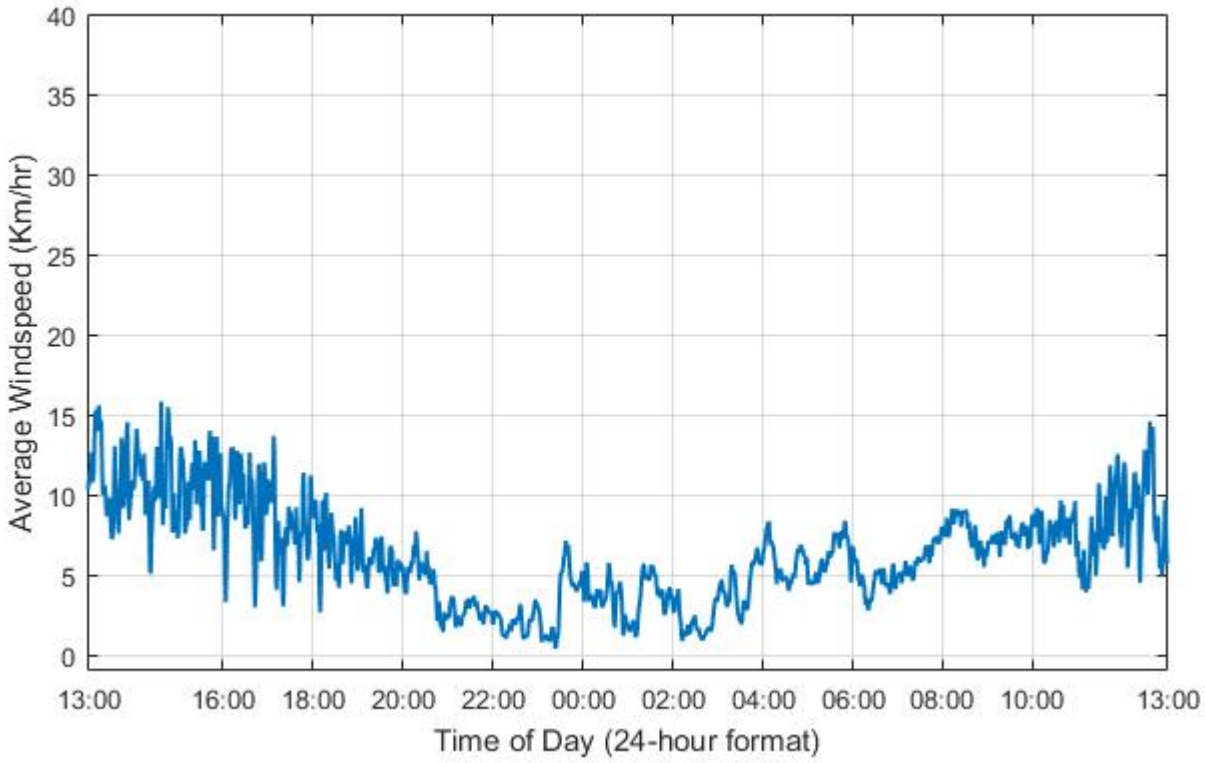
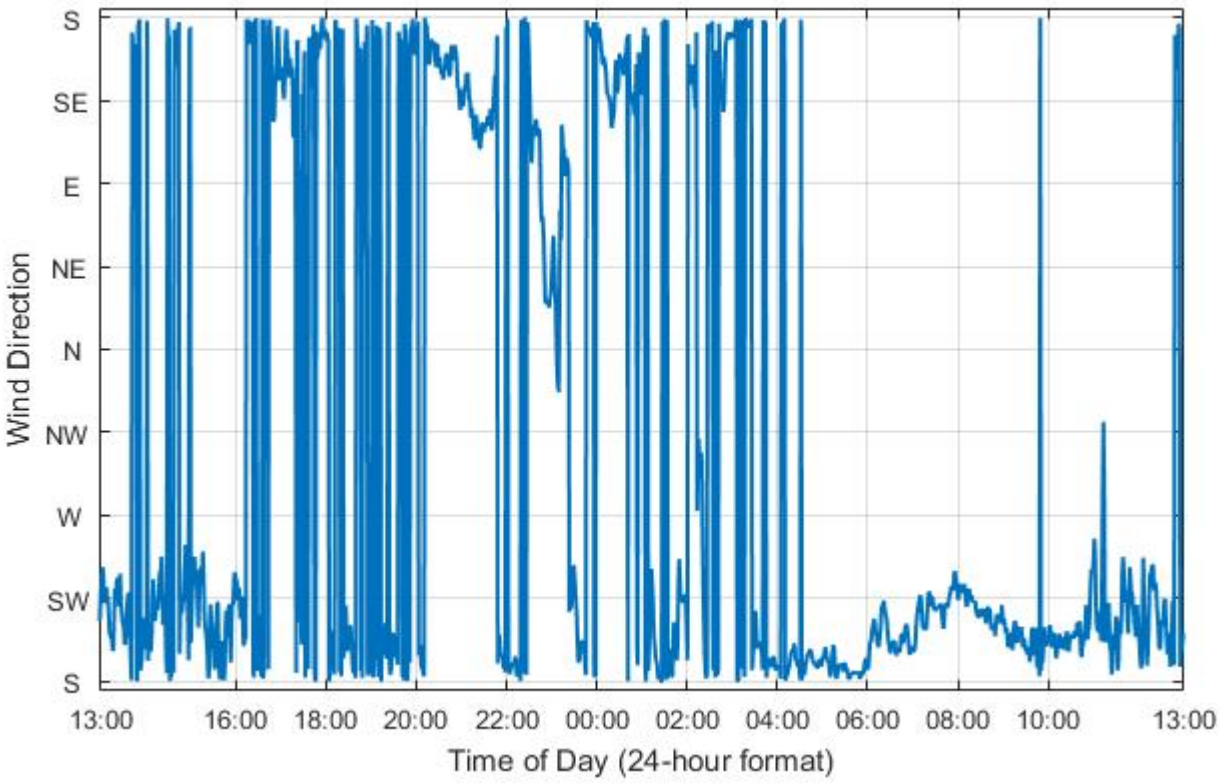
Appendix V WEATHER DATA

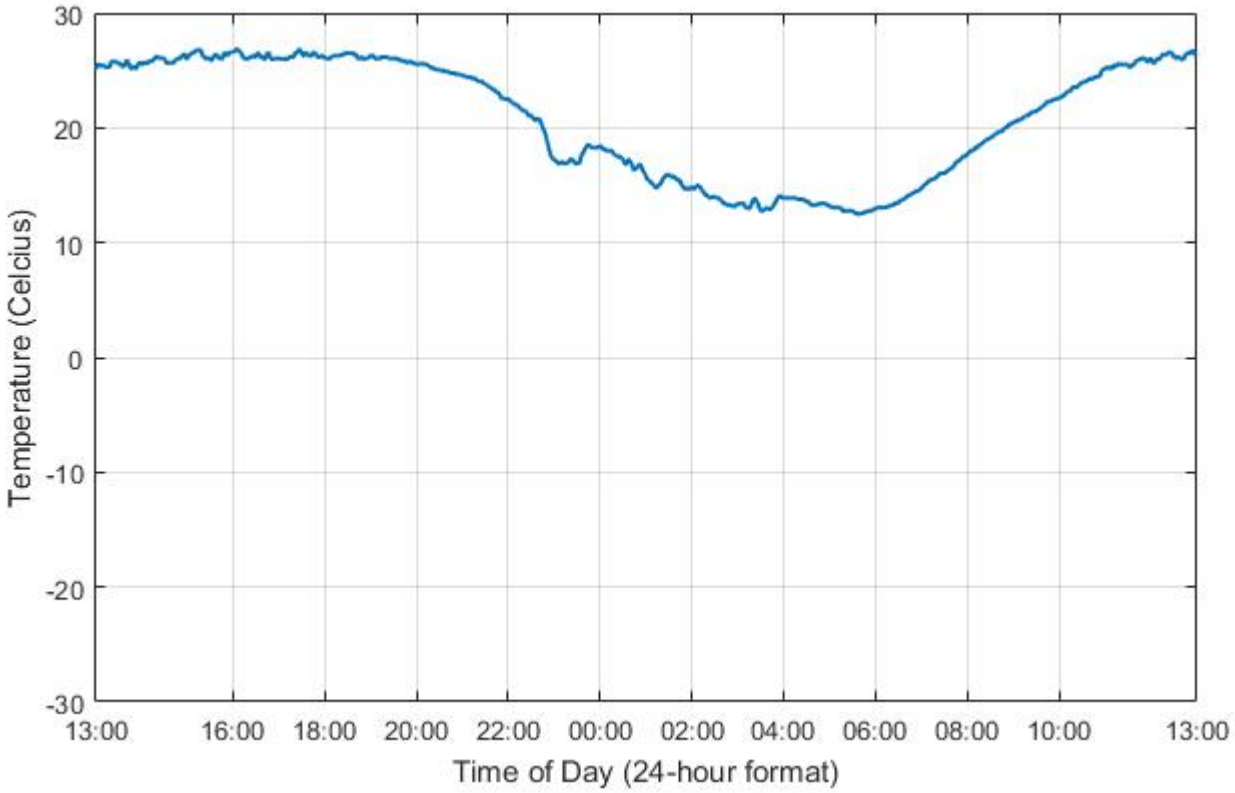
June 18 - 19, 2018 Weather Data



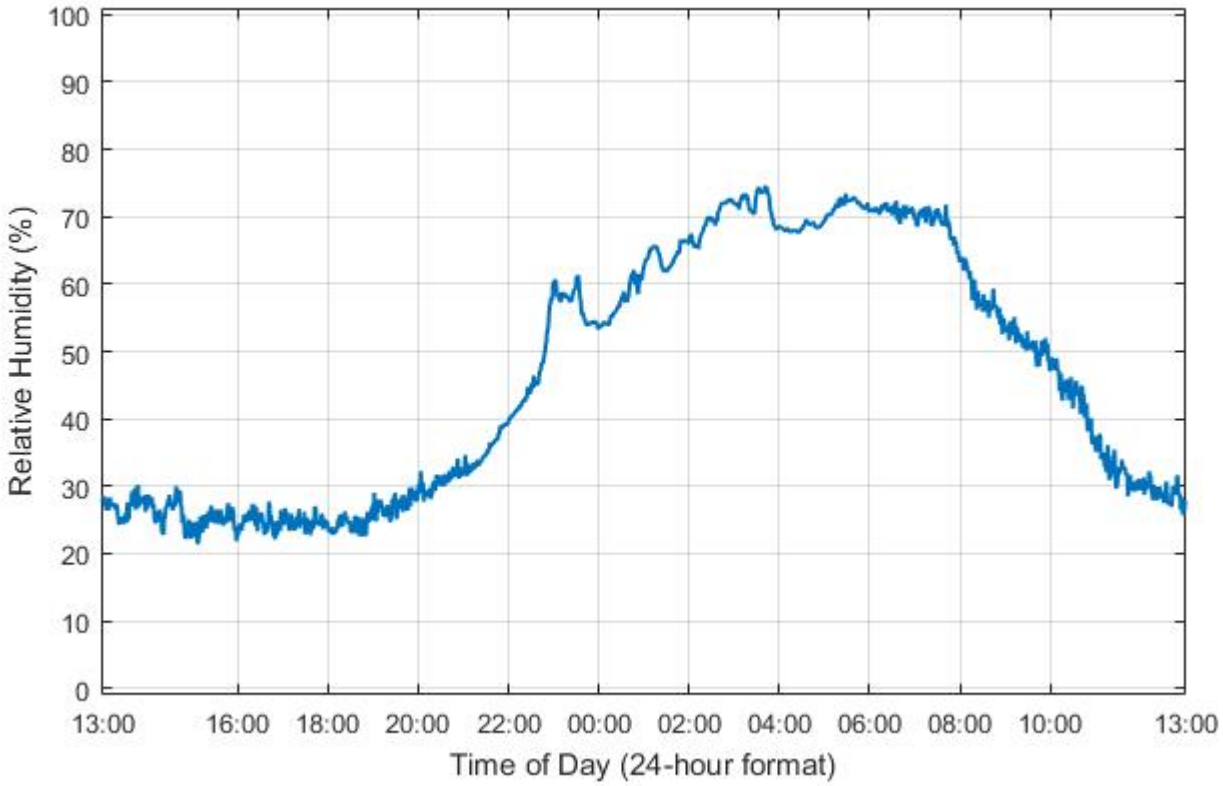
Monitored Wind Speed (June 18 – 19, 2018) at Noise Monitor Location 6



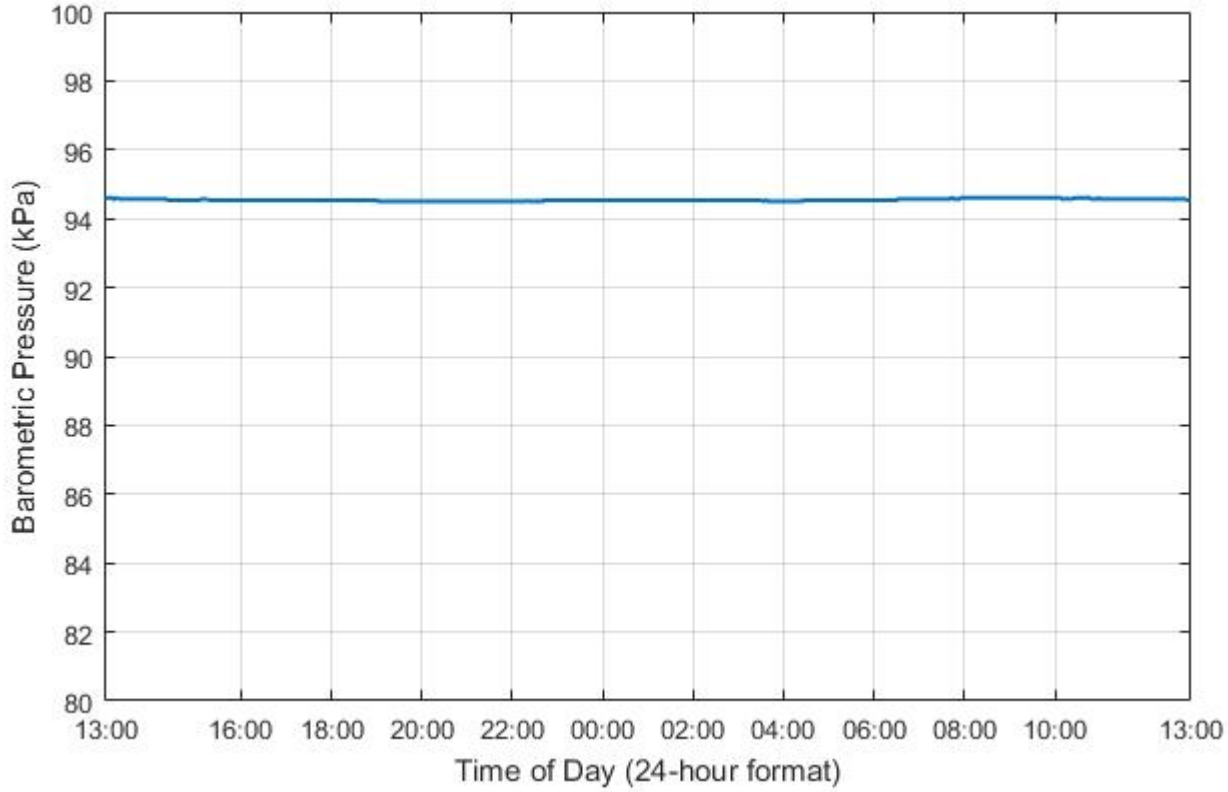
Monitored Wind Direction (June 18 – 19, 2018) at Noise Monitor Location 6



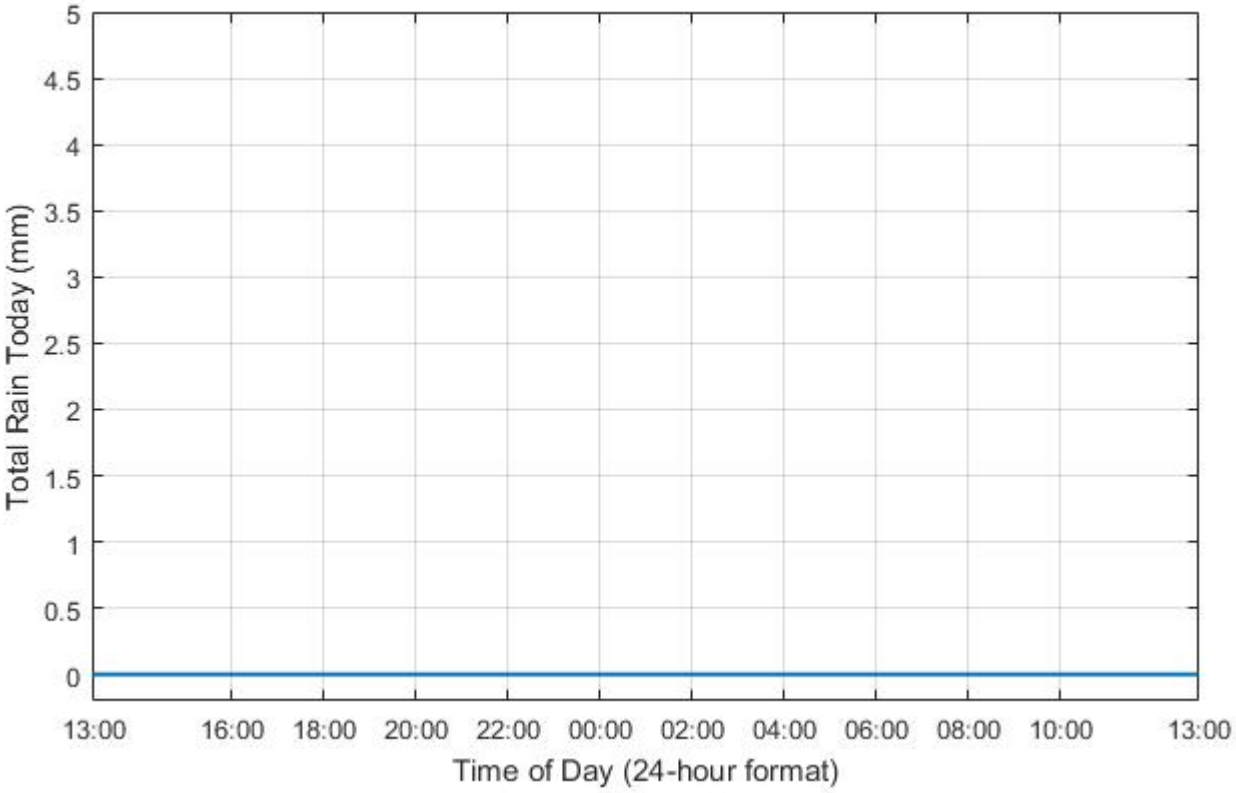
Monitored Temperature (June 18 – 19, 2018) at Noise Monitor Location 6



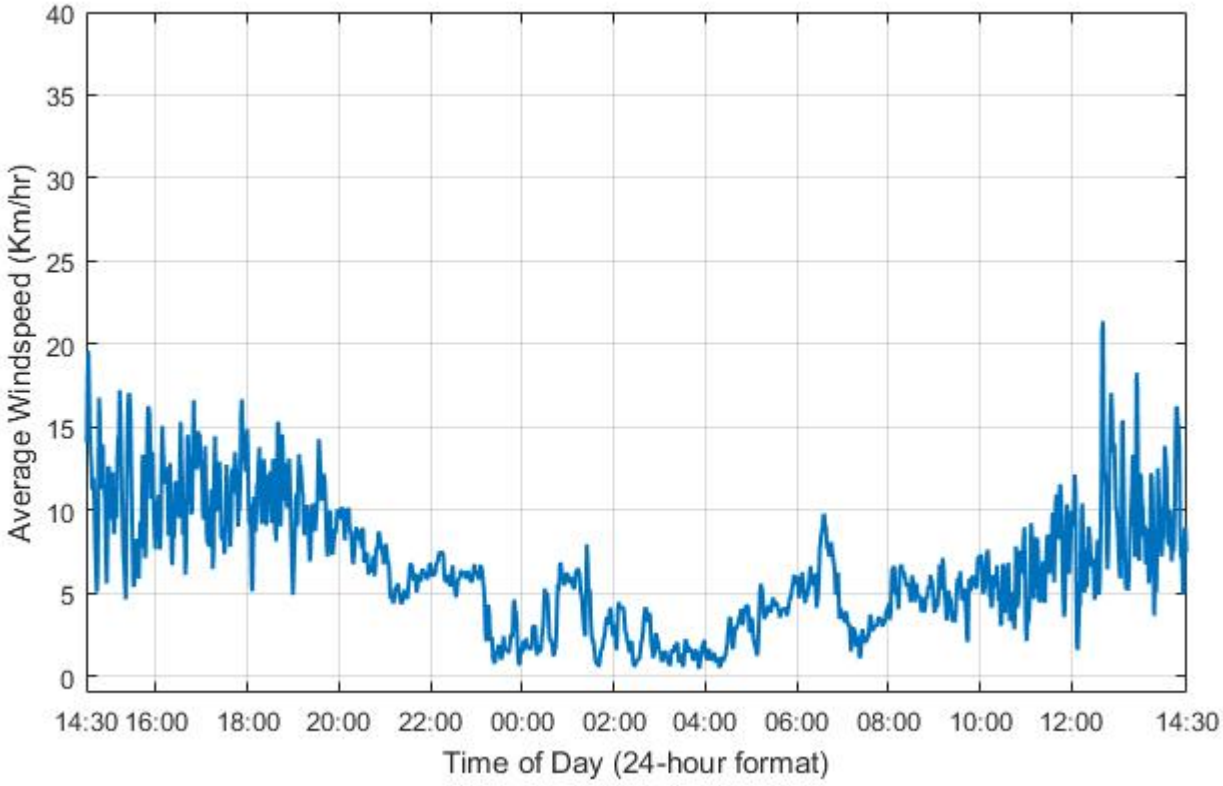
Monitored Humidity (June 18 – 19, 2018) at Noise Monitor Location 6



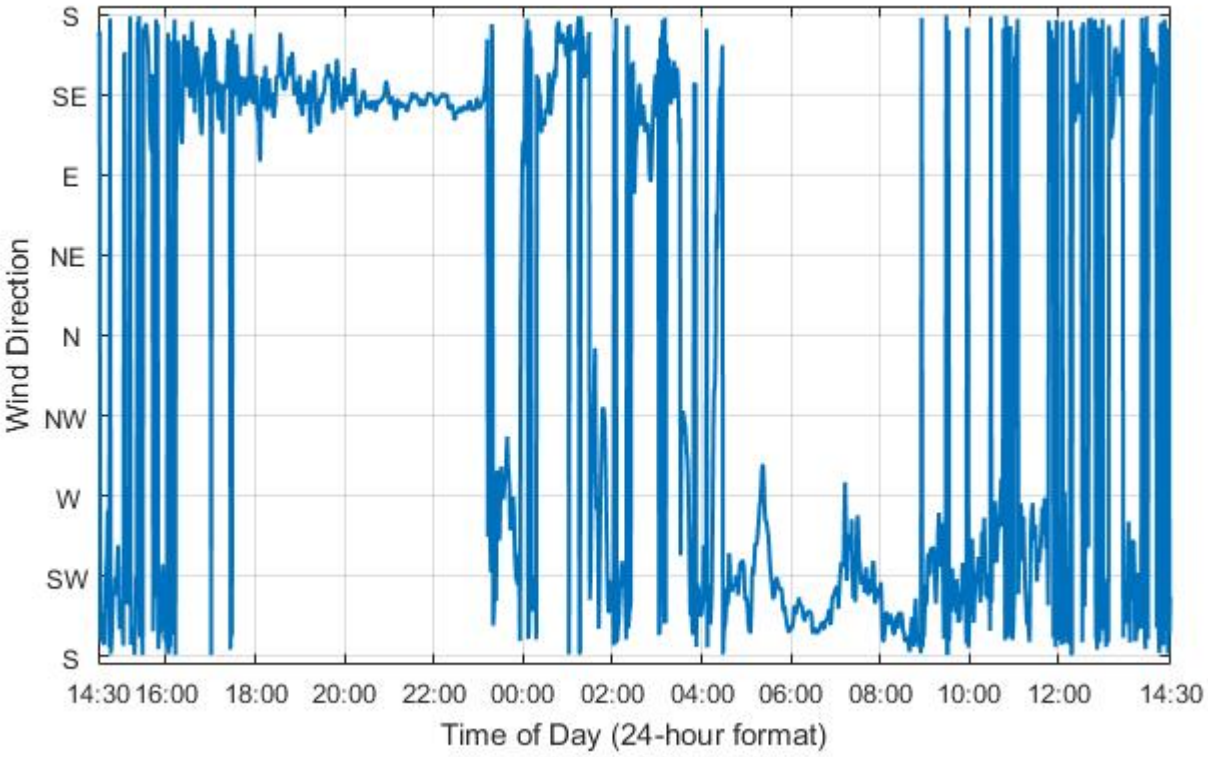
Monitored Barometric Pressure (June 18 – 19, 2018) at Noise Monitor Location 6



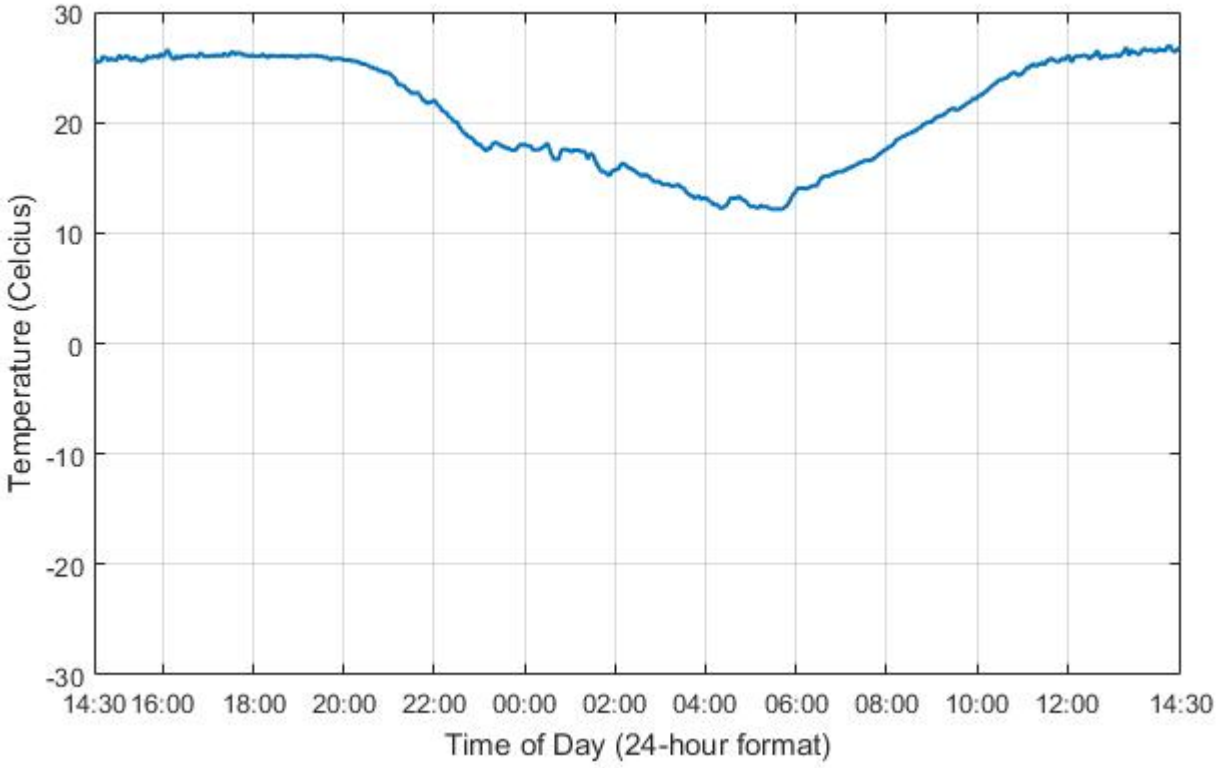
Monitored Rain Rate (June 18 – 19, 2018) at Noise Monitor Location 6



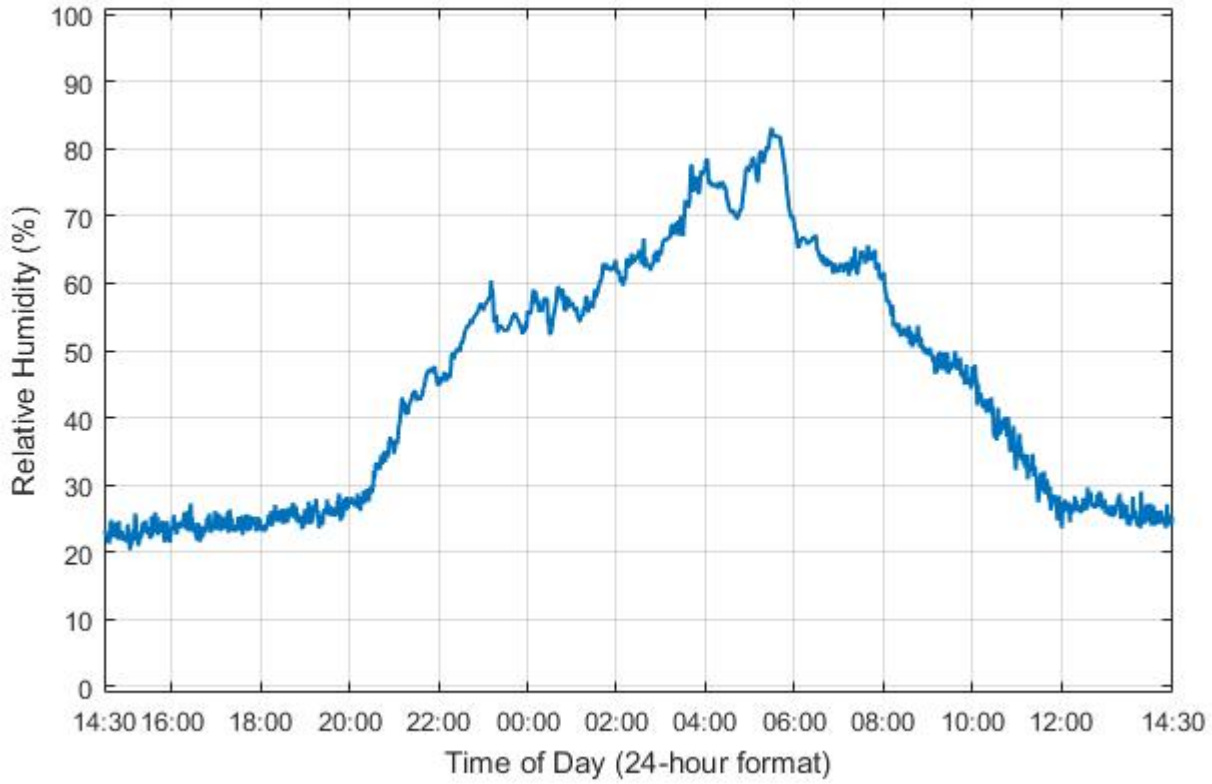
Monitored Wind Speed (June 18 – 19, 2018) at Noise Monitor Location 10



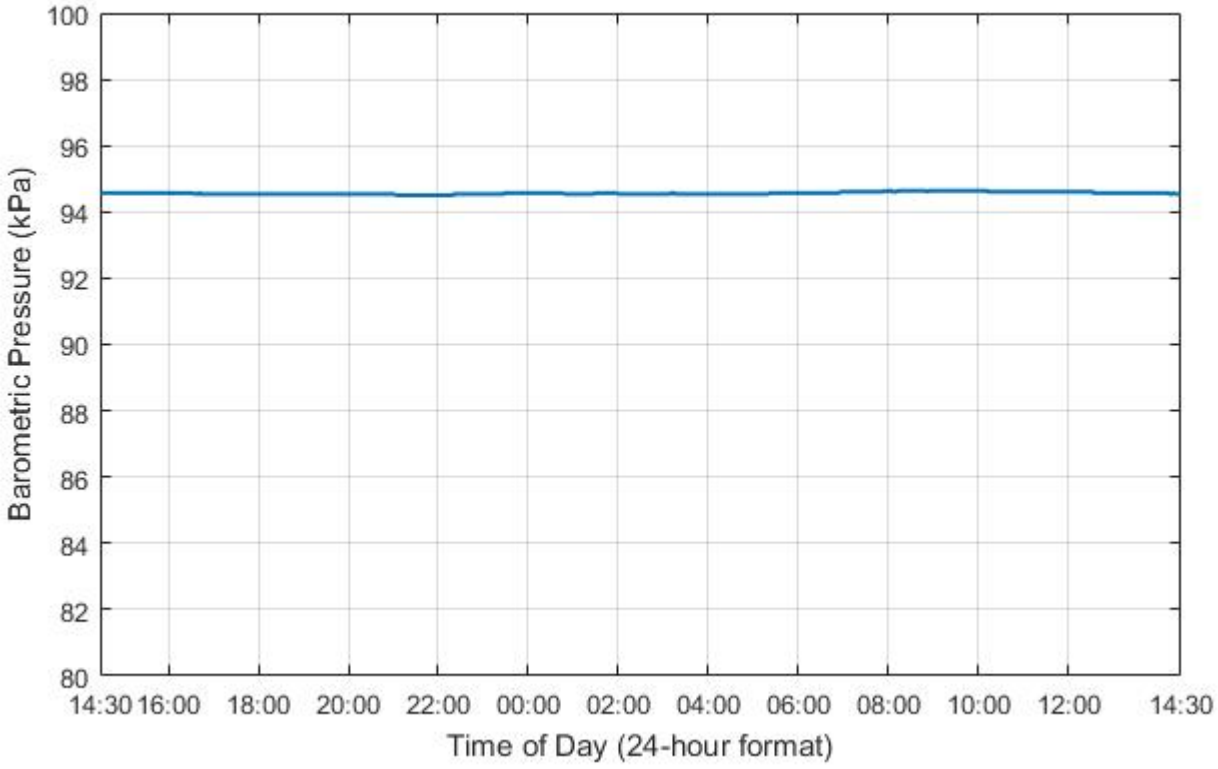
Monitored Wind Direction (June 18 – 19, 2018) at Noise Monitor Location 10



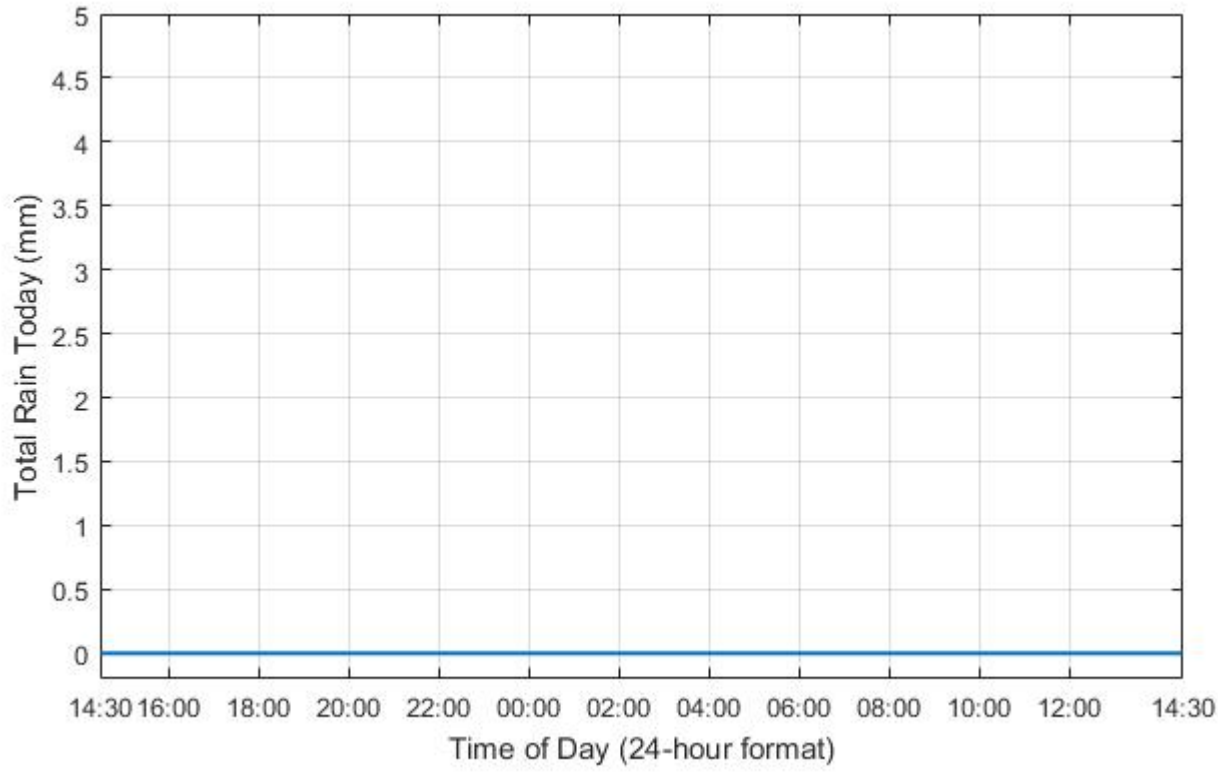
Monitored Temperature (June 18 – 19, 2018) at Noise Monitor Location 10



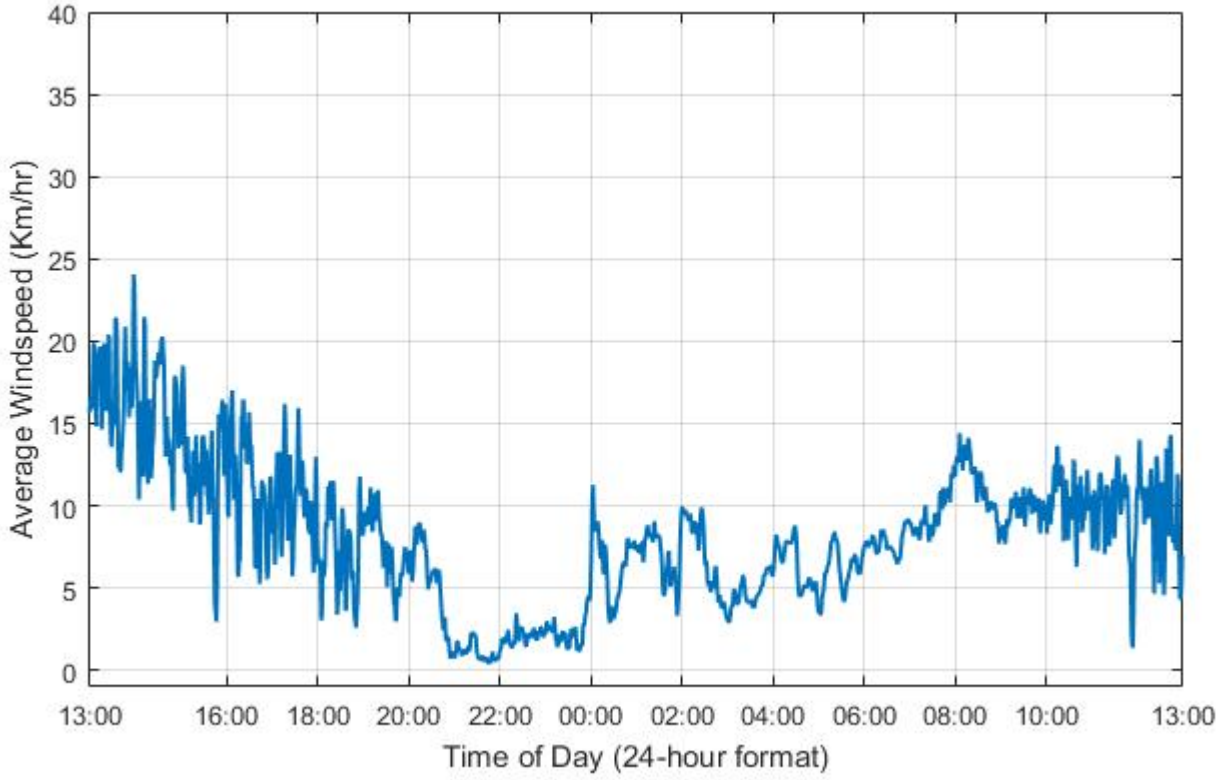
Monitored Humidity (June 18 – 19, 2018) at Noise Monitor Location 10



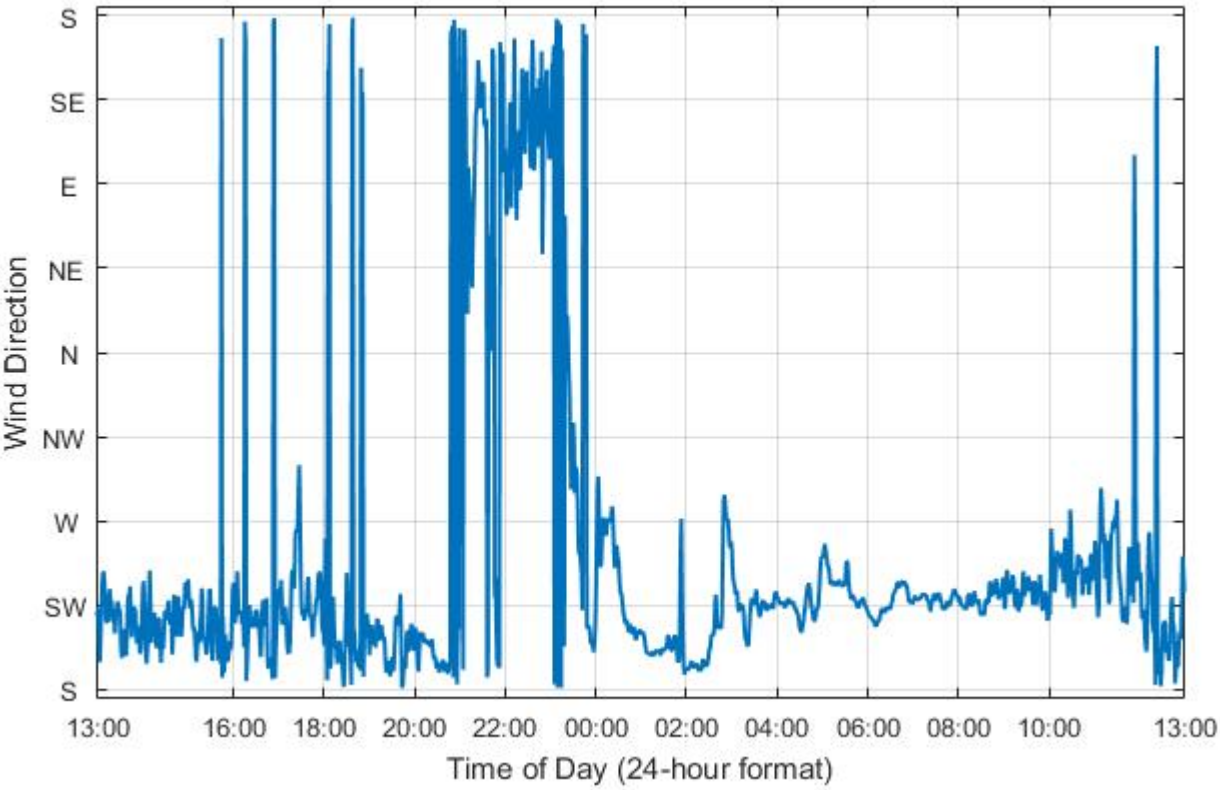
Monitored Barometric Pressure (June 18 – 19, 2018) at Noise Monitor Location 10



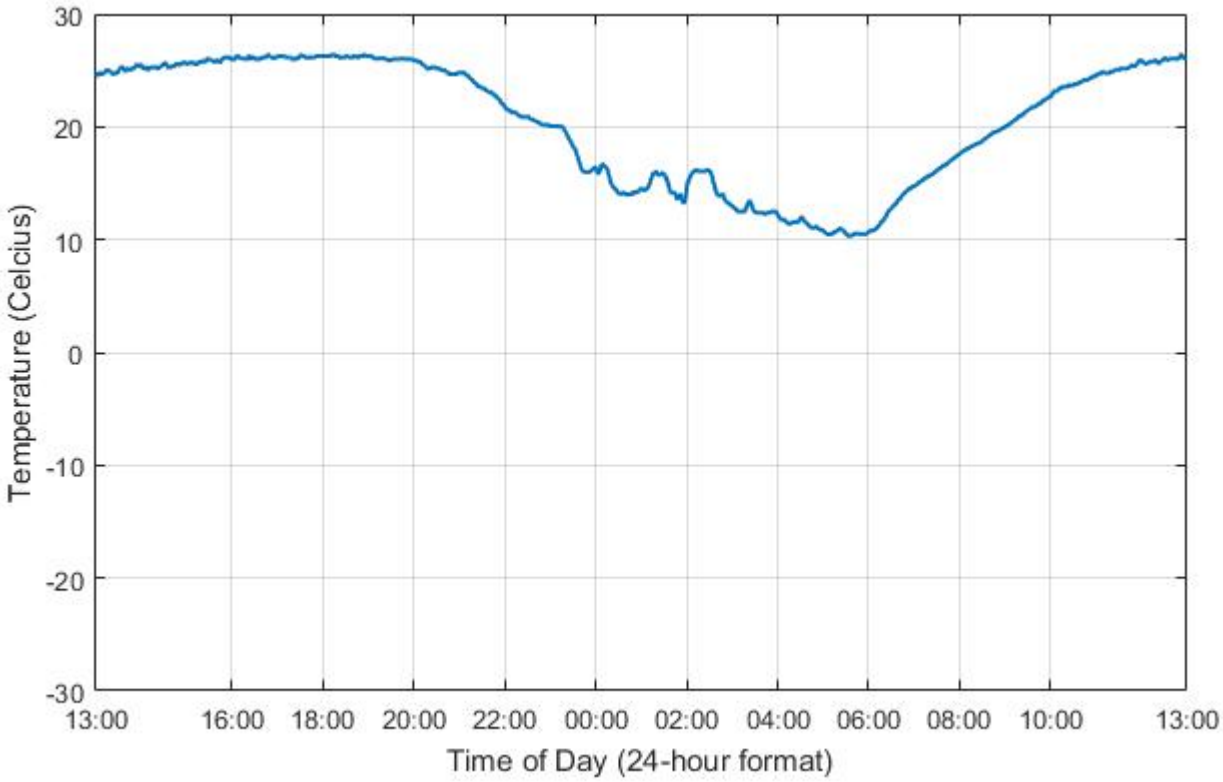
Night-time Monitored Rain Rate (June 18 – 19, 2018) at Noise Monitor Location 10



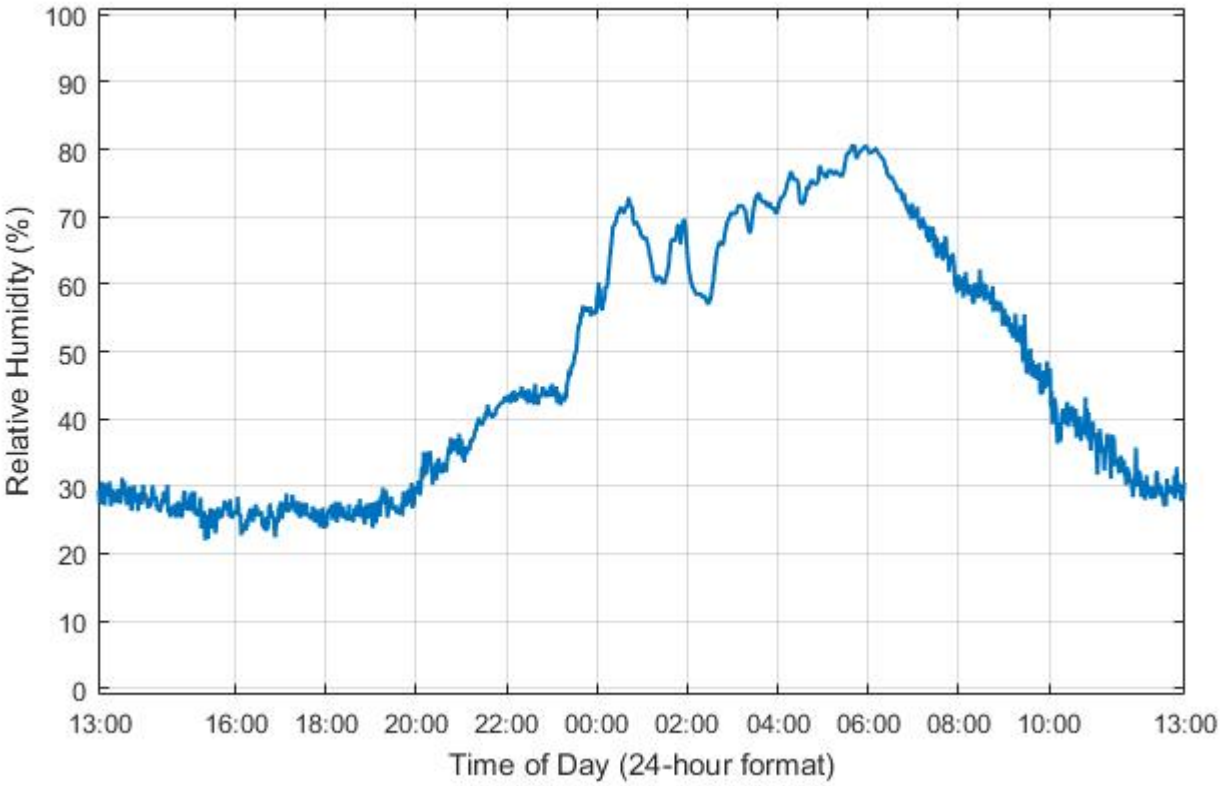
Monitored Wind Speed (June 18 – 19, 2018) at Noise Monitor Location 12



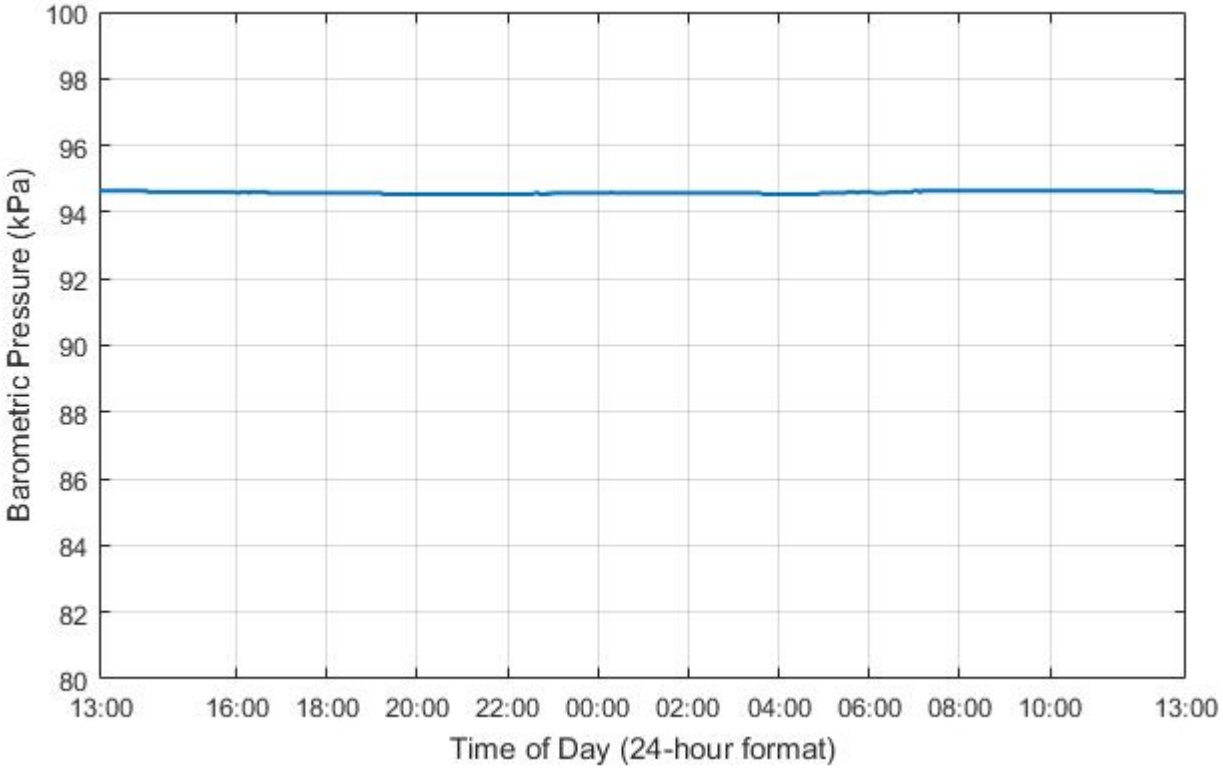
Monitored Wind Direction (June 18 – 19, 2018) at Noise Monitor Location 12



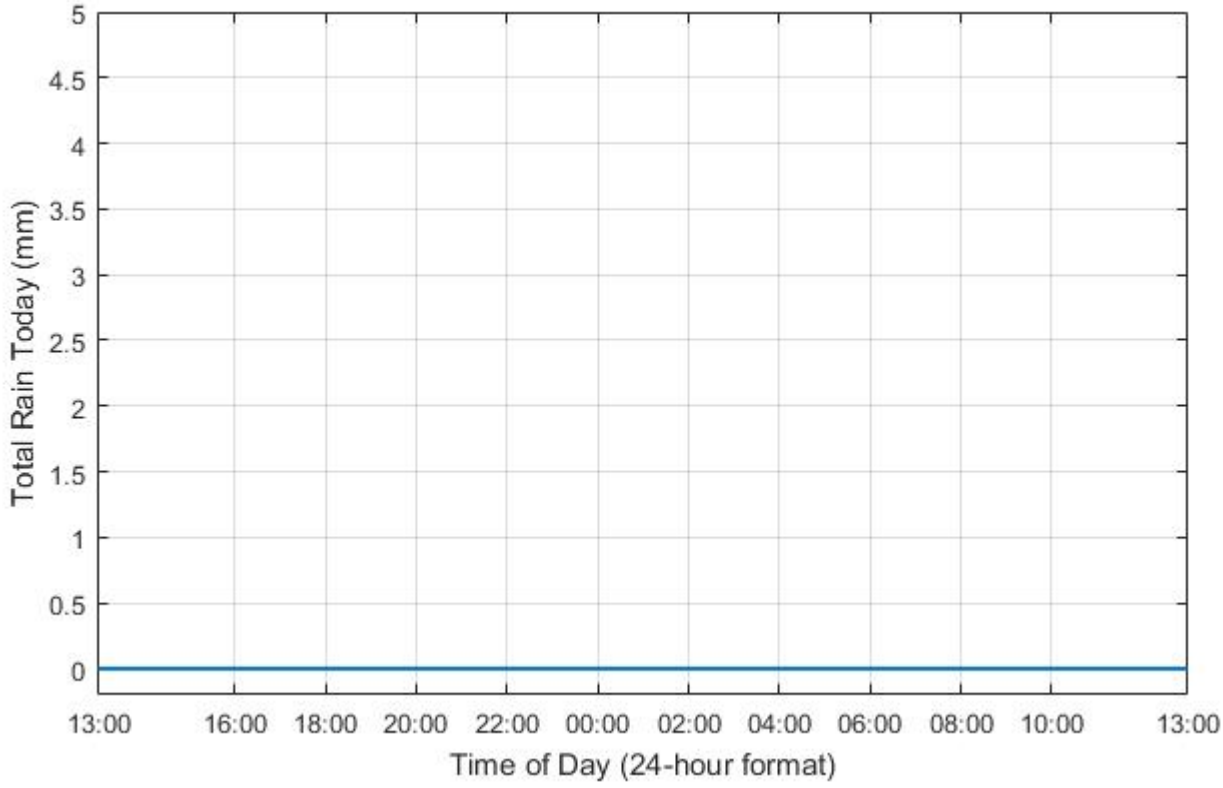
Monitored Temperature (June 18 – 19, 2018) at Noise Monitor Location 12



Monitored Humidity (June 18 – 19, 2018) at Noise Monitor Location 12

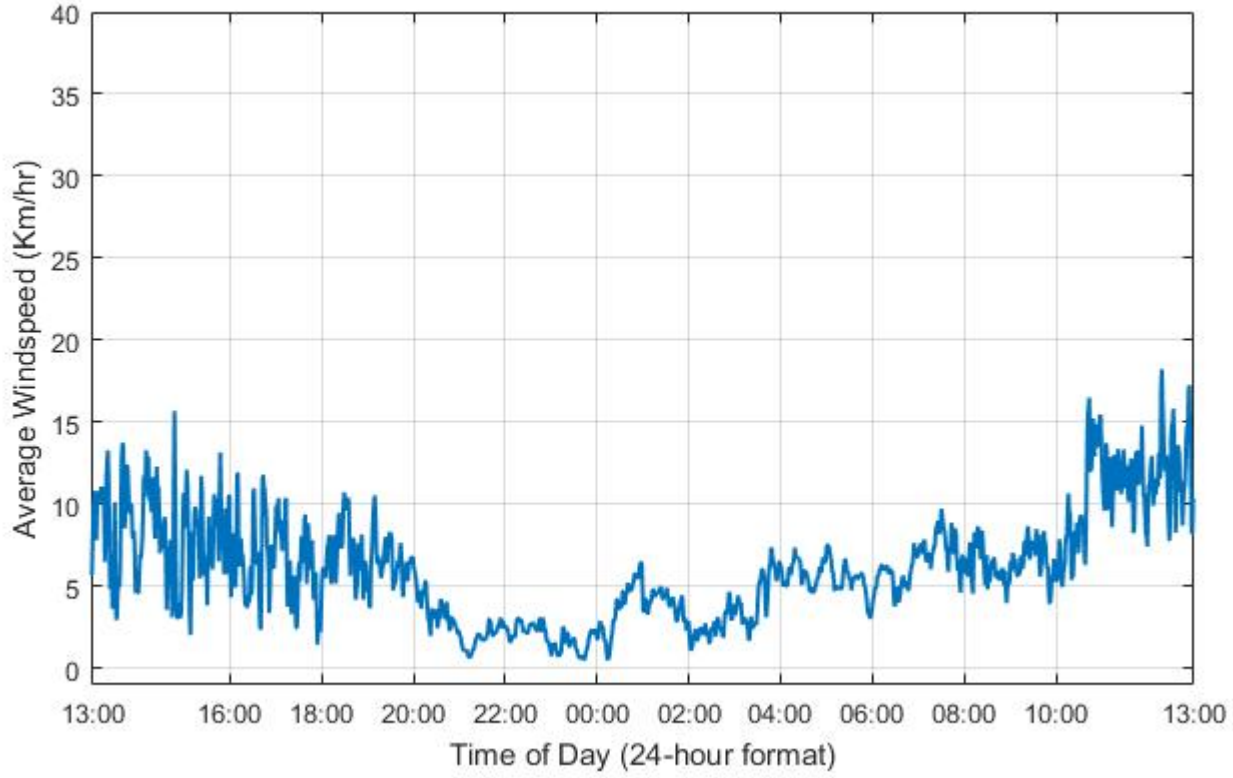


Monitored Barometric Pressure (June 18 – 19, 2018) at Noise Monitor Location 12

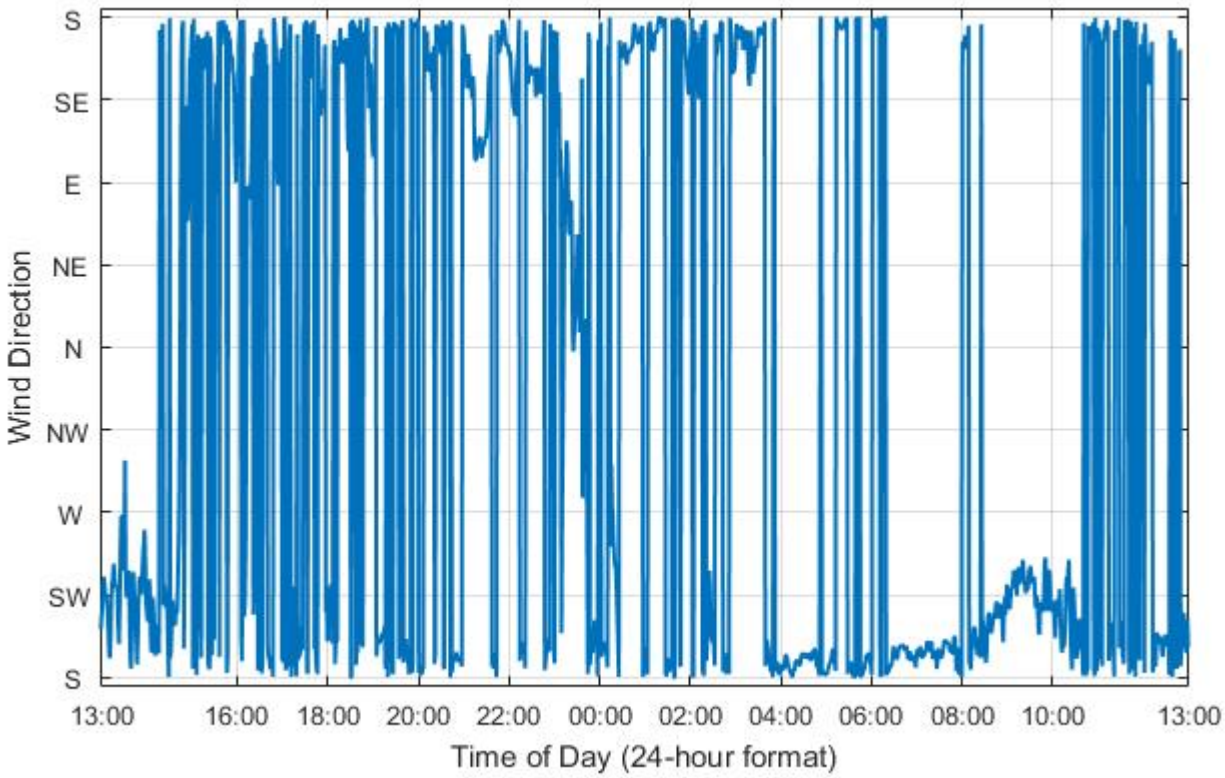


Monitored Rain Rate (June 18 – 19, 2018) at Noise Monitor Location 12

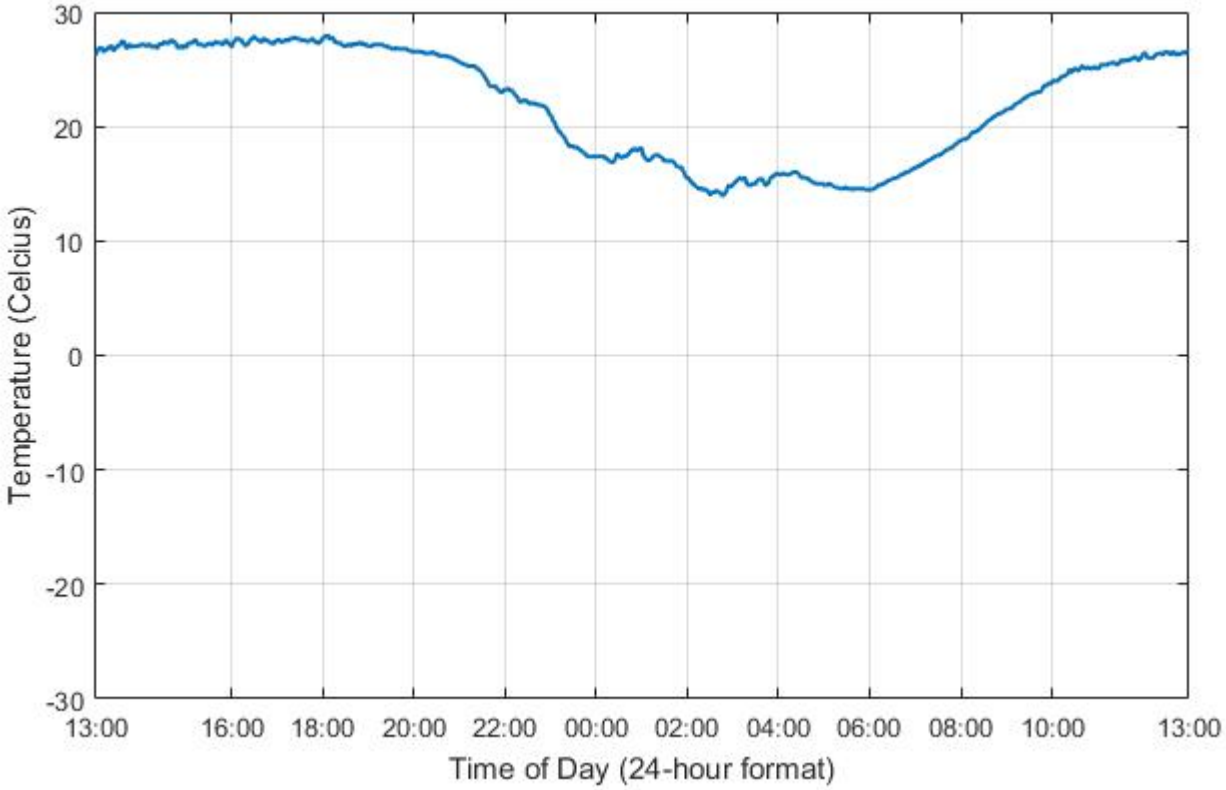
June 19 – 20, 2018 Weather Data



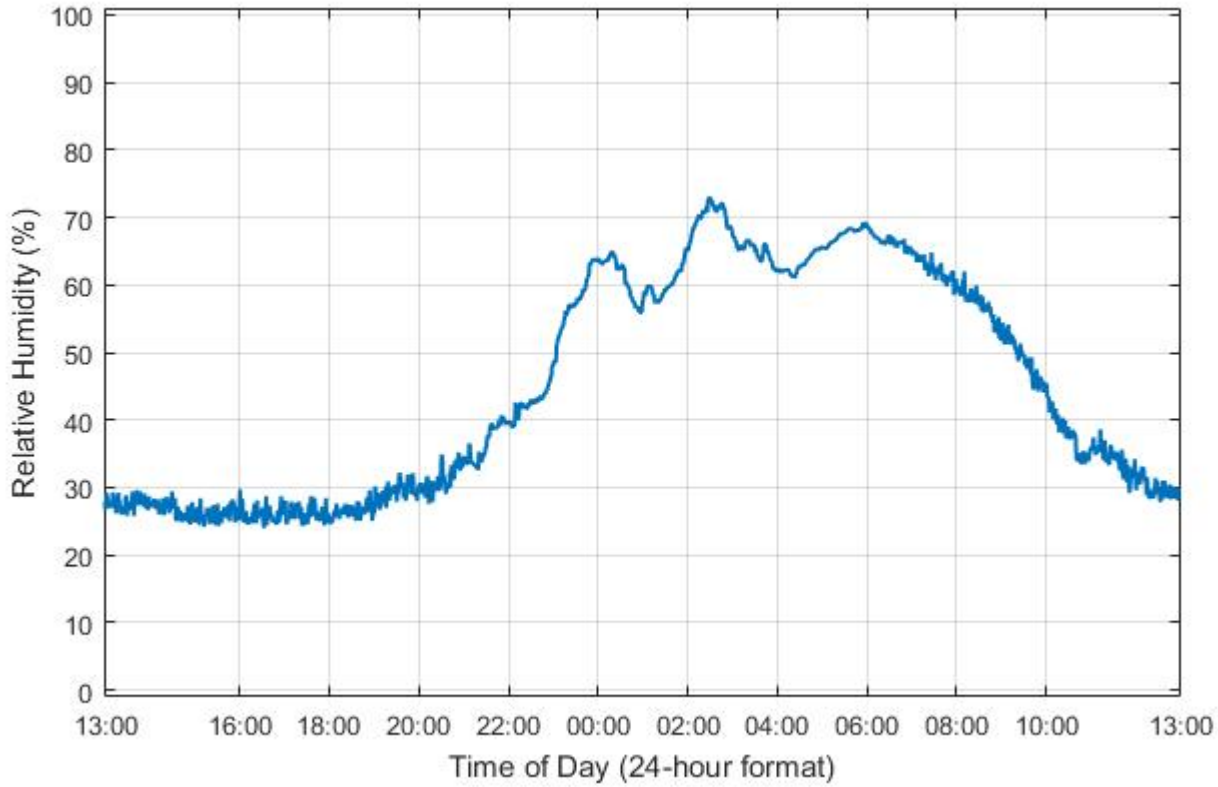
Monitored Wind Speed (June 19 – 20, 2018) at Noise Monitor Location 6



