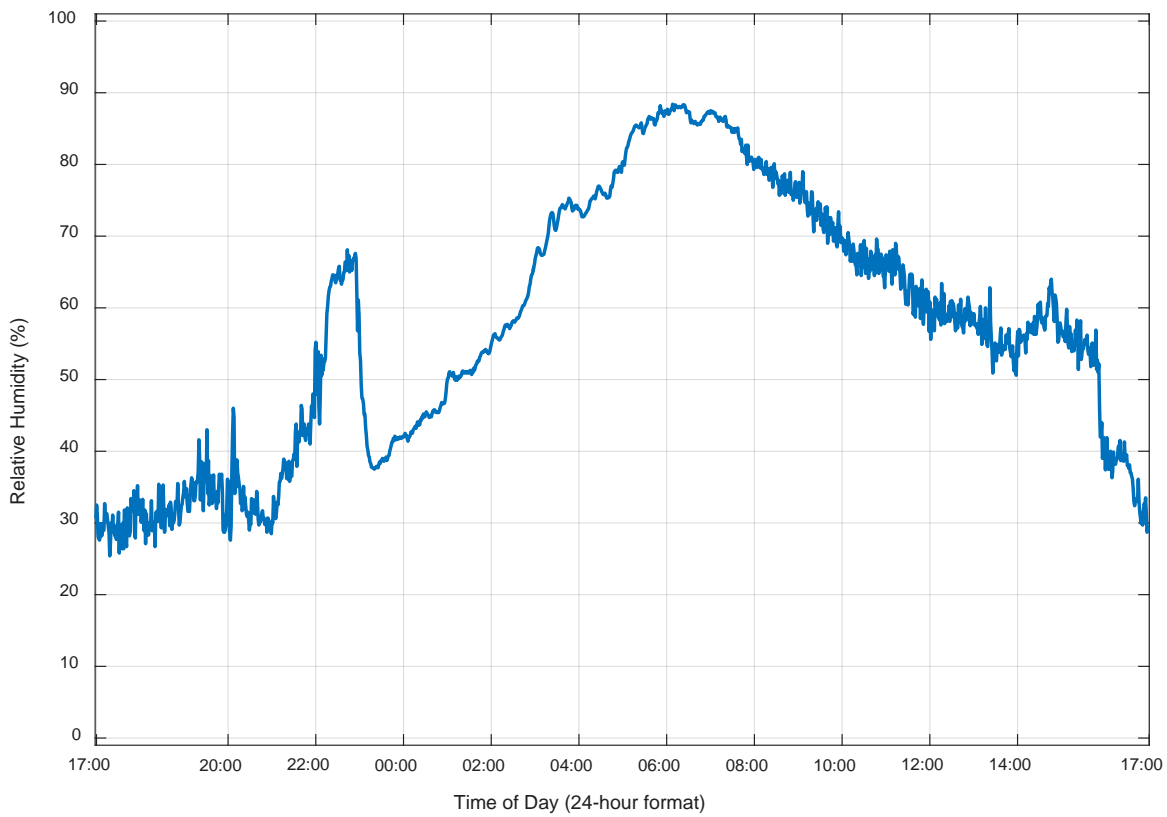
**Monitored Wind Speed (July 9 – 10, 2015) at Noise Monitor Location 12**



**Monitored Wind Direction (July 9 – 10, 2015) at Noise Monitor Location 12**

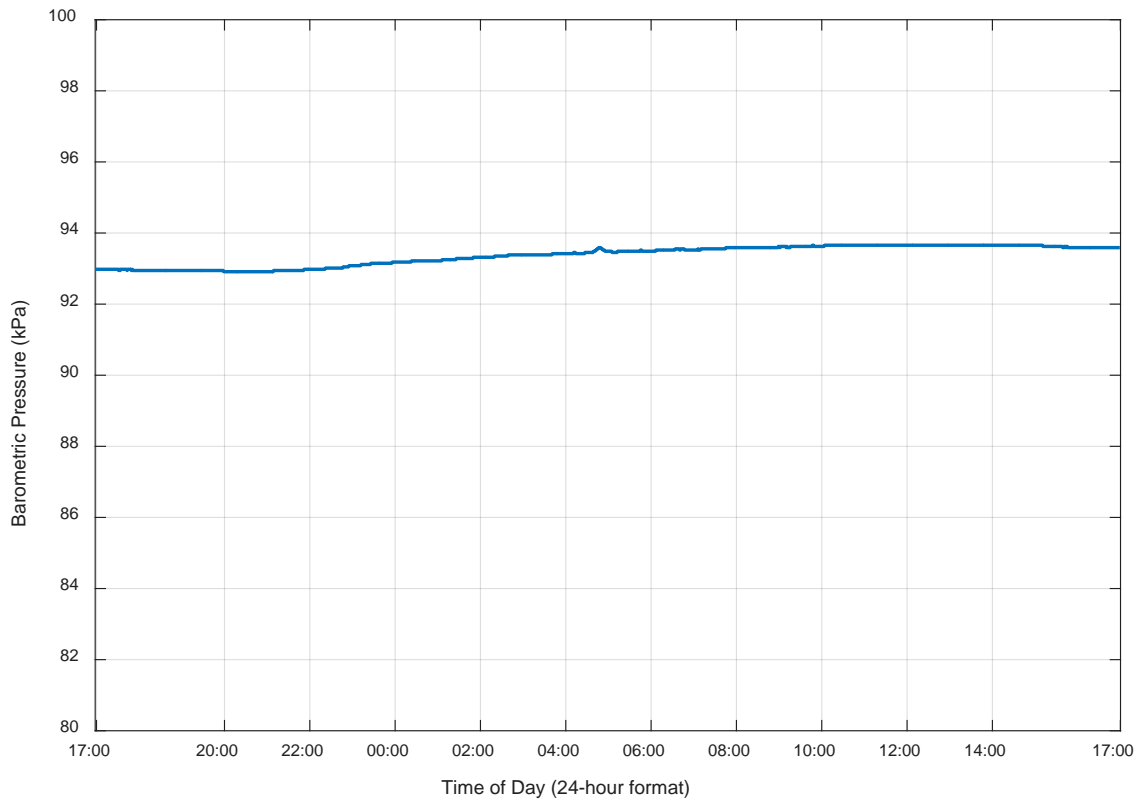


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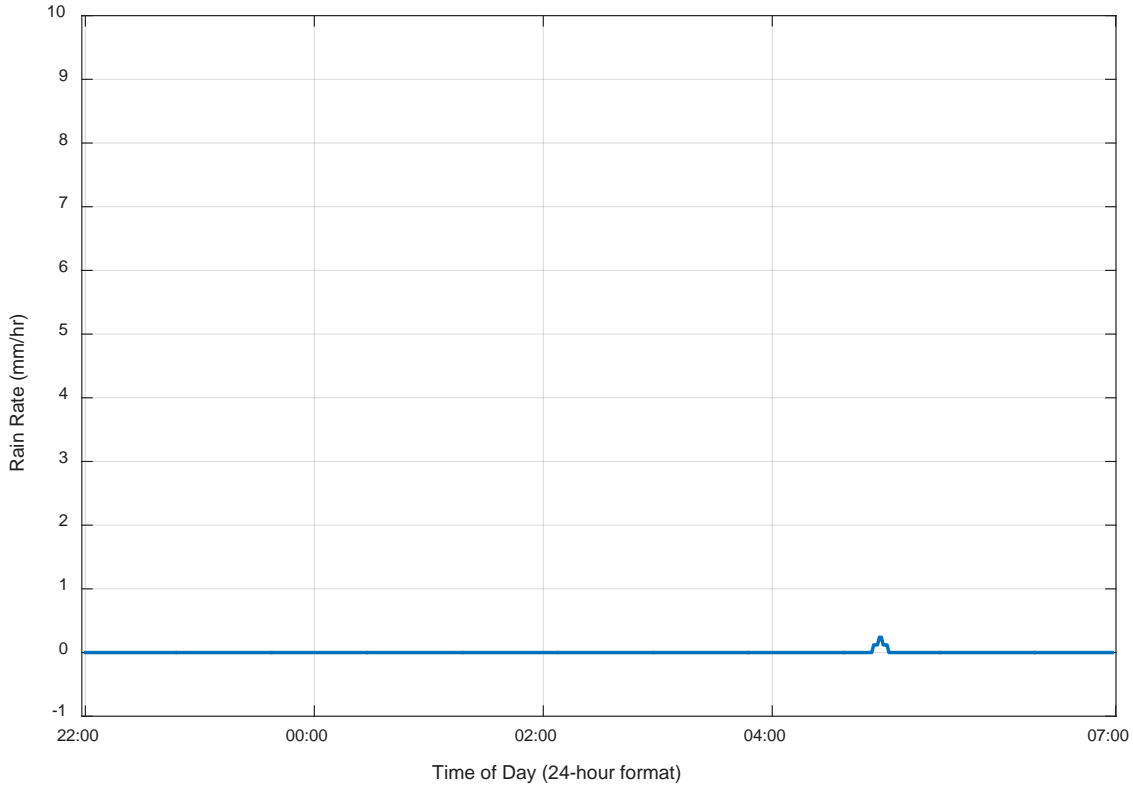


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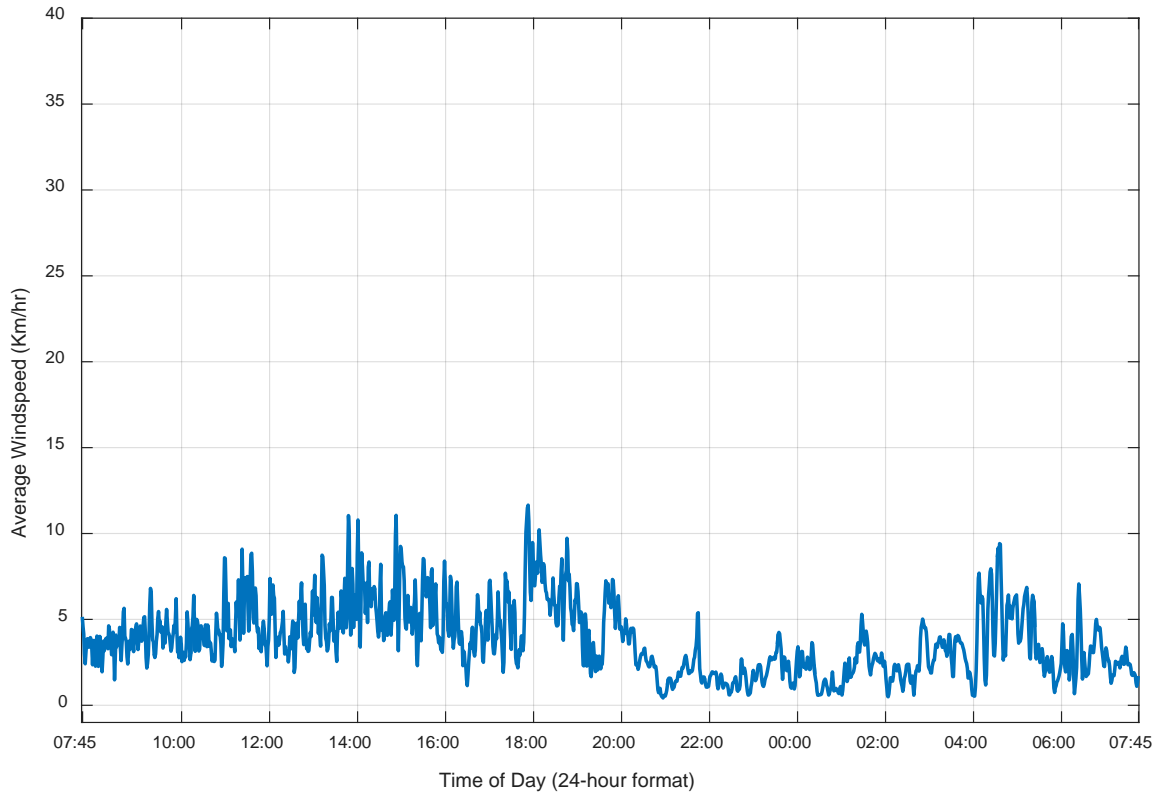


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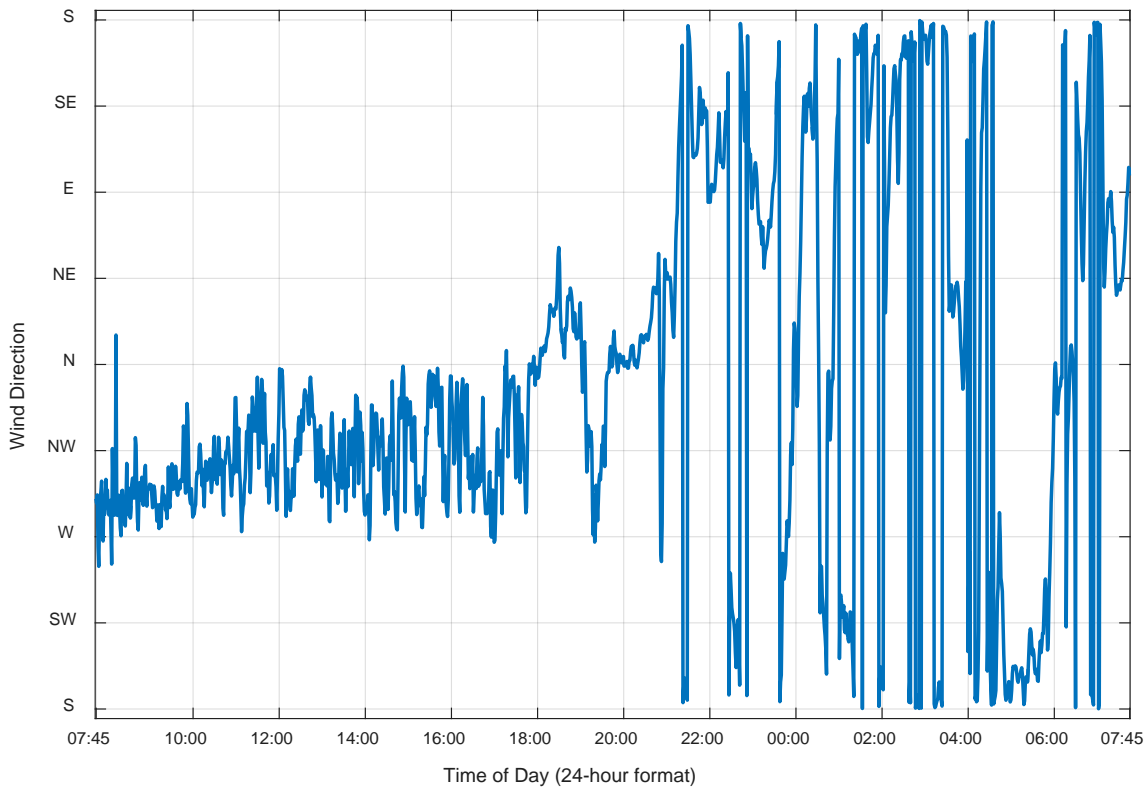


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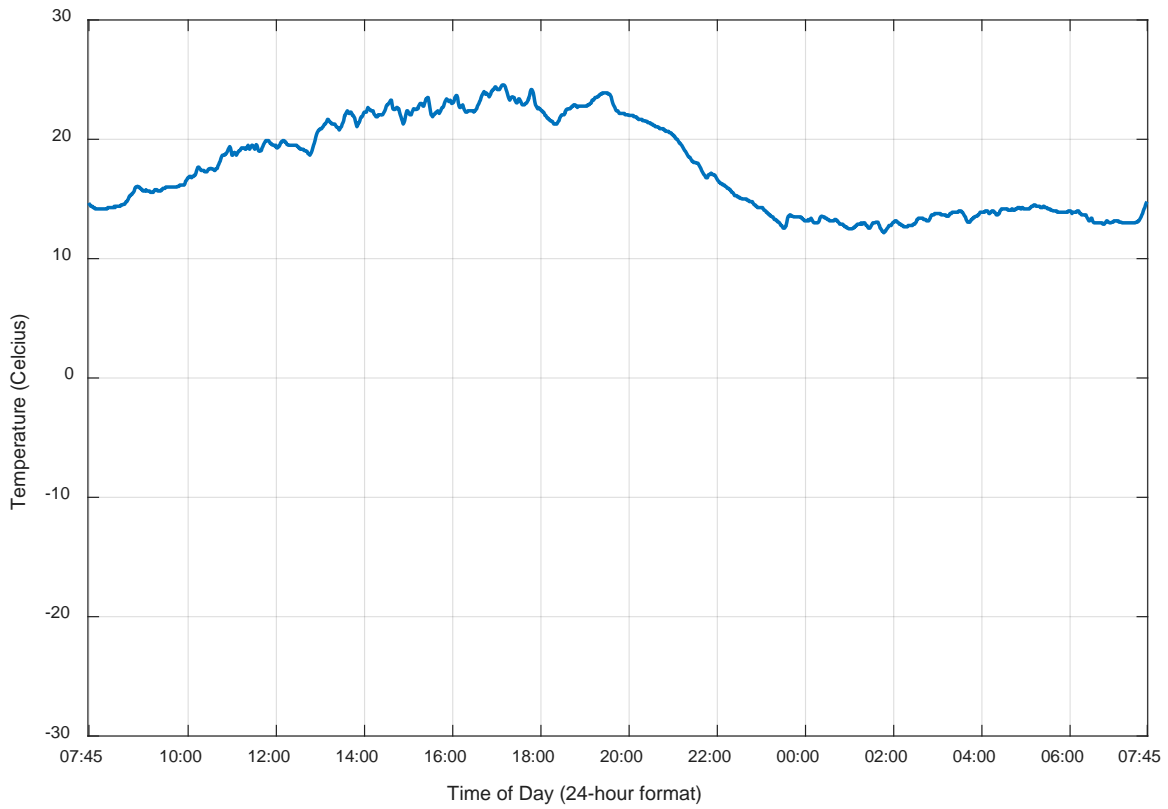
**August 7 – 8, 2015 Weather Data**



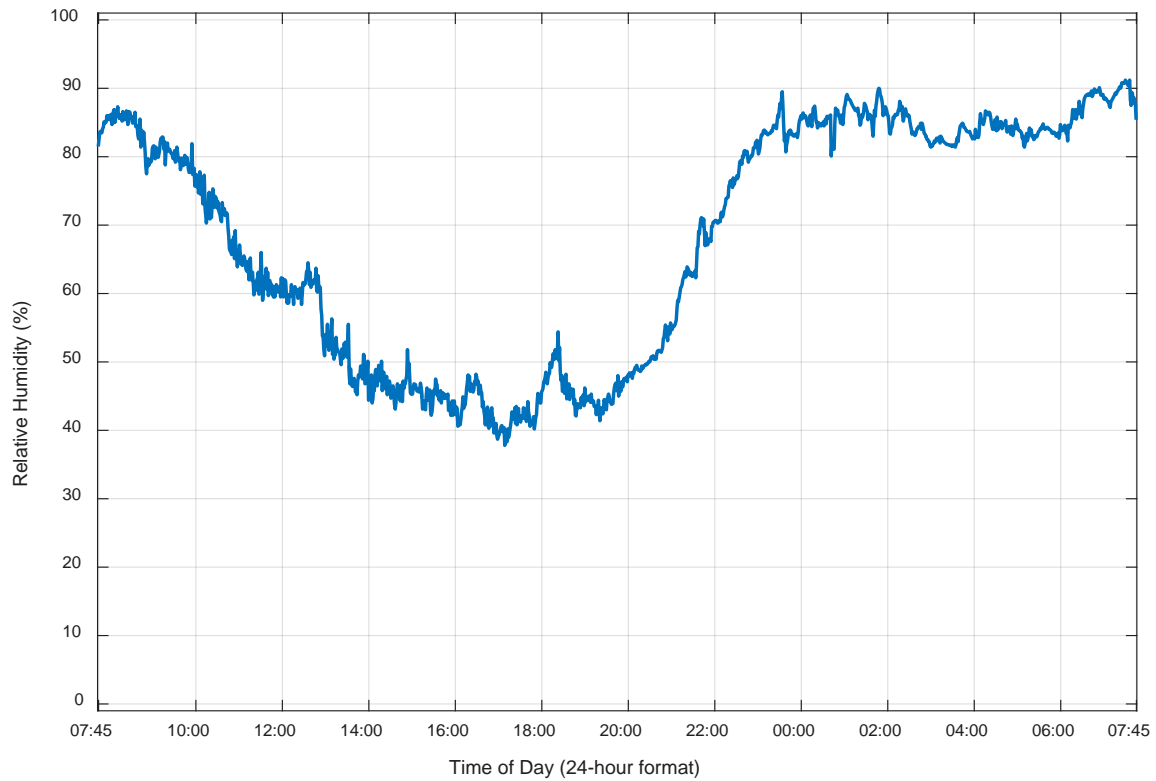
**Monitored Wind Speed (August 7 – 8, 2015) at Noise Monitor Location 6**



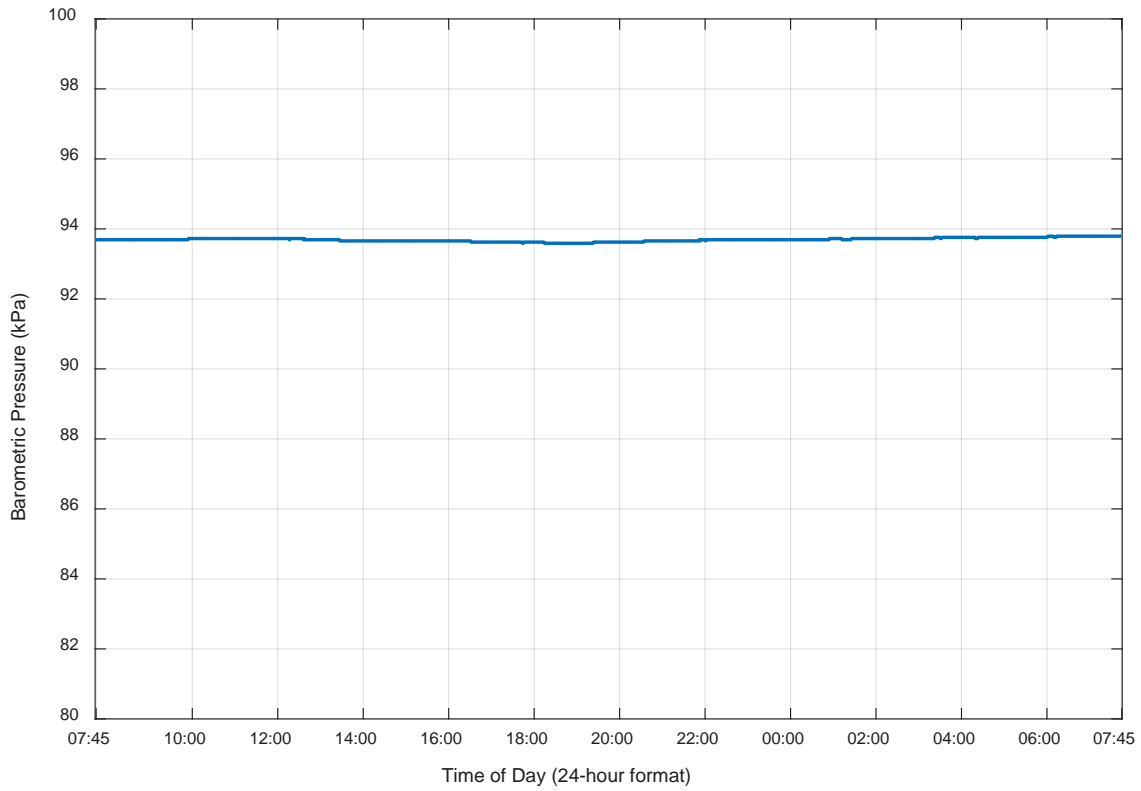
**Monitored Wind Direction (August 7 – 8, 2015) at Noise Monitor Location 6**



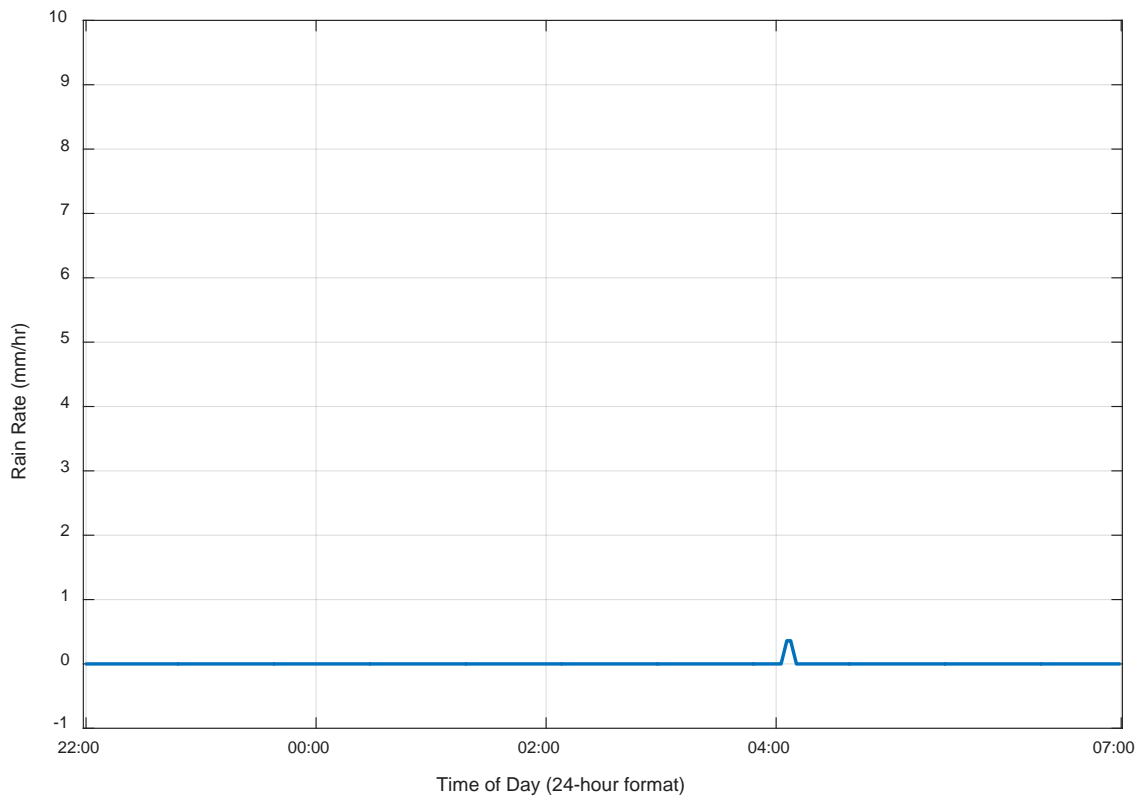
**Monitored Temperature (August 7 – 8, 2015) at Noise Monitor Location 6**



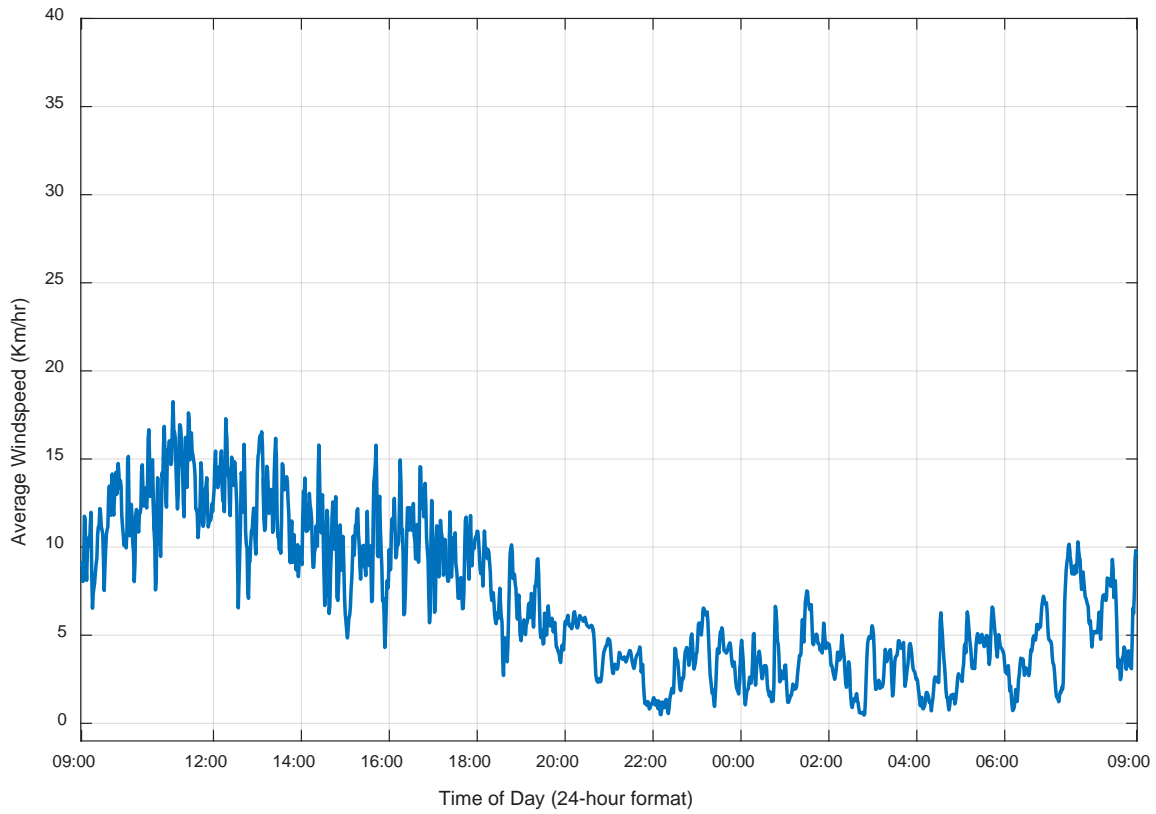
**Monitored Humidity (August 7 – 8, 2015) at Noise Monitor Location 6**



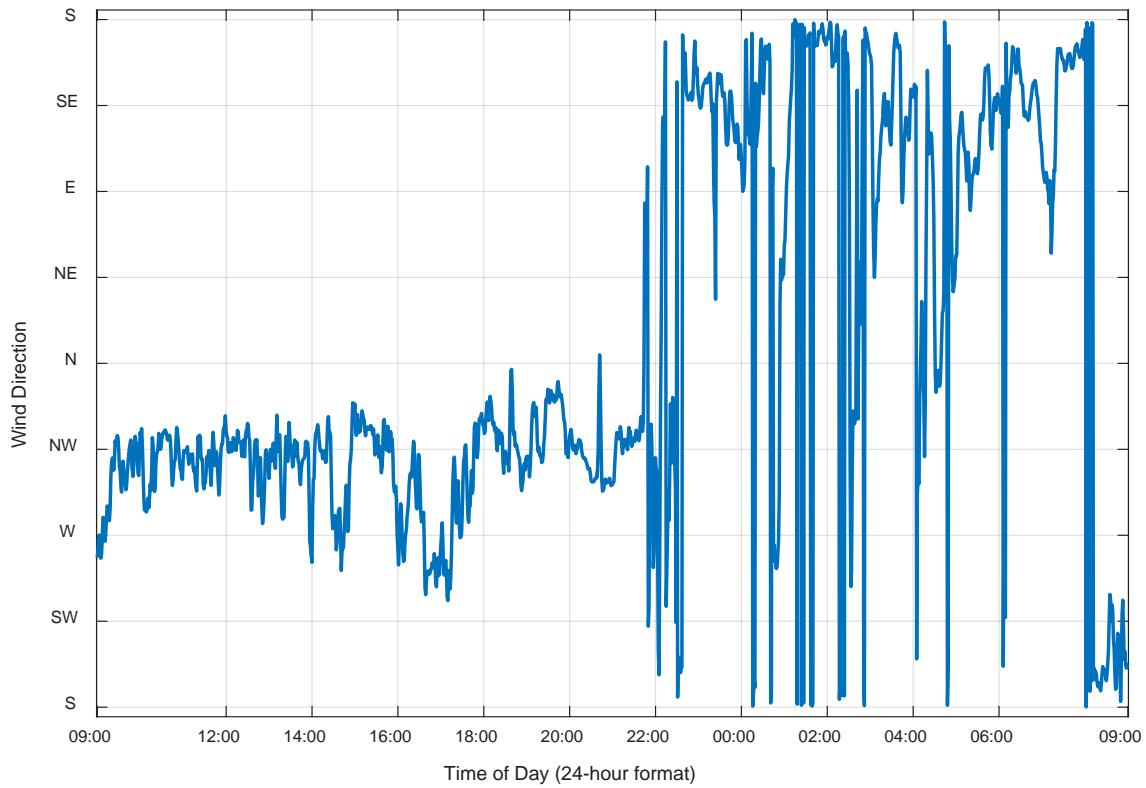
**Monitored Barometric Pressure (August 7 – 8, 2015) at Noise Monitor Location 6**



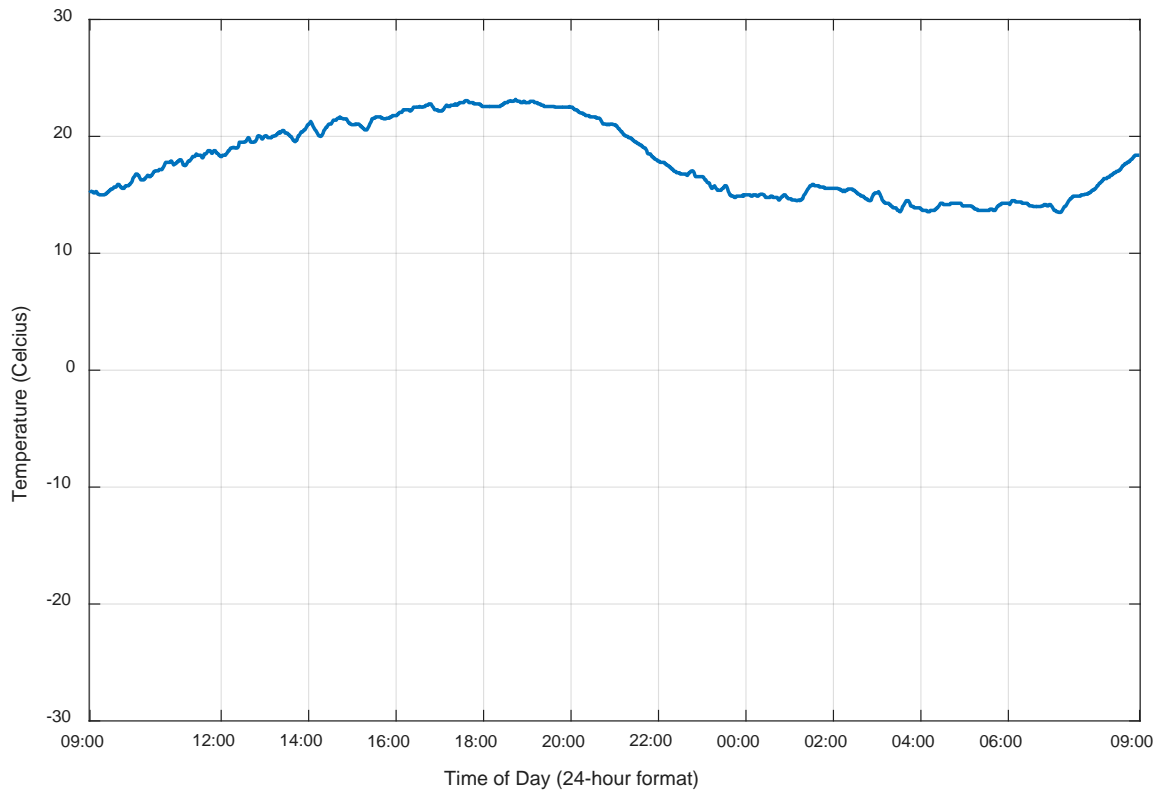
**Night-time Monitored Rain Rate (August 7 – 8, 2015) at Noise Monitor Location 6**



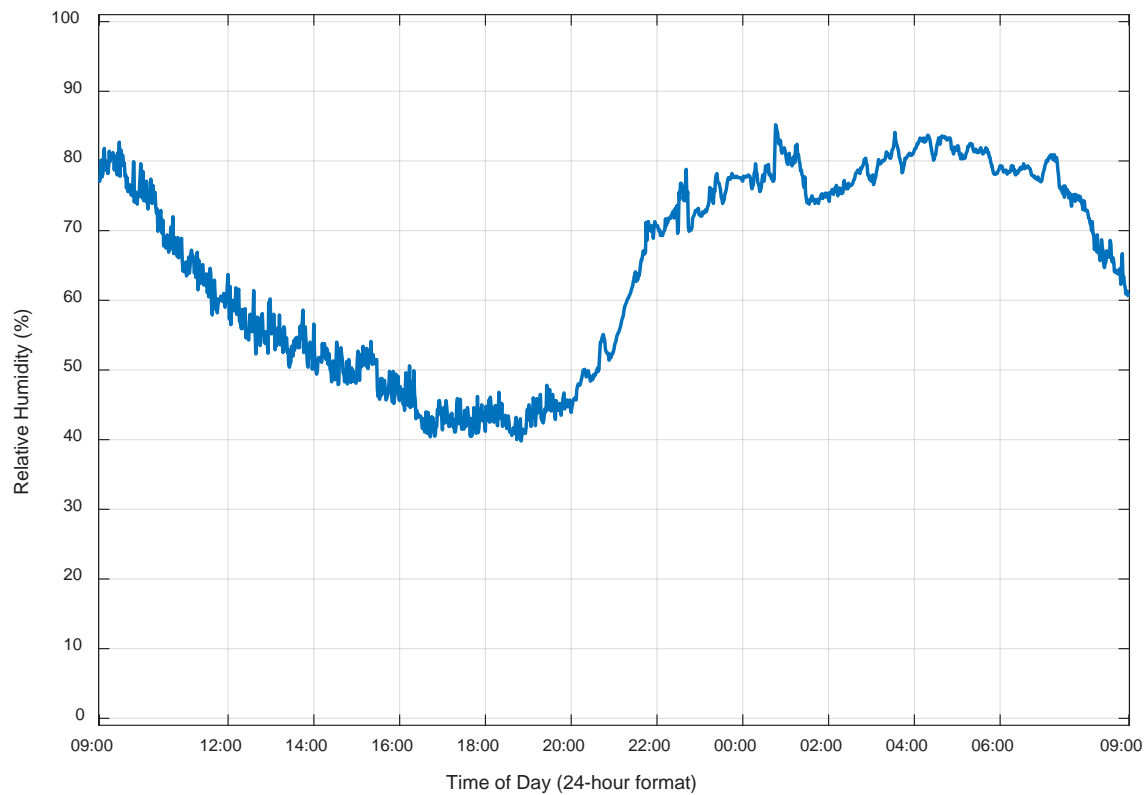
**Monitored Wind Speed (August 7 – 8, 2015) at Noise Monitor Location 10**



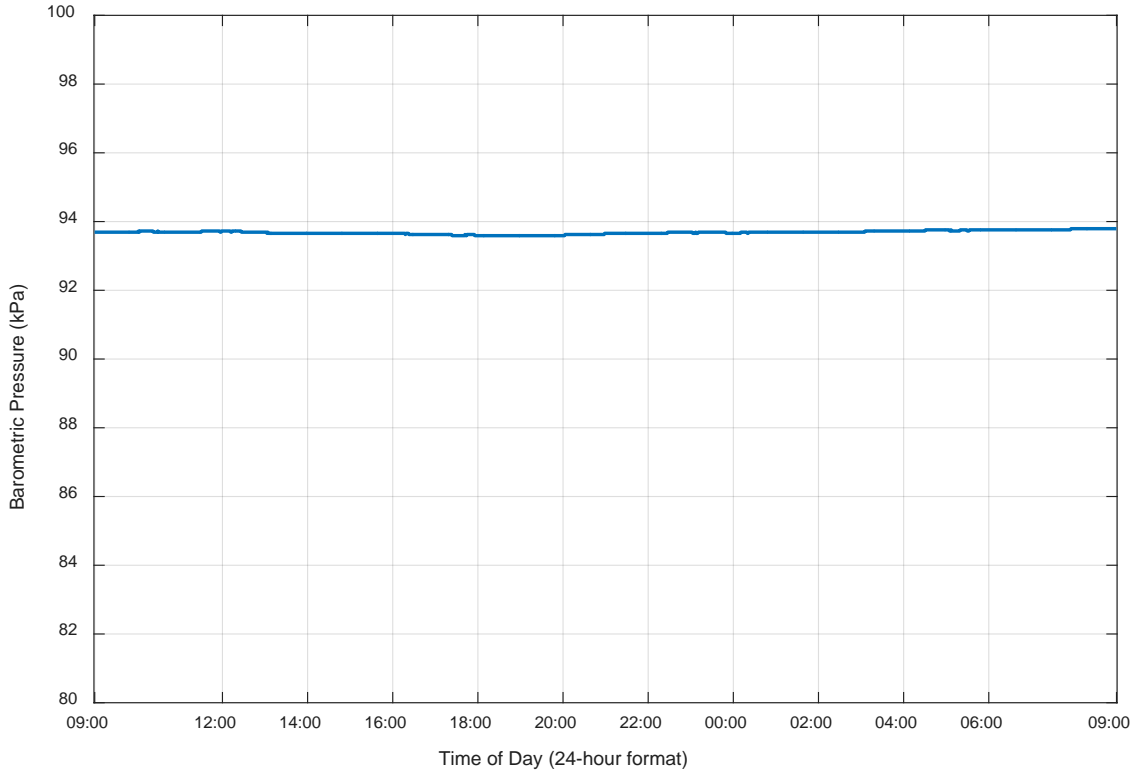
**Monitored Wind Direction (August 7 – 8, 2015) at Noise Monitor Location 10**



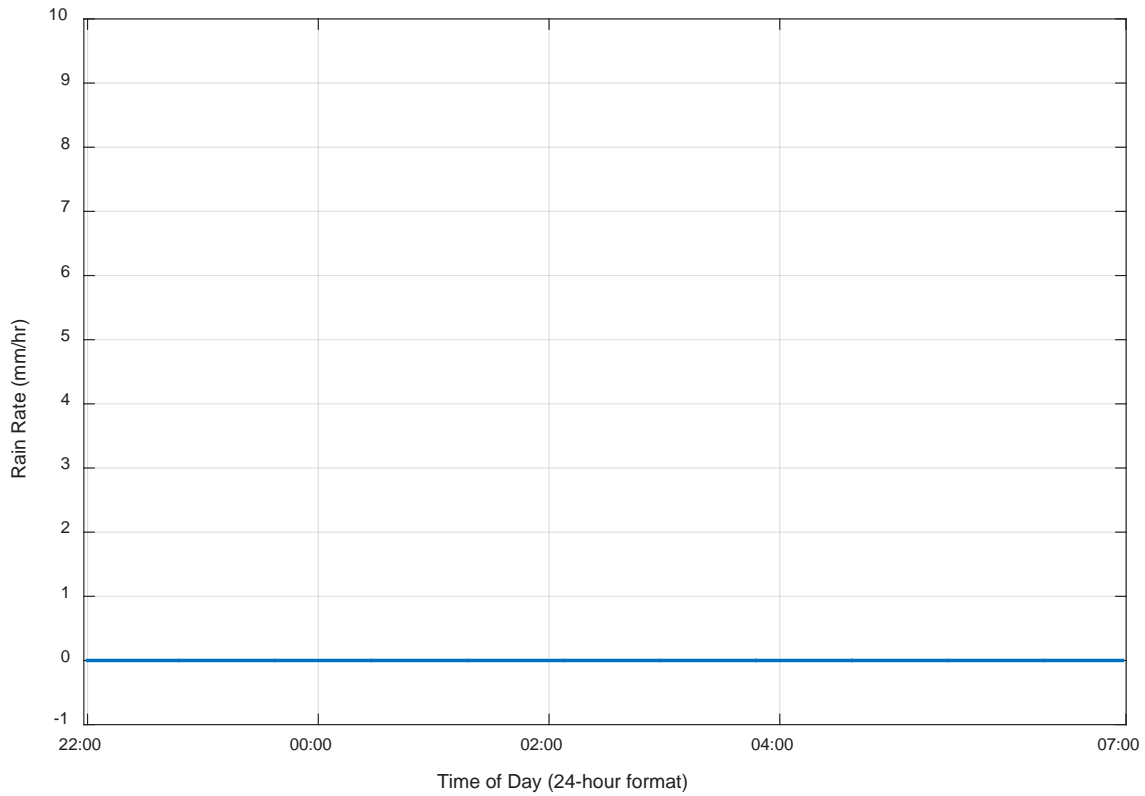
**Monitored Temperature (August 7 – 8, 2015) at Noise Monitor Location 10**



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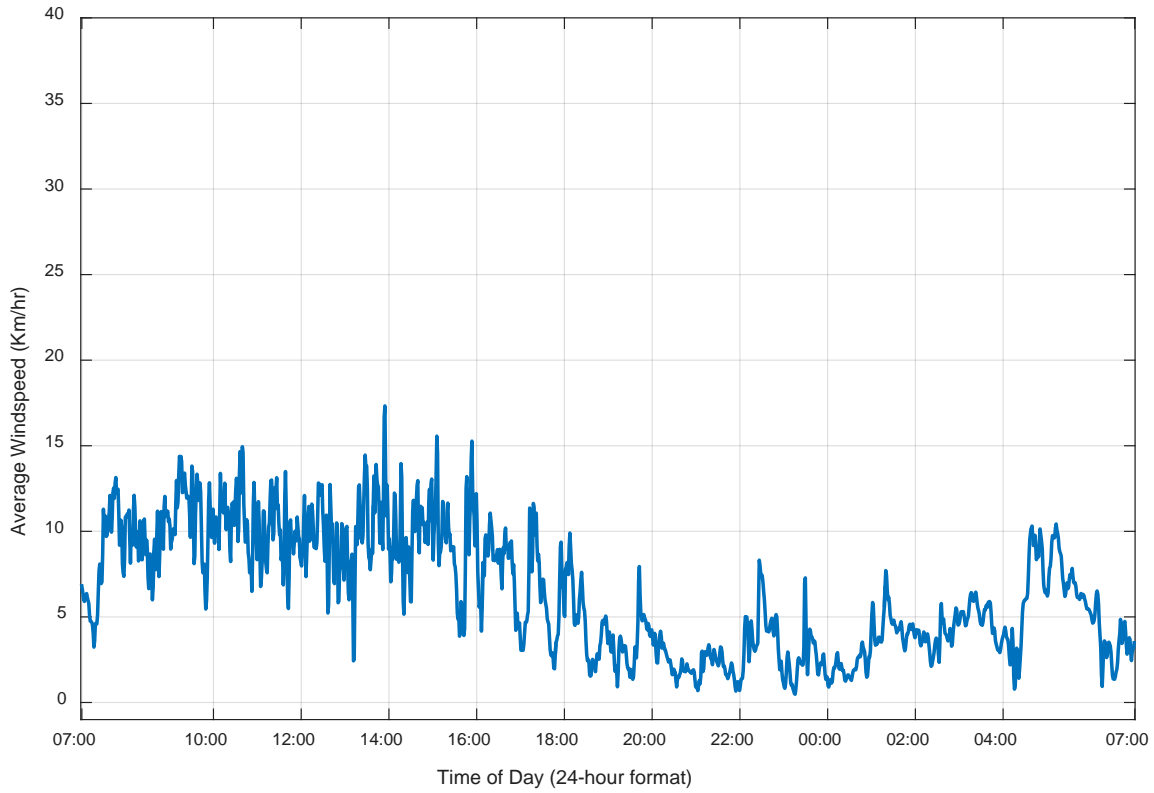


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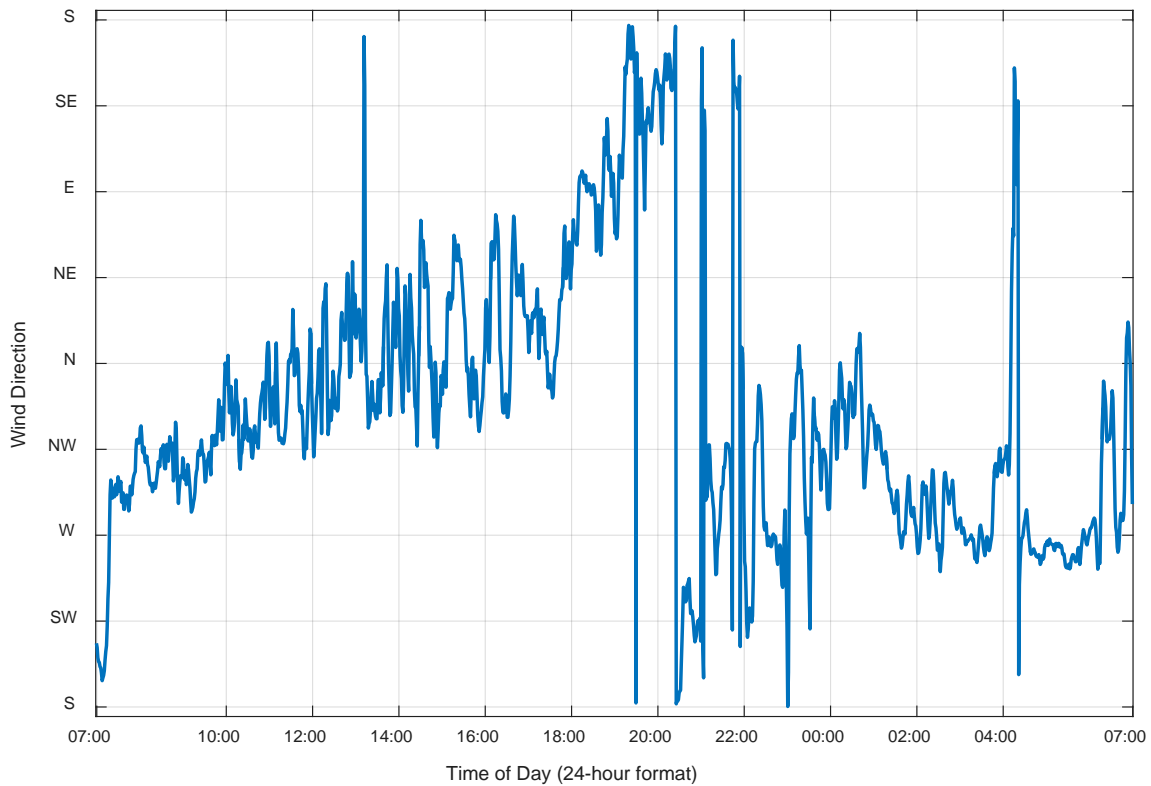


**Night-time Monitored Rain Rate (August 7 – 8, 2015) at Noise Monitor Location 10**

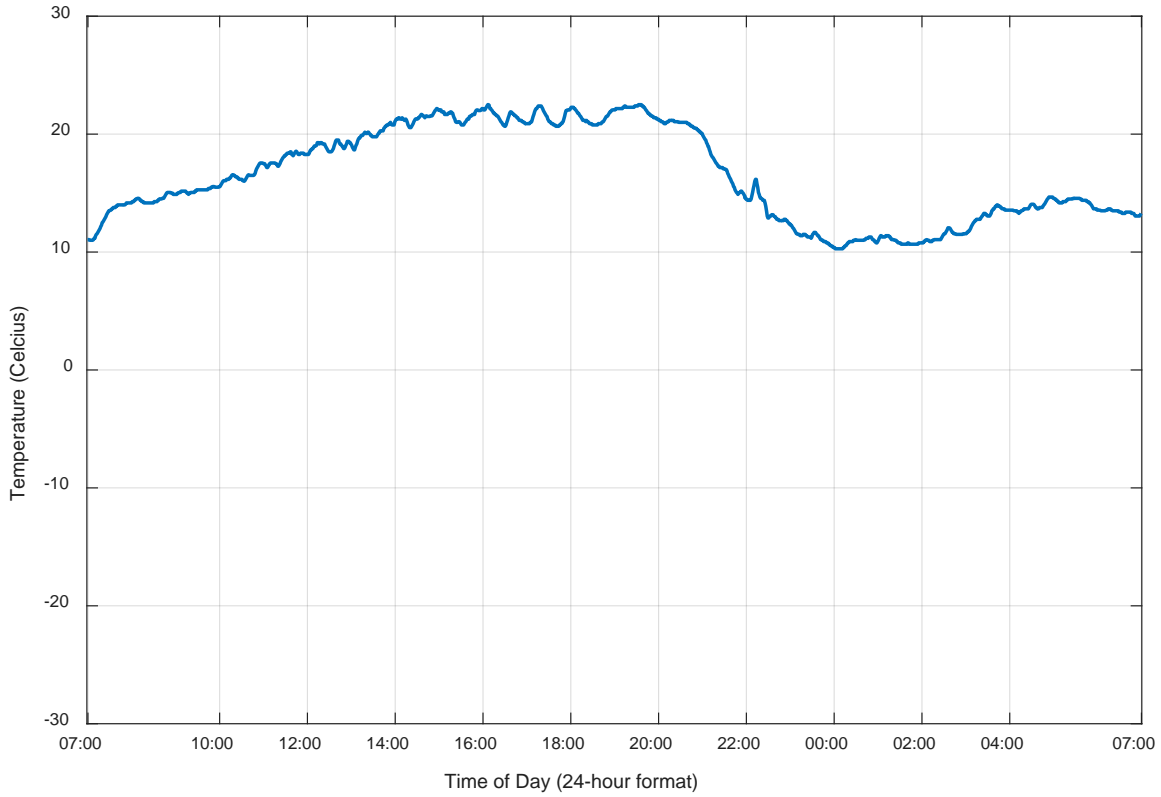




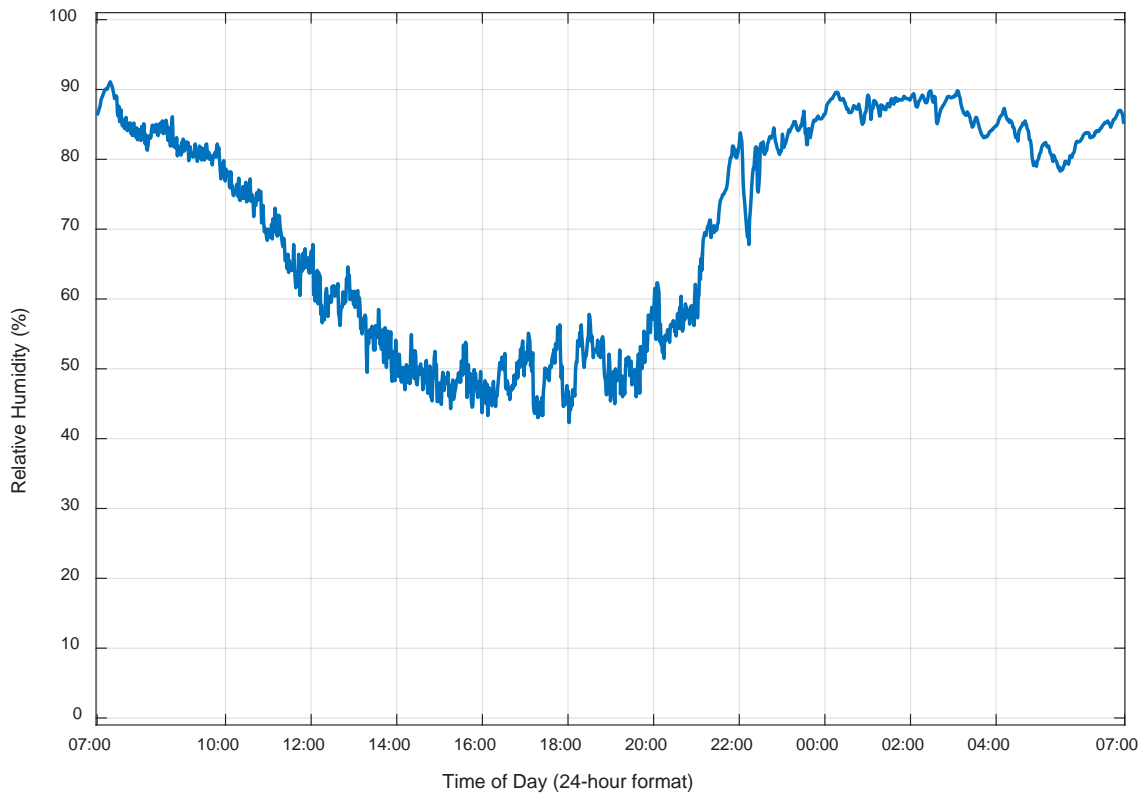
**Monitored Wind Speed (August 7 – 8, 2015) at Noise Monitor Location 12**



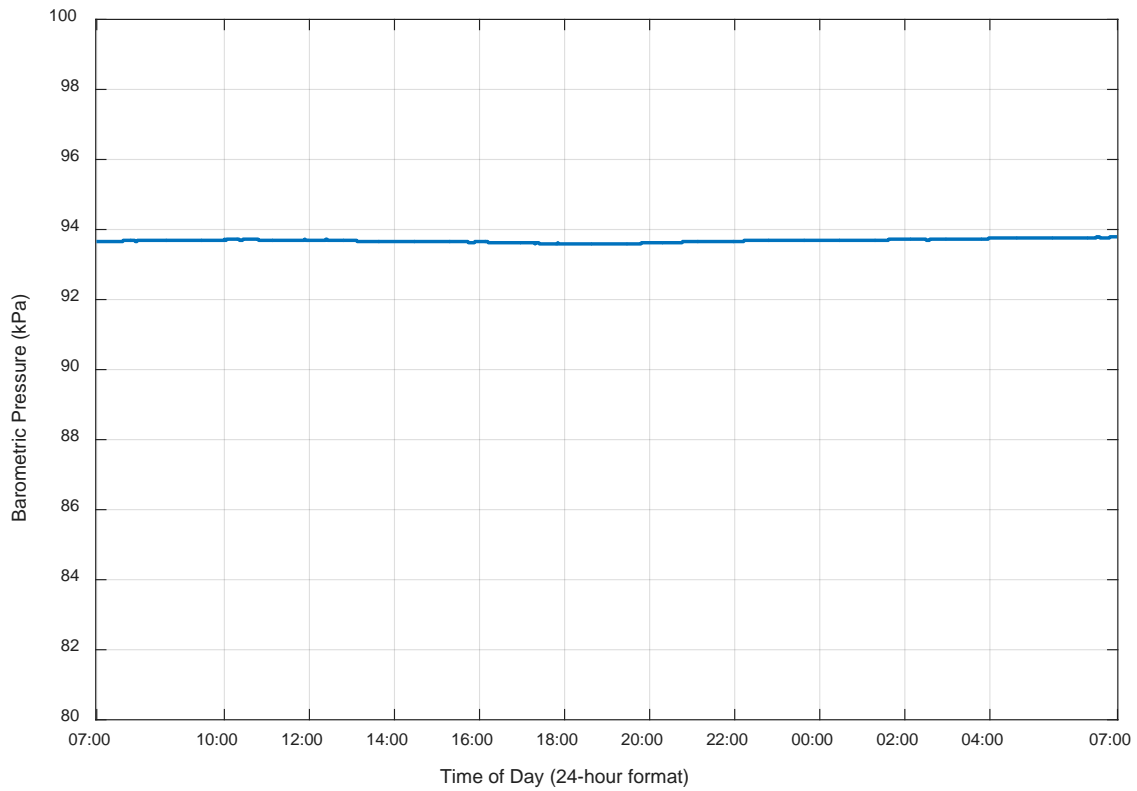
**Monitored Wind Direction (August 7 – 8, 2015) at Noise Monitor Location 12**



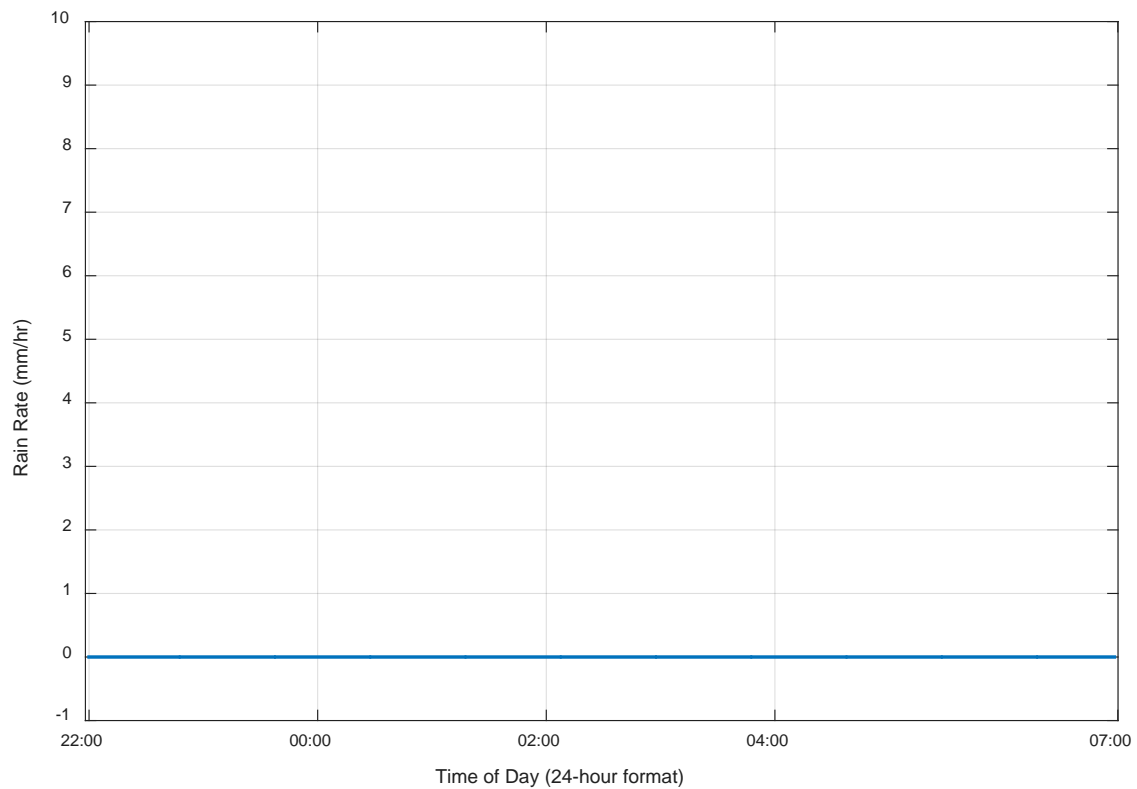
**Monitored Temperature (August 7 – 8, 2015) at Noise Monitor Location 12**



**Monitored Humidity (August 7 – 8, 2015) at Noise Monitor Location 12**

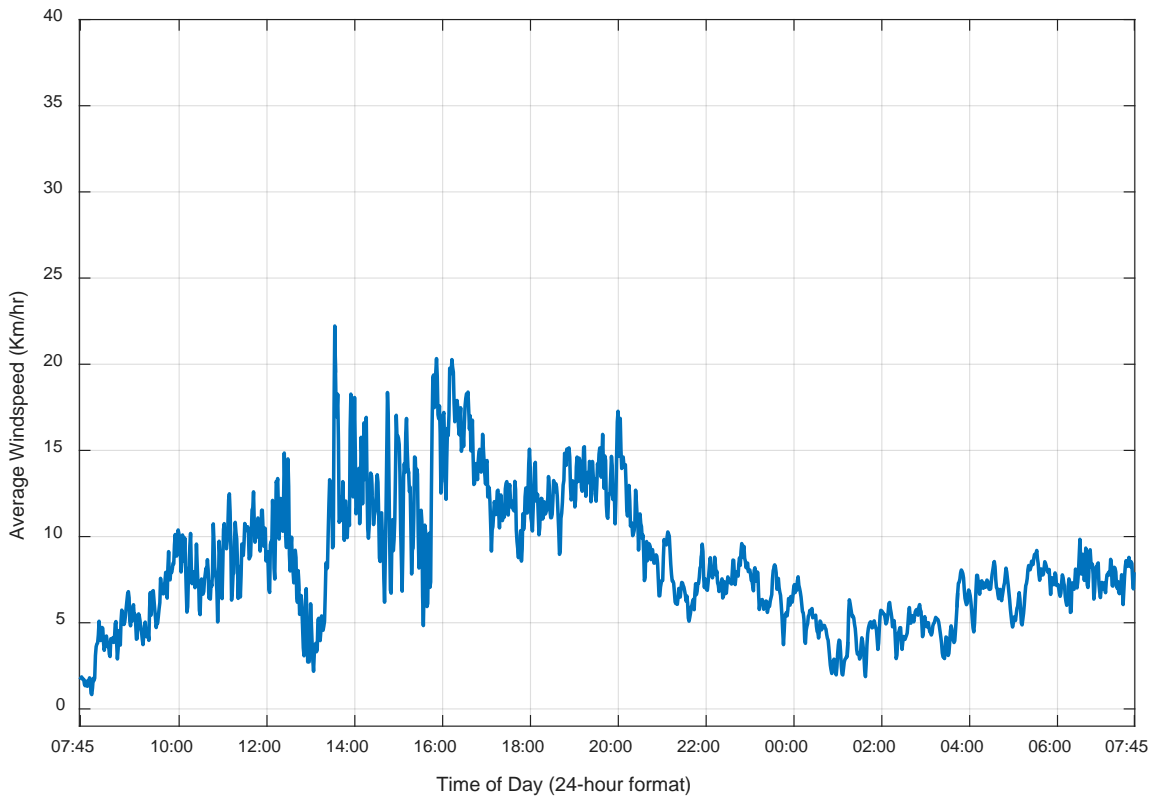


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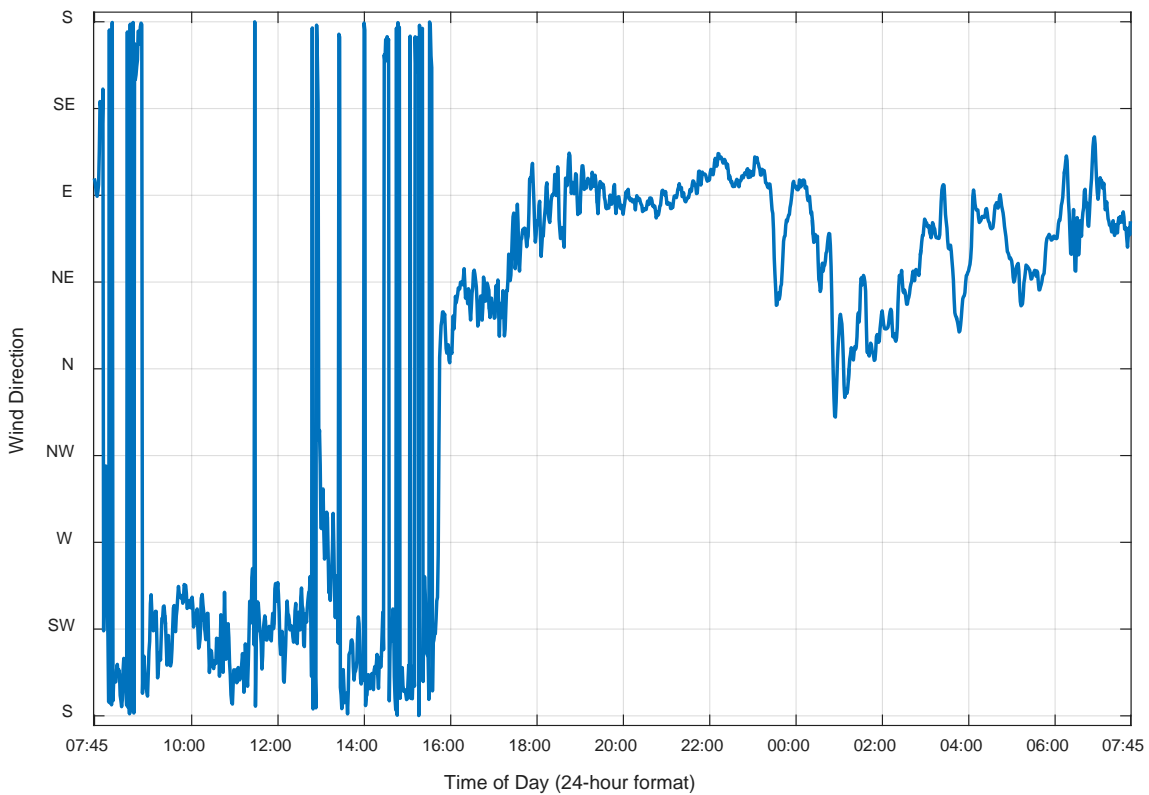


**Night-time Monitored Rain Rate (August 7 – 8, 2015) at Noise Monitor Location 12**

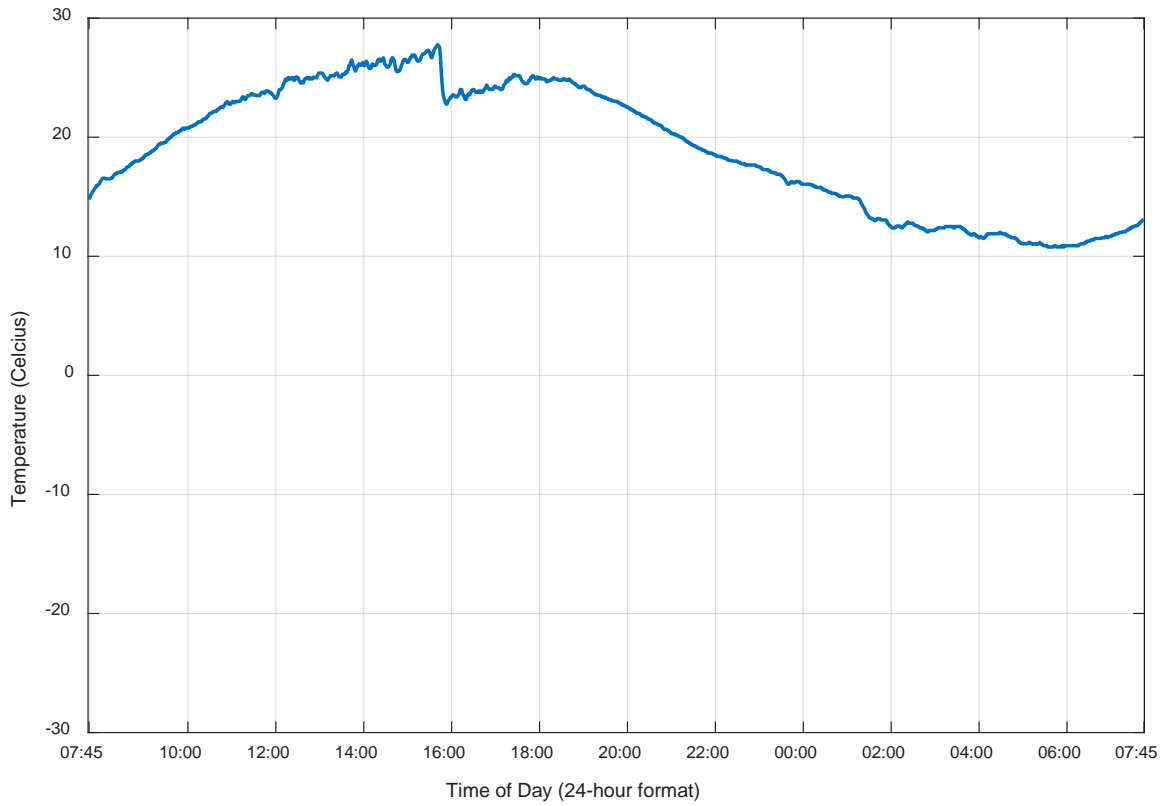
**August 8 – 9, 2015 Weather Data**



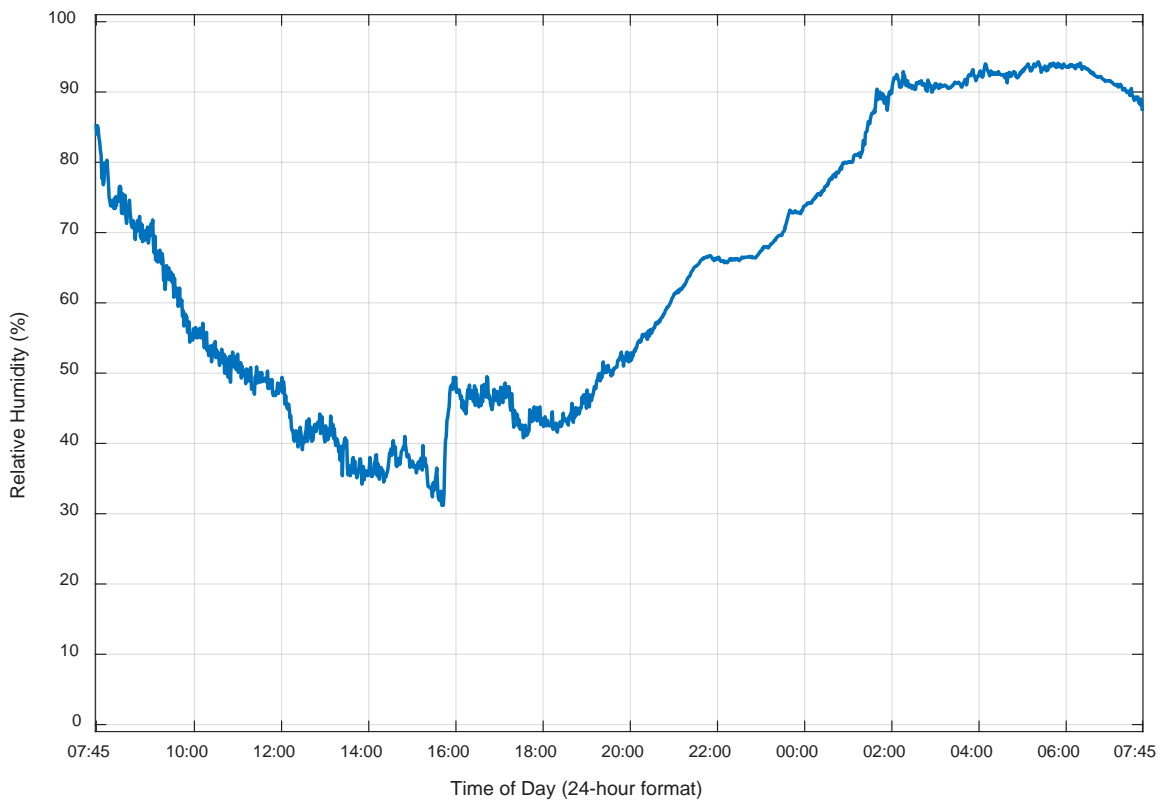
**Monitored Wind Speed (August 8 – 9, 2015) at Noise Monitor Location 6**



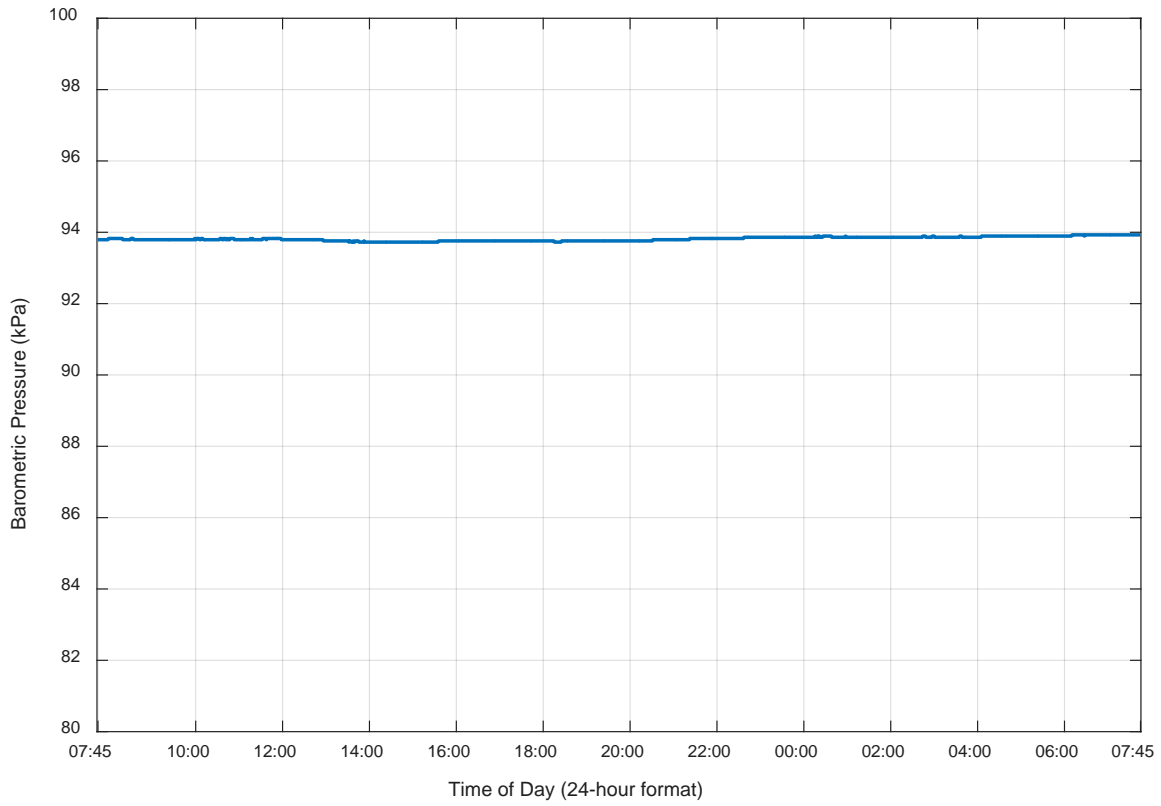
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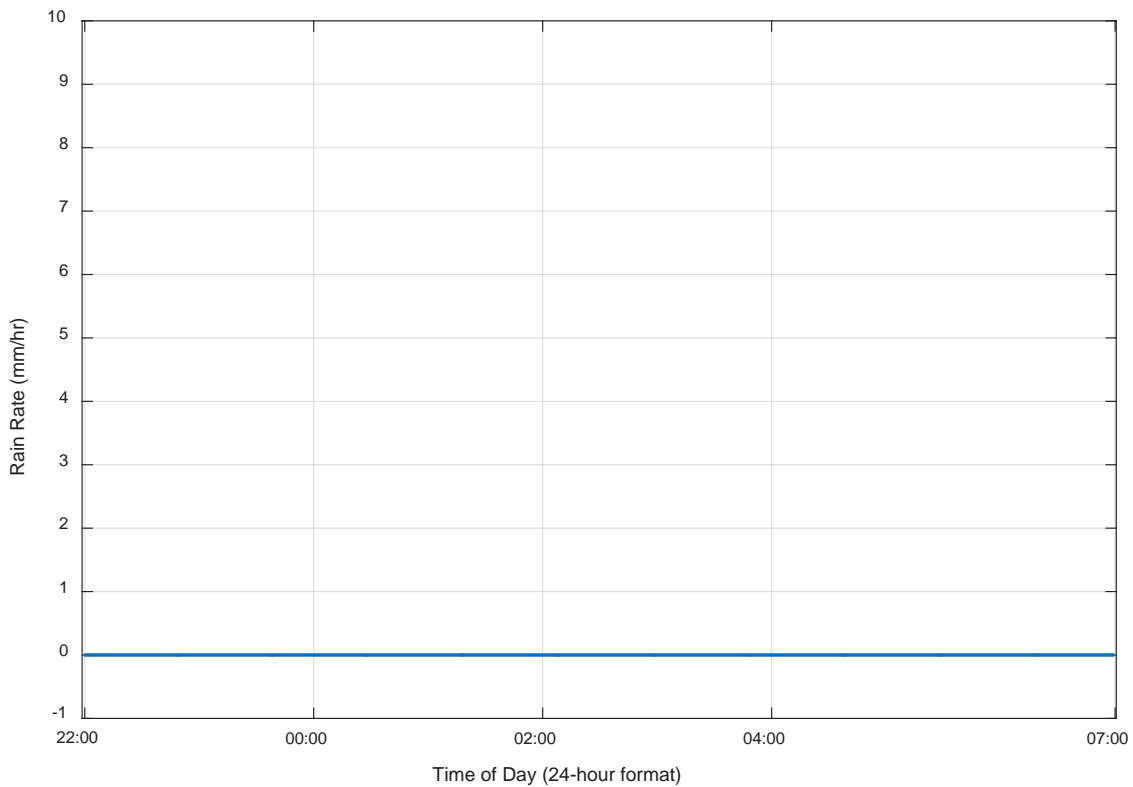
**Monitored Temperature (August 8 – 9, 2015) at Noise Monitor Location 6**



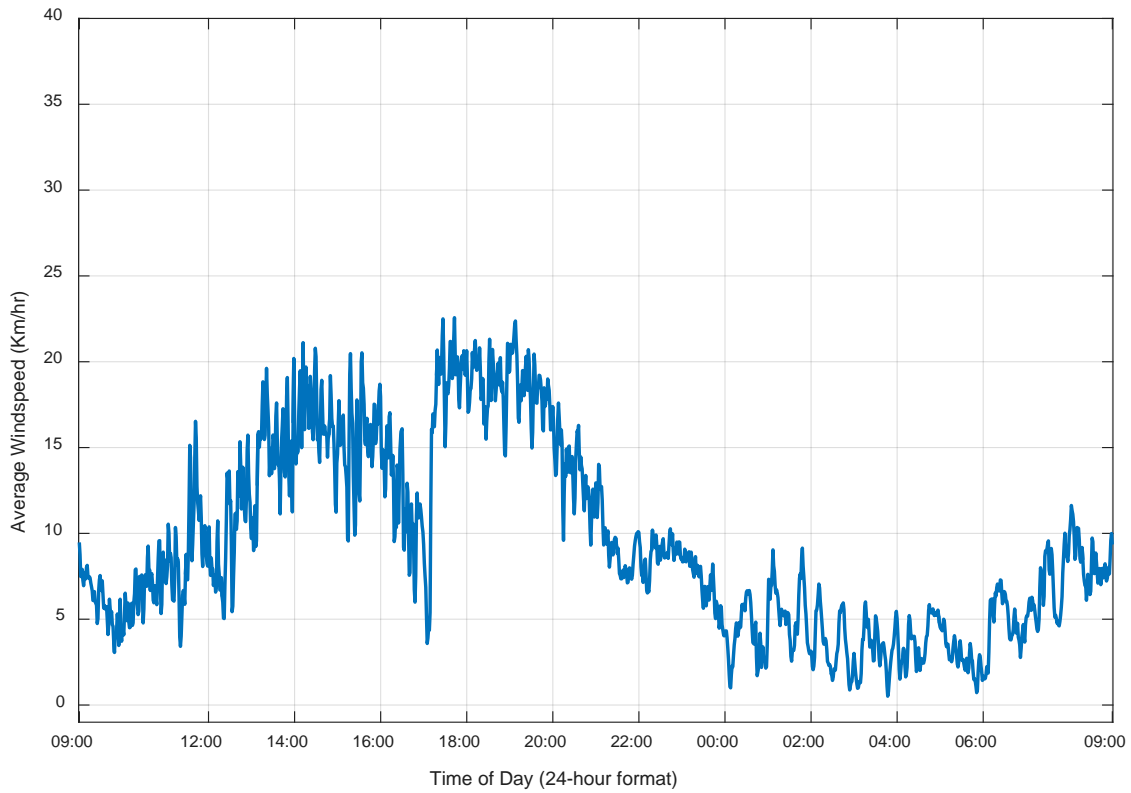
**Monitored Humidity (August 8 – 9, 2015) at Noise Monitor Location 6**



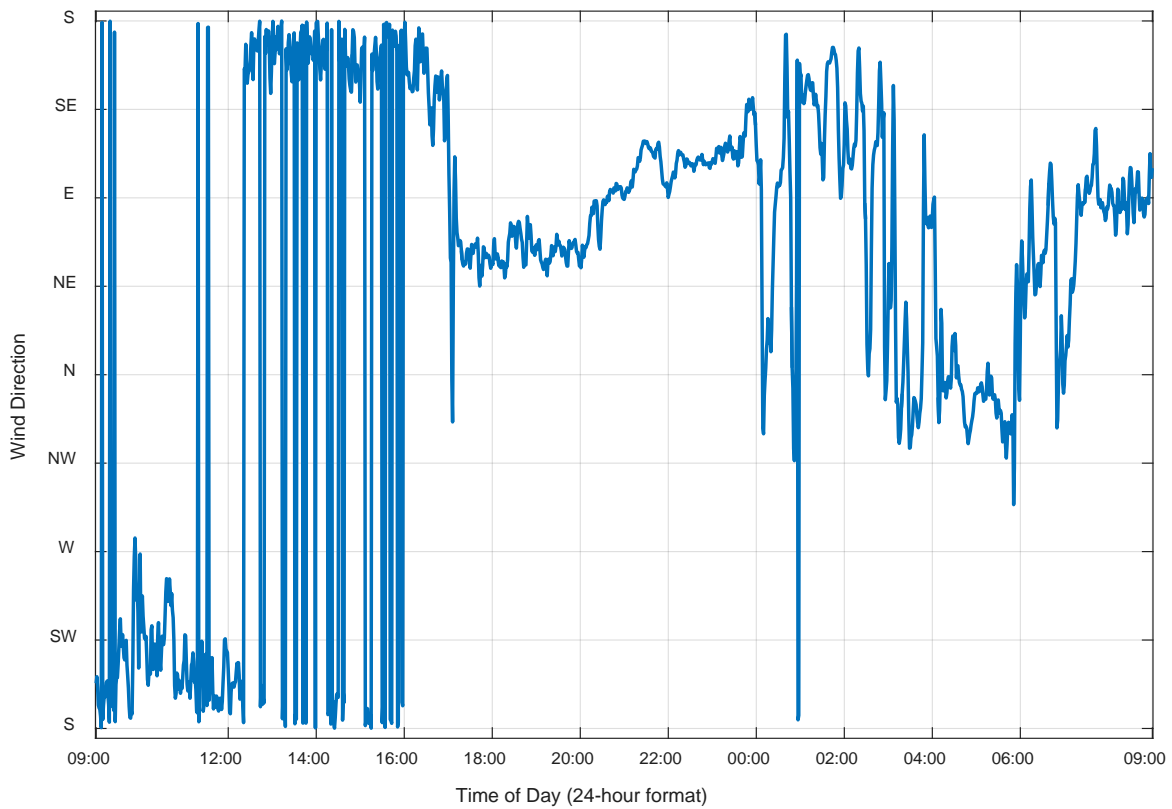
**Monitored Barometric Pressure (August 8 – 9, 2015) at Noise Monitor Location 6**