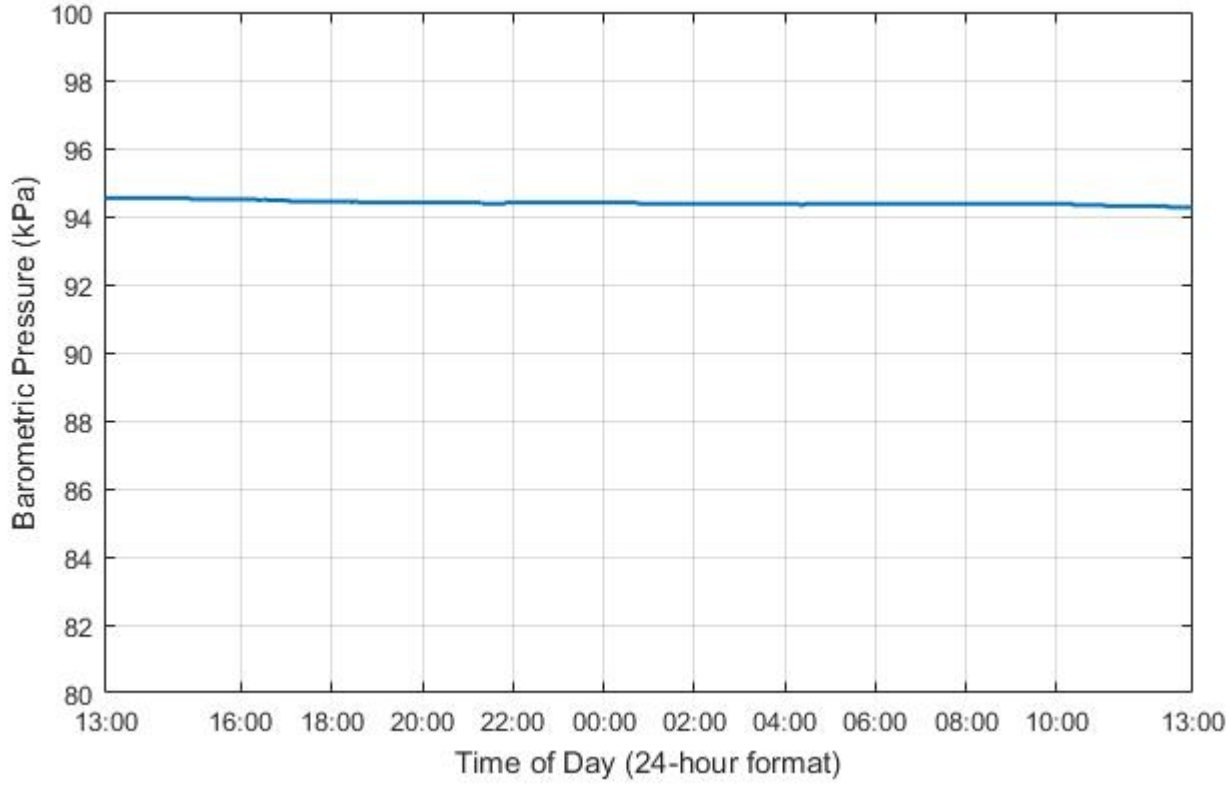
Monitored Wind Direction (June 19 – 20, 2018) at Noise Monitor Location 6



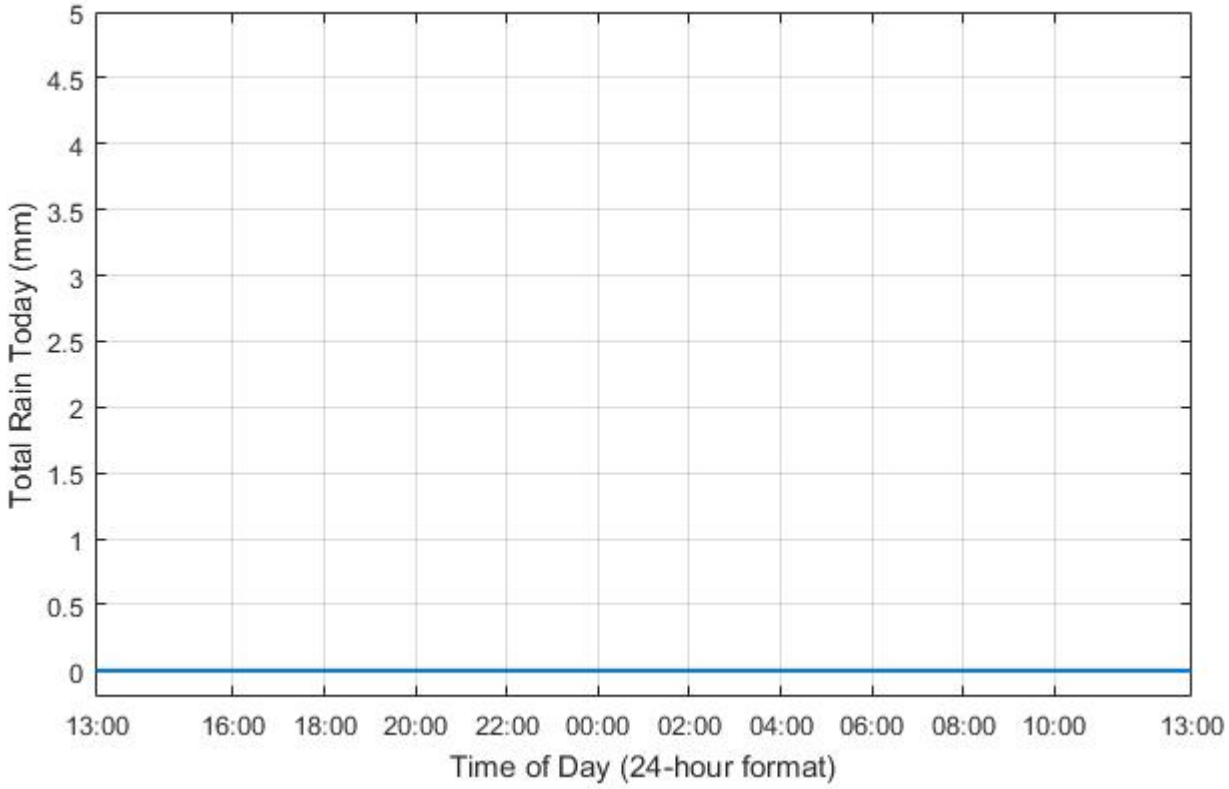
Monitored Temperature (June 19 – 20, 2018) at Noise Monitor Location 6



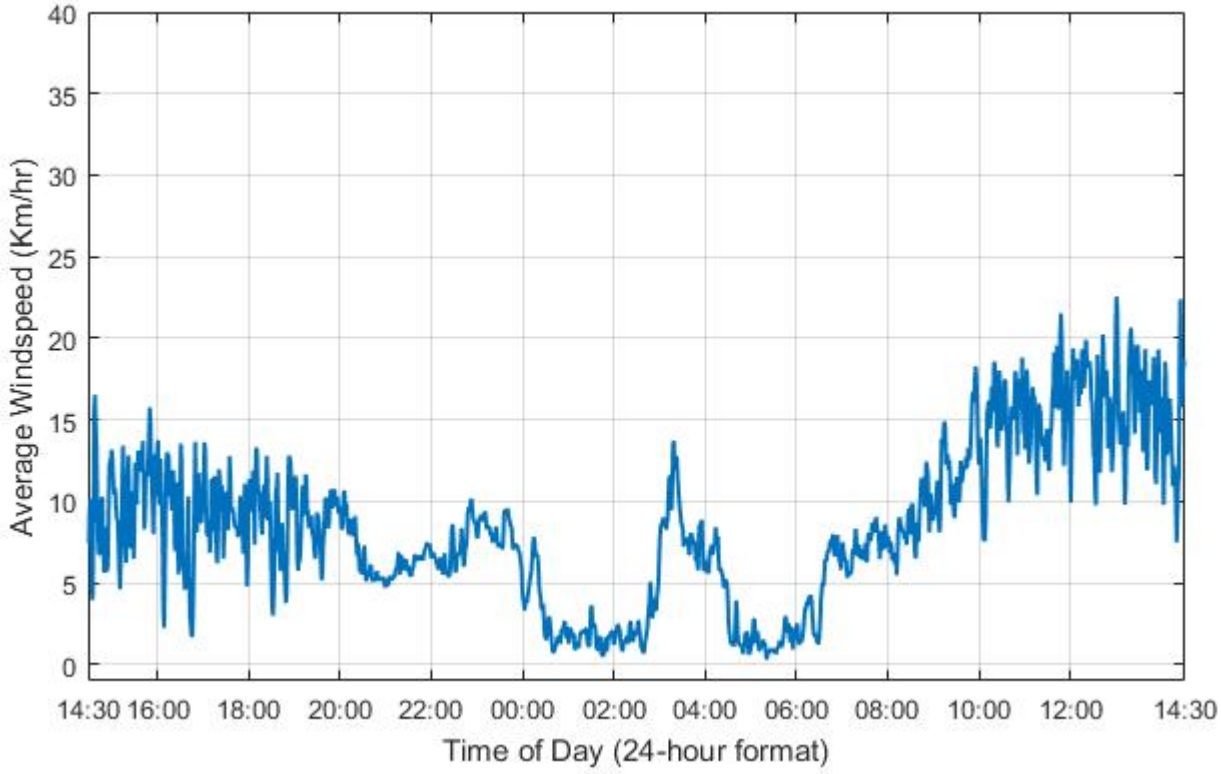
Monitored Humidity (June 19 – 20, 2018) at Noise Monitor Location 6



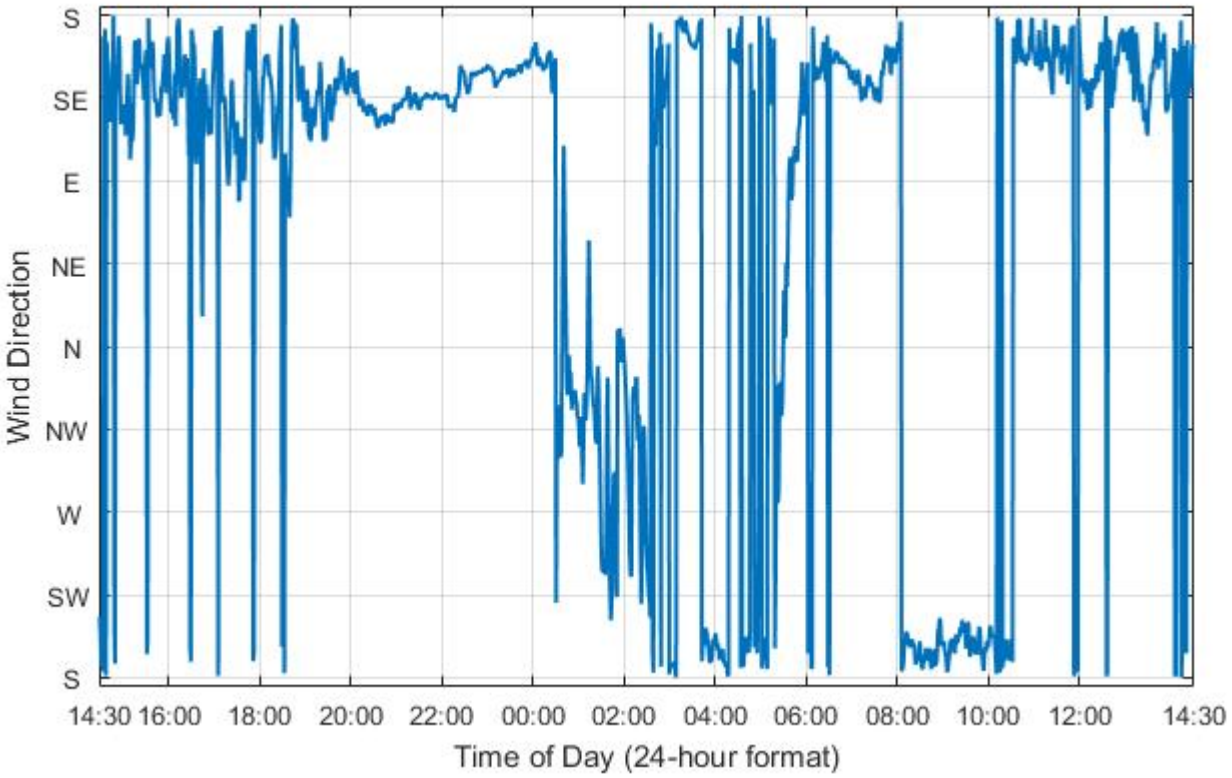
Monitored Barometric Pressure (June 19 – 20, 2018) at Noise Monitor Location 6



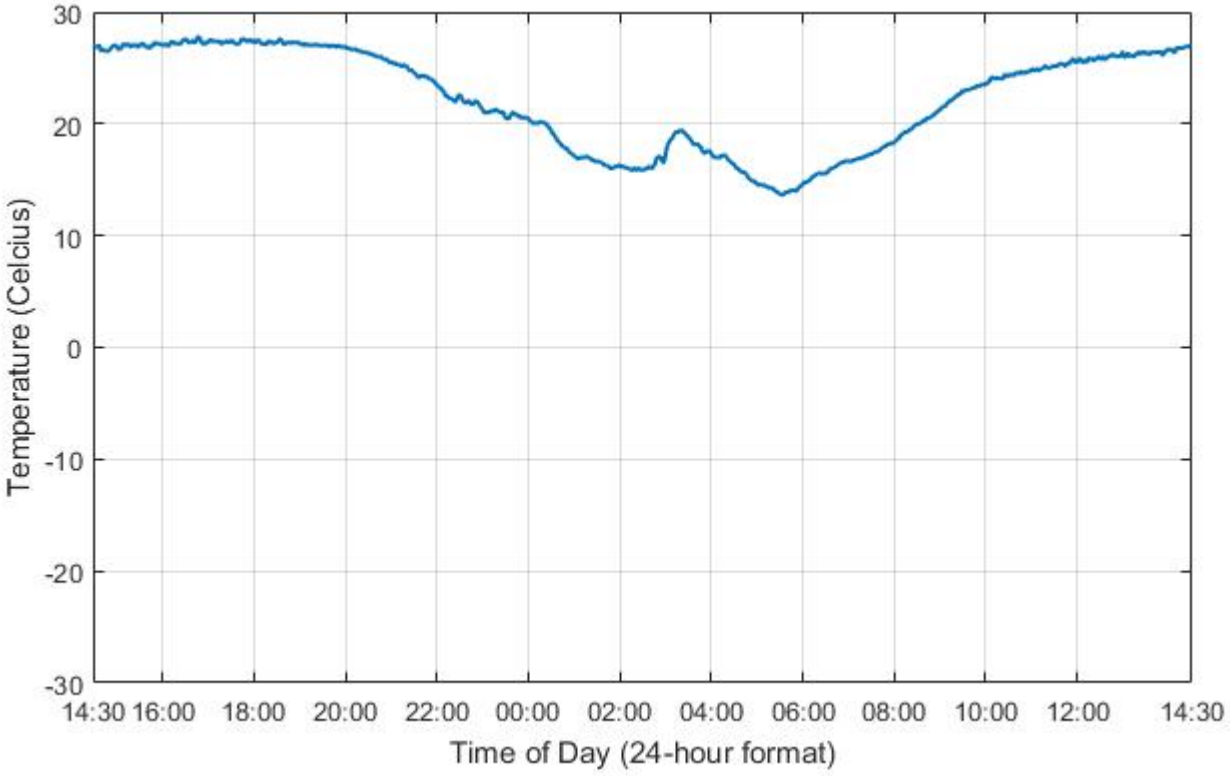
Monitored Rain Rate (June 19 – 20, 2018) at Noise Monitor Location 6



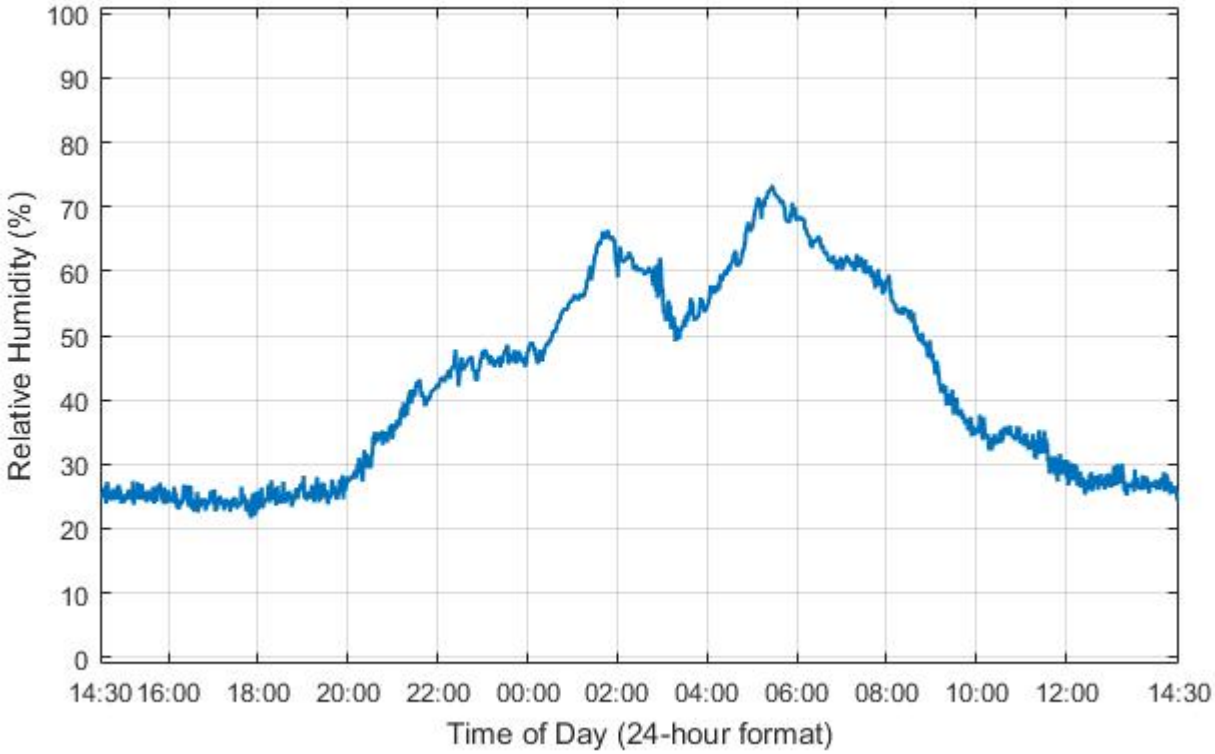
Monitored Wind Speed (June 19 – 20, 2018) at Noise Monitor Location 10



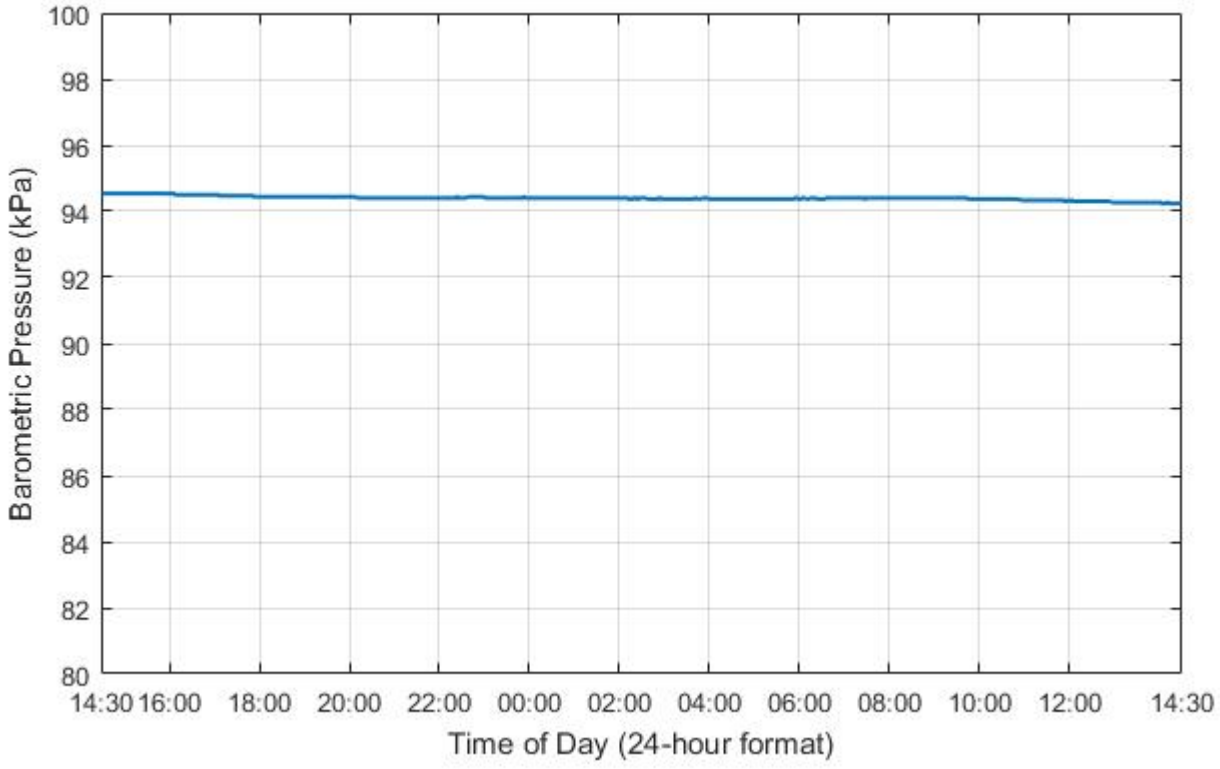
Monitored Wind Direction (June 19 – 20, 2018) at Noise Monitor Location 10



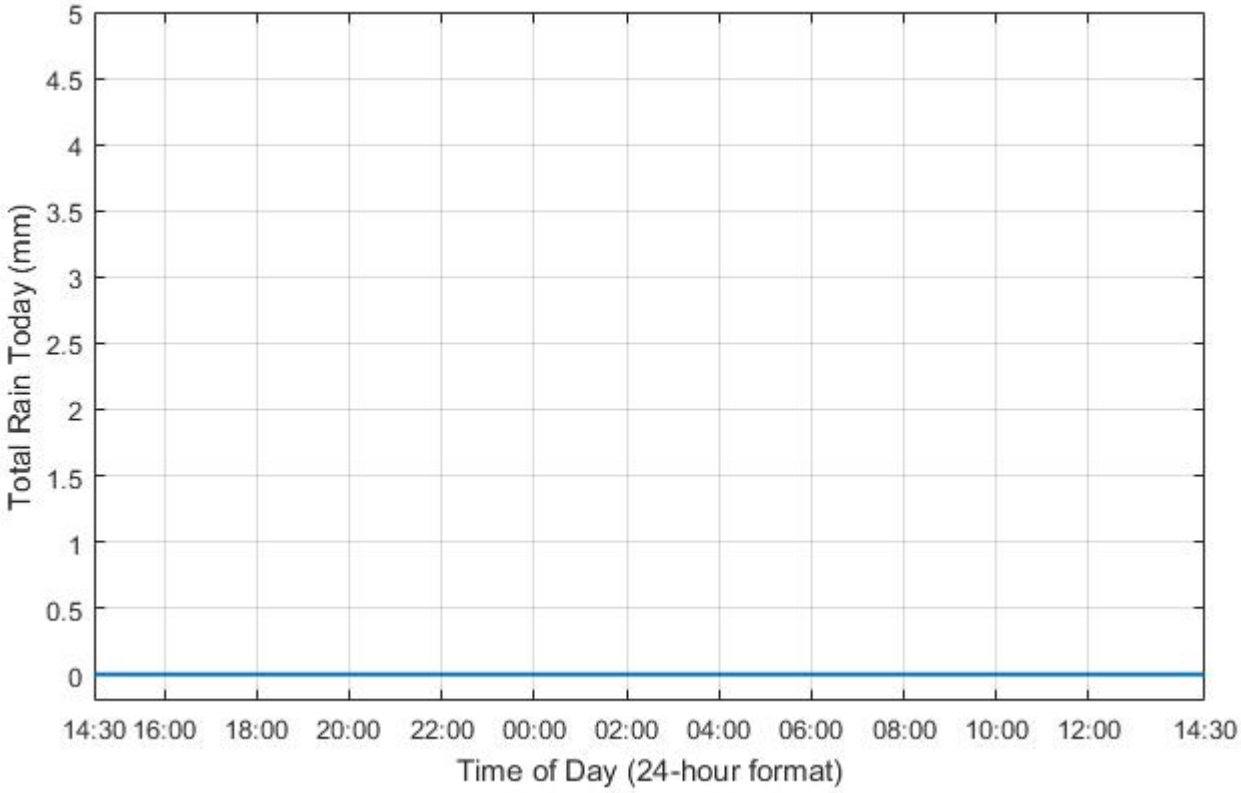
Monitored Temperature (June 19 – 20, 2018) at Noise Monitor Location 10



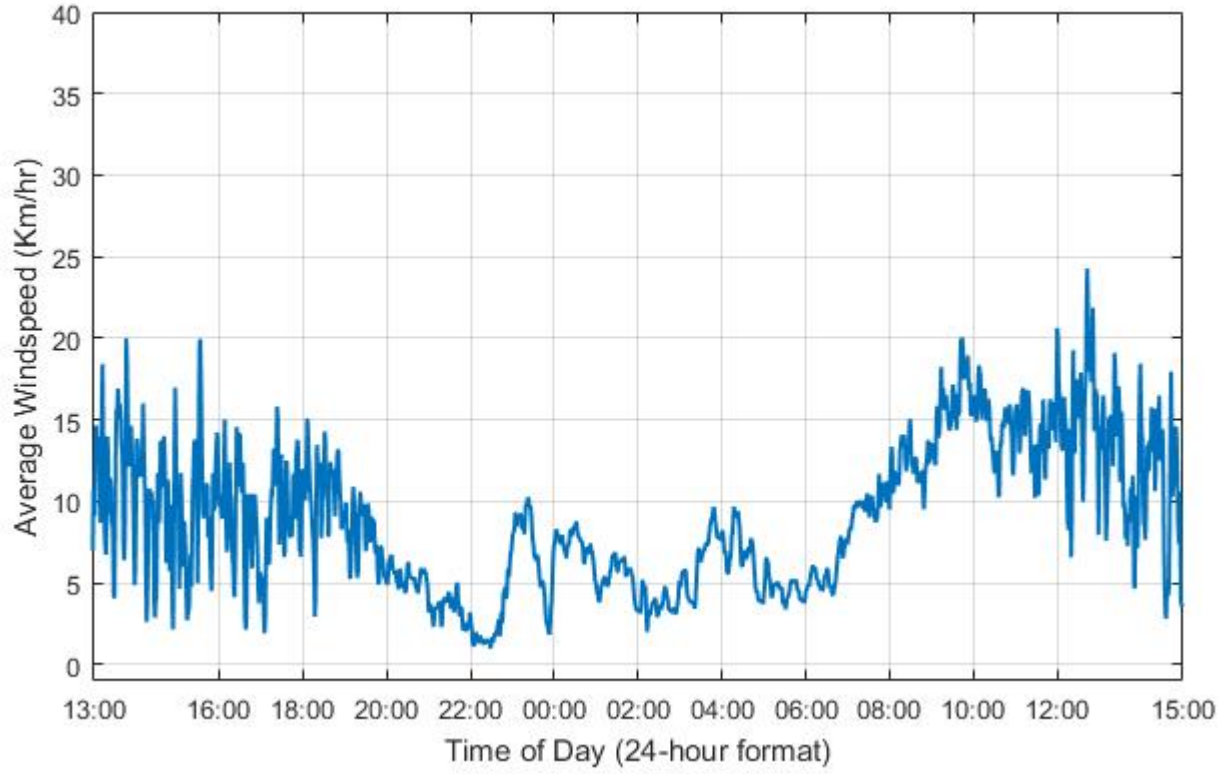
Monitored Humidity (June 19 – 20, 2018) at Noise Monitor Location 10



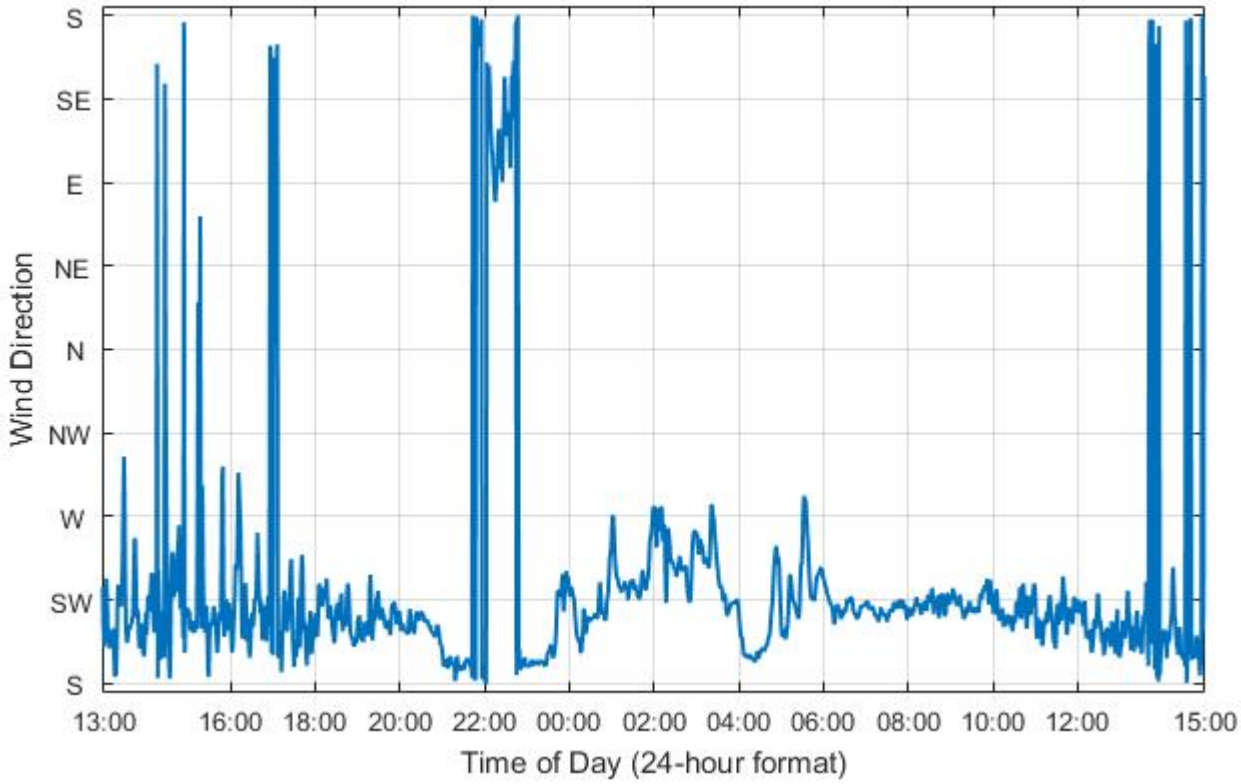
Monitored Barometric Pressure (June 19 – 20, 2018) at Noise Monitor Location 10



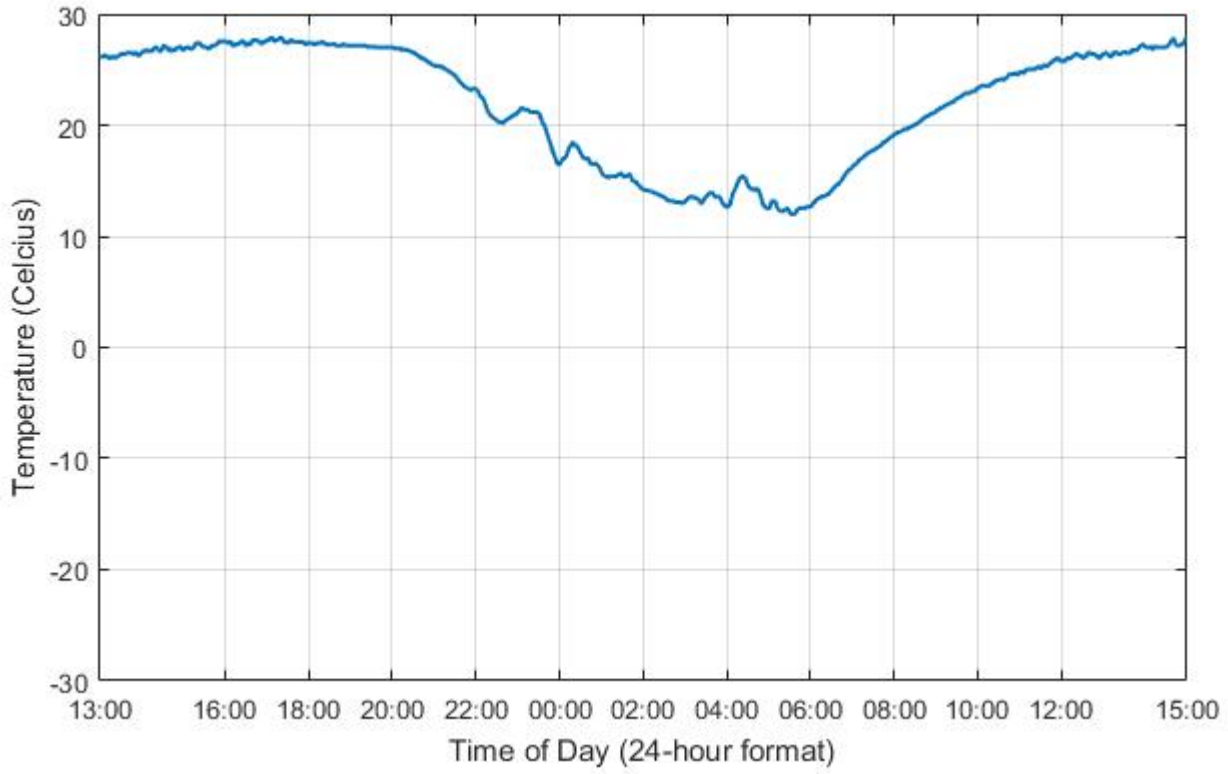
Night-time Monitored Rain Rate (June 19 – 20, 2018) at Noise Monitor Location 10



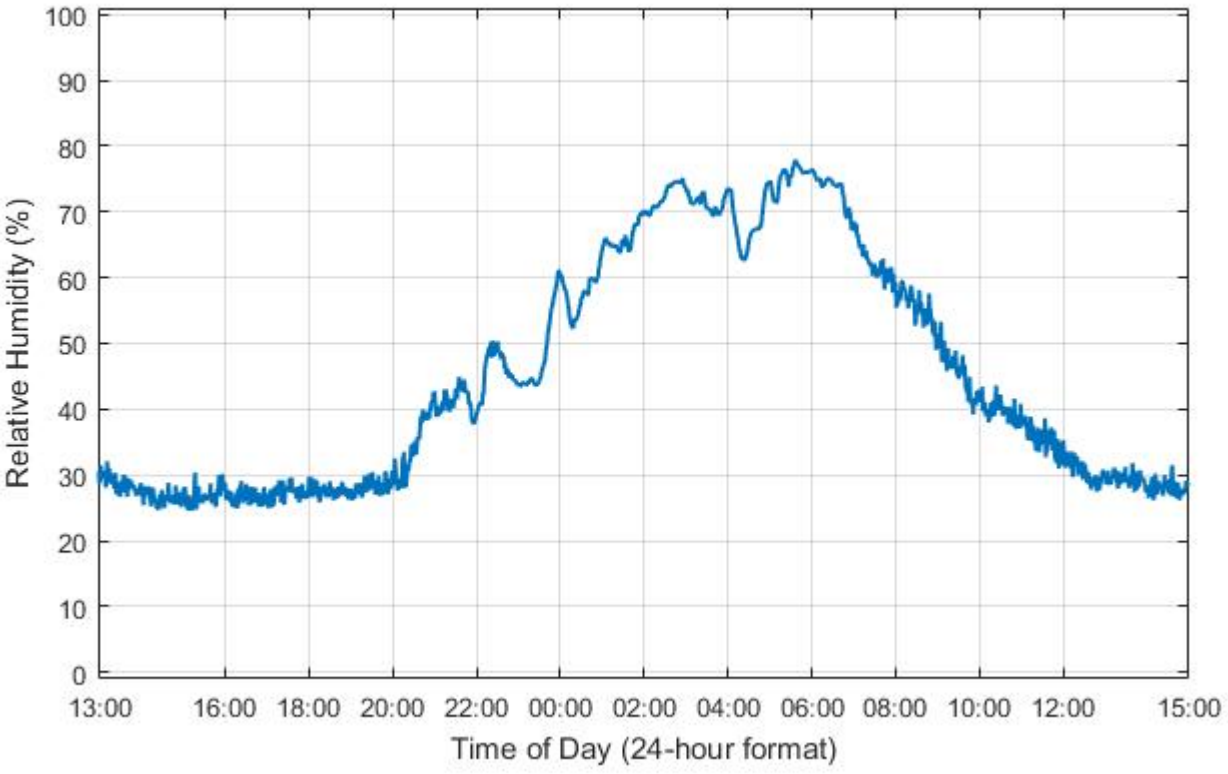
Monitored Wind Speed (June 19 – 20, 2018) at Noise Monitor Location 12



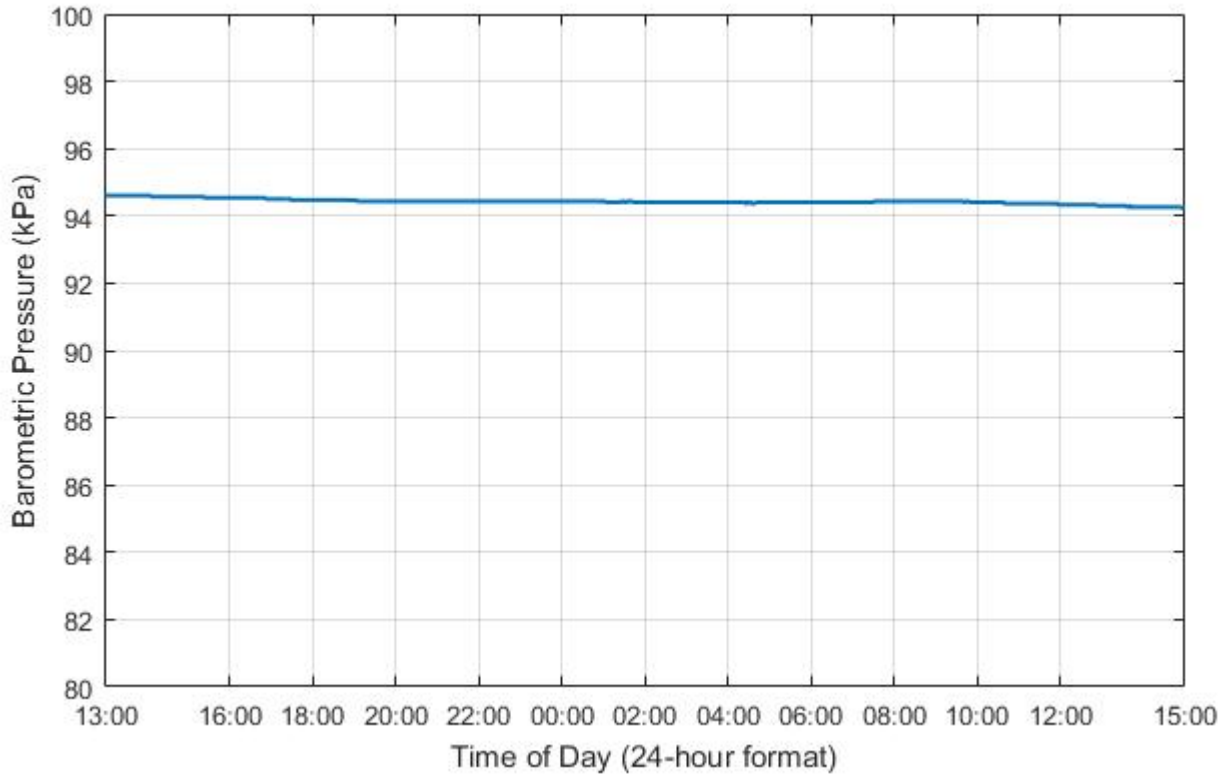
Monitored Wind Direction (June 19 – 20, 2018) at Noise Monitor Location 12



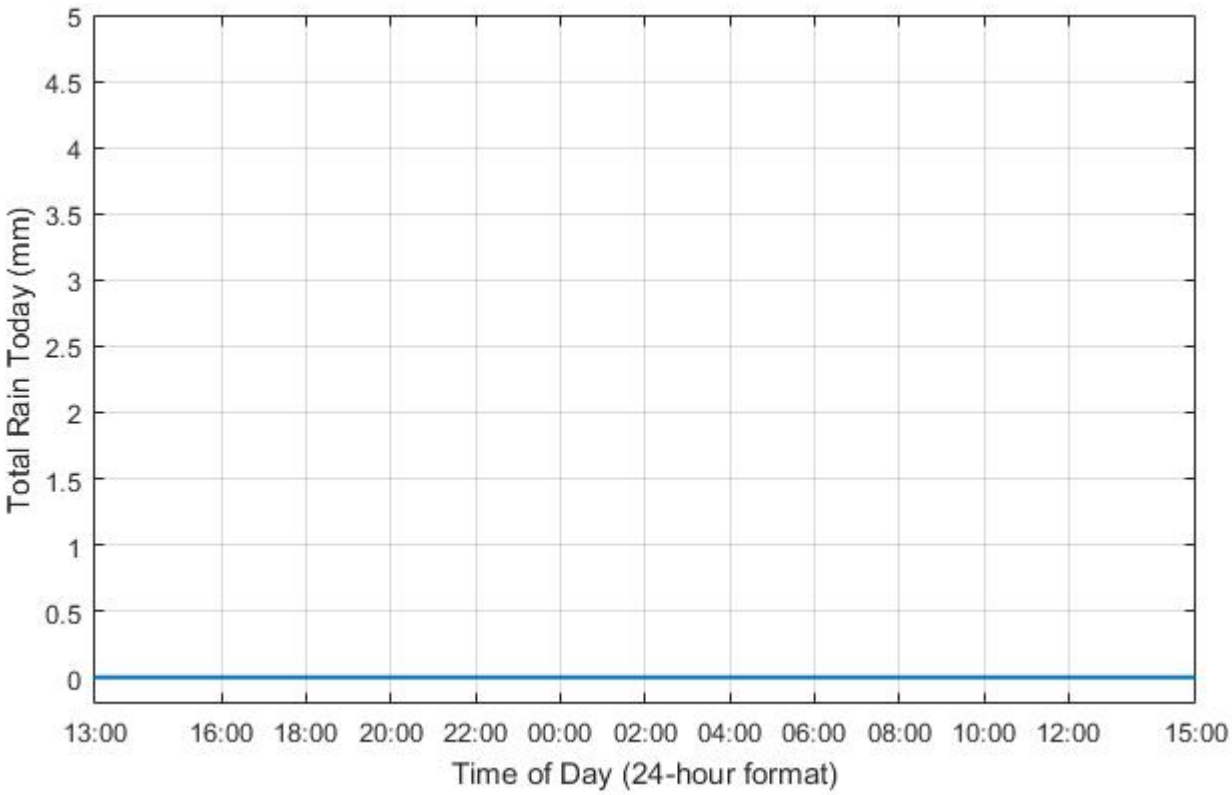
Monitored Temperature (June 19 – 20, 2018) at Noise Monitor Location 12



Monitored Humidity (June 19 – 20, 2018) at Noise Monitor Location 12

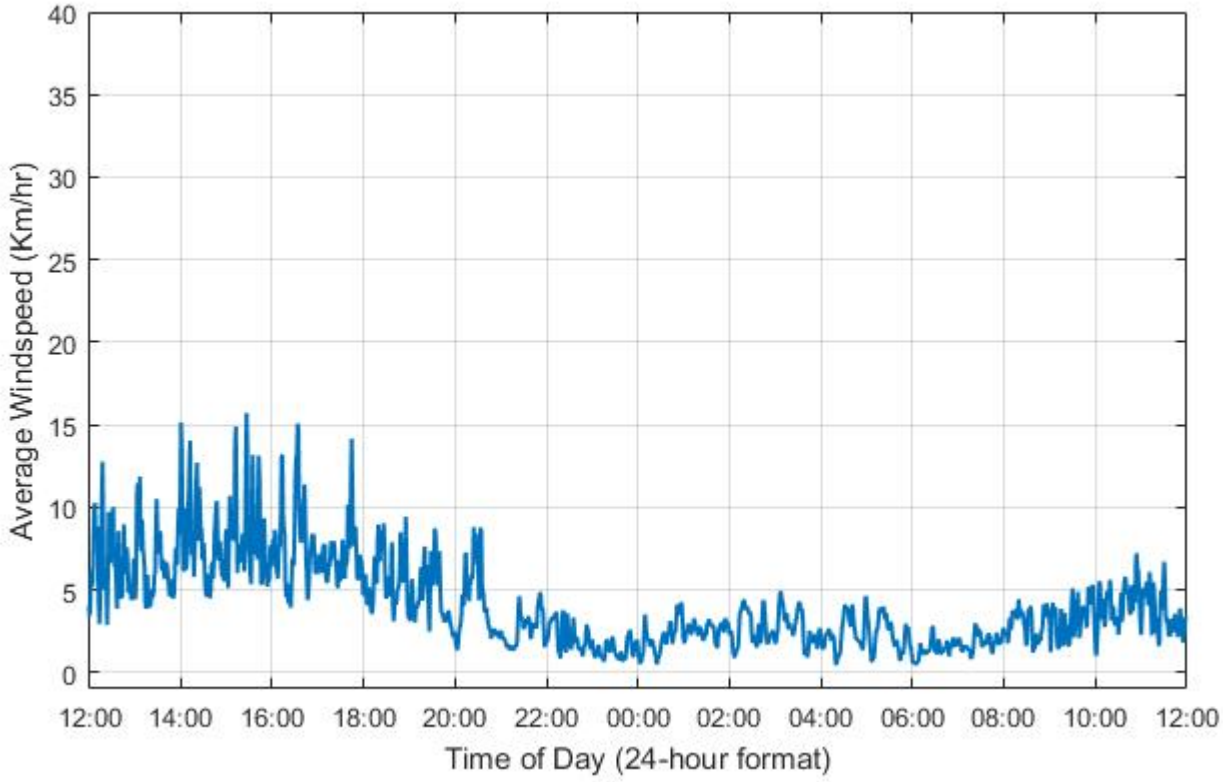


Monitored Barometric Pressure (June 19 – 20, 2018) at Noise Monitor Location 12

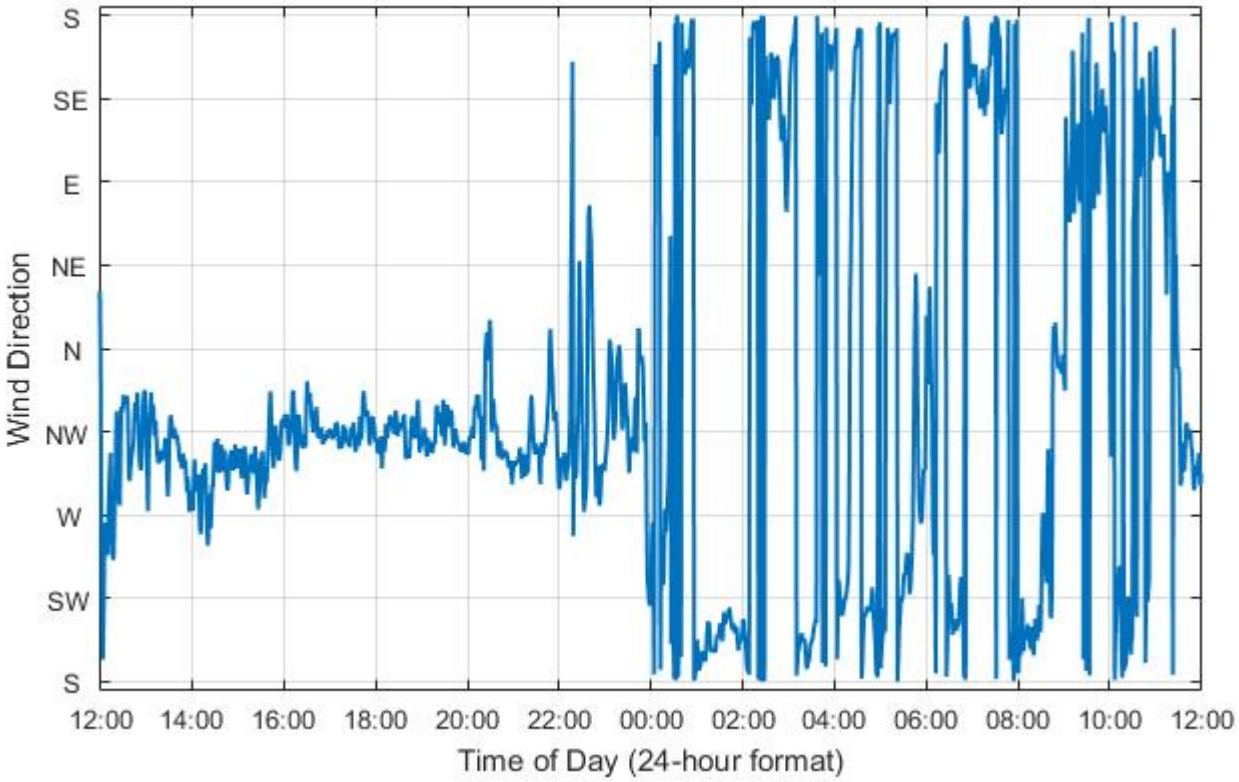


Night-time Monitored Rain Rate (June 19 – 20, 2018) at Noise Monitor Location 12

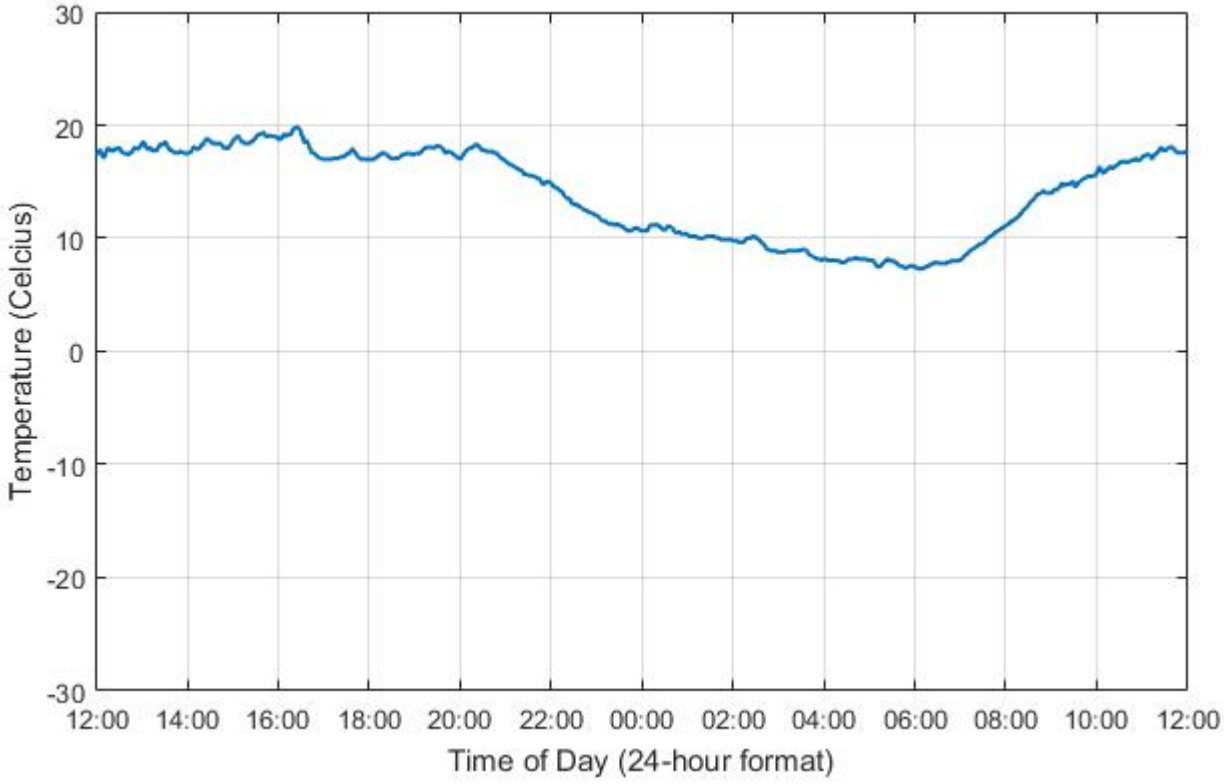
July 24 - 25, 2018 Weather Data



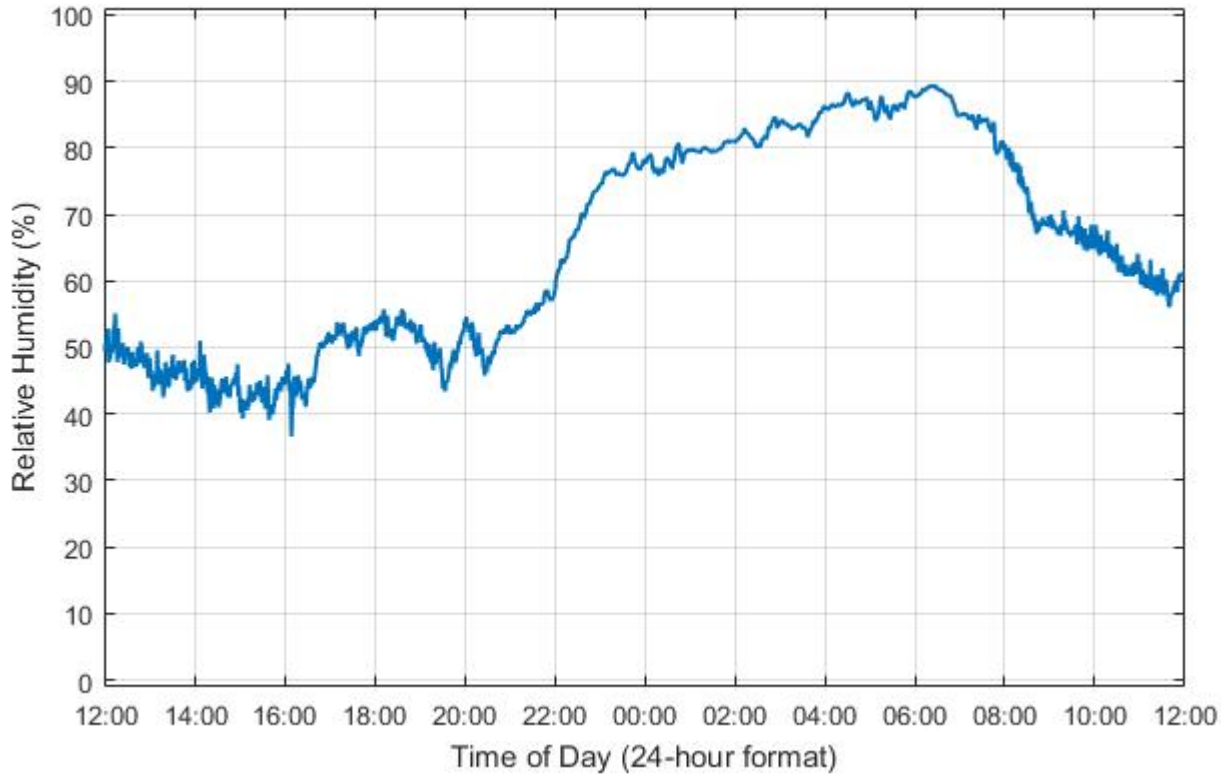
Monitored Wind Speed (July 24 – 25, 2018) at Noise Monitor Location 1



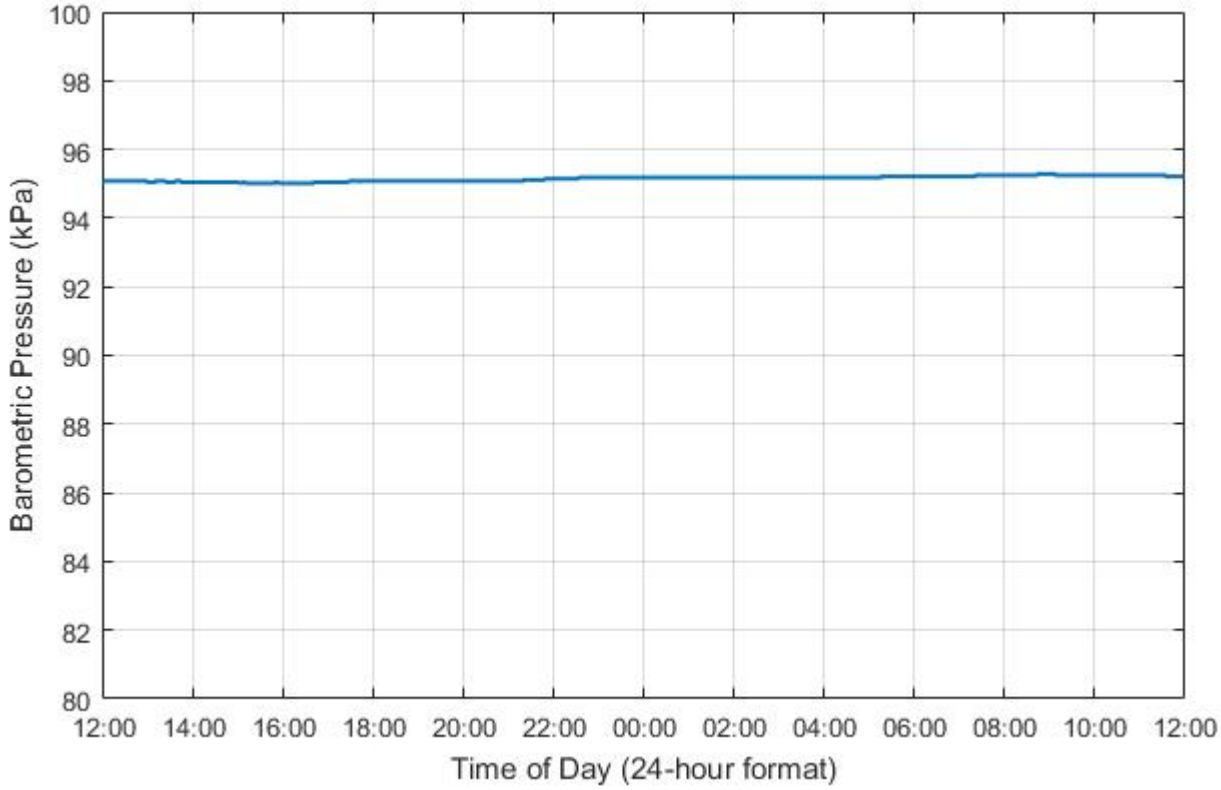
Monitored Wind Direction (July 24 – 25, 2018) at Noise Monitor Location 1



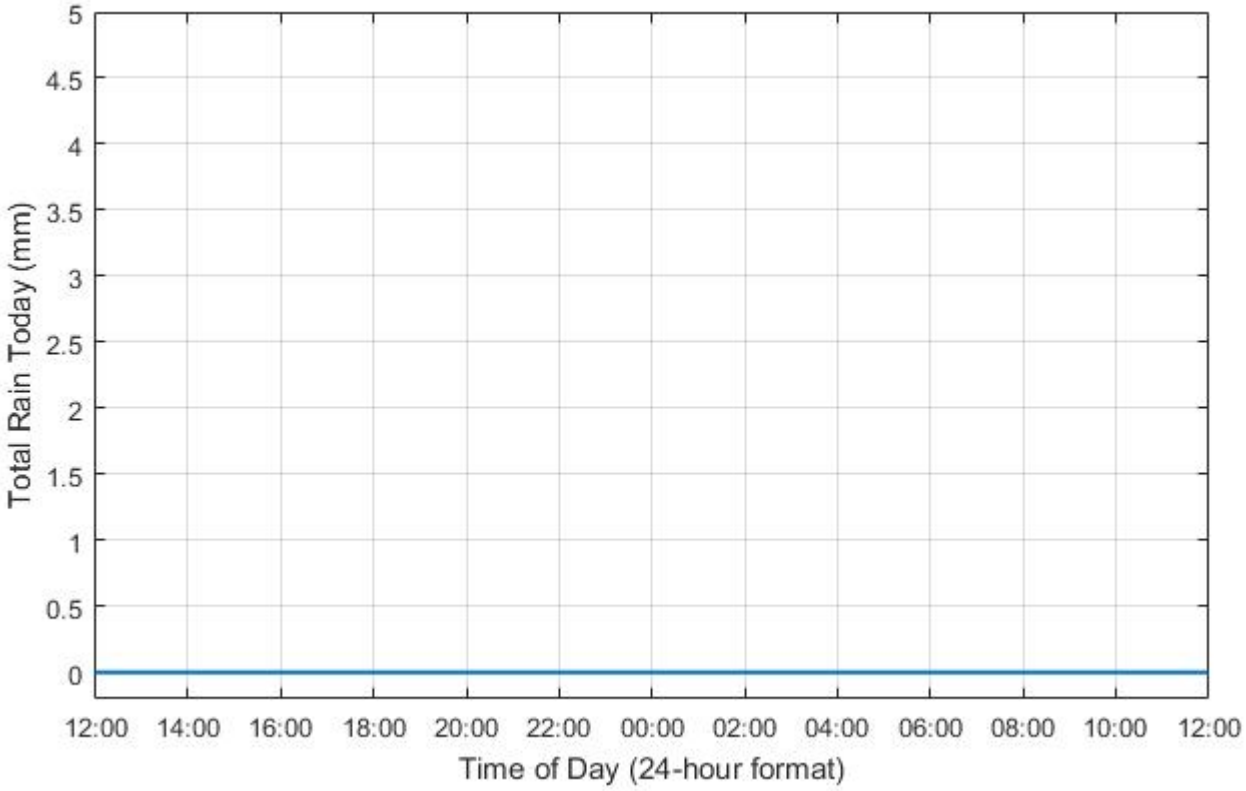
Monitored Temperature (July 24 – 25, 2018) at Noise Monitor Location 1



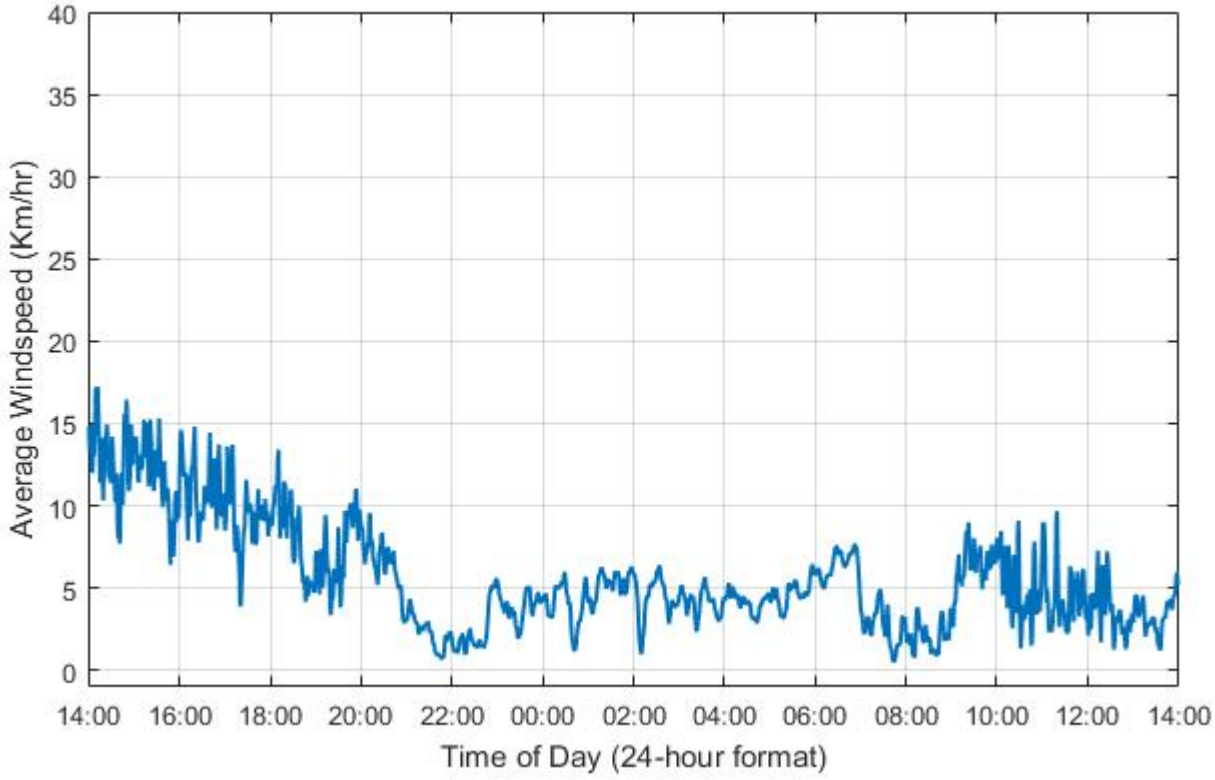
Monitored Humidity (July 24 – 25, 2018) at Noise Monitor Location 1



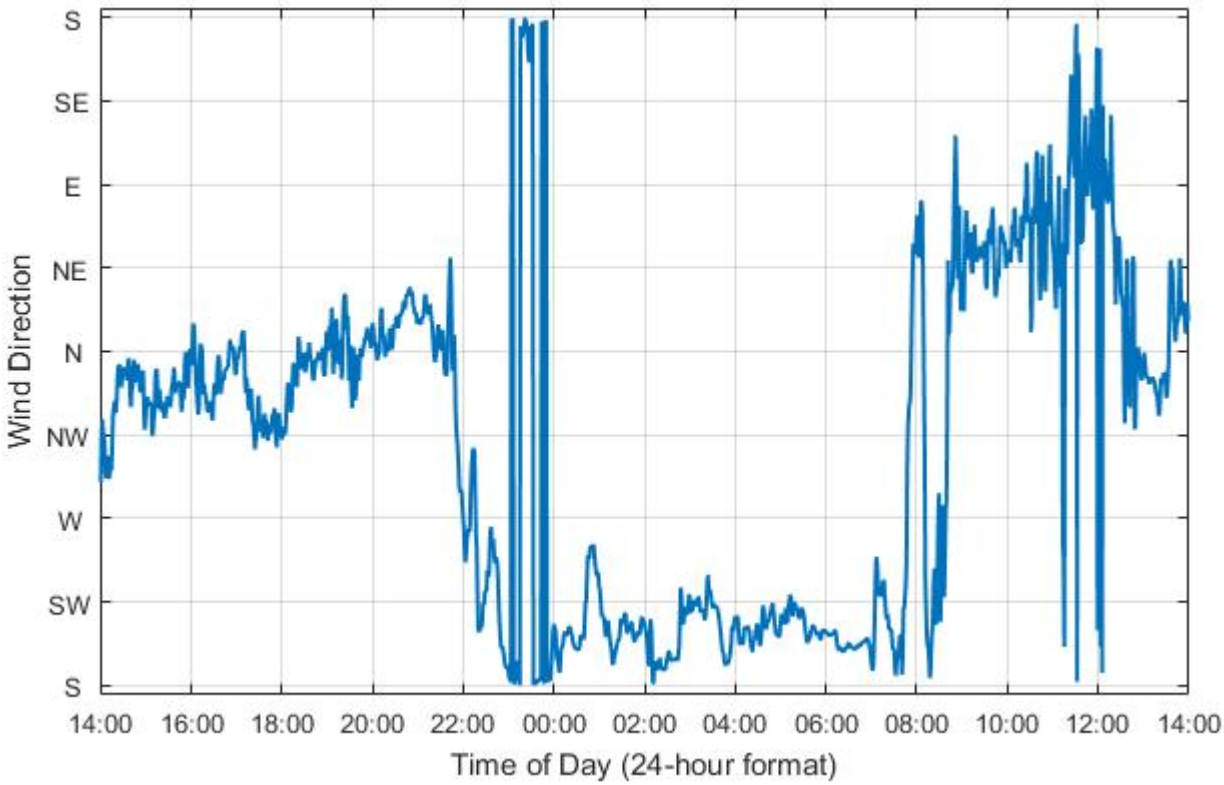
Monitored Barometric Pressure (July 24 – 25, 2018) at Noise Monitor Location 1



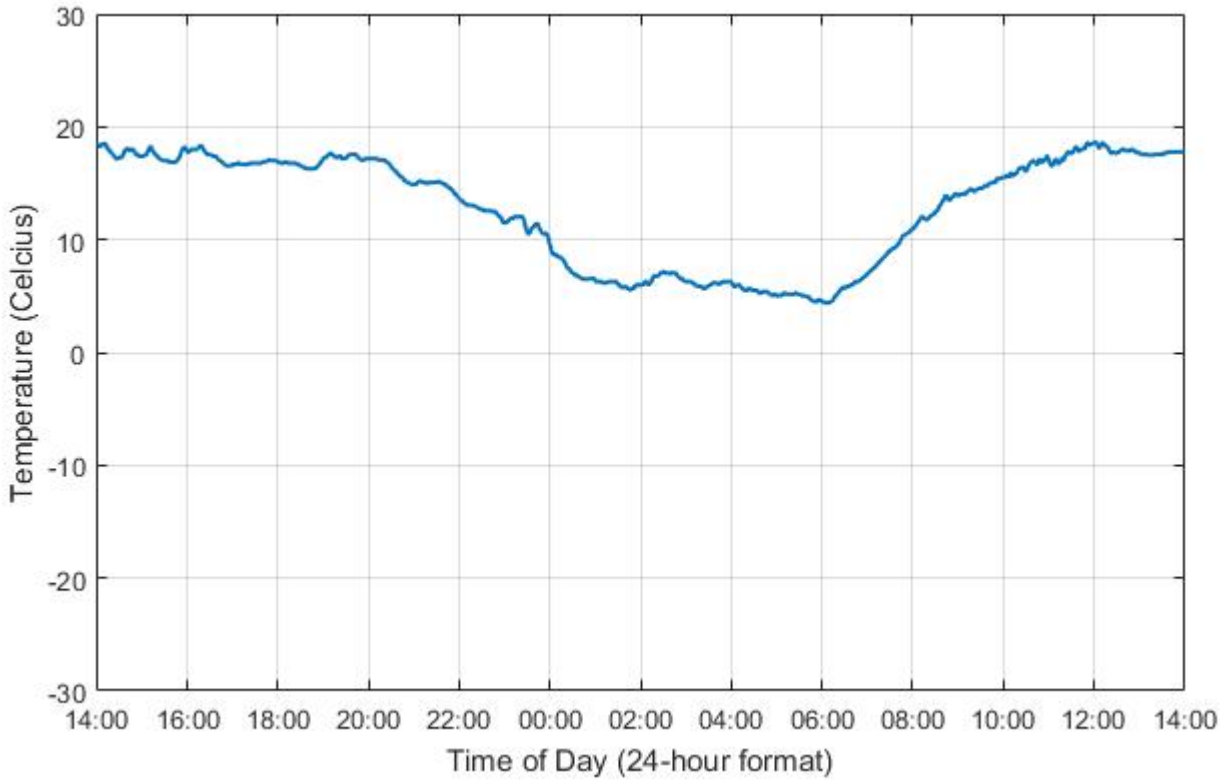
Monitored Rain Rate (July 24 – 25, 2018) at Noise Monitor Location 1



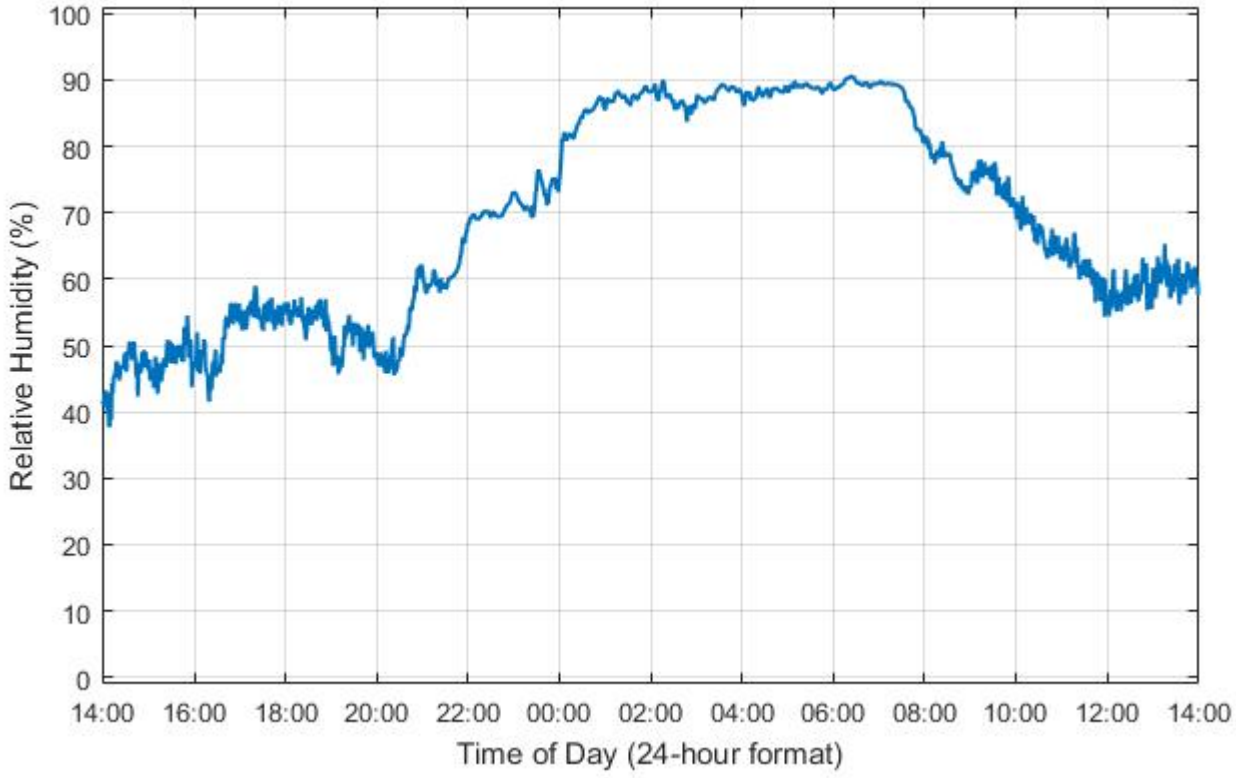
Monitored Wind Speed (July 24 – 25, 2018) at Noise Monitor Location 12



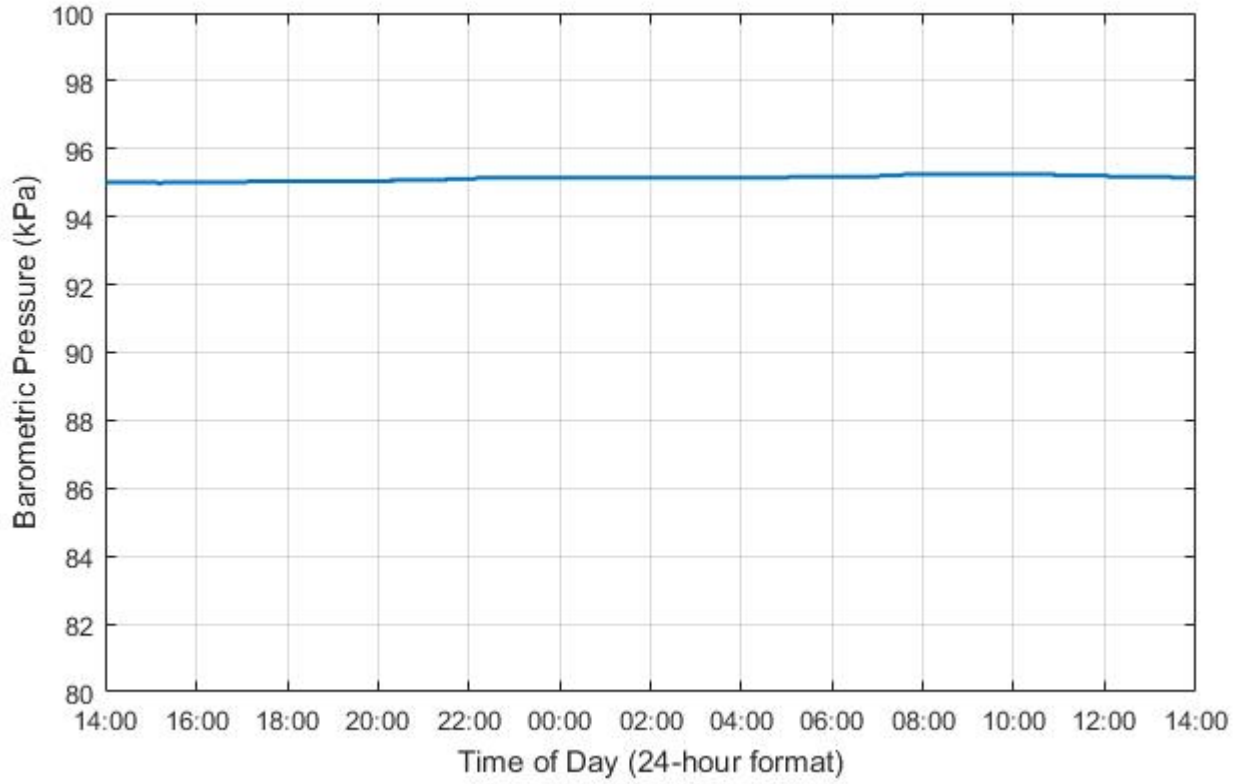
Monitored Wind Direction (July 24 – 25, 2018) at Noise Monitor Location 12



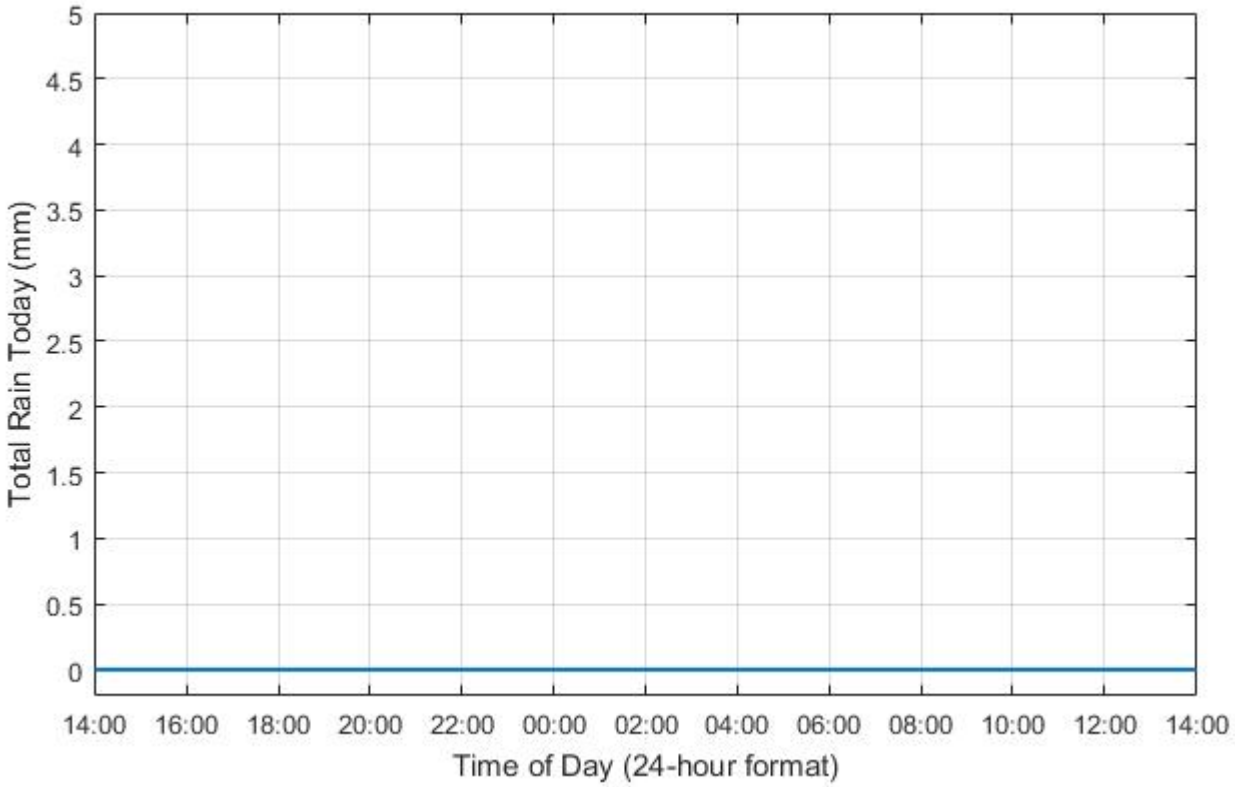
Monitored Temperature (July 24 – 25, 2018) at Noise Monitor Location 12



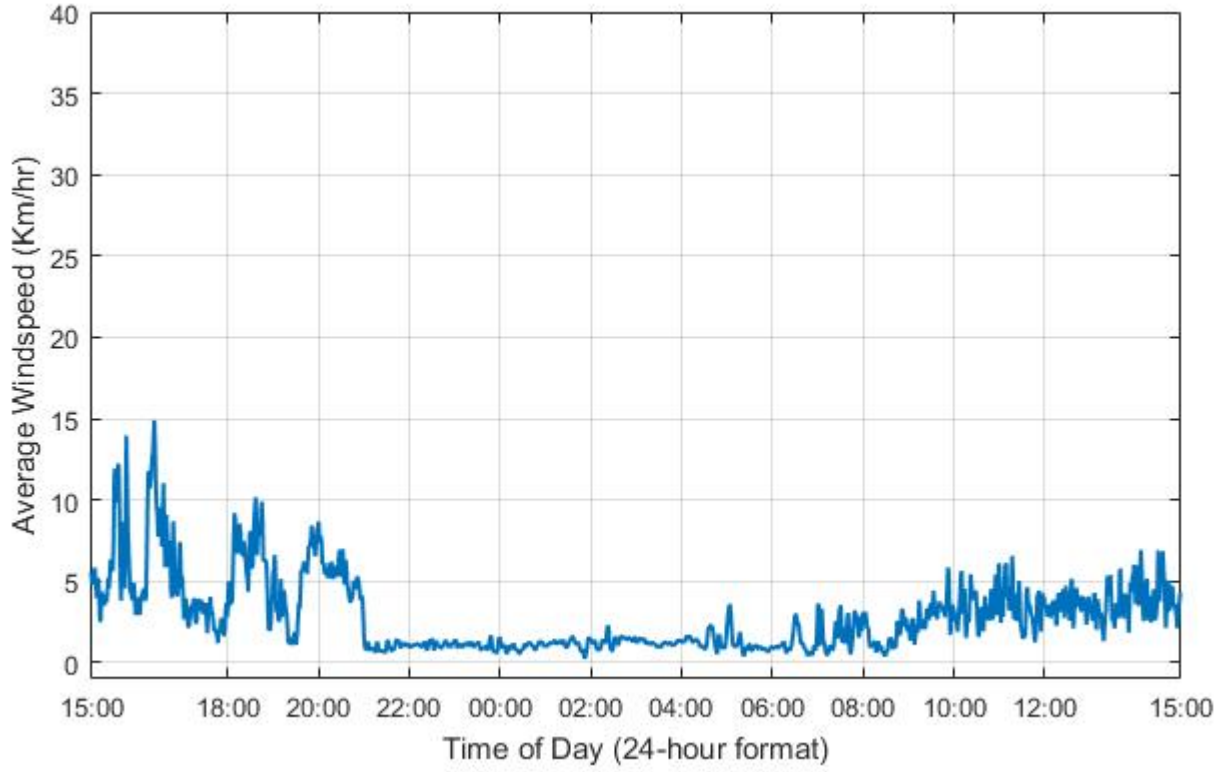
Monitored Humidity (July 24 – 25, 2018) at Noise Monitor Location 12



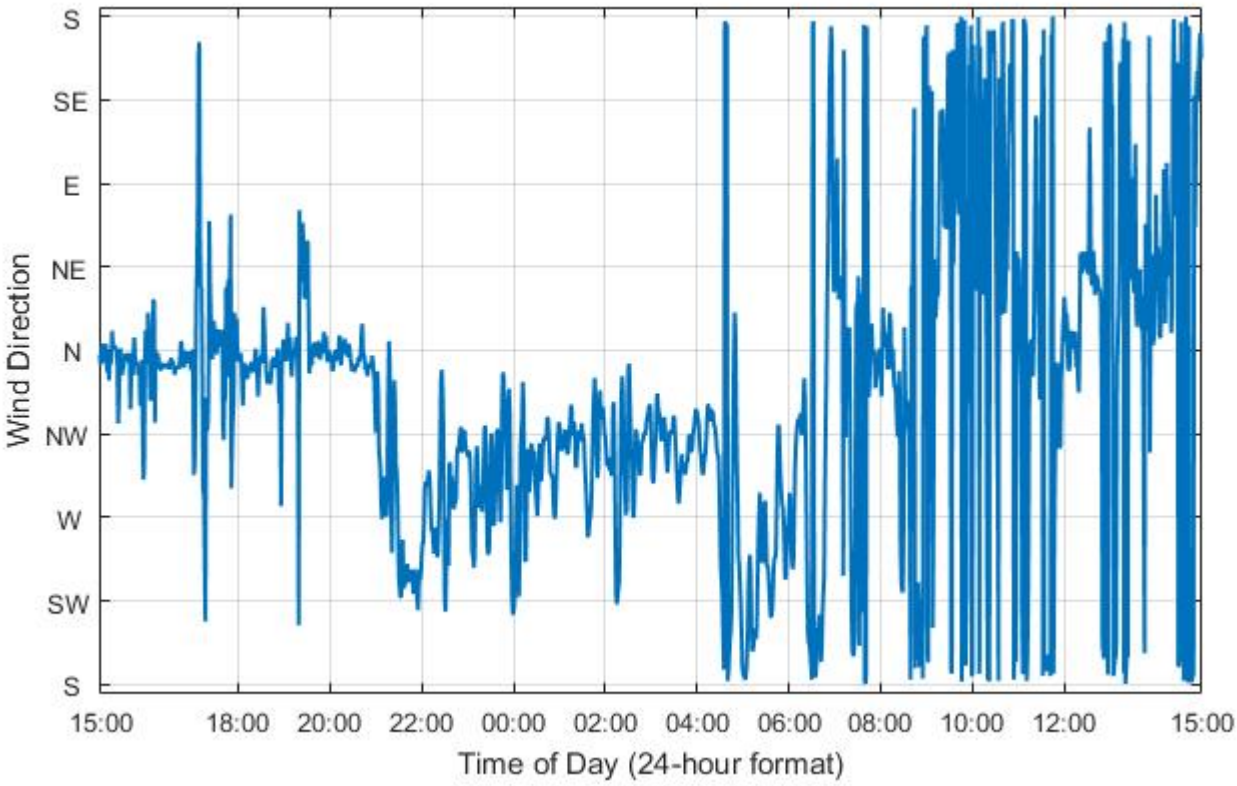
Monitored Barometric Pressure (July 24 – 25, 2018) at Noise Monitor Location 12



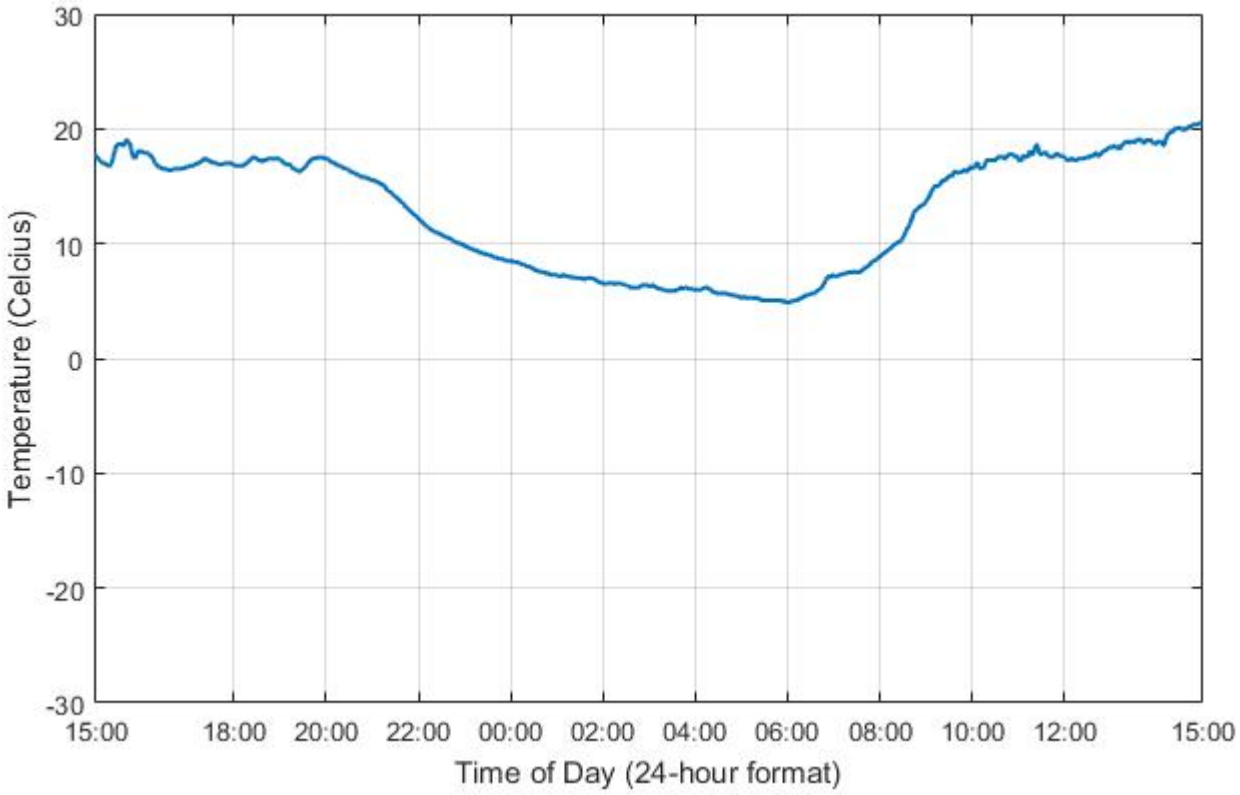
Monitored Rain Rate (July 24 – 25, 2018) at Noise Monitor Location 12



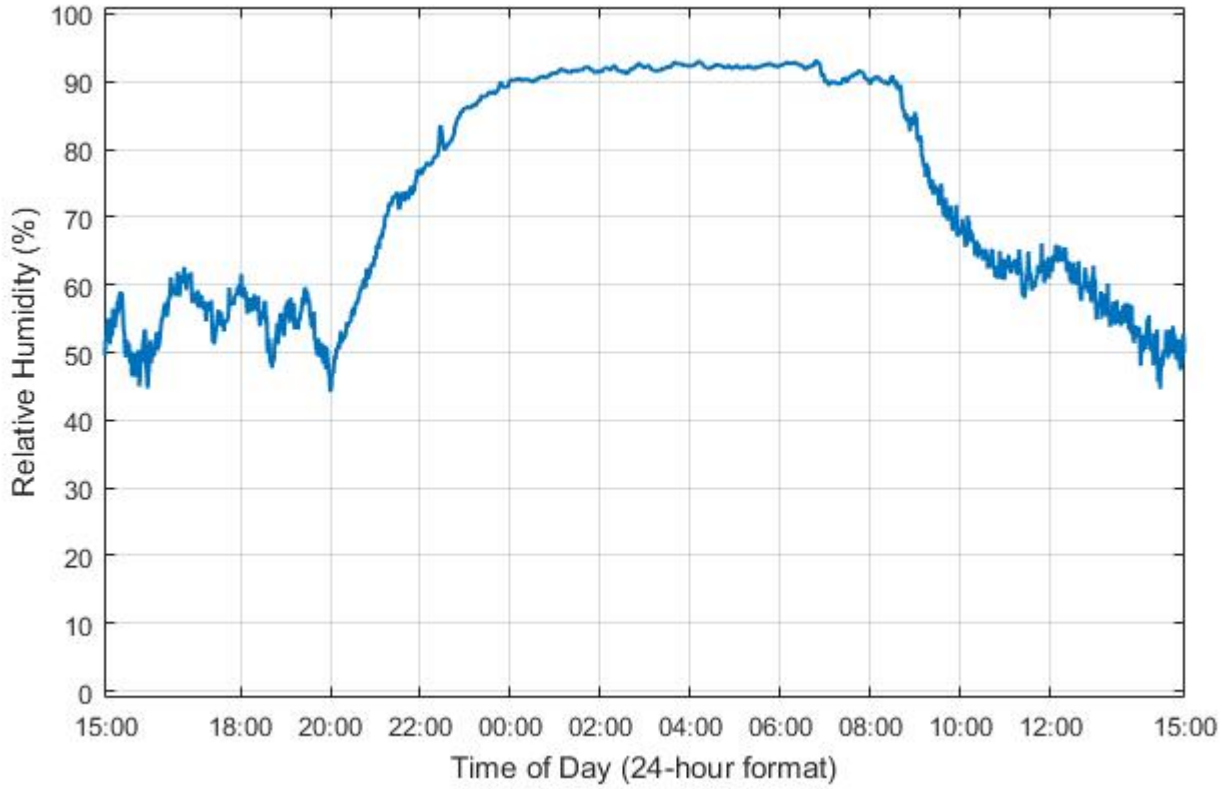
Monitored Wind Speed (July 24 – 25, 2018) at Noise Monitor Location 13



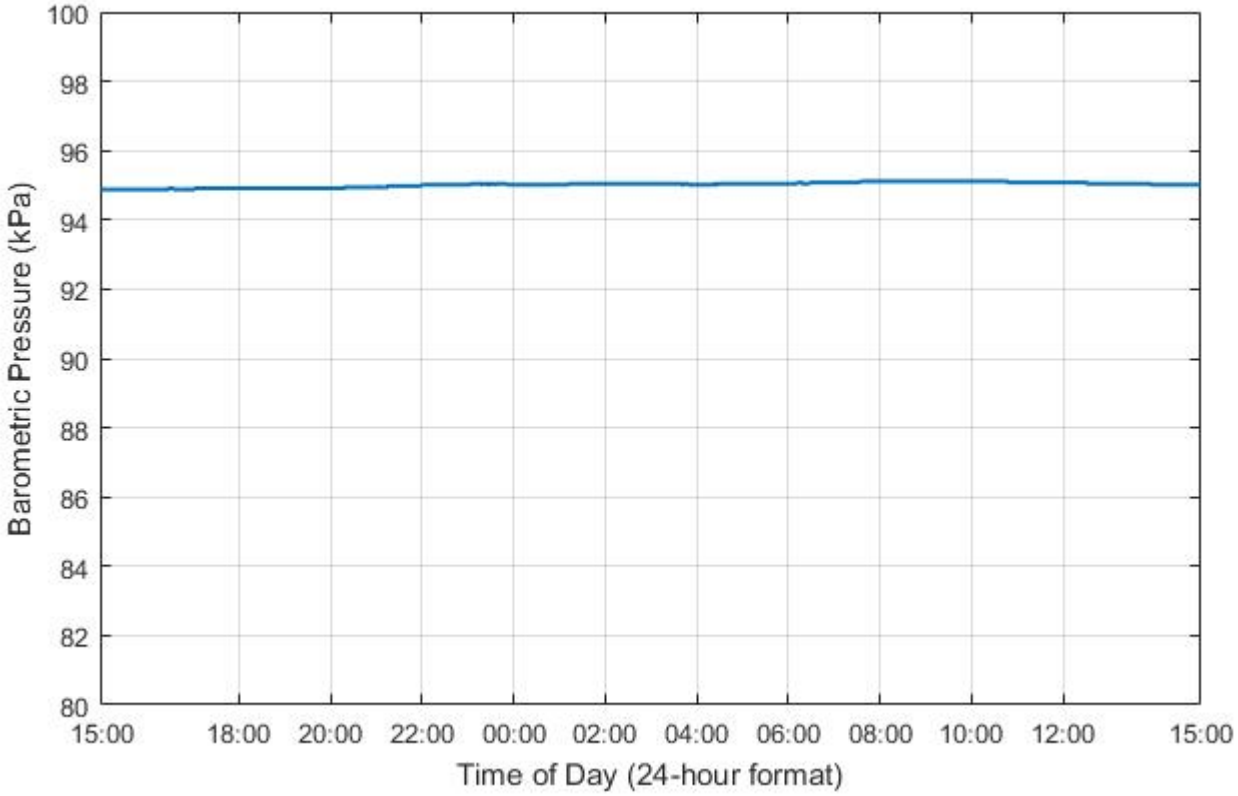
Monitored Wind Direction (July 24 – 25, 2018) at Noise Monitor Location 13



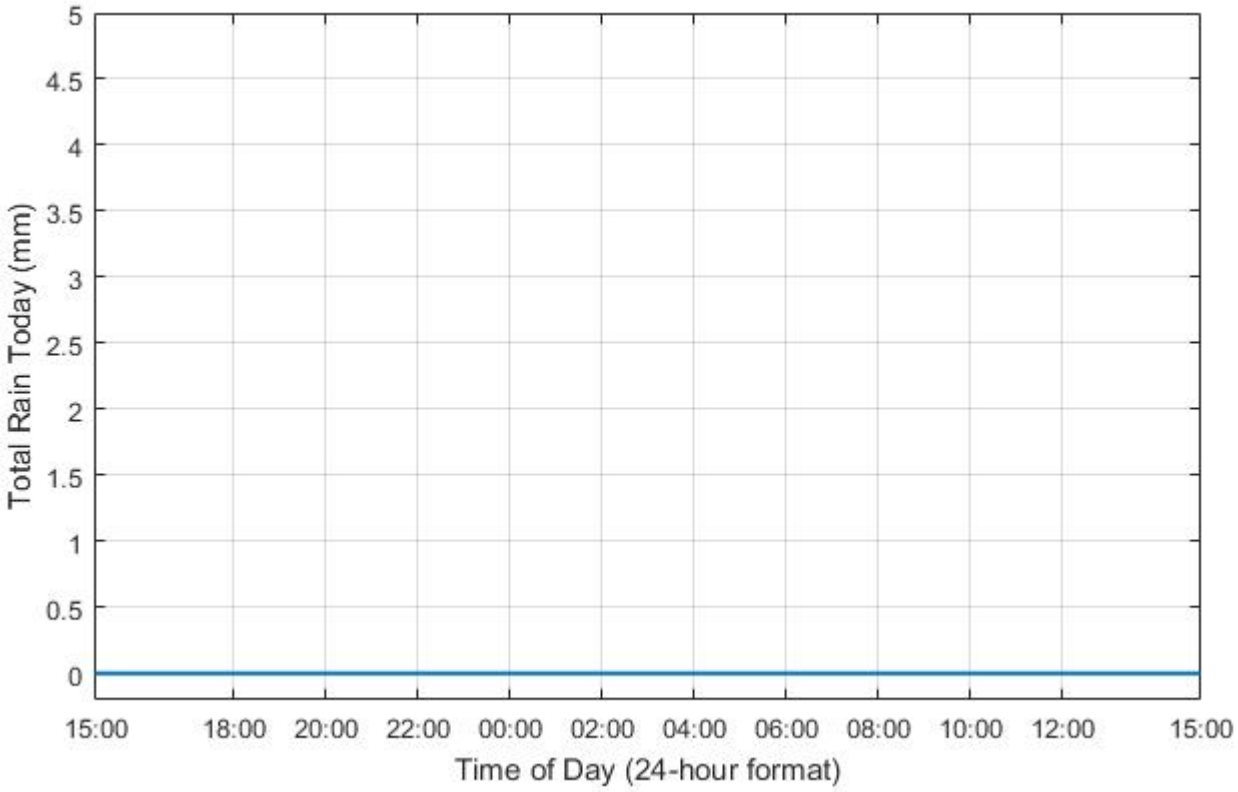
Monitored Temperature (July 24 – 25, 2018) at Noise Monitor Location 13



Monitored Humidity (July 24 – 25, 2018) at Noise Monitor Location 13

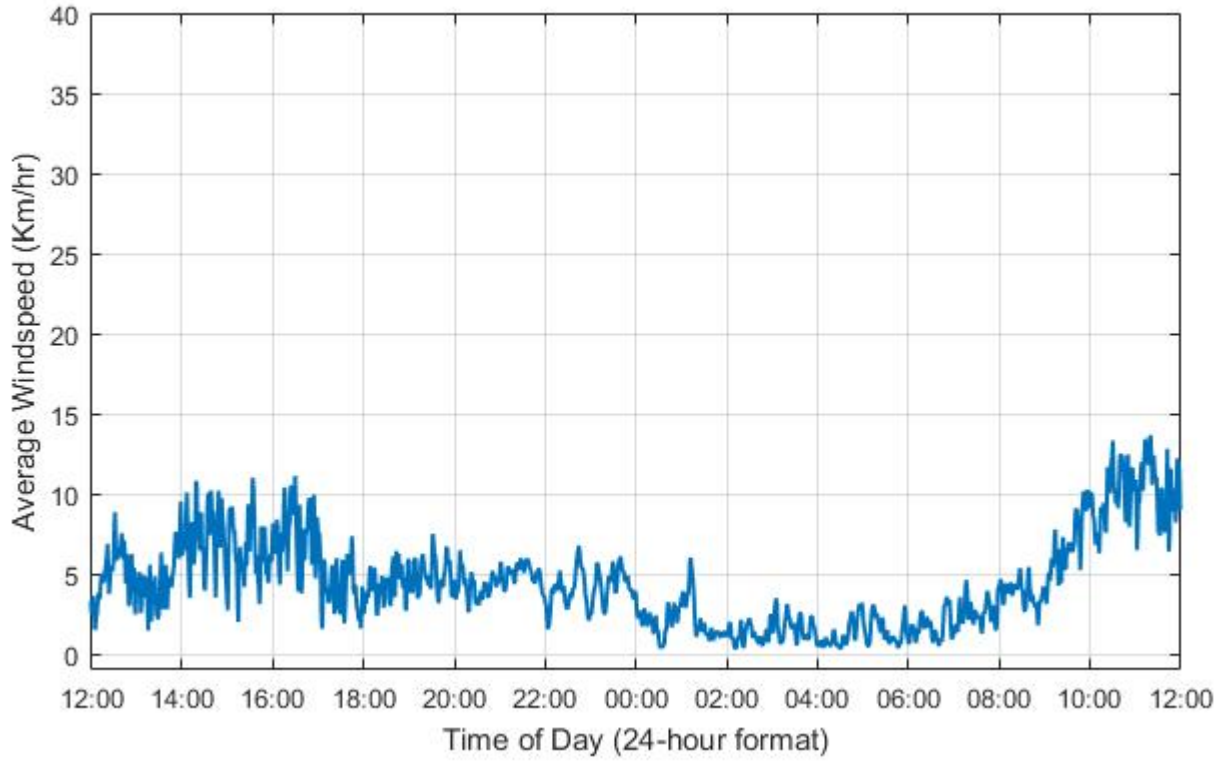


Monitored Barometric Pressure (July 24 – 25, 2018) at Noise Monitor Location 13

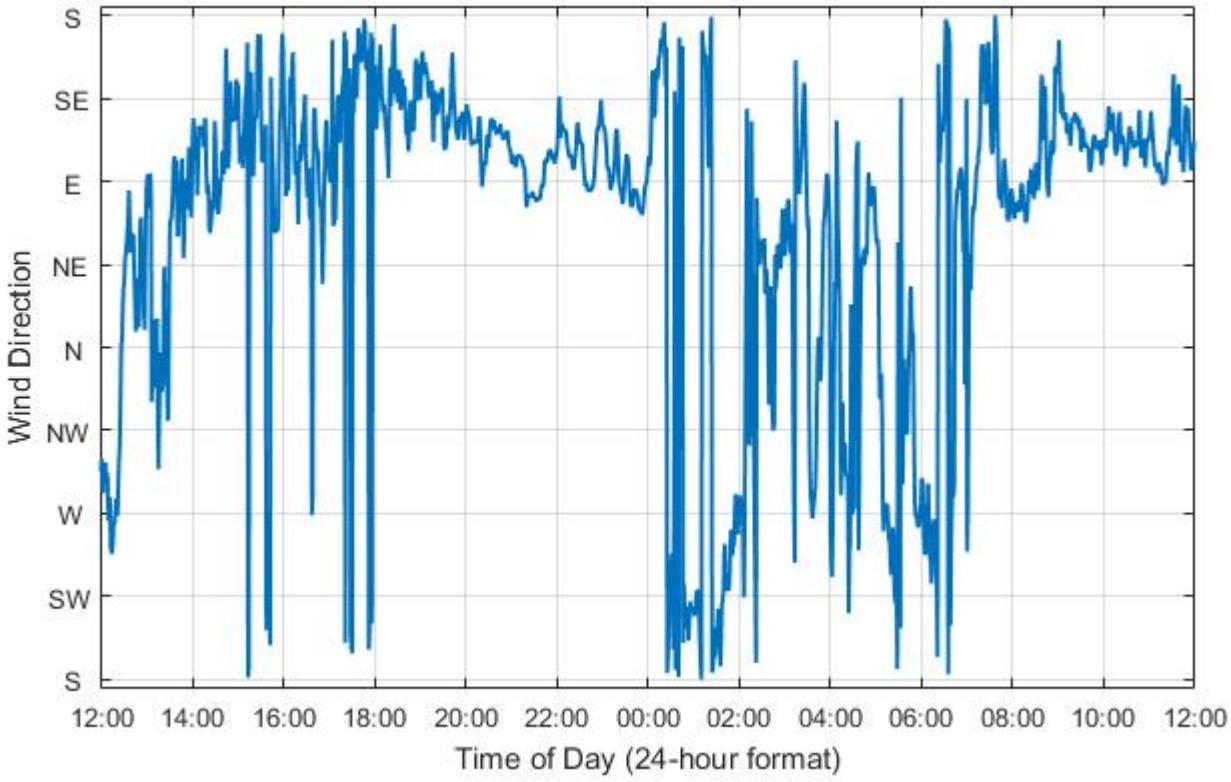


Night-time Monitored Rain Rate (July 24 – 25, 2018) at Noise Monitor Location 13

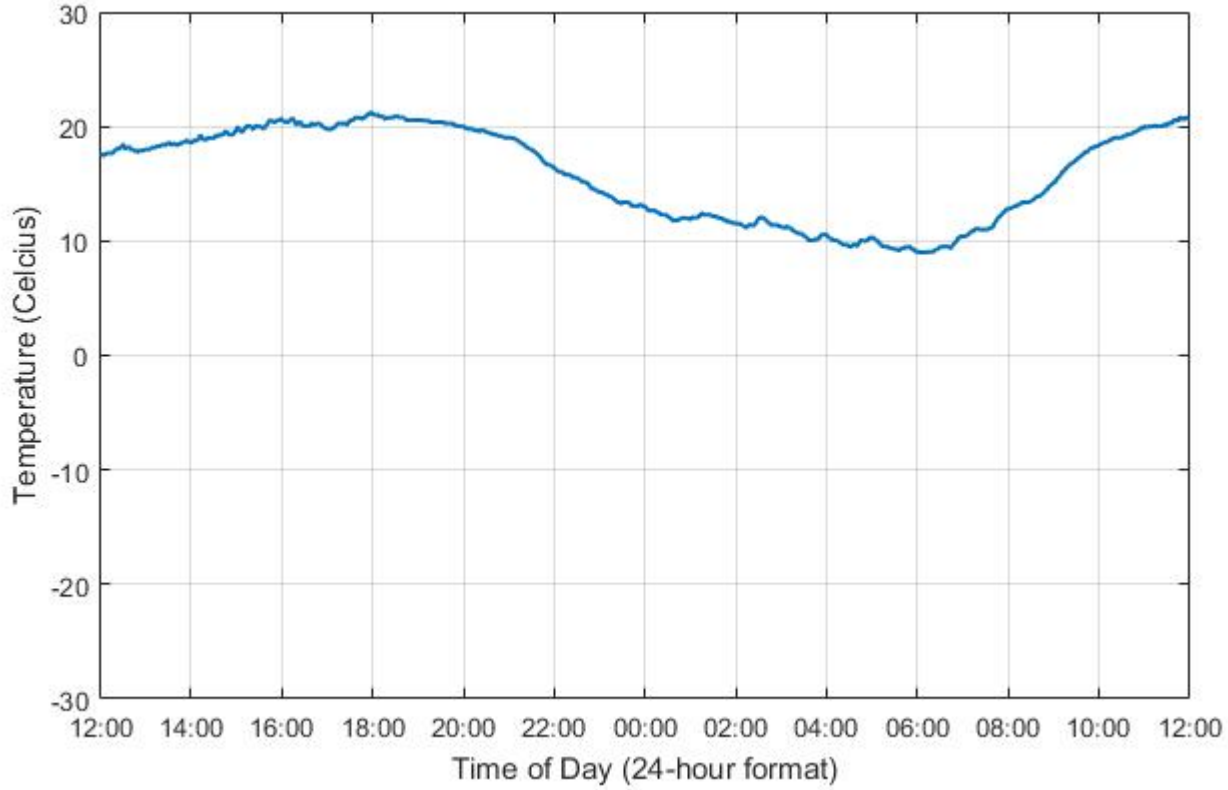
July 25 – 26, 2018 Weather Data



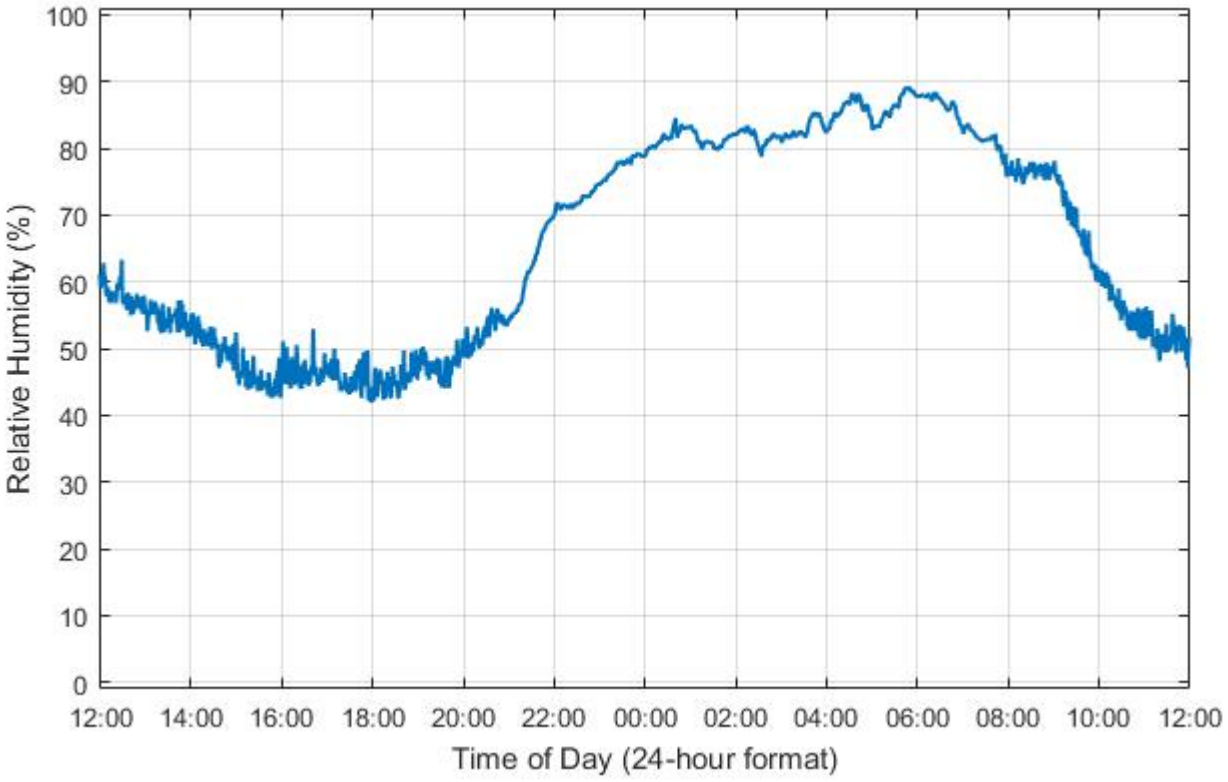
Monitored Wind Speed (July 25 – 26, 2018) at Noise Monitor Location 1



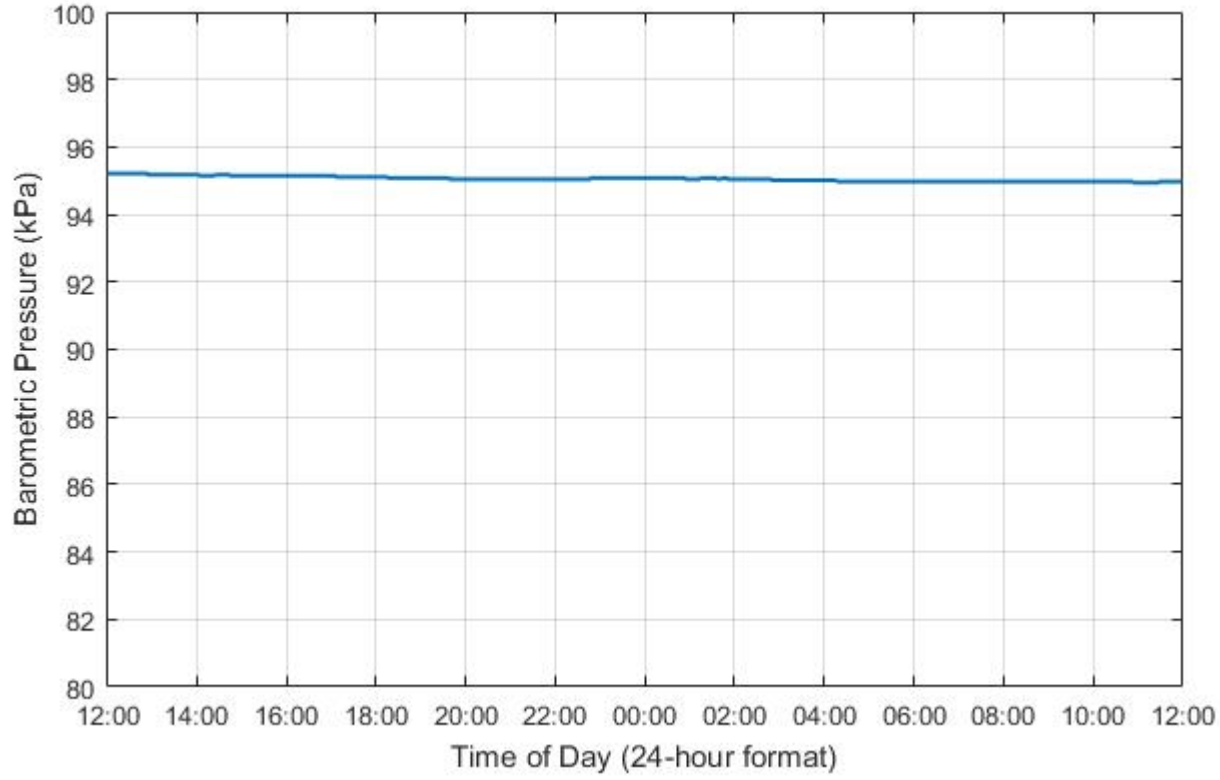
Monitored Wind Direction (July 25 – 26, 2018) at Noise Monitor Location 1



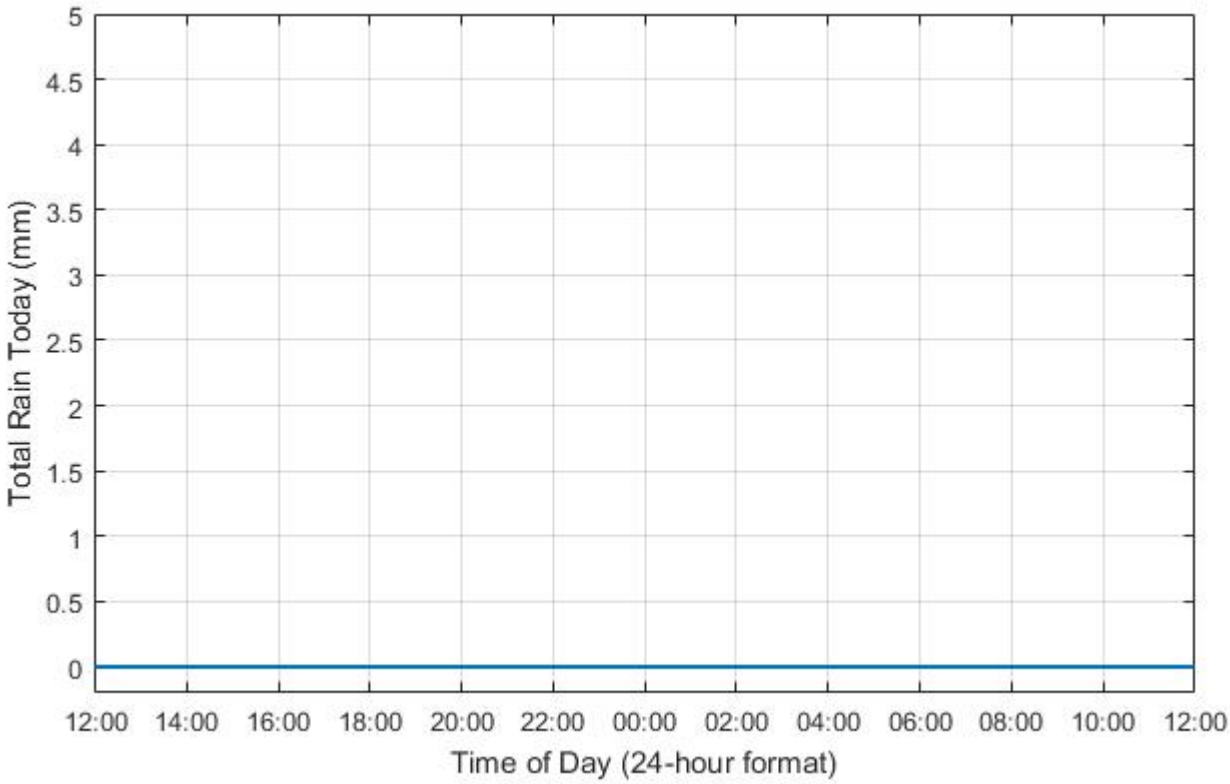
Monitored Temperature (July 25 – 26, 2018) at Noise Monitor Location 1



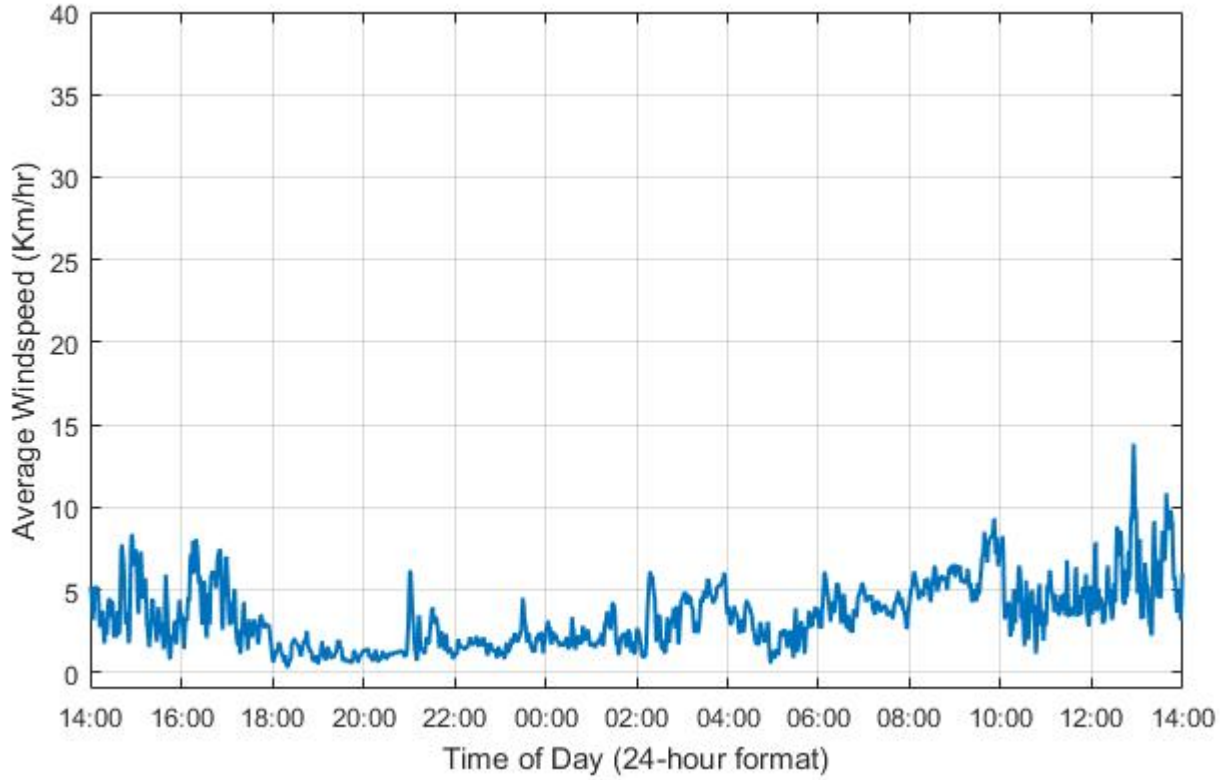
Monitored Humidity (July 25 – 26, 2018) at Noise Monitor Location 1