**Night-time Monitored Rain Rate (August 8 – 9, 2015) at Noise Monitor Location 6**

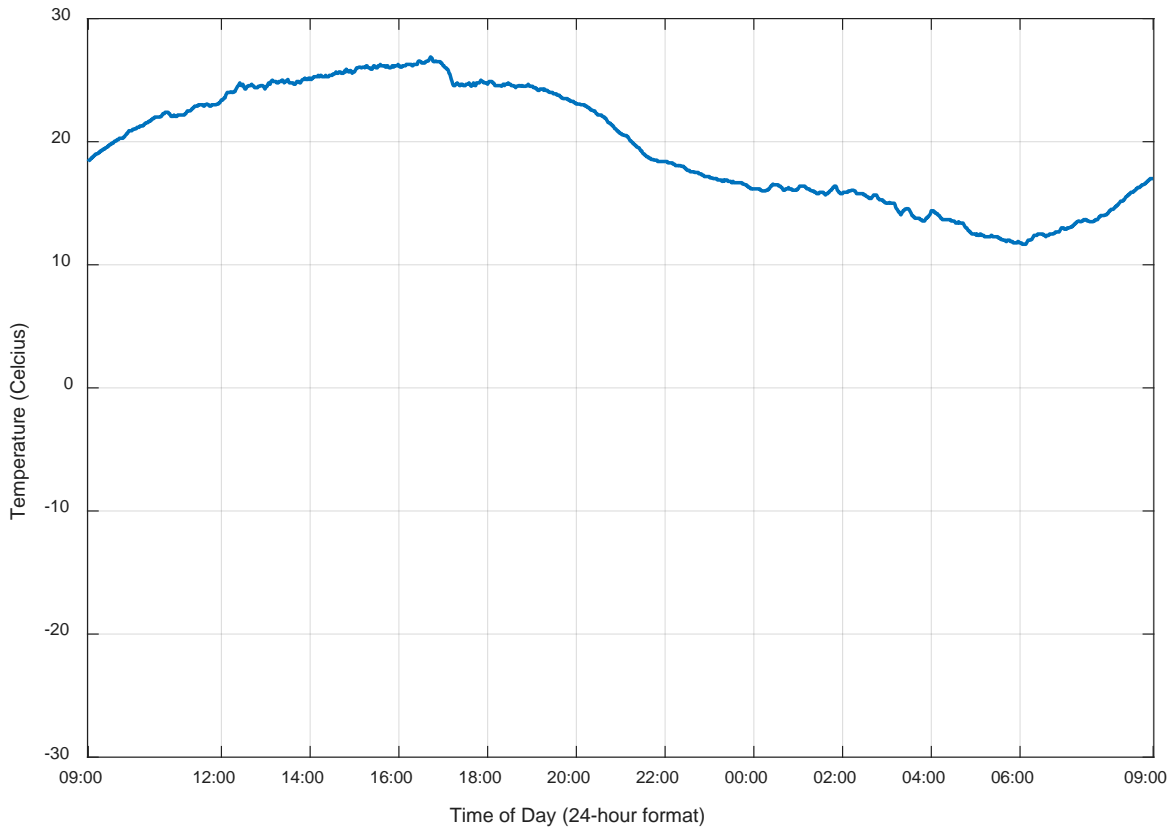


**Monitored Wind Speed (August 8 – 9, 2015) at Noise Monitor Location 10**

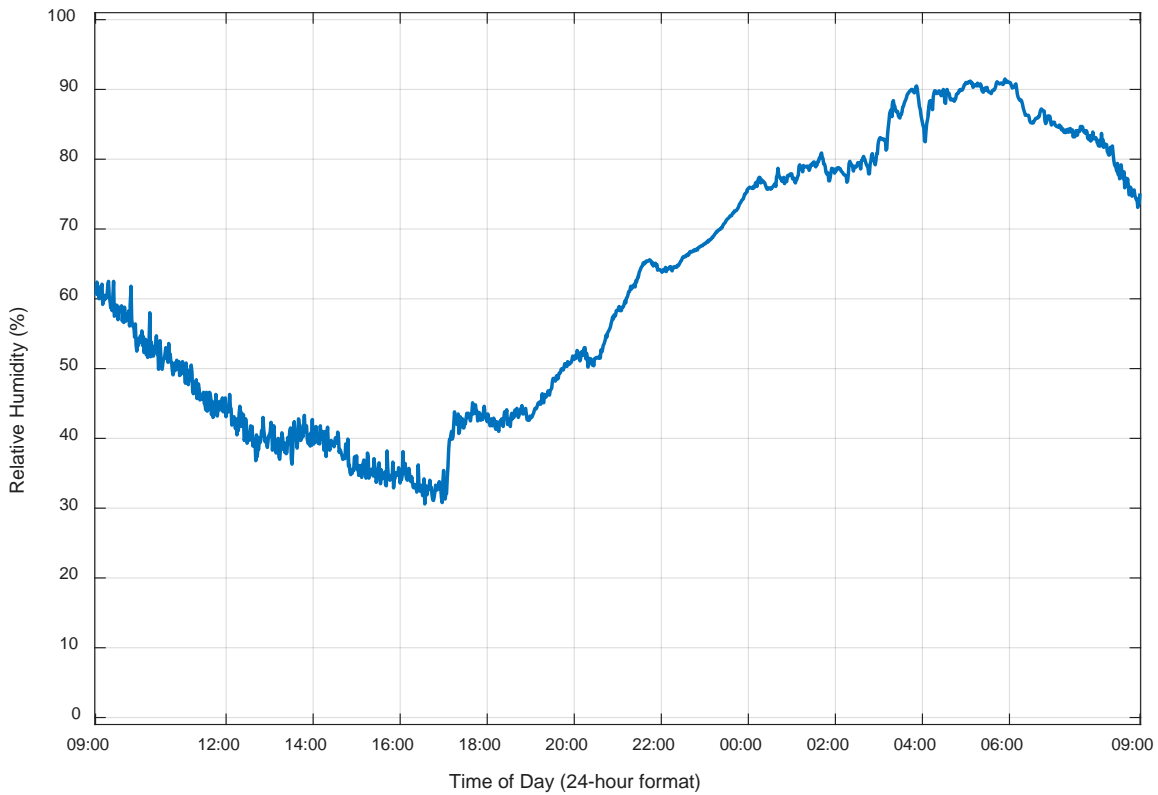


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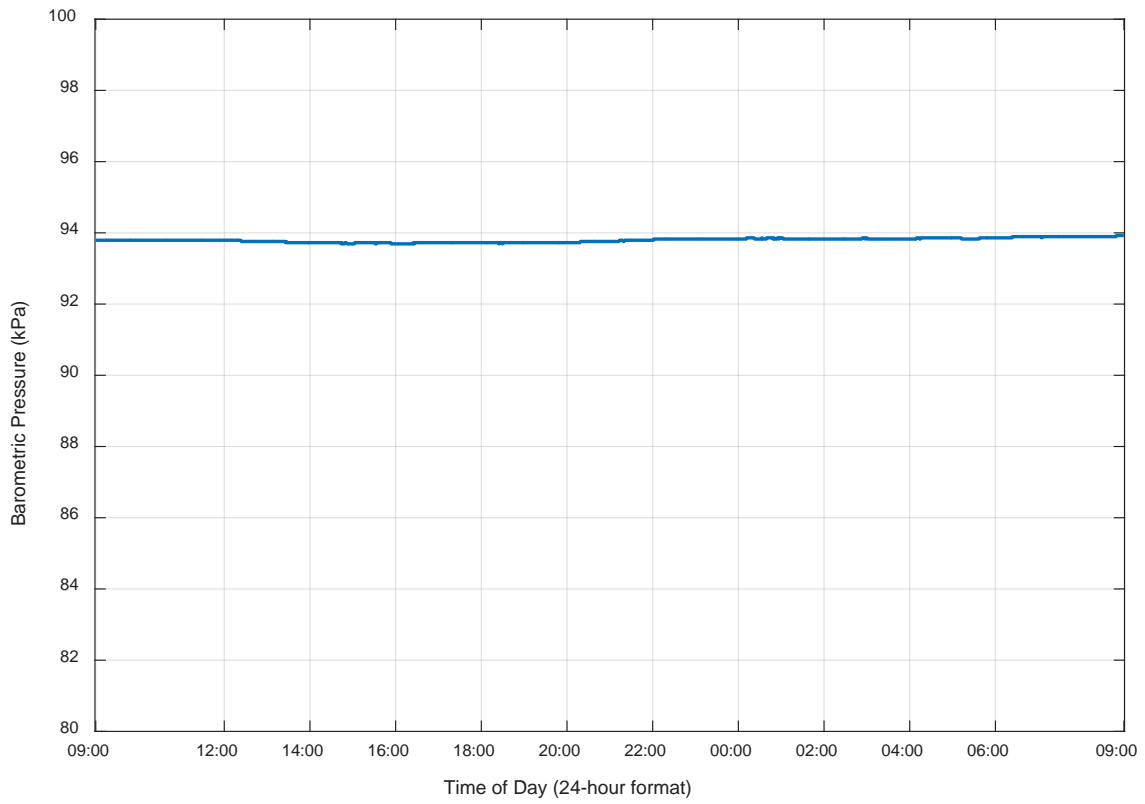




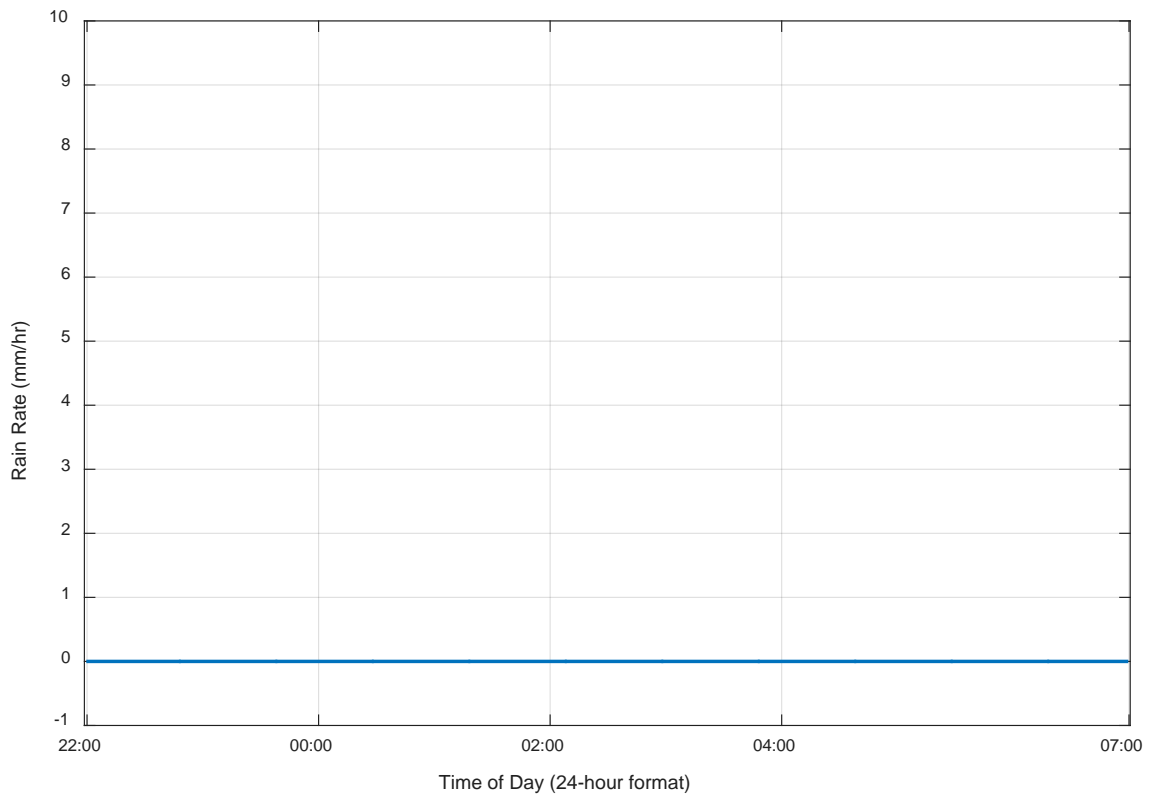
**Monitored Temperature (August 8 – 9, 2015) at Noise Monitor Location 10**



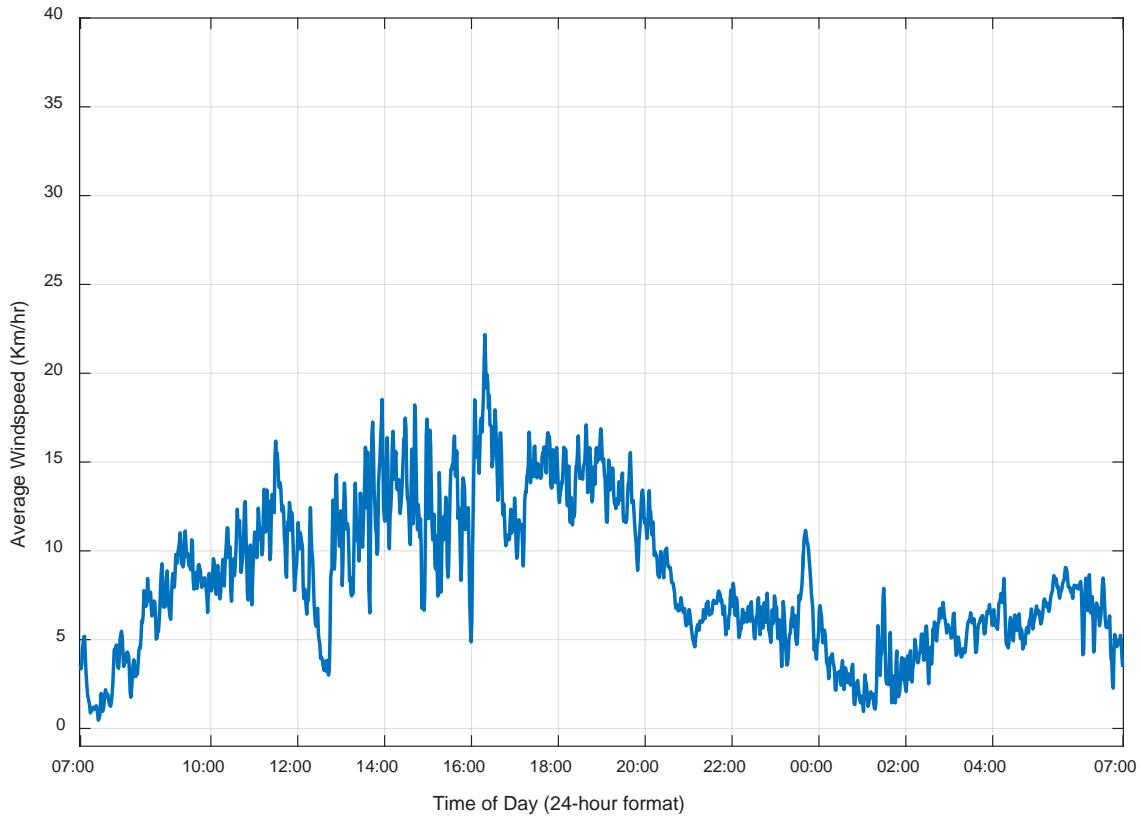
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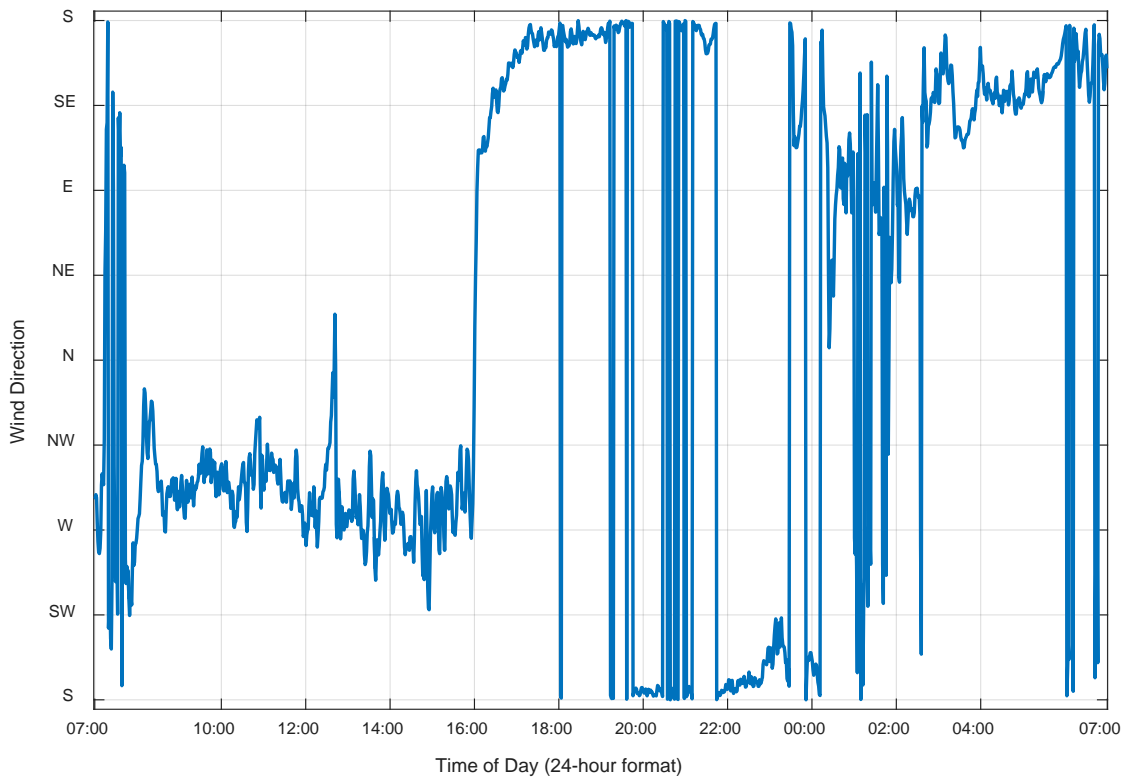
**Monitored Barometric Pressure (August 8 – 9, 2015) at Noise Monitor Location 10**



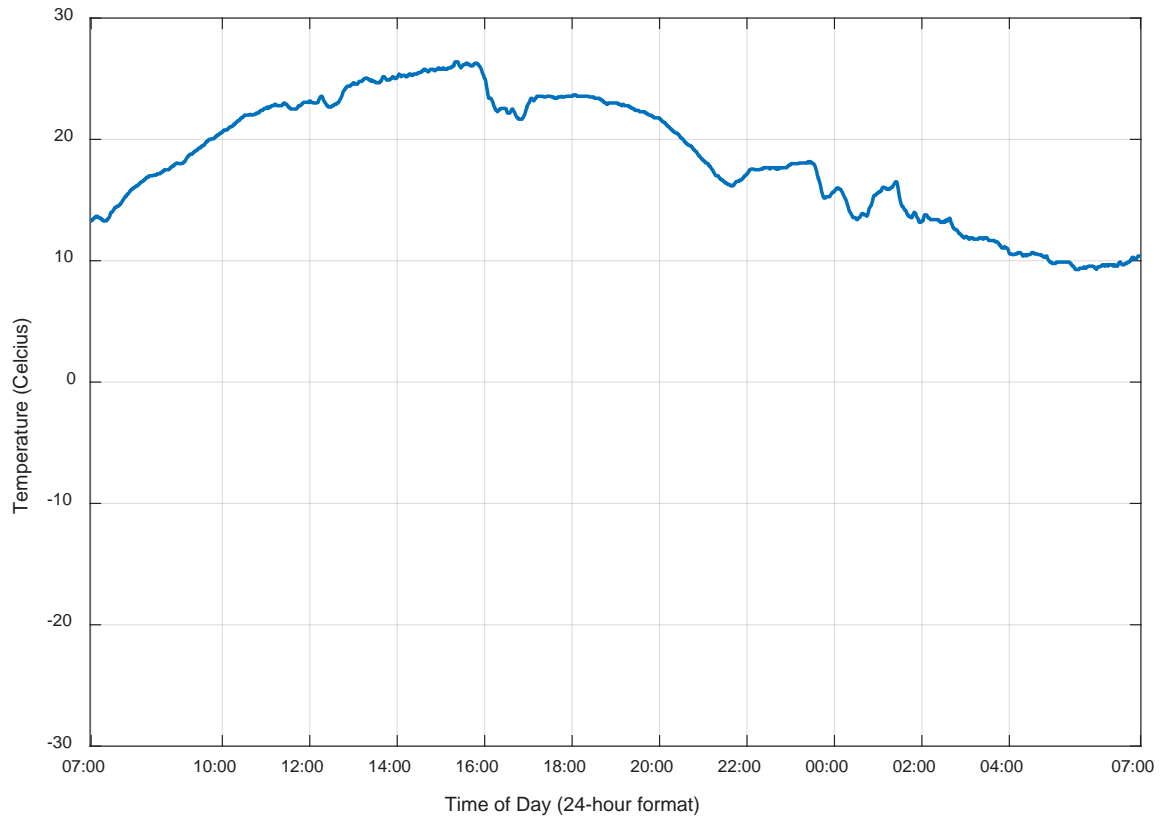
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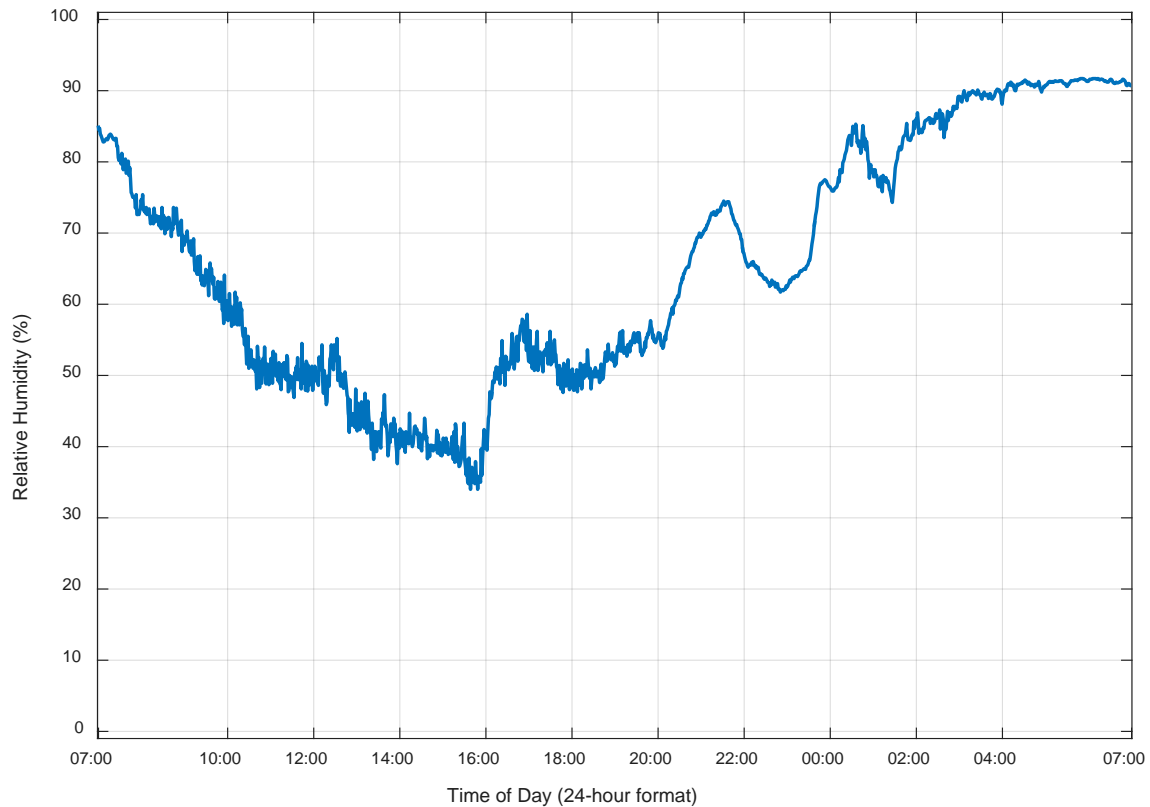
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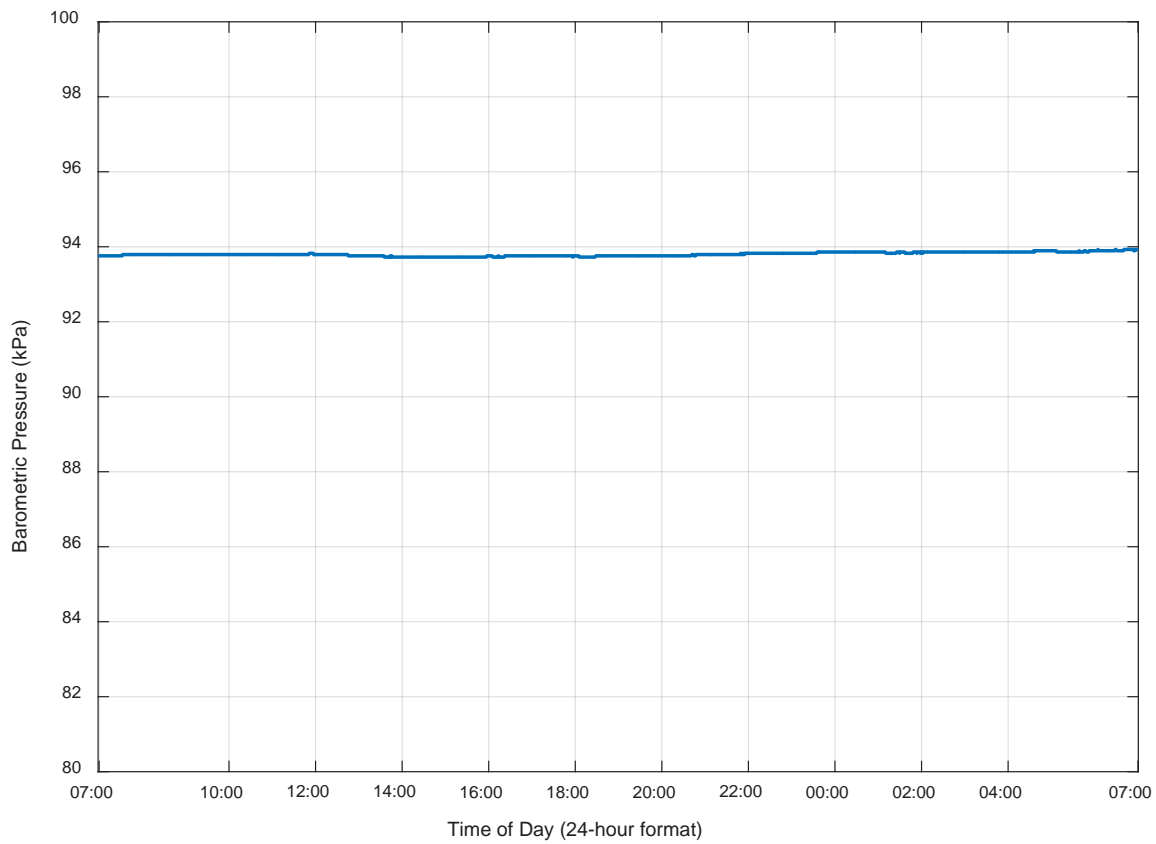
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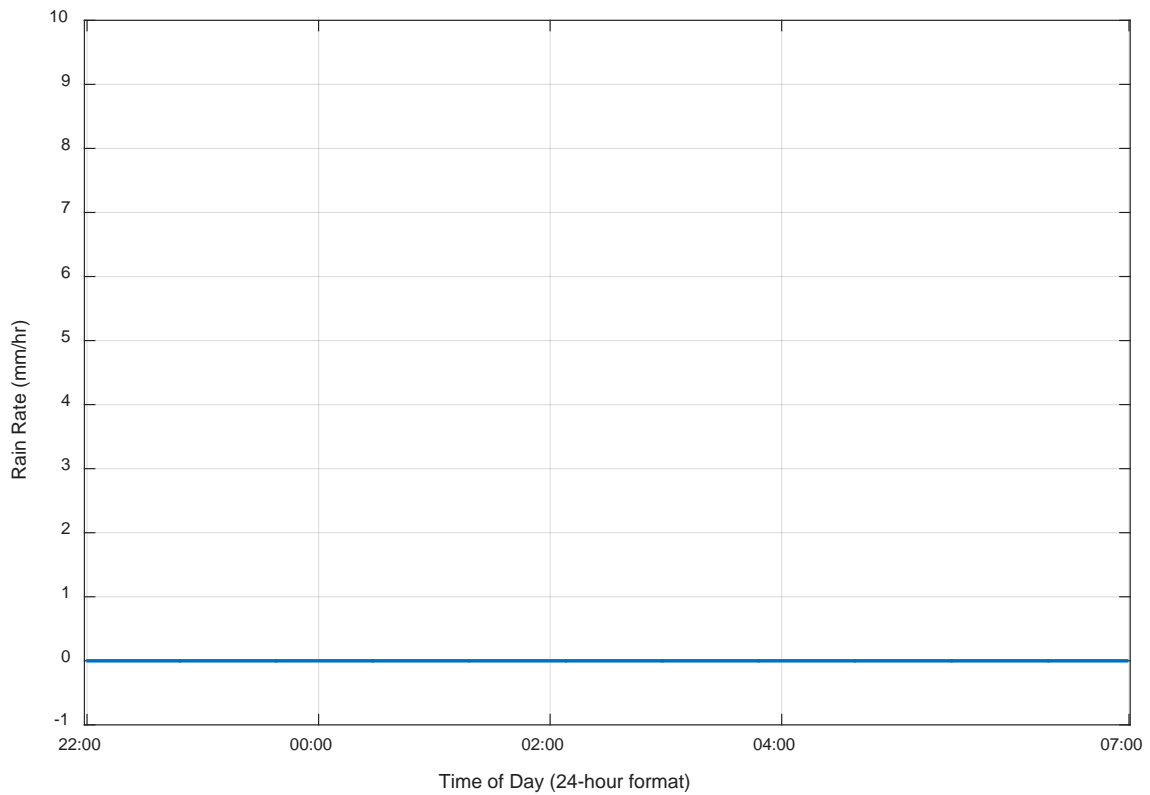
**Monitored Temperature (August 8 – 9, 2015) at Noise Monitor Location 12**



**Monitored Humidity (August 8 – 9, 2015) at Noise Monitor Location 12**

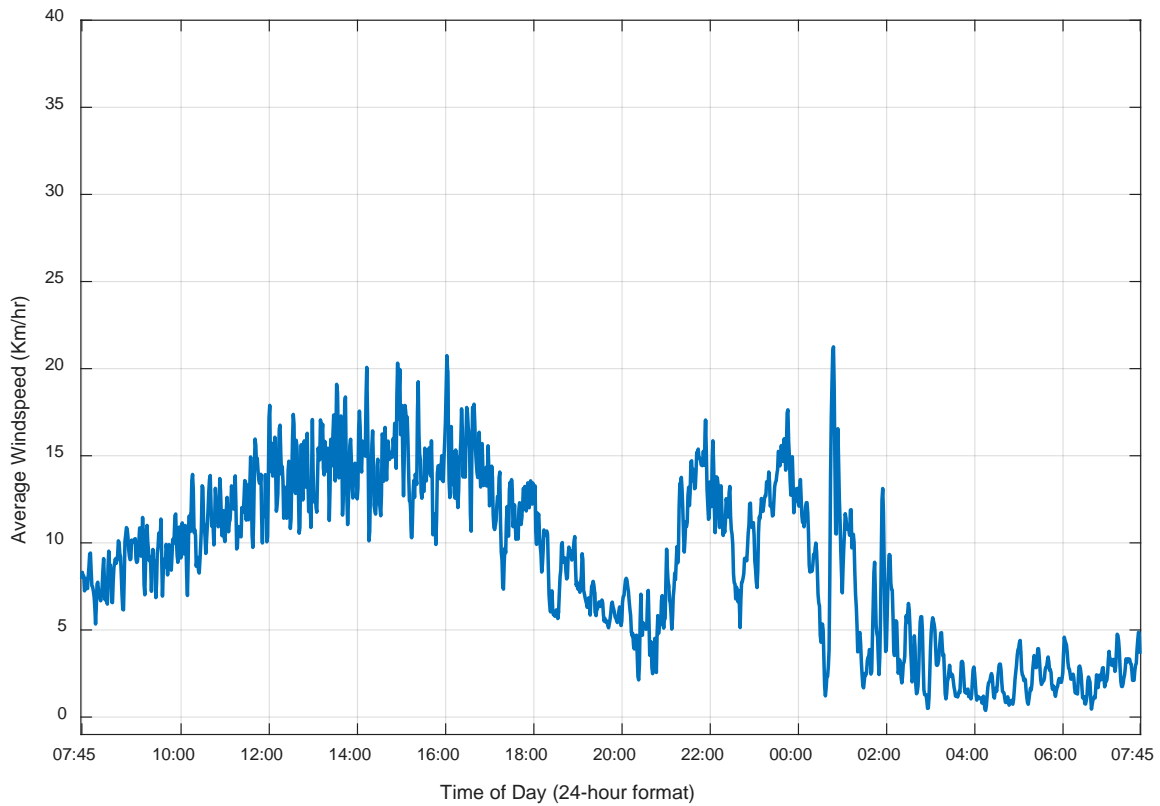


**Monitored Barometric Pressure (August 8 – 9, 2015) at Noise Monitor Location 12**

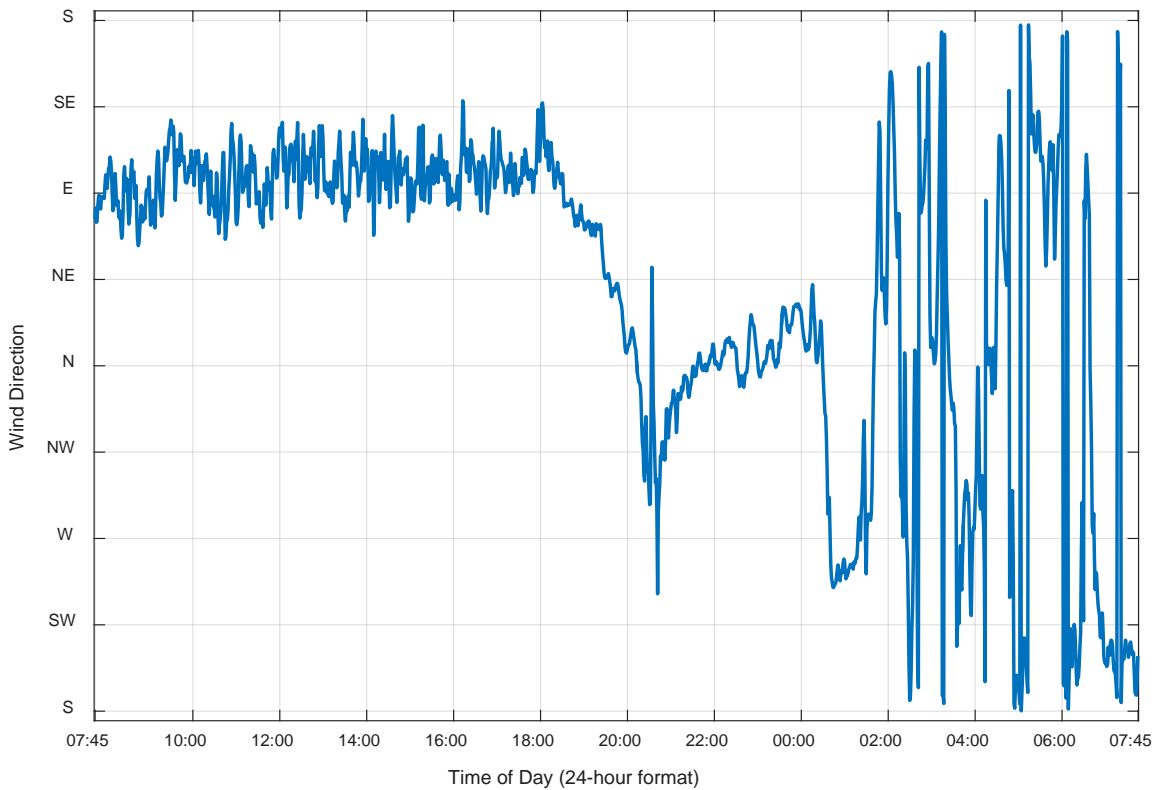


**Night-time Monitored Rain Rate (August 8 – 9, 2015) at Noise Monitor Location 12**

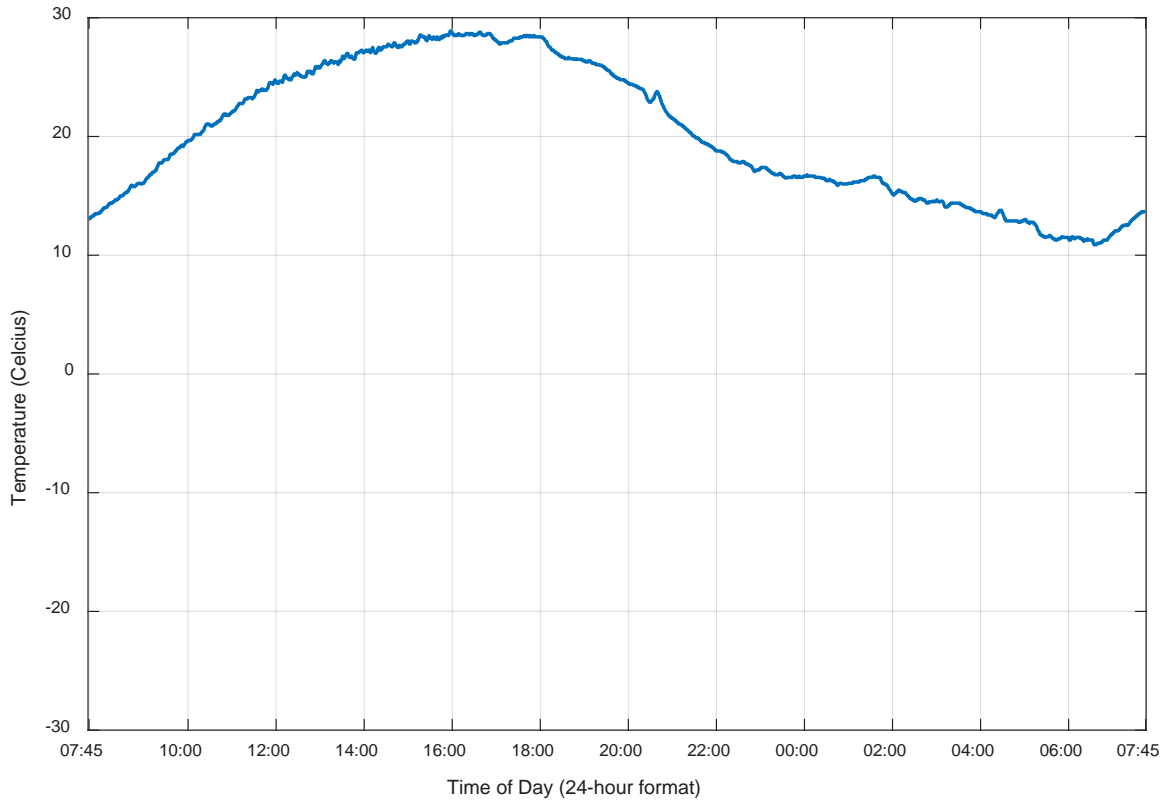
**August 9 – 10, 2015 Weather Data**



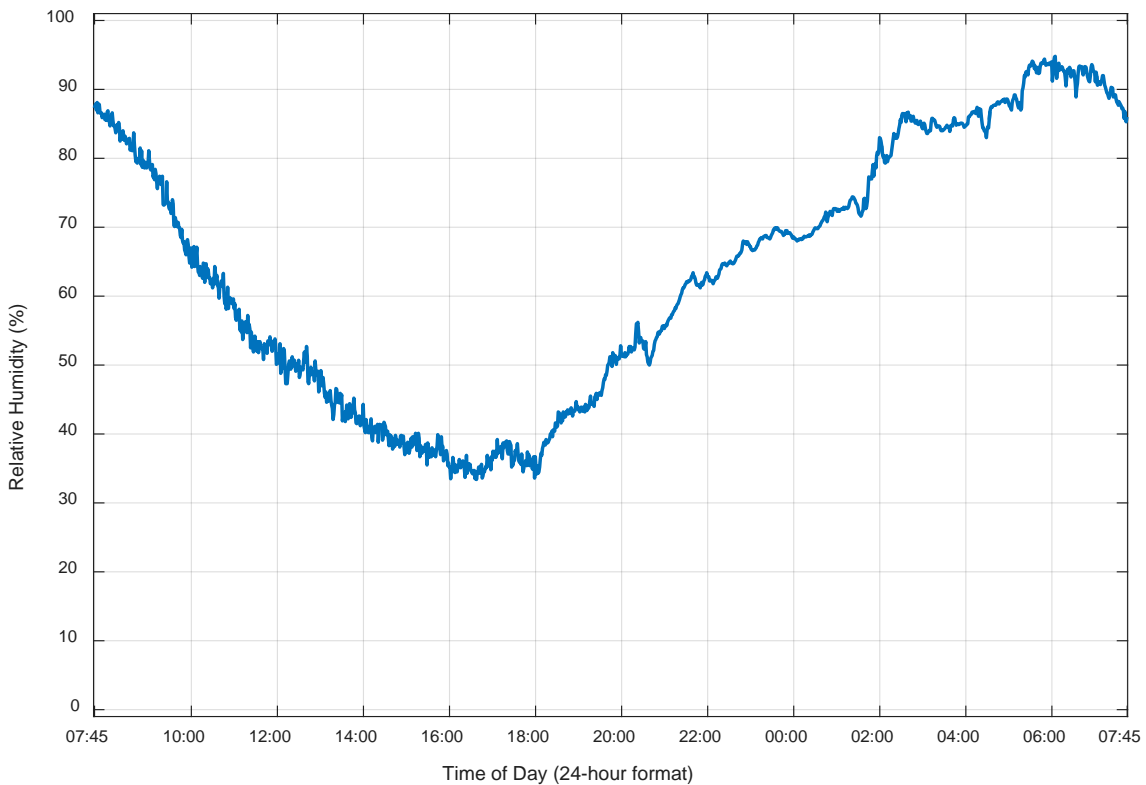
**Monitored Wind Speed (August 9 - 10, 2015) at Noise Monitor Location 6**



**Monitored Wind Direction (August 9 - 10, 2015) at Noise Monitor Location 6**

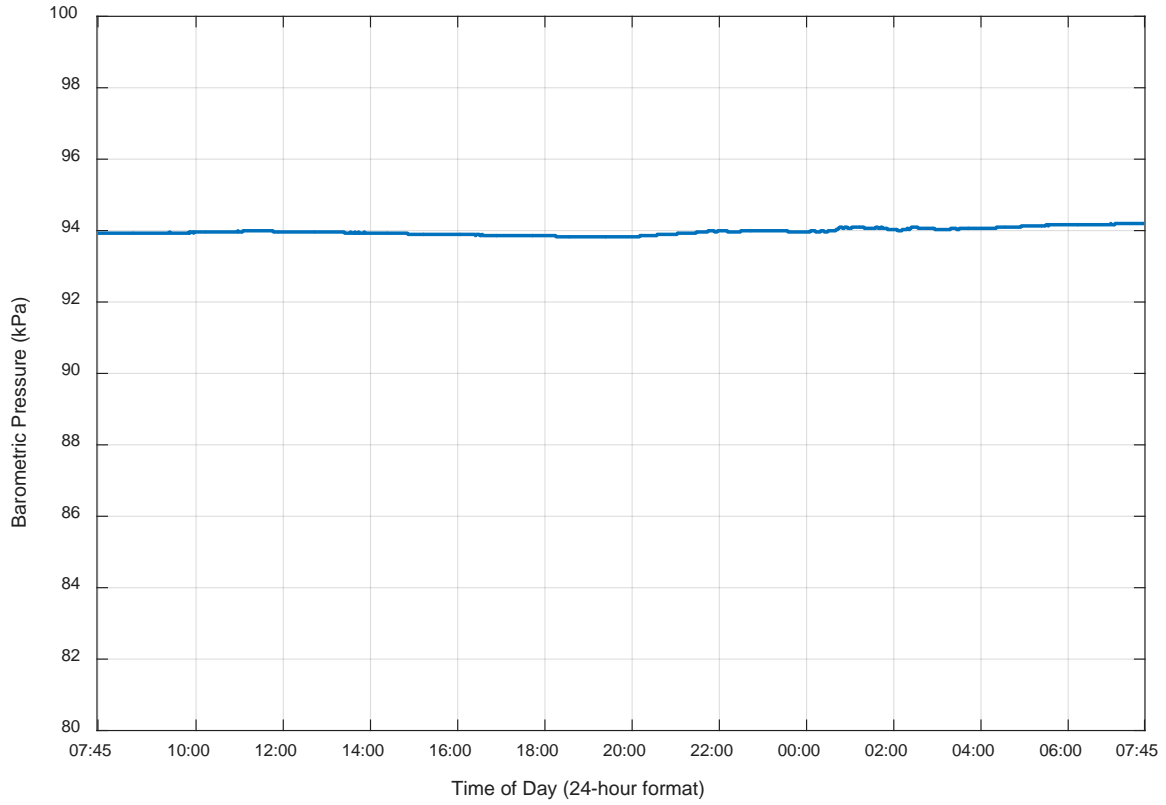


**Monitored Temperature (August 9 - 10, 2015) at Noise Monitor Location 6**

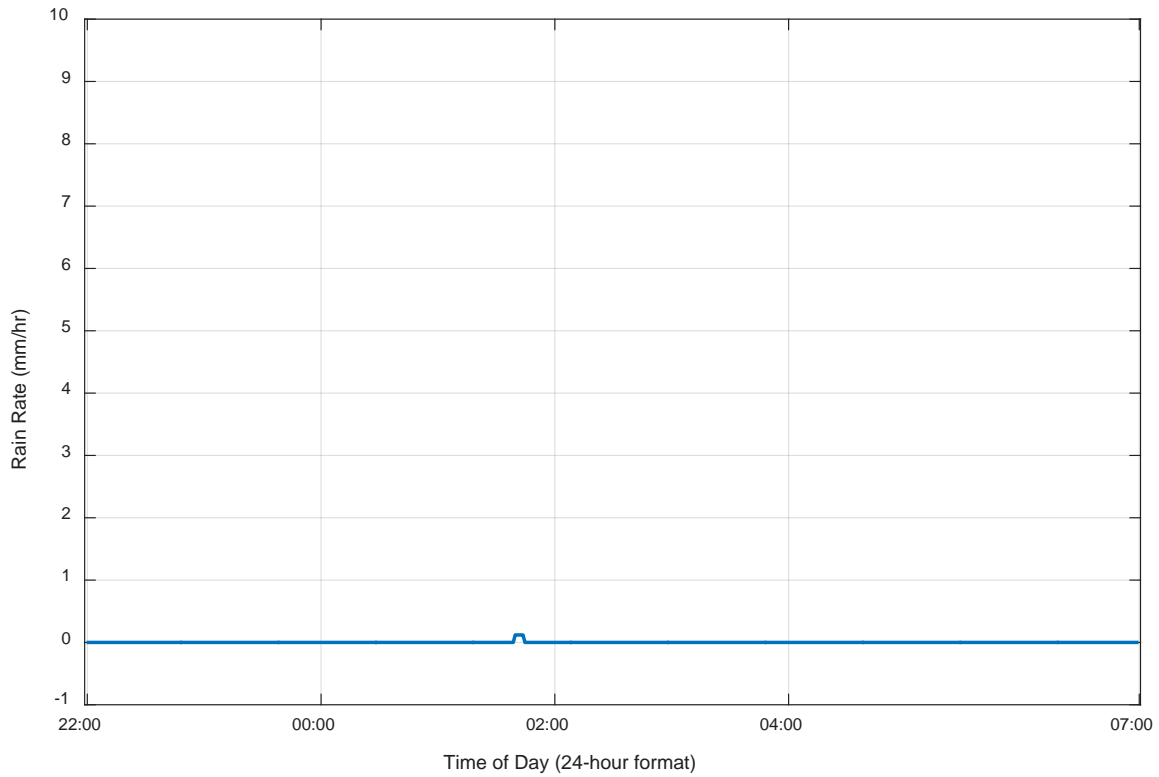


**Monitored Humidity (August 9 - 10, 2015) at Noise Monitor Location 6**

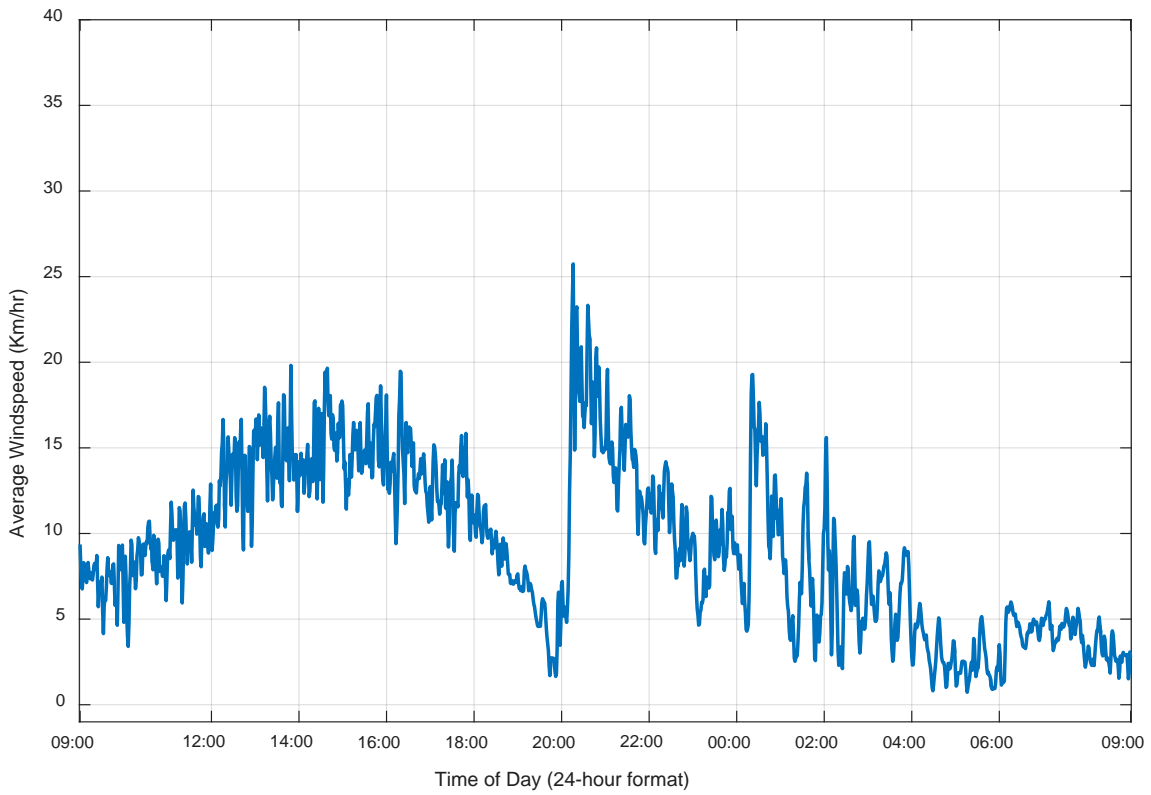




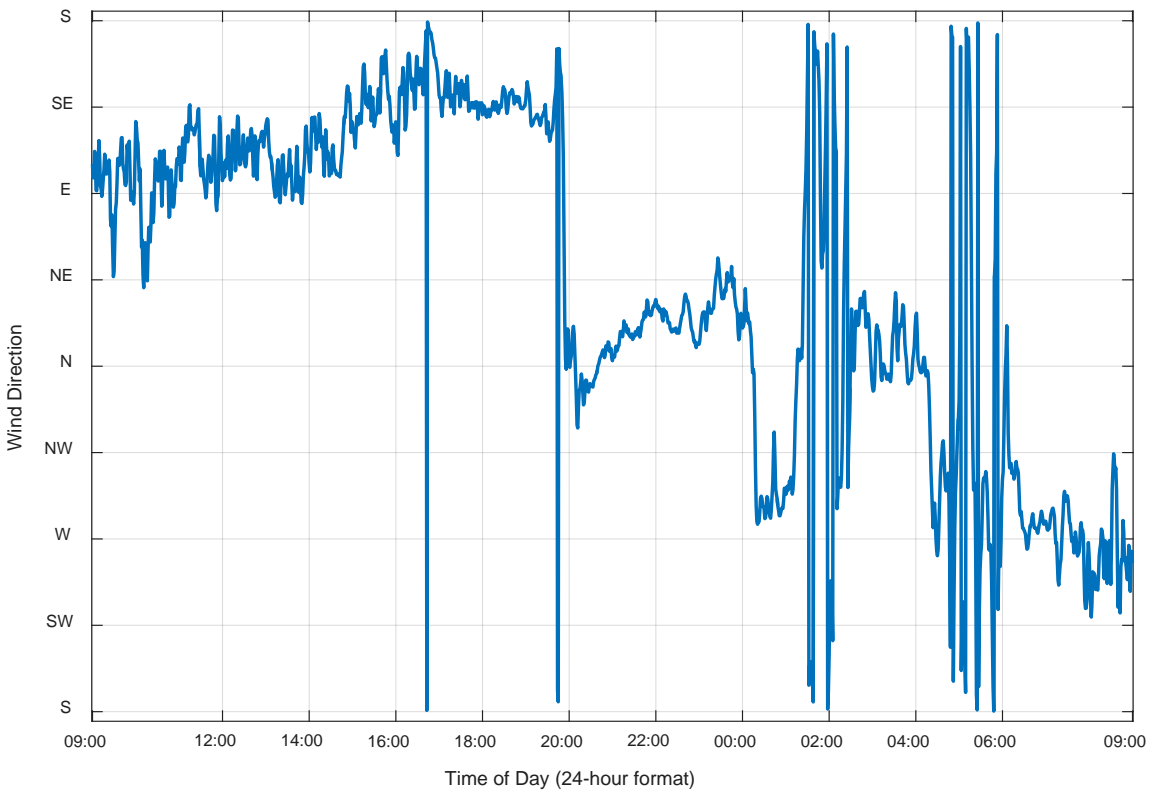
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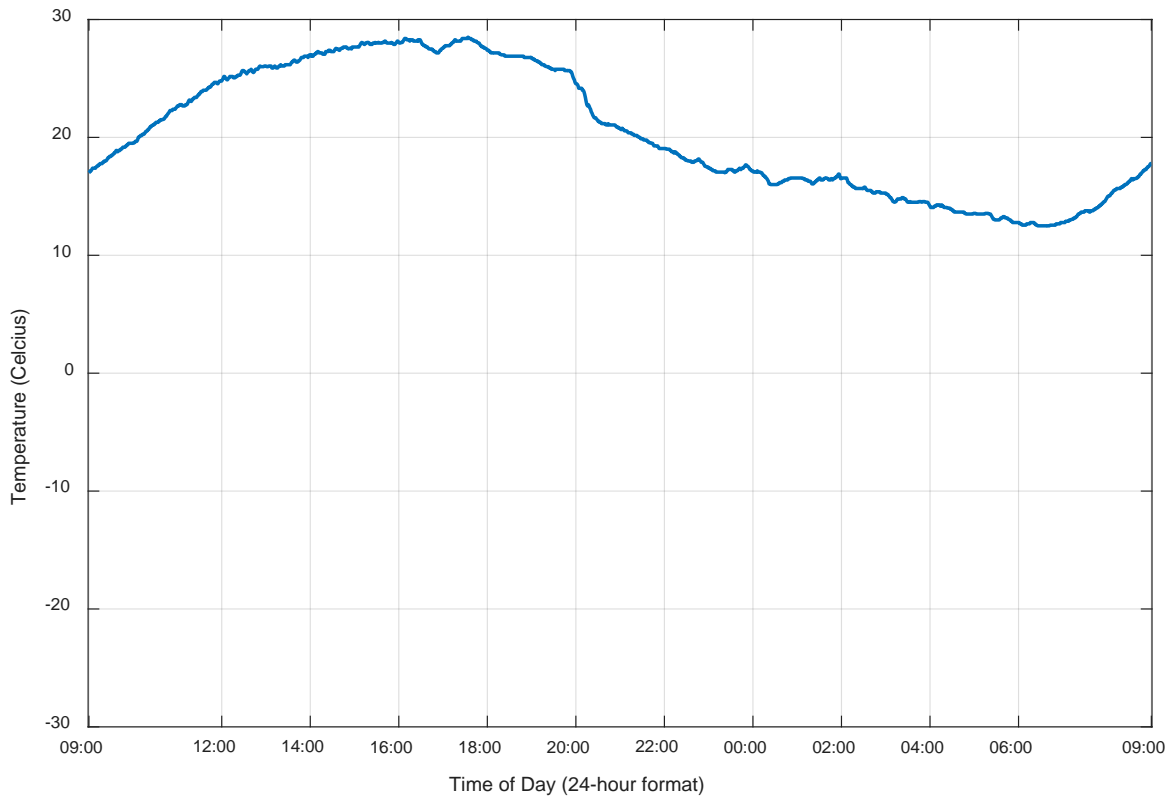
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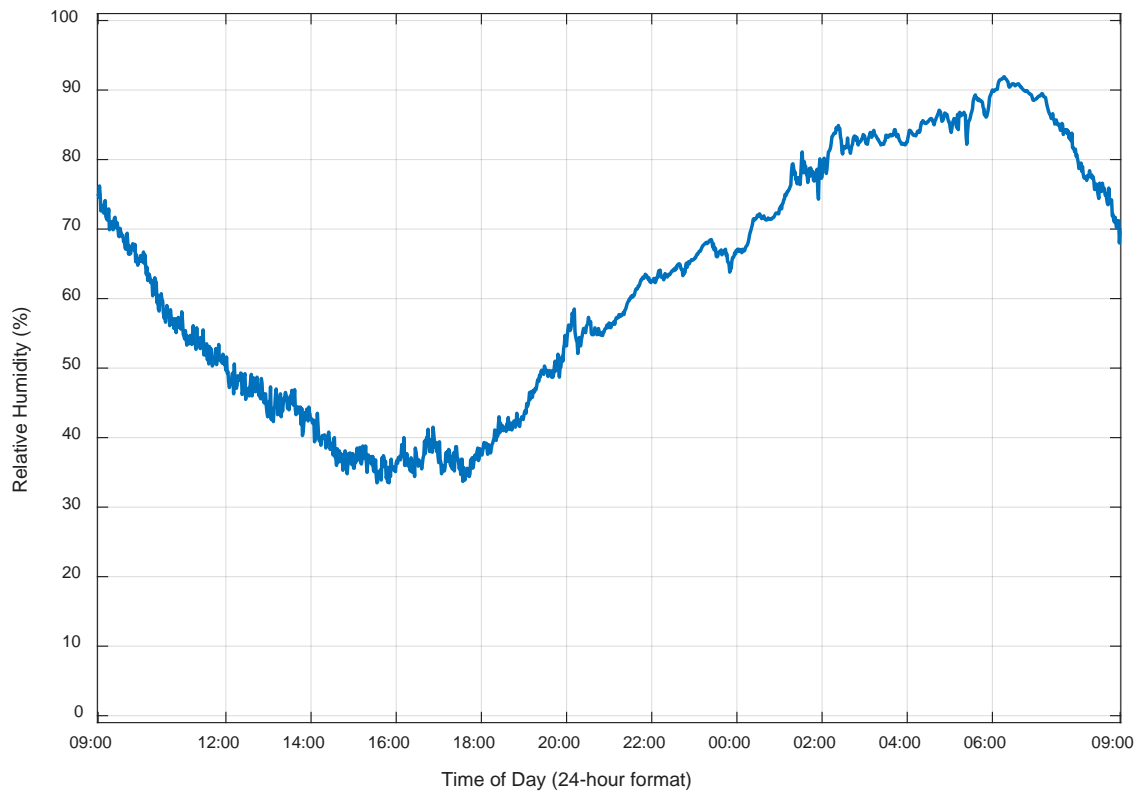
**Monitored Wind Speed (August 9 - 10, 2015) at Noise Monitor Location 10**



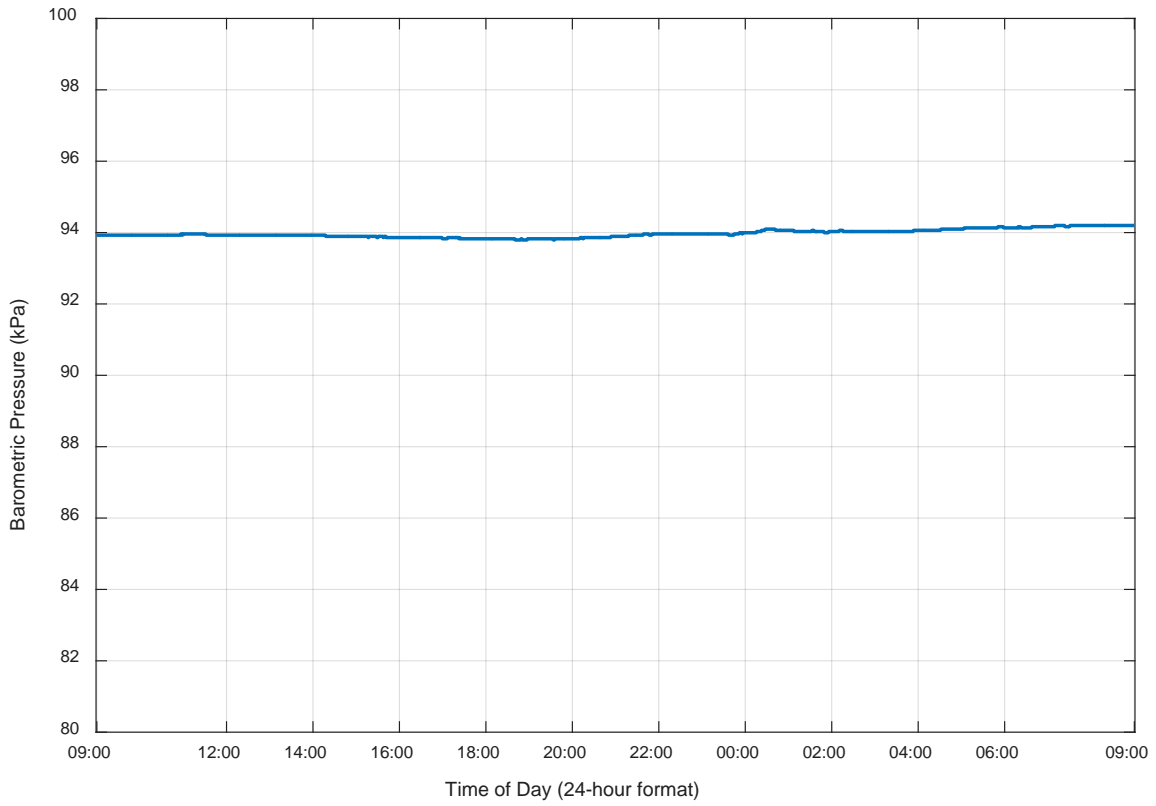
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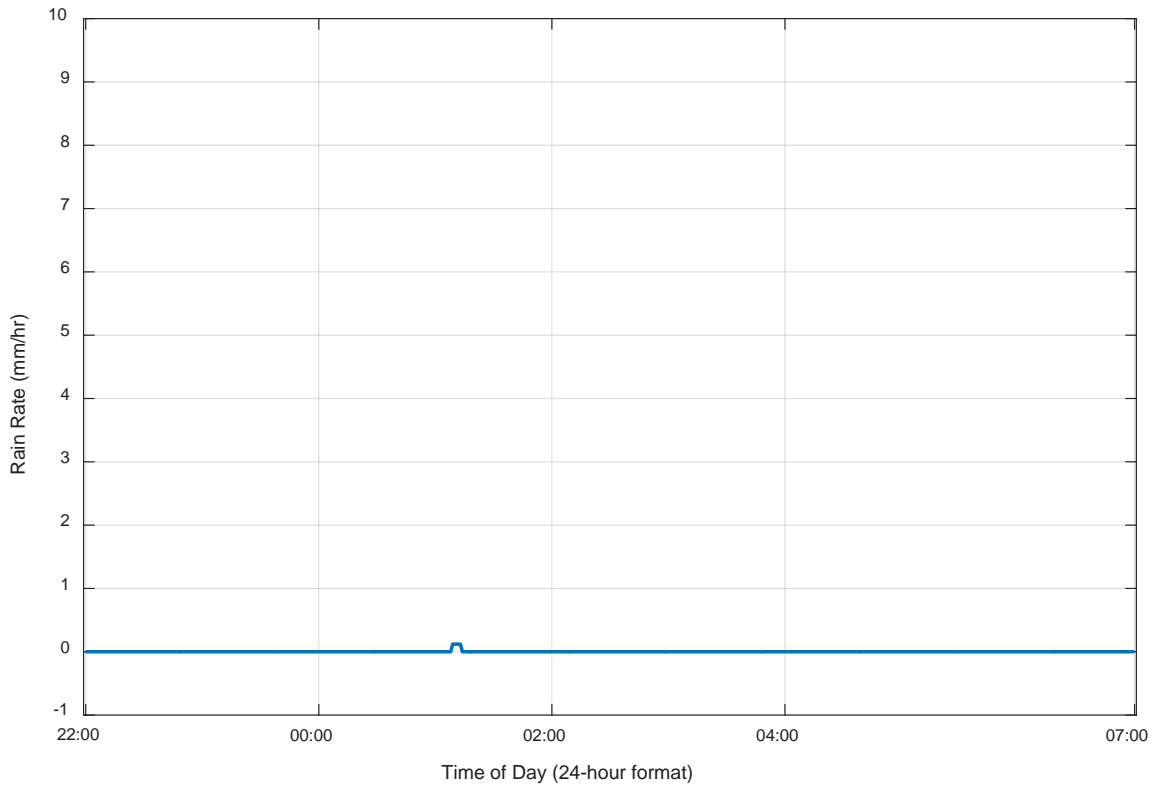
**Monitored Temperature (August 9 - 10, 2015) at Noise Monitor Location 10**



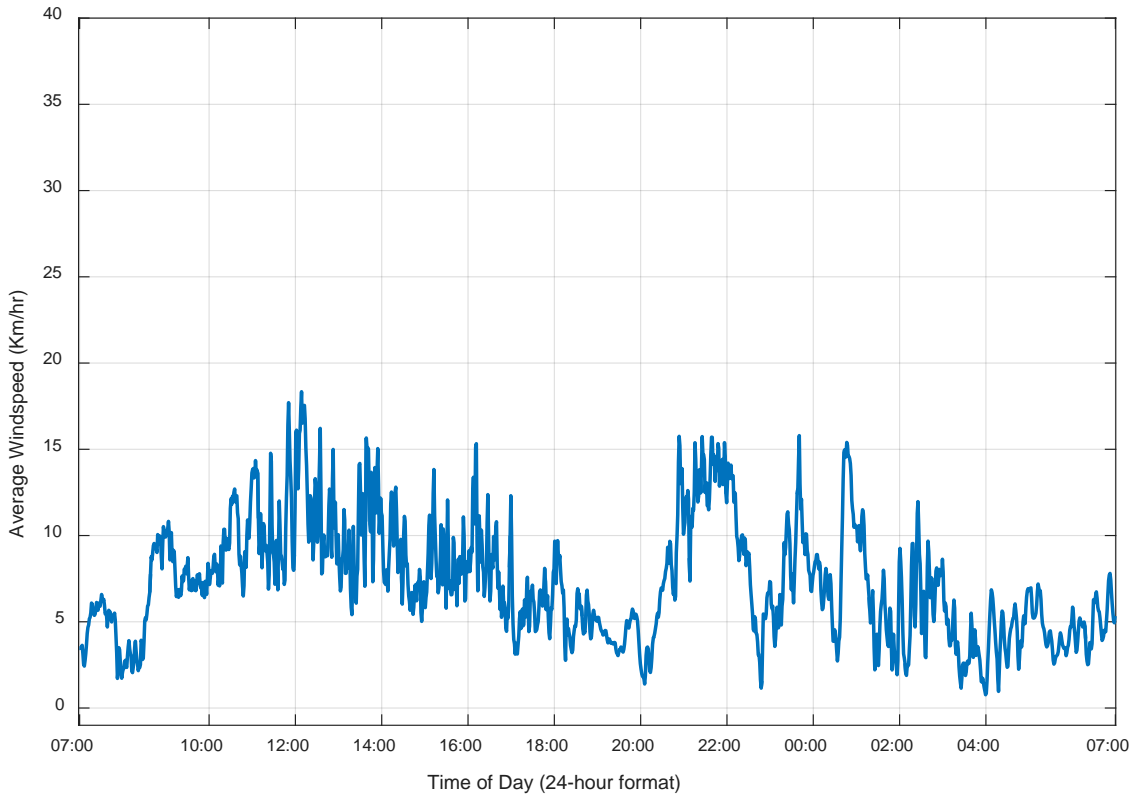
**Monitored Humidity (August 9 - 10, 2015) at Noise Monitor Location 10**



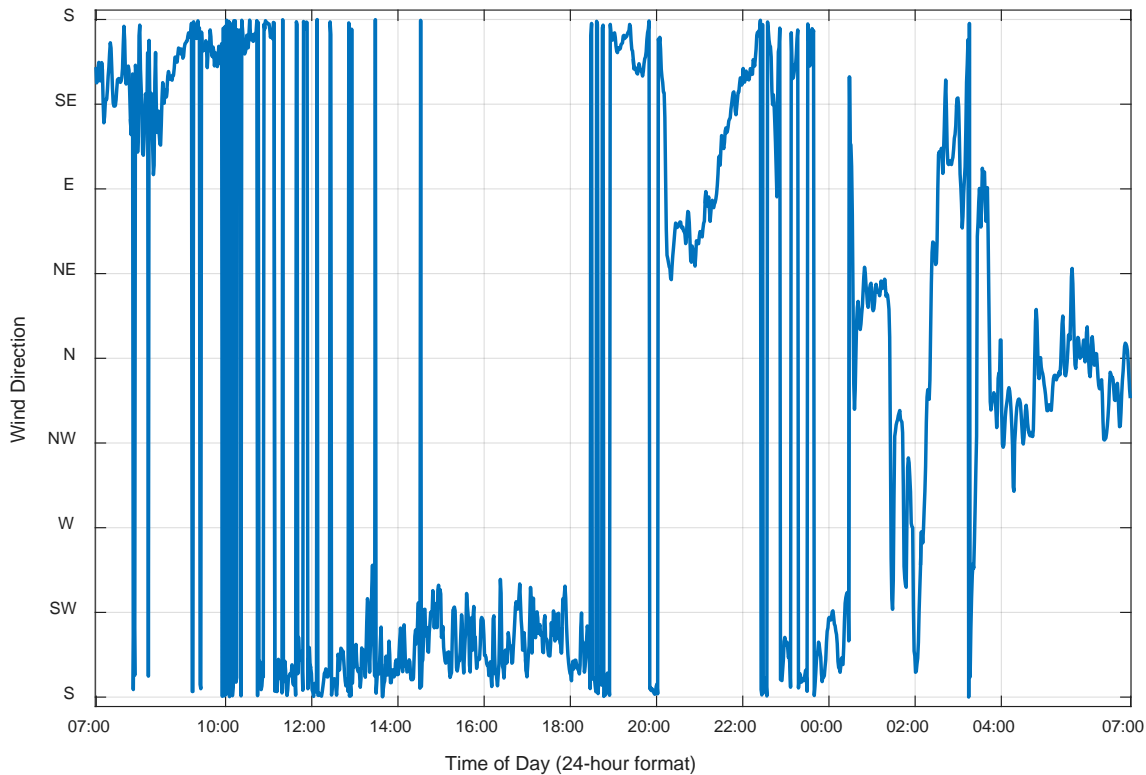
**Monitored Barometric Pressure (August 9 - 10, 2015) at Noise Monitor Location 10**



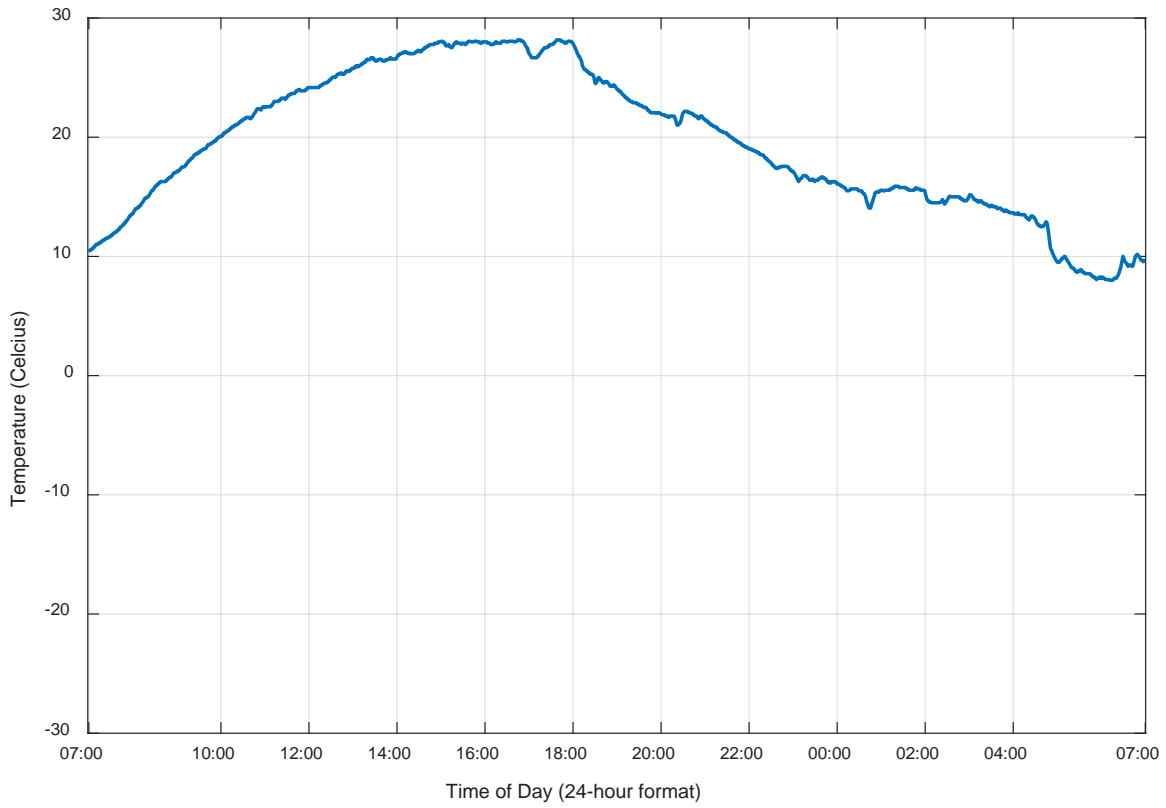
**Night-time Monitored Rain Rate (August 9 - 10, 2015) at Noise Monitor Location 10**



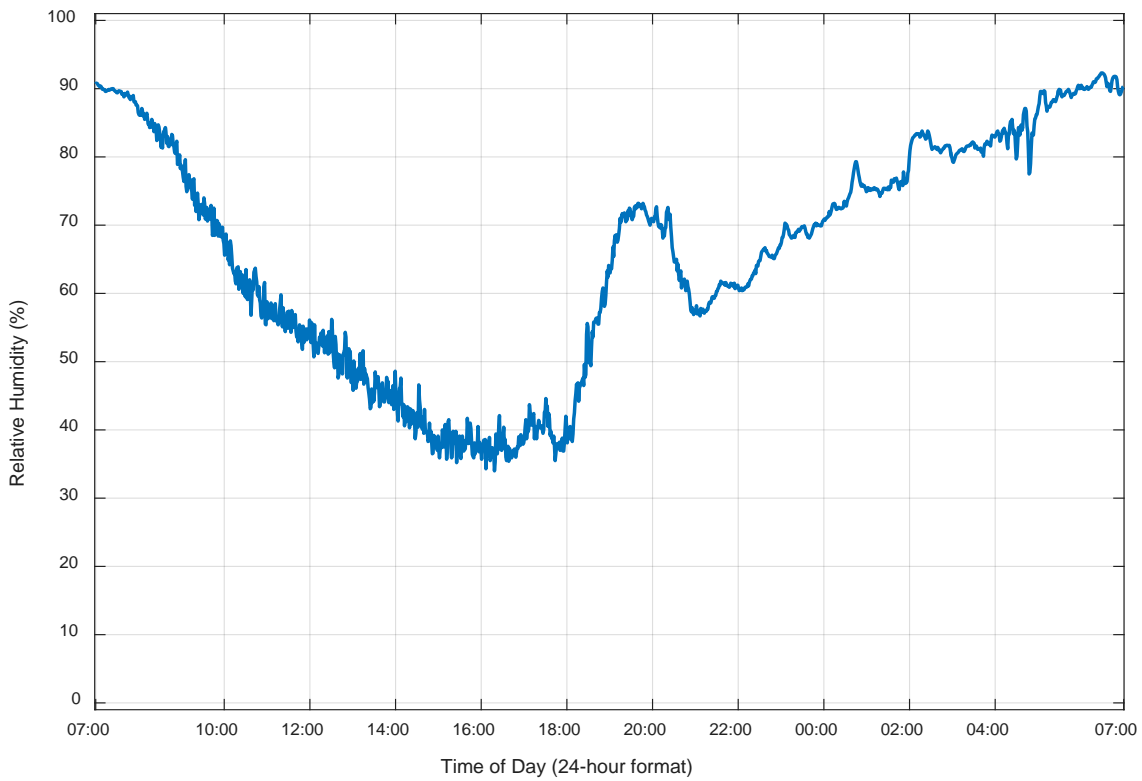
**Monitored Wind Speed (August 9 - 10, 2015) at Noise Monitor Location 12**



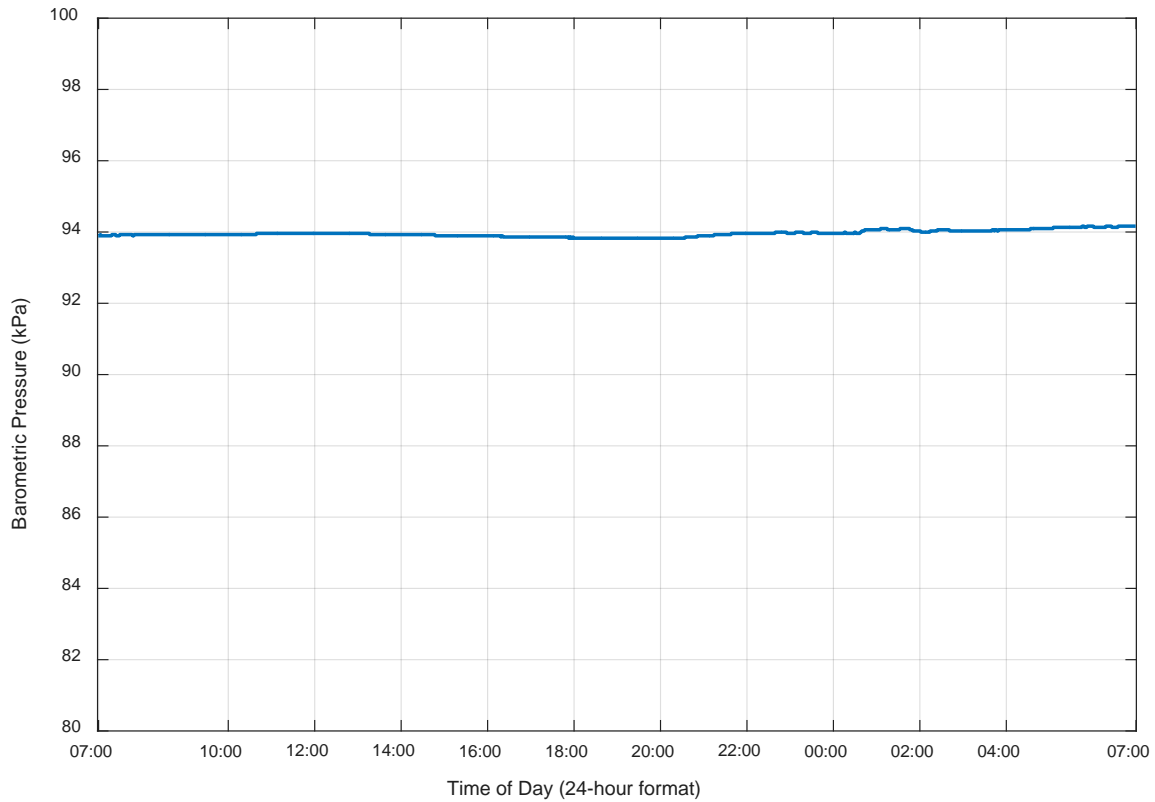
**Monitored Wind Direction (August 9 - 10, 2015) at Noise Monitor Location 12**



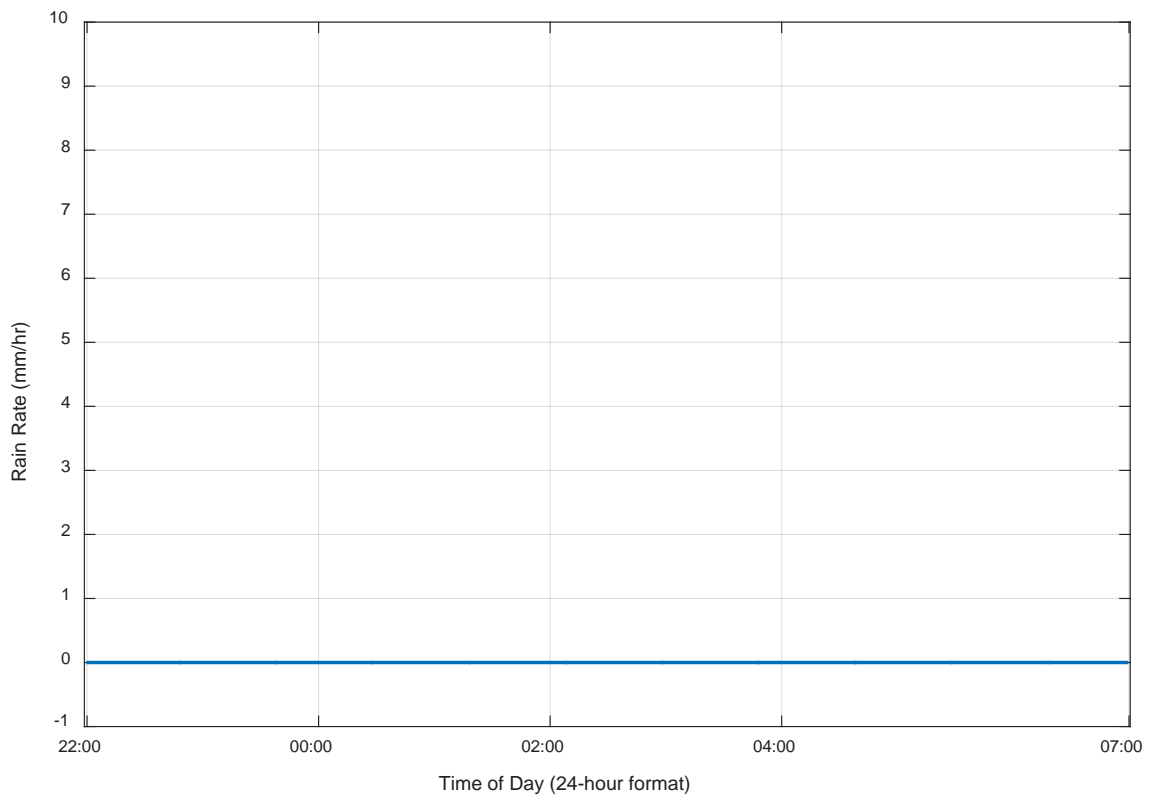
**Monitored Temperature (August 9 - 10, 2015) at Noise Monitor Location 12**



**Monitored Humidity (August 9 - 10, 2015) at Noise Monitor Location 12**



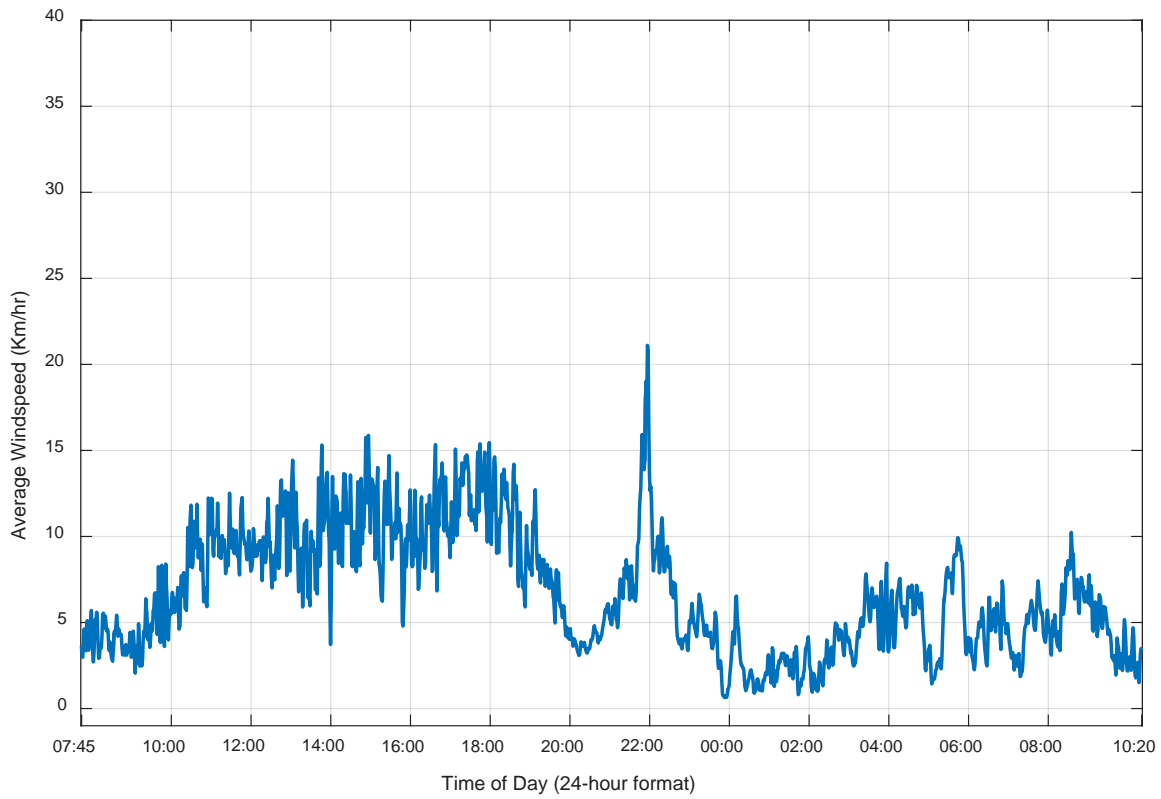
**Monitored Barometric Pressure (August 9 - 10, 2015) at Noise Monitor Location 12**



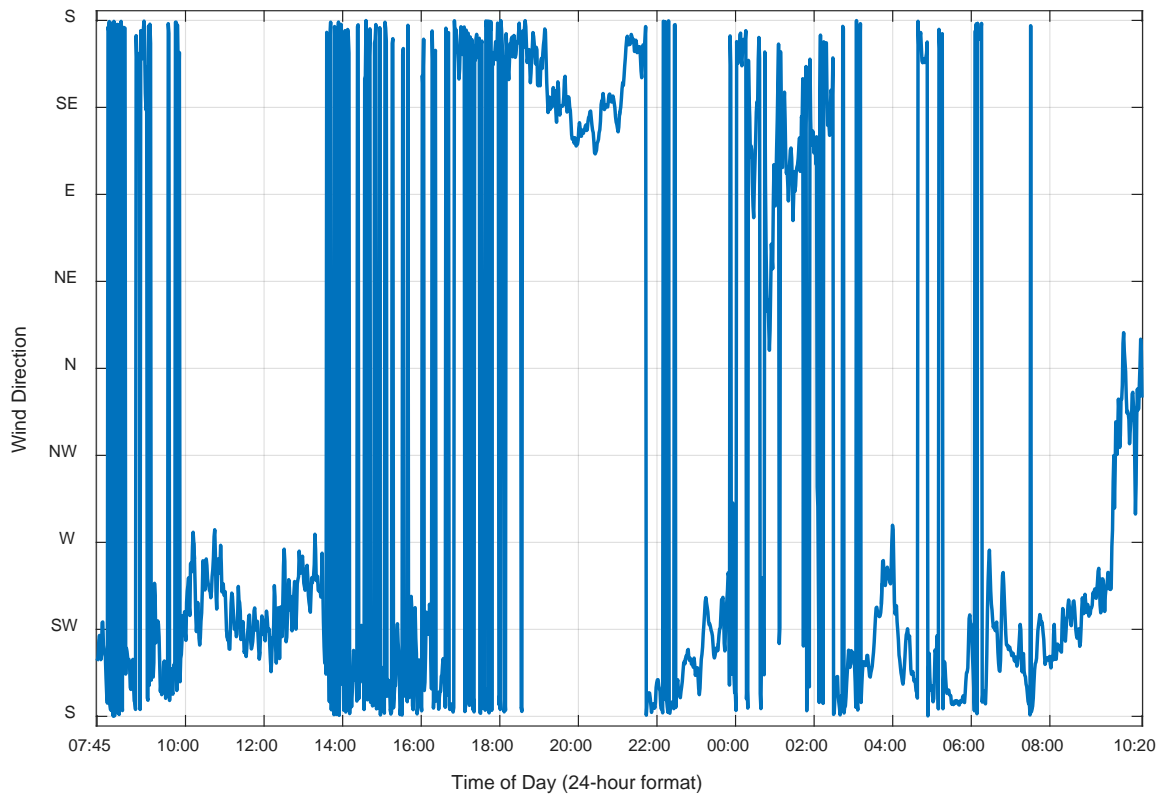
**Night-time Monitored Rain Rate (August 9 - 10, 2015) at Noise Monitor Location 12**