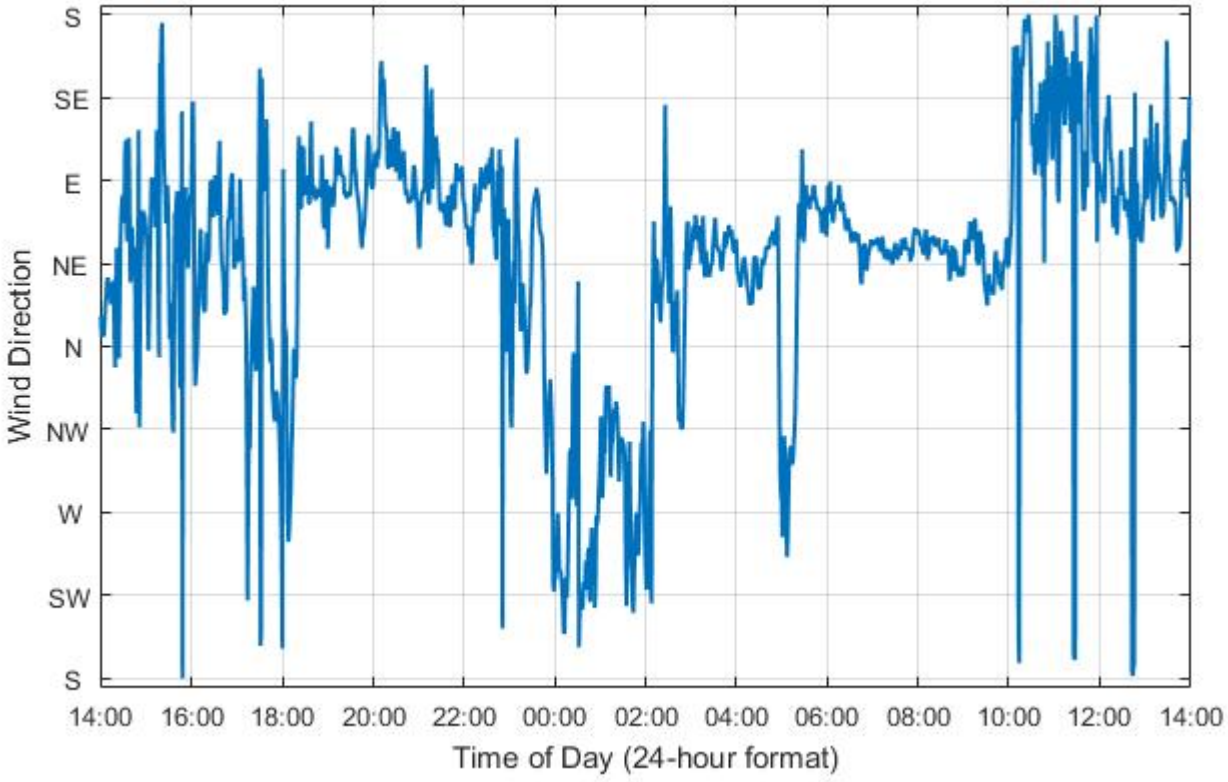
Monitored Barometric Pressure (July 25 – 26, 2018) at Noise Monitor Location 1



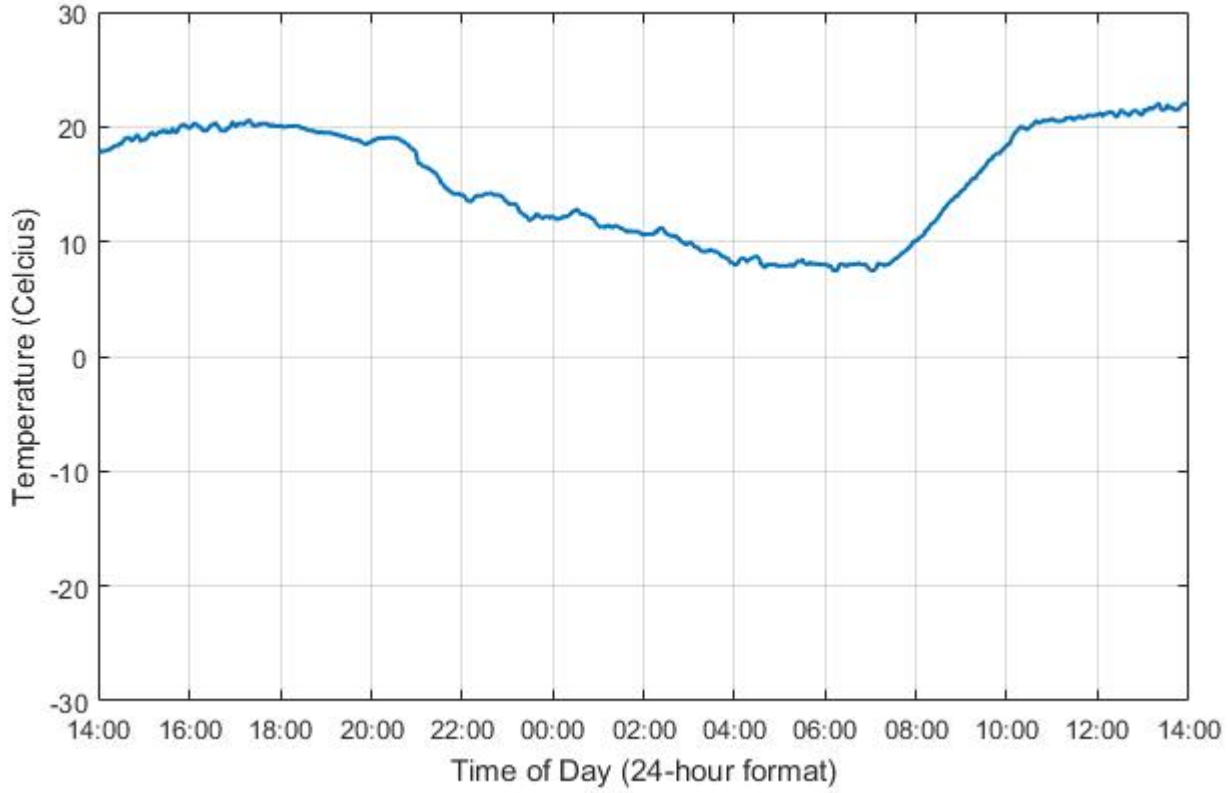
Night-time Monitored Rain Rate (July 25 – 26, 2018) at Noise Monitor Location 1



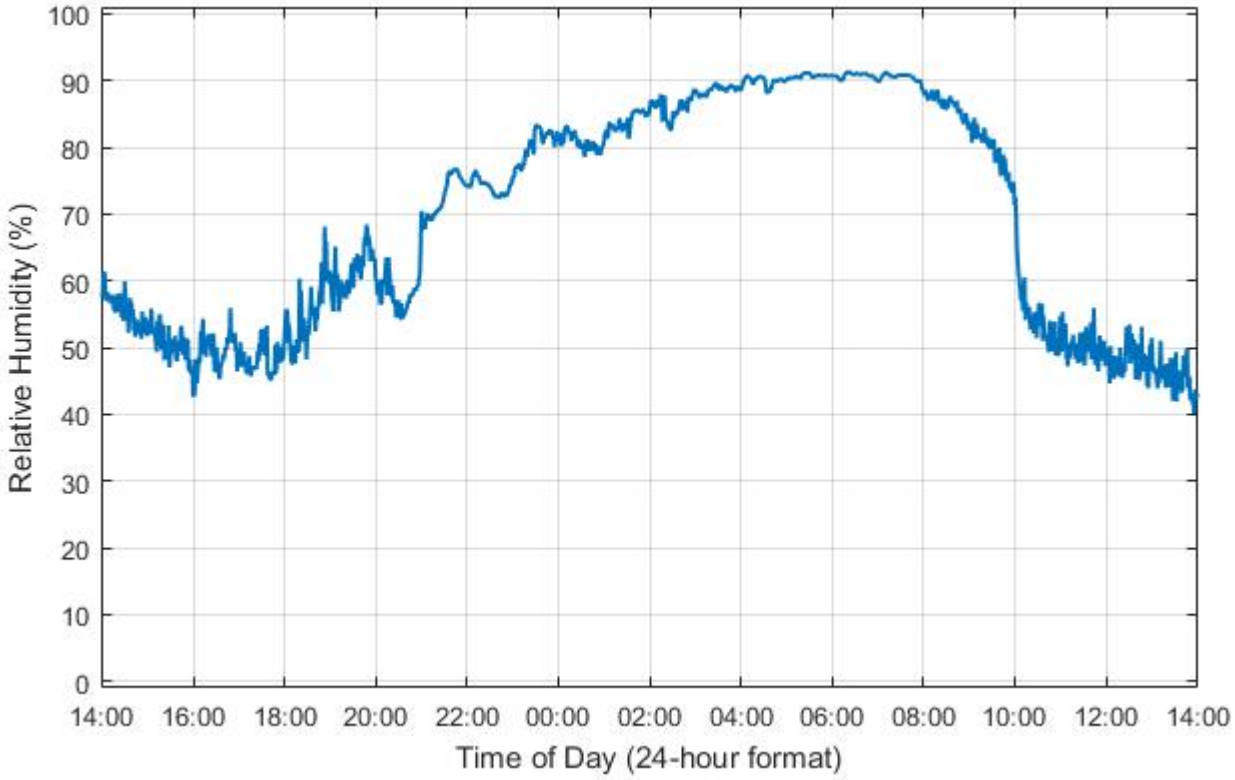
Monitored Wind Speed (July 25 – 26, 2018) at Noise Monitor Location 12



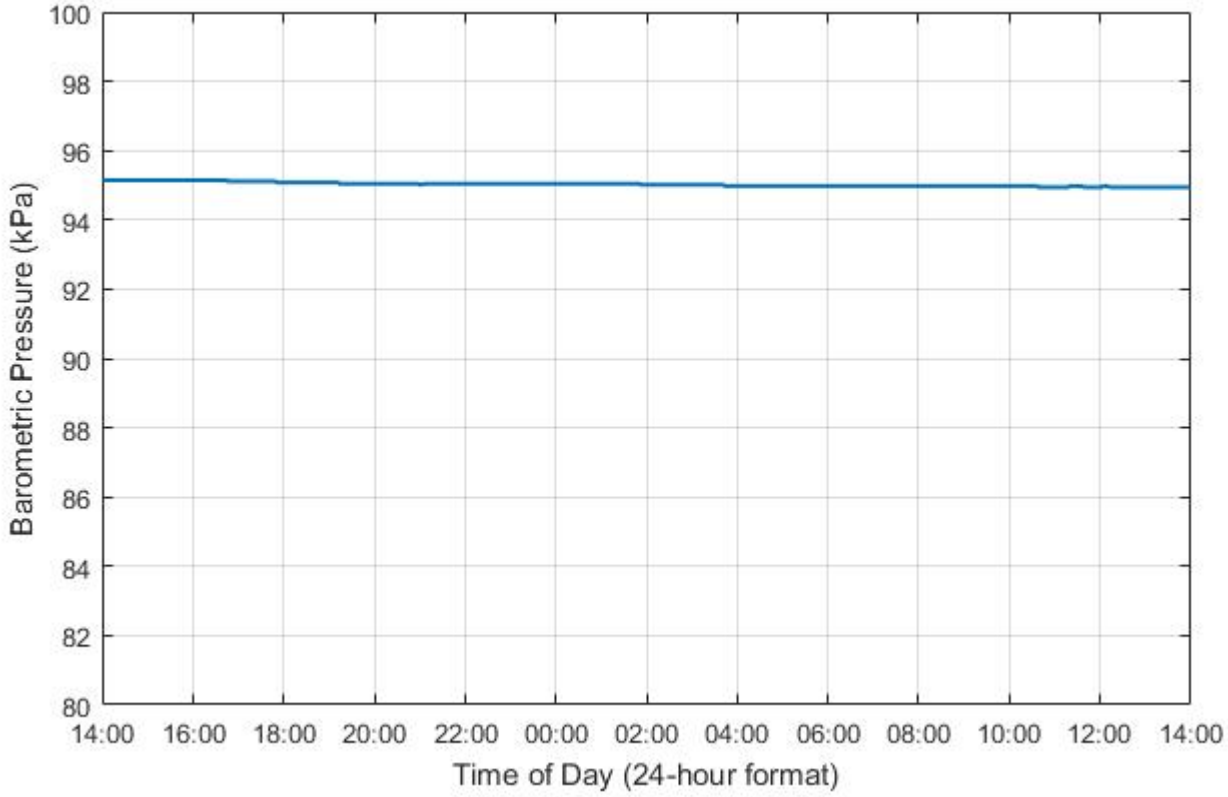
Monitored Wind Direction (July 25 – 26, 2018) at Noise Monitor Location 12



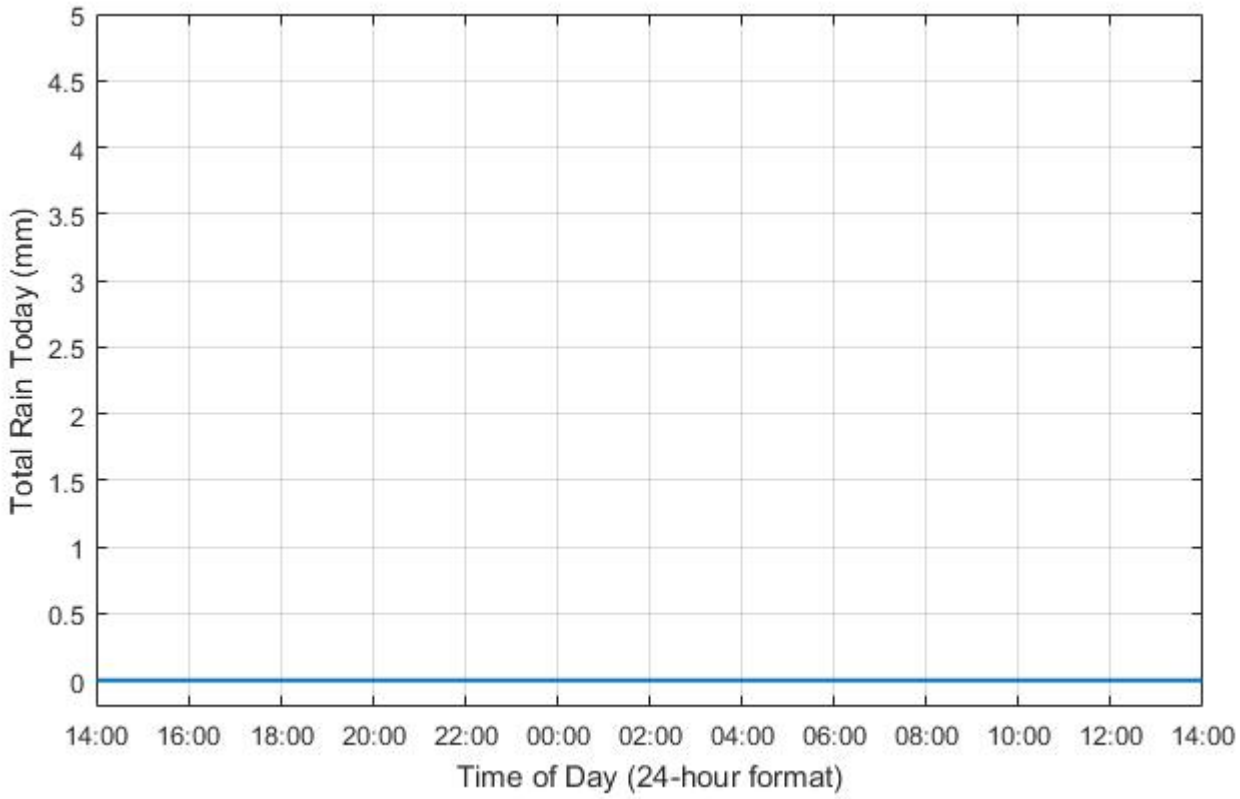
Monitored Temperature (July 25 – 26, 2018) at Noise Monitor Location 12



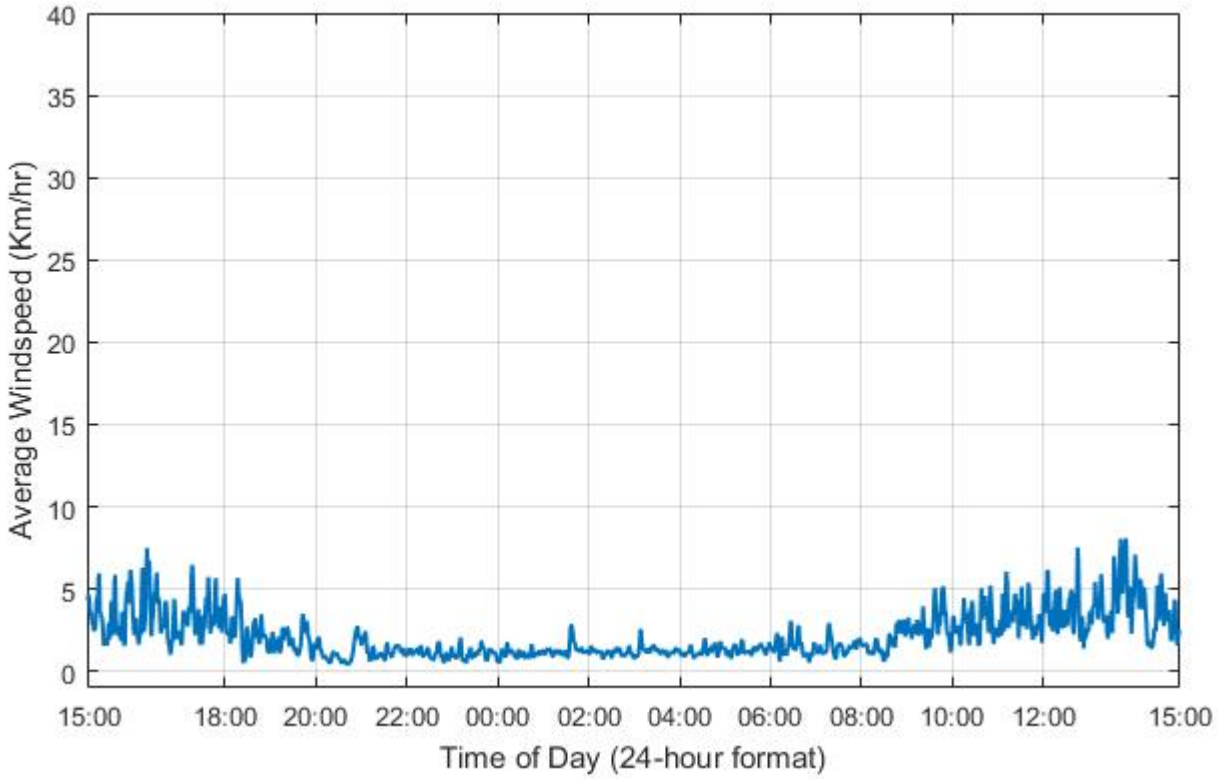
Monitored Humidity (July 25 – 26, 2018) at Noise Monitor Location 12



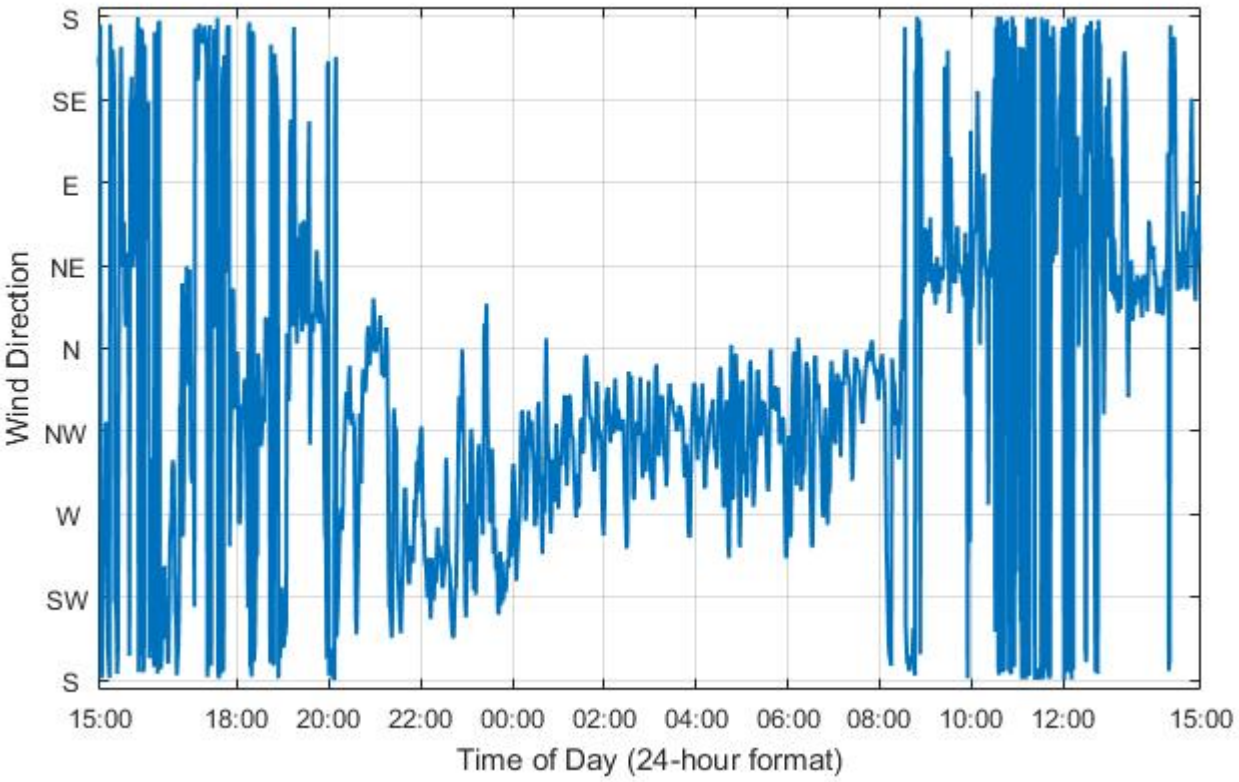
Monitored Barometric Pressure (July 25 – 26, 2018) at Noise Monitor Location 12



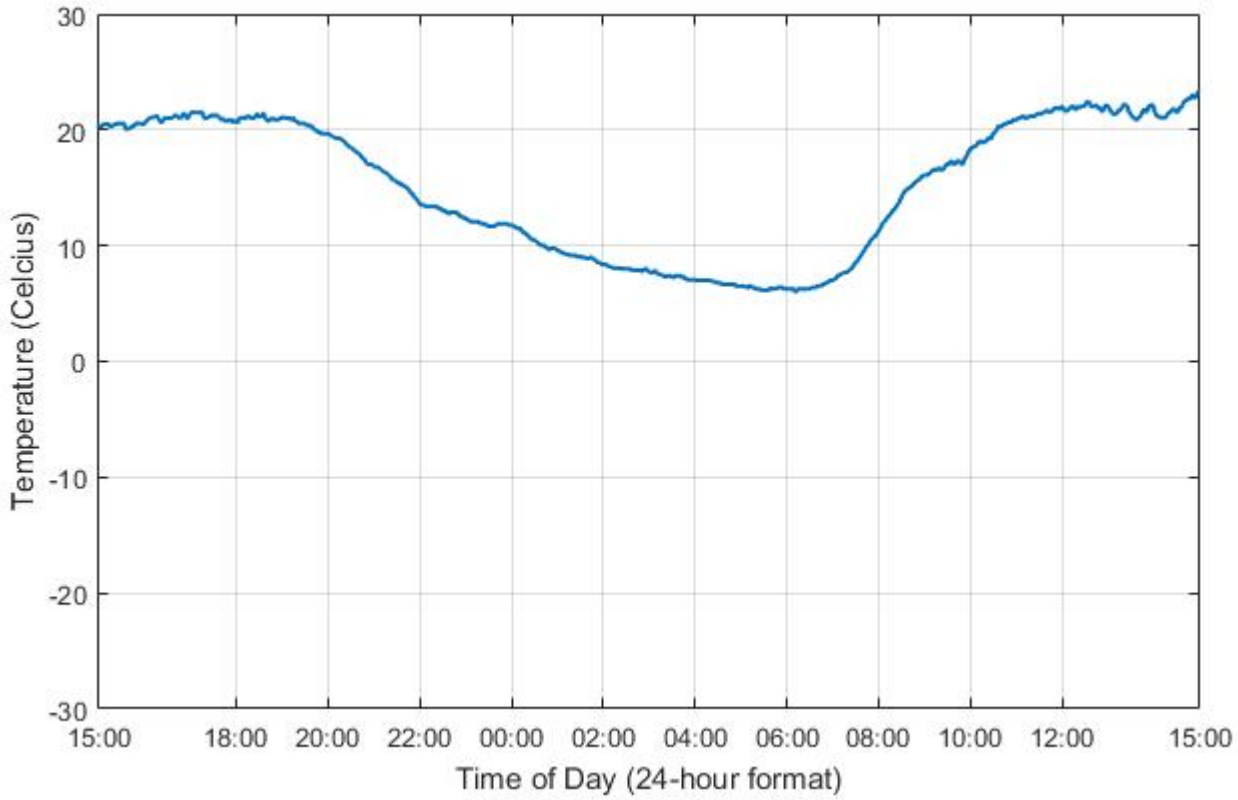
Night-time Monitored Rain Rate (July 25 – 26, 2018) at Noise Monitor Location 12



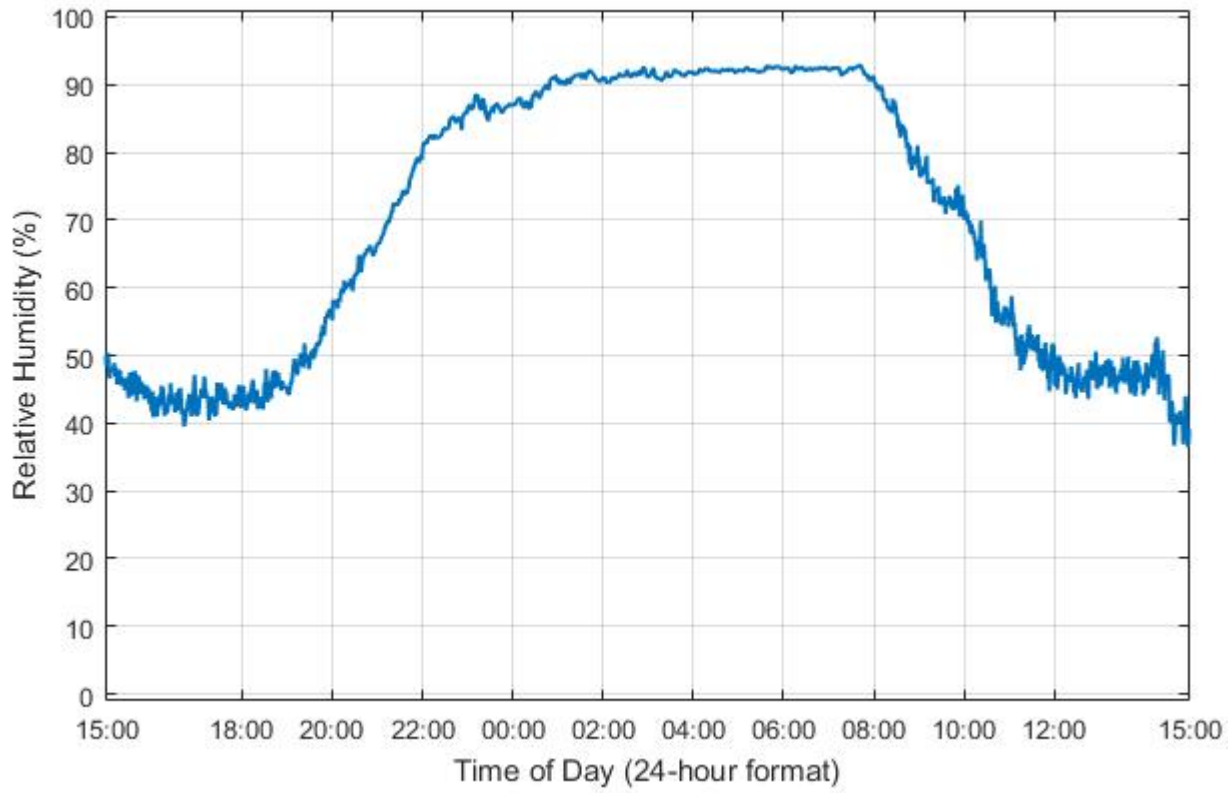
Monitored Wind Speed (July 25 – 26, 2018) at Noise Monitor Location 13



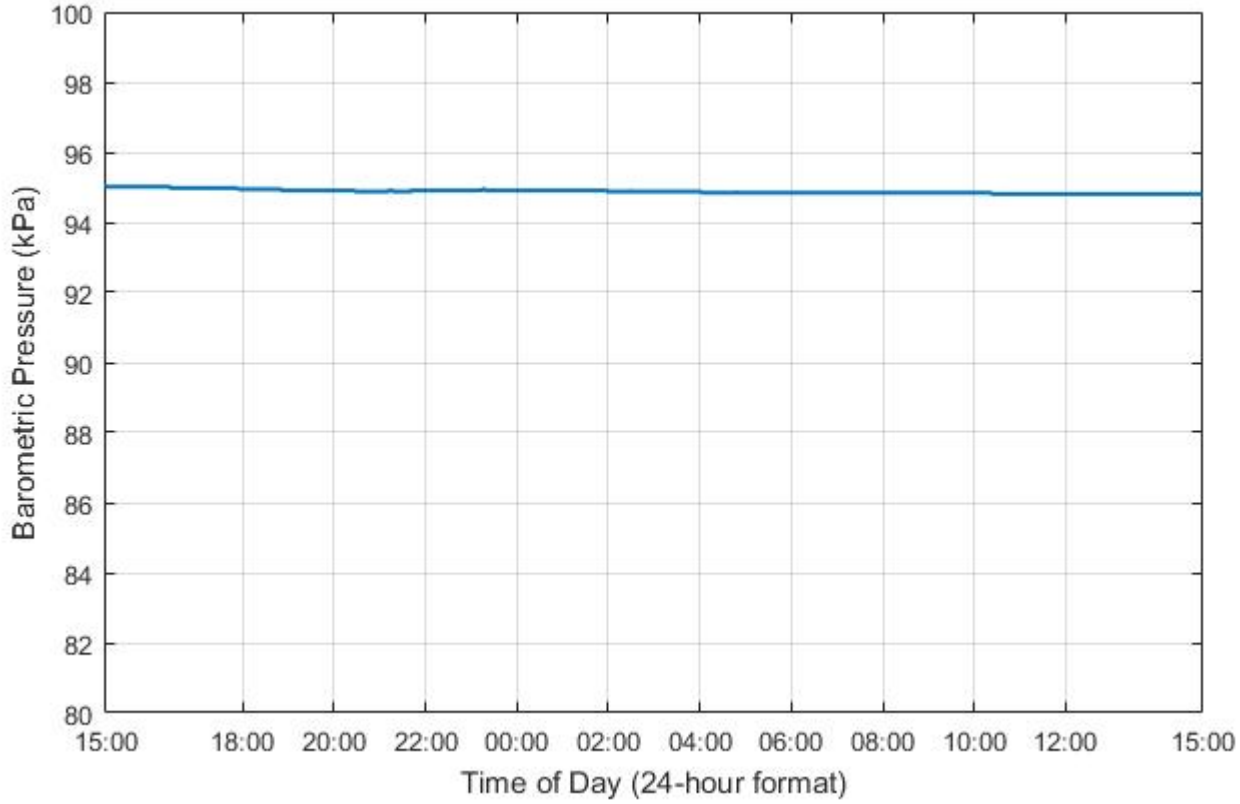
Monitored Wind Direction (July 25 – 26, 2018) at Noise Monitor Location 13



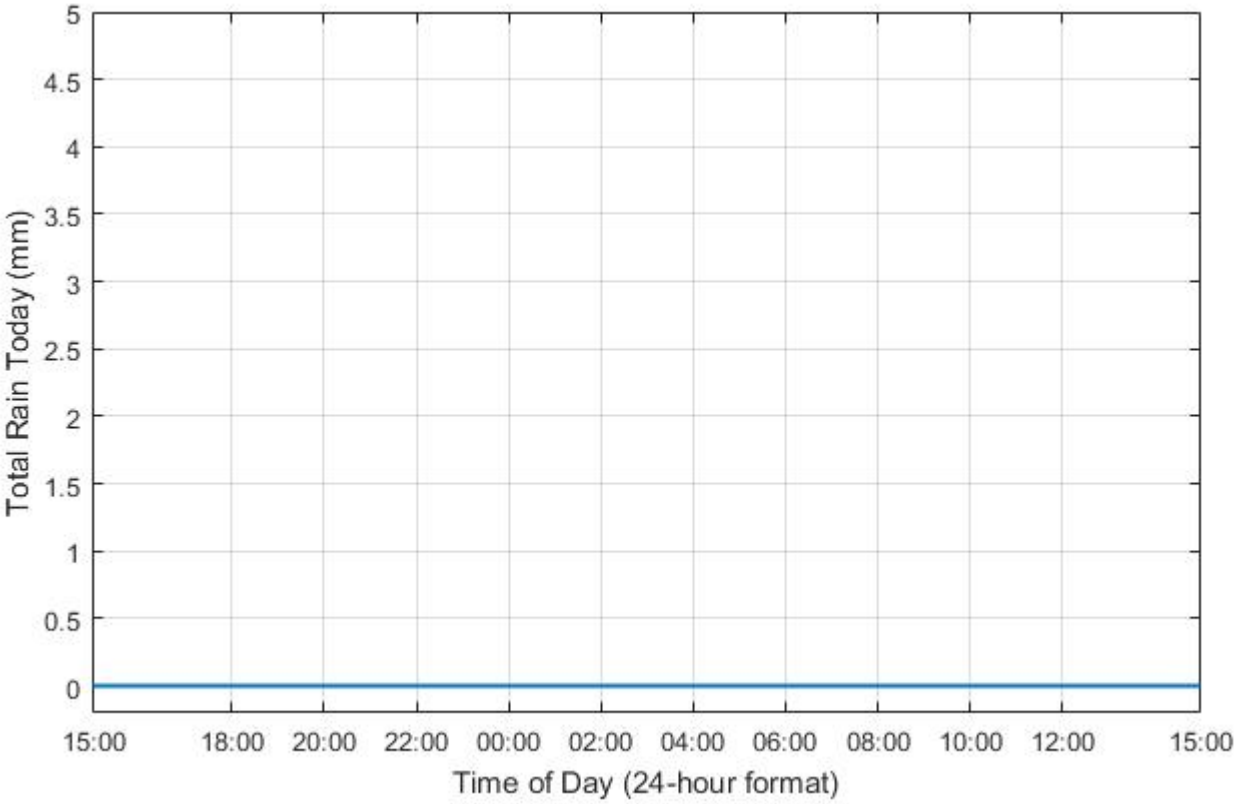
Monitored Temperature (July 25 – 26, 2018) at Noise Monitor Location 13



Monitored Humidity (July 25 – 26, 2018) at Noise Monitor Location 13



Monitored Barometric Pressure (July 25 – 26, 2018) at Noise Monitor Location 13



Monitored Rain Rate (July 25 – 26, 2018) at Noise Monitor Location 13

APPENDIX 4

NCIA Member Company Noise Management Plan Updates for 2017

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Access abides by AER's Directive 38.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	A noise monitoring was not conducted in 2017.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	N/A

Disclose any improvements/projects that are approved for 2017 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	There are no anticipated projects or improvement for 2017 that may impact noise levels.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	None.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	Access Pipeline did not receive any noise complaints for the 2017 year.

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.

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Access abides by AER's Directive 38.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	A noise monitoring was not conducted in 2017.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	N/A

Disclose any improvements/projects that are approved for 2017 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	There are no anticipated projects or improvement for 2017 that may impact noise levels.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	None.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	There was 1 noise complaint at the Keyera River Road (12" – originating at Access pipeline River Road meter station (04-18-055-21W4M), is located within an existing facility. The pipeline is bi-directional and connects to Keyera's Joesphburgh rail terminal and transports condensate to and from EDL through (MV-S3.5) (14-07-055-21W4M)). Report attached in email.

This information is being collected as per the NMP Standard 2010-003 Revised 31-March-2017. 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.

First Report

HA-20170814-001

Description

Title	Excessive noise reported at RRMS by Keyera employee
Description	At the time of the event, EDL was only receiving condensate from Keyera and directing the entire flow to STFL for a scheduled delivery. Due to the low flow and inability to hold pipeline back pressure at STFL, it is suspected the pressure drop across FCV-3001 of 1750kPa @ 7.5% open at RRMS caused the valve create the excessive noise. Aug 16th @ 23:30 - Keyera received a complaint from a landowner near Access MVS3.5 of excessive noise. This was passed onto Access Field operator informally the morning of Aug 17th from Keyera. During this time Keyera was operating normally with 500 kPa across FCV-3001 @ 16.5% open.

What

Where

Location of Hazard ID	Access Pipeline / Operations / South / Keyera Meter Station and Lateral Pipeline / Keyera Meter Station and Lateral Pipeline		
Occurred on Company Premises?	Yes	**Specific Location of Occurrence**	RRMS

When

Date of Occurrence	2017-08-14	**Time of Occurrence**	1:20 PM

Actual Impact and Likelihood

Open Risk Matrix

Actual Impact	1	**Likelihood**	4
Risk Level	II		

Potential Impact and Likelihood

Potential Impact	**Likelihood**

Investigation Team

Team	Allan Houghton Danny Irwin Kelsey Lemmens Rob Fossum

Root Cause Analysis

Root Cause	Equipment Design Specification

Actions/Recommendations

Action/Recommendation Title	Create an EWR to determine the feasibility of directing flow from TRICO or RRMS directly to Stonefell without SLED or CRW running.		
Description	Review the design of RRMS and FTSK LACT considers this operating scenario of low pipeline pressure when delivering directly to STFL.		
Person Responsible	Kelsey Lemmens	**Person Delegated**	
Due Date	2017-09-08	**Significance**	2

Action/Recommendation Title Check control valve for anti cavitation trim

Description The pipeline has fluctuating rates and pressure and will experience excessive pressure differentials at times across the control valve. (Trico valves could also be inspected)

Person Responsible Keith Deighton **Person Delegated** Brendan Pearce

Due Date 2017-09-15 **Significance** 3

Action/Recommendation Title Follow up with Keyera on the noise compliant

Description Communicate that this mode of operation is normal. Access is investigating the equipment performance and specs to confirm suitability.

Person Responsible Danny Irwin **Person Delegated**

Due Date 2017-09-08 **Significance** 3

Internal Reporting

Reported By David Mattice

Date Reported 2017-08-16

Follow Up Responsibilities

Responsible For Hazard Identification Investigation Rob Fossum

Follow Up Responsibilities

Responsible for Hazard Identification Review Allan Houghton

Follow Up Responsibilities

Responsible For Hazard Identification Closure Rob Fossum

Attachments

Files

Name High noise level Complaint.msg

Description Email
Action item confirmation. Contact Keyera.

Email Notifications

Notifications Log

Recipients	Parameters	Trigger	Days Sent
Kurt Roebuck		Responsible for closure changed	2017-12-17 10:16 PM
Allan Houghton (Responsible for Incident Review)		Incident review completed	2017-12-17 10:16 PM

NCIA Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Signs have been posted to inform of double hearing protection required within plant areas. Annual review of Standard Operating Procedures SFD/CGN-06-101 Hearing Conservation Program to ensure compliance.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	Noise survey conducted in July 2013 and provided as attached. No additional equipment/process was added since then.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Continue with Winterization with insulation on critical equipment including outside equipment. No change was made in equipment/process that warrant a new site noise model

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Maintain current program.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	A self-audit conducted on the Hearing Protection and Conservative Program. Senior leader in plant reviewed this every 2 years with no findings. Next audit will be conducted in Q3 2019.  Hearing Protection and Conservation Pro
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	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.

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

Hearing Protection and Conservation Program Self-Audit Checklist

Location: Scotford
Date: Dec 12 2017
Audit Performed by: Sara Stephens

		Y	N	NA	COMMENTS
A. Sources of Noise					
1	Equipment capable of producing more than 85 dBA have been identified and monitored for noise level	**X**			
2	High noise areas posted with warning signs.	X			
3	A report of the noise survey findings is available for review	X			Reviewed in safety meetings
B. Noise Reduction					
1	Major noise sources and options for engineering noise control have been identified	**X**			
2	Where practicable, engineering controls in place or considered to reduce noise	X			
3	Variety of hearing protectors available to employees	X			
4	Reusable hearing protectors are clean and in good condition	X			Operators responsibility
5	Hearing protectors worn where needed	X			
C. Audiometric Testing					
1	Individuals working in high noise areas receive audiometric (hearing) testing at frequency determined in the Hearing Conservation and Protection Program	**X**			
2	Employees transferred and/or hired into a job where there is potential of exposure to noise levels exceeding 85 dBA Lex receive baseline audiogram within 70 days.	X			
3	Individuals reassigned out of a hearing hazardous job or leaving receive a follow-up test or end-of-employment audiogram.	X	X		Not sure is end of employment tests are done
4	Workers are advised to bring their hearing protection with them to the hearing test.	X			
5	Use and care of hearing protection is reviewed by audiologist with each worker.	X			
D. Education and Training					
Noise exposed workers have received education on:					
1	The results of noise exposure measurements	X			
2	Effects of noise on hearing	X			
3	Proper use and maintenance of hearing protection	X			
4	Purpose of hearing testing	X			

NCIA Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number 2010-003	
Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard		Rev. Date 15-May 2018	Rev. 0

Bruderheim Energy Terminal Ltd. (Cenovus)

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Based on the current activity at the Terminal (i.e., rail transloading), a best management practice to address environmental noise at the Terminal has not been developed. If and when circumstances change that affect environmental noise this will be reviewed and a best management practice developed accordingly.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	No monitoring was completed in 2017.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No improvements or corrective actions have been implemented in 2017.

NCIA Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number 2010-003	
Noise Management Plan Reporting Requirements as per Section 5.4 of this Standard		Rev. Date 15-May 2018	Rev. 0

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Dismantling of the former chemical plant and associated buildings is scheduled to be completed from the end of May until the end of August. The work to be complete is of short duration and under a controlled dismantling plan.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	No audit/self assessment evaluation was completed.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	There were no noise complaints in 2017.

This information is being collected as per the NMP Standard 2010-003 Revised 15-May 2018 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 Northeast Capital Industrial Association	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

Insert your Company Name here: Chemtrade - 2017

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	All equipment that produce noise above 85db are placed in buildings to reduce noise and to provide a safe working area.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	No monitoring was done at the site level
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No changers were implemented

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No major improvements were made or equipment purchased that would have an impact.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	Routine internal audits are carried out at the site and IH assessments were down in 2018
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No complaints were received.

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.

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

October 19, 2018

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

Dear Dr. Danielson,

Subject: 2017 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 - 8325 if you require any further information or clarification.

Yours truly,

Jacint Domenech
Responsible Care Director
Dow Alberta Operations

Copy: Pravind Ramdial, Responsible Care Leader MEGlobal Canada ULC

Dow Fort Saskatchewan Site
2017 Noise Management Annual Report
Prepared for Northeast Capital Industrial Association (NCIA)

This report provides Dow and MEGlobal's 2017 input to the NCIA Regional Noise Management Plan report to be submitted to the AER. Based on AER licensed assets on the Fort Saskatchewan Site, Dow is required to follow AER Noise Directive 38 and provide input into the NCIA report. The Dow power plant is governed by the Alberta utilities Commission Rule 012: Noise Control. MEGlobal participates in the Noise Management Plan and provides this information on a voluntary basis.

Input Description	Dow and MEGlobal Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	A Noise Management Plan was developed by Dow and MEGlobal for submission to NCIA for inclusion in the 2011 NCIA report to the AER. A copy of the most recent version is included with this report. 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.
Attach results of any monitoring (fenceline outward) completed in 2017. *Note, you are not required to conduct any off-site monitoring.*	No noise monitoring (fenceline outward) was completed in 2017. The site noise model was updated in 2014 for all sources (other than on-site transportation) within the Dow Fort Saskatchewan Site, including MEGlobal. Recent updates to the Dow site model have been incorporated into the NCIA regional noise model.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). *Did those changes result in a requirement to update your site noise model?* *If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?*	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. 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.
Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). *Will these changes result in a requirement to update your site noise model?* *If so, when do you anticipate having an updated site model available?*	In 2018, 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.

Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	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 2017 by the site leader. No actions or gaps were identified related to the Noise Management Plan. 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. No additional self assessments were completed in 2017.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	There were no noise complaints in 2017 related to Dow or MEGlobal operations at the site.

Dow Fort Saskatchewan Site Noise Management Plan

Policy

The Dow Chemical Canada ULC Fort Saskatchewan site follows the Operating Discipline Management System (ODMS) of the Dow Chemical Company to manage environmental noise and hearing conservation.

MEGlobal Canada ULC (MEGlobal) Operations on the Dow Fort Saskatchewan Site follows ODMS and is included in this Noise Management Plan.

Scope

This document is created to define how the Dow Chemical Canada ULC Fort Saskatchewan site complies with the ODMS requirements concerning Noise Minimization and Hearing Conservation outlined in:

- Section E (noise minimization to meet community expectations and applicable government requirements) of 06.07 L1 Pollution Prevention
- Section C14 (employee hearing conservation) of 06.05 L1 Employee Health and Safety
- Section A2 (all equipment must be designed to control noise levels) of 06.03 EH&S Engineering Design and Control

Purpose

This document summarizes how the Dow Fort Saskatchewan Site meets the Northeast Capital Industrial Association (NCIA) requirement for a Noise Management Plan including identification, evaluation and control of noise impacts at this site.

This Noise Management Plan meets the requirements of NCIA Standard and Guideline #2010-003, as amended.

Based on AER licensed assets on the Fort Saskatchewan Site, Dow is required to follow AER Noise Directive 38 and provide input into the NCIA report. The Dow power plant is governed by the Alberta Utilities Commission Rule 012: Noise Control.

Goals / Objectives

Dow and MEGlobal, as Responsible Care® Companies will:

- Minimize, to the extent possible, noise levels impacting on the environment including minimizing nighttime and low frequency noise
- Maintain a noise monitoring program to reduce the likelihood of noise impacts on the environment
- Assign employees to manage the site noise monitoring, mitigation and continuous improvement.
- Ensure employees associated with noise sources are aware of the impact on the environment and the processes in place to control
- Design new and modified equipment to minimize noise.

Training Requirements

Workers are educated on noise through:

- All workers receive initial and three year recurring Environmental Training (Instructor led or online), which includes environmental noise.
- Noise exposed workers receive training on hearing conservation.
- Personnel conducting noise monitoring receive training from the Industrial Hygiene specialists.
- Personnel delivering unit industrial hygiene programs receive training on these programs.
- Training is tracked in a corporate web based system.

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 fenceline other than on-site transportation sources. The site noise model is updated if equipment is added or removed from the site that would significantly impact noise levels. The regional noise model is validated periodically by NCIA. If any discrepancies are noted during NCIA field validation related to the Dow site, Dow will work toward resolving the discrepancy and may validate the Dow noise model with field measurements if required. Dow responds to external noise complaints appropriately, including monitoring if necessary. Dispatch Noise Complaint Procedure EH&S On-Call Noise Complaint Logsheet Individual production units do their own noise surveys at least every five years, or when equipment is added, modified or removed. The onsite noise monitoring program is managed as per in ODMS 06.05.C14 Personal noise dosimetry is done periodically on a frequency depending on exposure.
Site Noise Sources	Site noise sources are detailed in the site 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.

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

Revision History

Approval

Approved by Date: January 2012

Carol Moen (Dow Responsible Care Leader)

Pravind Ramdial (MEGlobal Responsible Care Leader)

Review History

The following documents the review history for this file.

Date	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
June 2017	Jacint Domenech	Dow Responsible Care Leader
October 2018	Jacint Domenech	Dow Responsible Care Leader

Revision History

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

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

NCIA Northeast Capital Industrial Association	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

Enbridge Pipeline (Athabasca) 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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Enbridge has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	No offsite monitoring was conducted in 2017.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No improvement/corrective actions were implemented in 2017 that would impact the noise level output.

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No improvement/projects were approved for 2018 that would impact the noise level output.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	No audit/self-assessment evaluation was completed in 2017.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No noise complaints were received in 2017.

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Confirmed. Relevant Evonik site policy was provided in 2014 and has remained unchanged since then.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	No monitoring or assessment required or carried out in 2017.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	None to disclose at this time.

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	None to disclose at this time.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	2016 assessment and evaluation conducted by Evonik ESHQ/OH experts. Suitable report excerpt available upon request.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No complaints.

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 Northeast Capital Industrial Association	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

Keyera Corporation
Keyera Fort Saskatchewan (KFS) Facility
2017

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Keyera has implemented a best management practice to address environmental noise as per standard 2010-003. Keyera has provided an electronic copy of the site plan to NCIA.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	There were no facility improvements in 2017 which would impact the noise level at the KFS facility; and as such, no fence line monitoring was done for that year. No monitoring is planned outside the fence line except for in response to a specific noise complaint.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	There were no facility improvements in 2017 which would impact the noise level at the KFS facility; and as such, there were no site noise model update.

NCIA Northeast Capital Industrial Association	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

Input Description	Member Site Comments
Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	In 2018, Keyera has removed a couple of existing air intake silencers. The silencers were proven to be a fire hazard, and were thus removed for safety reasons. Keyera also plans to expand the injection facilities and install an Inlet Quality (IQ) building, although the IQ building is expected to have a negligible noise impact. The above changes have been assessed by Patching Associates Acoustical Engineering Ltd. in June 2018. The results of the assessment indicate that these changes do not result in any perceivable noise increase at the nearby residences. The noise impact assessment report, including an updated noise model, are available on request. Patching Associates Acoustical Engineering Ltd. will maintain an up-to-date noise model and provide this to SLR Consulting at the time of the next regional model revision, which is understood to be planned for 2018.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.	No self-assessment was conducted by Keyera in 2017. In 2018, Keyera completed a self-assessment with the assistance of Patching Associates Acoustical Engineering Ltd. This assessment included: detailed diagnostic noise measurements and modeling including cumulative impact assessment for the adjacent facilities existing in the Alberta Industrial Heartland, occupational noise mapping within the facility fence line, and a noise exposure assessment using noise dosimeters. The assessment documentation has been produced with the participation and review of the senior staff.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	There were no noise complaints received for 2017 for this site.

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 Northeast Capital Industrial Association	NCIA Standards and Guidelines	Document Number 2010-003	
Noise Management Plan Reporting Requirements per Section 5.4 of this Standard		Rev. Date 31-March 2016	Rev. 0

Nutrien 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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Nutrien has documented and implemented a Noise Management Plan. The plan consists of the following documents: • ESP 3.07.01 Noise Management Overview • ESP 3.07.02 Noise Management Program • ESP 3.07.03 Noise Source List • ESP 3.07.04 Monitoring Program
Provide a summary of any monitoring (fence line outward completed in 2017). Note, you are not required to conduct any off-site monitoring.	There was no off site monitoring other than the annual routine monitoring conducted by SLR.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	The site model was updated and was incorporated into the NCIA regional noise model.

Disclose any improvements / projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Approved projects have been deferred. In terms of the 30# Steam Vents identified in the Noise Model Update, silencers are now scheduled to be installed during the site steam outage in mid-2019. As stated in the 2013-2015 reports, 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. These assessments are primarily Occupational Hygiene, but it is anticipated that Environmental Noise will also be reduced. The boiler is now scheduled for 2019 with CGT-902 being deferred to 2021.
Disclose any audit / self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	The Noise Management Plan, program and associated documents are scheduled for review and update in 2019.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	There were no external noise complaints for either Redwater or Fort Saskatchewan in 2017.

This information is being collected 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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Yes and a copy has been provided
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	None outside the fence line
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No improvements or corrective actions for the site. No

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No improvement projects identified
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	No audit or self-assessment conducted
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No noise complaints received

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 Northeast Capital Industrial Association	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

Pembina Redwater Fractionation Facility

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	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.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	None completed
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No improvements or corrective actions were implemented in 2017.

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	RFS III became fully operational in 2018. SLR performed noise monitoring on site in 2018 to update our site model, which will be incorporated into the RNM in 2018.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	None completed
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No complaints received.

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	The Facility has an Environmental Noise Management Practice. The practice is part of PMC's Operational Management System (FSK-P-36-00-12).
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	No monitoring/assessments were completed in 2017.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Construction activities continued on with the Phase 3 Expansion project in 2017. This development began with the commissioning of a new facility brine pond, washing of storage caverns, operation of associated infrastructure to support the cavern development, and construction of a mercaptan oxidation plant. The expansion has resulted in the site conducting a noise impact assessment which was subsequently used to update the Regional Noise Model in 2014. SLR Consulting conducted the NIA and updated the model with the information.

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	The Facility will be continuing on with the Phase 3 expansion plans in 2018. This will include the construction and commissioning of new underground storage caverns, mercaptan oxidation plant, and additional earthworks to facilitate required surface water drainage upgrades. 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. The site model was updated in 2018 and all results have been provided to SLR.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	No audits or self-assessment evaluations were completed in 2017.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No noise complaints were received by the Facility in 2017.

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	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.  SUG.HSSE.ENV.NOIS .M.002_Site_Noise_M
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Site model updates were done for Refinery HCU Debottleneck Project and Refinery Fin-Fan Cooler in 2018 .

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No improvements/projects approved for 2018 that would impact the noise level output for the site
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	Will be conducted in November of 2018.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No noise complaints received in 2017.

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.

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

Scotford Upgrader	**Area: Noise Monitoring**	Document Number: SUG.HSSE.ENV.AIR.NOIS.M.002
	Title: Shell Scotford Site Noise Management Plan	Rev No: 2 Date: Nov 27-14
Document Owner: Environment Manager		Document Focal: Noise Focal

CONTENTS

Scotford Upgrader	**Area: Noise Monitoring**	Document Number: SUG.HSSE.ENV.AIR.NOIS.M.002
	Title: Shell Scotford Site Noise Management Plan	Rev No: 2 Date: Nov 27-14
Document Owner: Environment Manager		Document Focal: Noise Focal

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

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

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.

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).

2.2 Roles and Responsibilities

Department or Title	**Roles**
Community Affairs	• Notification to neighbours for planned activities. • Reactive communications to neighbours concern. • Monitor operations response to public concern.
Shift Supervisor or Designate	• Initiate investigation for public concern for operating units • Perform fence-line noise surveys. • If required follow-up with concern in off-hours (PA during normal hours).
Environment Department	• Support to Operations for investigation of noise concern, conducting fence-line noise surveys & regulatory notifications. • Data analysis and external noise surveys. • Maintain site noise model.
Industrial Hygiene	• Primary support for onsite noise monitoring.
Security	• Initial contact for public concern.

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.

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

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.
- 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.

NCIA Northeast Capital Industrial Association	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

Sherritt International Corporation

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	The Site has implemented the referenced standard and developed a Code of Practice which has been previously submitted to NCIA. There were no updates made to the Code of Practice in 2017.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	Fence line monitoring was completed in 2017 by SLR Consulting (Canada) Ltd. The five measurement locations used were the same as the ones used in previous surveys. The results for the 2017 survey are generally lower than the 2011 values, although the 2017 values are generally consistent with the measurement results from the 2013 survey. It appears that the 2017 are slightly higher than the 2015 due to non-routine construction activities. At this time it is believed that an updated Site model is not required as a result of the 2017 survey.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	None in 2017. The Site noise model does not require updating at this time.

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	As part of our Operational Excellence initiative Sherritt plans to optimize the usage of 35lbs steam which will potentially decrease the amount of venting required. This will potentially affect the noise profile at the Site during the venting season. However, since venting is not a regular occurrence at the Site it is not anticipated to affect the regular Site noise profile. The Site model should not require an update as a result of this change.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.	In 2017, a Site wide noise re-assessment was completed. There were no significant changes; therefore, the Site noise model does not require updating at this time.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No noise complaints were received in 2017.

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 Northeast Capital Industrial Association	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

Umicore 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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	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)
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	Not applicable – noise monitoring conducted inside the plant from an industrial hygiene perspective
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Management of Change (MOC) program includes elements to identify potential changes/ impacts with respect to noise exposure. Replacement Chiller Skid commission and in service with average db of 82 in upstairs area. No other changes made in 2017 that would impact noise levels.

Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Many of the projects approved for 2018 will not have any effect on the noise level. All circuits for the most part are located inside of Umicore proper buildings and maintain a rating of approximately 81 - 83 db. No requirement to update site noise model.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2017.	Not applicable – noise monitoring conducted inside the plant from an industrial hygiene perspective
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	No complaints received in 2017.

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.

APPENDIX 5

NCIA Member Company Noise Management Plan Updates for 2018

NCIA Northeast Capital Industrial Association	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

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

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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Access abides by AER's Directive 38.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	A noise monitoring was not conducted in 2018.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	N/A

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	There were no anticipated projects or improvement for 2019 that may have impacted noise levels.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	None.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	Access Pipeline did not receive any noise complaints for the 2018 year.

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 Northeast Capital Industrial Association	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

Access Pipeline o/a Wolf Midstream (Sturgeon Terminal)

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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Access abides by AER's Directive 38.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	A noise monitoring was not conducted in 2018.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	N/A

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	There are no anticipated projects or improvement for 2019 that may impact noise levels.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	None.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	Wolf Midstream did not receive any noise complaints for the 2018 year.

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 Northeast Capital Industrial Association	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

Air Liquide Canada – Scotford Complex

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Signs have been posted to inform of double hearing protection required within plant areas. Annual review of Standard Operating Procedures SFD/CGN-06-101 Hearing Conservation Program to ensure compliance.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	Noise survey conducted in July 2013 and provided as attached. No additional equipment/process was added since then.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Continue with Winterization with insulation on critical equipment including outside equipment. No change was made in equipment/process that warrant a new site noise model

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Maintain current program.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	A self-audit conducted on the Hearing Protection and Conservative Program. Senior leader in plant reviewed this every 2 years with no findings. Attached is the Hearing Conservation & Protection Program  SFD-CGN-06-101 Rev2 Hearing Conserv
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	None in 2018

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.

Hearing Conservation & Protection Program | Scotford Complex

This document supersedes the following document(s):

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

This printed procedure/empty form EXPIRES on: 1 November 2019

1. PURPOSE AND SCOPE

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

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

2. RESPONSIBILITIES

Plant Manager

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

Employees

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

Supervisors

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

Quality & IMS Facilitator

- Maintain hearing protection training records

3. NOISE MEASUREMENTS:

Plant Noise Survey

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

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

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

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

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

Figure 1
Note that the exterior areas where noise levels are greatest are near the meters/valves underneath the pipe rack north of the scales (96dBA)and near the ASU building's west overhead door (94dBA)

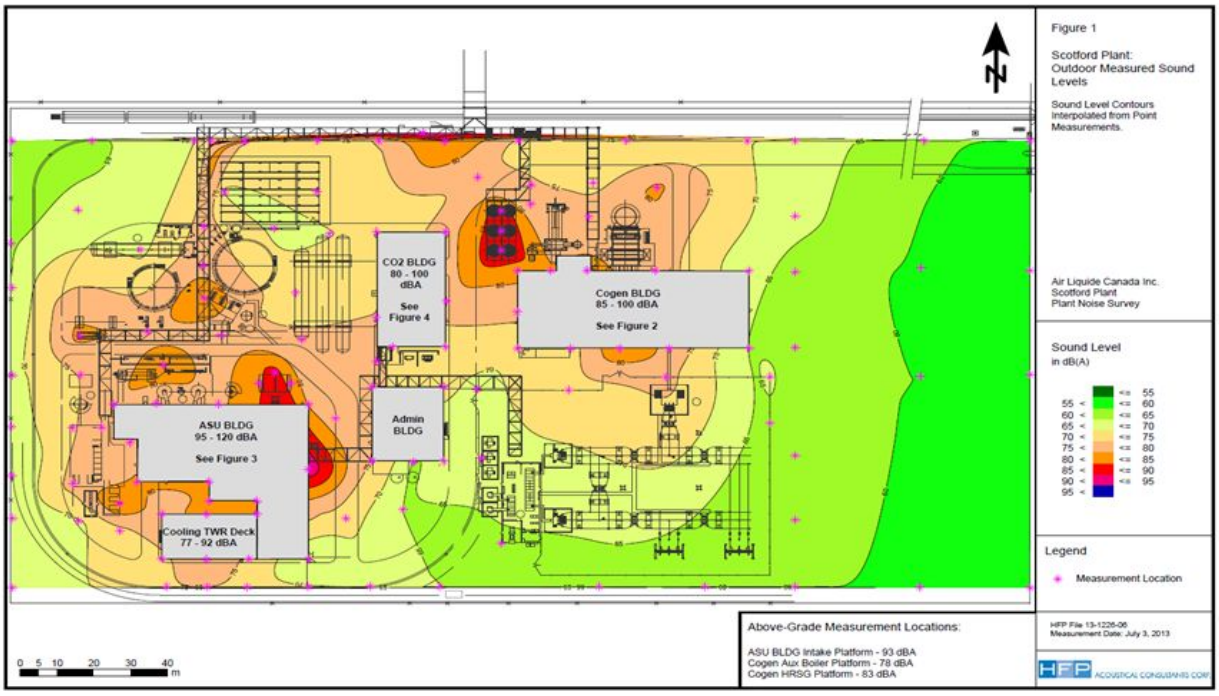


Figure 2

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

Figure 3

Note that inside the CO2 Plant, the areas where noise levels are greatest are to the north of the NH_3 Compression skid and the CO_2 Compression Skid. Noise levels in those areas were measured at 98 dB(A) and 94 dB(A), respectively

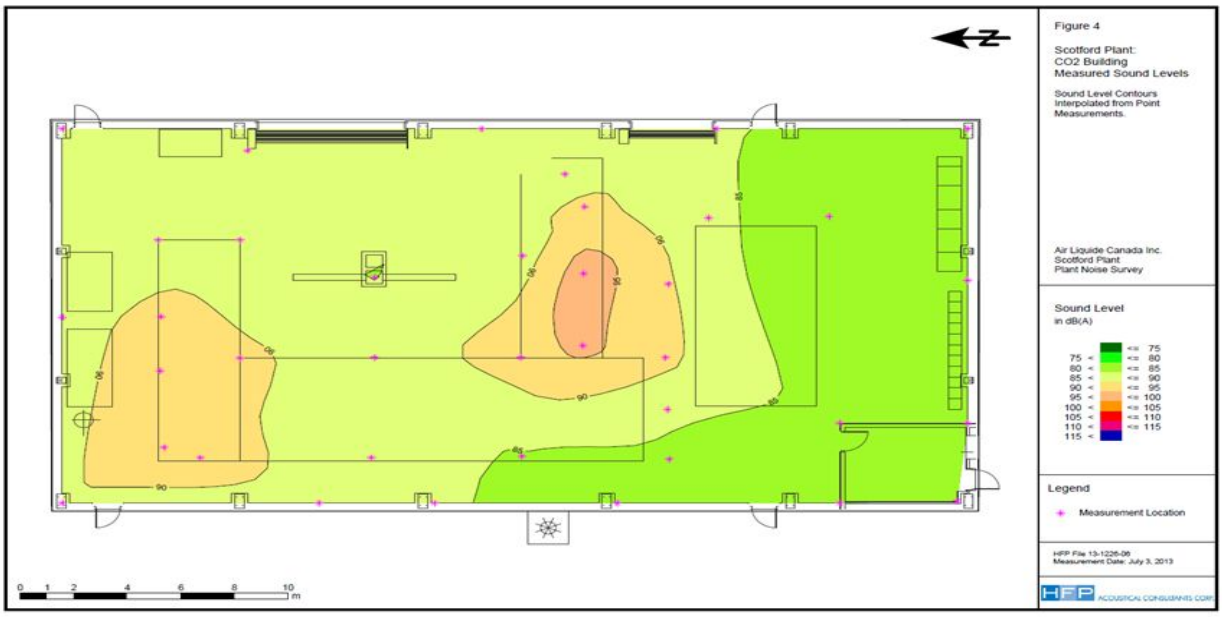
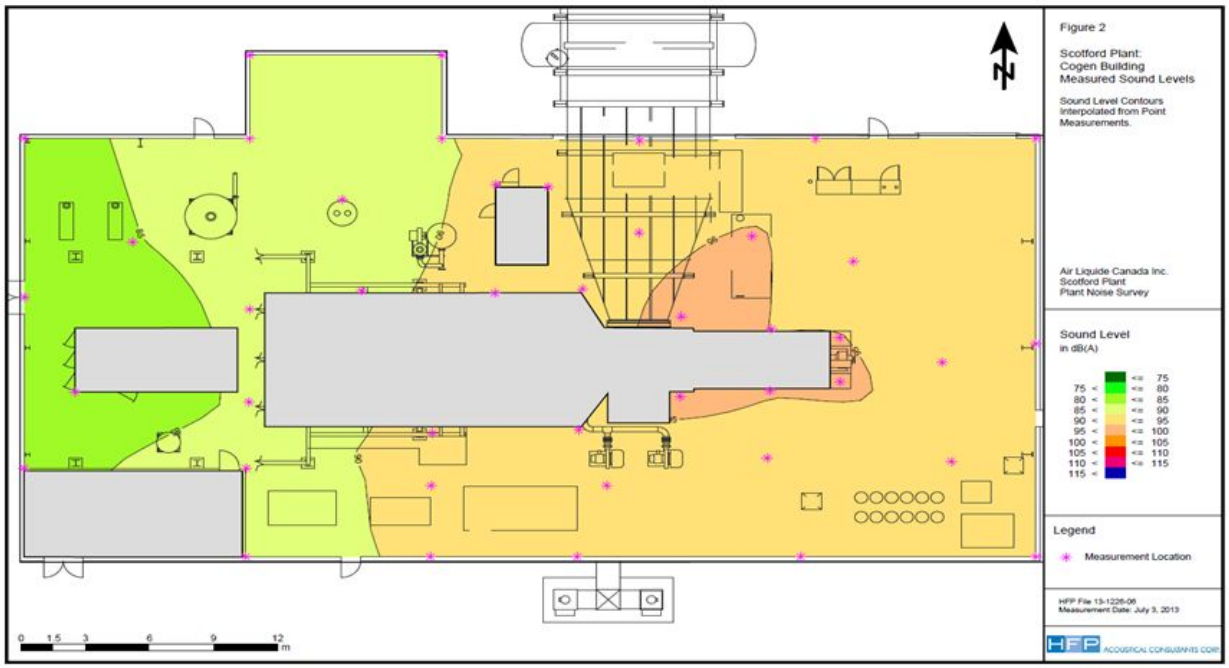


Figure 4

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



Exposure Level

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

NOISE EXPOSURE OF WORKERS

Scotford site

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

Cogen day shift	1	91.8	8	93.3	Correction to 12hr shift	N	Grade 2 or Class B HP; Hearing Protection and Prevention Program
CWP strainer cleaning	2	92.1	1	102.7	Correction to 9hr shift	N	Grade 4 or Class A HP; Hearing Protection and Prevention Program

4. EDUCATION AND TRAINING

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

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

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

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

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

5. HEARING PROTECTION

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

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

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

6. POSTING OF NOISE HAZARD AREAS

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

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

7. HEARING TESTS

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

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

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

8. ANNUAL PROGRAM REVIEW

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

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

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

NCIA Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Aux Sable has implemented a best management practice to address environmental noise and has retained Patching Associates Acoustical Engineering Ltd. to conduct noise measurements at the site in October 2018 and May 2019. This assessment was completed, and a report prepared to meet standard 2010-003 31-Mar-16. An up to date electronic copy of the plot plan was included with the noise model submission in May 2019.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	There were no noise measurements completed outside the facility fence line in 2018. Noise measurements at the facility fence line were completed in 2018, these showed no significant changes from previous fence line measurements.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	There were no changes to the facility in 2018. The current noise model for the facility based on 2016 and 2017 measurements was submitted to SLR in June 2018. There is no further requirement to update the noise model.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	There are no improvements or planned projects that will impact the noise levels in 2019.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	A sound study was completed in October 2018. This study found that there were no significant changes to the facility and was reviewed by senior site leaders. Full documentation available on request.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	There was no noise complaints received in 2018.