**August 10 – 11, 2015 Weather Data**

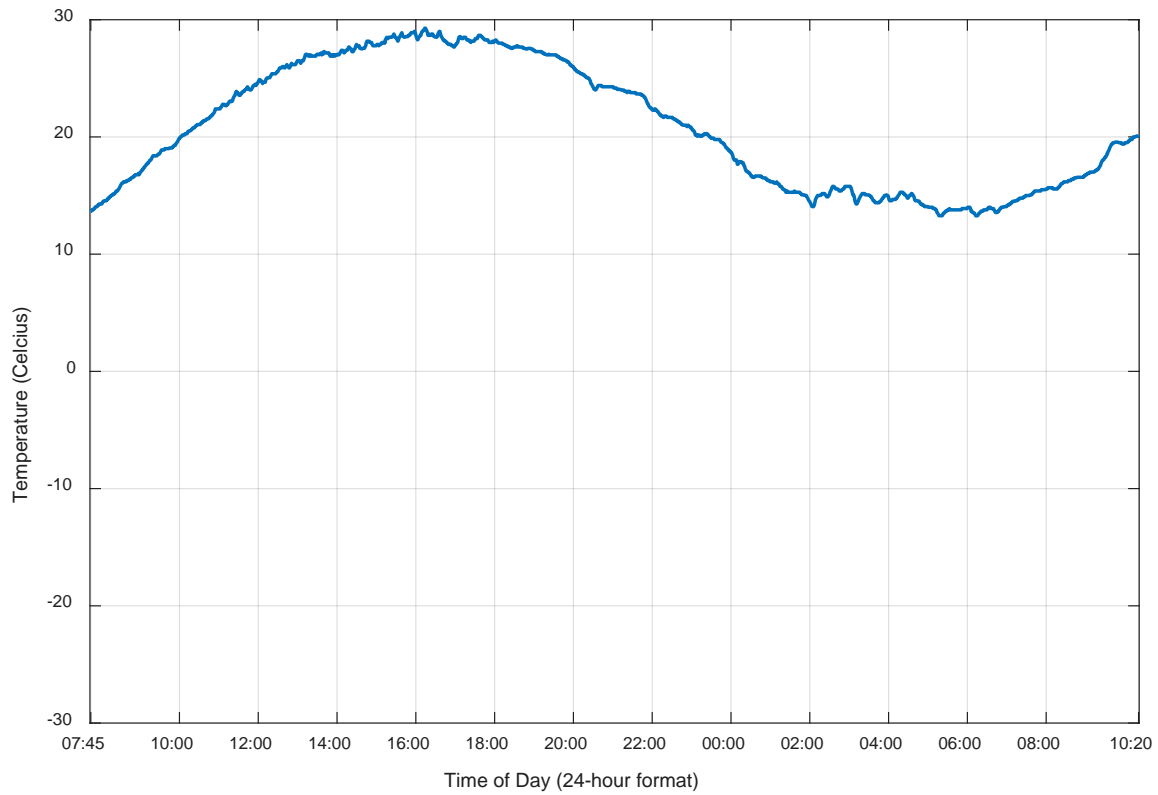




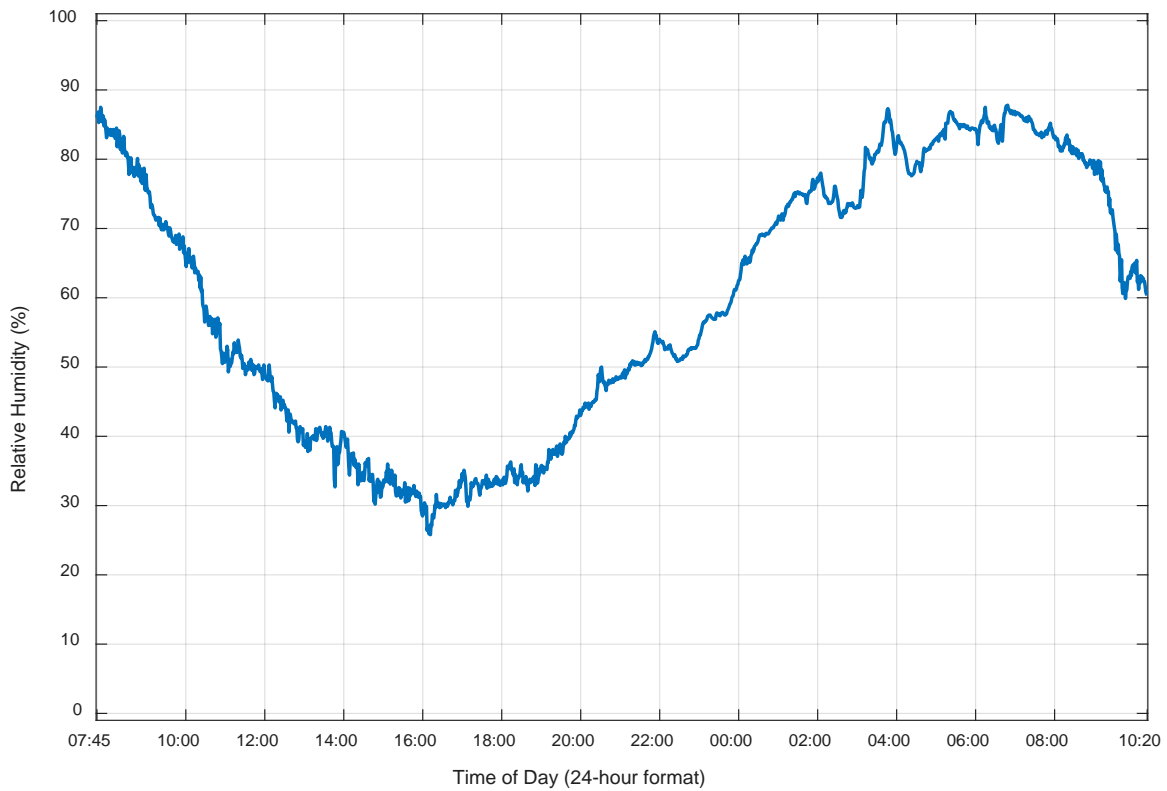
**Monitored Wind Speed (August 10 – 11, 2015) at Noise Monitor Location 6**



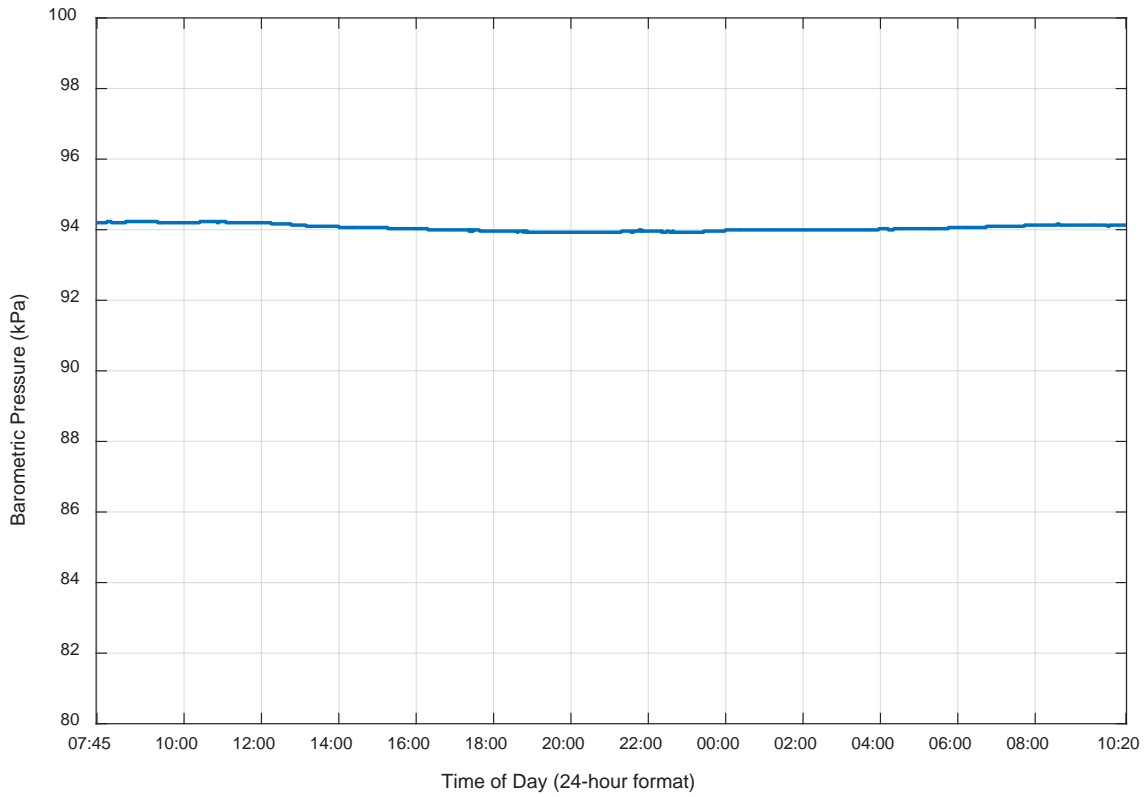
**Monitored Wind Direction (August 10 – 11, 2015) at Noise Monitor Location 6**



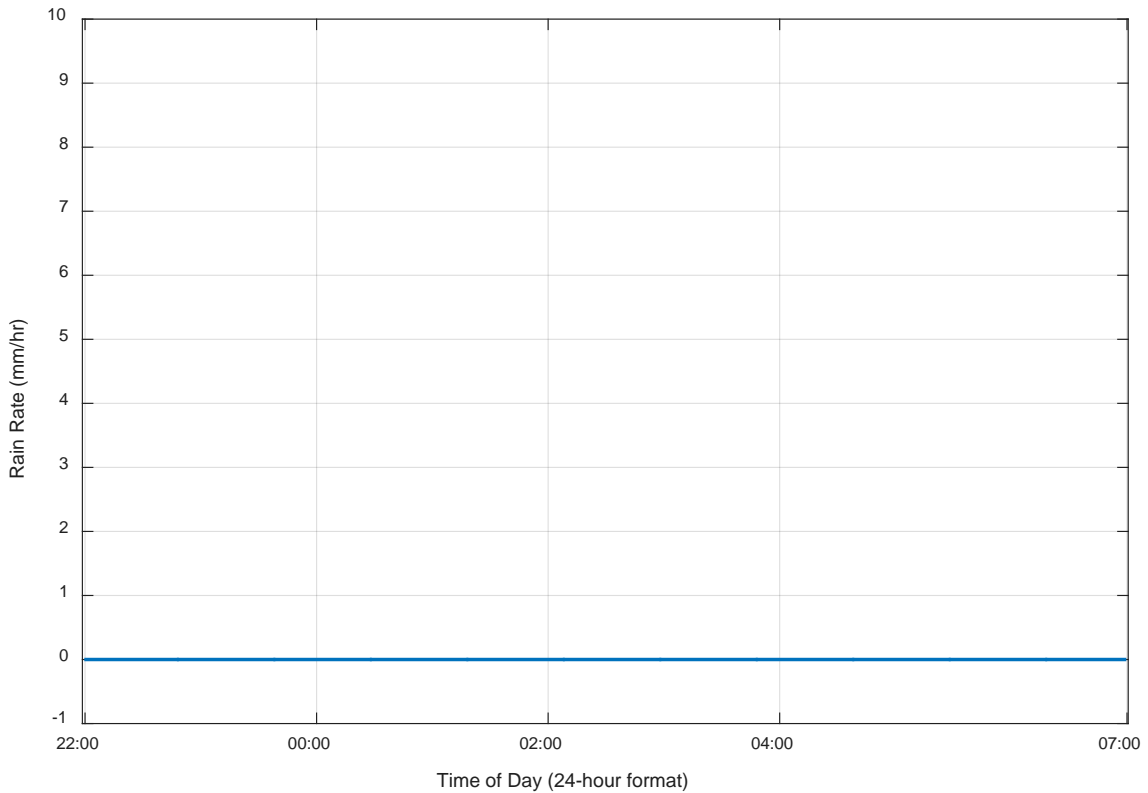
**Monitored Temperature (August 10 – 11, 2015) at Noise Monitor Location 6**



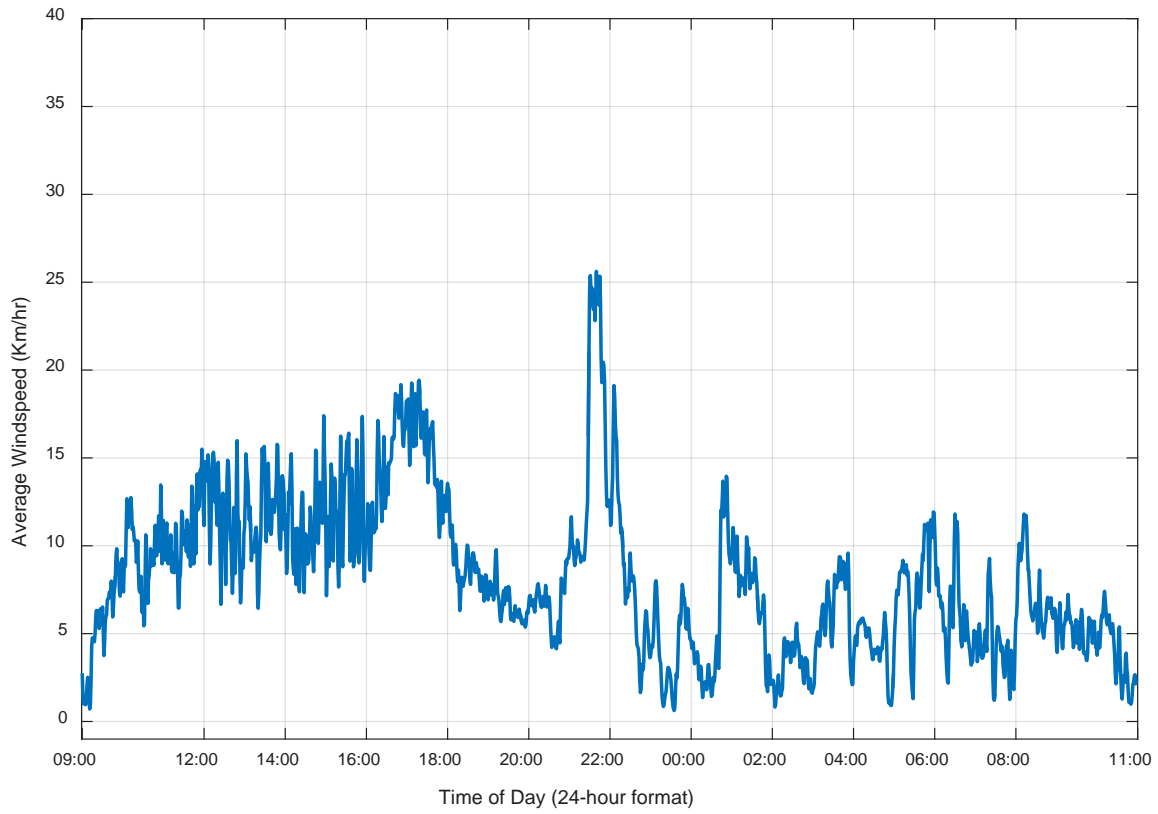
**Monitored Humidity (August 10 – 11, 2015) at Noise Monitor Location 6**



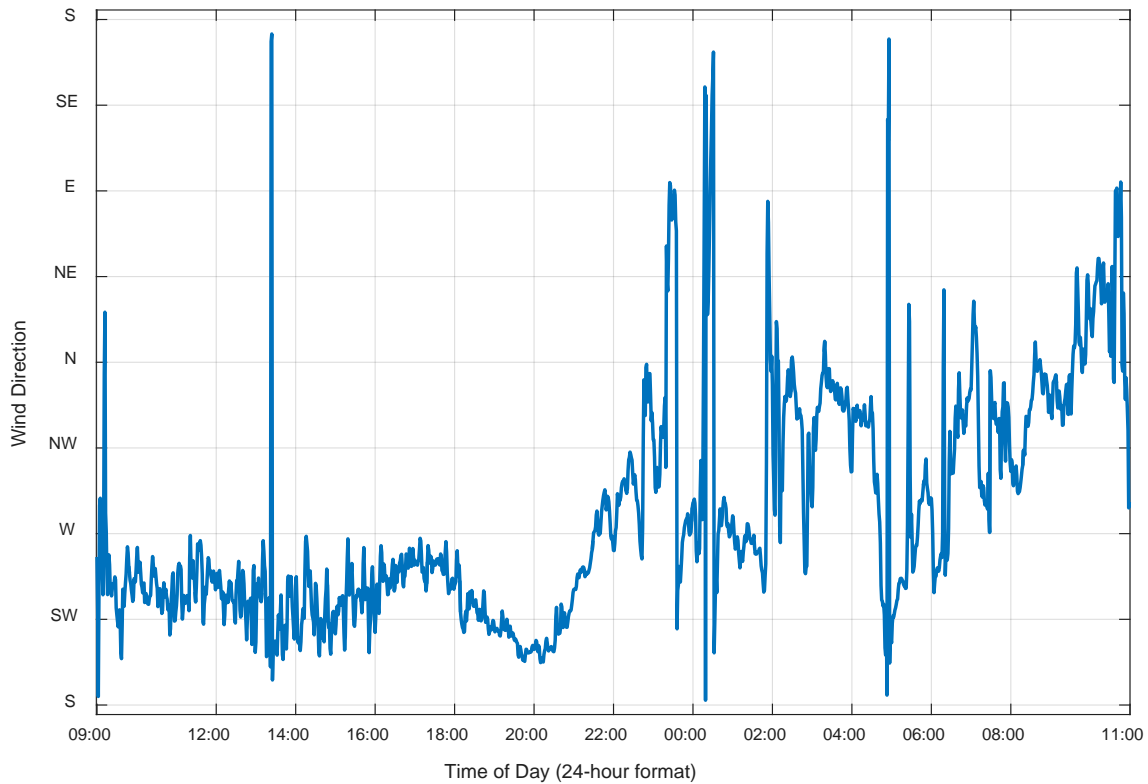
**Monitored Barometric Pressure (August 10 – 11, 2015) at Noise Monitor Location 6**



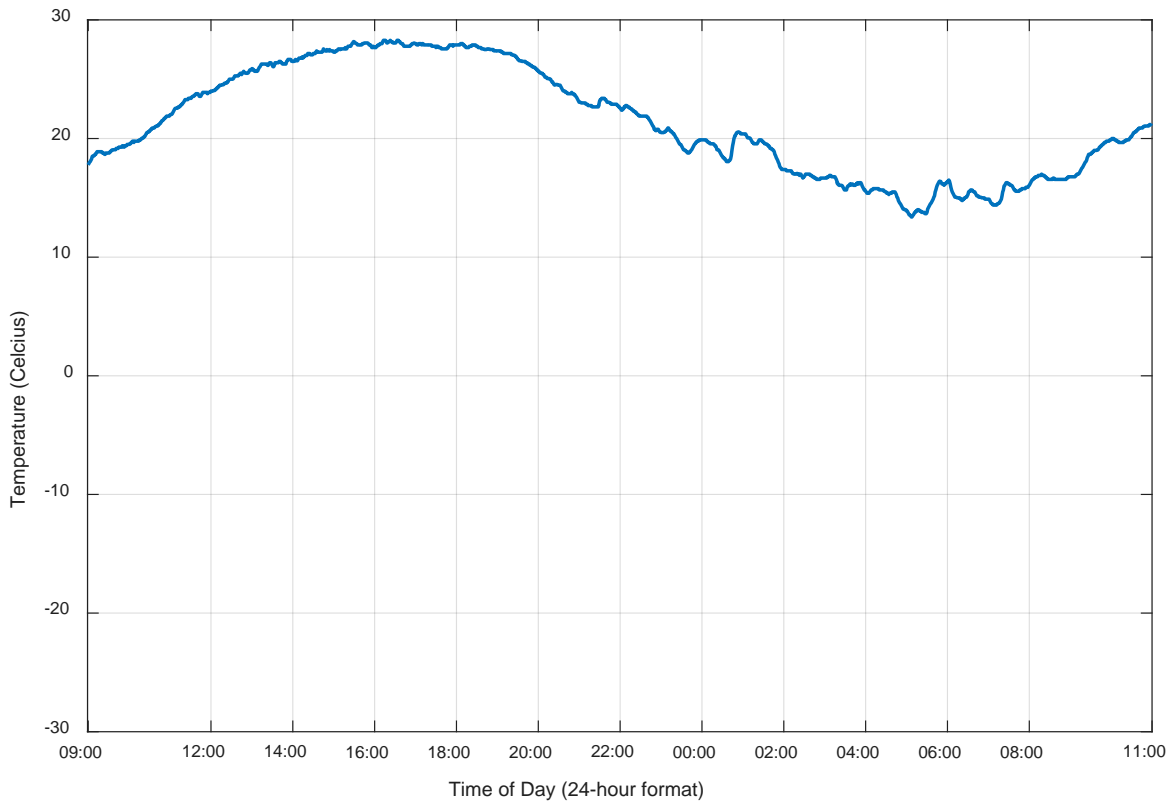
**Night-time Monitored Rain Rate (August 10 – 11, 2015) at Noise Monitor Location 6**



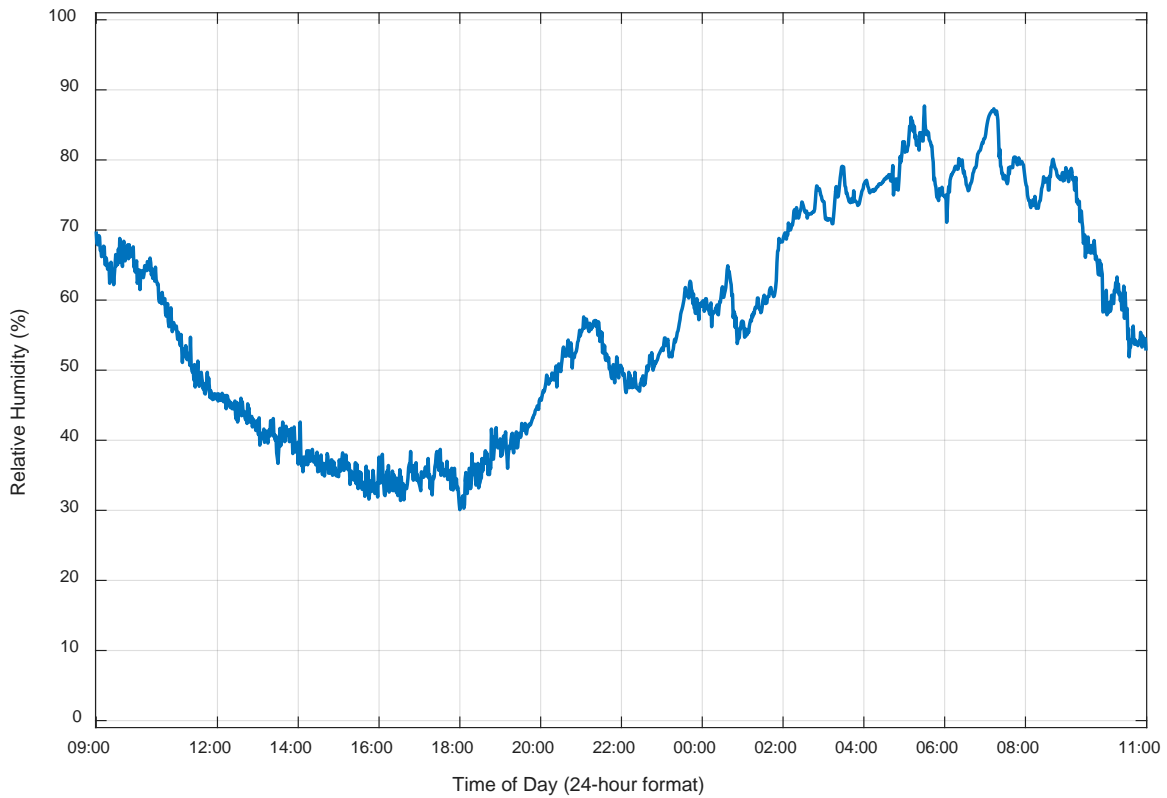
**Monitored Wind Speed (August 10 – 11, 2015) at Noise Monitor Location 10**



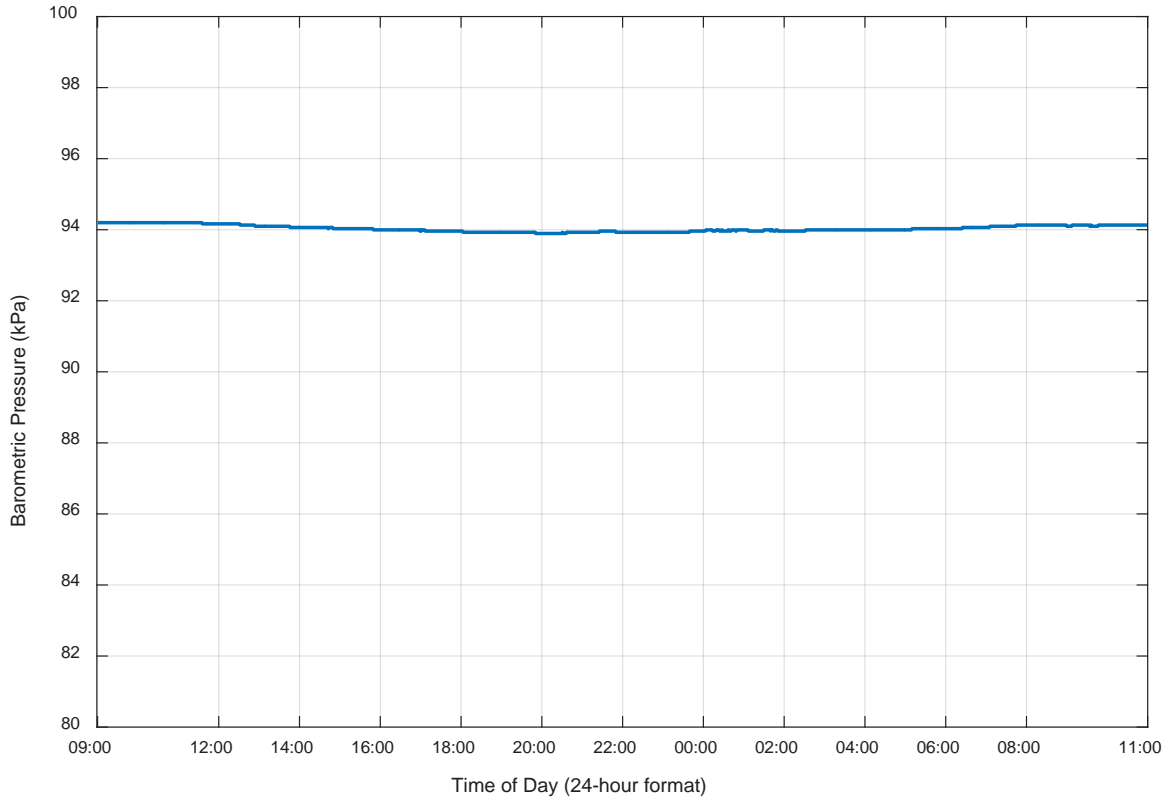
**Monitored Wind Direction (August 10 – 11, 2015) at Noise Monitor Location 10**



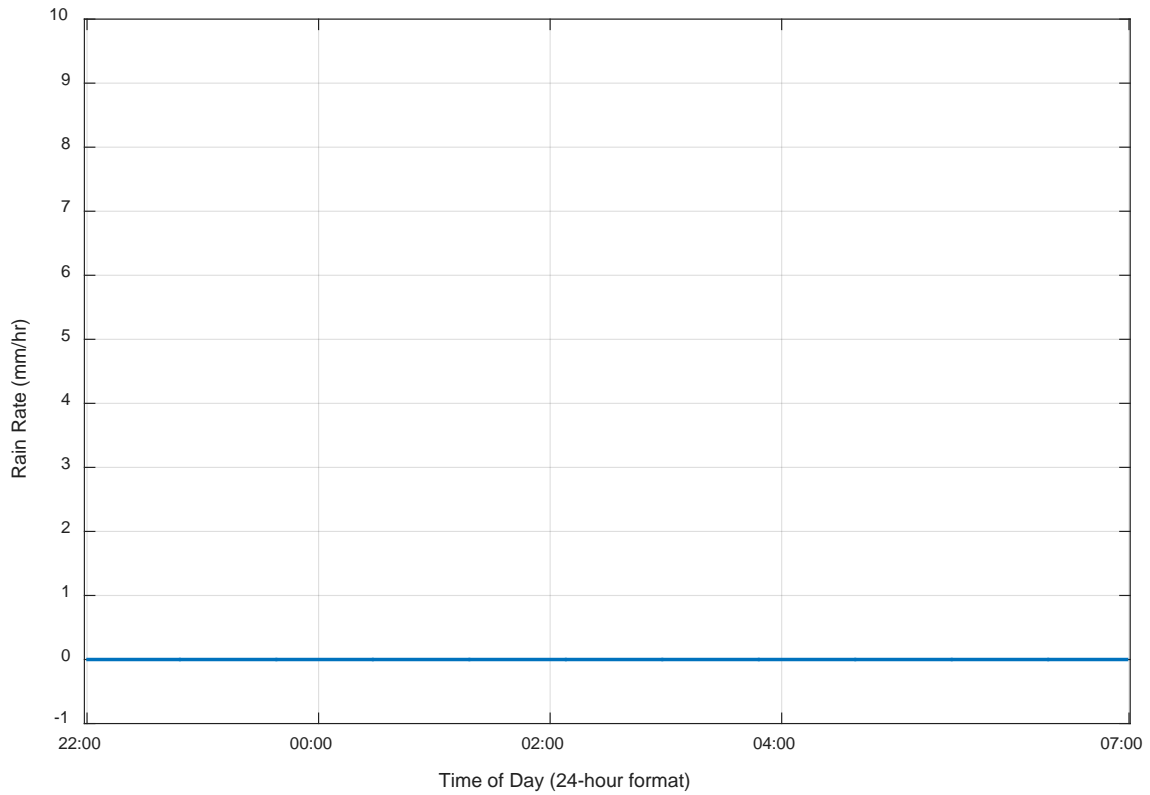
**Monitored Temperature (August 10 – 11, 2015) at Noise Monitor Location 10**



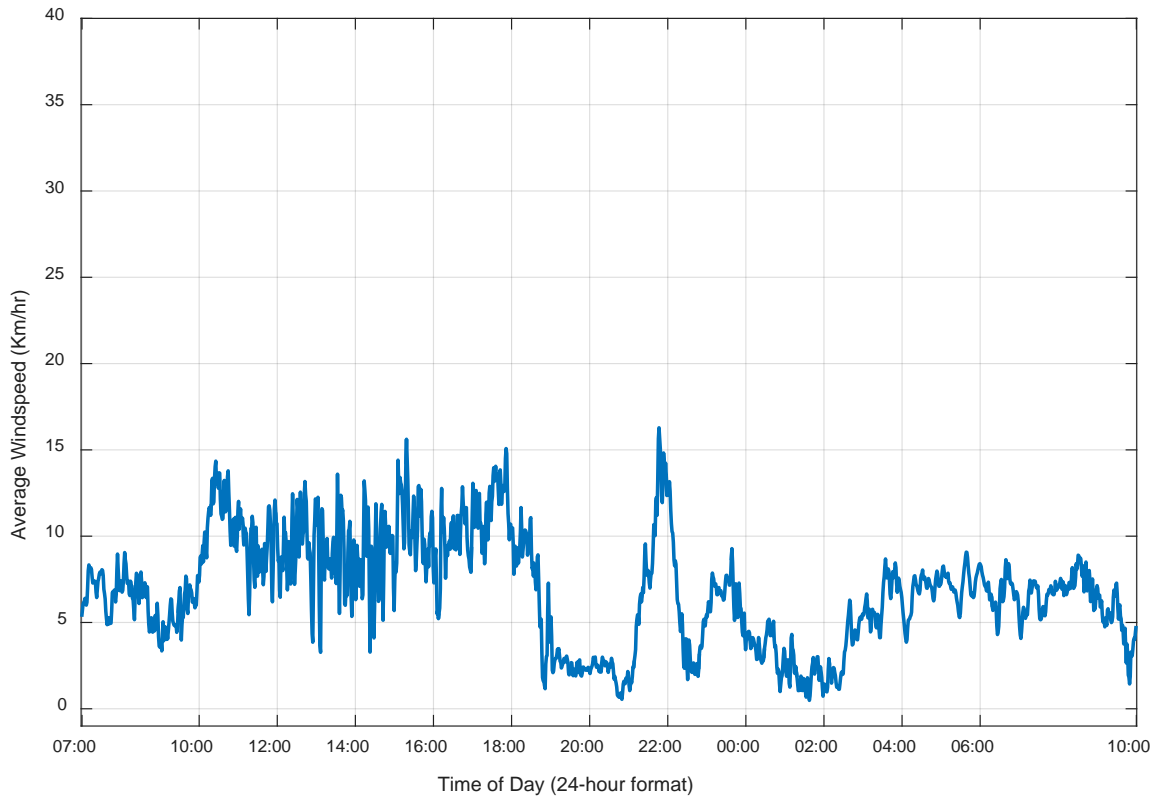
**Monitored Humidity (August 10 – 11, 2015) at Noise Monitor Location 10**



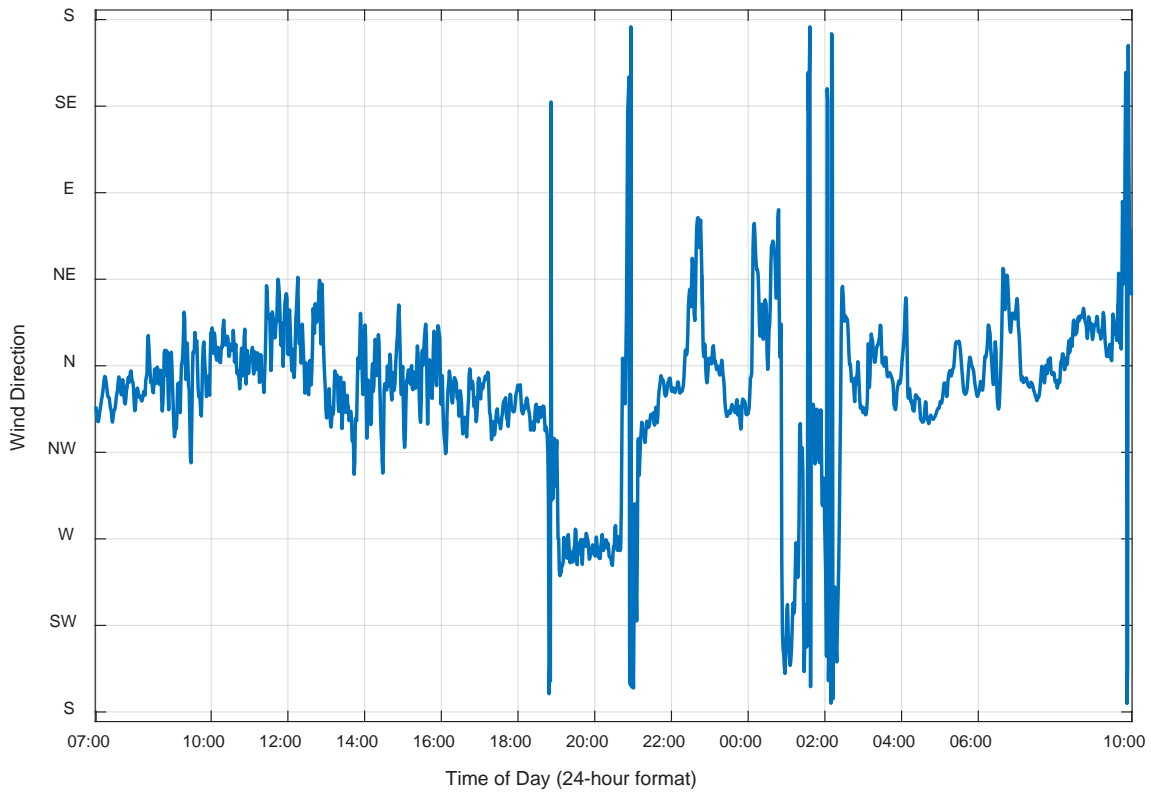
**Monitored Barometric Pressure (August 10 – 11, 2015) at Noise Monitor Location 10**



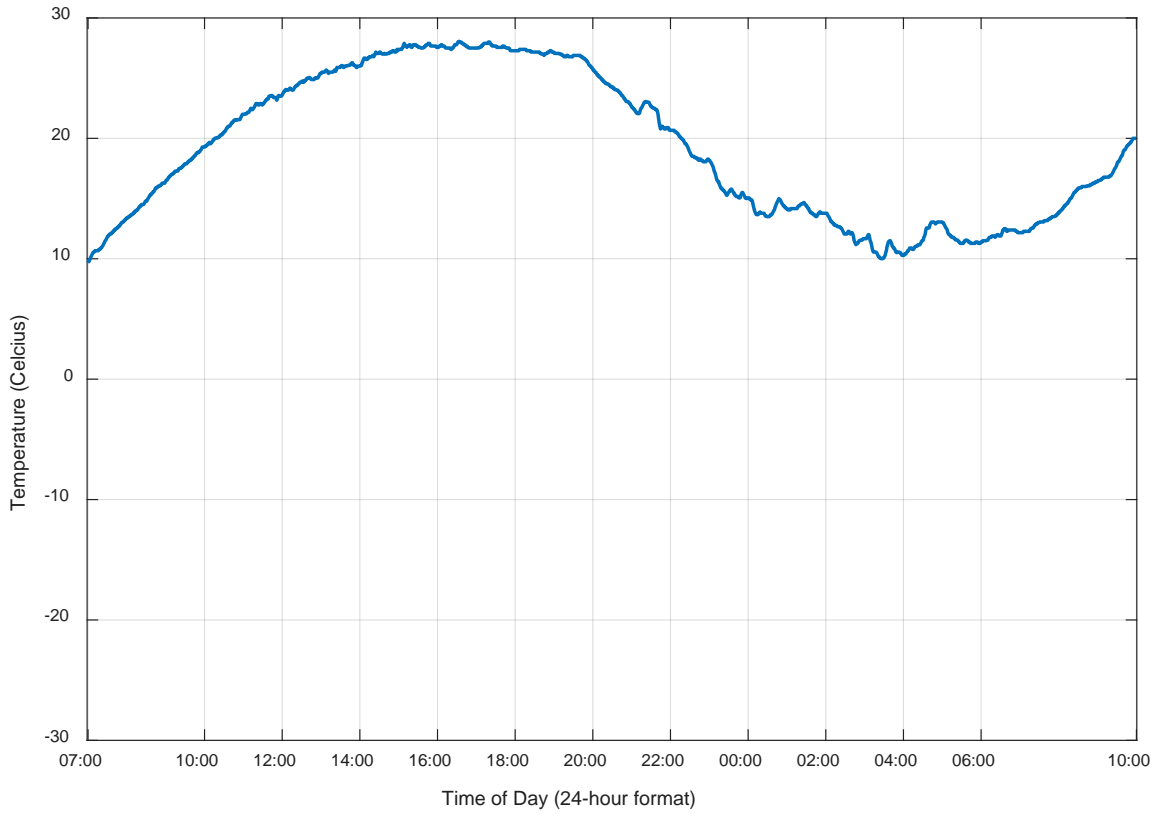
**Night-time Monitored Rain Rate (August 10 – 11, 2015) at Noise Monitor Location 10**



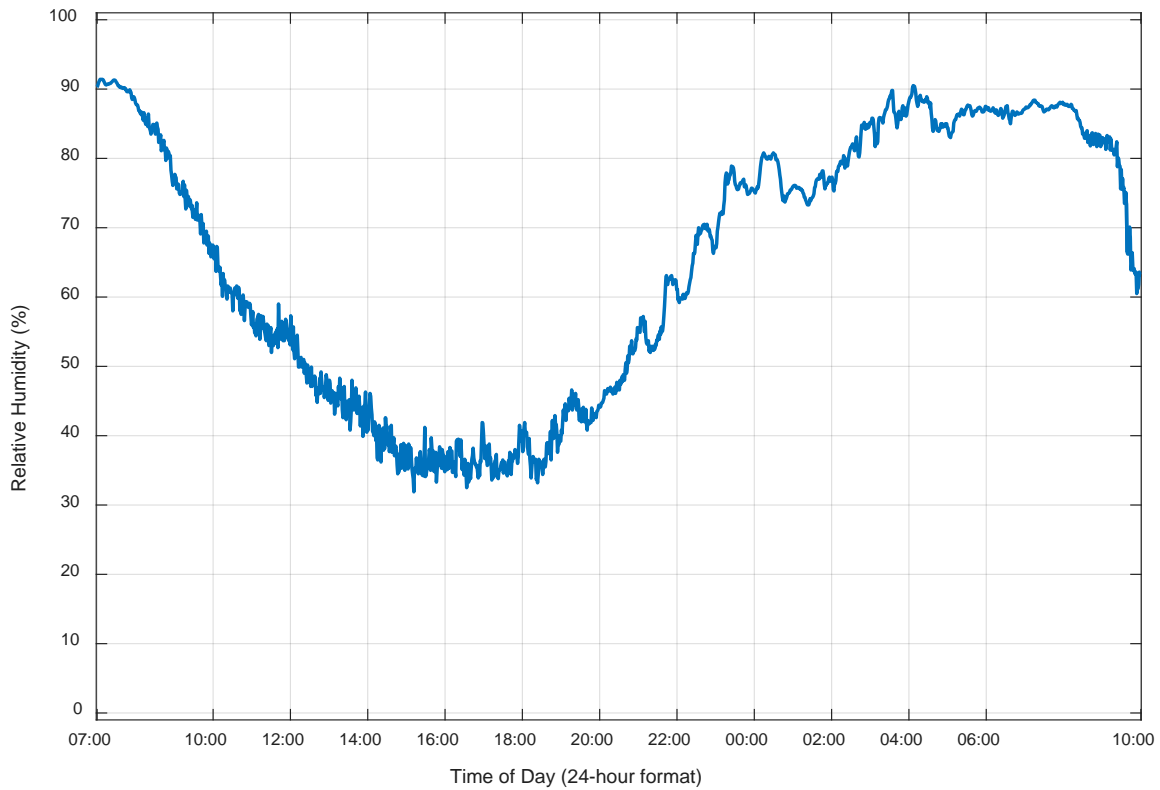
**Monitored Wind Speed (August 10 – 11, 2015) at Noise Monitor Location 12**



**Monitored Wind Direction (August 10 – 11, 2015) at Noise Monitor Location 12**

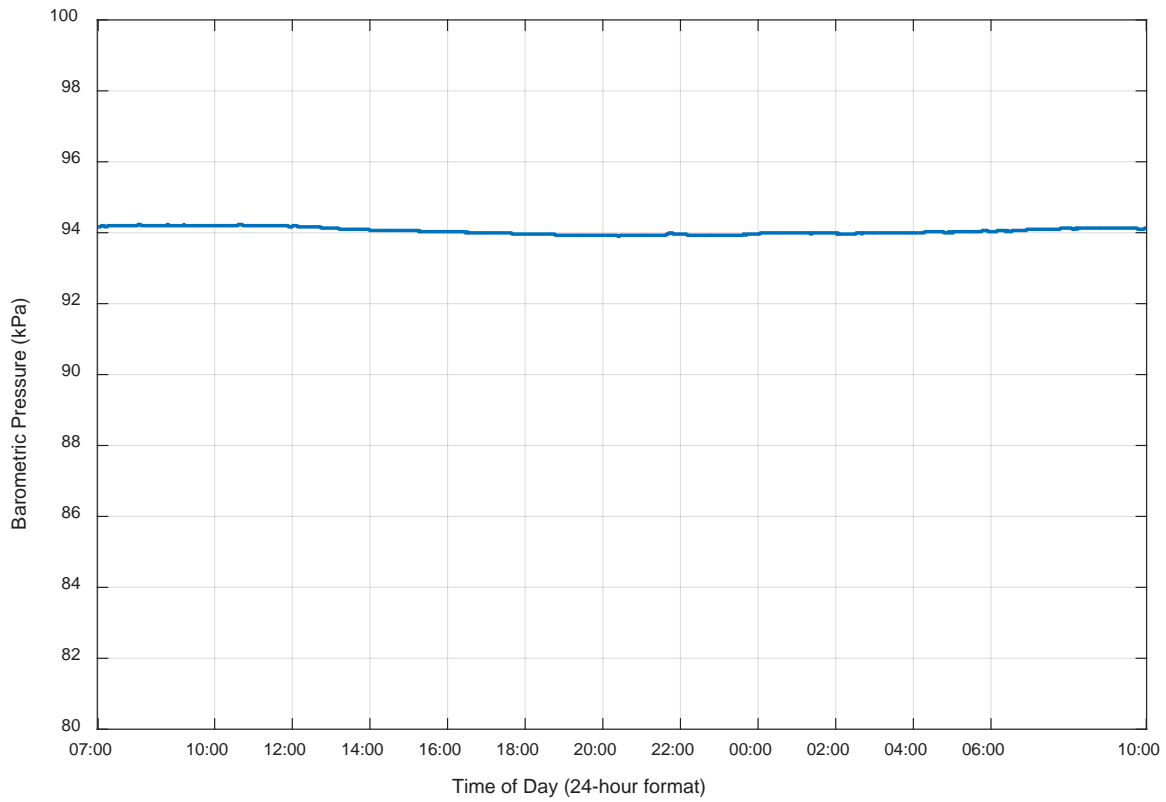


**Monitored Temperature (August 10 – 11, 2015) at Noise Monitor Location 12**

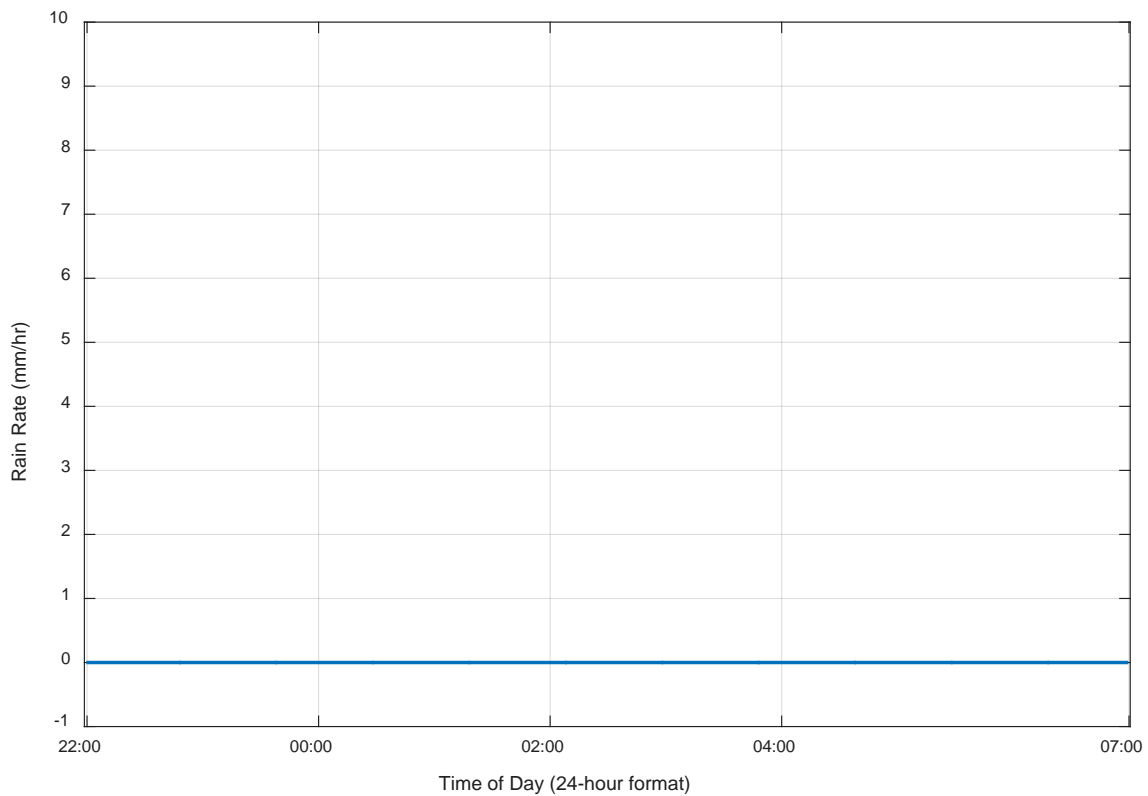


**Monitored Humidity (August 10 – 11, 2015) at Noise Monitor Location 12**






**Monitored Barometric Pressure (August 10 – 11, 2015) at Noise Monitor Location 12**



**Night-time Monitored Rain Rate (August 10 – 11, 2015) at Noise Monitor Location 12**

## **APPENDIX 2**

# **NCIA MEMBER COMPANY NOISE MANAGEMENT PLAN UPDATES and REPORTS**


	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

**Access Pipeline (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.

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Access abides by AER's Directive 38.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>A noise monitoring was not conducted in 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>N/A</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>There are no anticipated projects or improvement for 2016 that may impact noise levels.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>None.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>None.</p>

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.


	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b>  <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March</b> <b>2016</b>	<b>Rev.</b> <b>0</b>

**Access Pipeline (Sturgeon Terminal)**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Access abides by AER's Directive 38.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>A noise monitoring was not conducted in 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>N/A</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>There are no anticipated projects or improvement for 2016 that may impact noise levels.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>None.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>None.</p>

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.


	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

**Agrium Redwater and Fort Saskatchewan**

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Agrium has documented and implemented a Noise Management Plan. The plan consists of the following documents:</p> <ul style="list-style-type: none"> <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>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>In addition to the NCIA Regional Noise Model Annual Field Validation in the summer, Agrium completed offsite checks of both the Redwater and Fort Saskatchewan facilities at set locations to identify any abnormal change in the offsite noise profile of our facilities.</p> <p>Elevated noise levels were observed at both the Redwater (Q4) and Fort Saskatchewan (Q3, Q4) sites. Readings and details are attached.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>As stated in the 2013 and 2014 report, Agrium Redwater engaged both SLR and Noise Solutions to proactively provide noise control options for both the compressor / gas turbine (CGT-902) and Utilities Boiler #2 replacement projects respectively. The motive for these assessments is primarily Occupational Hygiene, but it is anticipated that Environmental Noise will also be reduced. Worthy of noting is that implementation of these projects have been rescheduled for either 2017 or 2018 (opposed to 2016).</p> <p>In addition, Agrium Redwater's Urea Process Unit made some changes to the diameter of the Process Steam Vent which may have contributed to elevated site Environmental Noise level.</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b>  <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March</b> <b>2016</b>	<b>Rev.</b> <b>0</b>

	<p>Agrium Redwater's Nitric Acid Unit is noted to be experiencing axial kickback which may have also contributed to elevated Environmental Noise level.</p> <p>In result, and in conjunction with the upcoming operating approval renewal application, Agrium Redwater has contracted SLR to update the site noise model and confirm the sources of elevated noise so that appropriate abatement strategies can be considered.</p>
<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>Agrium Redwater is in the process of planning and purchasing silencers for the Phos 30 # Steam Vents. Actual implementation of the silencers would occur in conjunction with the Boiler #2 replacement as a complete steam outage is required in both cases.</p> <p>As stated above, the site noise model will be updated in 2016. It is reasonable to anticipate that the next site modeling activity may be considered upon implementation of all the aforementioned projects stated above.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>Yes. We are implementing plan improvements in 2016.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>There were no external noise complaints for either Agrium Redwater or Fort Saskatchewan in 2015.</p>

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



Date	Time	Plant Site	Location	Wind Speed	Wind Direction	Sound Press. Level		Entered By	Comment	Sound Diff dB
						dBA	dBC			
12-Mar-15	11:30	Fort Saskatchewan	F1	3	177	39.3	57.1	HB	Occasional traffic, equipment hum.	17.8
30-Mar-15	10:37	Redwater	R3	15	307	44.1	64	HB	NH3II and Urea TA.	19.9
11-Jun-15	13:10	Fort Saskatchewan	F2	6	96	44.9	63	HB		18.1
29-Jun-15	11:45	Redwater	R4	10	212	34.5	53.1	HB	End of RPO TA.	18.6
10-Sep-15	13:10	Fort Saskatchewan	F4	14	242	50.8	72	HB	Check = 113.8 dBA. In addition to an observable hum, there was equipment activity on the gypsum stack, lawn mowers, and fire training. This monitoring session will not be used due to greater than 10 km/hr wind speeds. Will return.	21.2

Date	Time	Plant Site	Location	Wind Speed	Wind Direction	Sound Press. Level		Entered By	Comment	Sound Diff dB
						dBA	dBc			
16-Sep-15	18:45	Redwater	R1	3	355	44.9	57.8	HB	Check = 113.9 dBA. Wind speed and direction were calm so took SW of site at NWP Gate 3.	<b>12.9</b>
17-Sep-15	5:02	Fort Saskatchewan	F2	3	175	45.6	60.9	HB	Check = 113.9 dBA. Evident hum was observable. Difficult to discern if hum was from Sherritt. Incidenter #423611. Confirmed to be Sherritt's Clark Compressors venting as their Ammonia Plant had gone down.	<b>15.3</b>
17-Sep-15	4:53	Fort Saskatchewan	F3	5	165	47.3	60.7	HB	Check = 113.9 dBA. Evident hum was observable. Difficult to discern if hum was from Sherritt. Incidenter #423611. Confirmed to be Sherritt's Clark Compressors venting as their Ammonia Plant had gone down.	<b>13.4</b>
17-Sep-15	4:42	Fort Saskatchewan	F4	0	166	53.5	67.5	HB	Check = 113.9. Evident hum was observable. Difficult to discern if hum was from Sherritt. Incidenter #423611. Confirmed to be Sherritt's Clark Compressors venting as their Ammonia Plant had gone down.	<b>14.0</b>

Date	Time	Plant Site	Location	Wind Speed	Wind Direction	Sound Press. Level		Entered By	Comment	Sound Diff dB
						dBA	dBC			
17-Sep-15	4:35	Fort Saskatchewan	F1	4	166	49.4	64.4	HB	Check = 113.9. Situated at Lift Station and a evident hum was observable. Difficult to discern if hum was from Sherritt. Incidenter #423611. Confirmed to be Sherritt's Clark Compressors venting as their Ammonia Plant had gone down.	15.0
15-Dec-15	15:50	Fort Saskatchewan	F4	8	231	55.5	69	HB	Check = 113.1.dBA industrial hum was noticable. Contacted Ken S. who investigated with operations who reported nothing was out of the normal. Wind speed was higher than 5 km/hr so technically sample should be rejected. Sampling was not performed again at this site. Incidenter #439521.	13.5
22-Dec-15	17:30	Redwater	R1	6	41	61.6	75.5	HB	Check = 113.1 dBA. There is a noticable industrial hum which appears to be coming from the Urea Plant, but will verify with operations. This hum has been noticable since post November TA. Incidenter #439521.	13.9


	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b>  <b>2010-003</b>	
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**Insert your Company Name here: Air Liquide**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Standard Operating Procedures SFD/CGN-06-101 Hearing Conservation Program is in place.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>None completed for 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>No changes made.</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	N/A
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	N/A
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	None.

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.

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	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
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**ATCO Power Canada Ltd.:**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>ATCO Power has one facility operating in the Alberta Industrial Heartland: Scotford Cogeneration Plant. The Scotford Cogeneration Plant is located on the Shell Upgrader site and is included in the Shell Upgrader Noise Management Plan.</p> <p>In 2015, ATCO Power did not have any other sites that would be subject to the NCIA Noise Management Plan BMP requirements.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>ATCO Power did not conduct any noise monitoring/assessments in 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>Not applicable.</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>Not applicable.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>Not applicable.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>Not applicable.</p>

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.

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-004</b>	
		<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>	


**Aux Sable Canada LP:**

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Aux Sable has retained Patching Associates Acoustical Engineering Ltd. to conduct noise measurements at the current site. The field assessment was completed in May 2016 and a final report will be issued in July 2016 which will be written to standard 2010-003 (M31-Mar-16).</p> <p>Plot plan with occupational noise readings will be sent in July 2016.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>No monitoring was completed in 2015 as modifications to one of the pump units were not completed. We delayed the monitoring to the completion of the pump upgrades so as to capture the most up to date noise information.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>In 2015 new pumps were installed and commissioned. These changes are expected to have minimal impact on sound emissions and have been assessed by Patching Associates in May 2016, the results of the assessment including an updated noise model will be available in July 2016.</p> <p>Once available the updated noise model will be provided to SLR.</p>




	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-004</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>26-May 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>Aux Sable plans to upgrade one cooler unit on site. This will result in some minor noise impacts and the noise model will be updated once the new fans are specified.</p> <p>The updated noise model will be available fall 2016</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>This will be completed as part of the noise report Patching Associates is preparing in July 2016.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>Aux Sable has never received a noise complaint for this site.</p>

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.


	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>14-Apr-14</b>	<b>Rev.</b> <b>2</b>

**Insert your Company Name here:**

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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, including the Procedure/Practice/Standard reference.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Both Fort Saskatchewan facilities (CSC and Sulphides) have implemented a management program to address environmental noise as per NCIA Noise Management Plan Standard 2010-001.</p>
<p>Attach results of any monitoring/assessments (fence line outward) completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring, however if you did, please provide those results electronically to NCIA.</p>	<p>A report was submitted via email on February 11, 2016 by Chemtrade's EHS Supervisor Kathryn Dragowska.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>No changes that would impact the noise level have been made in 2015.</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>14-Apr-14</b>	<b>Rev.</b> <b>2</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>Not applicable</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>Submitted to the NCIA on February 11, 2016 via email by Kathryn Dragowska.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2014 including any actions taken to address them.</p>	<p>No complaints have been received in 2015.</p>

This information is being collected as per the NMP Standard 2010-003 Document, section 5.4. 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.

NCIA office, Fort Saskatchewan  
 #204 9902-102 Street  
 Fort Saskatchewan, AB  
 Attn.: Dr. Laurie J. Danielson, P. Chem.  
 Executive Director, Northeast Capital Industrial Association

February 10, 2016

**RE: Environmental Noise Monitoring Results for the Fort Saskatchewan CSC and Sulphides sites**

The following are Environmental Noise Monitoring Results for the Fort Saskatchewan CSC and Sulphides sites for 2015 as per the Chemtrade Environmental Noise Monitoring and Control Procedure CHE-FSK-ESH-001.

**General information**

**The Meter**

A Cirrus Model CR171A Noise Meter was used for all sound measurements. The meter was last calibrated on October 27, 2015 using techniques recommended by International Standards IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983 and ANSI S1.43-1997. An acoustic calibrator designed specifically for the meter, was used to check the calibration prior to the meter being used on December 23, 2015 and January 21, 2016.

**The measurements**

Noise measurements were taken by Kathryn Dragowska on December 23, 2015 and January 21, 2016.

**Weather information**

The wind direction on December 23, 2015 was out of the WNW and the wind speed varied between 1.6kph and 3.2kph. The wind direction on January 21, 2016 was out of the South and the wind speed varied between 0kph and 1.6kph.

**Fort Saskatchewan CSC**

Noise measurements were taken on December 23, 2015 at the same locations as those outline in CHE-FSK-ESH-001.

**CSC Noise Measurement Results:**

ID	Linear Sound Pressure Levels (dB L <sub>eq</sub> ) at Octave Band Frequencies (Hz)									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
1	72.9	66.2	57.8	59.0	60.6	60.2	50.7	40.5	33.3	62.5
2	74.0	68.7	58.7	61.0	60.5	58.8	51.9	43.5	35.1	62.2
3	73	64.8	58.0	55.1	59.2	57.9	52.2	42.6	33.8	61.0
4	76.2	70.7	62.9	57.2	60.4	57.8	50.5	42.0	37.7	61.3
5	78.0	74.4	68.8	60.8	57.2	58.9	51.6	42.7	36.3	61.8
6	75.0	64.7	58.7	60.3	76.0	76.6	71.2	61.6	47.4	79.0
7	78.7	70.0	67.6	64.1	74.9	74.6	66.1	53.7	45.2	76.7
8	81.5	69.1	59.8	63.5	72.9	72.5	57.6	50.1	44.3	74.3
9	73.8	66.2	59.1	54.6	56.6	54.5	45.2	35.0	30.0	57.5

**Fort Saskatchewan Sulphides**

Noise measurements were taken on January 21, 2016 at the same locations as those outline in CHE-FSK-ESH-001.

**Sulphides Noise Measurement Results:**

ID	Linear Sound Pressure Levels (dB L <sub>eq</sub> ) at Octave Band Frequencies (Hz)									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
1	83.7	80.3	74.7	70.7	68.4	66.1	62.6	58.3	53.9	71.0
2	75.5	72.8	70.5	66.2	63.3	61.2	60.3	53.4	54.2	66.8
3	70.0	70.8	66.5	60.7	64.1	61.8	59.8	53.0	48.3	66.3
4	72.2	71.6	63.3	55.6	57.8	56.8	54.8	47.8	40.9	61.2
5	73.9	79.2	67.7	63.7	63.4	58.3	58.6	50.0	43.8	65.0
6	81.3	80.4	71.9	73.1	68.1	64.5	59.4	53.2	46.3	69.9
7	74.2	71.2	66.9	63.4	59.4	58.6	52.7	44.1	41.0	62.4

**Discussion**

2015 noise measurement results are consistent with those taken by Karl Peet in December of 2014. Variations are attributed to the differences in traffic along adjacent roadways.

No significant changes were made to the operating capacity of the Chemtrade Fort Saskatchewan CSC and Sulphides sites in 2015 affecting environmental noise. Both facilities were running to normal operating capacities during the sampling times.

If you have any questions or concerns, please contact me at 780-288-3984 or Neil Moon at 780-998-2225.

Yours truly,



Kathryn Dragowska  
EHS Supervisor, Chemtrade West GP Inc.  
Fort Saskatchewan CSC and Sulphides

cc: Neil Moon – CSC Plant Manager and Regional Manager  
Jon Stevens – Sulphides Plant Manager



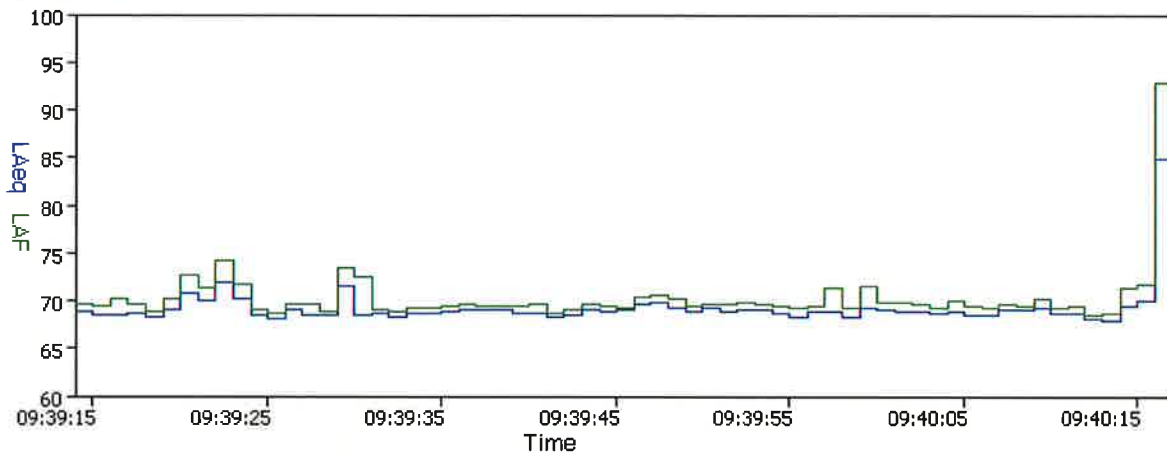
### Measurement Summary Report

Name	Sulphides - 1	<b>Summary</b>	LAF1	72.5 dB
Time	21/01/2016 9:39:14 AM	<b>LAeq</b> 71.0 dB	LAF5	70.7 dB
Duration	00:01:03	LAE	LAF10	69.9 dB
Instrument	G056962, CR:171A	LAFMax	LAF50	68.8 dB
			LAF90	68.1 dB
			LAF95	68.0 dB
			LAF99	67.7 dB

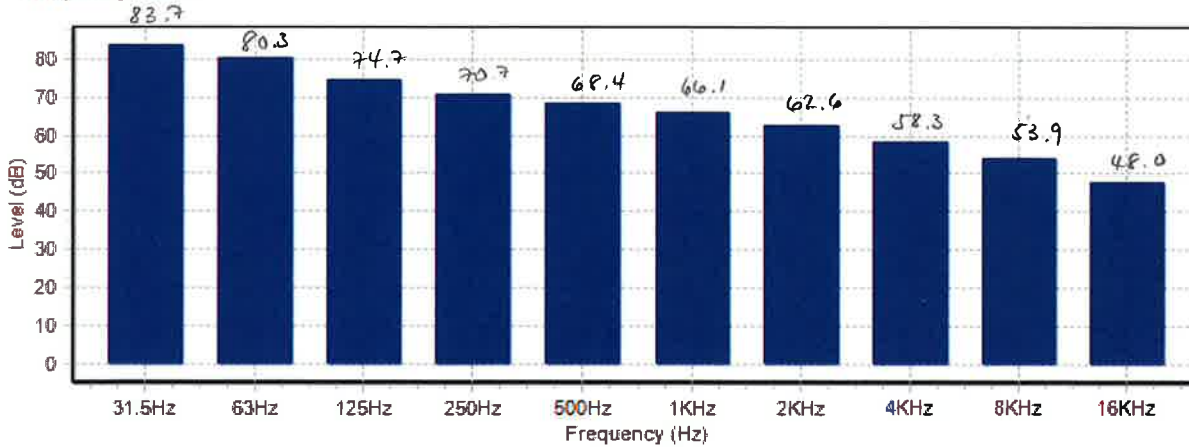
### Calibration Information

21/01/2016 9:36:59 AM 0.77 dB  
 21/01/2016 9:41:15 AM 1.00 dB

Time History



Frequency Bands



Fort Saskatchewan Sulphides: 2015 Environmental Noise Measurement (ID: 1)



Report ID



### Measurement Summary Report

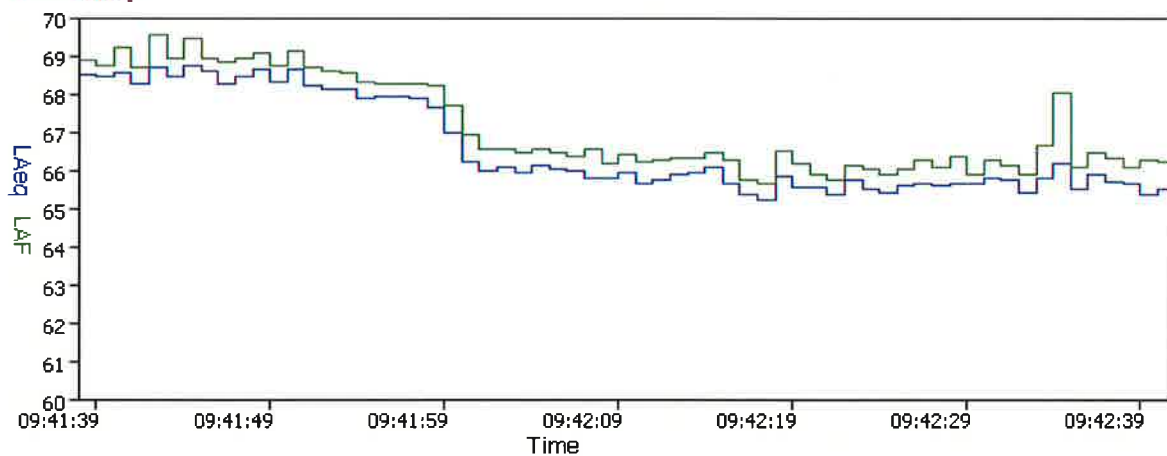
Name	Sulphides - 2	<b>Summary</b>	LAF1	68.9 dB
Time	21/01/2016 9:41:38 AM	L <sub>Aeq</sub> 66.8 dB	LAF5	68.6 dB
Duration	00:01:03	LAE 84.8 dB	LAF10	68.4 dB
Instrument	G056962, CR:171A	LAFMax 69.6 dB	LAF50	65.9 dB
			LAF90	65.3 dB
			LAF95	65.2 dB
			LAF99	65.0 dB

### Calibration Information

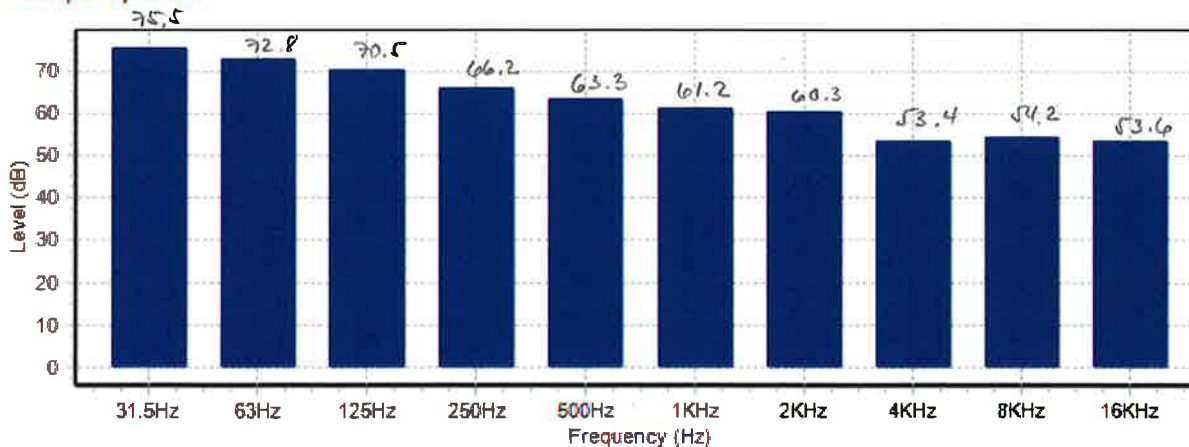
21/01/2016 9:41:15 AM 1.00 dB

21/01/2016 9:43:29 AM 1.07 dB

Time History



Frequency Bands



Fort Saskatchewan Sulphides: 2015 Environmental Noise Measurement (ID: 2)

Report ID





### Measurement Summary Report

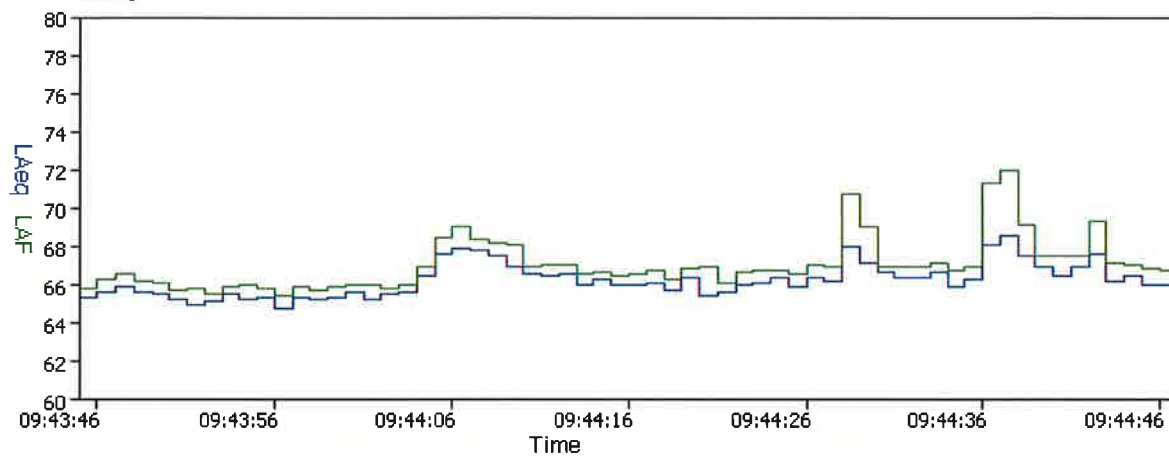
Name	Sulphides - 3	<b>Summary</b>	LAF1	69.0 dB
Time	21/01/2016 9:43:45 AM	L <sub>Aeq</sub> 66.3 dB	LAF5	67.9 dB
Duration	00:01:02	LAE 84.2 dB	LAF10	67.3 dB
Instrument	G056962, CR:171A	LAFMax 72.0 dB	LAF50	66.0 dB
			LAF90	65.1 dB
			LAF95	64.9 dB
			LAF99	64.5 dB

### Calibration Information

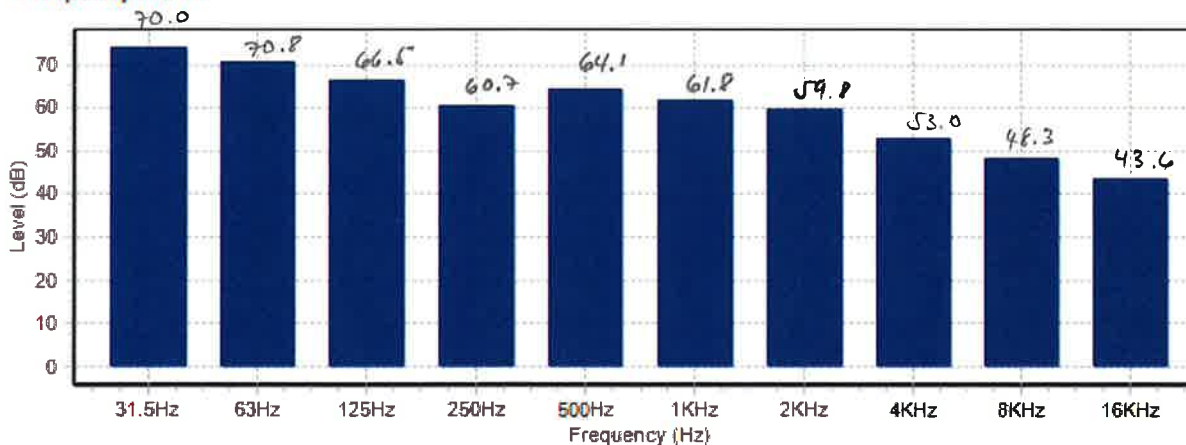
21/01/2016 9:43:29 AM 1.07 dB

21/01/2016 9:59:41 AM 0.82 dB

Time History



Frequency Bands



Fort Saskatchewan Sulphides: 2015 Environmental Noise Measurement (ID: 3)

Report ID







### Measurement Summary Report

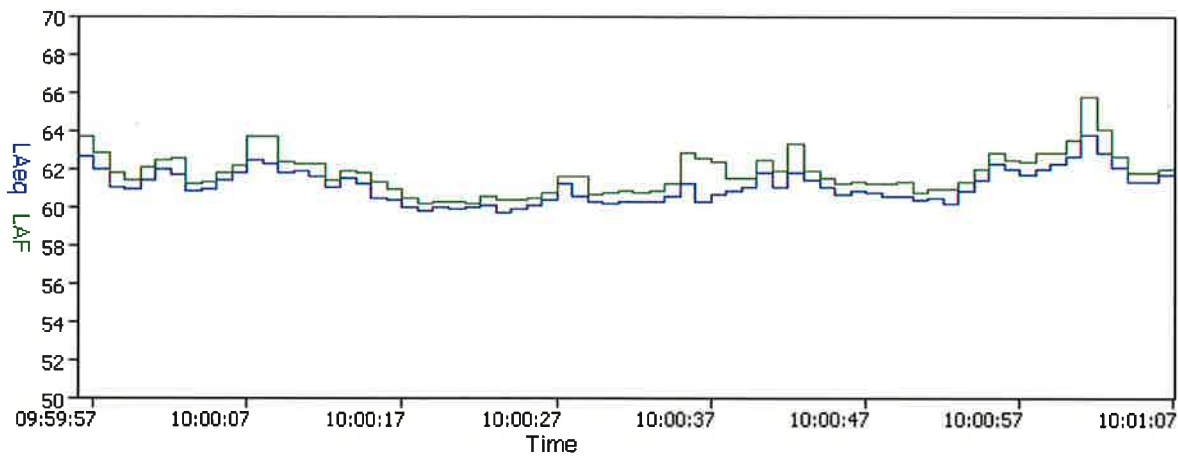
Name	Sulphides - 4	<b>Summary</b>	LAF1	63.3 dB
Time	21/01/2016 9:59:56 AM	L <sub>Aeq</sub> 61.2 dB	LAF5	62.6 dB
Duration	00:01:11	LAE 79.7 dB	LAF10	62.2 dB
Instrument	G056962, CR:171A	LAFMax 65.7 dB	LAF50	60.9 dB
			LAF90	59.9 dB
			LAF95	59.8 dB
			LAF99	59.5 dB

### Calibration Information

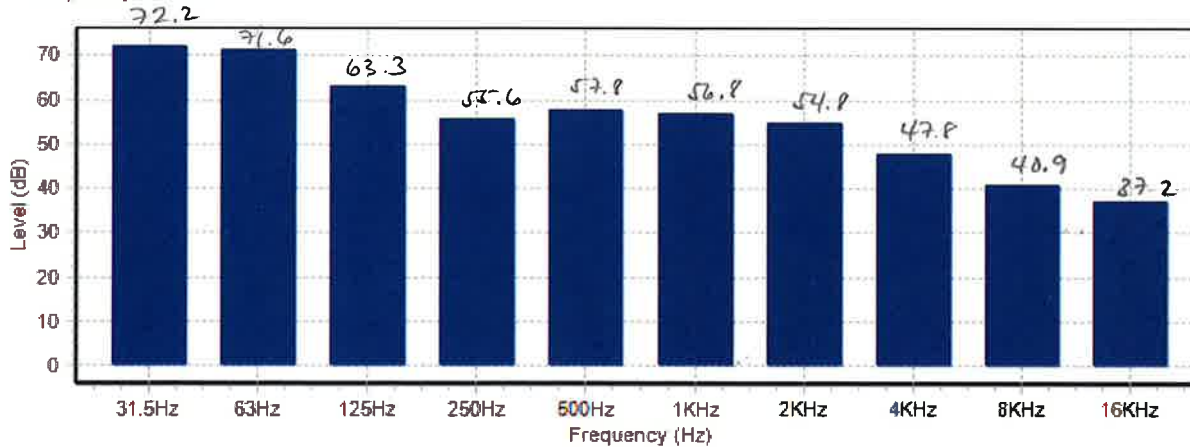
21/01/2016 9:59:41 AM 0.82 dB

21/01/2016 10:02:12 AM 0.91 dB

Time History



Frequency Bands



Fort Saskatchewan Sulphides: 2015 Environmental Noise Measurement (ID: 4)

Report ID





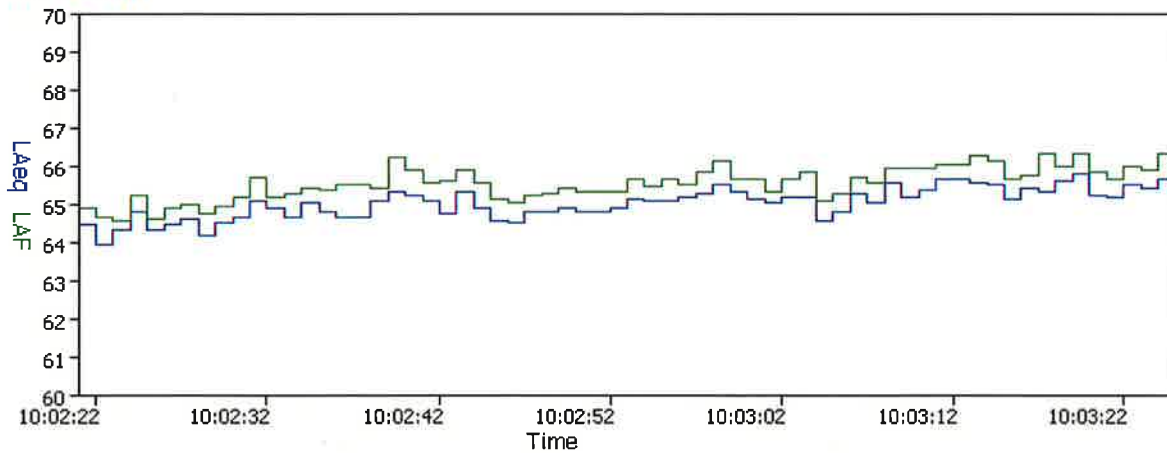
### Measurement Summary Report

Name	Sulphides - 5	<b>Summary</b>	LAF1	66.0 dB
Time	21/01/2016 10:02:21 AM	L <sub>Aeq</sub> 65.0 dB	LAF5	65.7 dB
Duration	00:01:04	LAE 83.1 dB	LAF10	65.6 dB
Instrument	G056962, CR:171A	LAFMax 66.3 dB	LAF50	65.0 dB
			LAF90	64.3 dB
			LAF95	64.2 dB
			LAF99	63.9 dB

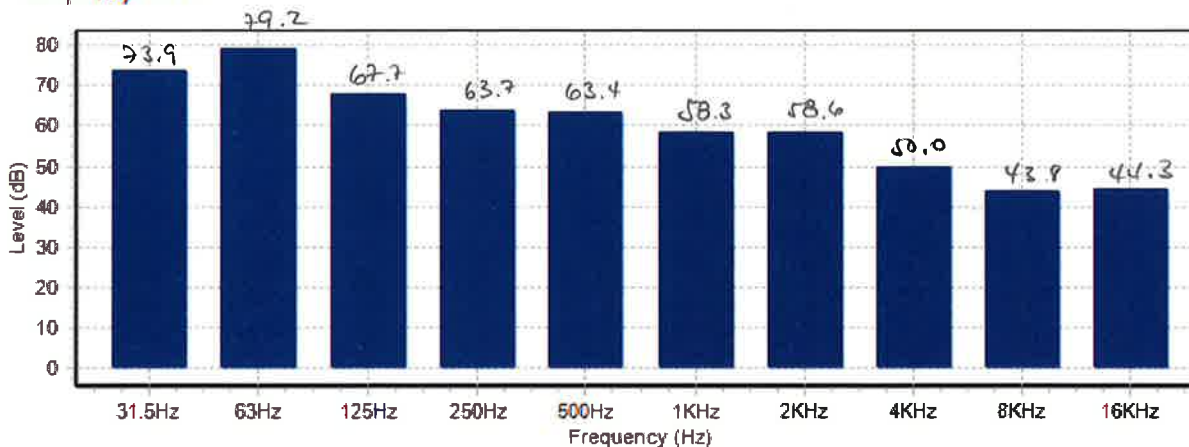
### Calibration Information

21/01/2016 10:02:12 AM 0.91 dB  
 21/01/2016 10:04:56 AM 0.88 dB

Time History



Frequency Bands



Fort Saskatchewan Sulphides: 2015 Environmental Noise Measurement (ID: 5)

Report ID



## Measurement Summary Report

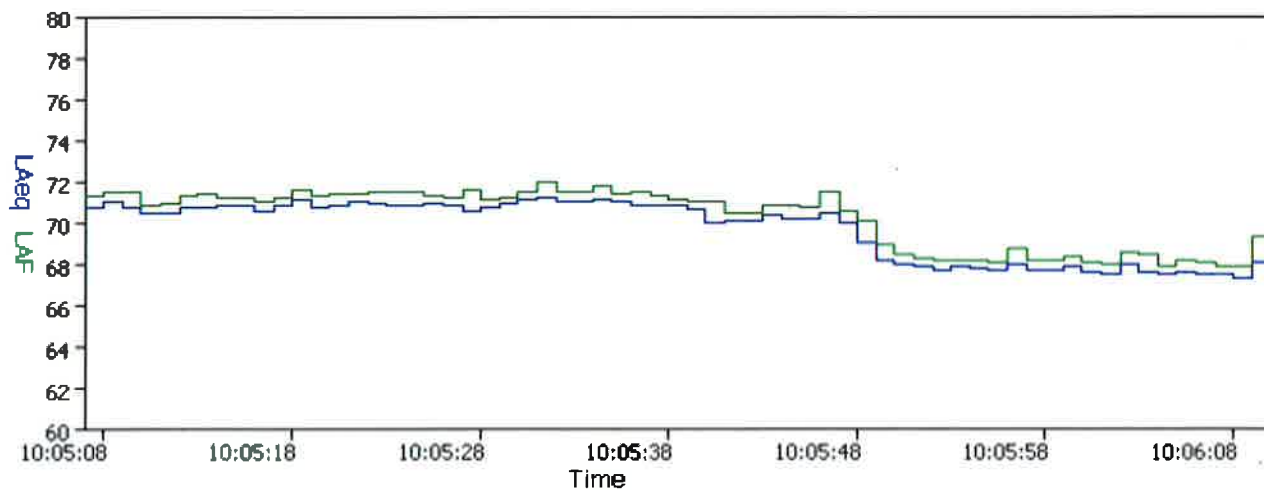
Name	Sulphides - 6	<b>Summary</b>	LAF1	71.4 dB
Time	21/01/2016 10:05:07 AM	L <sub>Aeq</sub> 69.9 dB	LAF5	71.1 dB
Duration	00:01:03	LAE 87.9 dB	LAF10	71.0 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub> 72.0 dB	LAF50	70.4 dB
			LAF90	67.5 dB
			LAF95	67.4 dB
			LAF99	67.2 dB