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.

2019 Noise Management Plan Update
Aux Sable Canada LP
Shell Offgas Liquids Recovery Plant
NE ¼ 24-055-22 W4M
Noise Dosimetry and Sound Pressure Level Mapping

Revision 0

Prepared for:

Chad Rothenburger
Aux Sable Canada LP

Prepared by:

Patching Associates Acoustical Engineering Ltd.
Consultants in Acoustics, Noise Control and Vibration

2019-06-21
Document ID: 5235-NMP-000

Notice

This report has been prepared by Patching Associates Acoustical Engineering Ltd (PAAE) in response to a specific request for service from, and for the exclusive use of, the Client to whom it is addressed. The findings contained in this report are based, in part, upon information provided by others. The information contained in this study is not intended for the use of, nor is it intended to be relied upon, by any person, firm, or corporation other than the Client to whom it is addressed, with the exception of the applicable regulating authority to whom this document may be submitted. PAAE accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

Professional Authentication

Project Role: Engineer of Record
Date: 2019-06-21
Patching Associates Acoustical Engineering Ltd. Permit to Practice: P05273
Title: Principal
Name: Justin Caskey, P.Eng.

Prepared by:

Analyst and Report Author: Curtis Makky, C.E.T.
Principal In Charge & Engineer of Record: Justin Caskey, P.Eng.

Table of Contents

Introduction

Aux Sable Canada LP (Aux Sable) retained Patching Associates Acoustical Engineering Ltd. (PAAE) to complete a Noise Management Plan (NMP) that meets the requirements of the Northeast Capital Industrial Association (NCIA) Standards and Guidelines 2010-003 issued 3-Sep-10, revised 31-Mar-16.

The Aux Sable NMP would be provided as an input into the NCIA Regional Noise Management Plan (RNMP) report to the Alberta Energy Regulator (AER) for the Aux Sable Shell Offgas Liquids Recovery (SOLR) facility located at NE-24-55-22 W4M.

This study has been commissioned to support Aux Sable's commitment to:

- Minimize to the extent practical, noise levels impacting on the environment.
- Maintain a fence line noise monitoring program to evaluate the facility noise level trend and to determine if there are any significant changes to sound emanating from the facility.
- Assign employees to manage the site noise monitoring, mitigation and continuation improvement programs.
- Ensure employees associated with noise sources are aware of the impact on the environment and the processes to control it, which are to be consistent with the company's industrial hygiene and occupational noise exposure control objectives.
- Design new and modify existing equipment with the intent to minimize occupational and environmental noise.

Specifically, this report consists of two components:

- Noise Dosimetry Study: A worker noise exposure assessment
- Sound Mapping: Mapping of Sound Pressure Levels in and around the facility buildings and equipment, extending to the fence line of the facility

Additionally, this study includes Engineering Noise Hazard Control recommendations based on investigation and diagnostic measurements of the most significant noise-producing equipment.

The noise dosimetry study quantifies actual, typical worker exposure to noise over the course of their daily work shift, while the sound mapping quantifies and visualizes noise levels in buildings and around equipment as well as propagation outwards from the facility into the environment. The sound mapping measurements were conducted during two different operating scenarios, with the intent to capture normal/maximum, as well as worst-case noise emissions.

These two components, combined and reviewed annually, and compared to prior year studies, are intended to help fulfil Aux Sable's commitments as described above, namely trending, monitoring, mitigation, and continual improvement of the management of environmental and occupational noise.

Explanation of technical details regarding sound measurement and analysis, such as the decibel scale, weightings, and other concepts referenced in this report can be found in Appendix A.

Noise Dosimetry Study

The noise dosimetry study serves to quantify actual, typical worker exposure to noise over the course of their daily work shift.

This assessment has been conducted in accordance with CSA Standard Z107.56-06 "Procedures for the Measurement of Occupational Noise Exposure". The results of this assessment have been compared to the noise exposure limits in Schedule 3, Table 1 of the Alberta Occupational Health and Safety Code 2009 and a total noise exposure level of 85 dBA averaged over the entire workday.

Noise Criteria

If workers are, or may be, exposed to noise at a work site in excess of the noise exposure limits stated in "Part 16 Noise Exposure" of the Alberta Occupational Health and Safety Code 2009 (OHS Code), then the employer is required to do a noise exposure assessment.

Under "Section 218 Worker Exposure to Noise" of Part 16 the OHS Code, employers must ensure that workers exposure to noise does not exceed:

a) the noise exposure limits in Schedule 3, Table 1, and
b) 85 dBA L_{ex} daily exposure level.

Table 1 – Summary of Noise Exposure Limits from Schedule 3 of the OHS Code

Exposure Level (dBA)	Exposure Duration
82	16 Hours
83	12 Hours and 41 Minutes
84	10 Hours and 4 Minutes
85	8 Hours
88	4 Hours
91	2 Hours
94	1 Hour
97	30 Minutes
100	15 Minutes
103	8 Minutes
106	4 Minutes
109	2 Minutes
112	56 Seconds
115 ≤	0

The daily exposure level, L_{ex}, is the noise exposure dose over the worker's normal daily shift energy-averaged to an eight-hour period. The daily exposure level takes into account the noise levels encountered over a worker's shift and the duration of the shift. Appendix A provides a more detailed explanation of common sound level measures.

To satisfy the OHS Code noise exposure, measurements must be performed in accordance with CSA Standard Z107.56-06, be updated if there is a change in equipment or process that affects the noise level or the length of time a worker is exposed to noise, and the equipment used for the measurements must meet the requirements in Section 219 of the OHS Code.

Employers must ensure that a copy of the results of a noise exposure assessment is available on request to an affected worker or an officer, and that record of the noise exposure assessment is retained for as long as the employer operates in Alberta.

If a noise exposure assessment confirms that workers are exposed to excess noise at a work site, to satisfy Section 221 of the OHS Code the employer must develop and implement a noise management program that includes the following policies and procedures:

a) A plan to educate workers in the hazards of exposure to excess noise and to train workers in the correct use of control measures and hearing protection;
b) The methods and procedures to be used when measuring or monitoring worker exposure to noise;
c) The posting of suitable warning signs in any work area where the noise level exceeds 85 dBA;
d) The methods of noise control to be used;
e) The selection, use, and maintenance of hearing protection devices to be worn by workers;
f) The requirements for audiometric testing and the maintenance of test records;
g) An annual review of the policies and procedures to address
    i. The effectiveness of the education and training plan,
    ii. The need for further noise measurement, and
    iii. The adequacy of the noise control measures.

Further specific requirements for the mandatory provision and maintenance of hearing protection equipment for workers are outlined in Section 222 of the OHS Code. Further specific requirements for the mandatory provision of audiometric testing for workers exposed to excess noise are outlined in Section 223 of the OHS Code.

Part 16 of the Alberta Occupational Health and Safety Code 2009 contains a complete listing of employer responsibilities in relation to noise exposure at the workplace. The Alberta OHS Act, Regulation and Code are available on the Government of Alberta Human Services website:
http://work.alberta.ca/occupational-health-safety/ohs-act-regulation-and-code.html

As vibration exposure is not regulated in Alberta, it was not intended to be part of this study. However, as part of diagnostic measurements for recommending the implementation of engineering noise hazard controls, some vibration measurements were taken, and the results are discussed in the Noise Control Recommendations section of this report.

Methodology

This noise exposure assessment has been conducted in accordance with CSA Standard Z107.56-06 "Procedures for the Measurement of Occupational Noise Exposure."

The noise exposure measurements were conducted on May 22 and 23, 2019. PAAE staff were advised that the facility was operating normally on these dates. The Hydrogen Compressor was not running, which is the normal current operating scenario, consistent with the 2018 study scenario, and the only significant difference from previous years' operating scenario.

The noise exposure levels of three categories of workers were assessed:

- Plant Operator – regular checking and operating of facility equipment throughout the facility
  - 12-hour day shift, and
  - 12-hour night shift
- Maintenance – routine and as-required repair and maintenance of various facility equipment
  - 10-hour shift
- Supervisor – mainly office based, with some direct exposure to facility equipment noise
  - 10-hour shift

Brüel & Kjær Type 4448B logging noise dosimeters were used to conduct the noise exposure assessment per each worker category. These instruments qualify as acceptable noise dosimeters under CSA Standard Z107.56-06 and satisfy the Type 2 tolerance requirements of ANSI standard S1.25-1991 (R1997). The microphone of the dosimeter was attached to the outside edge of the wearer's shoulder or as close as feasible. The dosimeters were calibrated before and after measurements. Table 2 shows a summary of the dosimeters used for this survey and the calibration dates for this equipment.

Table 2 – Instrumentation Summary

Equipment	Manufacturer/ Model	Instrument Serial No.	Last Traceable Calibration*	Calibration Interval Valid
Dosimeter – Plant Operator	Brüel & Kjær Type 4448B	4311574	N/A	N/A
Dosimeter – Maintenance	Brüel & Kjær Type 4448B	4311575	N/A	N/A
Dosimeter – Supervisor	Brüel & Kjær Type 4448B	4311573	N/A	N/A
Dosimeter Calibrator	Brüel & Kjær Type 4231	2052131	November 2, 2018	Yes

*Traceable laboratory calibration was conducted by Brüel & Kjær. As per CSA Z107.56-06, traceable calibration is not required for dosimeters.

Noise exposures were based on logging of noise levels experienced by each worker over the course of their shift, a few minutes shorter than their scheduled time due to the setup, fitting, and removal of the dosimeters at the beginning and end of their shifts. The logged levels were then extrapolated to cover the full extent of each shift (the L_{eq}, or energy-equivalent sound level) and calculations were based on this result.

Results

The results of the dosimetry study, and recommendation for hearing protection are presented below. A summary table and time history graph for each position/shift are shown at the end of the section.

The Plant Operator day shift position had the highest noise exposure, with an L_{ex} of 85.8 dBA, the limit being 85.0 dBA for an 8-hour shift. This equates to 121.3% of the daily allowed noise dose (in energy terms) before hearing protection is required. Because the actual shift length is 12-hour, this additional time and exposure increases the time-weighted dose above the 84.1 dBA L_{eq} or total sound energy equivalent.

Since the dose was found to be over the exposure limit, it is required that the Operator wear hearing protection in areas where noise levels are above 85 dBA. The loudest level recorded was 101.1 dBA, exposure to which would exceed the daily limit in approximately 10 minutes. The recorded exposure is a decrease over the previous annual study's findings, possibly due to differing tasks taking place during this particular day. Additionally, in colder conditions such as in wintertime, operators may spend more time in warm buildings, increasing their noise exposure beyond what was measured in this study.

The Plant Operator night shift position recorded an L_{ex} of 84.1 dBA, equating to 80.7% of the daily dose energy limit. Based on this result alone, hearing protection is not required for this shift. However, this is a significant decrease over the findings of the previous study, and it seems the exposure may vary from day to day, reinforcing the previous recommendation that hearing protection be worn at all times in areas with levels exceeding 85 dBA, no matter the sampled exposure. Further, the highest level recorded was 100.2 dBA, exposure to which would exceed the daily limit in less than 15 minutes.

The Maintenance position had a relatively low average noise level exposure during this study, with an L_{eq} of 70.3 dBA over the course of the shift, with an L_{ex} of 72.4 dBA or 4.2% dose. Even though average levels were low, this position had a C-weighted peak level of 129.7, enough to potentially cause hearing damage in a short period without adequate protection. Due to the exposure to such high levels, and the variance of year-to-year studies, hearing protection in areas over 85 dBA is recommended for this role.

Finally, the Supervisor position had low exposure levels, consistent with previous findings, with an L_{ex} of 71.1 dBA, or 4.0% of the maximum 8-hour sound energy dose, over a shift length of 10 hours. The maximum recorded level was 82.3 dBA, considerably lower than previous years' studies. However, as daily exposures may vary considerably, hearing protection is recommended in areas where noise levels are greater than 85 dBA.

Table 3 – Dosimetry Results

Job Description	Operator (Day)	Operator (Night)	Maintenance	Supervisor
Run Time	10:49:00	12:00:00	9:37:00	9:46:00
Start Date	22-May-19	22-May-19	22-May-19	22-May-19
Start Time	6:49:46	18:00:46	6:53:44	6:45:28
Stop Date	22-May-19	23-May-19	22-May-19	22-May-19
Stop Time	17:37:46	5:59:46	16:29:44	16:30:28
Pre-Calibration Date	22-May-19	22-May-19	22-May-19	22-May-19
Pre-Calibration Time	6:45:25	6:45:25	6:47:09	6:38:03
Post-Calibration Date	23-May-19	23-May-19	23-May-19	23-May-19
Post-Calibration Time	7:23:15	7:23:15	7:21:12	7:20:30
Calibration Deviation (dB)	0.7	0.7	0.4	0.5
Sample Period	1 minute	1 minute	1 minute	1 minute
Periods	649	720	577	586
Note	12-hour day shift	12-hour night shift	10-hour day shift	10-hour day shift
Results				
Dose	121.3%	80.7%	4.2%	4.0%
L_{eq} (dBA)	84.1	82.3	70.3	70.1
L_{Peak} (dBC)	128.3	120.6	129.7	116.2
L_{ex} (8 hr, dBA)	85.8	84.1	71.3	71.1
Criteria & Measurement Setup				
Exch. Rate (dB)	3	3	3	3
Threshold (dB)	0	0	0	0
Criterion (dBA)	85	85	85	85
Crit. Duration (hrs)	8	8	8	8
RMS Weight	A Weighting	A Weighting	A Weighting	A Weighting
Peak Weight	C Weighting	C Weighting	C Weighting	C Weighting
Detector	Slow	Slow	Slow	Slow

Figure 1 – Operator, 12-hour day shift

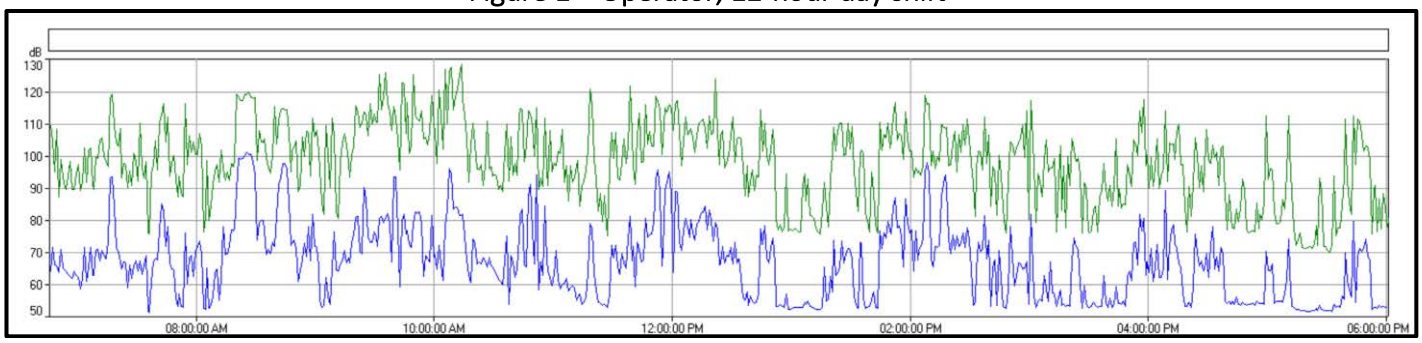


Figure 2 – Operator, 12-hour night shift

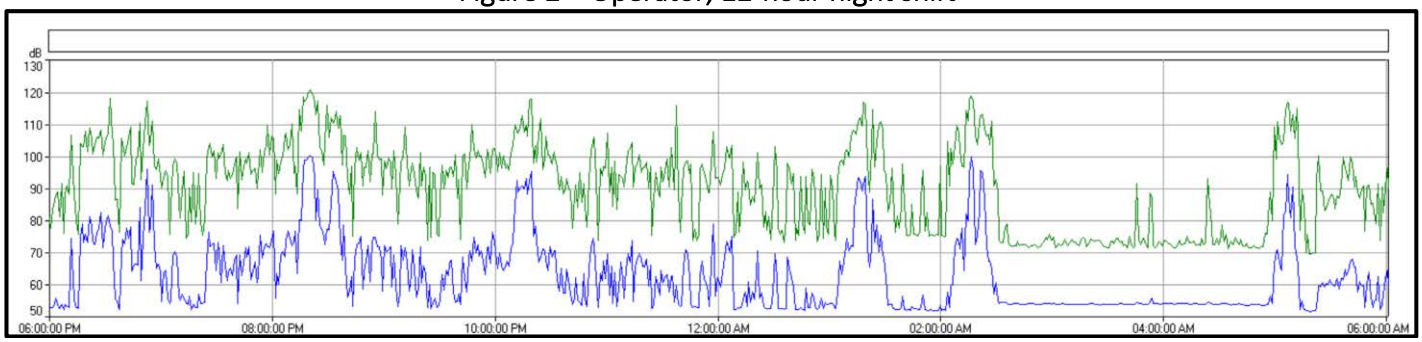


Figure 3 – Maintenance, 10-hour shift

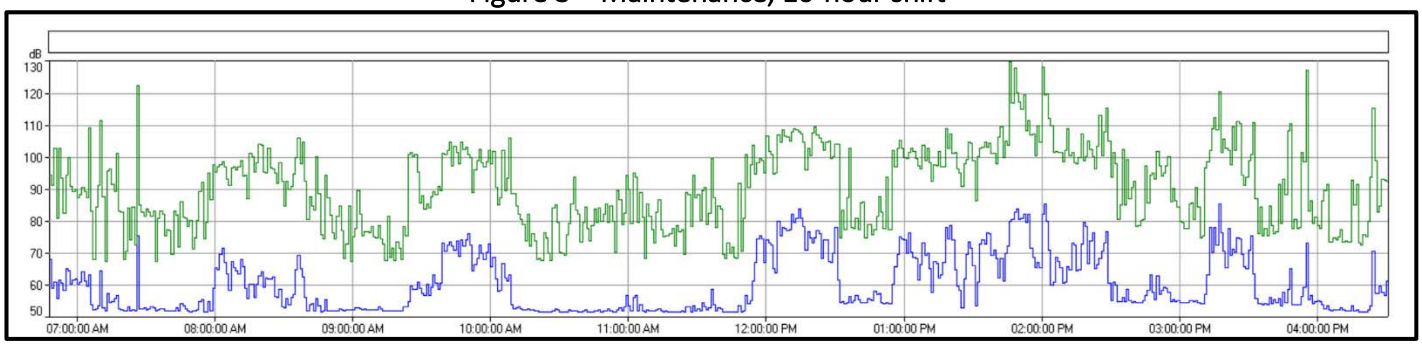
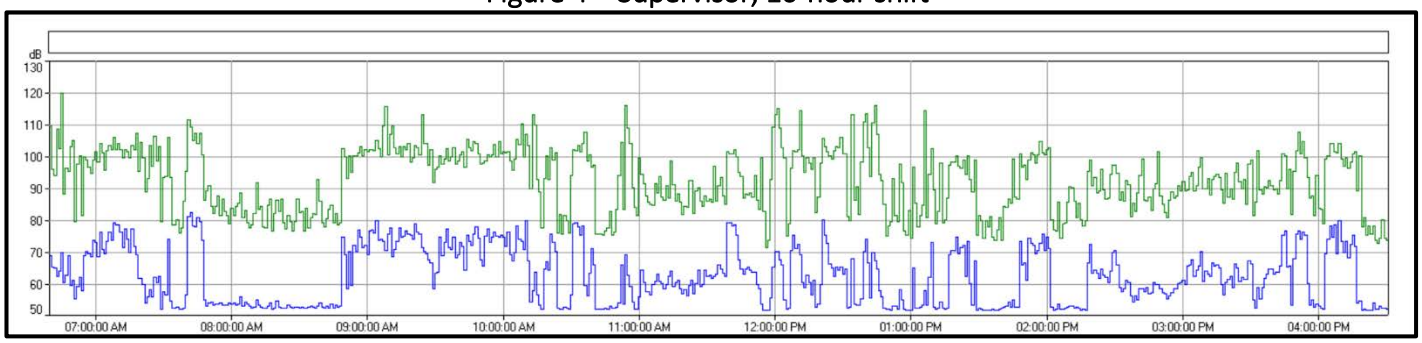


Figure 4 – Supervisor, 10-hour shift



LAeq LCpeak

Sound Mapping

The sound mapping serves to visualize noise levels in buildings and around equipment as well as propagation outwards from the facility equipment into the environment within the fence line.

Sound pressure levels in and around all the buildings, around outdoor noise emitting equipment, across the grounds and around the perimeter of the facility were measured with a Brüel & Kjær Type 2270, Class 1 integrating logging sound level meter. Two scenarios were mapped, as follows:

- Morning Scenario, May 22, 2019
  - Cooler temperatures under 15 degrees Celsius, possibly resulting in lower cooling fan speeds; bare, dry ground cover consisting mainly of gravel and compacted soil; calm wind
  - Doors **closed** on buildings containing noise emitting equipment
  - For both scenarios, Hydrogen Compressor unit did not operate, although this is the current normal/maximum facility operating condition as detailed in the Methodology section of the Noise Dosimetry Study
- Afternoon Scenario, May 22, 2019
  - Warmer temperatures around 10 degrees Celsius; ground cover and other environmental conditions consistent with the morning scenario
  - Doors (including overhead equipment doors) **open** on buildings containing noise emitting equipment, such as the large compressor units
  - A small, portable, engine-driven pump was temporarily operating next to the retention pond
  - Normal/maximum facility operations

The sound maps are attached in Appendix B. They can be used for visual reference, worker education, visitor orientation, and placing of signage related to noise levels. As well, the propagation of sound from the facility can be visually estimated, and levels noted around the fence line can be compared from year to year as part of the annual noise mitigation strategy.

Areas and buildings with sound pressure levels in excess of 85 dBA should be marked with warning signs for hearing protection, and areas where levels approach 105 dBA should be marked for double hearing protection. CSA Z94.2-02 (R2007) Hearing Protection Devices should be referenced for more detailed definitions and to determine appropriate specifications.

No sound level above 105 dBA was found within the facility during the time of the study, Table 4 shows the building interiors and outdoor areas were found to exceed 85 dBA.

Table 4 – Area Summary

Area	Sound Level	Maximum Exposure Duration
BU-302, Hydrogen Compressor Bldg.	94 dBA (previous year study reused)	1 hour
BU-101, Refrigerant Compressor Bldg.	96 dBA (tone at 237.5 Hz)	30 minutes
Outdoor area between BU-101 and AC-101/102 (Doors open)	85-90 dBA	2 hours
BU-201 Offgas Comp. Bldg.	103 dBA	8 minutes
Outdoor area around BU-201 (within 10m)	85-90 dBA (high frequency piping noise)	2 hours
D-104 Pump Skid	85-90 dBA (transient piping noise identified in previous study)	2 hours
Flare Stake Blowers (within 2m)	85 dBA	<8 hours
Skid Steer	Outside Cab 85-90 dBA	2 hours
Skid Steer	Inside Cab 82 dBA	16 hours

Noise Control Recommendations

The two buildings with the highest interior sound pressure levels were investigated in detail to determine the source of the noise and to recommend engineering hazard controls if possible.

- BU-101 Refrigerant Compressor Bldg.
  - 1500 HP Electric-Driven Screw Compressor, mounted on a steel frame welded to the building floor, vibrating at 237.5 Hz as measured with an accelerometer
  - Rigid coupling of the support frame to the steel floor plates causes the floor to vibrate at this frequency with a measured acceleration of 5-15 m/s^2, resulting in noise levels of up to 96 dBA with greater than 90% of the sound power concentrated in the 250 Hz 1/3 Oct. band and its 500 Hz harmonic
  - Isolation of the compressor from the floor using suitable material with a static deflection of up to $1/10^{th}$ of an inch is recommended to reduce the vibration transmitted to the floor plates and thus reduce noise levels
    - It should be noted that while occupational exposure to vibration is not regulated in Alberta, using the European Vibration Directive (2002/44/EC) limit of 1.15 m/s^2 for an 8-hour whole-body exposure as a guideline, the measured maximum acceleration of the floor plates at 15.6 m/s^2 greatly exceeds this limit and could pose a hazard
    - It is recommended to conduct further study to create suitable administrative controls to limit operator exposure until a practicable engineering hazard control can be designed and implemented

- Due to the configuration of the equipment, including a permanently welded frame, no obvious point of isolation could be identified, and modification of the existing support structure would be required for installation of isolating material
- A feasibility study for the installation of isolating material is recommended

- BU-201 Offgas Compressor Bldg.
  - 3100 HP, 890 RPM Electric-Driven Reciprocating Compressor
  - No single prominent or isolatable noise and vibration source exists, but rather the noise is generated from the overall system of the compressor including the casing of the compressor itself, piping and vessels, and excitation of enclosure (building) surfaces, and is consistent with the normal operation of this type of equipment
  - Installation of acoustic insulation/lagging on these components or an acoustic enclosure within the building surrounding the compressor would be required for significant reduction of sound pressure levels within the building, but the practicality of this would have to be examined to determine if it interferes with equipment operation and maintenance
  - Retrofit of the building walls with a perforated liner could be expected to reduce excess interior sound pressure levels due to reverberant buildup by approximately 3 dB
    - A more precise estimate of noise reduction would necessitate measurement of the building interior reverberation time
    - Further study to determine appropriate specifications of a perforated liner is recommended

Conclusion

Aux Sable Canada LP (Aux Sable) retained Patching Associates Acoustical Engineering Ltd. (PAAE) to complete a Noise Management Plan (NMP) that meets the requirements of the Northeast Capital Industrial Association (NCIA) Standards and Guidelines 2010-003 issued 3-Sep-10, revised 31-Mar-16.

The Aux Sable NMP would be provided as an input into the NCIA Regional Noise Management Plan (RNMP) report to the Alberta Energy Regulator (AER) for the Aux Sable Shell Offgas Liquids Recovery (SOLR) facility located at NE-24-55-22 W4M.

This report consists of two main components, designed to help fulfil Aux Sable's commitments to the RNMP. The noise dosimetry study quantifies actual, typical worker exposure to noise over the course of their daily work shift, while the sound mapping quantifies and visualizes noise levels in buildings and around equipment as well as propagation outwards from the facility into the environment.

The dosimetry study was the third instance conducted by PAAE, and comparison to prior data can be made. The Operator worker position exceeded daily exposure limits, but decreased from the previous year. This decrease is likely due to normal variations in daily work and not does not indicate a reduction in facility noise emissions. Therefore, it is possible to mitigate the overall noise exposure dose by limiting time spent in noisy areas through administrative controls. This would not eliminate the requirement for hearing protection. The Operator and Maintenance positions were exposed to very high noise levels that could cause hearing damage in a very short amount of time without adequate protection. These positions had exposure to levels above 120 dBC peak, considered loud enough to instantly damage hearing without protection.

For selection of hearing protection, CSA Grade 1 or Class C ear plugs or muffs (minimum CSA ratings) would be sufficient based on the measured noise exposure levels for all positions. Workers may choose style or type on preference, as long as it meets the Grade or Class and is CSA certified.

A limited investigation of the noise sources in the two loudest building was conducted to determine possible engineering hazard controls. As described in the Noise Control Recommendations section of the report, neither the Refrigerant Compressor Building nor the Offgas Compressor Building had any noise sources that could be readily or easily treatable, and further study is recommended to see if the suggested treatments are feasible.

Additionally, the interior sound level of a skid-steer loader used by workers at the site was measured and found to be under 82 dBA, less than the 85-dBA threshold for which hearing protection is typically recommended. However, it would still be prudent to wear hearing protection in and around this piece of equipment as levels directly adjacent to the engine exhaust are above 85 dBA, and driving and use of the loader might result in very loud impact noises.

The mapping study demonstrated no significant change in facility noise levels compared to the prior study, as the current operating scenario in which the Hydrogen Compressor unit does not regularly operate was consistent with the 2018 study. Interior levels of buildings were consistent, with the highest measured level in the Offgas Compressor building at 103 dBA. Opening of equipment doors did increase noise propagation from the main compressor buildings within facility limits, and increased levels immediately outside these buildings

beyond 85 dBA, but fence line levels were not noticeably different between the two operating scenarios tested, nor when compared to previous studies.

Aux Sable has committed to sharing and discussing the results of this study with workers in keeping with the company's health and safety policies and best practices, and as part of implementation of their Noise Management Plan. Specifically, the report and noise maps will be posted on-site, and reviewed with facility operators and other relevant staff during a safety meeting.

Appendix A

Explanation of Technical Details Regarding Sound Measurement and Analysis

Technical Details

Sound is the phenomena of vibrations transmitted through air, or other medium such as water or a building structure. The range of pressure amplitudes, intensities, and frequencies of the sound energy is very wide, and many specialized fields have developed using different ranges of these variables, such as room acoustics and medical ultrasound.

Due to the wide range of intensities, which are perceived as sound, standard engineering units become inconvenient. Sound levels are commonly measured on a logarithmic scale, with the level (in decibels, or dB) being proportional to ten times the common logarithm of the sound energy or intensity. Normal human hearing covers a range of about twelve to fourteen orders of magnitude in energy, from the threshold of hearing to the threshold of pain. On the decibel scale, the threshold of hearing is set as zero, written as 0 dB, while the threshold of pain varies between 120 to 140 dB. The most usual measure of sound is the sound pressure level (SPL), with 0 dB SPL set at 2.0×10^{-5} N/m^2 (also written 20 μPa), which corresponds to a sound intensity of 10^{-12} Watts/m^2 (or 1 picoWatt/m^2, written 1 pW/m^2).

Normal human hearing spans a frequency range from about 20 Hertz (Hz, or cycles per second) to about 20,000 Hz (written 20 KHz). However, the sensitivity of human hearing is not the same at all frequencies. To accommodate the variation in sensitivity, various frequency-weighting scales have been developed. The most common is the A-weighting scale, which is based on the sensitivity of human hearing at moderate levels; this scale reflects the low sensitivity to sounds of very high or very low frequencies. Sound levels measured on the A-weighted scale are written in A-weighted decibels, commonly shown as dBA or dB(A).

When sound is measured using the A-weighting scale, the reading is often called the “Noise level”, to confirm that human sensitivity and reactions are being addressed. A table of some common noise sources and their associated noise levels are shown in Table A1.

When the A-weighting scale is not used, the measurement is said to have a “linear” weighting, or to be un-weighted, and may be called a “linear” level. As the linear reading is an accurate measurement of the physical (sound) pressure, the term “Sound Pressure Level”, or SPL, is usually (but not universally) reserved for un-weighted measurements.

Noise is usually defined as “unwanted sound”, which indicates that it is not just the physical sound that is important, but also the human reaction to the sound that leads to the perception of sound as noise. It implies a judgment of the quality or quantity of sound experienced. As a human reaction to sound is involved, noise levels are usually given in A-weighted decibels (dBA). An alternate definition of noise is “sound made by somebody else”, which emphasizes that the ability to control the level of the sound alters the perception of noise.

Table A1- Noise Levels of Familiar Sources

Source Or Environment	Noise Level (dBA)
High Pressure Steam Venting To Atmosphere (3m)	121
Steam Boiler (2m)	90-95
Drilling Rig (10m)	80-90
Pneumatic Drill (15m)	85
Pump Jack (10m)	68-72
Truck (15m)	65-70
Business Office	65
Conversational Speech (1m)	60
Light Auto Traffic (30m)	50
Living Room	40
Library	35
Soft Whisper (5m)	20-35

The single number A-weighted level is often inadequate for engineering purposes, although it does supply a good estimate of people's reaction to a noise environment. As noise sources, control measures, and materials differ in the frequency dependence of their noise responses or production, sound is measured with a narrower frequency bandwidth; the specific methodology varies with the application. For most work, the acoustic frequency range is divided into frequency bands where the center frequency of each band is twice the frequency of the next lower band; these are called "Octave" bands, as their frequency relation is called an "Octave" in music, where the field of acoustics has its roots. For more detailed work, the octave bands, and certain standard octave and 1/3 octave bands have been specified by international agreements.

Where the noise at the receiver is steady, it is easy to assess the noise level. However, both the production of noise at the source and the transmission of noise can vary with time; most noise levels are not constant, either because of the motion of the noise source (as in traffic noise), because the noise source itself varies, or because the transmission of sound to the receiver location is not steady as over long distances. This is almost always the case for environmental noise studies. Several single number descriptors have been developed and are used to assess noise in these conditions.

The most common is the measurement of the "equivalent continuous" sound level, or L_{eq}, which is the level of a hypothetical source of a constant level which would give the same total sound energy as is measured during the sampling period. This is the "energy" average noise level. Typical sampling periods are one hour, nighttime (9 hours) or one day (24 hours); the sampling period used must be reported when using this unit.

The greatest value of the L_{eq} is that the contributions of different sources to the total noise level can be assessed, or in a case where a new noise source is to be added to an existing environment, the total noise level from new and old sources can be easily calculated. It is also sensitive to short term high noise levels.

Statistical noise levels are sometimes used to assess an unsteady noise environment. They indicate the levels that are exceeded a fixed percentage of the measurement time period measured. For example, the 10%-ile

level, written L_{10}, is the levels exceeded 10% of the time; this level is a good measure of frequent noisy occurrences such as steady road traffic. The 90% level, L_{90}, is the level exceeded 90% of the time, and is the background level, or noise floor. A steady noise source will modify the background level, while an intermittent noise source such as road or rail traffic will affect the short-term levels only.

One disadvantage with the L_{eq} measure, when used alone, is that nearby loud sources (e.g. dogs barking, or birds singing) can confuse the assessment of the situation when it is the noise from a distant plant that is the concern. For this reason, the equivalent level and the statistical levels can be used together to better understand the noise environment. One such indication is the difference between the L_{eq} and the L_{90} levels. A large difference between the L_{eq} and L_{90}, greater than 10 dB, indicates the intrusion of short-term noise events on the general background level. A small difference, less than 5 dB, indicates a very steady noise environment. If the L_{eq} value exceeds the L_{10} value this indicates the presence of significant short-term loud events.

For most noise measurement, instruments are adjusted so that the time response of the instrument is similar to the response of the human ear; this is the "Fast" setting. Measurement with the "Fast" setting therefore assesses the sound environment according to the way humans would hear it and react to it. Where the noise level varies substantially and an average level is wanted without the complexity of and L_{eq} or statistical measurement, the "Slow" setting is used on the sound level meter. The "Slow" setting is also typically used in industrial settings where hearing damage is a concern. Where the noise level changes very rapidly, for example due to impacts or detonations, the "Fast" and "Slow" settings do not respond quickly enough to assess the maximum levels, and the "Impulse" meter setting us used.

The Sound Power Level (abbreviated L_w, SWL or PWL) is the decibel equivalent of the total energy emitted from a source in the form of noise. The reference level for the sound power is 10^{-12} Watts, or 1 picoWatt (abbreviated pW). The sound power level is given by:

$$L_w, \text{SWL, PWL} = 10 \times \log_{10} (\text{Emitted Power} / 1\ \text{pW})\ \text{dB}$$

Therefore, a source emitting 1 Watt of power in the form of sound would have a sound power level of 120 dB. Sound power levels can be expressed in terms of frequency bands, an overall linear-weighted level or A-weighted, as is the case for sound pressure levels. However, sound power levels are inherent to the source of noise, whereas the sound pressure level is dependent on the source, but also on the distance from the source and other environmental factors.

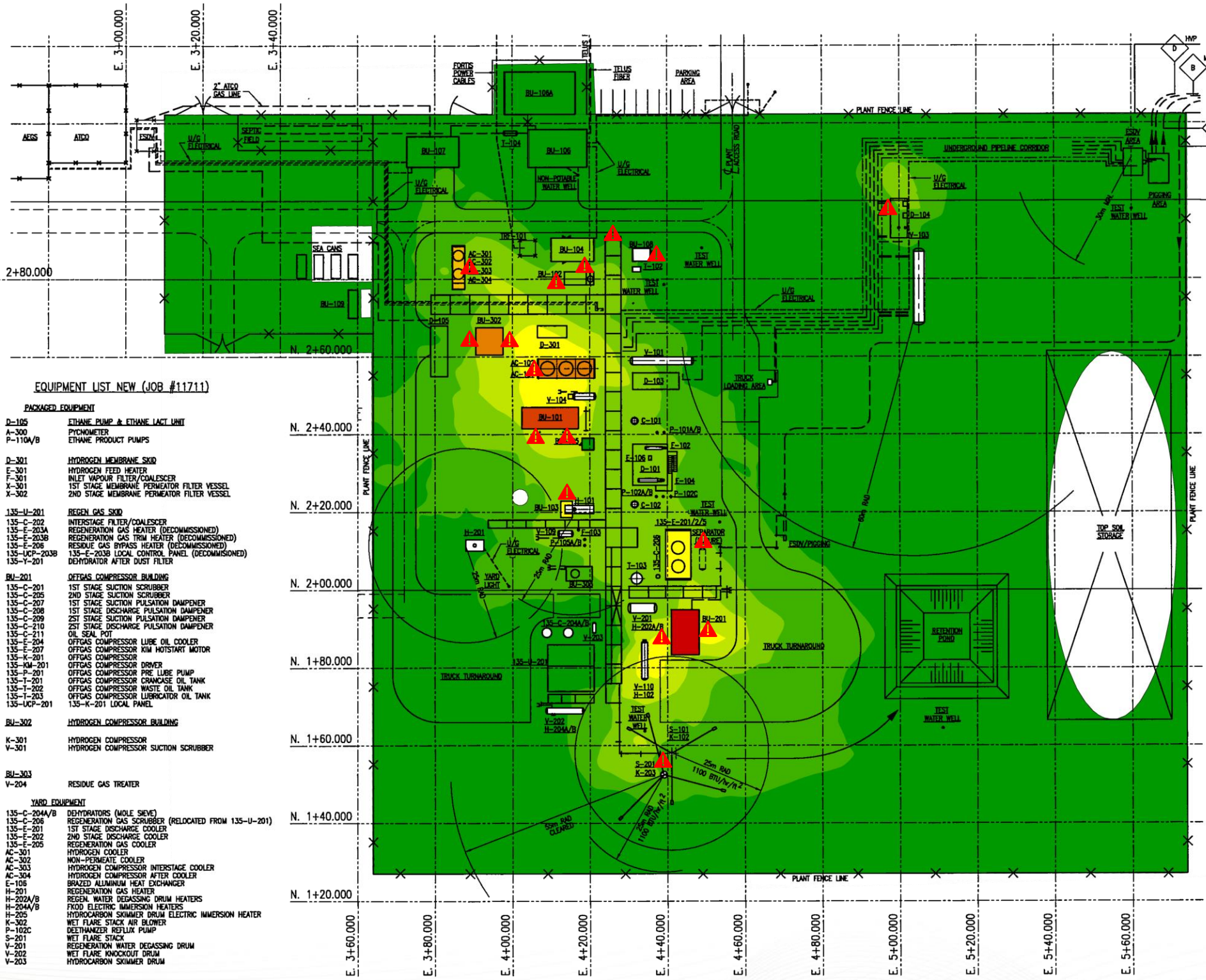
Appendix B

Sound Pressure Level Maps

Sound Pressure Levels dB(A)

Alberta OHS regulations require workers exposed to levels greater than 85 dBA based on a daily shift length of 8 hours to wear appropriate hearing protection. Areas with such levels should be marked with warning signs. For daily exposure levels greater than 105 dBA, double hearing protection is required.

< 65
65 - 70
70 - 75
75 - 80
80 - 85
85 - 90
90 - 95
95 - 100
100 - 105



EQUIPMENT LIST NEW (JOB #11711)

PACKAGED EQUIPMENT

D-105	ETHANE PUMP & ETHANE LACT UNIT
A-300	PYCNOMETER
P-110A/B	ETHANE PRODUCT PUMPS
D-301	HYDROGEN MEMBRANE SKID
E-301	HYDROGEN FEED HEATER
F-301	INLET VAPOUR FILTER/COALESCER
X-301	1ST STAGE MEMBRANE PERMEATOR FILTER VESSEL
X-302	2ND STAGE MEMBRANE PERMEATOR FILTER VESSEL
135-U-201	REGEN GAS SKID
135-C-202	INTERSTAGE FILTER/COALESCER
135-E-203A	REGENERATION GAS HEATER (DECOMMISSIONED)
135-E-203B	REGENERATION GAS TRIM HEATER (DECOMMISSIONED)
135-E-206	RESIDUE GAS BYPASS HEATER (DECOMMISSIONED)
135-UCP-2038	135-E-203B LOCAL CONTROL PANEL (DECOMMISIONED)
135-Y-201	DEHYDRATOR AFTER DUST FILTER
BU-201	OFFGAS COMPRESSOR BUILDING
135-C-201	1ST STAGE SUCTION SCRUBBER
135-C-205	2ND STAGE SUCTION SCRUBBER
135-C-207	1ST STAGE SUCTION PULSATION DAMPENER
135-C-208	1ST STAGE DISCHARGE PULSATION DAMPENER
135-C-209	2ST STAGE SUCTION PULSATION DAMPENER
135-C-210	2ST STAGE DISCHARGE PULSATION DAMPENER
135-C-211	OIL SEAL POT
135-E-204	OFFGAS COMPRESSOR LUBE OIL COOLER
135-E-207	OFFGAS COMPRESSOR KIM HOTSTART MOTOR
135-K-201	OFFGAS COMPRESSOR
135-KM-201	OFFGAS COMPRESSOR DRIVER
135-P-201	OFFGAS COMPRESSOR PRE LUBE PUMP
135-T-201	OFFGAS COMPRESSOR CRANCASE OIL TANK
135-T-202	OFFGAS COMPRESSOR WASTE OIL TANK
135-T-203	OFFGAS COMPRESSOR LUBRICATOR OIL TANK
135-UCP-201	135-K-201 LOCAL PANEL
BU-302	HYDROGEN COMPRESSOR BUILDING
K-301	HYDROGEN COMPRESSOR
V-301	HYDROGEN COMPRESSOR SUCTION SCRUBBER
BU-303	
V-204	RESIDUE GAS TREATER

YARD EQUIPMENT

135-C-204A/B	DEHYDRATORS (MOLE SIEVE)
135-C-206	REGENERATION GAS SCRUBBER (RELOCATED FROM 135-U-201)
135-E-201	1ST STAGE DISCHARGE COOLER
135-E-202	2ND STAGE DISCHARGE COOLER
135-E-205	REGENERATION GAS COOLER
AC-301	HYDROGEN COOLER
AC-302	NON-PERMEATE COOLER
AC-303	HYDROGEN COMPRESSOR INTERSTAGE COOLER
AC-304	HYDROGEN COMPRESSOR AFTER COOLER
E-106	BRAZED ALUMINUM HEAT EXCHANGER
H-201	REGENERATION GAS HEATER
H-202A/B	REGEN. WATER DEGASSING DRUM HEATERS
H-204A/B	FKOD ELECTRIC IMMERSION HEATERS
H-205	HYDROCARBON SKIMMER DRUM ELECTRIC IMMERSION HEATER
K-302	WET FLARE STACK AIR BLOWER
P-102C	DEETHANIZER REFLUX PUMP
S-201	WET FLARE STACK
V-201	REGENERATION WATER DEGASSING DRUM
V-202	WET FLARE KNOCKOUT DRUM
V-203	HYDROCARBON SKIMMER DRUM

EQUIPMENT LIST (EXISTING)

PACKAGED EQUIPMENT

D-101	DEMETHANIZER/DEETHANIZER REBOILER SKID
E-102	DEMETHANIZER TRIM REBOILER
E-103	DEETHANIZER REFLUX CONDENSER
V-102	DEETHANIZER REFLUX ACCUMULATOR
V-106	REFRIGERANT HEAD TANK
D-103	INLET FILTER SKID
F-101	INLET LIQUIDS FILTER
F-102	INLET VAPOUR FILTER / COALESCER
D-104	PUMP SKID
P-103A/B	PROPANE PLUS BOOSTER PUMPS
P-104A/B	PROPANE PLUS DELIVERY PUMPS
BU-101	REFRIGERANT COMPRESSOR BUILDING
E-105	REFRIGERANT COMPRESSOR LUBE OIL COOLER
F-104A-C	REFRIGERANT COMPRESSOR LUBE OIL FILTERS
F-107	REFRIGERANT COMPRESSOR LUBE OIL FILTER
K-101	REFRIGERANT COMPRESSOR
KD-101	REFRIGERANT COMPRESSOR MOTOR
P-106	REFRIGERANT COMPRESSOR LUBE OIL PUMP
P-107	REFRIG. COMPRESSOR LUBE OIL MAKEUP PUMP
P-109A/B	LIQUID REFRIG. LUBE OIL COOLING PUMPS
T-105	REFRIG. COMPRESSOR LUBE OIL TANK
V-105	REFRIGERANT INTERSTAGE ECONOMIZER
V-107	REFRIG. COMPRESSOR SUCTION SCRUBBER
V-108	REFRIG. COMPRESSOR DISCHARGE L.O. SEPARATOR
V-113	TSOC AUXILIARY RECEIVER
BU-102	INSTRUMENT AIR COMPRESSOR BUILDING
F-105	INSTRUMENT AIR DRYER PREFILTER
F-106	INSTRUMENT AIR DRYER AFTERFILTER
K-103A/B	INSTRUMENT AIR COMPRESSORS
V-111	DRY INSTRUMENT AIR RECEIVER
V-114A/B	INSTRUMENT AIR DRYERS
V-115	WET INSTRUMENT AIR RECEIVER
BU-103	HEAT MEDIUM HEATER BUILDING
H-101	HEATING MEDIUM HEATER
K-104	HEAT MEDIUM HEATER AIR BLOWER
BU-104	MCC BUILDING
BU-105	ANALYZER BUILDING
BU-106	CONTROL/OFFICE BUILDING
BU-106A	TEMPORARY OFFICE BUILDING
BU-107	WAREHOUSE
BU-108	GENERATOR BUILDING
N-101	EMERGENCY GENERATOR
BU-109	OIL STORAGE BUILDING

YARD EQUIPMENT

AC-101	DEETHANIZER BOTTOMS PRODUCT COOLER
AC-102	REFRIGERANT CONDENSER
C-101	DEMETHANIZER
C-102	DEETHANIZER
E-102	DEMETHANIZER TRIM REBOILER
E-104	DEETHANIZER REBOILER
F-103	HEATING MEDIUM FILTER
H-102	FKOD ELECTRIC IMMERSION HEATER
K-102	FLARE STACK AIR BLOWER
P-101A/B	DEETHANIZER FEED PUMPS
P-102A/B	DEETHANIZER REFLUX PUMPS
P-105A/B	HEATING MEDIUM PUMPS
S-101	FLARE STACK
T-102	N-101 DIESEL STORAGE TANK
T-103	HEAT MEDIUM POP TANK
T-104	SEPTIC TANK
TRF-101	TRANSFORMER 4160V/600V
V-101	INLET SEPARATOR/SLUG CATCHER
V-103	PROPANE PLUS STORAGE BULLET
V-104	REFRIGERANT ACCUMULATOR
V-109	HEATING MEDIUM SURGE TANK
V-110	FLARE KNOCKOUT DRUM

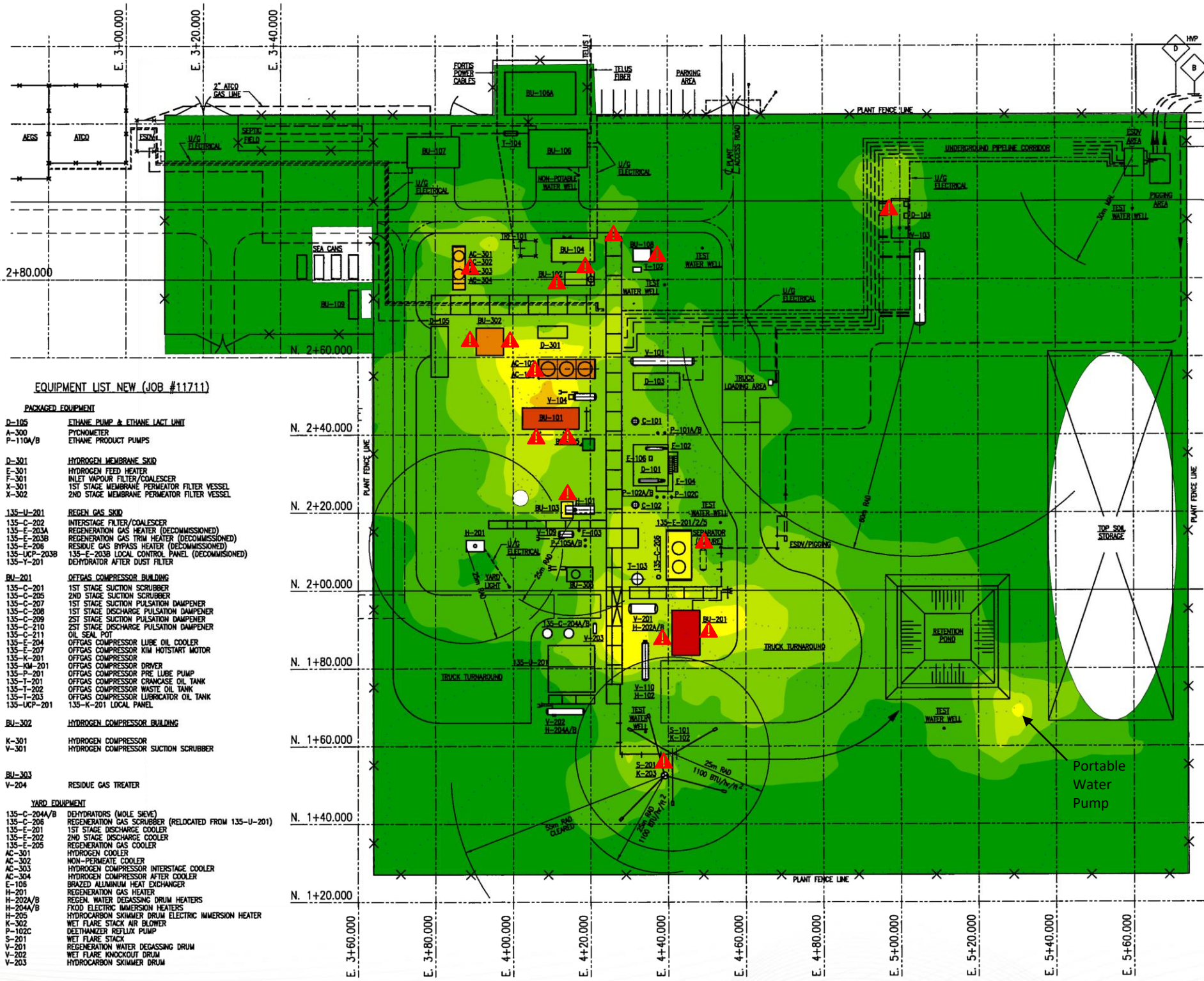
Hearing Protection Sign

Facility Name	Scenario	Location	Measurement Height	Measurement Date	Document ID
Aux Sable Canada Ltd. Shell Offgas Liquids Recovery	**Morning, doors closed, H2 Compressor not operating**	**NE ¼ 24-055-22 W4M**	**1.5 m**	**2019-05-22**	**5235-NAW-001**

Sound Pressure Levels dB(A)

Alberta OHS regulations require workers exposed to levels greater than 85 dBA based on a daily shift length of 8 hours to wear appropriate hearing protection. Areas with such levels should be marked with warning signs. For daily exposure levels greater than 105 dBA, double hearing protection is required.

- < 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- 85 - 90
- 90 - 95
- 95 - 100
- 100 - 105



EQUIPMENT LIST NEW (JOB #11711)

PACKAGED EQUIPMENT

D-105	ETHANE PUMP & ETHANE LACT UNIT
A-300	PYCNOMETER
P-110A/B	ETHANE PRODUCT PUMPS
D-301	HYDROGEN MEMBRANE SKID
E-301	HYDROGEN FEED HEATER
F-301	INLET VAPOUR FILTER/COALESCER
X-301	1ST STAGE MEMBRANE PERMEATOR FILTER VESSEL
X-302	2ND STAGE MEMBRANE PERMEATOR FILTER VESSEL
135-U-201	REGEN GAS SKID
135-C-202	INTERSTAGE FILTER/COALESCER
135-E-203A	REGENERATION GAS HEATER (DECOMMISSIONED)
135-E-203B	REGENERATION GAS TRIM HEATER (DECOMMISSIONED)
135-E-206	RESIDUE GAS BYPASS HEATER (DECOMMISSIONED)
135-UCP-203B	135-E-203B LOCAL CONTROL PANEL (DECOMMISIONED)
135-Y-201	DEHYDRATOR AFTER DUST FILTER
BU-201	OFFGAS COMPRESSOR BUILDING
135-C-201	1ST STAGE SUCTION SCRUBBER
135-C-205	2ND STAGE SUCTION SCRUBBER
135-C-207	1ST STAGE SUCTION PULSATION DAMPENER
135-C-208	1ST STAGE DISCHARGE PULSATION DAMPENER
135-C-209	2ST STAGE SUCTION PULSATION DAMPENER
135-C-210	2ST STAGE DISCHARGE PULSATION DAMPENER
135-C-211	OIL SEAL POT
135-E-204	OFFGAS COMPRESSOR LUBE OIL COOLER
135-E-207	OFFGAS COMPRESSOR KIM HOTSTART MOTOR
135-K-201	OFFGAS COMPRESSOR
135-KM-201	OFFGAS COMPRESSOR DRIVER
135-P-201	OFFGAS COMPRESSOR PRE LUBE PUMP
135-T-201	OFFGAS COMPRESSOR CRANCASE OIL TANK
135-T-202	OFFGAS COMPRESSOR WASTE OIL TANK
135-T-203	OFFGAS COMPRESSOR LUBRICATOR OIL TANK
135-UCP-201	135-K-201 LOCAL PANEL
BU-302	HYDROGEN COMPRESSOR BUILDING
K-301	HYDROGEN COMPRESSOR
V-301	HYDROGEN COMPRESSOR SUCTION SCRUBBER
BU-303	
V-204	RESIDUE GAS TREATER

YARD EQUIPMENT

135-C-204A/B	DEHYDRATORS (MOLE SIEVE)
135-C-206	REGENERATION GAS SCRUBBER (RELOCATED FROM 135-U-201)
135-E-201	1ST STAGE DISCHARGE COOLER
135-E-202	2ND STAGE DISCHARGE COOLER
135-E-205	REGENERATION GAS COOLER
AC-301	HYDROGEN COOLER
AC-302	NON-PERMEATE COOLER
AC-303	HYDROGEN COMPRESSOR INTERSTAGE COOLER
AC-304	HYDROGEN COMPRESSOR AFTER COOLER
E-105	BRAZED ALUMINUM HEAT EXCHANGER
H-201	REGENERATION GAS HEATER
H-202A/B	REGEN. WATER DEGASSING DRUM HEATERS
H-204A/B	FKOD ELECTRIC IMMERSION HEATERS
H-205	HYDROCARBON SKIMMER DRUM ELECTRIC IMMERSION HEATER
K-302	WET FLARE STACK AIR BLOWER
P-102C	DEETHANIZER REFLUX PUMP
S-201	WET FLARE STACK
V-201	REGENERATION WATER DEGASSING DRUM
V-202	WET FLARE KNOCKOUT DRUM
V-203	HYDROCARBON SKIMMER DRUM

EQUIPMENT LIST (EXISTING)

PACKAGED EQUIPMENT

D-101	DEMETHANIZER/DEETHANIZER REBOILER SKID
E-102	DEMETHANIZER TRIM REBOILER
E-103	DEETHANIZER REFLUX CONDENSER
V-102	DEETHANIZER REFLUX ACCUMULATOR
V-106	REFRIGERANT HEAD TANK
D-103	INLET FILTER SKID
F-101	INLET LIQUIDS FILTER
F-102	INLET VAPOUR FILTER / COALESCER
D-104	PUMP SKID
P-103A/B	PROPANE PLUS BOOSTER PUMPS
P-104A/B	PROPANE PLUS DELIVERY PUMPS
BU-101	REFRIGERANT COMPRESSOR BUILDING
E-105	REFRIGERANT COMPRESSOR LUBE OIL COOLER
F-104A-C	REFRIGERANT COMPRESSOR LUBE OIL FILTERS
F-107	REFRIGERANT COMPRESSOR LUBE OIL FILTER
K-101	REFRIGERANT COMPRESSOR
KD-101	REFRIGERANT COMPRESSOR MOTOR
P-106	REFRIGERANT COMPRESSOR LUBE OIL PUMP
P-107	REFRIG. COMPRESSOR LUBE OIL MAKEUP PUMP
P-109A/B	LIQUID REFRIG. LUBE OIL COOLING PUMPS
T-105	REFRIG. COMPRESSOR LUBE OIL TANK
V-105	REFRIGERANT INTERSTAGE ECONOMIZER
V-107	REFRIG. COMPRESSOR SUCTION SCRUBBER
V-108	REFRIG. COMPRESSOR DISCHARGE L.O. SEPARATOR
V-113	TSOC AUXILIARY RECEIVER
BU-102	INSTRUMENT AIR COMPRESSOR BUILDING
F-105	INSTRUMENT AIR DRYER PREFILTER
F-106	INSTRUMENT AIR DRYER AFTERFILTER
K-103A/B	INSTRUMENT AIR COMPRESSORS
V-111	DRY INSTRUMENT AIR RECEVER
V-114A/B	INSTRUMENT AIR DRYERS
V-115	WET INSTRUMENT AIR RECEVER
BU-103	HEAT MEDIUM HEATER BUILDING
H-101	HEATING MEDIUM HEATER
K-104	HEAT MEDIUM HEATER AIR BLOWER
BU-104	MCC BUILDING
BU-105	ANALYZER BUILDING
BU-106	CONTROL/OFFICE BUILDING
BU-106A	TEMPORARY OFFICE BUILDING
BU-107	WAREHOUSE
BU-108	GENERATOR BUILDING
N-101	EMERGENCY GENERATOR
BU-109	OIL STORAGE BUILDING

YARD EQUIPMENT

AC-101	DEETHANIZER BOTTOMS PRODUCT COOLER
AC-102	REFRIGERANT CONDENSER
C-101	DEMETHANIZER
C-102	DEETHANIZER
E-102	DEMETHANIZER TRIM REBOILER
E-104	DEETHANIZER REBOILER
F-103	HEATING MEDIUM FILTER
H-102	FKOD ELECTRIC IMMERSION HEATER
K-102	FLARE STACK AIR BLOWER
P-101A/B	DEETHANIZER FEED PUMPS
P-102A/B	DEETHANIZER REFLUX PUMPS
P-105A/B	HEATING MEDIUM PUMPS
S-101	FLARE STACK
T-102	N-101 DIESEL STORAGE TANK
T-103	HEAT MEDIUM POP TANK
T-104	SEPTIC TANK
TRF-101	TRANSFORMER 4160V/600V
V-101	INLET SEPARATOR/SLUG CATCHER
V-103	PROPANE PLUS STORAGE BULLET
V-104	REFRIGERANT ACCUMULATOR
V-109	HEATING MEDIUM SURGE TANK
V-110	FLARE KNOCKOUT DRUM

Hearing Protection Sign

Facility Name	Scenario	Location	Measurement Height	Measurement Date	Document ID
Aux Sable Canada Ltd. Shell Offgas Liquids Recovery	**Afternoon, doors open, H2 Compressor not operating**	**NE ¼ 24-055-22 W4M**	**1.5 m**	**2019-05-22**	**5235-NAW-002**

NCIA Northeast Capital Industrial Association	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

Insert your Company Name here: Chemtrade - 2018

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	All equipment that produce noise above 85db are placed in buildings to reduce noise and to provide a safe working area.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	No monitoring was done at the site level
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No changers were implemented

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No major improvements were made or equipment purchased that would have an impact.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	Routine internal audits are carried.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No complaints were received.

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.

October 31, 2019

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

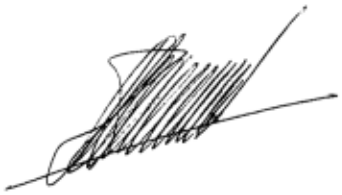
Dear Dr. Danielson,

Subject: 2018 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 - 8325 if you require any further information or clarification.