### Calibration Information

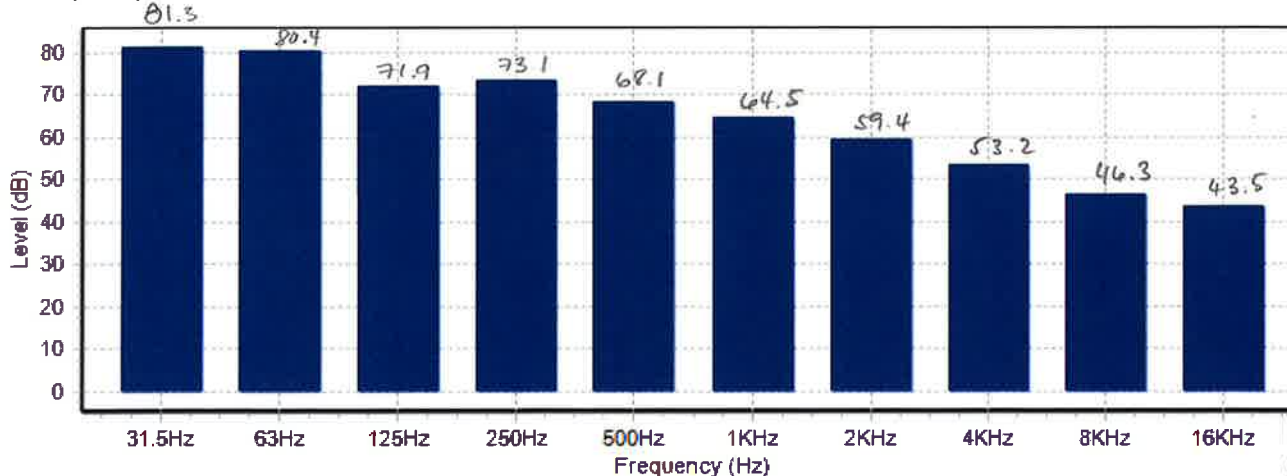
21/01/2016 10:04:56 AM 0.88 dB

21/01/2016 10:07:21 AM 0.88 dB

### Time History



### Frequency Bands



Report ID





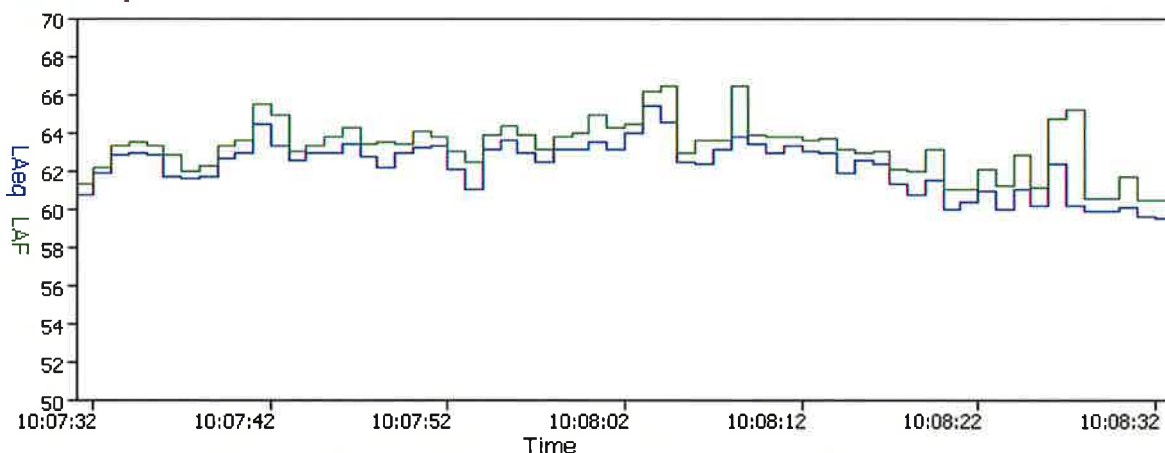
### Measurement Summary Report

Name	Sulphides - 7	<b>Summary</b>	LAF1	65.3 dB	
Time	21/01/2016 10:07:31 AM	L <sub>Aeq</sub>	62.4 dB	LAF5	64.2 dB
Duration	00:01:02	L <sub>AE</sub>	80.3 dB	LAF10	63.6 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub>	66.4 dB	LAF50	62.5 dB
				LAF90	59.9 dB
				LAF95	59.7 dB
				LAF99	59.2 dB

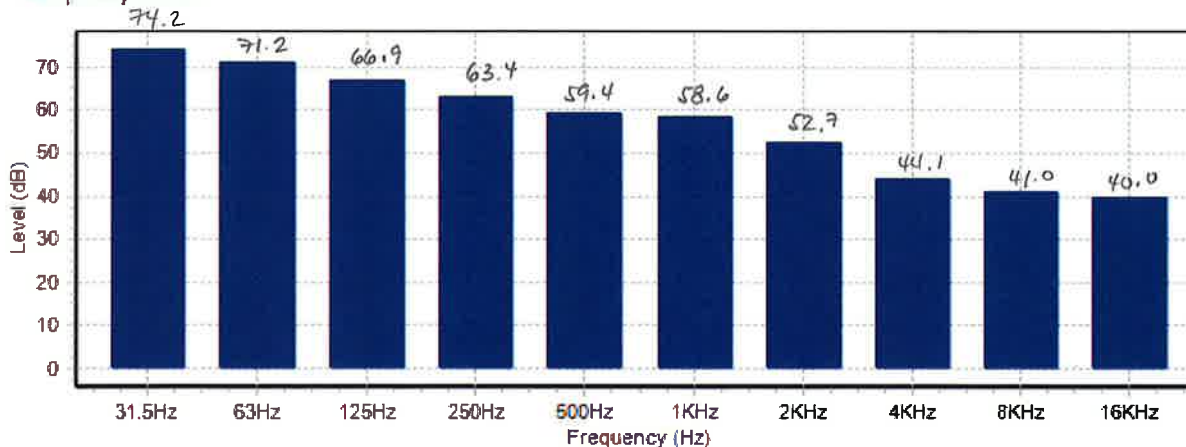
### Calibration Information

21/01/2016 10:07:21 AM 0.88 dB

Time History



Frequency Bands



Fort Saskatchewan Sulphides: 2015 Environmental Noise Measurement (ID: 7)


Report ID

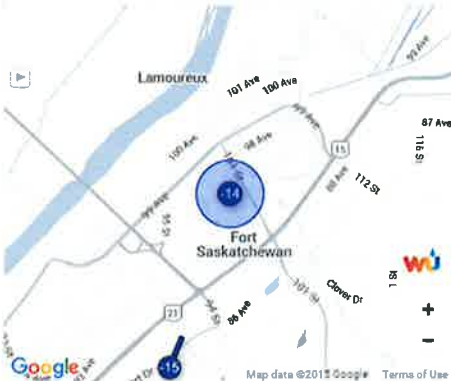


Forecast for Fort Saskatchewan, ALBERTA > 53.705 -113.212 > 623 m

[PWS Data](#) [PWS Widgets](#) [WunderStation](#)

PWS viewed 14 times since December 1, 2015

Satellite Webcam 



Fort Saskatchewan

Map data ©2015 Google [Terms of Use](#)

Low Clouds High Clouds  
Warm Cold

[View WunderMap](#)

Current Conditions Station reported 34 seconds ago

**-14.3 °C**

Feels Like **-14.3 °C**

Wind from WNW  
Gusts 1.6 km/h

0.0 km/h

Dew Point: -16 °C    UV: 0 ●  
 Humidity: 91%    Solar: --  
 Precip Rate: 0 mm/hr    Soil Moisture: --  
 Precip Accum: 0 mm    Soil Temp: --  
 Pressure: 998.87 hPa    Leaf Wetness: --

☀ 8:48 AM    🌇 4:14 PM

○ Waxing Gibbous | 97% Illuminated

Weather History for Fort Saskatchewan, ALBERTA [IALBERTA428]

[Previous](#)    Daily Mode     December     23     2015     [View](#)

Summary  
December 23, 2015

	High	Low	Average		High	Low	Average
Temperature	-10.7 °C	-15.9 °C	-13.3 °C	Wind Speed	5 km/h	--	0 km/h
Dew Point	-12.8 °C	-17.2 °C	-14.9 °C	Wind Gust	8 km/h	--	--
Humidity	91%	85%	88%	Wind Direction	--	--	WNW
Precipitation	0 mm	--	--	Pressure	999 hPa	995 hPa	--

Time	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate	Precip. Accum.
7:31 AM	-15.4 °C	-17.2 °C	88 %	WNW	0 kph	8 kph	996.5 hPa	0 mm	0 mm
7:46 AM	-15.9 °C	-17.2 °C	89 %	West	4.8 kph	6.4 kph	996.8 hPa	0 mm	0 mm
8:01 AM	-15.9 °C	-17.2 °C	90 %	WSW	0 kph	6.4 kph	996.8 hPa	0 mm	0 mm
8:16 AM	-15.9 °C	-17.2 °C	90 %	WNW	0 kph	3.2 kph	996.8 hPa	0 mm	0 mm
8:31 AM	-15.7 °C	-17.2 °C	89 %	West	1.6 kph	3.2 kph	996.8 hPa	0 mm	0 mm
8:46 AM	-15.7 °C	-17.2 °C	89 %	WNW	1.6 kph	1.6 kph	996.8 hPa	0 mm	0 mm
9:01 AM	-15.3 °C	-16.7 °C	90 %	WSW	1.6 kph	1.6 kph	996.8 hPa	0 mm	0 mm
9:16 AM	-14.8 °C	-16.1 °C	90 %	West	0 kph	0 kph	997.2 hPa	0 mm	0 mm
9:31 AM	-14.4 °C	-15.6 °C	90 %	West	0 kph	0 kph	997.2 hPa	0 mm	0 mm
9:46 AM	-13.9 °C	-15 °C	90 %	West	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
10:01 AM	-13.4 °C	-14.4 °C	90 %	West	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
10:16 AM	-13.1 °C	-14.4 °C	90 %	West	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
10:31 AM	-12.8 °C	-13.9 °C	90 %	NW	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
10:46 AM	-12.5 °C	-13.9 °C	90 %	WNW	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
11:01 AM	-12.4 °C	-13.9 °C	90 %	West	0 kph	1.6 kph	997.5 hPa	0 mm	0 mm
11:16 AM	-12.4 °C	-13.9 °C	89 %	West	0 kph	1.6 kph	997.5 hPa	0 mm	0 mm
11:31 AM	-12.3 °C	-13.3 °C	90 %	WSW	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
11:46 AM	-12.1 °C	-13.3 °C	89 %	WNW	0 kph	1.6 kph	997.2 hPa	0 mm	0 mm
12:01 PM	-11.9 °C	-13.3 °C	89 %	NW	0 kph	3.2 kph	997.2 hPa	0 mm	0 mm
12:16 PM	-11.7 °C	-13.3 °C	89 %	West	0 kph	3.2 kph	997.2 hPa	0 mm	0 mm
12:31 PM	-11.6 °C	-12.8 °C	89 %	West	0 kph	3.2 kph	996.8 hPa	0 mm	0 mm
12:46 PM	-11.3 °C	-12.8 °C	89 %	NE	0 kph	1.6 kph	996.8 hPa	0 mm	0 mm
1:01 PM	-11.2 °C	-12.8 °C	89 %	West	0 kph	1.6 kph	996.8 hPa	0 mm	0 mm



### Measurement Summary Report

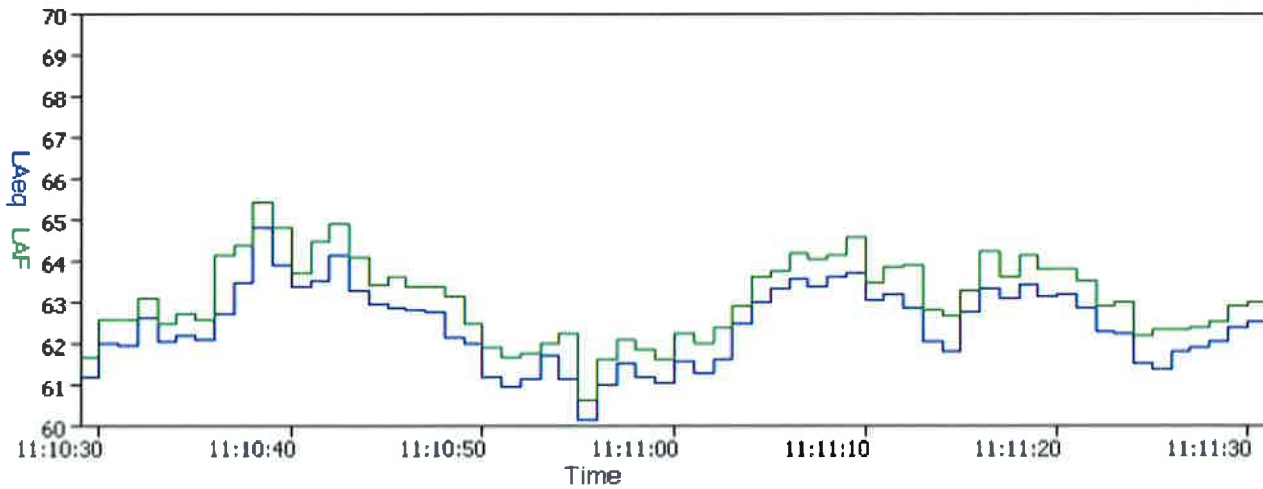
Name	CSC - 1	<b>Summary</b>	LAF1	64.6 dB	
Time	23/12/2015 11:10:29 AM	L <sub>Aeq</sub>	62.5 dB	LAF5	63.9 dB
Duration	00:01:02	L <sub>AE</sub>	80.4 dB	LAF10	63.6 dB
Instrument	G056962, CR:171A	L <sub>AFMax</sub>	65.4 dB	LAF50	62.3 dB
				LAF90	61.1 dB
				LAF95	60.7 dB
				LAF99	60.1 dB

### Calibration Information

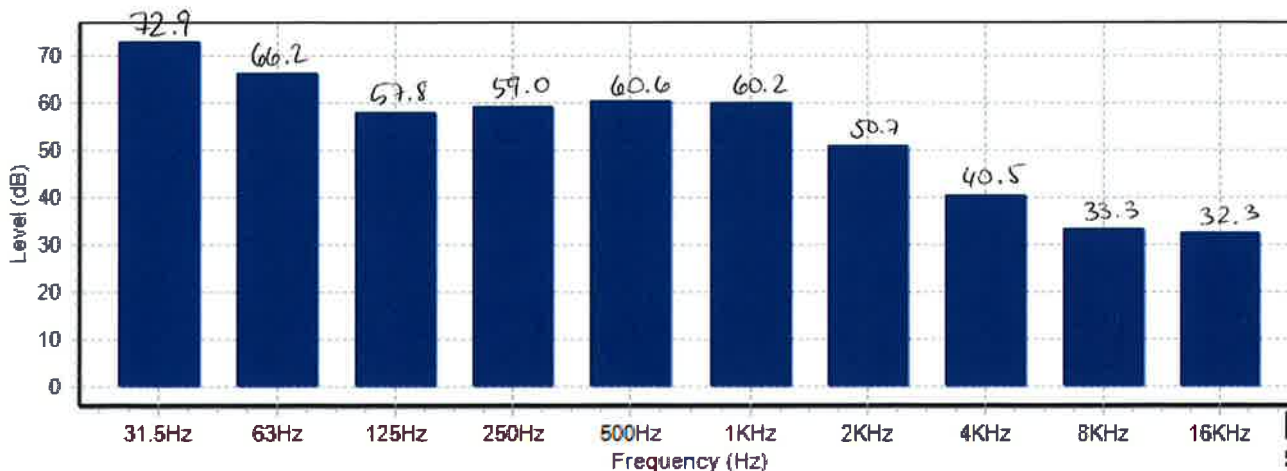
23/12/2015 11:10:08 AM 1.02 dB

23/12/2015 11:13:29 AM 1.10 dB

Time History



Frequency Bands



Report ID





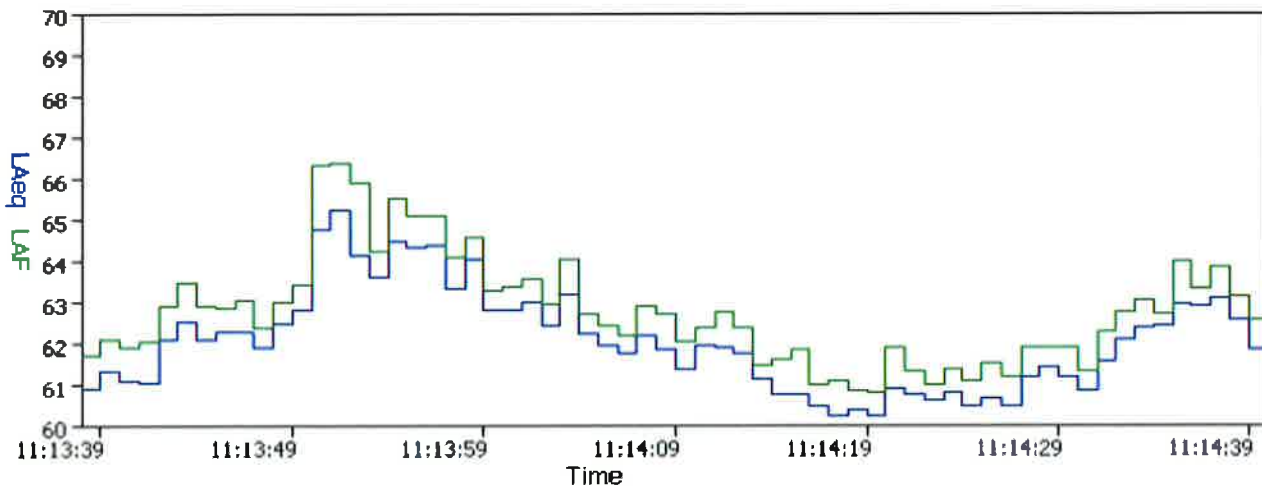
### Measurement Summary Report

Name	CSC - 2	<b>Summary</b>	LAF1	65.4 dB	
Time	23/12/2015 11:13:38 AM	L <sub>Aeq</sub>	62.2 dB	LAF5	64.4 dB
Duration	00:01:02	LAE	80.1 dB	LAF10	63.7 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub>	66.4 dB	LAF50	61.9 dB
				LAF90	60.4 dB
				LAF95	60.2 dB
				LAF99	59.8 dB

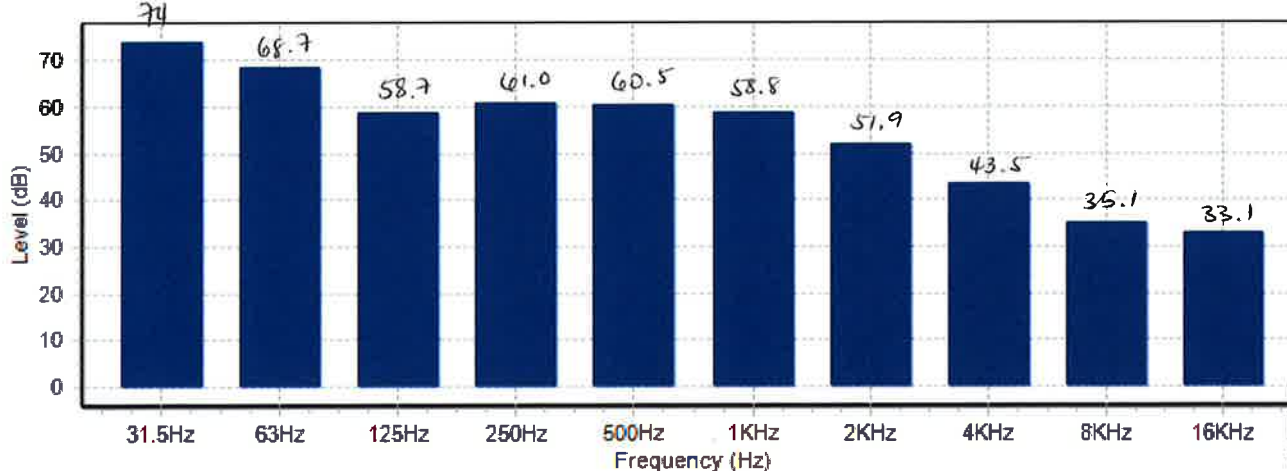
### Calibration Information

23/12/2015 11:13:29 AM 1.10 dB  
 23/12/2015 11:23:18 AM 1.17 dB

Time History



Frequency Bands



Report ID







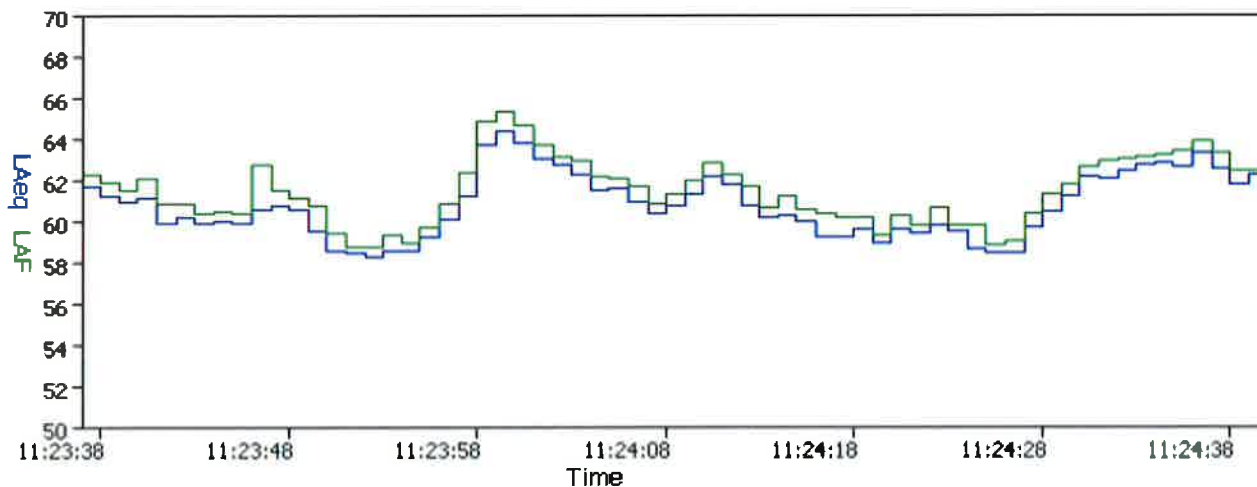
### Measurement Summary Report

Name	CSC - 3	<b>Summary</b>	LAF1	64.4 dB	
Time	23/12/2015 11:23:37 AM	LAeq	61.0 dB	LAF5	63.3 dB
Duration	00:01:03	LAE	79.0 dB	LAF10	62.7 dB
Instrument	G056962, CR:171A	LAFMax	65.3 dB	LAF50	60.5 dB
				LAF90	58.6 dB
				LAF95	58.3 dB
				LAF99	58.0 dB

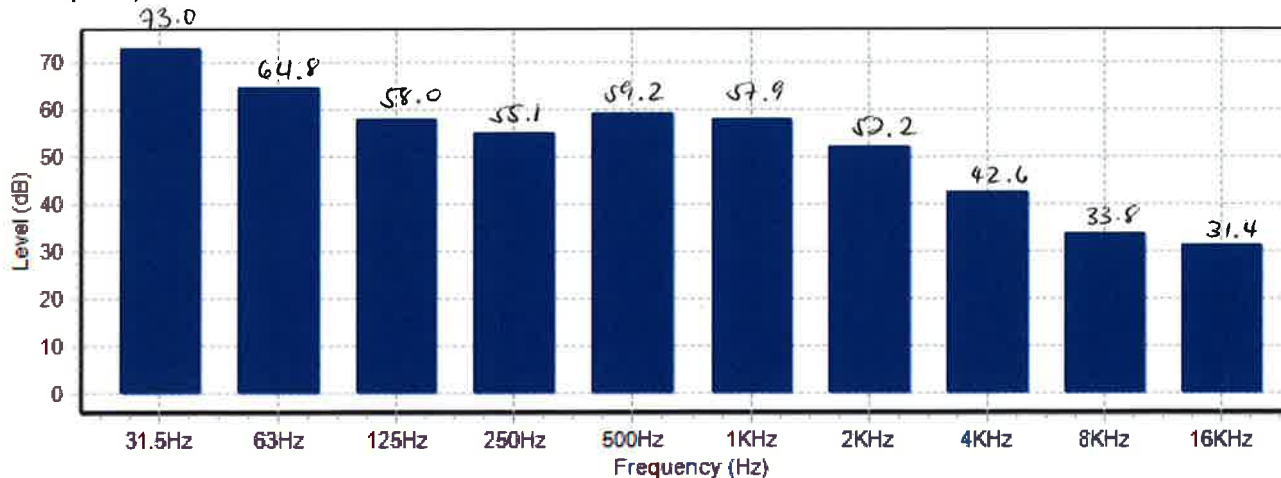
### Calibration Information

23/12/2015 11:23:18 AM 1.17 dB  
 23/12/2015 11:27:42 AM 1.12 dB

Time History



Frequency Bands



Report ID





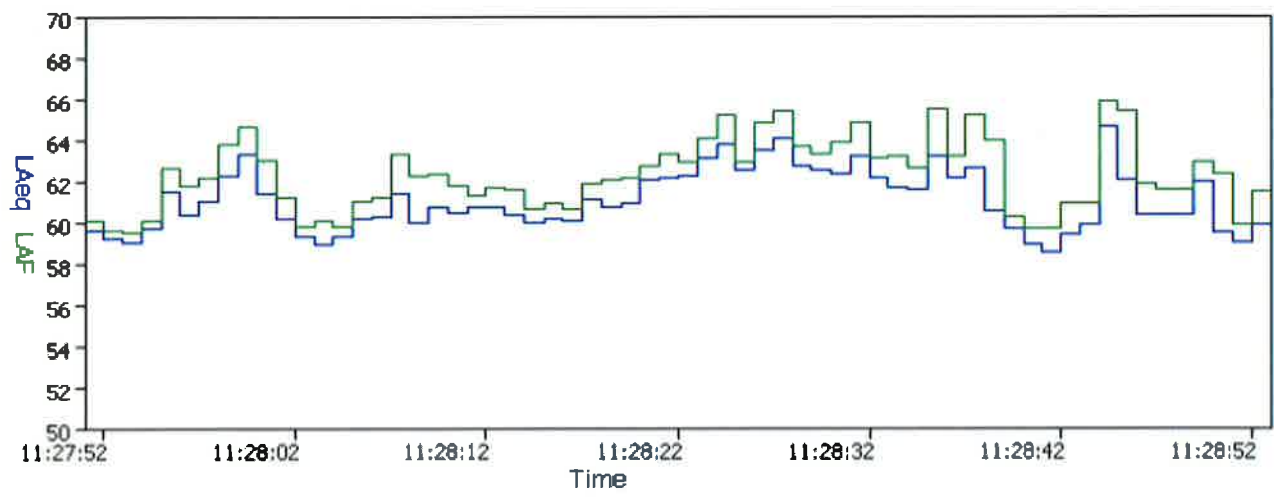
### Measurement Summary Report

Name	CSC - 4	<b>Summary</b>	LAF1	64.9 dB
Time	23/12/2015 11:27:51 AM	L <sub>Aeq</sub> 61.3 dB	LAF5	63.8 dB
Duration	00:01:02	LAE 79.2 dB	LAF10	63.1 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub> 65.8 dB	LAF50	60.7 dB
			LAF90	59.1 dB
			LAF95	58.7 dB
			LAF99	58.2 dB

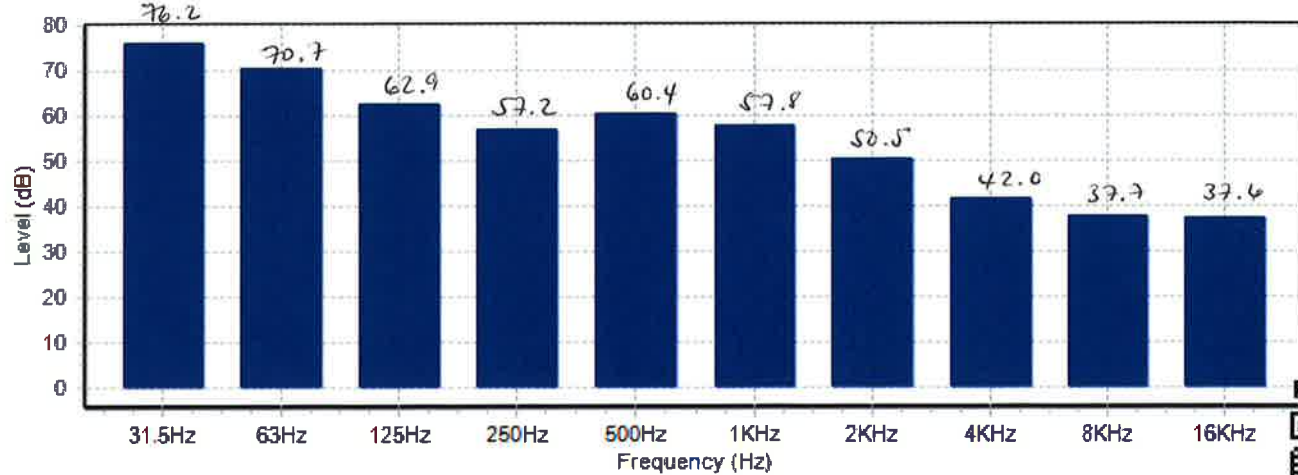
### Calibration Information

23/12/2015 11:27:42 AM 1.12 dB  
 23/12/2015 11:30:33 AM 1.34 dB

Time History



Frequency Bands





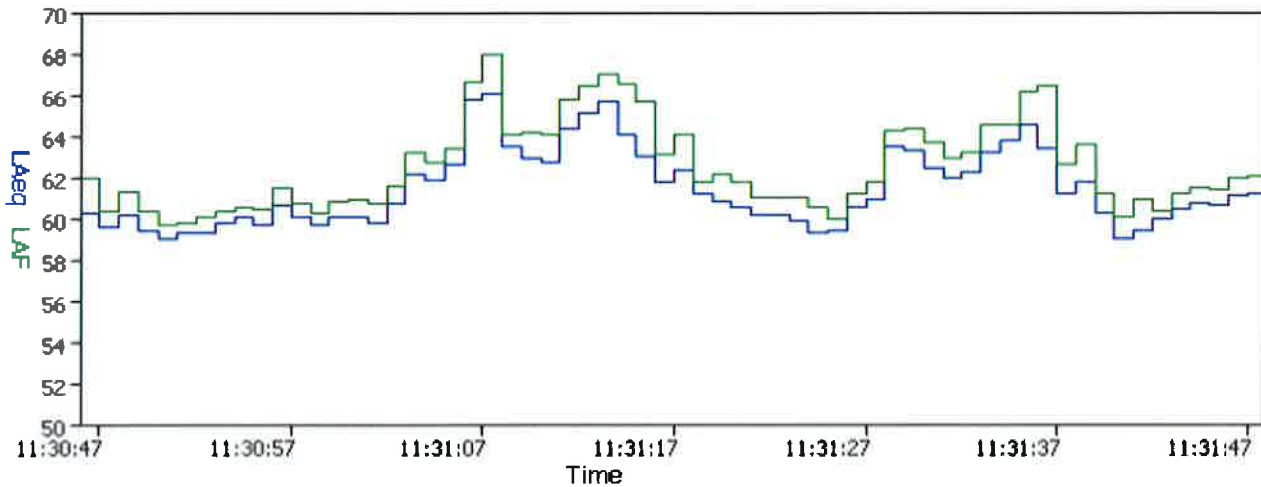
### Measurement Summary Report

Name	CSC - 5	<b>Summary</b>	LAF1	66.5 dB	
Time	23/12/2015 11:30:46 AM	L <sub>Aeq</sub>	61.8 dB	LAF5	65.1 dB
Duration	00:01:02	LAE	79.8 dB	LAF10	64.0 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub>	67.9 dB	LAF50	60.8 dB
				LAF90	59.3 dB
				LAF95	59.1 dB
				LAF99	58.4 dB

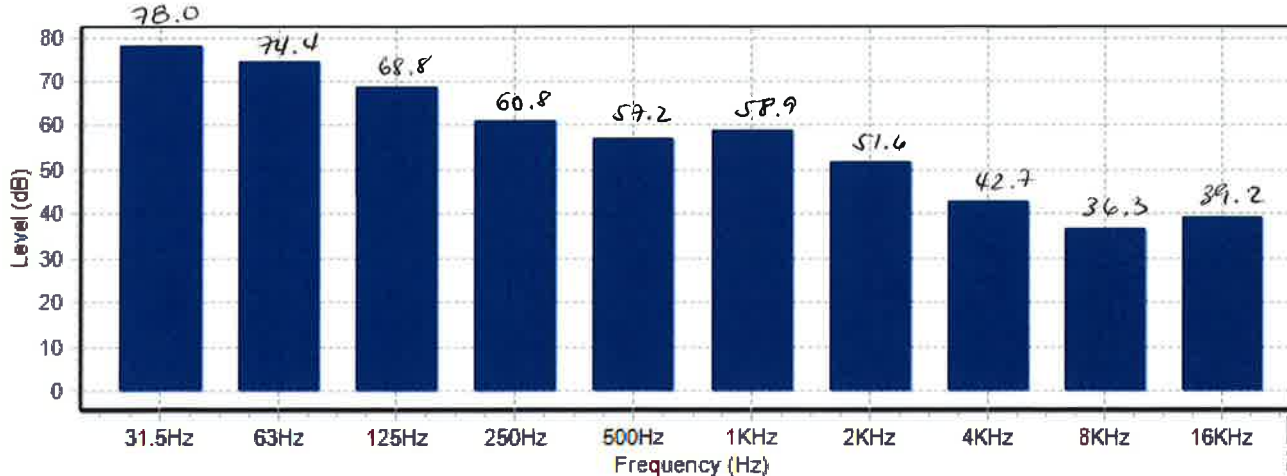
### Calibration Information

23/12/2015 11:30:33 AM 1.34 dB  
 23/12/2015 11:35:08 AM 1.35 dB

Time History



Frequency Bands



Report ID





### Measurement Summary Report

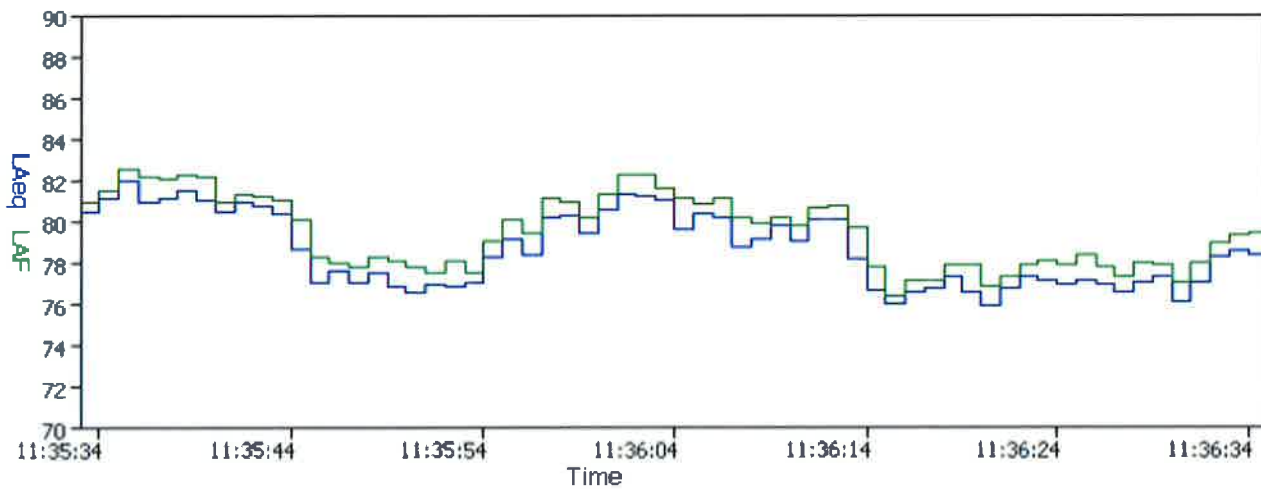
Name	CSC - 6	<b>Summary</b>	LAF1	81.9 dB
Time	23/12/2015 11:35:33 AM	L <sub>Aeq</sub> 79.0 dB	LAF5	81.4 dB
Duration	00:01:02	L <sub>AE</sub> 96.9 dB	LAF10	81.0 dB
Instrument	G056962, CR:171A	L <sub>AFMax</sub> 82.5 dB	LAF50	78.3 dB
			LAF90	76.4 dB
			LAF95	76.0 dB
			LAF99	75.6 dB

### Calibration Information

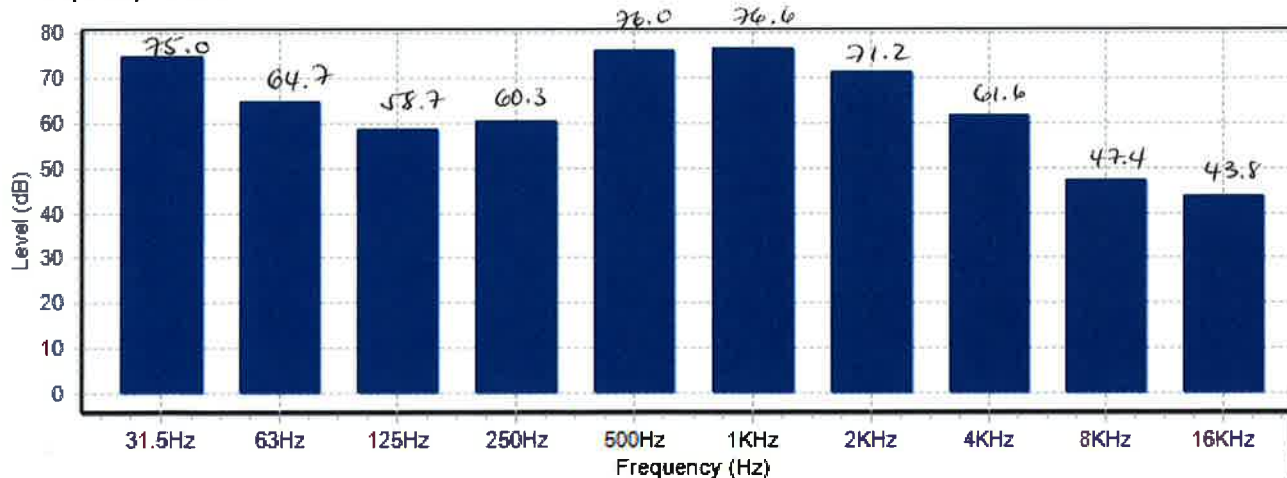
23/12/2015 11:35:08 AM 1.35 dB

23/12/2015 11:38:37 AM 1.40 dB

Time History



Frequency Bands



Report ID





### Measurement Summary Report

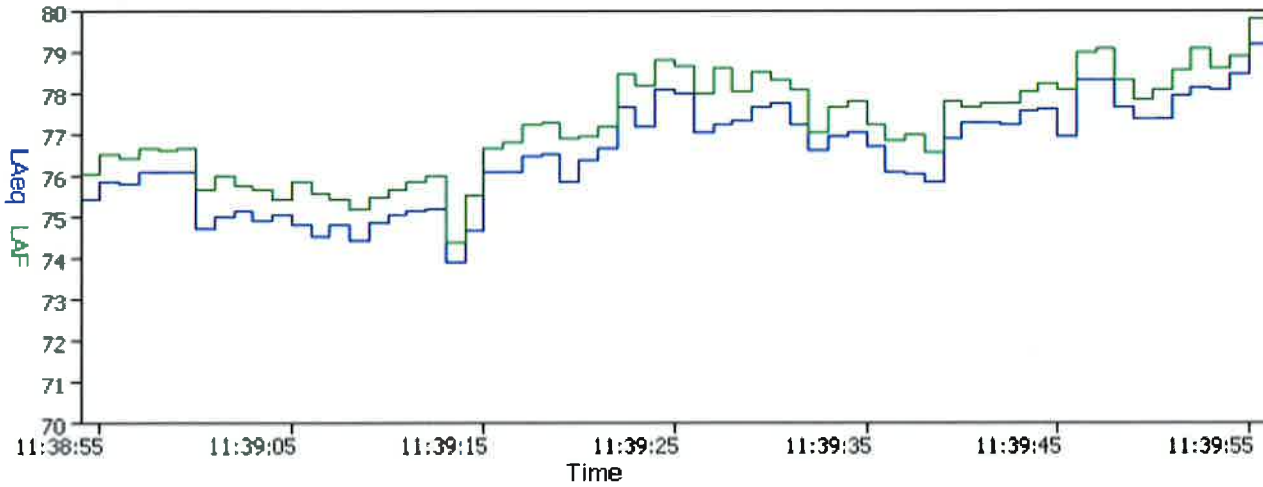
Name	CSC - 7	<b>Summary</b>	LAF1	78.8 dB	
Time	23/12/2015 11:38:54 AM	L <sup>A</sup> eq	76.7 dB	LAF5	78.3 dB
Duration	00:01:02	LAE	94.6 dB	LAF10	78.0 dB
Instrument	G056962, CR:171A	LAFMax	79.8 dB	LAF50	76.5 dB
				LAF90	74.7 dB
				LAF95	74.3 dB
				LAF99	73.7 dB

### Calibration Information

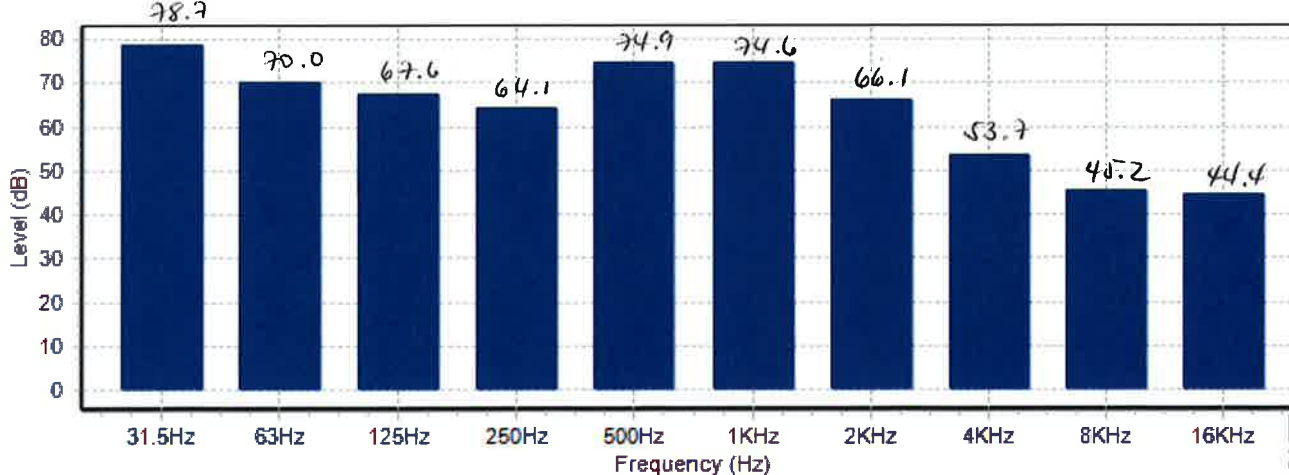
23/12/2015 11:38:37 AM 1.40 dB

23/12/2015 11:41:36 AM 1.39 dB

Time History



Frequency Bands



Report ID





### Measurement Summary Report

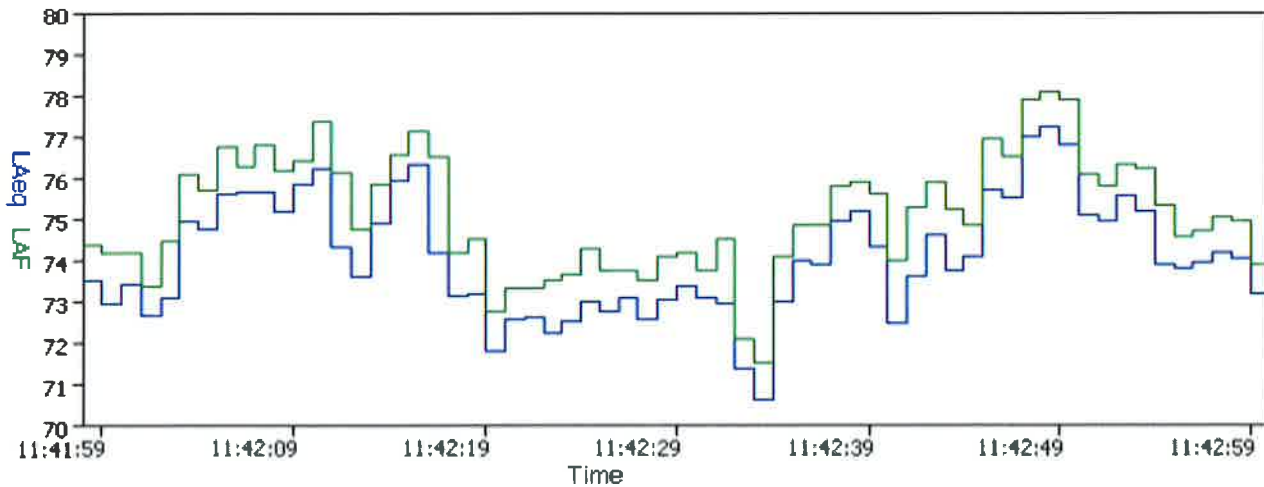
Name	CSC-8	<b>Summary</b>	LAF1	77.3 dB
Time	23/12/2015 11:41:58 AM	L <sub>Aeq</sub> 74.3 dB	LAF5	76.5 dB
Duration	00:01:02	LAE 92.2 dB	LAF10	76.0 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub> 78.1 dB	LAF50	73.9 dB
			LAF90	72.2 dB
			LAF95	71.7 dB
			LAF99	70.7 dB