Yours truly,



Jacint Domenech
Responsible Care Director
Dow Alberta Operations

Copy: Andrew Maile, Responsible Care Leader MEGlobal Canada ULC

Dow Fort Saskatchewan Site
2018 Noise Management Annual Report
Prepared for Northeast Capital Industrial Association (NCIA)

This report provides Dow and MEGlobal's 2018 input to the NCIA Regional Noise Management Plan report to be submitted to the AER. Based on AER licensed assets on the Fort Saskatchewan Site, Dow is required to follow AER Noise Directive 38 and provide input into the NCIA report. The Dow power plant is governed by the Alberta utilities Commission Rule 012: Noise Control. MEGlobal participates in the Noise Management Plan and provides this information on a voluntary basis.

Input Description	Dow and MEGlobal Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference.	A Noise Management Plan was developed by Dow and MEGlobal for submission to NCIA for inclusion in the 2011 NCIA report to the AER. A copy of the most recent version is included with this report. 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.
Attach results of any monitoring (fenceline outward) completed in 2018. *Note, you are not required to conduct any off-site monitoring.*	No noise monitoring (fenceline outward) was completed in 2018. The site noise model was updated in 2014 for all sources (other than on-site transportation) within the Dow Fort Saskatchewan Site, including MEGlobal. Recent updates to the Dow site model have been incorporated into the NCIA regional noise model.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). *Did those changes result in a requirement to update your site noise model?* *If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?*	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. 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.
Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). *Will these changes result in a requirement to update your site noise model?* *If so, when do you anticipate having an updated site model available?*	In 2019, 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-2012 turnaround and will plan for field monitoring only if the intensity of the sound when the vent is operating changes over time.

Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	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 2018 by the site leader. No actions or gaps were identified related to the Noise Management Plan. 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. No additional self assessments were completed in 2018.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	There were no noise complaints in 2018 related to Dow or MEGlobal operations at the site.

Dow Fort Saskatchewan Site Noise Management Plan

Policy

The Dow Chemical Canada ULC Fort Saskatchewan site follows the Operating Discipline Management System (ODMS) of the Dow Chemical Company to manage environmental noise and hearing conservation.

MEGlobal Canada ULC (MEGlobal) Operations on the Dow Fort Saskatchewan Site follows ODMS and is included in this Noise Management Plan.

Scope

This document is created to define how the Dow Chemical Canada ULC Fort Saskatchewan site complies with the ODMS requirements concerning Noise Minimization and Hearing Conservation outlined in:

- Section E (noise minimization to meet community expectations and applicable government requirements) of 06.07 L1 Pollution Prevention
- Section C14 (employee hearing conservation) of 06.05 L1 Employee Health and Safety
- Section A2 (all equipment must be designed to control noise levels) of 06.03 EH&S Engineering Design and Control

Purpose

This document summarizes how the Dow Fort Saskatchewan Site meets the Northeast Capital Industrial Association (NCIA) requirement for a Noise Management Plan including identification, evaluation and control of noise impacts at this site.

This Noise Management Plan meets the requirements of NCIA Standard and Guideline #2010-003, as amended.

Based on AER licensed assets on the Fort Saskatchewan Site, Dow is required to follow AER Noise Directive 38 and provide input into the NCIA report. The Dow power plant is governed by the Alberta Utilities Commission Rule 012: Noise Control.

Goals / Objectives

Dow and MEGlobal, as Responsible Care® Companies will:

- Minimize, to the extent possible, noise levels impacting on the environment including minimizing nighttime and low frequency noise
- Maintain a noise monitoring program to reduce the likelihood of noise impacts on the environment
- Assign employees to manage the site noise monitoring, mitigation and continuous improvement.
- Ensure employees associated with noise sources are aware of the impact on the environment and the processes in place to control
- Design new and modified equipment to minimize noise.

Training Requirements

Workers are educated on noise through:

- All workers receive initial and three year recurring Environmental Training (Instructor led or online), which includes environmental noise.
- Noise exposed workers receive training on hearing conservation.
- Personnel conducting noise monitoring receive training from the Industrial Hygiene specialists.
- Personnel delivering unit industrial hygiene programs receive training on these programs.
- Training is tracked in a corporate web based system.

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 fenceline other than on-site transportation sources. The site noise model is updated if equipment is added or removed from the site that would significantly impact noise levels. The regional noise model is validated periodically by NCIA. If any discrepancies are noted during NCIA field validation related to the Dow site, Dow will work toward resolving the discrepancy and may validate the Dow noise model with field measurements if required. Dow responds to external noise complaints appropriately, including monitoring if necessary. Dispatch Noise Complaint Procedure EH&S On-Call Noise Complaint Logsheet Individual production units do their own noise surveys at least every five years, or when equipment is added, modified or removed. The onsite noise monitoring program is managed as per in ODMS 06.05.C14 Personal noise dosimetry is done periodically on a frequency depending on exposure.
Site Noise Sources	Site noise sources are detailed in the site 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.

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

Revision History

Approval

Approved by Date: January 2012

Carol Moen (Dow Responsible Care Leader)

Pravind Ramdial (MEGlobal Responsible Care Leader)

Review History

The following documents the review history for this file.

Date	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
June 2017	Jacint Domenech	Dow Responsible Care Leader
October 2018	Jacint Domenech	Dow Responsible Care Leader

Revision History

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

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

NCIA Northeast Capital Industrial Association	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

Enbridge Pipeline (Athabasca) 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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Enbridge has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	No offsite monitoring was conducted in 2018
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No improvement/corrective actions were implemented in 2018 that would impact the noise level output.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No improvements/projects were approved for 2019 that would impact the noise level output
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	No audit/self-assessment evaluation was completed in 2018
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No noise complaints were received in 2018

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Confirmed. Relevant Evonik site policy was provided in 2014 and has remained unchanged since then.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	No monitoring or assessment required or carried out in 2018.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	None to disclose at this time.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	None to disclose at this time.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	2016 assessment and evaluation conducted by Evonik ESHQ/OH experts. Suitable report excerpt available upon request.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No complaints.

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 Northeast Capital Industrial Association	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

Keyera Corporation
Keyera Fort Saskatchewan (KFS) Facility
2018

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Keyera has implemented a best management practice to address environmental noise as per standard 2010-003. Keyera has provided an electronic copy of the site plan to NCIA.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	No monitoring was completed outside the fence line in 2018.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	In 2018, Keyera removed a couple of existing air intake silencers. The silencers were proven to be a fire hazard and were thus removed for safety reasons. Keyera expanded the injection facilities and installed an Inlet Quality (IQ) building (IQ building expected to have a negligible noise impact). The above changes have been assessed by Patching Associates Acoustical Engineering Ltd. in June 2018. The results of the assessment indicate that these changes do not result in any perceivable noise increase at the nearby residences. The noise impact assessment report, including an updated noise model, have been provided.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Work began on the replacement of the Hot Oil Heater in Frac 1 in 2019 which will reduce the overall site noise level when the new heater is commissioned in Q2 2020.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	In 2018, Keyera completed a self-assessment with the assistance of Patching Associates Acoustical Engineering Ltd (provided). This assessment included: detailed diagnostic noise measurements and modeling including cumulative impact assessment for the adjacent facilities existing in the Alberta Industrial Heartland, occupational noise mapping within the facility fence line, and a noise exposure assessment using noise dosimeters. The assessment documentation has been produced with the participation and review of the senior staff.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	There were no noise complaints received for 2018 for this site.

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.

Noise Impact Assessment
Keyera Corporation
Keyera Fort Saskatchewan (KFS) Facility
2-14-55-22 W4M

Revision 1

Prepared for:
Surbhi Bhargava, M.Sc, P. Chem
Keyera Corporation

Prepared by:
Patching Associates Acoustical Engineering Ltd.
Consultants in Acoustics, Noise Control and Vibration

2018-07-27
Document ID: 5092-NIA-001

Notice

This report has been prepared by Patching Associates Acoustical Engineering Ltd (PAAE) in response to a specific request for service from, and for the exclusive use of, the Client to whom it is addressed. The findings contained in this report are based, in part, upon information provided by others. The information contained in this study is not intended for the use of, nor is it intended to be relied upon, by any person, firm, or corporation other than the Client to whom it is addressed, with the exception of the applicable regulating authority to whom this document may be submitted. PAAE accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

Professional Authentication

Project Role: Engineer of Record
Date: 2018-07-27
Patching Associates Acoustical Engineering Ltd. Permit to Practice: P05273
Title: Project Engineer
Name: Samuel Lacrampe, P.Eng.

Prepared by:

Analyst and Report Author: Sheying Sun, PhD.
Principal In Charge: Justin Caskey, P.Eng.
Project Manager: Samuel Lacrampe, P.Eng.

Executive Summary

Keyera Corporation (Keyera, the client) retained Patching Associates Acoustical Engineering Ltd. (PAAE) to conduct a Noise Impact Assessment (NIA) for the Keyera Fort Saskatchewan (KFS) Facility located at 2-14-55-22 W4M (the subject facility). This is an existing facility. Keyera has recently removed some existing silencers on the HR-1502 Hot Oil Furnace Inlet Area, and this is expected to have an impact on the facility noise emissions.

This NIA was conducted in accordance with the requirements of the Alberta Energy Regulator (AER) Directive 038: Noise Control (the Directive), in the context of noise criteria established for Alberta's Industrial Heartland (AIH) through the Regional Noise Management Plan project coordinated through the Northeast Capital Industrial Association (NCIA). The noise contribution from the updated KFS facility including all existing equipment without Silencers on HR-1502 was assessed with the adjacent facilities existing in the NCIA area.

There are several adjacent facilities in the Industrial Heartland, adjacent to the subject facility, that are operational. These facilities have been included in the NIA model in order to assess the cumulative impacts from the combined operations of the energy facilities as required in Directive 038. The adjacent facility noise emissions were assessed from the NCIA Regional Noise Model, as an overall level from all the existing facility noise sources in the model. There are a number of residences within 1500 m of the subject facility fence line, labeled as receivers R1 to R5 in the NIA to represent the residential area.

The table below summarizes the overall Sound Pressure Levels (SPL) predictions from the model for each receiver in the study area. The Facility SPL is the overall SPL from all the facilities in the study area. The Cumulative SPL includes the contribution of the Facility SPL and the Ambient Sound Levels (ASL).

Overall Sound Pressure Levels

Receiver	NCIA PSL (dBA)	ASL (dBA)	Facility SPL (dBA)		Cumulative SPL (dBA)	Meet the NCIA PSL	dBC-dBA
			KFS	Adjacent Facilities*			
R1	**49.9**	38.0	38.2	49.3	**49.9**	Yes	18.1
R2	**48.6**	38.0	38.3	47.7	**48.6**	Yes	17.7
R3	**48.5**	38.0	39.4	47.5	**48.5**	Yes	17.5
R4	**50.4**	35.0	42.3	49.3	**50.2**	Yes	16.1
R5	**49.9**	35.0	41.4	48.9	**49.8**	Yes	16.2

The results of this assessment indicate that the KFS facility with the removal of the silencers on the HR-1502 Hot Oil Furnace Inlet Area is expected to meet the NCIA PSL, resulting in no-net increase for all the receivers in the study area. The most impacted receiver is R4, located approximately 680 m NW from the subject facility, with a Cumulative SPL of 50.2 dBA, and a NCIA PSL of 50.4 dBA.

Additional noise control is not required for the subject facility to comply with the AER Directive 038: Noise Control.

Table of Contents

Acronyms

Acronym	Description
AADT	Average Annual Daily Traffic
AB	Alberta
AER	Alberta Energy Regulator
ASL	Ambient Sound Level
BC	British Columbia
BSL	Basic Sound Level
dB	Decibel
dBA	A-Weighted Decibel
dBC	C-Weighted Decibel
dBZ	Z-Weighted Decibel or Linear Decibel
CSL	Comprehensive Sound Level
DIL	Dynamic Insertion Loss
ISO	International Organization for Standardization
L_{eq}	Energy Equivalent Sound Level
LFN	Low Frequency Noise
LSD	Legal Subdivision
NIA	Noise Impact Assessment
NC	Noise Control
NR	Noise Reduction
OGC	Oil & Gas Commission
PSL	Permissible Sound Level
PWL	Sound Power Level
SPL	Sound Pressure Level
TL	Transmission Loss
UTM	Universal Transverse Mercator

Introduction

Keyera Corporation (Keyera, the client) retained Patching Associates Acoustical Engineering Ltd. (PAAE) to conduct a Noise Impact Assessment (NIA) for the Keyera Fort Saskatchewan (KFS) Facility located at 2-14-55-22 W4M (the subject facility). This is an existing facility. Keyera has recently removed some existing silencers on the HR-1502 Hot Oil Furnace Inlet Area, and this is expected to have an impact on the facility noise emissions.

This NIA was conducted in accordance with the requirements of the Alberta Energy Regulator (AER) Directive 038: Noise Control (the Directive), in the context of noise criteria established for Alberta's Industrial Heartland (AIH) through the Regional Noise Management Plan project coordinated through the Northeast Capital Industrial Association (NCIA). The noise contribution from the updated KFS facility including all existing equipment without Silencers on HR-1502 was assessed with the adjacent facilities existing in the NCIA area.

See Appendix A for a glossary of terms used in the report.

Study Area

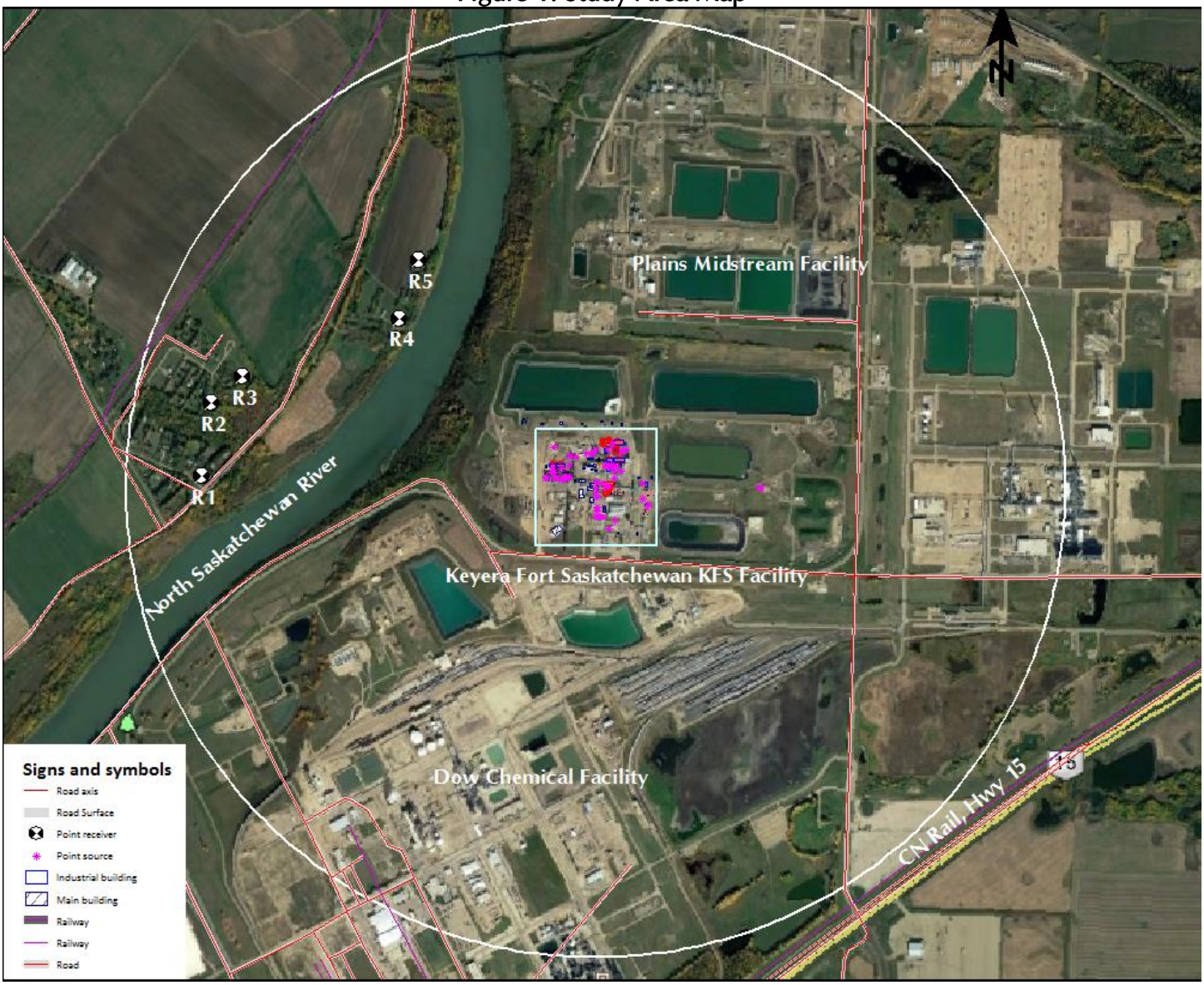
The subject facility is located at 2-14-55-22 W4M, approximately 5 km NE of Fort Saskatchewan, Alberta, in the Industrial Heartland. The terrain cover in the study area is mainly flat with farmland and patches of trees. The North Saskatchewan River runs through the study area to the west of the subject facility.

There are several adjacent facilities in the Industrial Heartland, adjacent to the subject facility, that are operational. These facilities have been included in the NIA model in order to assess the cumulative impacts from the combined operations of the energy facilities as required in Directive 038. The adjacent facility noise emissions were assessed from the NCIA Regional Noise Model, as an overall level from all the existing facility noise sources in the model.

There are a number of residences within 1500 m of the subject facility fence line, labeled as receivers R1 to R5 in the NIA to represent the residential area.

Figure 1 shows a map of the study area. The 1500 m boundary from the subject facility fence line is shown in solid white line in Figure 1.

Figure 1: Study Area Map



Noise Criteria

Primary Overall dBA Analysis

Noise for energy related facilities is regulated through the AER Directive 038: Noise Control (the Directive). The Directive sets the Permissible Sound Level (PSL), which is the limit that the Sound Pressure Level (SPL) emanating from the facilities in the study area plus the Ambient Sound Level (ASL) may not exceed over a specified period, as measured at specific locations of interest (the receivers). These allowable limits are dependent on the population density, proximity to heavily traveled transportation routes (motor vehicles, rail and aircraft) and other specified adjustments. The SPL is the sound level received at a specific location. The ASL is the average background sound level not attributable to energy industry facilities. The ASL is assumed to be 5 dBA below the PSL, as prescribed by the Directive. The receivers are located at the residences existing within 1500 m of the subject facility, or else at the study area boundary.

In this NIA, there are a number of residences within 1500 m of the subject facility, labeled as receivers R1 to R5 in the NIA to represent the residential area. The dwelling density per quarter section of land is between 9 to 160 dwellings for Receivers R1 to R3, and below 9 dwellings for Receivers R4 and R5.

The PSL is 43 dBA L_{eq} (nighttime) and 53 dBA L_{eq} (daytime), and the ASL is 38 dBA L_{eq} (nighttime) and 48 dBA L_{eq} (daytime) for the receivers R1 to R3 in the study area. The PSL is 40 dBA L_{eq} (nighttime) and 50 dBA L_{eq} (daytime), and the ASL is 35 dBA L_{eq} (nighttime) and 45 dBA L_{eq} (daytime) for the receivers R4 and R5 in the study area. See Appendix B for the PSL calculations based on Section 2.1 of the Directive.

Even though the existing KFS facility can be taken as Pre-1988 deferred facility status, this relaxed criterion will not be considered because the AER intends to eliminate deferred status for pre-1988 facilities as of October 17, 2018. Table 1 shows the values for the Pre-1988 Cumulative SPL, and these are shown for information purposes only.

In this instance the Keyera KFS Facility operations are located within the area designated as the AIH, which is a major concentration of industrial facilities located northeast of the city of Fort Saskatchewan, Alberta. The AER considers the AIH area a special case. In this area, a regional Noise Management Plan (NMP) is underway by the NCIA as per section 5.1 of the Directive. Under the NMP, specific Permissible Sound Levels (PSL) are revised periodically and compliance is confirmed through the NMP. In this area, the PSL for the residences are based on ambient sound level, existing KFS facility sound level and adjacent facilities based on the NCIA Regional Noise Model. Table 1 shows both criteria, but the NCIA Cumulative SPL will be used in this noise study.

Table 1: Sound Pressure Levels – for Setup of PSL

Receiver	Approximate Distance & Direction from the Fence line of the Subject Facility	ASL (dBA)	KFS SPL (NCIA Regional Noise Model)* (dBA)	KFS SPL (Pre-1988 Noise Model)* (dBA)	Adjacent Facilities SPL* (dBA)	Cumulative SPL (NCIA Regional Noise Model) (dBA)	Cumulative SPL (Pre-1988 Noise Model) (dBA)
R1	1220 m W	38.0	38.4	41.7	49.3	**49.9**	**50.3**
R2	1200 m WNW	38.0	38.4	42.5	47.7	**48.6**	**49.2**
R3	1110 m WNW	38.0	39.1	43.3	47.5	**48.5**	**49.2**
R4	680 m NW	35.0	43.1	46.5	49.3	**50.4**	**51.2**
R5	810 m NW	35.0	42.4	45.7	48.9	**49.9**	**50.7**

*Note: values were taken from previous SLR Noise Impact Assessment Report in 2014 (SLR Project No.: 203.50009.00000).

The Cumulative SPL based on the NCIA Regional Noise Model becomes the NCIA PSL for this assessment.

Secondary Low Frequency Noise Analysis

The Directive outlines criteria for Low Frequency Noise (LFN) consideration. LFN considers noise that may be satisfactory on a dBA basis but contains a dominant low frequency that may increase annoyance at nearby residences. LFN analysis is considered a "second-stage" investigation by the Directive and is only to be conducted as a specific response to a LFN complaint. According to the Directive, a LFN component exists when:

- the dBC minus dBA sound level is equal to or greater than 20 dB, and
- there is a clear tonal component at a $^1/_3$ octave frequency of 250 Hz or below.

If a LFN component is identified as per the Directive, then a 5 dBA penalty is added to the measured or predicted SPL.

In this analysis, there is no specific LFN complaint from any residence in the area. Moreover, there is insufficient spectral data available to predict the existence of a tonal component at any of the receiver location. As such, this study evaluates potential LFN for information purposes only, by investigating the predicted dBC-dBA levels at all the receivers.

Major Equipment

Table 2 gives details of the major equipment found at the subject facility. The details were obtained from the client and field visit by PAAE staff. All the equipment is existing. See Appendix C for a plot plan showing the subject facility equipment layout.

Table 2: Subject Facility Equipment Details

Equipment Name	Equipment Details
BU-1117 Wash Pump Bldg	• Two 25 hp centrifugal pumps, one run, one standby • Two 500 hp multi-stage centrifugal pumps, one run, one standby • Enclosure: Insulated metal building, doors open year-round
Bu-1890 Cochin Pump Bldg	• Two 1200 hp centrifugal pumps, both run as needed • VFD on each pump motor, both pumps measured running at 41 Hz (68%) • Enclosure: Insulated metal building, doors closed year-round
BU-3131 Refrigeration Compressor Bldg	• Generator: unknown make and model • Engine: Caterpillar 3306, 220 hp, 1650 RPM • South Hampton Industrial Model CVU-24 Air Handling Unit x 2 • Enclosure: insulated metal building, doors open year-round
Outdoor Pumps	• PM-3152 and 3153 – 250 hp centrifugal (one run, one standby) • PM-3142 and 3143 – 25 hp centrifugal (one run, one standby) • PM-3015 and 3016 – 100 hp centrifugal (one run, one standby) • PM-1812 and 1813 – 30 hp centrifugal (one run, one standby) • PM-1815 and 1816 – 15 hp centrifugal (one run, one standby) • PM-1832 – 50 hp centrifugal • PM-4156, 4157 and 4158 – 200 hp centrifugal (PM-4156 and 4157 running, 4158 standby) • PM-4023 and 4024 – 250 hp centrifugal (one run, one standby) • PM-4043 and 4044 – 60 hp centrifugal (one run, one standby) • PM-4137 and 4138 – 60 hp centrifugal (one run, one standby) • PM-4144 and 4145 – 100 hp centrifugal (one run, one standby) • PM-4141 and 4142 – 50 hp centrifugal (one run, one standby) • PM-1861 – 40 hp centrifugal
BU-3136 Regen Bldg	• Lube Oil Pump and Chillers for each pump (two run, two standby) • P-3040 and 3060 – 100 hp centrifugal (one run, one standby) • P-3034 and 3035 – 60 hp centrifugal (one run, one standby) • Enclosure: Insulated metal building, doors closed year-round.
BU-3137 Sales Bldg	• PM-3013 and 3014 – 600 hp REDA pumps (one run, one standby) • Enclosure: Insulated metal building, doors closed year-round.
BU-1107 Pump Bldg	• PM-1820, 1821, and 1822 – 100 hp centrifugal pumps (two run, one standby) • Enclosure: Insulated metal building, doors open year-round
BU-3132 Hot Oil Bldg	• PM-3116 and 3117 – 300 hp centrifugal pumps (one run, one standby) • Lube Oil Pumps • Enclosure: Insulated metal building, doors closed year-round
Bu-1106 Pump Bldg	• PM-1808 and 1809 – 40 hp centrifugal (one run, one standby) • PM-1810 and 1811 – 15 hp centrifugal (one run, one standby) • Enclosure: Insulated metal building, doors open year-round

Table 2: Subject Facility Equipment Details

Equipment Name	Equipment Details
BU-1103 Treater Bldg	• PV-1716 Propane/Amine Mixer Tank • PV-1717 Amine Settler Tank • PV-1710 Fuel Gas Scrubber • PV-1711 Regen Gas Scrubber • PV-1733 Water Drain Tank • PM-1830 and 1831 – 20 hp centrifugal pumps (one run, one standby) • Enclosure: Insulated metal building, doors open year-round
BU-1102 Injection Pump Bldg	• Turbine Pumps PM-1803, 1804, 1805 and 1814 (PM-1814 running at time of assessment). Pumps run as needed and start automatically • Electric Pumps PM-1817, 1818 and 1819 – 1250 hp Induction Motors (PM-1818 running at time of assessment) • Enclosure: Insulated metal building, doors open year-round
BU-1128 Injection Pump Bldg	• PM-1851, 1852, 1853 and 1854 Injection Pumps (PM -1853 and 1854 running at time of assessment) • Enclosure: Insulated metal building, doors half open, half closed
BU-4258 Injection Pump Bldg.	• PM-4132, 4133, 4134 and 4135 1750 hp Electric Driven Injection Pumps (PM-4132 and PM-4134 running at time of assessment) • PM-4008 and 4009 raw feed booster pumps – 200 hp centrifugal (one run, one standby) • Enclosure: Insulated metal building, doors half open, half closed
BU-1111 Pentane Pump Bldg	• PM-1835 and 1836 – 250 hp centrifugal (one run, one standby) • Enclosure: Insulated metal building, doors half open, half closed
BU-4250 Amine Bldg	• PM-4069 and 4070 – 50 hp centrifugal (one run, one standby) • PM-4074 and 4075 – 0.5 hp centrifugal (one run, one standby) • Enclosure: Insulated metal building, doors half open, half closed
BU-4252 Instrument Air Bldg	• C-4200 and 4201 Sullair 7509 Air Compressors (one run, one standby) • Enclosure: Insulated metal building, doors closed year-round.
M-3147 Cryo Flare Blower	• 60 hp electric motor • Measured at 20 Hz
BU-1105 Utility Bldg	• BU-1001 3.75 MMBTU/hr Boiler • PM-1828 and 1829 – 15 hp centrifugal (one run, one standby) • PM-1825 – 15 hp centrifugal • CM-12.02 and12.03 Instrument Air Compressors • Enclosure: Insulated metal building, doors half open, half closed
BU-1129 Injection Pump MCC Building	• Injection Pump VFD Units with Powered Ventilation • Enclosure: Insulated metal building, doors closed year-round
BU-4257 Raw Feed Pump Building	• PM-4005 and 4006, 300 hp centrifugal pumps (both run) • Enclosure: Insulated metal building, doors part way open year-round.
Vapour Compressor Skid	• Two electric drive vapour compressors • Enclosure: Insulated metal building with one open side
Fired Heaters	• HR-1501 Regen Gas Heater and Salt Bath Heater • HR-1502 Hot Oil Furnace o The inlet silencers were removed for safety reasons • H-3044 Regen Gas Heater • H-3150 Hot Oil Heater • HR-4111 Regeneration Gas Heater • HR-4155 Hot Oil Heat Medium Heater

Table 2: Subject Facility Equipment Details

Equipment Name	Equipment Details
Coolers	• HT-3037 Regen Gas/Gas Exchanger – Measured at 60 Hz (100%) • HT-1604 A to L Depropanizer O.H. Condenser – 60 Hz • HT-1606 A to F Debutanizer O.H. Condenser – 60 Hz • HT-1607 Propane Cooler – 60 Hz • HT-1608 Butane Cooler – 60 Hz • HT-1609 Regeneration Gas Cooler – 19 Hz • HT-1610 Coolant Condenser • HT-1618 ADIP Cooler – 60 Hz • HT-1619 Refrigerant Condenser Fan – 60 Hz • HT-4021 Depropanizer O.H. Condenser – CHART 6-HF144-2-36 Coolers x 6, run at 60 Hz • HT-4041 Debutanizer O.H. Condenser – CHART 6-HF132-2-30 Coolers x 6, run at 60 Hz • HT-4130 Condensate Rundown Cooler – 48 Hz • HT-4112 Regen Gas Cooler – CHART 1-HF60-2-12 Cooler, run at 60 Hz • HT-4089/4090 Propane/Butane Coolant Condenser – CHART 1-HF108-2-28 Cooler, run at 50 Hz • HT-4060 Butane Cooler – CHART 1-HF96-2-22 Cooler, run at 60 Hz • HT-4061 Propane Cooler – CHART 1-HF120-2-28 Cooler, run at 60 Hz • HT-4063 Amine Regeneration O.H Condenser – 54 Hz • HT-4071 Amine Cooler • HT- 3080 to 3087 Refrigerant Condensers – AXH-156-2ZF Cooler x 8 – run at 60 Hz
Future Injection Pump Building and MCC Building	• Existing on site but not yet commissioned. • Assumed same noise emission as BU-4258 Injection Pump Bldg.
Future MCC Building	• Existing on site but not yet commissioned. • Assumed same noise emission as BU-700 MCC Bldg
Excluded	• BU-3133 Instrument Air Bldg. – Not running at time of assessment • PM-1827 hydrocarbon recovery pump (does not run) • PM-3141 – 150 hp centrifugal pump (does not run) • PM-18.40 – closed in and blinded • BU-1113 Refrig Compressor Bldg – Compressor disconnected • PM–4196 and 4197 (does not run) • PM- 4191 (does not run) • BU-1101 Raw feed booster pump building (does not run) • BU-4254 Firewater pump building, emergency only

Method

The method used in the NIA follows the requirements set forth in the Directive.

- The study area and facility physical layouts were determined from drawings obtained by the client, satellite images, and a field visit by PAAE staff in June 2018.

- The Sound Power Levels (PWL) were determined for the major facility noise sources through field diagnostic, field reconnaissance and previous study on similar units. See Appendix D for a list of all the calculated PWL.

- Field diagnostic was performed with a Sound Intensity Level meter to quantify the subject facility PWL in details. The noise model used for this study was calibrated using reference SPL measurements conducted at several locations within the existing facility fence line during the field diagnostic measurements.

- It is assumed that the facility operating conditions do not change significantly between the daytime and the nighttime period. As such, the NIA analysis focuses solely on the nighttime period, as the Directive PSL is more stringent during the nighttime than during the daytime.

- Sound propagation calculations were undertaken using the noise modeling software package SoundPLAN to determine the facility SPL at the receivers. All calculations were undertaken in linear octave bands.

- The resulting Cumulative SPL were compared to the NCIA PSL to determine if the subject facility will result in noticeable noise level increase. If the Facility SPL exceed the current sound pressure level, then noise control recommendations are designed to bring the facility SPL down to reduce the impact to an amount that is reasonable, for all the receivers in the study area.

Modeling Parameters

Table 3 lists the major parameters used in the noise model. These parameters meet the guideline set forth in the Directive. The modeled conditions produce results representative of meteorological conditions favouring sound propagation (e.g., downwind or mild temperature inversion conditions) during the summer nighttime, as prescribed by the Directive. These conditions do not occur all the time at the receiver and the resulting SPL are expected to be lower than those predicted for most of the time. Therefore, the environmental conditions modeled represent "close-to-worst-case" sound propagation conditions.

Table 3: Modeling Parameters

Parameter	Value	Description
Modeling software	SoundPLAN Version 8.0	An advanced noise propagation model that considers geometric spreading, atmospheric sound absorption, ground impedance effects, site topography and geometry, vegetation and environmental conditions. The SoundPLAN model calculates the contribution level of each noise source at the receiver location in octave bands as well as calculating the overall facility sound level.
Standard followed	ISO 9613	As recommended in the Directive guidelines. Specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The published accuracy for this standard is ± 3 dBA between 100 m to 1000 m. Accuracy levels beyond 1000 m are not published.
Wind Condition	1 – 5 m/s Downwind	ISO 9613 uses a slight downwind condition from each noise source to each receiver. Wind speed is measured at a height of 3 m to 11 m above ground and covers the acceptable range specified in the AER Directive 038.
Ground Factor	0.0 for water bodies and roads 0.3 within all facility limits 0.8 for residential properties 0.8 everywhere else	The ground factor G is a property of the ground material, with value ranging from 0 to 1. The typical values below were determined from several standards and guidelines, including ISO 9613, Commission Directive EU 2015/996, and Nord 2000. G = 0.0 is suitable for asphalt, concrete, pavement, water G = 0.3 is suitable for compacted dense ground, gravel road, hard soil G = 0.6 is suitable for sand, compacted field and gravel, roadside dirt G = 0.8 is suitable for cultivated land, such as farm land G = 1.0 is suitable for uncultivated land, such as forest floor and loose ground For residential properties, the ground factor was determined from the proportion of the above typical values, based on satellite images.
Order of Reflection	3	The model calculates reflection effects from the reflective surfaces included in the model.
Foliage	Excluded	Not included based on conservative considerations due to the presence of human dwelling residences in the study area.
Temperature	10ºC	Represents typical summer nighttime temperature.
Relative Humidity	80%	Represents typical summer nighttime relative humidity.
Topography	1 m Resolution	Topographical data obtained from Natural Resources Canada.

Results

Overall Sound Pressure Levels

Table 4 summarizes the overall Sound Pressure Levels (SPL) predictions from the model for each receiver in the study area. The Facility SPL is the overall SPL from all the facilities in the study area. The Cumulative SPL includes the contribution of the Facility SPL and the Ambient Sound Levels (ASL).

Table 4: Overall Sound Pressure Levels

Receiver	NCIA PSL (dBA)	ASL (dBA)	Facility SPL (dBA)		Cumulative SPL (dBA)	Meet the NCIA PSL	dBC-dBA
			KFS	Adjacent Facilities*			
R1	**49.9**	38.0	38.2	49.3	**49.9**	Yes	18.1
R2	**48.6**	38.0	38.3	47.7	**48.6**	Yes	17.7
R3	**48.5**	38.0	39.4	47.5	**48.5**	Yes	17.5
R4	**50.4**	35.0	42.3	49.3	**50.2**	Yes	16.1
R5	**49.9**	35.0	41.4	48.9	**49.8**	Yes	16.2

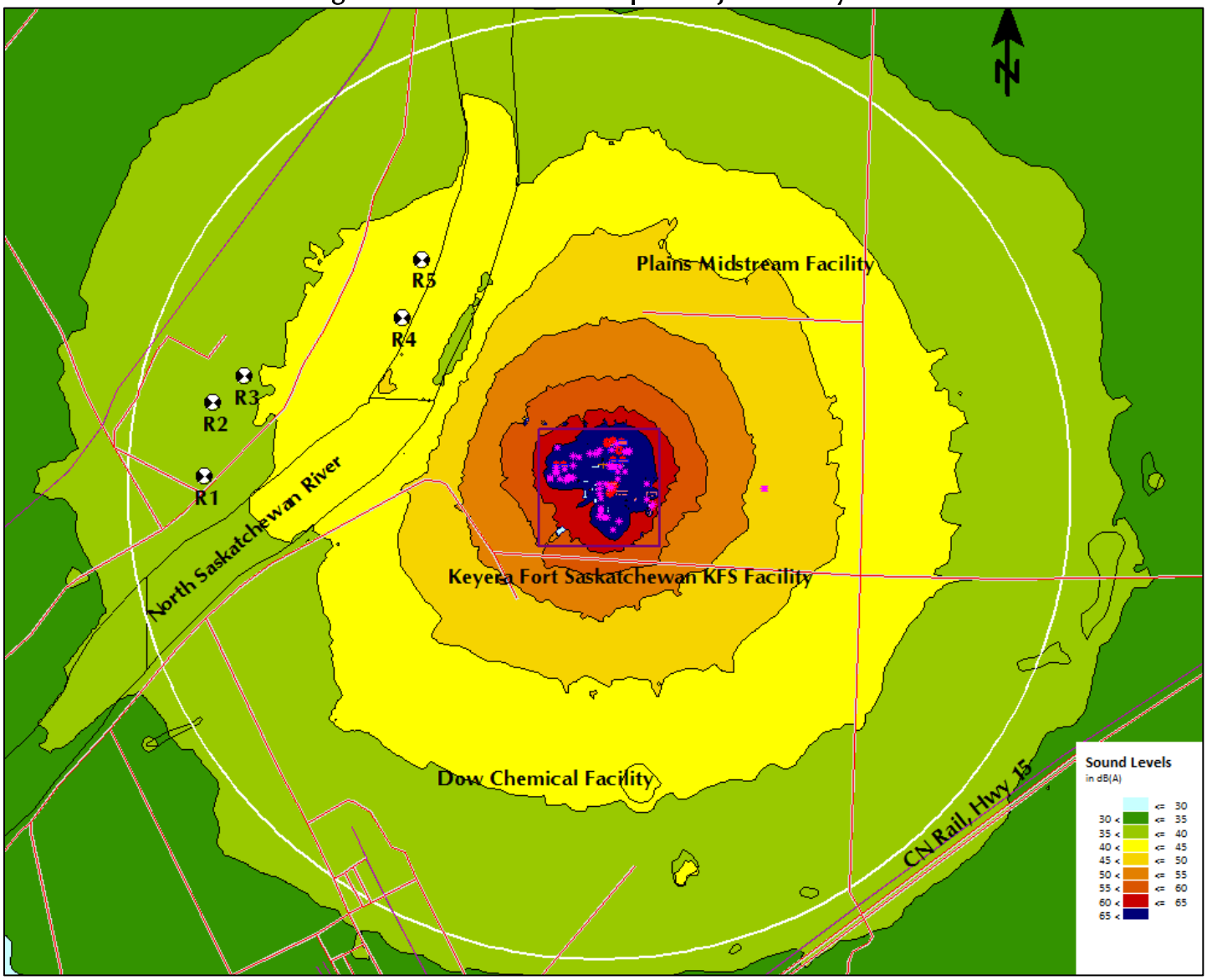
*Note: values were taken from previous SLR Noise Impact Assessment Report in 2014 (SLR Project No.: 203.50009.00000).

The above results indicate that the KFS facility with the removal of the silencers on the HR-1502 Hot Oil Furnace Inlet Area is expected to meet the NCIA PSL, resulting in no-net increase for all the receivers in the study area. The most impacted receiver is R4, located approximately 680 m NW from the subject facility. Additional noise control is not required for the subject facility to comply with the Directive.

The above results also indicate that the dBC-dBA values are expected to meet the 20 dB limit at all of the receivers in the study area. However, the secondary assessment of LFN is inconclusive at this stage because there are insufficient 1/3 octave band data at the receivers to determine tonality. As such, the predicted dBC-dBA values in the above table are provided for information purposes only.

Figure 2 shows the noise map of the area with Fort Saskatchewan KFS Facility SPL contours.

Figure 2: Noise Contour Map – Subject Facility SPL



Source Order Ranking

Table 5 lists the top ten dominant noise sources received at the most impacted receiver R4, located approximately 680 m NW from the subject facility. See Appendix E for the complete source order ranking table.

Table 5: Source Order Ranking - Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
001	BU-1102 Bldg Exhaust Tip	34.4	11.2
002	HT-3080-87 Refrig Condensers Inlet	32.5	15.1
003	HR-1502 Hot Oil Furnace Inlet Area	31.7	2.9
004	BU-1102 Bldg PM-1803 Engine Exhaust	31.7	12.3
005	BU-3131 Refrig Bldg Open Louver SW	28.2	1.9
006	BU-3131 Refrig Bldg Open Louver NW	28.1	2.1
007	HT-1606 OH Condenser Inlet	27.2	15.6
008	HT-1610 Coolant Condenser Inlet	27.2	11.0
009	HT-4041 Debut OH Condenser Inlet	27.2	13.4
010	HR-4155 Hot Oil HM Heater Inlet Area	27.0	13.5
011+	Cumulative Remaining 302 Noise Sources	37.7	16.2
	Facility SPL	42.3	14.0
	Adjacent Facility	49.3	
	ASL	35.0	-
	Cumulative SPL	50.2	-
	NCIA PSL	50.4	-

The above results indicate that the dominant noise of the subject facility comes from the BU-1102 Bldg Exhaust Tip, HT-3080-87 Refrig Condensers Inlet, with the HR-1502 Hot Oil Furnace Inlet Area (unsilenced) ranking third. If any noise control is desired for the subject facility, it should aim at attenuating the dominant noise sources.

For general technical details on sound levels and analysis, as well as for a best practices approach as recommended by the Directive, see Appendix F.

Conclusion

Keyera Corporation retained Patching Associates Acoustical Engineering Ltd. to conduct a Noise Impact Assessment for the Fort Saskatchewan KFS Facility located at 2-14-55-22 W4M. This is an existing facility. Keyera has recently removed some existing silencers on the HR-1502 Hot Oil Furnace Inlet Area, and this is expected to have an impact on the facility noise emissions.

This NIA was conducted in accordance with the requirements of the Alberta Energy Regulator (AER) Directive 038: Noise Control (the Directive), in the context of noise criteria established for Alberta's Industrial Heartland (AIH) through the Regional Noise Management Plan project coordinated through the Northeast Capital Industrial Association (NCIA). The noise contribution from the updated KFS facility including all existing equipment without Silencers on HR-1502 was assessed with the adjacent facilities existing in the NCIA area.

The results of this assessment indicate that the KFS facility with the removal of the silencers on the HR-1502 Hot Oil Furnace Inlet Area is expected to meet the NCIA PSL, resulting in no-net increase for all the receivers in the study area.

The most impacted receiver is R4, located approximately 680 m NW from the subject facility, with a Cumulative SPL of 50.2 dBA, and a NCIA PSL of 50.4 dBA.

Additional noise control is not required for the subject facility to comply with the AER Directive 038: Noise Control.

References

Alberta Energy Regulator (AER). 2007. *Directive 038: Noise Control*. Revised Edition, February 2007. Calgary, Alberta.

SoundPLAN GmbH . Version 8.0, 2018., Backnang, Germany.

International Organization for Standardization (ISO). 1993. *Standard 9613-1, Acoustics – Attenuation of Sound during Propagation Outdoors – Part 1: Calculation of Absorption of Sound by the Atmosphere*, Geneva Switzerland.

International Organization for Standardization (ISO) 1996. *Standard 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation*, Geneva Switzerland.

Natural Resources Canada: www.nrcan.gc.ca

Google Earth Pro, licensed to Patching Associates Acoustical Engineering Ltd.

AbaData 2.0, licensed to Patching Associates Acoustical Engineering Ltd.

Alberta Transportation: www.transportation.alberta.ca/mapping

Appendix A: Glossary

Table A: Glossary

Term	Description
Average Annual Daily Traffic (AADT)	The total volume of vehicle traffic of a highway or road for a year divided by 365 days.
Alberta Energy Regulator (AER)	The Alberta Energy Regulator ensures the safe, efficient, orderly, and environmentally responsible development of hydrocarbon resources over their entire life cycle. This includes allocating and conserving water resources, managing public lands, and protecting the environment while providing economic benefits for all Albertans.
Ambient sound level (ASL)	The sound pressure level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The ASL does not include any energy-related industrial component and must be measured without it. The ASL is assumed to be 5 dBA below the determined PSL as per section 2.1 of the Directive.
A-weighted sound level (dBA)	The sound level as measured on a sound level meter using a setting that emphasizes the middle frequency components similar to the frequency response of the human ear at levels typical of rural backgrounds in mid frequencies.
Bands (full octave or 1/3 octave)	A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. Each octave band has a centre frequency that is double the centre frequency of the octave band preceding it. The 1/3 octave band analysis provides a finer breakdown of sound distribution as a function of frequency.
Cumulative SPL	The cumulative sound pressure level from the facilities and the ambient sound level.
Comprehensive Sound Level (CSL)	The sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The CSL does include industrial components and must be measured with them, but it should exclude abnormal noise events. The CSL is used to determine whether a facility is in compliance with the Directive.
Cumulative noise level	The sound level that is the total contribution of all industrial noise sources (existing and proposed) from EUB-regulated facilities at the receptor.
C-weighted sound level (dBC)	The C-weighting approximates the sensitivity of human hearing at industrial noise levels (above about 85 dBA). The C-weighted sound level (i.e., measured with the C-weighting) is more sensitive to sounds at low frequencies than the A-weighted sound level and is sometimes used to assess the low-frequency content of complex sound environments.
Daytime	Defined as the hours from 07:00 to 22:00.
Deferred facility	Facilities constructed and in operation prior to October 1988. These facilities do not have to demonstrate compliance in the absence of a complaint. This does not exempt them from the requirements but does recognize that they were potentially designed without the same considerations for noise as facilities approved after the date when the first comprehensive noise control directive (ID 88-1) was published and put into effect.
Directive 038: Noise Control	Directive 038: Noise Control states the requirements for noise control as they apply to all operations and facilities under the jurisdiction of the Alberta Energy and Utilities Board (EUB). The directive also provides background information and describes an approach to deal with noise problems. This directive is the fifth edition, superseding Interim Directive (ID) 99-8.
Energy equivalent sound level (Leq)	The average weighted sound level over a specified period of time. It is a single-number representation of the cumulative acoustical energy measured over a time interval. The time interval used should be specified in brackets following the Leq—e.g., Leq (9) is a 9-hour Leq. If a sound level is constant over the measurement period, the Leq will equal the constant sound level.
Emergency	An unplanned event requiring immediate action to prevent loss of life or property. Events occurring more than four times a year are not considered unplanned.
Facility SPL	The overall sound pressure level from all the facilities in the study area
Heavily Travelled Road	Generally includes highways and any other road where the average traffic count is at least 10 vehicles/hour over the nighttime period. It is acknowledged that highways are sometimes lightly travelled during the nighttime period, which is usually the period of greatest concern. The AER will use the 10 vehicles/hour criterion to determine whether highways qualify as heavily travelled during the nighttime period.

Table A: Glossary

Term	Description
Low Frequency Noise (LFN)	Where a clear tone is present below and including 250Hz and the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB.
Nighttime	Defined as the hours from 22:00 to 07:00.
Noise	Generally associated with the unwanted portion of sound.
Noise Impact Assessment (NIA)	An NIA identifies the expected sound level emanating from a facility as measured 15 m from the nearest or most impacted permanently or seasonally occupied dwelling. It also identifies what the permissible sound level is and how it was calculated.
Permanent facility	A facility that is in operation for more than two months.
Permissible Sound Level (SPL)	The maximum SPL that a facility must not exceed at receivers located within 1500 m from the subject facility fence line. The PSL for each receiver is determined as per section 2.1 of the Directive.
Receiver	The location of the residences existing in the NIA study area for which the SPL is determined. In the event that there are no residences existing in the study area, then hypothetical receivers are included at 1500 m from the subject facility fence line.
Representative conditions	Those conditions typical for an area and/or the nature of a complaint. For ASLs, these are conditions that portray the typical activities for the area, not the quietest time. For CSLs, these do not constitute absolute worst-case conditions or the exact conditions the complainant has highlighted if those conditions are not easily duplicated. Sound levels must be taken only when representative conditions exist; this may necessitate a survey of extensive duration (two or more consecutive nights).
Sound Power Level (PWL)	The sound level emitted. The decibel equivalent of the rate of energy (or power) emitted in the form of noise. The sound power level is given by: $PWL = 10 \times LOG_{10}\left(\frac{Sound\ as\ Power}{W_0}\right)$ Where $W_0 = 10^{-12}$ watts (or 1 pW)
Sound Pressure Level (SPL)	The sound level received. The decibel equivalent of the pressure of sound waves at a specific location, which is measured with a microphone. The sound pressure level is given by: $SPL = 20 \times LOG_{10}\left(\frac{Sound\ as\ Pressure}{P_0}\right)$ Where $P_0 = 2 \times 10^{-5}$ Pa (or 20 μPa)
Subject facility	The energy industry facility which is the object of the NIA.
Temporary facility	Any facility that will be in operation less than 60 days.
Tonal component	A pronounced peak clearly obvious within the sound level spectrum.

Appendix B: Permissible Sound Level Determination

AER Directive 038: Noise Control, Section 2.1: Permissible Sound Level Determination
Keyera Corporation Fort Saskatchewan (KFS) Facility at 2-14-55-22 W4M
Receivers R1 to R3 in the Study Area

Basic Nighttime Sound Level

Proximity to Transportation	Dwelling Unit Density per ¼ Section of Land			Nighttime	Daytime
	1 - 8 Dwellings	9 - 160 Dwellings	>160 Dwellings		
Category 1	40	43	46	43	43
Category 2	45	48	51		
Category 3	50	53	56		
			Daytime Adjustment	N/A	10
			Basic Sound Levels	43	53

Class A Adjustments

Class	Reason for Adjustment	Value (dBA L_{eq})	Nighttime	Daytime
A1	Seasonal Adjustment (Wintertime Operation)	+5	N/A	N/A
A2	Ambient Monitoring Adjustment	-10 to +10	N/A	N/A
	Class Adjustment = Sum of A1 and A2 (as applicable), but not to exceed a maximum of 10 dBA L_{eq}			
		Total Class A Adjustments	0	0

Class B Adjustments

Class	Duration of Activity	Value (dBA L_{eq})	Nighttime	Daytime
B1	1 day	+15		
B2	7 days	+10		
B3	< or = to 60 days	+5		
B4	> 60 days	0	0	0
Class B Adjustment = one only of B1, B2, B3 or B4				
		Class B Adjustment	0	0
		PERMISSIBLE SOUND LEVEL (dBA)	**43**	**53**

Category 1: Dwelling units more than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers.
Category 2: Dwelling units more than 30 m but less than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers.
Category 3: Dwelling units less than 30 m from heavily travelled roads and/or rail lines and/or subject to frequent aircraft flyovers.

AER Directive 038: Noise Control, Section 2.1: Permissible Sound Level Determination
Keyera Corporation Fort Saskatchewan (KFS) Facility at 2-14-55-22 W4M
Receivers R4 and R5 in the Study Area

Basic Nighttime Sound Level

Proximity to Transportation	Dwelling Unit Density per ¼ Section of Land			Nighttime	Daytime
	1 - 8 Dwellings	9 - 160 Dwellings	>160 Dwellings		
Category 1	40	43	46	40	40
Category 2	45	48	51		
Category 3	50	53	56		
			Daytime Adjustment	N/A	10
			Basic Sound Levels	40	50

Class A Adjustments

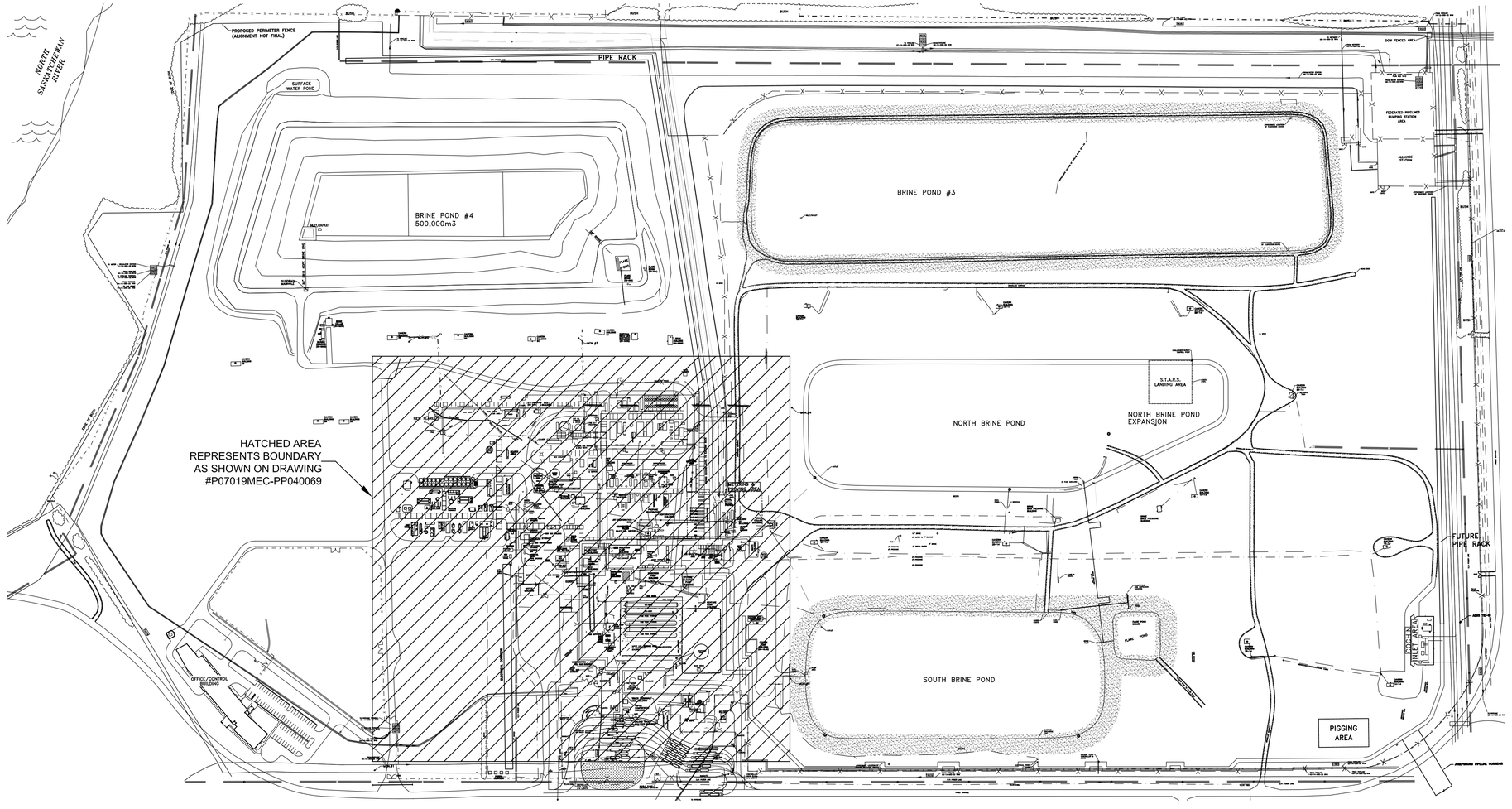
Class	Reason for Adjustment	Value (dBA L_{eq})	Nighttime	Daytime
A1	Seasonal Adjustment (Wintertime Operation)	+5	N/A	N/A
A2	Ambient Monitoring Adjustment	-10 to +10	N/A	N/A
	Class Adjustment = Sum of A1 and A2 (as applicable), but not to exceed a maximum of 10 dBA L_{eq}			
		Total Class A Adjustments	0	0

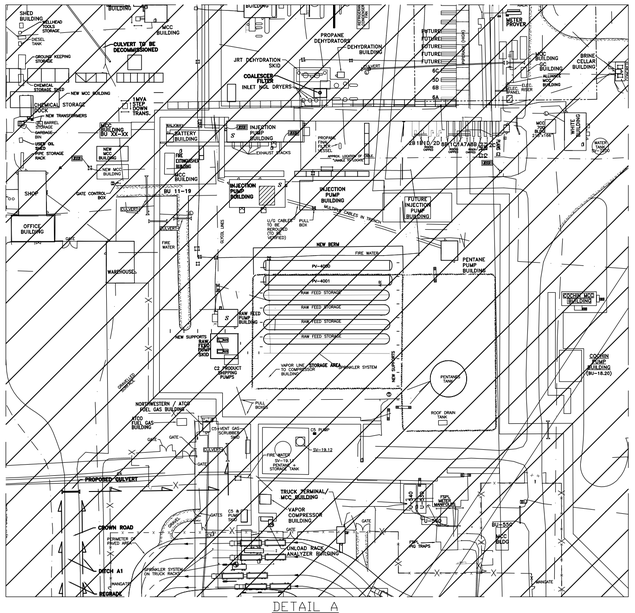
Class B Adjustments

Class	Duration of Activity	Value (dBA L_{eq})	Nighttime	Daytime
B1	1 day	+15		
B2	7 days	+10		
B3	< or = to 60 days	+5		
B4	> 60 days	0	0	0
Class B Adjustment = one only of B1, B2, B3 or B4				
		Class B Adjustment	0	0
		PERMISSIBLE SOUND LEVEL (dBA)	**40**	**50**

Category 1: Dwelling units more than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers.
Category 2: Dwelling units more than 30 m but less than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers.
Category 3: Dwelling units less than 30 m from heavily travelled roads and/or rail lines and/or subject to frequent aircraft flyovers.

Appendix C: Subject Facility Plot Plan





DETAIL A
NTS

SCALE 1:1000

LEGEND

- CONSTRUCTION IN PROGRESS
- ENGINEERING IN PROGRESS
- CAVERN SYSTEM 4
- CAVERN SYSTEM 5
- CAVERN SYSTEM 6
- FUTURE
- FUTURE SOIL STOCKPILE
- PIPE RACKS & ELECTRICAL CORRIDORS
- DRAINAGE & SITE WATER CONTAINMENT
- EXISTING
- FUTURE BUILDING

NOTE: SOME EXISTING PIPES & CABLES OMITTED FOR CLARITY

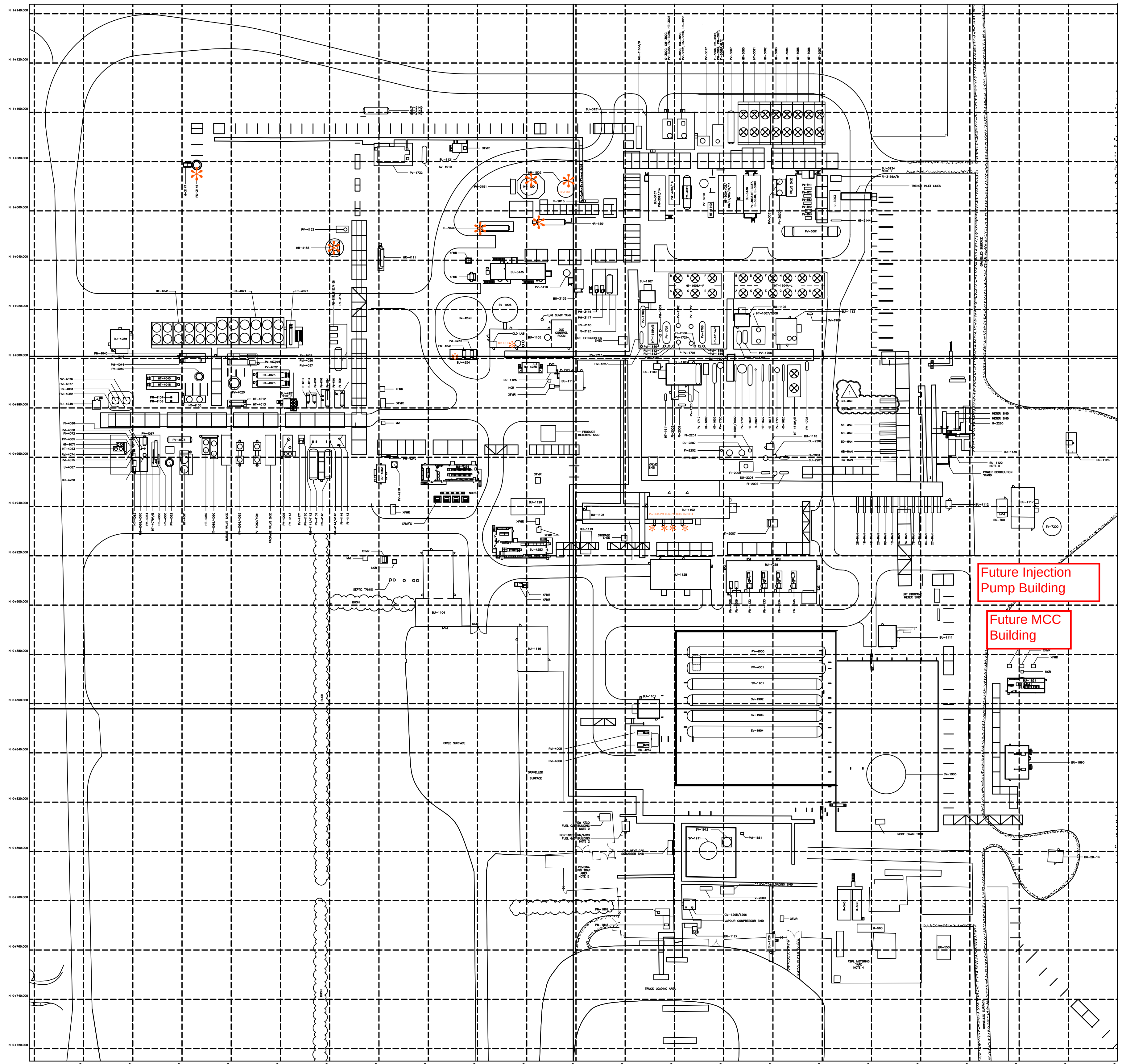
SCALE 1:1000
0 25 50 75 100 metres

KEYERA DRAWING NUMBER: P07-019-MEC-PP-04-0102

KEYERA
FORT SASKATCHEWAN
DEVELOPMENT PLAN

FILE NO. P07-019-MEC-PP-04-0102

NO.	DATE	REVISION	BY	CHK.	E.CHK.	E.APP	PROJ.#
0	14.05.23	ISSUED FOR KEYERA BUSINESS DEVELOPMENT	HH	GL	JE	JS	3885KEY
1	15.06.29	GENERAL UPDATE FOR KEYERA BUSINESS DEVELOPMENT	BW	TG			
2	16.06.01	GENERAL UPDATE FOR KEYERA BUSINESS DEVELOPMENT	BW	MS			



BUILDING AND EQUIPMENT INDEX

TAG NUMBER	DESCRIPTION	TAG NUMBER	DESCRIPTION
BU-1101	RAW FEED BOOSTER PUMP BUILDING	PM-1862	______
BU-1102	INJECTION PUMP BUILDING	PM-3013	C2 PRODUCT PUMP
BU-1103	TREATER BUILDING	PM-3014	C2 PRODUCT PUMP
BU-1104	OFFICE BUILDING	PM-3015	DEETHANIZER REFLUX PUMP
BU-1105	UTILITY BUILDING	PM-3016	DEETHANIZER REFLUX PUMP
BU-1106	REFLUX PUMP BUILDING	PM-3026	LUBE OIL PUMP
BU-1107	HOT OIL BUILDING	PM-3056	LUBE OIL PUMP
BU-1108	BATTERY BUILDING	PM-3069	PROPANE COOLANT PUMP
BU-1109	OPERATOR TOOL SHED	PM-3070	PROPANE COOLANT PUMP
BU-1110	GAS CHROMATOGRAPH BUILDING	PM-3116	HOT OIL CIRC. PUMP
BU-1111	PENTANE PUMP BUILDING	PM-3117	HOT OIL CIRC. PUMP
BU-1112	GAS CHROMATOGRAPH BUILDING	PM-3141	DEETHANIZER RE-RUN PUMP
BU-1113	REFRIGERATION BUILDING	PM-3142	DEETHANIZER FEED BOOSTER PUMP
BU-1114	MAIN MCC BUILDING	PM-3143	DEETHANIZER FEED BOOSTER PUMP
BU-1116	WAREHOUSE	PM-3152	DEETHANIZER FEED PUMP
BU-1117	WHITE BUILDING (WASH PUMP BUILDING)	PM-3153	DEETHANIZER FEED PUMP
BU-1118	DEHYDRATOR BRINE TANK BUILDING	PM-4005	RAW FEED PUMP
BU-1119	PM-1817/19 VFD BUILDING	PM-4006	RAW FEED PUMP
BU-1121	FLARE VAULT MCC BUILDING	PM-4008	RAW FEED PUMP
BU-1122	ALLIANCE MCC BUILDING	PM-4009	RAW FEED PUMP
BU-1123	BRINE CELLAR BUILDING	PM-4023	DEPROPANIZER REFLUX PUMP
BU-1125	UPS BUILDING	PM-4024	DEPROPANIZER REFLUX PUMP
BU-1126	TRUCK TERMINAL/MCC BUILDING	PM-4036	CORROSION INHIBITOR INJECTION PUMP
BU-1127	TRUCK RACK ANALYZER BUILDING	PM-4037	CORROSION INHIBITOR INJECTION PUMP
BU-1128	INJECTION PUMP BUILDING #2	PM-4043	DEBUTANIZER REFLUX PUMP
BU-1129	INJECTION PUMP MCC BUILDING	PM-4044	DEBUTANIZER REFLUX PUMP
BU-1130	GAS CHROMATOGRAPH BUILDING	PM-4068	AMINE DRAIN DRUM PUMP
BU-1821	COCHIN MCC BUILDING	PM-4069	AMINE REGENERATION PUMP
BU-1890	PUMP BUILDING	PM-4070	AMINE REGENERATION PUMP
BU-3131	REFRIGERANT COMPRESSOR BUILDING	PM-4074	AMINE REGENERATOR REFLUX PUMP
BU-3133	INSTRUMENTAL AIR COMPRESSOR BUILDING	PM-4075	AMINE REGENERATOR REFLUX PUMP
BU-3134	GAS CHROMATOGRAPH BUILDING	PM-4077	FRESH AMINE PUMP
BU-3135	MCC BUILDING	PM-4082	AMINE TREATED WATER PUMP
BU-3136	REGEN GAS COMPRESSOR BUILDING	PM-4132	INJECTION PUMP
BU-3137	C2 PRODUCT PUMP BUILDING	PM-4133	INJECTION PUMP
BU-4248	RO BUILDING	PM-4134	INJECTION PUMP
BU-4250	AMINE BUILDING	PM-4135	INJECTION PUMP
BU-4251	ANALYZER BUILDING	PM-4137	CONDENSATE PUMP
BU-4252	INSTRUMENT AIR BUILDING	PM-4138	CONDENSATE PUMP
BU-4253	MCC BUILDING	PM-4141	PROPANE INJECTION BOOSTER PUMP
BU-4254	FIREWATER PUMP BUILDING	PM-4142	PROPANE INJECTION BOOSTER PUMP
BU-4255	LAB BUILDING	PM-4144	BUTANE INJECTION BOOSTER PUMP
BU-4256	MCC BUILDING	PM-4145	BUTANE INJECTION BOOSTER PUMP
BU-4257	RAW FEED PUMP BUILDING	PM-4156	HOT OIL HEAT MEDIUM CIRCULATION PUMP
BU-4258	INJECTION PUMP BUILDING	PM-4157	HOT OIL HEAT MEDIUM CIRCULATION PUMP
BU-4259	MAINTENANCE BUILDING	PM-4158	HOT OIL HEAT MEDIUM CIRCULATION PUMP
BU-550	FSPL MCC BUILDING	PM-4191	CLOSED HYDROCARBON DRAIN DRUM PUMP
BU-700	MCC 700 BUILDING	PM-4196	CLOSED WATER DRAIN DRUM PUMP
BU-2B-14	STORAGE CAVERN 2B WELLHEAD BUILDING	PM-4197	CLOSED WATER DRAIN DRUM PUMP
C-3020	REFRIGERANT COMPRESSOR	PM-4231	ELECTRIC FIRE WATER PUMP
C-3040	REGEN GAS COMPRESSOR	PM-4232	DIESEL FIRE WATER PUMP
C-3050	REFRIGERANT COMPRESSOR	PM-4240	UTILITY WATER BOOSTER PUMP
C-3060	REGEN GAS COMPRESSOR	PV-1701	PROPANE TREATER
CM-1205	VAPOUR COMPRESSOR	PV-1702	PROPANE TREATER
CM-1206	VAPOUR COMPRESSOR	PV-1703	DEPROPANIZER
CM-3020	REFRIGERANT COMPRESSOR MOTOR	PV-1704	DEPROPANIZER REFLUX ACCUMULATOR
CM-3050	REFRIGERANT COMPRESSOR MOTOR	PV-1705	______
DU-2201	ETHANE PLUS DEHYDRATOR	PV-1706	DEBUTANIZER REFLUX ACCUMULATOR
DU-2202	ETHANE PLUS/PROPANE DEHYDRATOR	PV-1707	PROPANE SURGE TANK
DU-2204	PROPANE DEHYDRATOR	PV-1708	BUTANE SURGE TANK
DU-2206	LIQUID PROPANE DEHYDRATOR	PV-1709	HEATING MEDIUM SURGE TANK
DU-2207	LIQUID PROPANE DEHYDRATOR	PV-1713	HYDROCARBON RECOVERY TANK
FI-2001	PROPANE FILTER COALESCER	PV-1717	SETTLER TANK
FI-2002	BUTANE FILTER COALESCER	PV-1721	BUTANE TREATER
FI-2003	RAW FEED FILTER COALESCER	PV-1722	BUTANE TREATER
FI-2005	PROPANE FILTER	PV-1723	SETTLER TANK
FI-2006	BUTANE FILTER	PV-1728	REFRIGERANT ACCUMULATOR
FI-2007	PROPANE FINAL FILTER VESSEL	PV-1729	DEETHANIZER TOWER
FI-2008	PROPANE FILTER	PV-1732	UNDERGROUND FLARE KNOCKOUT DRUM
FI-2009	ETHANE PLUS FILTER COALESCER	PV-3001	DEETHANIZER FEED VESSEL
FI-2013	FUEL GAS SCRUBBER	PV-3010	DEETHANIZER
FI-2025	PROPANE DUST FILTER	PV-3012	DEETHANIZER REFLUX ACCUMULATOR
FI-2251	PROPANE FILTER COALESCER	PV-3017	REFRIGERANT COMPRESSOR SUCTION SCRUBBER
FI-2252	PROPANE FINAL FILTER	PV-3030	PRODUCT TREATING TOWER
FI-3066	LUBE OIL COALESCER	PV-3031	PRODUCT TREATING TOWER
FI-3068A/B/C	REFRIGERANT DRYERS	PV-3022	LUBE OIL SEPARATOR
FI-3123	HOT OIL FILTER	PV-3033	REGEN GAS SCRUBBER
FI-3156A/B	INLET SOLIDS FILTERS	PV-3042	LUBE OIL RECLAIMER
FI-4011A/B	FEED FILTERS	PV-3052	LUBE OIL SEPARATOR
FI-4072	AMINE FILTER	PV-3067	REFRIGERANT SURGE DRUM
FI-4086	AMINE DRAIN FILTER	PV-3110	INSTRUMENT AIR RECEIVER
FI-4143	PROPANE FILTER	PV-3118	HOT OIL EXPANSION DRUM
FI-4146	BUTANE FILTER	PV-3145	CRYO FLARE KNOCKOUT DRUM
FS-3146	CRYO FLARE STACK	PV-3151	HOT OIL FUEL GAS SCRUBBER & BURNER MANAGEMENT SYSTEM
H-3044	REGEN GAS HEATER	PV-4000	RAW FEED STORAGE TANK
H-3150	HOT OIL HEATER	PV-4001	RAW FEED STORAGE TANK
HR-1501	REGEN GAS HEATER & SALT BATH	PV-4020	DEPROPANIZER
HR-1502	HOT OIL FURNACE & STACK	PV-4022	DEPROPANIZER REFLUX ACCUMULATOR
HR-4155	HOT OIL HEAT MEDIUM HEATER	PV-4040	DEBUTANIZER
HR-4111	REGENERATION GAS HEATER	PV-4042	DEBUTANIZER REFLUX ACCUMULATOR
HT-1601	FEED PENTANES PLUS EXCHANGER	PV-4062	AMINE CONTACTOR
HT-1602	DEPROPANIZER FEED HEATER	PV-4064	AMINE REGENERATOR
HT-1603	DEPROPANIZER REBOILER	PV-4065	AMINE ACID GAS SCRUBBER
HT-1604A-L	DEPROPANIZER O.H. CONDENSER	PV-4067	AMINE DRAIN DRUM
HT-1605	DEBUTANIZER REBOILER	PV-4073	PROPANE COALESCER
HT-1606A-F	DEBUTANIZER O.H. CONDENSER	PV-4091	PROPANE TREATER
HT-1607	PROPANE COOLER	PV-4092	PROPANE TREATER
HT-1608	BUTANE COOLER	PV-4093	BUTANE TREATER
HT-1609	REGENERATION GAS COOLER	PV-4094	BUTANE TREATER
HT-1610A/B	COOLANT CONDENSER FAN	PV-4095	BACKUP PROPANE COALESCER
HT-1611	ADIP REGENERATOR REBOILER	PV-4113	REGENERATION GAS SCRUBBER
HT-1616	DEETHANIZER REBOILER	PV-4139	PROPANE SURGE DRUM
HT-1618A/B	ADIP COOLER	PV-4140	BUTANE SURGE DRUM
HT-1619A/B	REFRIGEREANT CONDENSER FAN	PV-4150	HOT OIL HEAT MEDIUM EXPANSION DRUM
HT-1620	REFRIGERANT SUB-COOLER	PV-4153	HOT OIL HEAT MEDIUM REGEN GAS FILTER SEPARATOR
HT-1622	DEETHANIZER FEED PRE-HEATER	PV-4170	MP FUEL GAS SCRUBBER
HT-3004	ETHANE SUBCOOLER	PV-4171	HP FUEL GAS FILTER COALESCER
HT-3005	FEED SUBCOOLER	PV-4190	CLOSED HYDROCARBON DRAIN DRUM
HT-3006	FEED TRIM EXCHANGER	PV-4194	CLOSED WATER DRAIN DRUM
HT-3007	FEED BOTTOMS EXCHANGER	PV-4210	INSTRUMENT AIR RECEIVER
HT-3008	DEETH BOTTOMS REBOILER	SV-1901	RAW FEED STORAGE TANK
HT-3009	SIDE REBOILER	SV-1902	RAW FEED STORAGE TANK
HT-3011	DEETHANIZER CONDENSER	SV-1903	RAW FEED STORAGE TANK
HT-3025	LUBE OIL COOLER	SV-1904	RAW FEED STORAGE TANK
HT-3037	REGEN GAS/GAS EXCHANGER	SV-1905	PENTANE TANK
HT-3055	LUBE OIL COOLER	SV-1906	WATER TANK
HT-3080	REFRIGERANT CONDENSER	SV-1909	UNDERGROUND TANK
HT-3081	REFRIGERANT CONDENSER	SV-1910	UNDERGROUND OPEN WATER DRAIN TANK
HT-3082	REFRIGERANT CONDENSER	SV-1911	PENTANE + STORAGE TANK
HT-3083	REFRIGERANT CONDENSER	SV-1912	PENTANE + STORAGE TANK
HT-3084	REFRIGERANT CONDENSER	SV-4035	CORROSION INHIBITOR TOTE
HT-3085	REFRIGERANT CONDENSER	SV-4076	FRESH AMINE STORAGE TANK
HT-3086	REFRIGERANT CONDENSER	SV-4081	AMINE TREATED WATER TANK
HT-3087	REFRIGERANT CONDENSER	SV-4230	FIRE WATER STORAGE TANK
HT-3140	C3+ CHILLER	SV-7200	WATER SETTLING TANK
HT-3144	C2+ INLET HEATER	U-2280	C2+ METER SKID
HT-3148	K.O. DRUM VAPORIZER	U-530	FSPL METER SKID
HT-3149	K.O. DRUM VAPORIZER	U-540	FSPL METER SKID
HT-4012	CONDENSATE/FEED EXCHANGER	U-560	FSPL METER PROVER SKID
HT-4013	DEPROPANIZER FEED HEATER	U-3003	INLET METERING SKID
HT-4021	DEPROPANIZER OVERHEAD CONDENSORS	U-4087	ANTI FOAM INJECTION PACKAGE
HT-4025	DEPROPANIZER REBOILER	V-2000	MERCAPTAN
HT-4026	DEPROPANIZER REBOILER	1A-MAN	CAVERN 1A MANIFOLD
HT-4027	DEPROPANIZER OVERHEAD/FEED EXCHANGER	1B-MAN	CAVERN 1B MANIFOLD
HT-4041	DEBUTANIZER OVERHEAD CONDENSORS	1C-MAN	CAVERN 1C MANIFOLD
HT-4045	DEBUTANIZER REBOILER	1D-MAN	CAVERN 1D MANIFOLD
HT-4046	DEBUTANIZER REBOILER	2B-MAN	CAVERN 2B MANIFOLD
HT-4060	BUTANE COOLER	2C-MAN	CAVERN 2C MANIFOLD
HT-4061	PROPANE COOLER	2D-MAN	CAVERN 2D MANIFOLD
HT-4063	AMINE REGENERATOR OVERHEAD CONDENSER	3B-MAN	CAVERN 3B MANIFOLD
HT-4066	AMINE REGENERATOR REBOILER	3D-MAN	CAVERN 3D MANIFOLD
HT-4071	AMINE COOLER	C3-MAN	C3 MANIFOLD
HT-4079A/B	LEAN/RICH EXCHANGER	C4-MAN	C4 MANIFOLD
HT-4080	PROPANE HEATER	5B-MAN	CAVERN 5B MANIFOLD
HT-4083	AMINE RECLAIMER	5D-MAN	CAVERN 5D MANIFOLD
HT-4089	PROPANE COOLANT CONDENSER	6A-MAN	CAVERN 6A MANIFOLD
HT-4090	BUTANE COOLANT CONDENSER	6B-MAN	CAVERN 6B MANIFOLD
HT-4130	CONDENSATE RUNDOWN COOLER	6C-MAN	CAVERN 6C MANIFOLD
M-3147	CRYO FLARE AIR ASSIST BLOWER	7A-MAN	CAVERN 7A MANIFOLD
MB-3155A/B	CO2 REMOVAL MEMBRANES	7B-MAN	CAVERN 7B MANIFOLD
PM-1812	PROPANE INJECTION BOOSTER PUMP	8B-MAN	CAVERN 8B MANIFOLD
PM-1813	PROPANE INJECTION BOOSTER PUMP (SPARE)		
PM-1815	BUTANE INJECTION BOOSTER PUMP		
PM-1816	BUTANE INJECTION BOOSTER PUMP		
PM-1827	HYDROCARBON RECOVERY PUMP		
PM-1839	DEETHANIZER PUMP		
PM-1840	DEETHANIZER PUMP		
PM-1845	C5+ PUMP		
PM-1861	C5 PUMP		

−20m 0 20m 40m 60m 80m

SCALE 1 : 1800

REFERENCE DRAWINGS

DWG. NO.	TITLE

NO.	DATE	REVISIONS	DWN BY	CHK'D BY	APPR BY
2	17 03 10	GENERAL ASBUILT OF DRAWING TO MATCH FIELD	BW	TW	TW
1	14 06 06	REVISED PER FIELD REDLINE	CK		
0	99 12 08	ISSUED FOR APPROVAL	BN		

PERMIT

SEAL

RELEASED ONLY FOR	SECT. LEADER	PROJ. ENG.	DATE
CHECKING			
PRELM.			
BIDDING			
FABRIC.			
CONSTR.			

DATE: 17 03 10
SCALE: 1:1800
DESIGN: BW
DRAWN: BW
CHKD: TW
APP.: TW

KEYERA

FORT SASKATCHEWAN
KFS FACILITY
PROCESS AREA PLOT PLAN

CAD NO. P07-019-MEC-PP-04-0069.DWG
CONTRACTOR DWG NO.
SIZE
DWG. NO. P07019MEC-PP040069
REV. 2

Appendix D: Sound Power Levels

The Sound Power Levels (PWL) were determined for all of the facility major noise sources. The PWL in linear octave band are presented in the table below.

- For each existing noise source that was operating normally during the field visit, the PWL was obtained from field diagnostic measurements on June 11-14, 2018.
- For each existing noise source not operating normally during the field visit, the PWL was obtained from previous studies on similar units on site.

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
HT-3080 to 3087 Refrigerant Condensers Inlet	Field	122	118	117	115	109	107	105	102	94	113	123
HR-1502 Hot Oil Furnace Inlet Area – No Silencer	Field	100	103	109	110	100	100	102	105	111	113	115
BU-1102 Injection Pump Building Exhaust Tip	Field	116	118	118	113	110	106	98	86	79	111	122
M-3147 Cryo Flare Air Assist Blower Inlet 75%	Field	102	104	102	109	108	107	102	97	90	111	114
Valve Skid Piping NW Corner BU-1102	Field	107	103	98	97	98	103	106	103	99	111	112
HT-1606 Debutanizer OH Condenser Inlet	Field	115	114	109	109	105	102	100	99	100	109	118
DU-2206 and 2207 Liquid Propane Dehydrator Piping	Field	104	97	93	94	100	101	103	102	98	108	109
BU-1102 Injection Pump Building PM-1803 Engine Exhaust Tip	Field	114	116	116	112	107	101	91	78	79	108	120
HT-4041 Debutanizer OH Condenser Inlet	Field	116	113	108	105	105	98	95	97	87	106	117
BU-3131 Refrigerant Compressor Building OH Door Open	Field	90	90	91	99	104	100	97	95	82	106	108
HR-1502 Hot Oil Furnace Inlet W Sil	Field	92	96	101	103	93	92	95	98	104	105	108
HT-3080 to 3087 Refrigerant Condensers Discharge	Field	119	113	112	109	102	98	96	88	79	105	119
HT-4021 Depropanizer OH Condenser Inlet	Field	114	113	108	103	104	98	95	97	87	105	116
PM-1861 C5 Pump	Field	80	81	80	84	91	95	95	99	100	104	103
HT-1610 Coolant Condenser Fan	Field	113	106	106	104	103	99	92	88	82	104	113

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
HT-1604 Depropanizer OH Condenser Inlet	Field	117	116	110	105	101	97	95	92	87	104	118
Vapour Compressor Skid	Field	97	96	92	94	98	98	98	91	90	103	105
PM-3142/3143 Deethanizer Feed Booster Pump	Field	96	92	87	82	78	78	102	82	80	103	103
HT-1613 ADIP Cooler Fan Inlet	Field	106	106	106	104	102	96	88	82	77	102	111
HT-1607 and 1608 Propane and Butane Cooler Inlet	Field	108	104	106	104	101	96	90	87	88	102	111
BU-3131 Refrigerant Compressor Building Open Louver Northwest	Field	101	94	84	93	103	96	91	89	74	102	105
BU-3131 Refrigerant Compressor Building Open Louver Southwest	Field	101	94	84	93	103	96	91	89	74	102	105
PM-1812 Propane Injection Booster Pump	Field	96	91	89	97	100	98	94	86	79	102	104
HR-4155 Hot Oil Heat Medium Heater Inlet Area	Field	104	112	108	108	99	84	85	84	83	102	115
HT-1604 Depropanizer OH Condenser Discharge	Field	115	113	110	105	98	94	92	85	77	102	117
PM-1832 Pentane Pump	Field	95	89	92	98	100	98	92	86	78	101	104
HT-1606 Debutanizer OH Condenser Housing	Field	111	110	105	103	99	96	93	87	88	101	113
HT-1619 Refrigerant Condenser Fan Inlet	Field	109	109	105	102	99	96	93	87	83	101	112
HT-4041 Debutanizer OH Condenser Discharge	Field	119	113	107	102	100	94	91	86	75	101	118
BU-3131 Refrigerant Compressor Building Open Door North	Field	90	89	92	95	101	95	91	90	74	101	104
BU-3131 Refrigerant Compressor Building Open Door North	Field	90	89	92	95	101	95	91	90	74	101	104
BU-3131 Refrigerant Compressor Building Open Door East	Field	90	89	92	95	101	95	91	90	74	101	104
HT-4021 Depropanizer OH Condenser Discharge	Field	116	112	106	101	100	93	89	86	75	100	116

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-1111 Pentane Pump Building Sliding Door Open	Field	81	85	89	97	99	96	90	82	75	100	103
PM-3152/3153 Deethanizer Feed Pump	Field	95	91	90	89	85	91	90	90	99	100	101
HT-1610 Coolant Condenser Fan	Field	102	98	99	99	100	95	87	76	68	100	106
HT-1613 ADIP Cooler Fan Discharge	Field	105	98	102	101	100	95	87	76	70	100	108
BU-1102 Injection Pump Building Wall	Field	115	111	108	105	96	90	87	79	83	100	116
HT-3080 to 3087 Refrigerant Condensers Housing	Field	114	110	106	102	95	92	92	87	80	100	114
HT-1604 Depropanizer OH Condenser Housing	Field	113	111	106	100	94	92	90	84	78	99	114
HT-1607 and 1608 Propane and Butane Cooler Discharge	Field	106	104	102	101	98	92	86	76	74	99	109
BU-1102 Injection Pump Building PM-1803 Combustion Air Intake	Field	99	90	91	86	83	78	71	79	99	98	100
BU-3132 Hot Oil Building Open OH Door	Field	88	85	88	89	88	96	91	85	84	98	99
PV-4170 MP Fuel Gas Scrubber	Field	94	90	84	83	85	89	93	93	84	98	98
PM-4156 Hot Oil Heat Medium Circulation Pump	Field	91	102	92	92	96	91	92	86	87	98	104
BU-1102 Injection Pump Building Exhaust Piping	Field	111	108	108	101	95	90	83	75	81	98	113
BU-1102 Injection Pump Building Lube Oil Cooler Fan Discharge Piping	Field	112	105	104	100	97	90	81	76	81	97	112
BU-1102 Injection Pump Building PM-1803 Engine Exhaust Piping	Field	108	108	107	101	94	88	81	74	84	97	112
PM-4157 Hot Oil Heat Medium Circulation Pump	Field	91	95	89	93	95	91	90	85	89	97	101
HT-1610 Coolant Condenser Fan	Field	104	102	102	98	96	92	85	79	73	97	107
HT-1606 Debutanizer OH Condenser Discharge	Field	110	107	103	100	92	91	87	81	77	97	111
BU-3132 Hot Oil Building Open Door East	Field	87	83	86	87	87	94	89	83	82	97	98

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3132 Hot Oil Building Open Door West	Field	87	83	86	87	87	94	89	83	82	97	98
HT-1613 ADIP Cooler Fan Housing	Field	103	105	102	100	95	89	83	81	77	96	108
HT-1619 Refrigerant Condenser Fan Discharge	Field	106	107	103	98	93	90	89	80	74	96	109
Piping Section 1	Field	95	94	91	85	84	90	93	87	80	96	99
BU-4258 Injection Pump Building OH Door SW Open	Field	85	86	87	87	83	83	94	83	80	96	97
BU-3131 Refrigerant Compressor Building Closed Louver Northwest	Field	92	87	84	90	96	89	86	85	69	96	99
BU-3131 Refrigerant Compressor Building Closed Louver Southwest	Field	92	87	84	90	96	89	86	85	69	96	99
Piping Section 2	Field	94	92	90	83	84	90	92	86	81	96	98
Piping Section 9	Field	83	81	79	77	82	90	93	83	76	96	95
Piping Section 8	Field	86	84	81	77	80	90	93	84	75	96	95
BU-1102 Injection Pump Building PM-1803 Lube Oil Cooler Louver	Field	91	87	89	91	93	91	87	81	85	95	99
BU-1102 Injection Pump Building PM-1803 Lube Oil Cooler Piping	Field	107	105	104	99	92	85	81	75	85	95	109
HT-3037 Regen Gas/Gas Exchanger Inlet East	Field	99	102	99	94	90	89	89	84	76	95	104
PM-3015/3016 Deethanizer Reflux Pump	Field	92	88	85	87	85	91	87	86	88	95	97
PM-1815 1816 Butane Injection Booster Pump	Field	96	87	84	87	90	92	87	81	76	95	98
PM-4144 Butane Injection Booster Pump	Field	88	83	84	86	89	89	87	84	90	95	96
BU-1111 Pentane Pump Building Window Open	Field	82	80	81	94	94	91	84	76	70	95	98
BU-1111 Pentane Pump Building Window Open	Field	82	80	81	94	94	91	84	76	70	95	98
HT-1607 and 1608 Propane and Butane Cooler Housing	Field	103	101	101	97	93	87	81	77	77	95	106

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3137 C2 Product Pump Building Open OH Door	Field	103	96	90	86	86	89	89	85	79	94	102
HT-1619 Refrigerant Condenser Fan Housing	Field	106	103	101	97	92	87	84	78	76	94	108
Piping Section 4	Field	90	90	89	84	81	86	90	86	79	94	96
BU-4258 Injection Pump Building Wall	Field	101	107	99	93	89	88	87	79	77	94	108
U-3003 Inlet Meter Skid Piping	Field	100	97	91	85	81	84	84	88	89	93	101
BU-1102 Injection Pump Building Purge Air Blower and Piping	Field	102	106	100	96	91	85	84	77	74	93	108
BU-1102 Injection Pump Building Lube Oil Cooler Fan Inlet	Field	91	91	89	89	91	89	85	80	81	93	98
BU-1117 White Building (Wash Pump Building) South OH Door Open	Field	85	79	78	80	83	84	87	88	83	93	93
HT-3037 Regen Gas/Gas Exchanger Discharge	Field	99	101	101	94	88	87	85	77	67	93	105
Piping Section 5	Field	91	87	88	81	81	86	89	83	76	93	95
BU-1111 Pentane Pump Building Door Open	Field	75	74	80	89	92	89	83	74	68	93	96
BU-1111 Pentane Pump Building Door Open	Field	75	74	80	89	92	89	83	74	68	93	96
PM-4141 Propane Injection Booster Pump	Field	87	85	83	85	84	87	87	84	85	93	94
H-3044 Regen Gas Heater Bottom Air Intake	Field	91	88	80	78	81	86	87	86	84	93	94
HT-4060 Butane Cooler Inlet	Field	110	99	93	91	90	87	84	84	78	93	108
Piping Section 6	Field	88	86	86	78	79	86	90	83	75	93	94
Piping Section 7	Field	85	86	82	76	77	87	89	82	73	93	93
BU-3131 Refrigerant Compressor Building Air Handling Unit Inlet	Field	89	97	99	94	91	86	81	75	71	93	102
BU-1102 Injection Pump Building Combustion Air Intake	Field	101	92	95	87	83	78	73	76	92	92	101
PM-3069/3070 Propane Coolant Pump	Field	91	85	85	80	83	85	87	82	86	92	94

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
HT-4130 Condensate Rundown Cooler Inlet	Field	109	102	96	94	88	83	80	86	79	92	108
BU-1102 Injection Pump Building Purge Air Discharge P1818 Piping	Field	100	101	104	92	87	85	80	71	74	92	106
Piping Section 3	Field	90	88	89	83	79	84	89	83	78	92	95
PM-4023 Depropanizer Reflux Pump	Field	96	91	91	87	90	88	80	81	84	92	98
HT-4041 Debutanizer OH Condenser Housing	Field	103	99	96	93	90	83	80	85	73	92	104
BU-3131 Refrigerant Compressor Building Wall	Field	107	102	94	90	91	86	83	78	72	92	106
BU-1106 Reflux Pump Building Slide Door Open	Field	97	88	80	85	89	89	83	75	69	92	97
PM-4138 Condensate Pump	Field	93	89	84	83	83	80	80	89	77	92	95
HT-4060 Butane Cooler Discharge	Field	104	99	92	91	90	86	83	77	71	91	103
BU-1117 White Building (Wash Pump Building) North OH Door Open	Field	86	83	81	82	83	82	87	85	79	91	92
H-3150 Hot Oil Heater Inlet Area	Field	95	103	97	98	88	75	75	74	73	91	105
H-3044 Regen Gas Heater Top Air Intake	Field	89	89	79	78	81	85	87	82	81	91	94
PM-3015/3016 Deethanizer Reflux Motor	Field	89	84	81	84	86	87	84	80	79	91	93
BU-1890 Cochin Pump Building OH Door Open	Field	81	83	81	87	84	85	87	75	74	91	93
HT-4021 Depropanizer OH Condenser Housing	Field	104	98	96	91	90	83	77	78	69	90	104
BU-4250 Amine Building OH Door Open	Field	87	80	78	77	85	87	82	81	83	90	92
BU-1128 Injection Pump Building #2 Building Wall	Field	100	104	96	95	86	81	80	72	72	90	105
BU-1107 Hot Oil Building North Door Open	Field	90	85	79	78	86	86	82	81	76	90	93
BU-1107 Hot Oil Building West Door Open	Field	90	85	79	78	86	86	82	81	76	90	93

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
HT-4089/4090 Propane and Butane Coolant Condenser Inlet	Field	100	99	93	93	88	83	79	78	73	90	102
BU-1102 Injection Pump Building Open OH Door	Field	91	95	94	86	86	83	84	80	75	90	98
BU-1102 Injection Pump Building Open Door North	Field	91	95	94	86	86	83	84	80	75	90	98
BU-1102 Injection Pump Building Open Door Northwest	Field	91	95	94	86	86	83	84	80	75	90	98
BU-1102 Injection Pump Building Open Door Northeast	Field	91	95	94	86	86	83	84	80	75	90	98
BU-1102 Injection Pump Building Open Door East	Field	91	95	94	86	86	83	84	80	75	90	98
M-3147 Cryo Flare Air Assist Blower Blower Body 75%	Field	88	86	83	88	88	86	80	80	64	90	94
BU-4258 Injection Pump Building OH Door Closed	Field	89	94	95	93	87	84	80	70	67	90	99
BU-1128 Injection Pump Building #2 Pump 1854 Lube Oil Cooler Discharge	Field	81	84	92	90	87	85	83	73	65	90	96
BU-1128 Injection Pump Building #2 Pump 1853 Lube Oil Cooler Discharge	Field	81	81	87	92	86	84	82	72	60	90	95
BU-1102 Injection Pump Building PM-1803 Lube Oil Cooler Discharge	Field	102	99	100	93	86	79	75	70	79	89	104
M-3147 Cryo Flare Air Assist Blower Inlet 33%	Field	97	95	94	90	85	84	77	82	65	89	99
BU-1106 Reflux Pump Building Open Window East	Field	94	88	83	85	87	86	80	72	66	89	95
BU-1106 Reflux Pump Building Open Window West	Field	94	88	83	85	87	86	80	72	66	89	95
HT-4112 Regen Gas Cooler Inlet	Field	99	104	94	88	87	82	78	80	72	89	104
BU-1106 Reflux Pump Building Open Door North	Field	93	88	81	84	88	86	79	71	65	89	95
BU-1102 Injection Pump Building South Open Door	Field	93	96	94	86	85	81	84	78	74	89	99

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3131 Refrigerant Compressor Building OH Door Closed	Field	90	83	80	87	89	83	78	75	60	89	94
HT-4130 Condensate Rundown Cooler Discharge	Field	110	99	94	90	87	82	79	76	67	89	108
BU-1102 Injection Pump Building Lube Oil Cooler Fan Discharge	Field	106	99	95	90	87	81	77	74	77	89	105
PM-4043 Debutanizer Reflux Pump	Field	97	92	90	86	87	84	79	75	66	88	98
BU-4258 Injection Pump Building OH Door Open	Field	80	84	78	75	75	75	87	74	63	88	89
BU-3132 Hot Oil Building Wall	Field	104	100	93	89	83	84	79	75	73	88	104
BU-3132 Hot Oil Building Skid Underskid	Field	99	91	92	91	79	82	80	77	75	88	99
BU-1128 Injection Pump Building #2 OH Door Open South	Field	85	89	84	88	83	83	81	75	68	88	93
BU-1128 Injection Pump Building #2 OH Door Open East	Field	85	89	84	88	83	83	81	75	68	88	93
HT-3037 Regen Gas/Gas Exchanger Housing	Field	98	98	96	88	84	79	79	73	69	87	101
BU-700 MCC 700 Building HVAC Inlet	Field	84	84	88	94	80	79	76	71	68	87	96
BU-3136 Regen Gas Compressor Building Open Door North	Field	91	87	83	79	79	83	82	78	73	87	92
BU-3136 Regen Gas Compressor Building Open Door South	Field	91	87	83	79	79	83	82	78	73	87	92
HT-4089/4090 Propane and Butane Coolant Condenser Discharge	Field	98	98	92	91	85	79	76	70	64	87	101
HT-4063 Amine Reneration OH Condenser Inlet	Field	105	95	87	85	81	83	81	72	67	87	103
HT-4071 Amine Cooler Inlet	Field	105	95	87	85	81	83	81	72	67	87	103
HT-4130 Condensate Rundown Cooler Housing	Field	99	95	92	90	84	78	74	79	74	87	100
BU-1111 Pentane Pump Building Wall	Field	96	94	92	91	85	79	75	67	65	87	99

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3136 Regen Gas Compressor Building East Open Windows	Field	85	79	78	78	82	83	80	76	77	87	89
BU-3136 Regen Gas Compressor Building West Open Windows	Field	85	79	78	78	82	83	80	76	77	87	89
BU-1103 Treater Building South Open Door	Field	83	78	72	75	79	81	80	80	72	86	88
BU-1103 Treater Building Sliding Door Open	Field	83	78	72	75	79	81	80	80	72	86	88
BU-1103 Treater Building North Open Window	Field	89	85	75	75	79	81	79	79	71	86	90
BU-3136 Regen Gas Compressor Building North Lube Oil Cooler Louver Open	Field	82	76	73	74	80	83	78	72	68	86	87
BU-3137 C2 Product Pump Building Open Windows West	Field	90	87	82	78	77	81	80	76	69	85	91
BU-3137 C2 Product Pump Building Open Windows East	Field	90	87	82	78	77	81	80	76	69	85	91
BU-4250 Amine Building Wall	Field	99	93	91	88	82	80	74	69	68	85	99
HT-4112 Regen Gas Cooler Discharge	Field	95	101	89	85	83	75	75	75	79	85	101
BU-1102 Injection Pump Building Purge Air Discharge P1818	Field	98	87	89	83	81	79	80	72	66	85	97
BU-1117 White Building (Wash Pump Building) East Door Open	Field	77	76	75	73	75	76	80	80	75	85	86
BU-1102 Injection Pump Building Open Louver	Field	93	88	90	85	82	78	73	72	80	85	95
BU-1102 Injection Pump Building Lube Oil Cooler Fan Louver P1817	Field	93	93	92	85	82	79	74	70	76	85	97
HT-4060 Butane Cooler Housing	Field	99	92	89	87	83	78	74	73	69	85	98
BU-1117 White Building (Wash Pump Building) North Door Open	Field	79	75	73	75	78	75	80	78	72	85	86
BU-1102 Injection Pump Building Lube Oil Cooler Fan Louver P1818	Field	89	92	87	89	83	77	75	66	60	85	95

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-1890 Cochin Pump Building Wall	Field	94	92	87	87	80	78	79	61	64	85	95
BU-1128 Injection Pump Building #2 Door Open	Field	82	82	84	85	79	79	78	73	65	84	90
HT-4112 Regen Gas Cooler Housing	Field	99	102	90	86	83	75	71	73	68	84	103
BU-1890 Cochin Pump Building P1891 Lube Oil Cooler Louver	Field	85	81	78	84	83	80	75	71	65	84	90
BU-3137 C2 Product Pump Building Open Door West	Field	88	84	80	76	76	80	79	75	70	84	89
BU-3137 C2 Product Pump Building Open Door East	Field	88	84	80	76	76	80	79	75	70	84	89
BU-1890 Cochin Pump Building P1890 Lube Oil Cooler Louver	Field	87	81	78	83	83	79	73	70	63	84	90
BU-3131 Refrigerant Compressor Building Closed Door North	Field	93	86	87	83	82	77	76	70	65	84	93
BU-3131 Refrigerant Compressor Building Closed Door North	Field	93	86	87	83	82	77	76	70	65	84	93
BU-3131 Refrigerant Compressor Building Closed Door East	Field	93	86	87	83	82	77	76	70	65	84	93
BU-4252 Instrument Air Building Doors Open	Field	80	77	73	75	83	77	72	70	78	84	87
H-3044 Regen Gas Heater Exhaust	Field	101	95	92	88	76	76	73	69	70	84	100
BU-4250 Amine Building Skid and Underskid	Field	97	93	88	80	80	80	76	65	63	84	97
BU-3137 C2 Product Pump Building Closed OH Door	Field	104	99	91	83	79	77	75	70	68	83	103
BU-1103 Treater Building North Open Door	Field	89	80	75	72	77	79	77	77	68	83	89
BU-1111 Pentane Pump Building Sliding Door Closed	Field	85	83	81	84	83	78	72	62	57	83	90
BU-4258 Injection Pump Building PMM 4132 Lube Oil Cooler	Field	82	87	88	86	81	78	73	63	60	83	92
BU-4258 Injection Pump Building PMM 4135 Lube Oil Cooler	Field	82	87	88	86	81	78	73	63	60	83	92

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-1102 Injection Pump Building Ridge Vent	Field	86	88	88	85	80	75	76	71	66	83	93
HR-4111 Regeneration Gas Heater Exhaust	Field	95	95	94	88	73	75	69	59	54	83	99
BU-3136 Regen Gas Compressor Building South Lube Oil Cooler Louver Open	Field	80	75	71	74	79	79	75	70	67	83	85
BU-4258 Injection Pump Building Door Open	Field	80	79	74	68	68	69	81	67	58	82	84
BU-4258 Injection Pump Building Door Open	Field	80	79	74	68	68	69	81	67	58	82	84
BU-4258 Injection Pump Building Door Open	Field	80	79	74	68	68	69	81	67	58	82	84
BU-4258 Injection Pump Building Door Open	Field	80	79	74	68	68	69	81	67	58	82	84
BU-1106 Reflux Pump Building Slide Door Closed	Field	98	93	87	81	78	76	74	71	66	82	97
HT-4089/4090 Propane and Butane Coolant Condenser Housing	Field	95	92	88	86	80	73	70	67	65	82	96
BU-1106 Reflux Pump Building Open Louver East	Field	89	85	80	75	80	79	72	62	56	82	90
BU-1106 Reflux Pump Building Open Louver West	Field	89	85	80	75	80	79	72	62	56	82	90
HR-1501 Regen Gas Heater & Salt Bath Exhaust	Field	91	90	86	83	74	74	73	71	77	82	93
BU-1890 Cochin Pump Building Door Open	Field	75	78	75	79	77	78	76	67	68	82	85
BU-1890 Cochin Pump Building Door Open	Field	75	78	75	79	77	78	76	67	68	82	85
BU-1128 Injection Pump Building #2 Door Open North	Field	86	85	78	83	76	78	73	68	62	82	89
BU-1128 Injection Pump Building #2 Door Open South	Field	86	85	78	83	76	78	73	68	62	82	89
BU-1128 Injection Pump Building #2 Door Open Northwest	Field	86	85	78	83	76	78	73	68	62	82	89
BU-1128 Injection Pump Building #2 Door Open Northeast	Field	86	85	78	83	76	78	73	68	62	82	89

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-1128 Injection Pump Building #2 Door Open Southwest	Field	86	85	78	83	76	78	73	68	62	82	89
BU-1128 Injection Pump Building #2 Door Open Southeast	Field	86	85	78	83	76	78	73	68	62	82	89
BU-4252 Instrument Air Building Wall	Field	94	90	86	83	80	74	72	69	70	82	95
BU-3136 Regen Gas Compressor Building Closed Door North	Field	95	93	83	77	76	77	74	68	62	81	95
BU-3136 Regen Gas Compressor Building Closed Door South	Field	95	93	83	77	76	77	74	68	62	81	95
BU-1890 Cochin Pump Building Louver Open	Field	76	77	70	77	76	76	76	61	60	81	84
BU-1890 Cochin Pump Building Louver Open	Field	76	77	70	77	76	76	76	61	60	81	84
BU-1107 Hot Oil Building Open Window East	Field	82	77	69	70	76	76	73	71	66	80	84
BU-1107 Hot Oil Building Open Window South	Field	82	77	69	70	76	76	73	71	66	80	84
BU-1107 Hot Oil Building Open Window West	Field	82	77	69	70	76	76	73	71	66	80	84
HR-4111 Regeneration Gas Heater West Air Inlet	Field	88	87	82	68	69	77	72	72	68	80	90
BU-3132 Hot Oil Building Open Window	Field	78	73	70	69	68	78	72	67	65	80	82
M-3147 Cryo Flare Air Assist Blower Body 33%	Field	86	83	80	74	71	66	67	78	56	80	87
BU-4252 Instrument Air Building Air Compressor Discharge	Field	77	80	85	82	76	75	71	63	56	80	88
HR-4111 Regeneration Gas Heater Bottom Air Inlet	Field	86	84	78	70	71	75	73	72	67	80	88
HT-4063 Amine Reneration OH Condenser Housing	Field	98	90	88	82	76	72	69	64	62	80	97
HT-4071 Amine Cooler Housing	Field	98	90	88	82	76	72	69	64	62	80	97
BU-3137 C2 Product Pump Building Closed Windows West	Field	89	85	81	76	73	76	72	66	61	79	89

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3137 C2 Product Pump Building Closed Windows East	Field	89	85	81	76	73	76	72	66	61	79	89
BU-1106 Reflux Pump Building Closed Door North	Field	91	88	84	82	78	73	67	63	61	79	92
BU-1102 Injection Pump Building North Closed Door	Field	91	88	84	82	78	73	67	63	61	79	92
BU-1102 Injection Pump Building Closed Door Northwest	Field	91	88	84	82	78	73	67	63	61	79	92
BU-1102 Injection Pump Building Closed Door Southwest	Field	91	88	84	82	78	73	67	63	61	79	92
BU-1102 Injection Pump Building Closed Door Northeast	Field	91	88	84	82	78	73	67	63	61	79	92
BU-1102 Injection Pump Building Closed Door Northeast	Field	91	88	84	82	78	73	67	63	61	79	92
BU-1102 Injection Pump Building Closed Door East	Field	91	88	84	82	78	73	67	63	61	79	92
BU-4258 Injection Pump Building OH Door SW Closed	Field	87	88	84	79	75	72	73	63	60	79	91
BU-3132 Hot Oil Building Open Louver	Field	76	72	69	67	66	78	69	63	62	79	81
BU-3132 Hot Oil Building Closed OH Door	Field	88	85	81	76	73	76	70	65	64	79	89
BU-1890 Cochin Pump Building Window Open	Field	75	72	73	75	74	74	72	65	62	78	82
BU-1890 Cochin Pump Building Window Open	Field	75	72	73	75	74	74	72	65	62	78	82
BU-1890 Cochin Pump Building Window Open	Field	75	72	73	75	74	74	72	65	62	78	82
BU-1890 Cochin Pump Building Louver Closed	Field	77	78	71	75	71	72	75	53	52	78	82
BU-1890 Cochin Pump Building Louver Closed	Field	77	78	71	75	71	72	75	53	52	78	82
BU-4252 Instrument Air Building Louver Open	Field	79	76	69	70	80	69	65	61	61	78	83
HR-1501 Regen Gas Heater & Salt Bath Top Air Inlet	Field	86	81	72	79	73	71	71	67	64	78	87

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3136 Regen Gas Compressor Building North Lube Oil Cooler Louver Closed	Field	83	77	74	71	72	74	70	65	62	78	83
BU-1107 Hot Oil Building North Door Closed	Field	91	86	82	76	73	72	70	66	63	77	91
BU-1107 Hot Oil Building West Door Closed	Field	91	86	82	76	73	72	70	66	63	77	91
BU-1106 Reflux Pump Building Closed Window East	Field	94	88	82	79	75	72	68	64	60	77	93
BU-1106 Reflux Pump Building Closed Window West	Field	94	88	82	79	75	72	68	64	60	77	93
HR-3044 Regen Gas Heater Exhaust Pilot	Field	84	81	77	73	68	67	72	71	69	77	85
BU-1106 Reflux Pump Building Ridge Vent	Field	90	85	79	79	76	71	64	63	57	77	90
BU-1106 Reflux Pump Building Closed Louver East	Field	90	85	79	74	75	74	67	59	56	77	90
BU-1106 Reflux Pump Building Closed Louver West	Field	90	85	79	74	75	74	67	59	56	77	90
BU-1821 Cochin MCC Building East Air Handling Unit	Field	72	69	81	75	73	73	71	62	54	77	83
BU-3136 Regen Gas Compressor Building Ridge Vent	Field	85	82	80	74	74	73	69	63	60	77	87
BU-3137 C2 Product Pump Building Open Louver	Field	85	75	73	71	69	73	72	67	61	77	84
BU-3132 Hot Oil Building Closed Door East	Field	87	83	80	75	72	74	68	63	62	77	88
BU-3132 Hot Oil Building Closed West	Field	87	83	80	75	72	74	68	63	62	77	88
BU-1111 Pentane Pump Building Window Closed	Field	85	80	75	77	76	72	66	58	56	77	86
BU-1128 Injection Pump Building #2 Louver Open	Field	79	84	84	79	72	71	68	64	57	77	88
BU-3137 C2 Product Pump Building Closed Door West	Field	90	88	78	72	71	72	69	63	57	76	90

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3137 C2 Product Pump Building Closed Door East	Field	90	88	78	72	71	72	69	63	57	76	90
HR-1501 Regen Gas Heater & Salt Bath Bottom Air Inlet	Field	86	82	76	72	69	68	72	66	68	76	86
BU-1111 Pentane Pump Building Window Closed	Field	84	80	76	79	75	71	64	57	54	76	86
BU-1111 Pentane Pump Building Window Closed	Field	84	80	76	79	75	71	64	57	54	76	86
BU-4250 Amine Building Door Open North	Field	84	78	73	68	71	73	69	65	61	76	84
BU-4250 Amine Building Door Open South	Field	84	78	73	68	71	73	69	65	61	76	84
BU-1890 Cochin Pump Building OH Door Closed	Field	81	80	74	75	71	73	70	54	54	76	84
BU-1117 White Building (Wash Pump Building) South Window Open	Field	71	69	64	64	67	68	71	71	65	76	77
BU-1117 White Building (Wash Pump Building) West Window Open	Field	71	69	64	64	67	68	71	71	65	76	77
BU-1117 White Building (Wash Pump Building) West Window Open	Field	71	69	64	64	67	68	71	71	65	76	77
BU-1117 White Building (Wash Pump Building) West Window Open	Field	71	69	64	64	67	68	71	71	65	76	77
BU-700 MCC 700 Building HVAC Exhaust	Field	77	74	79	82	71	68	63	58	54	76	85
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-4258 Injection Pump Building Louver Open	Field	72	79	69	65	63	64	73	61	50	75	80
BU-1117 White Building (Wash Pump Building) North OH Door Closed	Field	89	84	77	70	71	68	69	65	59	75	89
BU-3132 Hot Oil Building Ridge Vent	Field	83	78	73	71	67	73	62	60	63	75	83
BU-1128 Injection Pump Building #2 OH Door Closed South	Field	83	87	84	77	70	66	64	57	55	74	89
BU-1128 Injection Pump Building #2 OH Door Closed East	Field	83	87	84	77	70	66	64	57	55	74	89
BU-3136 Regen Gas Compressor Building East Closed Windows	Field	84	82	76	70	68	69	68	61	60	74	85
BU-3136 Regen Gas Compressor Building West Closed Windows	Field	84	82	76	70	68	69	68	61	60	74	85
BU-3136 Regen Gas Compressor Building South Lube Oil Cooler Louver Closed	Field	81	77	72	69	69	70	67	61	59	74	82
BU-1107 Hot Oil Building Open Louver	Field	78	72	64	64	70	70	66	62	57	74	79
BU-4252 Instrument Air Building Skid and Underskid	Field	86	84	79	75	74	62	58	53	53	74	87
BU-4252 Instrument Air Building Louver Closed	Field	81	75	68	68	75	64	62	59	55	73	81
BU-4252 Instrument Air Building Doors Closed	Field	83	80	73	67	73	65	65	61	60	73	84
HT-4063 Amine Reneration OH Condenser Discharge	Field	89	81	81	76	70	67	61	56	53	73	88
HT-4071 Amine Cooler Discharge	Field	89	81	81	76	70	67	61	56	53	73	88
BU-4250 Amine Building OH Door Closed	Field	88	81	81	69	72	67	62	60	60	73	88
BU-4250 Amine Building Gable Fan	Field	72	70	87	70	67	62	62	57	48	73	87
BU-1111 Pentane Pump Building Door Closed	Field	80	77	75	73	72	68	63	55	49	73	82
BU-1111 Pentane Pump Building Door Closed	Field	80	77	75	73	72	68	63	55	49	73	82
BU-1111 Pentane Pump Building Ridge Vent	Field	74	73	68	74	72	67	61	52	47	73	79

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-3132 Hot Oil Building Closed Louver	Field	78	75	69	66	63	70	64	59	60	72	79
BU-1128 Injection Pump Building #2 Door Closed North	Field	86	81	79	73	69	66	64	58	54	72	86
BU-1128 Injection Pump Building #2 Door Closed South	Field	86	81	79	73	69	66	64	58	54	72	86
BU-1128 Injection Pump Building #2 Door Closed Northwest	Field	86	81	79	73	69	66	64	58	54	72	86
BU-1128 Injection Pump Building #2 Door Closed Northeast	Field	86	81	79	73	69	66	64	58	54	72	86
BU-1128 Injection Pump Building #2 Door Closed Southwest	Field	86	81	79	73	69	66	64	58	54	72	86
BU-1128 Injection Pump Building #2 Door Closed Southeast	Field	86	81	79	73	69	66	64	58	54	72	86
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-4258 Injection Pump Building Louver Closed	Field	72	79	69	65	63	61	70	57	49	72	80
BU-3137 C2 Product Pump Building Closed Louver	Field	84	79	70	68	65	69	65	60	54	72	84
BU-4252 Instrument Air Building Gable Fan	Field	77	75	81	68	67	66	64	59	55	72	83
BU-1117 White Building (Wash Pump Building) South OH Door Closed	Field	85	81	76	70	67	65	65	62	59	72	85
BU-1103 Treater Building South Closed Door	Field	83	80	72	65	64	66	65	63	57	71	83

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-1103 Treater Building North Closed Door	Field	83	80	72	65	64	66	65	63	57	71	83
BU-1103 Treater Building Sliding Door Closed	Field	83	80	72	65	64	66	65	63	57	71	83
BU-4258 Injection Pump Building Door Closed	Field	79	76	71	67	69	61	65	54	51	70	80
BU-4258 Injection Pump Building Door Closed	Field	79	76	71	67	69	61	65	54	51	70	80
BU-4258 Injection Pump Building Door Closed	Field	79	76	71	67	69	61	65	54	51	70	80
BU-4258 Injection Pump Building Door Closed	Field	79	76	71	67	69	61	65	54	51	70	80
BU-4252 Instrument Air Building Ridge Vent	Field	77	70	73	72	68	63	60	58	58	70	79
BU-1107 Hot Oil Building Ridge Vent Open	Field	79	75	72	70	68	65	60	57	54	70	80
BU-4250 Amine Building Window Closed	Field	82	77	74	70	64	64	62	54	52	69	82
BU-4250 Amine Building Window Closed	Field	82	77	74	70	64	64	62	54	52	69	82
BU-1107 Hot Oil Building Closed Louver	Field	78	71	65	63	66	66	61	56	54	69	77
BU-1890 Cochin Pump Building Door Closed	Field	76	73	67	67	63	65	62	45	47	69	77
BU-1890 Cochin Pump Building Door Closed	Field	76	73	67	67	63	65	62	45	47	69	77
BU-1107 Hot Oil Building Closed Window East	Field	79	74	69	66	64	64	60	59	57	68	79
BU-1107 Hot Oil Building Closed Window South	Field	79	74	69	66	64	64	60	59	57	68	79
BU-1107 Hot Oil Building Closed Window West	Field	79	74	69	66	64	64	60	59	57	68	79
BU-3132 Hot Oil Building Closed Window	Field	80	75	68	66	58	65	59	58	60	68	80
BU-1821 Cochin MCC Building South Louver	Field	79	73	77	67	65	62	59	52	50	68	80
BU-3131 Refrigerant Compressor Building West Air Handling Unit Inlet	Field	74	69	63	67	67	60	58	57	59	68	75

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-4250 Amine Building Door Closed North	Field	85	81	76	69	64	60	56	56	49	68	85
BU-4250 Amine Building Door Closed South	Field	85	81	76	69	64	60	56	56	49	68	85
BU-1117 White Building (Wash Pump Building) North Door Closed	Field	82	79	70	63	60	57	61	59	52	67	82
BU-4250 Amine Building Louver Open	Field	79	74	65	60	61	63	59	54	49	66	78
BU-4250 Amine Building Louver Open	Field	79	74	65	60	61	63	59	54	49	66	78
BU-4250 Amine Building Louver Open	Field	79	74	65	60	61	63	59	54	49	66	78
BU-1128 Injection Pump Building #2 Door Closed	Field	76	77	69	69	59	57	56	50	50	65	79
HR-3044 Regen Gas Heater Top Air Inlet Pilot	Field	75	74	68	63	57	55	58	57	59	65	77
BU-1117 White Building (Wash Pump Building) North Window Closed	Field	78	73	66	62	60	56	59	51	45	64	77
BU-4250 Amine Building Louver Closed	Field	79	75	66	61	60	60	56	52	47	64	79
BU-4250 Amine Building Louver Closed	Field	79	75	66	61	60	60	56	52	47	64	79
BU-4250 Amine Building Louver Closed	Field	79	75	66	61	60	60	56	52	47	64	79
BU-1117 White Building (Wash Pump Building) East Door Closed	Field	75	73	66	61	57	56	58	55	53	64	76
HR-3044 Regen Gas Heater Bottom Air Inlet Pilot	Field	77	73	68	62	57	53	58	56	56	64	77
BU-1890 Cochin Pump Building Window Closed	Field	78	72	69	64	62	57	52	44	42	63	77
BU-1890 Cochin Pump Building Window Closed	Field	78	72	69	64	62	57	52	44	42	63	77
BU-1890 Cochin Pump Building Window Closed	Field	78	72	69	64	62	57	52	44	42	63	77
BU-4258 Injection Pump Building Gable Fan	Field	66	62	54	54	60	52	58	46	37	62	67
Brine Back Pressure Building #2 Open Louver East	Field	57	52	40	52	54	57	56	54	43	62	63
Brine Back Pressure Building #2 Open Louver West		57	52	40	52	54	57	56	54	43	62	63

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
BU-1117 White Building (Wash Pump Building) South Window Closed	Field	74	68	62	57	53	50	48	44	43	57	73
BU-1117 White Building (Wash Pump Building) West Window Closed	Field	74	68	62	57	53	50	48	44	43	57	73
BU-1117 White Building (Wash Pump Building) West Window Closed	Field	74	68	62	57	53	50	48	44	43	57	73
BU-1117 White Building (Wash Pump Building) West Window Closed	Field	74	68	62	57	53	50	48	44	43	57	73

Appendix E: Source Order Ranking - Receiver R4

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
001	BU-1102 Bldg Exhaust Tip	34.4	11.2
002	HT-3080-87 Refrig Condensers Inlet	32.5	15.1
003	HR-1502 Hot Oil Furnace Inlet Area	31.7	2.9
004	BU-1102 Bldg PM-1803 Engine Exhaust	31.7	12.3
005	BU-3131 Refrig Bldg Open Louver SW	28.2	1.9
006	BU-3131 Refrig Bldg Open Louver NW	28.1	2.1
007	HT-1610 Coolant Condenser Inlet	27.2	15.6
008	HT-4041 Debut OH Condenser Inlet	27.2	11.0
009	HT-1606 OH Condenser Inlet	27.2	13.4
010	HR-4155 Hot Oil HM Heater Inlet Area	27.0	13.5
011	DU-2206 and 2207 Dehydrator Piping	26.5	3.2
012	HT-4021 Deprop OH Condenser Inlet	25.8	13.8
013	Valve Skid Piping NW Corner BU-1102	25.4	8.4
014	HT-1607 and 1608 Cooler Inlet	25.3	9.8
015	HT-3080-87 Refrig Condensers Discharge	24.2	17.0
016	HT-1619 Refrig Condenser Fan Inlet	23.6	13.6
017	HT-4041 Debut OH Condenser Discharge	23.5	21.6
018	HT-1610 Coolant Condenser Discharge	23.1	6.7
019	Vapour Compressor Skid	22.7	2.8
020	HT-4021 Deprop OH Condenser Discharge	22.2	16.9
021	HT-1606 OH Condenser Housing	21.6	17.4
022	PM-1832 Pump	21.2	1.8
023	HT-1613 ADIP Cooler Fan Inlet	20.9	14.1
024	PM-4156 Hot Oil HM Circulation Pump	20.8	8.0
025	HT-1604 OH Condenser Inlet	20.5	22.8
026	HT-1610 Coolant Condenser Housing	20.4	11.0
027	HT-1613 ADIP Cooler Fan Discharge	20.1	11.6
028	PM-4157 Hot Oil HM Circulation Pump	20.0	4.0
029	HT-1607 and 1608 Cooler Discharge	19.8	11.2
030	HT-1604 OH Condenser Discharge	19.7	19.7
031	HT-3080-87 Refrig Condensers Housing	19.7	18.5
032	BU-1102 Bldg Bldg Wall N	19.7	18.8
033	PM-1812 Propane Inj Booster Pump	18.6	5.8
034	BU-1111 Pump Bldg Sliding Door Open	18.2	-2.4
035	HT-1619 Refrig Condenser Fan Discharge	18.0	16.4
036	PV-4170 MP Fuel Gas Scrubber	17.9	3.5
037	HT-1607 and 1608 Cooler Housing	17.8	12.6
038	BU-1106 Pump Bldg Slide Door Closed	17.2	1.6
039	Piping Section 1	17.2	6.1
040	HT-1619 Refrig Condenser Fan Housing	16.8	15.7
041	Future Injection Pump Bldg Wall N	16.5	19.8
042	BU-1102 Bldg Cooler Fan Inlet	16.2	7.5
043	H-3150 Hot Oil Heater Inlet Area	16.2	13.7
044	BU-4258 Pump Bldg Bldg Wall N	16.1	20.3
045	HT-1613 ADIP Cooler Fan Housing	16.1	16.5
046	PM-1815 1816 Butane Inj Booster Pump	15.9	5.6
047	PM-4023 Depropanizer Reflux Pump	15.9	8.4
048	BU-1106 Pump Bldg Open Window W	15.8	6.8

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
049	BU-1102 Bldg Cooler Discharge Piping	15.4	22.5
050	BU-3131 Refrig Bldg OH Door Closed	15.1	-3.1
051	HT-1604 OH Condenser Housing	15.1	25.2
052	HT-1606 OH Condenser Discharge	14.9	18.8
053	PM-4141 Propane Inj Booster Pump	14.5	1.9
054	BU-1128 Bldg #2 Pump 1853 Cooler Disch	14.4	3.3
055	HT-4060 Butane Cooler Discharge	14.4	19.3
056	M-3147 Cryo Flare Blower Inlet 33%	14.3	10.8
057	BU-1102 Bldg Bldg Wall W	14.1	20.6
058	HT-4112 Regen Gas Cooler Inlet	14.0	17.8
059	HT-4063 OH Condenser Inlet	13.8	17.1
060	H-3044 Heater Bottom Air Intake	13.5	4.4
061	HT-4060 Butane Cooler Inlet	13.3	22.9
062	BU-1102 Bldg PM-1803 Exhaust Piping	13.3	22.3
063	PM-4043 Debutanizer Reflux Pump	13.2	10.6
064	HT-4041 Debut OH Condenser Housing	12.9	14.5
065	BU-1102 Bldg Exhaust Piping	12.8	28.9
066	H-3044 Heater Top Air Intake	12.8	4.9
067	HT-4130 Condensate Cooler Inlet	12.6	22.3
068	Piping Section 7	12.4	18.8
069	Future Injection Pump Bldg Wall W	12.4	2.5
070	HT-4021 Deprop OH Condenser Housing	12.2	14.8
071	HT-4089/4090 Coolant Condenser Inlet	12.2	16.9
072	BU-700 MCC Bldg HVAC Inlet	12.0	6.6
073	HT-4130 Condensate Cooler Discharge	12.0	23.0
074	Future MCC Bldg HVAC Inlet	11.8	6.8
075	HT-4071 Amine Cooler Inlet	11.5	24.8
076	BU-1102 Bldg Bldg Wall S	11.5	19.4
077	Piping Section 9	11.3	1.4
078	HT-4089/4090 Coolant Condenser Discharge	11.2	18.9
079	Piping Section 8	11.0	3.6
080	BU-4258 Pump Bldg Bldg Wall W	10.8	19.3
081	U-3003 Inlet Meter Skid Piping	10.5	15.1
082	HT-4112 Regen Gas Cooler Housing	10.4	19.7
083	BU-3131 Refrig Bldg Bldg Wall N	10.3	16.9
084	BU-3131 Refrig Bldg Bldg Wall W	10.2	17.4
085	BU-3137 Pump Bldg Open Windows W	9.9	9.4
086	BU-1102 Bldg Cooler Discharge	9.8	22.5
087	BU-1111 Pump Bldg Window Open N	9.7	9.7
088	BU-3131 Refrig Bldg Closed Door N	9.6	4.1
089	HT-4112 Regen Gas Cooler Discharge	9.6	4.3
090	BU-3131 Refrig Bldg Closed Door N	9.6	21.8
091	Piping Section 4	8.9	8.9
092	Piping Section 3	8.7	9.4
093	HR-4111 Heater Exhaust	8.6	15.3
094	BU-1128 Bldg #2 Bldg Wall N	8.5	18.6
095	PM-3142/3143 Deeth Feed Booster Pump	8.4	18.0
096	H-3044 Heater Exhaust	8.4	13.4