### Calibration Information

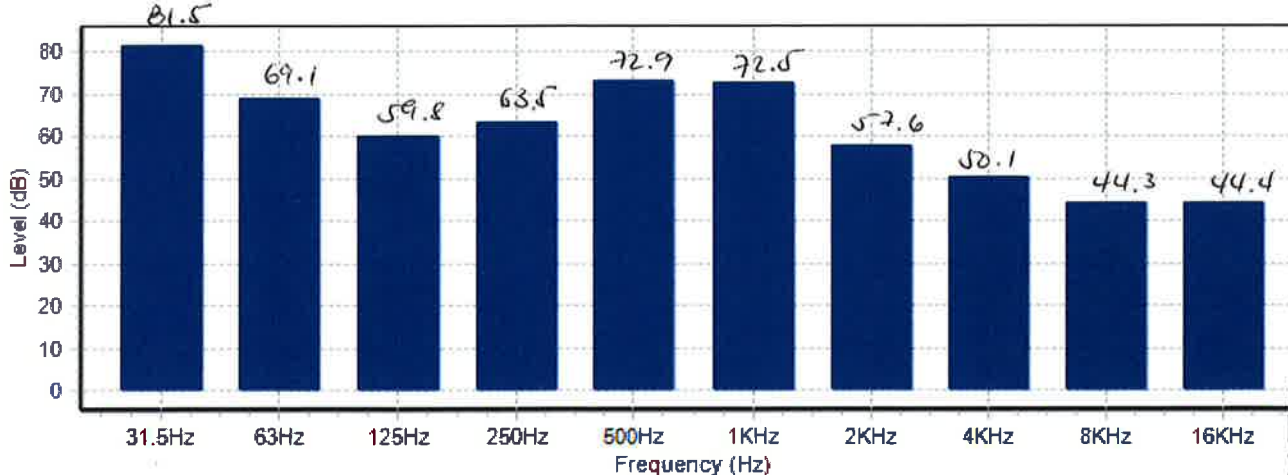
23/12/2015 11:41:36 AM 1.39 dB

23/12/2015 12:04:57 PM 1.13 dB

Time History



Frequency Bands



Report ID





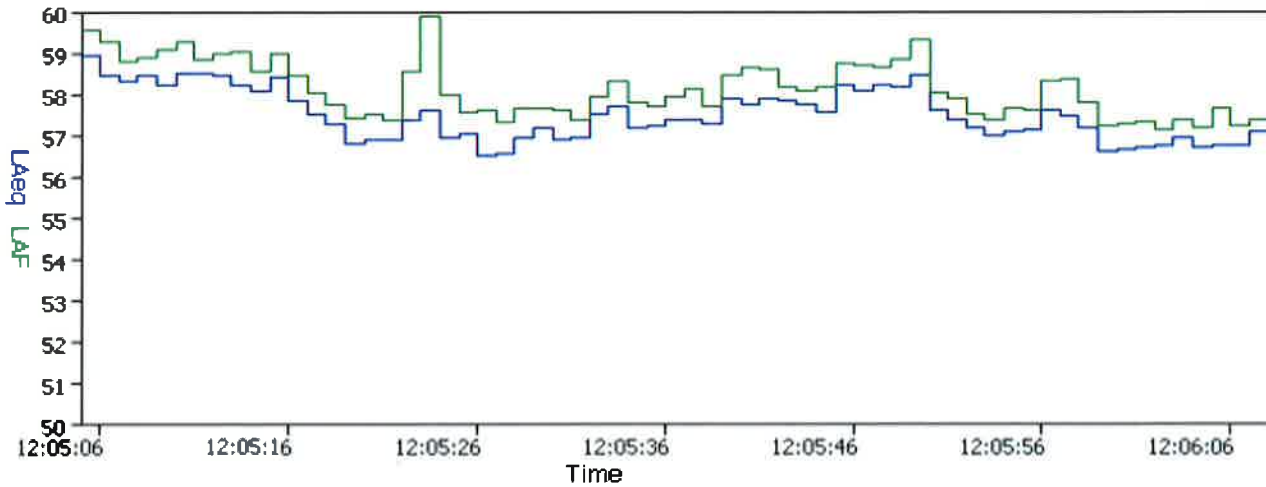
### Measurement Summary Report

Name	CSC - 9	<b>Summary</b>	LAF1	59.0 dB
Time	23/12/2015 12:05:05 PM	L <sub>Aeq</sub> 57.5 dB	LAF5	58.6 dB
Duration	00:01:03	LAE 75.5 dB	LAF10	58.4 dB
Instrument	G056962, CR:171A	LAF <sub>Max</sub> 59.9 dB	LAF50	57.3 dB
			LAF90	56.6 dB
			LAF95	56.5 dB
			LAF99	56.1 dB

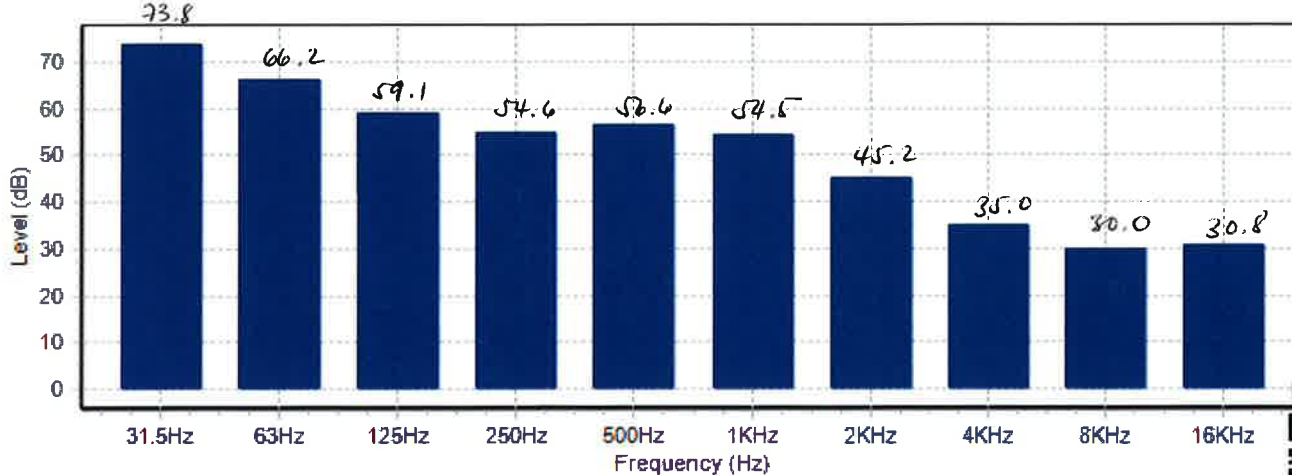
### Calibration Information

23/12/2015 12:04:57 PM 1.13 dB

Time History



Frequency Bands



Report ID



PWS viewed 23 times since January 1, 2016

[Satellite](#) [Webcam](#)

View WunderMap

### Current Conditions

Station reported 10 minutes ago

# -9.2 °C

Feels Like -9.2 °C

0.0

km/h

Wind from **ESE**  
Gusts 0.0 km/h

Dew Point: -10 °C    UV: 0

Humidity: 92%        Solar: --

Precip Rate: 0 mm/hr    Soil Moisture: --

Precip Accum: 0 mm    Soil Temp: --

Pressure: 1013.77 hPa    Leaf Wetness: --

☀ 8:35 AM    🌅 4:53 PM

☾ Waxing Gibbous | 94% Illuminated

## Weather History for Fort Saskatchewan, ALBERTA [IALBERTA428]

[Previous](#)
Daily Mode
January
21
2016
[View](#) [Next](#)

### Summary

Jan 21, 2016

	High	Low	Average		High	Low	Average
Temperature	-9.2 °C	-18.8 °C	-14 °C	Wind Speed	0 km/h	--	0 km/h
Dew Point	-10 °C	-20.6 °C	-18 °C	Wind Gust	2 km/h	--	--
Humidity	94%	86%	88%	Wind Direction	--	--	South
Precipitation	0 mm	--	--	Pressure	1021 hPa	1014 hPa	--



# Weather History Table

 Download

Time	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate	Precip. Accum.
12:09 AM	-16.9 °C	-18.3 °C	88 %	South	0 kph	0 kph	1020.9 hPa	0 mm	0 mm
12:24 AM	-16.9 °C	-18.3 °C	89 %	South	0 kph	0 kph	1020.9 hPa	0 mm	0 mm
12:39 AM	-17.1 °C	-18.9 °C	88 %	South	0 kph	0 kph	1020.5 hPa	0 mm	0 mm
12:54 AM	-17.2 °C	-18.9 °C	88 %	SSE	0 kph	0 kph	1020.2 hPa	0 mm	0 mm
1:09 AM	-17.4 °C	-18.9 °C	87 %	SSE	0 kph	0 kph	1019.9 hPa	0 mm	0 mm
1:24 AM	-17.7 °C	-19.4 °C	86 %	SSE	0 kph	0 kph	1019.5 hPa	0 mm	0 mm
1:39 AM	-17.9 °C	-19.4 °C	87 %	SSE	0 kph	0 kph	1019.5 hPa	0 mm	0 mm
1:54 AM	-18.2 °C	-20 °C	86 %	SSE	0 kph	0 kph	1019.5 hPa	0 mm	0 mm
2:09 AM	-18.5 °C	-20.6 °C	86 %	SSE	0 kph	0 kph	1019.5 hPa	0 mm	0 mm
2:24 AM	-18.7 °C	-20.6 °C	87 %	SSE	0 kph	0 kph	1019.9 hPa	0 mm	0 mm
2:39 AM	-18.8 °C	-20.6 °C	86 %	SSE	0 kph	0 kph	1019.5 hPa	0 mm	0 mm
3:24 AM	-17.8 °C	-19.4 °C	88 %	SSE	0 kph	0 kph	1019.2 hPa	0 mm	0 mm
3:40 AM	-18 °C	-19.4 °C	87 %	SSE	0 kph	0 kph	1018.8 hPa	0 mm	0 mm
3:55 AM	-18.4 °C	-20 °C	86 %	SSE	0 kph	0 kph	1018.8 hPa	0 mm	0 mm
4:10 AM	-18.4 °C	-20 °C	87 %	SSE	0 kph	0 kph	1018.8 hPa	0 mm	0 mm
4:25 AM	-17.8 °C	-19.4 °C	88 %	ENE	0 kph	1.6 kph	1018.5 hPa	0 mm	0 mm
4:40 AM	-17.4 °C	-18.9 °C	88 %	ENE	0 kph	1.6 kph	1018.5 hPa	0 mm	0 mm
4:55 AM	-17.4 °C	-18.9 °C	87 %	SE	0 kph	0 kph	1018.2 hPa	0 mm	0 mm
5:10 AM	-17.8 °C	-19.4 °C	87 %	SE	0 kph	0 kph	1017.8 hPa	0 mm	0 mm
5:25 AM	-18 °C	-19.4 °C	87 %	SE	0 kph	0 kph	1017.8 hPa	0 mm	0 mm
5:55 AM	-17.6 °C	-18.9 °C	88 %	SE	0 kph	0 kph	1017.5 hPa	0 mm	0 mm
6:10 AM	-17.1 °C	-18.9 °C	88 %	SW	0 kph	0 kph	1017.5 hPa	0 mm	0 mm
6:25 AM	-16.9 °C	-18.3 °C	88 %	SW	0 kph	0 kph	1017.2 hPa	0 mm	0 mm
6:40 AM	-17.1 °C	-18.9 °C	87 %	SW	0 kph	0 kph	1017.2 hPa	0 mm	0 mm
6:56 AM	-17 °C	-18.3 °C	88 %	WSW	0 kph	0 kph	1016.8 hPa	0 mm	0 mm
7:11 AM	-16.6 °C	-18.3 °C	88 %	NNE	0 kph	0 kph	1016.5 hPa	0 mm	0 mm
7:26 AM	-16.4 °C	-17.8 °C	88 %	NNE	0 kph	0 kph	1016.5 hPa	0 mm	0 mm

Time	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate	Precip. Accum.
7:26 AM	-16.4 °C	-17.3 °C	88 %	NNE	0 kph	0 kph	1015.5 hPa	0 mm	0 mm
7:41 AM	-16.1 °C	-17.8 °C	88 %	NE	0 kph	1.6 kph	1015.8 hPa	0 mm	0 mm
7:56 AM	-15.9 °C	-17.2 °C	88 %	NE	0 kph	0 kph	1015.5 hPa	0 mm	0 mm
8:11 AM	-15.7 °C	-17.2 °C	88 %	NE	0 kph	0 kph	1015.1 hPa	0 mm	0 mm
8:26 AM	-15.5 °C	-17.2 °C	87 %	NW	0 kph	0 kph	1015.1 hPa	0 mm	0 mm
8:41 AM	-15.7 °C	-17.2 °C	88 %	NW	0 kph	0 kph	1014.4 hPa	0 mm	0 mm
8:56 AM	-15.1 °C	-16.7 °C	89 %	NW	0 kph	-- kph	1014.4 hPa	-- mm	0 mm
9:11 AM	-14.4 °C	-15.6 °C	90 %	West	0 kph	0 kph	1014.4 hPa	0 mm	0 mm
9:41 AM	-13.7 °C	-15 °C	90 %	West	0 kph	0 kph	1014.4 hPa	0 mm	0 mm
9:56 AM	-12.7 °C	-13.9 °C	92 %	West	0 kph	1.6 kph	1014.4 hPa	0 mm	0 mm
10:11 AM	-11.6 °C	-12.8 °C	92 %	West	0 kph	0 kph	1014.1 hPa	0 mm	0 mm
10:27 AM	-9.9 °C	-10.6 °C	94 %	SW	0 kph	0 kph	1013.8 hPa	0 mm	0 mm
10:42 AM	-9.2 °C	-10 °C	92 %	ESE	0 kph	0 kph	1013.8 hPa	0 mm	0 mm

NCIA office, Fort Saskatchewan  
#204 9902-102 Street  
Fort Saskatchewan, AB  
Attn.: Dr. Laurie J. Danielson, P. Chem.  
Executive Director, Northeast Capital Industrial Association

February 11, 2016

**RE: Annual self-assessment of Chemtrade's Environmental Noise Management program for the Fort Saskatchewan CSC and Sulphides sites**

As per Chemtrade's Environmental Noise Monitoring and Control Procedure CHE-FSK-ESH-001, Neil Moon (Regional Manager) and Kathryn Dragowska (EHS Supervisor) have performed an annual self-assessment of our program. The following items have been examined and corrective actions have been noted below:

**Items examined:**

1. Noise survey results from 2015
2. Review of any noise complaints and their follow-up
3. Review of worker training records (TLM)
4. Review of capital projects and changes made which may impact environmental noise from either facility
5. General review of the procedure

No corrective actions are required, both plants are in compliance.

If there are any questions concerning this assessment, please contact Kathryn Dragowska at (780) 288-3984.

Yours truly,



Neil Moon  
Regional Manager



Kathryn Dragowska  
EH&S Supervisor



---

**Dow Chemical Canada ULC**  
Bag 16, Highway 15  
Fort Saskatchewan, Alberta  
T8L 2P4, Canada

June 10, 2016

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

Dear Dr. Danielson,

**Subject: 2015 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 Marcella deJong at 780 - 992 - 8529 or myself at 780 - 998 - 5720 if you require any further information or clarification.

Yours truly,

A handwritten signature in black ink, appearing to read "Mike Dziarmaga".

Mike Dziarmaga, P. Eng.  
Responsible Care Leader  
Dow Alberta Operations

Copy: Pravind Ramdial, Responsible Care Leader MEGlobal Canada ULC



WORLDWIDE PARTNER

Dow Fort Saskatchewan Site  
 2015 Noise Management Annual Report  
 Prepared for Northeast Capital Industrial Association (NCIA)

This report provides Dow and MEGlobal's 2015 input to the NCIA Regional Noise Management Plan report to be submitted to the AER in June 2016. 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.

<i>Input Description</i>	Dow and MEGlobal Comments
<p><i>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-10, revised 14-Apr-14, revised 31-Mar-16 including the Procedure / Practice / Standard reference.</i></p>	<p>A Noise Management Plan was developed by Dow and MEGlobal for submission to NCIA for inclusion in the 2011 NCIA report to the AER. This plan was last updated in 2015. A copy of the most recent version is included with this report.</p> <p>Noise management is done on a site wide basis without separation of which facilities are required to follow AER Directive 38 and AUC Rule 012.</p>
<p><i>Attach results of any monitoring / assessments (fenceline outward) completed in 2015.</i></p> <p><i>Note, you are not required to conduct any off-site monitoring, however if you did, please provide those results electronically to NCIA.</i></p>	<p>No noise monitoring (fenceline outward) was completed in 2015. The site noise model was updated in 2014 for all sources (other than on-site transportation) within the Dow Fort Saskatchewan Site, including MEGlobal.</p> <p>Recent updates to the Dow site model have been incorporated into the NCIA regional noise model.</p>
<p><i>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</i></p> <p><i>Did those changes result in a requirement to update your site noise model?</i></p> <p><i>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?</i></p>	<p>Changes were made to a Dow site steam turbine in 2012 which has resulted in significantly less venting of a seasonally operated steam vent during the summer season.</p> <p>Since the spring 2012 turnaround, we have seen a significant decrease in the number of days that this steam vent has been open. However, the intensity of the venting remains similar to prior to the turnaround. This source was removed from the NCIA regional noise model during the most recent update but remains in the Dow site model as part of a worst case.</p>
<p><i>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</i></p> <p><i>Will these changes result in a requirement to update your site noise model?</i></p> <p><i>If so, when do you anticipate having an updated site model available?</i></p>	<p>In 2016, Dow will continue track the frequency of time that the steam vent is operated as well as the valve position to ensure that the frequency remains reduced from pre-turnaround and will plan for field monitoring only if the intensity of the sound when the vent is operating changes over time.</p>

<p><i>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</i></p>	<p>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 November 2014 by the site leader. No actions or gaps were identified related to the Noise Management Plan.</p> <p>In March 2014, the AER conducted an audit of the Dow Site Noise Management Plan. Dow participated fully in the audit and provided all requested information to the AER auditor including, most recently, an updated source order ranking for each residence near the Dow site in January 2015.</p>
<p><i>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</i></p>	<p>There were no noise complaints in 2015 related to Dow or MEGlobal operations at the site.</p>

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# Dow Fort Saskatchewan Site Noise Management Plan

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<b>Policy</b>	<p>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.</p> <p>MEGlobal Canada ULC (MEGlobal) Operations on the Dow Fort Saskatchewan Site follows ODMS and is included in this Noise Management Plan.</p>
<b>Scope</b>	<p>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:</p> <ul style="list-style-type: none"><li>• Section E (noise minimization to meet community expectations and applicable government requirements) of <a href="#">06.07 L1 Pollution Prevention</a></li><li>• Section C14 (employee hearing conservation) of <a href="#">06.05 L1 Employee Health and Safety</a></li><li>• Section A2 (all equipment must be designed to control noise levels) of <a href="#">06.03 EH&amp;S Engineering Design and Control</a></li></ul>
<b>Purpose</b>	<p>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.</p> <p>This Noise Management Plan meets the requirements of NCIA Standard and Guideline #2010-003, as amended.</p> <p>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.</p>
<b>Goals / Objectives</b>	<p>Dow and MEGlobal, as Responsible Care® Companies will:</p> <ul style="list-style-type: none"><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><li>• Assign employees to manage the site noise 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>
<b>Training Requirements</b>	<p>Workers are educated on noise through:</p> <ul style="list-style-type: none"><li>• All workers receive initial and three year recurring Environmental Training (Instructor led or MyLearning), which includes environmental noise.</li><li>• Noise exposed workers receive MyLearning 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 MyLearning training on these programs.</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 [Alberta Operations Project Regulatory Review Checklist](#), 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 [Noise Model](#) prepared by SLR Consulting Ltd. which includes all significant site sources within the fence line 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 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 [Noise Model](#) and included in the NCIA regional noise model. In addition, each unit has an area [noise map](#).

**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.



<b>Reporting Requirements</b>	<p>Annual reports will be generated for the NCIA. This report will include the following information for the calendar year:</p> <ul style="list-style-type: none"> <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>
<b>Ownership</b>	The AER Regulatory Specialist manages the Noise Management Program and reports to NCIA as required.

## Revision History


<b>Approval</b>	<p>Approved by</p> <p>Carol Moen (Dow Responsible Care Leader)</p> <p>Pravind Ramdial (MEGlobal Responsible Care Leader)</p>	Date: January 2012
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**Review History** The following documents the review history for this file.

Date	Reviewed By	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

**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.

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
		<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>	
		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>


**Evonik Canada Inc:**

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Confirmed. Relevant Evonik site policy was provided in 2014 and has remained unchanged since then.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>No monitoring or assessment required or carried out in 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>None to disclose at this time.</p>

*J.S., May 13, 2016*

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

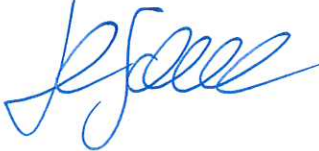
<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>None to disclose at this time.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>2012 assessment and evaluation conducted by Evonik ESHQ/ OH experts. Suitable report excerpt available upon request.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>No complaints.</p>

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.


Document finalized May 13, 2016

Hans Schuhbauer



Kevin Wagil




	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
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**Insert your Company Name here: Keyera**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Confirmed. The site has a noise management plan based on the current NCIA standard. The document is called KFS Site Noise Management Plan.</p> <p>NCIA has a copy of the current plan.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>No off-site monitoring was completed in 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>No improvements were completed in 2015.</p>

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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>2015 equipment additions included construction of a De-ethanizer unit. The De-ethanizer was operational in the spring of 2015.</p> <p>Construction of a second Fractionation unit also took place during 2015, with expected commissioning and operation commencing in the spring of 2016.</p> <p>Once the addition is complete there will be a requirement to update the site noise model, which is expected to be completed in 2016.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>Additional noise modeling has been conducted as part of the detailed engineering phase for construction of a new fractionation plant at the site. The design and regulatory components have been completed and equipment commissioning will occur in 2016.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>There were no noise complaints received in 2015.</p>

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		<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>	

**Insert your Company Name here: North West Redwater Partnership**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Throughout 2015 NWR has been in construction mode related to the first phase of the Sturgeon Refinery. Construction activity will remain ongoing throughout 2017, with certain pre-commissioning activities occurring in H2 2017.</p> <p>The Noise Management Plan adopted by NWR and as reflected in its model is to purchase equipment with noise characteristics as required for OH&amp;S compliance, and to perform in accordance with model expectations.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>As there has been no operational period whatsoever for the NWR facility, there have been no tests of actual vs modelled performance. Such tests will follow early operations periods, likely in 2018</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>There have been no notable updates to the Noise Model built by SLR Consulting (and their predecessor) and currently incorporated into the NCIA regional noise model. NWR has provided all required permissions to SLR and NCIA regarding use of data and model results into the regional model. A copy of the NWR-specific noise model was submitted to the AER (predecessor – EUB/ERCB) and accepted (circa 2007~2008)</p>

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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	N/A
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	N/A
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	None.

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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.

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>MSP2-3 Occupational Health and Personnel Safety</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>None</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>None</p> <p>No</p> <p>No</p>




	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
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Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).	None
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?	N/A
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.	Site Management Procedure reviewed.
Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.	No noise complaints received related to Oerlikon Metco (Canada) Inc.

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**Insert your Company Name here: Pembina NGL Corporation – Redwater Fractionation Facilities (I & II)**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Pembina Redwater facilities have a Noise Management Program, which includes implementation of Best Management Practices to address environmental noise as per the NCIA Noise Management Plan.</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>None completed.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>No improvements or corrective actions were implemented in 2015 for the facility.</p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>The following projects are scheduled to become operational in 2016:</p> <ol style="list-style-type: none"> <li>1) RFS II fractionator: additional facilities to increase fractionation capacity will increase overall noise output at the facility. Noise modelling was completed in support of this project.</li> <li>2) ROF C3+ De-bottlenecking project: additional infrastructure to increase production from the olefinic feed stock to the plant. Includes the addition of a Sulphur Recovery Unit (SRU).</li> </ol>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>None completed.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>None received.</p>

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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.

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>The Facility has an Environmental Noise Management Practice. The practice is part of the site ISO 14001 certified management system (FSK-P-36-00-12).</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>No monitoring/assessments were completed in 2015.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>Construction activities continued on with the Phase 1 &amp; 2 Expansion project in 2015. This development began with the final construction of a new facility brine pond, drilling of new storage caverns, installation of associated infrastructure to support the cavern development, construction of new NGL storage facility, and earthworks and infrastructure installation for a new rail loading terminal.</p> <p>The expansion has resulted in the site conducting a noise impact assessment which was subsequently used to update the Regional Noise Model in 2014.</p> <p>SLR Consulting conducted the NIA and updated the model with the information.</p>

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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>The Facility will be continuing on with the Phase 1, 2 &amp; 3 Expansion plans in 2016. This will include the construction of a new facility brine pond, washing and development of underground storage caverns, excavation and construction of new surface water retention pond, commissioning of NGL storage area, installation of additional infrastructure at the fractionation plant, construction of new warehouse, and additional earthworks to facilitate future expansion plans.</p> <p>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.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>No audits or self-assessment evaluations were completed in 2015.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>No noise complaints were received by the Facility in 2015.</p>

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**Insert your Company Name here:** [Praxair Canada Inc Fort Saskatchewan Air Separation Plant](#)

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p><a href="#">Sound survey completed on July 24 2013 by Rishi Sookhaki. Site will be conducting a sound survey later this year (2016). A site plan is included with the results.</a></p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p><a href="#">No changes</a></p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p><a href="#">No changes to the way the facility operates. No improvements or corrective actions undertaken in 2015.</a></p>

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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>No changes planned in 2015 that will impact noise level of the facility.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>No changes</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>No noise complaints received in 2015</p>

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Sound Survey  
 July 24, 2013  
 Rishi Sookhai


Dec 17, 2013 (PL3 Area)  
 Measured by Mike Carter.

ROSS CREEK  
 SUBSTATION  
 (90656)



TYPE OF PLANT		DRAWN BY	CHECKED	SITE IDENTIFICATION	
FORT SASKATCHEWAN, AB		M.F.	-	-	
TITLE		REVIEWED	APPROVED	PROJECT NUMBER	
PLOT PLAN		-	-	-	
MODEL NAME	SCALE	DATE	SHEET	TOT SHTS.	
1	NTS	11/27/12	1	1	
SIZE	DRAWING NUMBER	ALTERATION			
D				A	





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**Shell Scotford Site**

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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 (attached), including the Procedure/Practice/Standard reference.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>In 2014, Shell Scotford amalgamated individual (Refinery, Chemicals, and Upgrader) Site NMPs into one document. It is called the Shell Scotford Site Noise Management Plan (SUG.HSSE.ENV.AIR.NOIS.M.002). Document attached.</p>  <p>SUG.HSSE.ENV.NOIS .M.002_Site_Noise_M</p>
<p>Attach results of any monitoring/assessments (fenceline outward) completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring, however if you did, please provide those results electronically to NCIA.</p>	<p>No monitoring/assessments completed in 2015</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>In 2014 the Chemicals, Refinery, Upgrader, and Expansion model updates were 100% completed. These updates will be included in the next RNM update.</p> <p>Site noise model for all 4 sites is complete and will be updated in RNM in next round of update.</p> <p>Theoretical model was developed for Debottleneck project.</p>

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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>Two projects will have an impact on noise: Refinery Debottleneck Project and Quest (CO2 capture).</p> <p>Site model update will be done for Quest in 2016.</p> <p>Chemical Plant site model will be updated in 2016.</p> <p>Debottleneck Project will start-up in 2017.</p> <p>Debottleneck Project will require our site model update. This will happen in 2017 -2018.</p>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>Site NMP has set internal audit frequency to a 3 year cycle with the first one being in 2015. However, AER audited our site NMP in Q1 2014, which will fulfill our internal auditing requirement so next audit is 2017.</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>No noise complaints received in 2015.</p>


This information is being collected as per the NMP Standard 2010-003 Document attached, section 5.4. 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.

## Shell Scotford Site Noise Management Plan


Document Review and Approval		
Reviewed By		
Elaine Rippon		
Maurice Ouellet		
Wendy Konsorada		
Michael Frigge		
Achim Schempp		
APPROVED BY	DATE	SIGNATURE

Version 2  
27-November-2014

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## 1 POLICY

Royal Dutch Shell's Commitment and Policy on Health, Security, Safety, the Environment and Social Performance demonstrates commitment for reducing environmental and social impacts resulting from our operations. For Shell Scotford, noise is actively managed by instituting controls, and measures up front when designing or changing parts of the process that generate noise, and by also measuring and monitoring to ensure controls are effective. This Site Noise Management Plan is part of the Scotford's ongoing commitment to the environment, our neighbours, and social performance. The Scotford Leadership Teams are committed to controlling noise and support the contents of this Site Noise Management Plan.

## 2 NOISE MANAGEMENT PROGRAM


### 2.1 Goals and Objectives

#### 2.1.1 Regulatory Compliance

Noise is regulated by the Alberta Energy and Resources Conservation Board (ERCB), Directive 038, "Noise Control Directive - User Guide" and applies to all facilities where the ERCB has issued a permit to operate. Section 5.1 of the Noise Control Directive states,

"A facility is in compliance if a CSL (comprehensive sound level) survey conducted at representative conditions has results equal to or lower than the established PSL (permissible sound level), taking into consideration any LFN (low frequency noise). Alternatively, if the ERCB agrees that a CSL survey is not practical, a detailed Noise Management Plan (NMP) approved by the ERCB may be used."

The Industrial Heartland is considered an area where a CSL survey is not practical due to the large industrial base in a relatively small area. As such, all NCIA (Northeast Capital Industrial Association) member companies in the Industrial Heartland are mandated to participate in the Regional Noise Management Plan developed by the NCIA. The RNMP is designed with the intent of minimizing, to the extent practical, the noise levels impacting on the environment from member companies and their associated industrial facilities. The RNMP ensures that NCIA member

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companies adopt best practices and principles in noise management and that each member company will implement a Site NMP (noise management plan) independently. Each NMP must include:

- identification of noise sources,
- assessment of current noise mitigation programs,
- performance effectiveness of noise control devices,
- methods of noise measurement,
- best practices programs, and
- continuous improvement programs


Compliance with D-38 is to be demonstrated through conformance with the RNMP on the basis of due diligence for noise control (taking all reasonable steps to reduce a given impact). Key expectations with respect to compliance are as follows:

1. Conformance with individual facility programs - implementing best practices in monitoring, abatement, self audit, annual reporting and other program details.
2. Complaint Resolution - partnership with regulator to determine adequate resources to manage complaints to a "workable resolution".
3. Readiness for potential management system (Site NMP) audit - similar to other regulated activities under current monitoring and enforcement rules.
4. Participation in development and maintenance of a Regional Noise Model - the model provides a baseline for industrial noise and allows for an empirical assessment of potential problem area and sources.
5. Tracking noise management initiatives and providing an annual status to NCIA to facilitate a comprehensive annual report to the ERCB.

Companies that do not demonstrate conformance with the plan would default to Permissible Sound Level (PSL) compliance under Directive 038.

#### 2.1.2 Noise Control Objectives

Shell recognizes that it is not practical or possible to eliminate all sources of noise. However, it is expected that wherever possible, noise

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control practices and mitigation will be in place to minimize noise, for example, maintaining a noise standard when procuring new equipment or taking into consideration possible noise impacts when instituting plant process changes. It also includes how Shell operates including employing the use of silencers and mufflers, or simply keeping doors on buildings closed.

Shell takes a proactive approach for activities that could have an environmental impact such as noise. When planning work that could generate excessive noise, such as boiler blow downs or flaring for example, it is important to assess the community impact and communicate with stakeholders as required. It is also Shell's approach to avoid practices that create excessive noise during evening hours and weekends whenever possible.


If despite proactive measures a resident expresses concern that they are impacted by plant operation, Shell will immediately initiate a complaint protocol and work in collaboration with the resident to attain resolution.

### 2.1.3 Continuous Improvement and Best Practices

For Shell, continuous improvement from a noise perspective means to examine noise sources to discover and eliminate problems. Examination of noise sources is accomplished through Industrial Hygiene (IH) noise surveys, noise modelling, and offsite noise surveys. When any of these tools identifies a potential unacceptable noise level, mitigation plans are implemented.

Shell educates and trains their staff on the Noise Management Plan during Operations Compliance Training.

Shell stays current by attending the bi-annual noise conference (hosted by the Alberta Acoustics & Noise Association) and having active representation on the NCIA Noise Best Practices Sub-committee. In the way Shell will be aware of the latest technology and advancements in the noise field and institute best practices accordingly.


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#### 2.1.4 Facility Communication Strategies

Where noise has been identified as a potential issue with the community, Shell will notify stakeholders in advance of the activity by utilizing the NRCAER line.


If a noise concern is received from a stakeholder, then [SDP11021 Public Concern Response Practice](#) is activated and followed and the [SUG.HSSE.ENV.NOIS.P.001 Noise Sampling Practice](#) is initiated and followed. All relevant information is entered in the [SDF11021 Public Concern Form](#) and the [SUG.HSSE.ENV.NOIS.TO.001 Fenceline Noise Monitoring Form](#) along with an incident report being entered into FIM (Fountain Incident Management).



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## 2.2 Roles and Responsibilities

Department Title	or	Roles
Community Affairs		<ul style="list-style-type: none"> <li>• Notification to neighbours for planned activities.</li> <li>• Reactive communications to neighbours concern.</li> <li>• Monitor operations response to public concern.</li> </ul>
Shift Supervisor or Designate		<ul style="list-style-type: none"> <li>• Initiate investigation for public concern for operating units</li> <li>• Perform fence-line noise surveys.</li> <li>• If required follow-up with concern in off-hours (PA during normal hours).</li> </ul>
Environment Department		<ul style="list-style-type: none"> <li>• Support to Operations for investigation of noise concern, conducting fence-line noise surveys &amp; regulatory notifications.</li> <li>• Data analysis and external noise surveys.</li> <li>• Maintain site noise model.</li> </ul>
Industrial Hygiene		<ul style="list-style-type: none"> <li>• Primary support for onsite noise monitoring.</li> </ul>

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Security	<ul style="list-style-type: none"> <li>Initial contact for public concern.</li> </ul>
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## 2.3 Monitoring and Measuring

### 2.3.1 Fenceline Monitoring

When a public concern is received and the [SDP 11021 Public Concern Response Practice](#) is activated, as stated in 2.1.4, or activities on site create the need to monitor noise levels, fenceline noise measurements are conducted.

Fenceline measurements are conducted as per [SUG.HSSE.ENV.NOIS.P.001 Noise Sampling Practice](#) and results are recorded on [SUG.HSSE.ENV.NOIS.TO.001 Fenceline Noise Monitoring Form](#).

If the need arises for any other type of noise monitoring, a request can be submitted through [SUG.HSSE.ENV.NOIS.TO.002 Request for Non-Routine Noise Sampling](#).


### 2.3.2 Industrial Hygiene (IH) Surveys

IH Surveys are done on a request basis, or at a minimum a unit noise survey is conducted every 4 years. All results and reports are stored in Livelink.

Shell is regulated under the Alberta OH&S Code and participates in the Hearing Conversation Program set forth in the code. IH is responsible to ensure that workers get noise dosimeter testing done every 2 years as part of this program.

### 2.3.3 Noise Modelling

A detailed noise model was developed for the Shell Scotford Upgrader in 2006 and can be viewed here [2006 Noise Model](#). The model identifies all noise sources within the base Upgrader.

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The Upgrader Expansion started operations in June 2011. It is Shell's intent to update the original 2006 Model to include the Expansion facilities, and to identify any changes to the existing Base plant, by the end of 2014.

#### 2.3.4 Routine Monitoring

There is currently no routine monitoring being done at Shell Scotford, due to the fact there has not been a residence complaint since 2004 and the results of the 2005 Noise Model demonstrated satisfactory offsite noise levels.


An offsite noise survey of the Shell facilities will be completed in 2014 to determine the offsite CSL's post Expansion project start up.

The results of this survey along with the information obtained from the upcoming model will determine what, if any, routine monitoring will be conducted.

#### 2.4 Noise Control

Proactively ensuring mitigative measures and controls are considered in order to minimize the impact of noise when implementing facility design changes or purchasing new equipment is a key principle of noise control. When implementing a change at Shell Scotford, whether it's new equipment or a modification to existing equipment, the MOC (Management of Change) process must be followed. For the Upgrader, Shell's definition of a plant change can be found in [SUG.CON.MOC.C.001 Definition of Plant Change](#). For Manufacturing, changes that do not require following the MOC process are listed in [SCM-MOC-SP-01 Changes Not Requiring Management of Change \(MOC\)](#).

The [Management of Change Quality Assurance Manual](#) describes the work process for all managed changes within the Shell Scotford Upgrader. The [SCM-MOC-PR-01 Management of Change \(MOC\) Procedure](#) describes the work process for all managed changes within Shell Scotford Manufacturing. Any change that may increase noise as per [SUG.CON.MOC.G.001 Environmental Guideline for Noise Producing Equipment](#) needs to be reviewed and signed off by both the Environment department and Industrial Hygiene as per [SUG.CON.MOC.C.003 Discipline Review Parties Matrix](#) for the Upgrader, and the [SCM-MOC-G-06 Discipline Reviewer Matrix for Manufacturing](#)

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### 3 AUDIT/SELF ASSESSMENT

Noise is included in the scope of ongoing ISO 14001 audits and the HSSE MS internal audits under social performance. Audit findings are recorded in Fountain Assurance Management (FAM) with related action items assigned to individuals. Audit findings are reviewed by Upgrader Leadership Team.

An internal audit specific to the Site NMP against the NCIA Standards and Guidelines will be done every 3 years.


Audit results and findings will be included in the annual summary to NCIA to be included in the NCIA Annual Noise Report to ERCB.

### 4 REPORTING


All routine sampling results, non-routine sampling results, monitoring surveys, and modelling results are stored in Shell's Livelink and/or Sharepoint system.

Shell has the responsibility to provide input into the Annual Regional Noise Management Plan report, which is submitted to the ERCB by NCIA. Information to be provided is as follows:

- Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-001 issued 3-Sep-10.
- Procedure/Practice/Standard reference (i.e. SOP-AG-RW-200-002)
- Results of any monitoring/assessments (fenceline outward) completed in the reporting year.
- Improvements implemented for the reporting year.

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- Changes that have resulted in increased noise levels on your site for the year reporting on.
- Noise Complaints received and follow up actions taken to address them.
- Planned improvements to noise management practice, noise abatement work or noise model work for the upcoming year.


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**Insert your Company Name here:**

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

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


<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>The site has implemented this standard and Code of Practice and has previously been submitted to the NCIA.</p> <p>There have been no updates to the Code of Practice in 2015</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>Fence Line monitoring was conducted by SLR on August 26, 2015.</p> <p>The overall noise output from Sherritt/Corefco Site at the five predetermined locations is a decrease by 3 dB.</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>There have been no improvement/correction actions implemented in 2015.</p> <p>The noise readings were assessed and it was deemed that it was not required to be used in the noise model.</p>

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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>There has been no noise complaints for the 2015 year.</p>

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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**Umicore Canada:**

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


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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p>Code of Practice (COP-323-7) Noise Exposure Management Plan included in the Umicore Canada Inc. Management System. Reference to ‘environmental noise’ included in the Umicore Canada Inc. Air Quality Management Program (COP-319-2)</p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015.</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p>Not applicable – noise monitoring conducted inside the plant from an industrial hygiene perspective</p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p>The new nitrogen generate skid (see below) was installed in 2015 but will not be commissioned until Q1 2016.</p>



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<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<p>The new Nitrogen Generation system:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The nitrogen will be generated using a separation membrane system whereby the air will separated to produce 600 m<sup>3</sup>/hr of purified nitrogen at 830 kPa for inert blanketing of process applications then ultimately released to atmosphere, and 800 m<sup>3</sup>/hr of nitrogen-depleted air that will be released to atmosphere</li> <li><input type="checkbox"/> The air that feeds the membrane banks will be compressed using a pair of rotary screw compressors. The air compressor system will be generate air at 1390 kPa at a rate of up to 1400 m<sup>3</sup>/hr.</li> <li><input type="checkbox"/> As per the manufacturer (Kaeser) of the two air compressors, the single speed and variable speed air compressors have rated sound pressure levels of 69 dBA and 70 dBA respectively per ISO 2151 using ISO 9614-2. Both air compressors will be located inside the UCI production facility, therefore, noise assessments from an industrial hygiene perspective will conducted during commissioning to ensure the manufacturer specifications are met</li> <li><input type="checkbox"/> The exhaust vent from the nitrogen separation membrane generates sound pressure levels of 80-85 dBA however, this vent will be equipped with a silencer/muffler which reduces the sound pressure levels to 55-65 dBA.</li> <li><input type="checkbox"/> Umicore Canada Inc. will ensure appropriate information/monitoring is conducted to facilitate updating of the NCIA Regional Noise Model during the next applicable update</li> </ul>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<p>Not applicable – noise monitoring conducted inside the plant from an industrial hygiene perspective</p>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<p>Did not receive any noise complaints in 2015</p>

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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.



**NCIA Standards and Guidelines**

Document Number  
**2010-003**

**Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard**

Rev. Date  
**31-March  
2016**


Rev.  
**0**

**Value Creation Inc.**

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

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

<b>Input Description</b>	<b>Member Site Comments</b>
<p>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.</p> <p>Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.</p>	<p align="center"><b>Not Applicable. There is no construction or operations anticipated during 2016.</b></p>
<p>Provide a summary of any monitoring (fence line outward completed in 2015).</p> <p>Note, you are not required to conduct any off-site monitoring.</p>	<p align="center"><b>Not Applicable.</b></p>
<p>Disclose any improvements/corrective actions implemented in 2015 or status thereof that would impact the noise level output for your site (either up or down).</p> <p>Did those changes result in a requirement to update your site noise model?</p> <p>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?</p>	<p align="center"><b>Not Applicable.</b></p>

	<b>NCIA Standards and Guidelines</b>	<b>Document Number</b> <b>2010-003</b>	
<b>Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard</b>		<b>Rev. Date</b> <b>31-March 2016</b>	<b>Rev.</b> <b>0</b>

<p>Disclose any improvements/projects that are approved for 2016 that would impact the noise level output for your site (either up or down).</p> <p>Will these changes result in a requirement to update your site noise model?</p> <p>If so, when do you anticipate having an updated site model available?</p>	<b>Not Applicable.</b>
<p>Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.</p>	<b>Not Applicable.</b>
<p>Provide a Noise Complaint summary for all noise complaints received in 2015 including any actions taken to address them.</p>	<b>Not Applicable.</b>

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.