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
097	PM-1861 C5 Pump	8.4	7.3
098	BU-1106 Pump Bldg Open Window S	8.2	14.6
099	BU-4250 Amine Bldg Bldg Wall W	8.2	15.6
100	PM-4138 Condensate Pump	8.1	12.1
101	BU-1106 Pump Bldg Open Louver W	7.9	9.8
102	HT-4130 Condensate Cooler Housing	7.6	18.4
103	BU-4258 Pump Bldg PMM 4132 Cooler	7.2	10.0
104	PM-3015/3016 Deethanizer Reflux Pump	7.1	11.7
105	BU-1102 Bldg Air Intake	7.1	17.1
106	BU-1102 Bldg PM-1803 Air Intake	6.9	14.8
107	HT-4060 Butane Cooler Housing	6.8	18.9
108	HT-4063 OH Condenser Housing	6.6	17.1
109	BU-4250 Amine Bldg Skid and Underskid	6.6	16.2
110	PM-4144 Butane Inj Booster Pump	6.3	10.6
111	PM-3152/3153 Deeth Feed Pump	6.1	15.1
112	BU-3132 Hot Oil Bldg Bldg Wall W	6.0	19.3
113	HT-3037 Regen Exchanger Discharge	5.9	22.9
114	HT-3037 Regen Exchanger Inlet E	5.7	13.6
115	BU-3132 Hot Oil Bldg Skid Underskid W	5.7	23.2
116	BU-1106 Pump Bldg Closed Door N	5.5	8.5
117	BU-3132 Hot Oil Bldg Bldg Wall N	5.2	13.8
118	BU-4250 Amine Bldg Bldg Wall N	5.1	26.3
119	BU-1102 Bldg Ridge Vent	5.0	11.0
120	BU-1102 Bldg PM-1803 Cooler Piping	5.0	15.4
121	HT-4089/4090 Coolant Condenser Housing	4.9	18.9
122	HT-4071 Amine Cooler Housing	4.9	18.3
123	BU-1128 Bldg #2 Pump 1854 Cooler Disch	4.7	14.4
124	BU-3132 Hot Oil Bldg Skid Underskid N	4.7	7.3
125	BU-1102 Bldg Purge Air Blower and Piping	4.4	24.2
126	BU-4258 Pump Bldg Bldg Wall S	4.1	27.5
127	Future Injection Pump Bldg Wall S	4.0	20.5
128	BU-1128 Bldg #2 Bldg Wall W	4.0	25.5
129	HR-1501 Heater & Salt Bath Exhaust	4.0	14.6
130	BU-1103 Treater Bldg N Open Windows	3.8	8.7
131	HR-4111 Heater W Air Inlet	3.7	12.2
132	BU-4250 Amine Bldg Skid and Underskid	3.5	13.5
133	BU-1107 Hot Oil Bldg N Door Closed	3.5	16.5
134	Piping Section 2	3.3	20.0
135	BU-1102 Bldg Closed Door N	3.2	17.1
136	BU-3132 Hot Oil Bldg Open Louvers	3.2	-0.6
137	BU-3137 Pump Bldg Closed Door W	3.0	16.7
138	BU-1102 Bldg Purge Air Disch P1818 Piping	2.8	22.1
139	BU-1102 Bldg Closed Door NE	2.7	17.5
140	HR-4111 Heater Bottom Air Inlet	2.7	11.3
141	BU-1890 Pump Bldg Louver Open	2.4	17.8
142	BU-1890 Pump Bldg Bldg Wall W	2.4	9.2
143	BU-4258 Pump Bldg PMM 4135 Cooler	2.2	13.1
144	BU-1117 White Bldg N OH Door Open	2.2	12.4

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
145	BU-1128 Bldg #2 Louver Open	2.2	15.9
146	BU-3137 Pump Bldg Open OH Door	2.1	28.4
147	BU-1102 Bldg Bldg Wall E	2.0	28.7
148	HR-1501 Heater & Salt Bath Top Air Inlet	2.0	10.1
149	PM-3015/3016 Deethanizer Reflux Motor	1.8	14.5
150	Piping Section 6	1.8	12.0
151	HT-3037 Regen Exchanger Housing	1.7	24.6
152	BU-4252 IA Bldg Air Comp Discharge	1.6	12.0
153	BU-4250 Amine Bldg Gable Fan	1.4	10.6
154	BU-3137 Pump Bldg Open Louver W	1.2	16.9
155	BU-1106 Pump Bldg Ridge Vent	1.1	11.4
156	BU-4258 Pump Bldg PMM 4132 Cooler	1.0	17.1
157	BU-1102 Bldg PM-1803 Cooler Discharge	0.8	26.2
158	BU-4258 Pump Bldg PMM 4135 Cooler	0.6	16.2
159	Future MCC Bldg HVAC Exhaust	0.6	7.0
160	BU-1111 Pump Bldg Window Open S	0.6	8.0
161	BU-700 MCC Bldg HVAC Exhaust	0.4	18.2
162	BU-1890 Pump Bldg Bldg Wall N	0.4	7.8
163	HT-4063 OH Condenser Discharge	0.3	14.5
164	BU-1102 Bldg PM-1803 Cooler Louver	0.2	14.3
165	BU-1111 Pump Bldg Bldg Wall W	0.1	21.5
166	BU-3131 Refrig Bldg AHU Inlet	-0.2	17.3
167	HR-1501 Heater & Salt Bath Bot Air Inlet	-0.2	12.6
168	BU-1111 Pump Bldg Bldg Wall N	-0.3	20.7
169	BU-4258 Pump Bldg Bldg Wall E	-0.5	13.9
170	M-3147 Cryo Flare Blower Body 33%	-0.5	25.4
171	BU-4252 IA Bldg Doors Closed	-0.5	14.2
172	BU-1111 Pump Bldg Bldg Wall E	-0.9	16.0
173	BU-1106 Pump Bldg Open Window E	-1.0	18.3
174	BU-3136 Comp Bldg Closed Door S	-1.0	25.5
175	Future Injection Pump Bldg Wall E	-1.3	24.6
176	Piping Section 5	-1.4	19.8
177	BU-3132 Hot Oil Bldg Ridge Vent	-1.5	13.4
178	BU-4252 IA Bldg Gable Fan	-1.6	11.7
179	HT-4071 Amine Cooler Discharge	-1.7	16.5
180	HR-3044 Heater Exhaust Pilot	-1.8	12.3
181	BU-1128 Bldg #2 Bldg Wall E	-1.9	23.7
182	BU-1128 Bldg #2 Door Closed N	-2.1	17.0
183	BU-4250 Amine Bldg OH Door Open	-2.2	21.4
184	BU-4252 IA Bldg Bldg Wall N	-2.3	16.1
185	BU-4252 IA Bldg Bldg Wall W	-2.8	18.1
186	BU-1128 Bldg #2 Bldg Wall S	-2.9	24.7
187	BU-1890 Pump Bldg Window Open	-2.9	8.2
188	BU-1102 Bldg Open OH Door	-2.9	8.3
189	BU-1890 Pump Bldg Window Open	-3.0	19.0
190	BU-3132 Hot Oil Bldg Closed Door W	-3.2	19.5
191	BU-4250 Amine Bldg Window Closed E	-3.2	15.2
192	BU-1107 Hot Oil Bldg Open Window W	-3.3	14.3

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
193	BU-1107 Hot Oil Bldg W Door Closed	-3.5	23.2
194	BU-3132 Hot Oil Bldg Closed OH Door	-3.6	21.4
195	BU-4250 Amine Bldg Bldg Wall E	-3.7	17.5
196	BU-3136 Comp Bldg E Open Windows	-3.7	26.4
197	BU-3132 Hot Oil Bldg Bldg Wall E	-3.9	22.7
198	BU-1102 Bldg Open Door S	-3.9	27.1
199	BU-3136 Comp Bldg W Open Windows	-3.9	31.9
200	BU-3131 Refrig Bldg Bldg Wall S	-4.0	17.8
201	BU-4250 Amine Bldg Door Closed N	-4.0	19.1
202	BU-4258 Pump Bldg OH Door E Closed	-4.1	18.3
203	BU-1890 Pump Bldg OH Door Closed	-4.2	14.7
204	BU-3136 Comp Bldg Closed Door N	-4.5	29.0
205	BU-4258 Pump Bldg Louver Open	-4.6	11.8
206	BU-4258 Pump Bldg Louver Open	-4.6	12.2
207	BU-1128 Bldg #2 Pump 1854 Cooler Disch	-4.6	12.1
208	BU-3136 Comp Bldg S Cooler Louver Open	-4.8	10.6
209	BU-1128 Bldg #2 Pump 1853 Cooler Disch	-4.8	14.1
210	BU-4258 Pump Bldg Louver Open	-4.8	12.6
211	BU-3132 Hot Oil Bldg Bldg Wall S	-5.0	25.0
212	BU-3131 Refrig Bldg Bldg Wall E	-5.1	16.2
213	BU-4258 Pump Bldg OH Door E Closed	-5.1	29.1
214	BU-1107 Hot Oil Bldg Open Window S	-5.1	17.0
215	BU-4258 Pump Bldg Louver Open	-5.7	13.3
215	BU-4258 Pump Bldg Louver Open	-5.7	13.5
215	BU-4258 Pump Bldg Louver Open	-5.7	13.5
218	BU-4258 Pump Bldg Louver Open	-5.8	13.4
219	PM-3069/3070 Propane Coolant Pump	-5.8	18.7
220	BU-4252 IA Bldg Skid and Underskid	-6.0	12.0
221	BU-3132 Hot Oil Bldg Closed Window	-6.0	17.9
222	BU-4250 Amine Bldg Louver Open W	-6.3	20.7
223	BU-1128 Bldg #2 OH Door Closed E	-6.4	15.0
224	BU-3137 Pump Bldg Open Windows E	-6.7	20.3
225	BU-3131 Refrig Bldg W AHU Inlet	-6.8	9.4
226	BU-3136 Comp Bldg N Cooler Louver Open	-6.9	17.9
227	BU-4252 IA Bldg Skid and Underskid	-7.0	12.7
228	BU-4252 IA Bldg Ridge Vent	-7.1	15.9
229	BU-1102 Bldg Cooler Fan Louver P1817	-7.2	23.1
230	BU-4258 Pump Bldg Door Closed W	-7.3	13.2
231	BU-1117 White Bldg S OH Door Open	-7.4	15.1
232	BU-4250 Amine Bldg Bldg Wall S	-7.5	29.0
233	BU-1102 Bldg Cooler Fan Louver P1818	-7.6	20.9
234	BU-1103 Treater Bldg Sliding Door Closed	-7.9	20.4
235	BU-3132 Hot Oil Bldg Skid Underskid E	-7.9	24.7
236	BU-1102 Bldg Purge Air Discharge P1818	-8.0	27.7
237	BU-1111 Pump Bldg Bldg Wall S	-8.0	16.0
238	BU-1107 Hot Oil Bldg Open Window E	-8.1	23.3
239	BU-3132 Hot Oil Bldg Skid Underskid S	-8.3	26.1
240	BU-1103 Treater Bldg N Closed Door	-8.5	14.8

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
241	BU-1102 Bldg Open Louver	-8.8	23.4
242	BU-4258 Pump Bldg Louver Open	-9.1	4.8
243	BU-1128 Bldg #2 Door Closed NE	-9.4	24.2
244	BU-1106 Pump Bldg Open Louver E	-9.5	20.2
245	BU-3137 Pump Bldg Closed Door E	-9.5	25.1
246	BU-1111 Pump Bldg Ridge Vent	-9.8	14.4
247	BU-3131 Refrig Bldg Closed Door N	-9.9	23.1
248	BU-4250 Amine Bldg Skid and Underskid	-10.0	27.5
249	BU-1117 White Bldg N Window Open	-10.0	10.9
250	BU-1890 Pump Bldg Bldg Wall E	-10.8	24.5
251	BU-1890 Pump Bldg Louver Open	-11.1	17.6
252	BU-4252 IA Bldg Bldg Wall E	-11.1	19.5
253	BU-1107 Hot Oil Bldg Open Louver W	-11.1	24.6
254	BU-4252 IA Bldg Louver Open	-11.3	19.3
255	BU-1102 Bldg Closed Door E	-11.8	25.5
256	BU-4258 Pump Bldg Door Closed N	-12.0	26.4
257	BU-1102 Bldg Closed Door SW	-12.0	20.2
258	BU-1890 Pump Bldg P1891 Cooler Louver	-12.2	19.3
259	BU-1890 Pump Bldg Door Closed	-12.3	16.8
260	BU-3132 Hot Oil Bldg Closed Door E	-12.4	21.6
261	BU-3137 Pump Bldg Open Louver E	-12.4	23.9
262	BU-1111 Pump Bldg Door Closed N	-12.4	22.4
263	BU-3136 Comp Bldg Ridge Vent	-12.5	26.2
264	BU-1890 Pump Bldg Bldg Wall S	-12.5	18.1
265	BU-1890 Pump Bldg P1890 Cooler Louver	-12.5	23.9
266	BU-4258 Pump Bldg Louver Open	-12.8	21.1
267	BU-4258 Pump Bldg Louver Open	-12.8	16.2
268	BU-4258 Pump Bldg Door Closed N	-13.0	21.4
269	BU-4250 Amine Bldg Skid and Underskid	-13.1	28.2
270	BU-4258 Pump Bldg Louver Open	-13.1	16.4
271	BU-1117 White Bldg W Window Open	-13.2	14.1
272	BU-4258 Pump Bldg Louver Open	-13.3	16.6
273	BU-4258 Pump Bldg Louver Open	-13.4	21.2
274	BU-1128 Bldg #2 OH Door Closed S	-13.4	21.8
275	HR-3044 Heater Top Air Inlet Pilot	-13.4	16.1
276	BU-1117 White Bldg W Window Open	-13.6	9.3
277	BU-4258 Pump Bldg Louver Open	-13.6	16.9
278	BU-1128 Bldg #2 Door Closed W	-14.1	21.8
279	HR-3044 Heater Bottom Air Inlet Pilot	-14.2	17.4
280	BU-4252 IA Bldg Bldg Wall S	-14.4	26.6
281	BU-4258 Pump Bldg OH Door SW Closed	-14.5	25.8
282	BU-1117 White Bldg N Door Closed	-14.7	25.0
283	BU-4258 Pump Bldg OH Door SW Closed	-15.3	22.8
284	BU-1107 Hot Oil Bldg Open Louver	-15.9	18.6
285	BU-4250 Amine Bldg Door Closed S	-16.8	29.2
286	BU-1821 Cochin MCC Bldg E AHU	-17.5	13.6
287	BU-4250 Amine Bldg Window Closed E	-17.8	28.8
288	BU-1890 Pump Bldg Window Open	-19.1	17.2

Table E: Source Order Ranking – Receiver R4

Rank	Noise Source	SPL (dBA)	dBC-dBA
289	BU-4258 Pump Bldg Door Closed W	-19.2	24.5
290	BU-1128 Bldg #2 Door Closed SW	-19.3	26.3
291	BU-1128 Bldg #2 Door Closed SE	-19.4	26.2
292	BU-4252 IA Bldg Skid and Underskid	-19.5	26.2
293	BU-4258 Pump Bldg Louver Open	-19.6	22.9
294	BU-1111 Pump Bldg Door Closed S	-20.5	22.1
295	BU-1117 White Bldg W Window Open	-20.6	21.5
296	BU-1103 Treater Bldg S Closed Door	-22.9	35.2
297	BU-4258 Pump Bldg Louver Open	-23.2	23.1
298	BU-4258 Pump Bldg Louver Open	-23.3	22.7
299	BU-4258 Pump Bldg Louver Open	-23.3	23.0
300	BU-4258 Pump Bldg Louver Open	-23.4	22.2
301	BU-4258 Pump Bldg Louver Open	-24.5	31.2
301	BU-4258 Pump Bldg Louver Open	-24.5	20.4
303	BU-4250 Amine Bldg Louver Open E	-24.5	20.3
304	BU-4258 Pump Bldg Louver Open	-24.6	20.3
305	BU-4252 IA Bldg Skid and Underskid	-24.7	30.0
306	BU-1117 White Bldg S Window Open	-24.8	17.2
307	BU-1821 Cochin MCC Bldg S Louver	-27.4	29.7
308	BU-1128 Bldg #2 Door Closed E	-28.8	32.9
309	Brine BP Bldg #2 Open Louver E	-29.5	9.5
309	Brine BP Bldg #2 Open Louver W	-29.5	9.5
311	BU-4258 Pump Bldg Door Closed E	-29.6	30.3
312	BU-4258 Pump Bldg Door Closed E	-29.7	29.5
	Facility SPL	42.3	14.0
	Adjacent Facility	49.3	
	ASL	35.0	-
	Cumulative SPL	50.2	-
	NCIA PSL	50.4	-

Appendix F: Technical Details and Best Practices Approach

Technical Details

Sound is the phenomena of vibrations transmitted through air, or other medium such as water or a building structure. The range of pressure amplitudes, intensities, and frequencies of the sound energy is very wide, and many specialized fields have developed using different ranges of these variables, such as room acoustics and medical ultrasound.

Due to the wide range of intensities, which are perceived as sound, standard engineering units become inconvenient. Sound levels are commonly measured on a logarithmic scale, with the level (in decibels, or dB) being proportional to ten times the common logarithm of the sound energy or intensity. Normal human hearing covers a range of about twelve to fourteen orders of magnitude in energy, from the threshold of hearing to the threshold of pain. On the decibel scale, the threshold of hearing is set as zero, written as 0 dB, while the threshold of pain varies between 120 to 140 dB. The most usual measure of sound is the sound pressure level (SPL), with 0 dB SPL set at 2.0×10^{-5} N/m^2 (also written 20 μPa), which corresponds to a sound intensity of 10^{-12} Watts/m^2 (or 1 picoWatt/m^2, written 1 pW/m^2).

Normal human hearing spans a frequency range from about 20 Hertz (Hz, or cycles per second) to about 20,000 Hz (written 20 kHz). However, the sensitivity of human hearing is not the same at all frequencies. To accommodate the variation in sensitivity, various frequency-weighting scales have been developed. The most common is the A-weighting scale, which is based on the sensitivity of human hearing at moderate levels; this scale reflects the low sensitivity to sounds of very high or very low frequencies. Sound levels measured on the A-weighted scale are written in A-weighted decibels, commonly shown as dBA or dB(A).

Human hearing becomes more sensitive to lower frequency sounds as the level of the sound increases. For this purpose, the C-weighing scale was developed to assess reaction to higher levels sounds. Although the C-weighting scale, or the sound level in dBC, is seldom used on its own, the levels in dBC and dBA are often used together to assess the significance of the low-frequency components of sound. In some cases, a limit is placed on the dBC level at a location in order to limit the amount of low-frequency noise.

When sound is measured using the A-weighting scale, the reading is often called the "Noise level", to confirm that human sensitivity and reactions are being addressed. A table of some common noise sources and their associated noise levels are shown in the table below.

When the A-weighting scale is not used, the measurement is said to have a "linear" weighting, or to be unweighted, and may be called a "linear" level. As the linear reading is an accurate measurement of the physical (sound) pressure, the term "Sound Pressure Level", or SPL, is usually (but not universally) reserved for unweighted measurements.

Noise is usually defined as "unwanted sound", which indicates that it is not just the physical sound that is important, but also the human reaction to the sound that leads to the perception of sound as noise. It implies a judgment of the quality or quantity of sound experienced. As a human reaction to sound is involved, noise levels are usually given in A-weighted decibels (dBA). However, use of the C-weighting scale, usually in combination with the dBA level, is becoming more common as well. An alternate

definition of noise is "sound made by somebody else", which emphasizes that the ability to control the level of the sound alters the perception of noise.

Noise Levels of Familiar Sources

Source Or Environment	Noise Level (dBA)
High Pressure Steam Venting To Atmosphere (3 m)	121
Steam Boiler (2 m)	90-95
Drilling Rig (10 m)	80-90
Pneumatic Drill (15 m)	85
Pump Jack (10 m)	68-72
Truck (15 m)	65-70
Business Office	65
Conversational Speech (1 m)	60
Light Auto Traffic (30 m)	50
Living Room	40
Library	35
Soft Whisper (5 m)	20-35

The single number A-weighted level is often inadequate for engineering purposes, although it does supply a good estimate of people's reaction to a noise environment. As noise sources, control measures, and materials differ in the frequency dependence of their noise responses or production, sound is measured with a narrower frequency bandwidth; the specific methodology varies with the application. For most work, the acoustic frequency range is divided into frequency bands where the center frequency of each band is twice the frequency of the next lower band; these are called "Octave" bands, as their frequency relation is called an "Octave" in music, where the field of acoustics has its roots. For more detailed work, the octave bands, and certain standard octave and 1/3 octave bands have been specified by international agreements.

Where the noise at the receiver is steady, it is easy to assess the noise level. However, both the production of noise at the source and the transmission of noise can vary with time; most noise levels are not constant, either because of the motion of the noise source (as in traffic noise), because the noise source itself varies, or because the transmission of sound to the receiver location is not steady as over long distances. This is almost always the case for environmental noise studies. Several single number descriptors have been developed and are used to assess noise in these conditions.

The most common is the measurement of the "equivalent continuous" sound level, or L_{eq}, which is the level of a hypothetical source of a constant level which would give the same total sound energy as is measured during the sampling period. This is the "energy" average noise level. Typical sampling periods are one hour, nighttime (9 hours) or one day (24 hours); the sampling period used must be reported when using this unit.

The greatest value of the L_{eq} is that the contributions of different sources to the total noise level can be assessed, or in a case where a new noise source is to be added to an existing environment, the total noise level from new and old sources can be easily calculated. It is also sensitive to short term high noise levels.

Statistical noise levels are sometimes used to assess an unsteady noise environment. They indicate the levels that are exceeded a fixed percentage of the measurement time period measured. For example, the 10th percentile level, written L_{10}, is the levels exceeded 10% of the time; this level is a good measure of frequent noisy occurrences such as steady road traffic. The 90% level, L_{90}, is the level exceeded 90% of the time, and is the background level, or noise floor. A steady noise source will modify the background level, while an intermittent noise source such as road or rail traffic will affect the short-term levels only.

One disadvantage with the L_{eq} measure, when used alone, is that nearby loud sources (e.g. dogs barking, or birds singing) can confuse the assessment of the situation when it is the noise from a distant plant that is the concern. For this reason, the equivalent level and the statistical levels can be used together to better understand the noise environment. One such indication is the difference between the L_{eq} and the L_{90} levels. A large difference between the L_{eq} and L_{90}, greater than 10 dB, indicates the intrusion of short-term noise events on the general background level. A small difference, less than 5 dB, indicates a very steady noise environment. If the L_{eq} value exceeds the L_{10} value this indicates the presence of significant short-term loud events.

For most noise measurement, instruments are adjusted so that the time response of the instrument is similar to the response of the human ear; this is the "Fast" setting. Measurement with the "Fast" setting therefore assesses the sound environment according to the way humans would hear it and react to it. Where the noise level varies substantially and an average level is wanted without the complexity of and L_{eq} or statistical measurement, the "Slow" setting is used on the sound level meter. The "Slow" setting is also typically used in industrial settings where hearing damage is a concern. Where the noise level changes very rapidly, for example due to impacts or detonations, the "Fast" and "Slow" settings do not respond quickly enough to assess the maximum levels, and the "Impulse" meter setting us used.

The Sound Power Level (abbreviated L_w, SWL or PWL) is the decibel equivalent of the total energy emitted from a source in the form of noise. The reference level for the sound power is 10^{-12} Watts, or 1 picoWatt (abbreviated pW). The sound power level is given by:

$$L_w, \text{SWL}, \text{PWL} = 10 \times \log_{10} (\text{Emitted Power} / 1 \text{ pW}) \text{ dB}$$

Therefore, a source emitting 1 Watt of power in the form of sound would have a sound power level of 120 dB. Sound power levels can be expressed in terms of frequency bands, an overall linear-weighted level or A-weighted, as is the case for sound pressure levels. However, sound power levels are inherent to the source of noise, whereas the sound pressure level is dependant on the source, but also on the distance from the source and other environmental factors.

Note that according to the acoustical literature (E.g. Noise Control Engineering from Bies and Hanson), the subjective effect of changes in SPL is as follows:

- A 3 dB change is "just perceptible".
- A 5 dB change is "clearly noticeable".
- A 10 dB change is "twice as loud or half as loud".
- A 20 dB change is "much louder or much quieter".

Best Practices Approach

The AER encourages licensees to adopt and incorporate a best practices approach to noise management into their facility maintenance and operating procedures. This may include such things as taking regular fence line measurements to determine if there are any significant changes to sound emanating from the facility, orientating fans away from directly facing receivers, closing equipment building doors and windows whenever possible, equipping facility related vehicles including trucks with appropriate mufflers, and where possible, scheduling noisy events during daytime hours of 7 AM to 8 PM in order to reduce potential noise disturbances. Where high noise generating activity like high pressure blowdown or venting would occur, appropriate vent silencer should be fitted on the vent nozzle to minimize noise disturbance.

Construction Noise

Although there is no specific construction noise level limit detailed by the Directive, there are general recommendations for construction noise mitigation during equipment installation. This includes all activities associated with installation of the proposed new equipment. The document states:

> "While Directive 038 is not applicable to construction noise, licensees should attempt to take the following reasonable mitigating measures to reduce the impact on nearby dwellings of construction noise from new facilities or modifications to existing facilities. Licensees should:
> - Conduct construction activity between the hours of 07:00 and 22:00 to reduce the potential impact of construction noise;
> - Advise nearby residents of significant noise-causing activities and schedule these events to reduce disruption to them;
> - Ensure all internal combustion engines are fitted with appropriate muffler systems; and
> - Take advantage of acoustical screening from existing on-site buildings to shield dwellings from construction equipment noise.
>
> Should a valid complaint be made during construction, the licensee is expected to respond expeditiously and take appropriate action to ensure that the issue has been managed responsibly."

The AER encourages licenses to adopt these recommendations into their noise management plan where reasonably practical to minimize potential noise disturbances during construction related activities.

Noise Management Plan
Keyera Corporation
Fort Saskatchewan (KFS) Facility
2-14-55-22 W4M
Noise Dosimetry and Sound Pressure Level Mapping

Revision 0

Prepared for:
Surbhi Bhargava, M.Sc, P. Chem
Keyera Corporation

Prepared by:
Patching Associates Acoustical Engineering Ltd.
Consultants in Acoustics, Noise Control and Vibration

2018-07-31
Document ID: 5092-NMP-000

Notice

This report has been prepared by Patching Associates Acoustical Engineering Ltd (PAAE) in response to a specific request for service from, and for the exclusive use of, the Client to whom it is addressed. The findings contained in this report are based, in part, upon information provided by others. The information contained in this study is not intended for the use of, nor is it intended to be relied upon, by any person, firm, or corporation other than the Client to whom it is addressed, with the exception of the applicable regulating authority to whom this document may be submitted. PAAE accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

Professional Authentication

Project Role: Engineer of Record
Date: 2018-07-31
Patching Associates Acoustical Engineering Ltd. Permit to Practice: P05273
Title: Project Engineer
Name: Samuel Lacrampe, P.Eng.

Prepared by:

Analysts and Report Authors:	Sheying Sun, PhD.
	Mackenzie Kunz, B.Sc, E.I.T.
	Samuel Lacrampe, P.Eng.
Principal In Charge:	Justin Caskey, P.Eng.
Project Manager:	Samuel Lacrampe, P.Eng.

Table of Contents

Introduction

Keyera Corporation (Keyera) retained Patching Associates Acoustical Engineering Ltd. (PAAE) to complete a Noise Management Plan (NMP) that meets the requirements of the Northeast Capital Industrial Association (NCIA) Standards and Guidelines 2010-003 issued 3-Sep-10, revised 31-Mar-16. The Keyera NMP would be provided as an input into the NCIA Regional Noise Management Plan (RNMP) report to the Alberta Energy Regulator (AER) for the Keyera Fort Saskatchewan KFS Facility (KFS) located at 2-14-55-22 W4M.

Keyera is committed to reducing the environmental noise impacts of its operations to the extent practical. This Site NMP is part of the Keyera's ongoing commitment to the environment, our neighbours, and social performance. The Keyera Leadership Team is committed to controlling noise and supports the contents of this Site NMP. Appendix A summarizes the Keyera Environmental, Health & Safety (EH&S) Policy.

This study has been commissioned to support Keyera's commitment to:

- Minimize to the extent practical, noise levels impacting on the environment.
- Maintain a fence line noise monitoring program to evaluate the facility noise level trend and to determine if there are any significant changes to sound emanating from the facility.
- Assign employees to manage the site noise monitoring, mitigation and continuation improvement programs.
- Ensure employees associated with noise sources are aware of the impact on the environment and the processes to control it, which are to be consistent with the company's industrial hygiene and occupational noise exposure control objectives.
- Design new and modified equipment with the intent to minimize occupational and environmental noise.

Specifically, this report consists of two components:

- Noise Dosimetry Study: A worker noise exposure assessment
- Sound Mapping: Mapping of Sound Pressure Levels in and around the facility buildings and equipment, extending to the fence line of the facility

The noise dosimetry study quantifies actual, typical worker exposure to noise over the course of their daily work shift, while the sound mapping quantifies and visualizes noise levels in buildings and around equipment as well as propagation outwards from the facility into the environment. The sound mapping measurements were conducted in the existing case, which is the normal operating scenario, with the intent to capture normal noise emissions.

These two components, combined and reviewed annually, and compared to prior year studies, are intended to help fulfil Keyera's commitments as described above, namely trending, monitoring, mitigation, and continual improvement of the management of environmental and occupational noise.

Noise Dosimetry Study

The noise dosimetry study serves to quantify actual, typical worker exposure to noise over the course of their daily work shift.

This assessment has been conducted in accordance with CSA Standard Z107.56-06 "Procedures for the Measurement of Occupational Noise Exposure". The results of this assessment have been compared to the noise exposure limits in Schedule 3, Table 1 of the Alberta Occupational Health and Safety Code 2009 and a total noise exposure level of 85 dBA averaged over the entire workday.

Noise Criteria

If workers are, or may be, exposed to noise at a work site in excess of the noise exposure limits stated in "Part 16 Noise Exposure" of the Alberta Occupational Health and Safety Code 2009 (OHS Code), then the employer is required to do a noise exposure assessment.

Under "Section 218 Worker Exposure to Noise" of Part 16 the OHS Code, employers must ensure that workers exposure to noise does not exceed:

a) the noise exposure limits in Schedule 3, Table 1, and
b) 85 dBA L_{ex} daily exposure level.

Table 1 – Summary of Noise Exposure Limits from Schedule 3 of the OHS Code

Exposure Level (dBA)	Exposure Duration
82	16 Hours
83	12 Hours and 41 Minutes
84	10 Hours and 4 Minutes
85	8 Hours
88	4 Hours
91	2 Hours
94	1 Hour
97	30 Minutes
100	15 Minutes
103	8 Minutes
106	4 Minutes
109	2 Minutes
112	56 Seconds
115 ≤	0

The daily exposure level, L_{ex}, is the noise exposure dose over the worker's normal daily shift energy-averaged to an eight-hour period. The daily exposure level takes into account the noise levels encountered over a worker's shift and the duration of the shift.

To satisfy the OHS Code noise exposure, measurements must be performed in accordance with CSA Standard Z107.56-06, be updated if there is a change in equipment or process that affects the noise level or the length of time a worker is exposed to noise, and the equipment used for the measurements must meet the requirements in Section 219 of the OHS Code.

Employers must ensure that a copy of the results of a noise exposure assessment is available on request to an affected worker or an officer, and that record of the noise exposure assessment is retained for as long as the employer operates in Alberta.

If a noise exposure assessment confirms that workers are exposed to excess noise at a work site, to satisfy Section 221 of the OHS Code the employer must develop and implement a noise management program that includes the following policies and procedures:

a) A plan to educate workers in the hazards of exposure to excess noise and to train workers in the correct use of control measures and hearing protection;
b) The methods and procedures to be used when measuring or monitoring worker exposure to noise;
c) The posting of suitable warning signs in any work area where the noise level exceeds 85 dBA;
d) The methods of noise control to be used;
e) The selection, use, and maintenance of hearing protection devices to be worn by workers;
f) The requirements for audiometric testing and the maintenance of test records;
g) An annual review of the policies and procedures to address
    i. The effectiveness of the education and training plan,
    ii. The need for further noise measurement, and
    iii. The adequacy of the noise control measures.

Further specific requirements for the mandatory provision and maintenance of hearing protection equipment for workers are outlined in Section 222 of the OHS Code. Further specific requirements for the mandatory provision of audiometric testing for workers exposed to excess noise are outlined in Section 223 of the OHS Code.

Part 16 of the Alberta Occupational Health and Safety Code 2009 contains a complete listing of employer responsibilities in relation to noise exposure at the workplace. The Alberta OHS Act, Regulation and Code are available on the Government of Alberta Human Services website: http://work.alberta.ca/occupational-health-safety/ohs-act-regulation-and-code.html

This assessment does not consider vibration exposure.

Methodology

This noise exposure assessment has been conducted in accordance with CSA Standard Z107.56-06 "Procedures for the Measurement of Occupational Noise Exposure."

The noise exposure measurements were conducted on June 11-14, 2018. PAAE staff were advised that the facility was operating normally on these dates.

The noise exposure levels of three categories of workers were assessed:

- Plant Operator – regular checking and operating of facility equipment throughout the facility
  - 12-hour day shift, from 05:30 to 17:30
  - 12-hour night shift, from 17:30 to 05:30
- Maintenance – routine and as-required repair and maintenance of various facility equipment
  - 9-hour shift, from 07:30 to 17:00
- Management – mainly office based, with some direct exposure to facility equipment noise
  - 8-hour shift, from 07:00 to 15:30

Larson Davis model 706RC logging noise dosimeters were used to conduct the noise exposure assessment per each worker category. These instruments qualify as acceptable noise dosimeters under CSA Standard Z107.56-06 and satisfy the Type 2 tolerance requirements of ANSI standard S1.25-1991 (R1997). The microphone of the dosimeter was attached to the outside edge of the wearer's shoulder or as close as feasible. The dosimeters were calibrated before measurement, and checked after measurement. Table 2 shows a summary of the dosimeters used for this survey and the calibration dates for this equipment.

Table 2 – Instrumentation Summary

Equipment	Manufacturer/ Model	Instrument Serial No.	Last Traceable Calibration*	Calibration Valid
Dosimeter – Plant Operator	Larson Davis 706RC	17815	May 31, 2018	Yes
Dosimeter – Maintenance	Larson Davis 706RC	17985	May 31, 2018	Yes
Dosimeter – Management	Larson Davis 706RC	17783	May 31, 2018	Yes
Dosimeter Calibrator	Larson Davis CAL200	15740	May 24, 2018	Yes

*Traceable laboratory calibration was conducted by The Modal Shop.

Results

The results of the dosimetry study are summarized in Table 3 below; and Figures 1 to 4 show time history graphs, for each position/shift assessed.

Table 3 – Dosimetry Results

Job Description	Operator (Day)	Operator (Night)	Maintenance	Management
Run Time	08:12:00	11:56:00	08:26:00	09:28:00
Start Date	13-Jun-18	13-Jun-18	13-Jun-18	13-Jun-18
Start Time	9:10:30	17:33:48	08:10:18	08:07:47
Stop Date	13-Jun-18	14-Jun-18	13-Jun-18	13-Jun-18
Stop Time	17:22:30	05:29:48	16:36:18	17:36:18
Pre Calibration Date	13-Jun-18	13-Jun-18	13-Jun-18	13-Jun-18
Pre Calibration Time	07:04:32	07:04:32	07:01:15	07:08:05
Post Calibration Date	14-Jun-18	14-Jun-18	13-Jun-18	13-Jun-18
Post Calibration Time	08:04:12	08:04:12	18:32:11	18:35:28
Calibration Deviation (dB)	-0.1	-0.1	0	-0.1
Sample Period	60 seconds	60 seconds	60 seconds	60 seconds
Periods (minutes)	492	716	506	568
Note	12-hour day shift	12-hour night shift	9-hour day shift	8-hour day shift
Results				
Dose	130.6%	34.4%	43.8%	23.1%
L_{eq} (dBA)	84.4	78.6	80.9	77.9
L_{max} (dBA)	104.0	102.0	104.0	101.8
L_{Peak} (dB, Unweighted)	138.2	138.8	135.1	135.9
L_{min} (dBA)	48.5	50.4	54.5	45.8
L_{ex} (8 hr, dBA)	86.2	80.4	81.4	78.6
Settings				
Exch. Rate	3	3	3	3
Threshold	0	0	0	0
Criterion	85	85	85	85
Crit. Duration	8	8	8	8
RMS Weight	A Weighting	A Weighting	A Weighting	A Weighting
Peak Weight	Unweighted	Unweighted	Unweighted	Unweighted
Detector	Slow	Slow	Slow	Slow
Gain	0	0	0	0

Figure 1 – Operator, 12-hour day shift

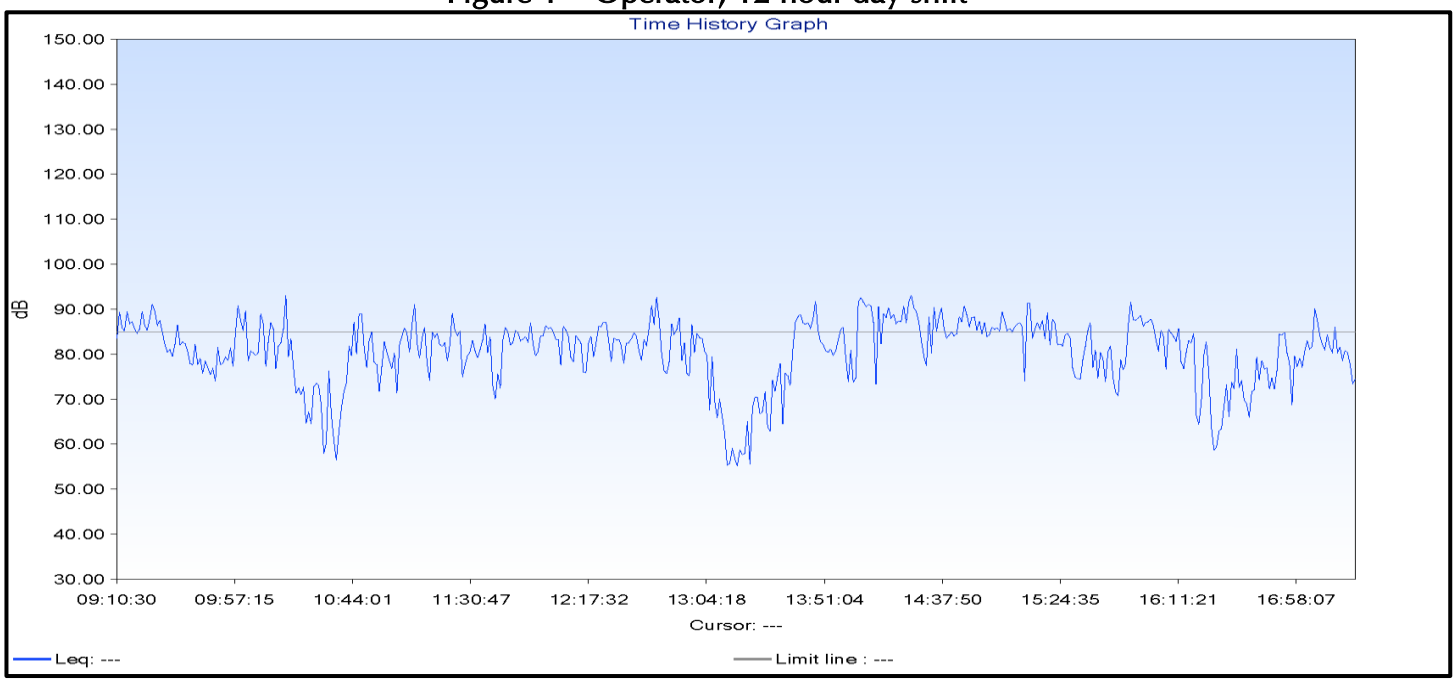


Figure 2 – Operator, 12-hour night shift

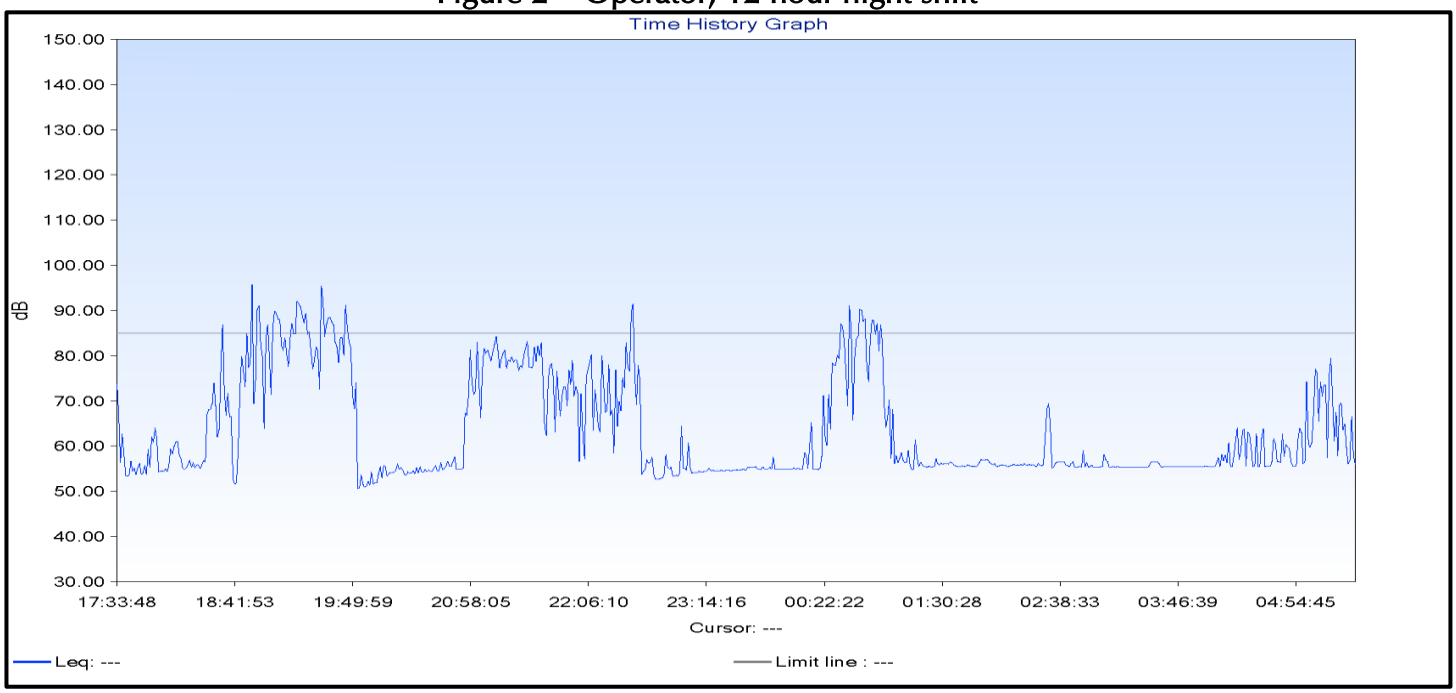


Figure 3 – Maintenance, 9-hour shift

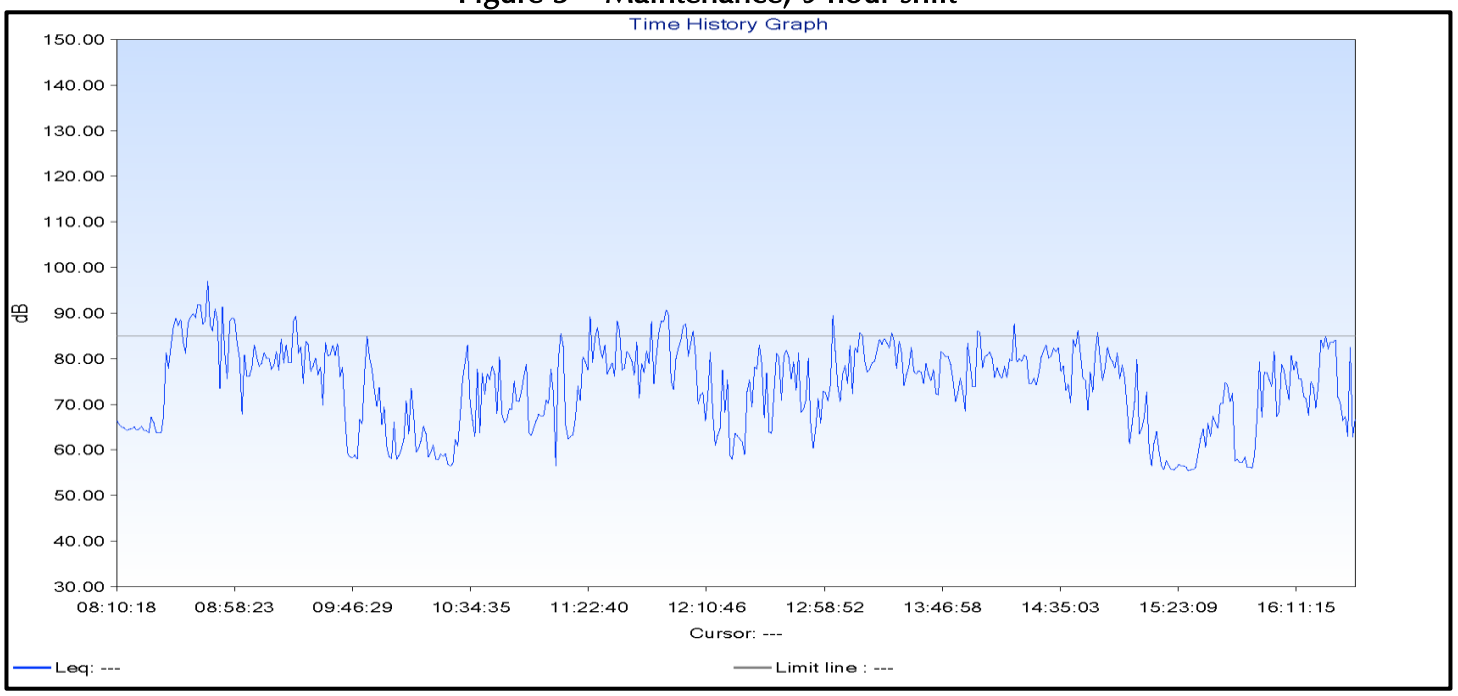
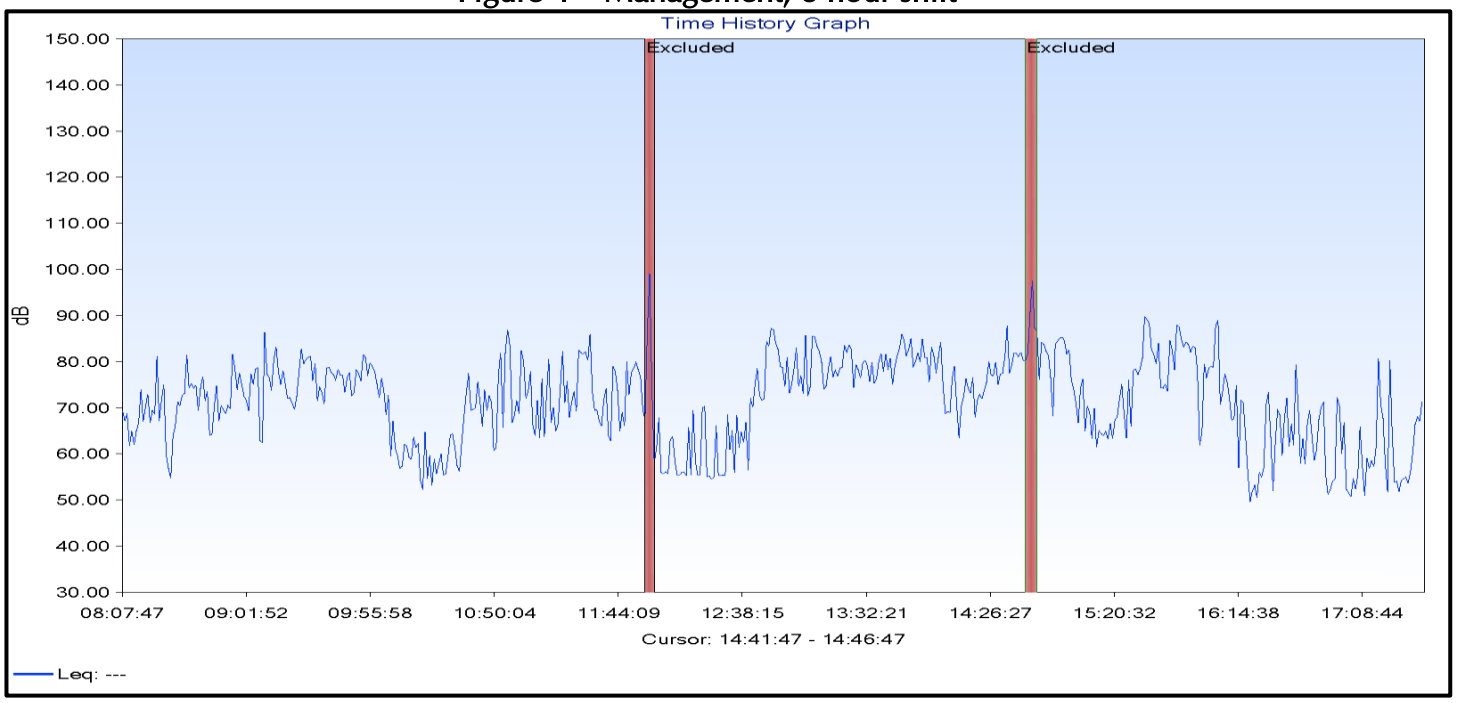


Figure 4 – Management, 8-hour shift



Plant Operator – Day Shift:

The Plant Operator day shift position had the highest noise exposure, with an L_{ex} of 86.2 dBA or 130.6% of the daily allowed noise dose (in energy terms) for a L_{eq} limit of 85.0 dBA for an 8-hour shift. Therefore hearing protection is required for this position. The loudest level recorded was 104.0 dBA, exposure to which the daily limit would be exceeded if exceeding more than 4 minutes without hearing protection.

Plant Operator – Night Shift:

The Plant Operator night shift position had a lower average noise exposure than the Operator day shift position, with an L_{ex} of 80.4 dBA or 34.4% of the daily allowed noise dose (in energy terms) for a L_{eq} limit of 85.0 dBA for an 8-hour shift. Therefore hearing protection is not required for this position. However, hearing protection is still recommended in areas where noise levels are greater than 85 dBA. The loudest level recorded was 102.0 dBA, exposure to which the daily limit would be exceeded if exceeding more than 8 minutes without hearing protection.

Note that this dosimetry test was only done for a single shift; and although it is considered representative, it may not have captured the worst-case conditions experienced throughout the year. If the Plant Operator night shift position is sometimes similar to the day shift position, then hearing protection would be required.

Maintenance:

The Maintenance position had a slightly higher average noise exposure than the Operator night shift position, with an L_{ex} of 81.4 dBA or 43.8% of the daily allowed noise dose (in energy terms) for a L_{eq} limit of 85.0 dBA for an 8-hour shift. Therefore hearing protection is not required for this position. However, hearing protection is still recommended in areas where noise levels are greater than 85 dBA. The loudest level recorded was 104.0 dBA, exposure to which the daily limit would be exceeded if exceeding more than 4 minutes without hearing protection.

Management:

The Management position had the lowest noise exposure, with an L_{ex} of 78.6 dBA or 23.1% of the daily allowed noise dose (in energy terms) for a L_{eq} limit of 85.0 dBA for an 8-hour shift. Therefore hearing protection is not required for this position. However, hearing protection is still recommended in areas where noise levels are greater than 85 dBA. The loudest level recorded was 101.8 dBA, exposure to which the daily limit would be exceeded if exceeding more than 8 minutes without hearing protection.

Two events were excluded from the data set as shown in Figure 4, as these were considered abnormally high levels, and likely due to erroneous data input caused by the microphone being inadvertently bumped.

Noise Maps

The noise maps serve to visualize noise levels in buildings and around equipment as well as propagation outwards from the facility equipment into the environment within the fence line.

Sound pressure levels in and around all the buildings, around outdoor noise emitting equipment, across the grounds and around the perimeter of the facility were measured with a Brüel & Kjær Type 2270, Class 1 integrating logging sound level meter. The existing case, which is the normal operating situation, was mapped.

The noise maps are attached in Appendix B. They can be used for visual reference, worker education, visitor orientation, and placing of signage related to noise levels. As well, the propagation of sound from the facility can be visually estimated, and levels noted around the fence line can be compared from year to year as part of the annual noise mitigation strategy.

Areas and buildings with sound pressure levels in excess of 85 dBA should be marked with warning signs for hearing protection, and areas where levels exceed 105 dBA should be marked for double hearing protection. CSA Z94.2-02 (R2007) Hearing Protection Devices should be referenced for more detailed definitions and to determine appropriate specifications.

Conclusion

Keyera Corporation retained Patching Associates Acoustical Engineering Ltd. to complete a Noise Management Plan (NMP) that meets the requirements of the Northeast Capital Industrial Association (NCIA) Standards and Guidelines 2010-003 issued 3-Sep-10, revised 31-Mar-16.

The Keyera NMP would be provided as an input into the NCIA Regional Noise Management Plan (RNMP) report to the Alberta Energy Regulator (AER) for the Keyera Fort Saskatchewan KFS facility located at 2-14-55-22W4M.

This report consists of two components, designed to help fulfil Keyera's commitments to the RNMP. The noise dosimetry study quantifies actual, typical worker exposure to noise over the course of their daily work shift, and the noise maps quantify and visualize noise levels in buildings and around equipment as well as propagation outwards from the facility into the environment.

The dosimetry study was the first instance analyzed by PAAE, and no comparison to prior data can be made. Only the Plant Operation day shift position exceeded the daily exposure limits, but all positions were exposed to very high noise levels that could cause hearing damage in a very short amount of time without adequate protection.

The noise maps are attached in Appendix B. They can be used for visual reference, worker education, visitor orientation, and placing of signage related to noise levels. As well, the propagation of sound from the facility can be visually estimated, and levels noted around the fence line can be compared from year to year as part of the annual noise mitigation strategy.

Keyera has committed to sharing and discussing the results of this study with workers, in keeping with the company's health and safety policies, and as part of implementation of their Noise Management Plan. Specifically, the report and noise maps will be posted on-site, and reviewed during a safety meeting.

See Appendix C for the NCIA Annual Submission Form for 2017.

Appendix A: Keyera Health, Safety, and Environment Policy

Health, Safety and Environment Policy

We at Keyera are committed to achieving an injury free workplace. We will strive to be a leading performer in our industry. We believe every job can be done safely and in an environmentally responsible manner by following these guiding principles in all of our daily activities and decisions. We expect this commitment will be embraced by everyone at our worksites and it will not be compromised.

LEADERSHIP – Management and Supervisors are accountable for the health and safety of all persons on our worksites. We believe everyone can be a safety leader by making health and safety a daily priority.

RESPONSIBILITY – We - managers, supervisors, employees, contractors and visitors - are responsible for the health and safety of ourselves and those around us. We will cooperate with all efforts to enhance health and safety at our worksites.

PREVENTION – We will identify hazards and take the necessary measures to control risk.

WORKER INVOLVEMENT – We will make safe behaviors an integral part of every task performed, including taking the time to do it right. We will care enough to intervene when we see an unsafe condition or behavior.

TRAINING – We will be adequately trained and competent. We will apply that training to perform our work safely.

ENVIRONMENTAL STEWARDSHIP – We are committed to environmental protection, mitigation and restoration as an integral part of our business. We will take steps to reduce the impact of our activities on the environment.

CONTINUOUS IMPROVEMENT – We will continuously improve by openly communicating our successes and our challenges, and through the application of learnings.

COMPLIANCE – We will comply with all laws and regulations applicable to our operations.

At Keyera, no job is more important, no service more urgent, than maintaining a safe, healthy and environmentally responsible workplace. Please join us in making this commitment a daily priority.

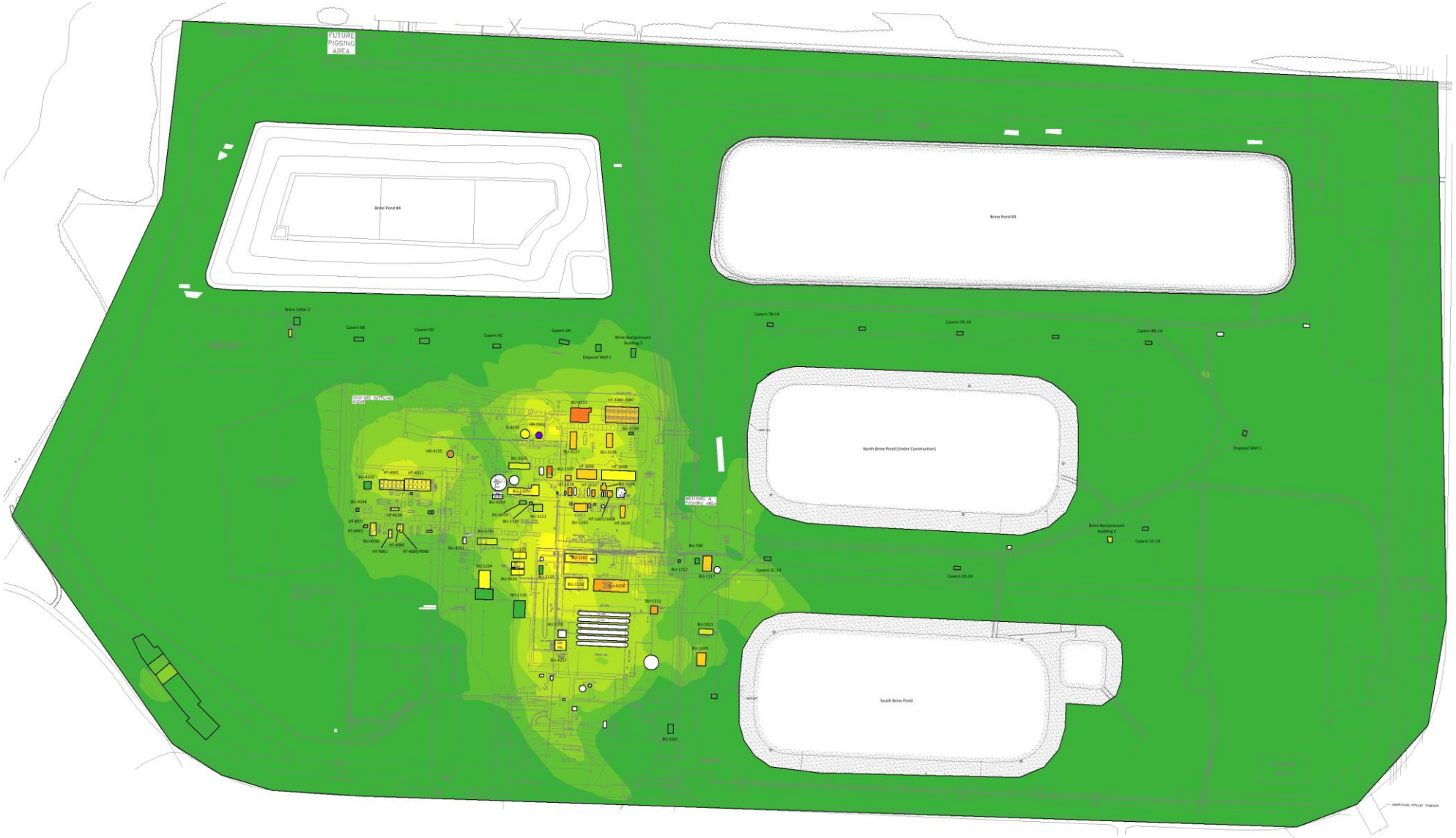
David G. Smith
President and Chief Executive Officer
Keyera Corp.

EFFECTIVE DATE: MARCH 2017

Appendix B: Noise Maps

Sound Pressure Levels dB(A)

Alberta OHS regulations require workers exposed to levels greater than 85 dBA based on a daily shift length of 8 hours to wear appropriate hearing protection. Areas with such levels should be marked with warning signs. For daily exposure levels greater than 105 dBA, double hearing protection is required.



	<	60
60	-	65
65	-	70
70	-	75
75	-	80
80	-	85
85	-	90
90	-	95
95	-	100
100	-	105
105	<	

Facility Name	Scenario	Location	Measurement Height	Measurement Date	Document ID
Keyera Fort Saskatchewan	**Summertime Normal Construction Operations Ongoing**	**02-14-55-22 W4M**	**2.0m**	**2018-06-14**	**5092-NAW-000**

Sound Pressure Levels dB(A)

Alberta OHS regulations require workers exposed to levels greater than 85 dBA based on a daily shift length of 8 hours to wear appropriate hearing protection. Areas with such levels should be marked with warning signs. For daily exposure levels greater than 105 dBA, double hearing protection is required.

	<	60	
60	-	65	
65	-	70	
70	-	75	
75	-	80	
80	-	85	
85	-	90	
90	-	95	
95	-	100	
100	-	105	
105	<		

Facility Name	Scenario	Location	Measurement Height	Measurement Date	Document ID
Keyera Fort Saskatchewan	**Summertime Normal Construction Operations Ongoing**	**02-14-55-22 W4M**	**2.0m**	**2018-06-14**	**5092-NAW-000**

Appendix C: NCIA Annual Submission Form

NCIA Northeast Capital Industrial Association	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

Keyera Corporation
Keyera Fort Saskatchewan (KFS) Facility
2017

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Keyera has implemented a best management practice to address environmental noise as per standard 2010-003. Keyera has provided an electronic copy of the site plan to NCIA.
Provide a summary of any monitoring (fence line outward completed in 2017. Note, you are not required to conduct any off-site monitoring.	There were no facility improvements in 2017 which would impact the noise level at the KFS facility; and as such, no fence line monitoring was done for that year. No monitoring is planned outside the fence line except for in response to a specific noise complaint.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	There were no facility improvements in 2017 which would impact the noise level at the KFS facility; and as such, there were no site noise model update.

NCIA Northeast Capital Industrial Association	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

Input Description	Member Site Comments
Disclose any improvements/projects that are approved for 2018 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	In 2018, Keyera has removed a couple of existing air intake silencers. The silencers were proven to be a fire hazard, and were thus removed for safety reasons. Keyera also plans to expand the injection facilities and install an Inlet Quality (IQ) building, although the IQ building is expected to have a negligible noise impact. The above changes have been assessed by Patching Associates Acoustical Engineering Ltd. in June 2018. The results of the assessment indicate that these changes do not result in any perceivable noise increase at the nearby residences. The noise impact assessment report, including an updated noise model, are available on request. Patching Associates Acoustical Engineering Ltd. will maintain an up-to-date noise model and provide this to SLR Consulting at the time of the next regional model revision, which is understood to be planned for 2018.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan.	No self-assessment was conducted by Keyera in 2017. In 2018, Keyera completed a self-assessment with the assistance of Patching Associates Acoustical Engineering Ltd. This assessment included: detailed diagnostic noise measurements and modeling including cumulative impact assessment for the adjacent facilities existing in the Alberta Industrial Heartland, occupational noise mapping within the facility fence line, and a noise exposure assessment using noise dosimeters. The assessment documentation has been produced with the participation and review of the senior staff.
Provide a Noise Complaint summary for all noise complaints received in 2017 including any actions taken to address them.	There were no noise complaints received for 2017 for this site.

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 Northeast Capital Industrial Association	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

Nutrien 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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Nutrien has a Noise Management Plan. The plan consists of the following documents: • ESP 3.07.01 Noise Management Overview • ESP 3.07.02 Noise Management Program • ESP 3.07.03 Noise Source List • ESP 3.07.04 Monitoring Program
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	There was no offsite monitoring completed in 2018 for the Redwater or the Fort Saskatchewan facilities.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	There were no improvements or corrective actions implemented in 2018at the Redwater or Fort Saskatchewan facilities.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	<u>Redwater</u> Approved projects have been deferred. In terms of the 30# Steam Vents identified in the Noise Model Update, Noise Curtains are now scheduled to be installed in 2019. As stated in the 2013-2015 reports, 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. These assessments are primarily Occupational Hygiene, but it is anticipated that Environmental Noise will also be reduced. The boiler is now scheduled for 2019 with CGT-902 being deferred to 2021. <u>Fort Saskatchewan</u> No improvement/projects planned for 2019.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	The Noise Management Plan, program and associated documents are scheduled for review and update in 2019.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	There were no external noise complaints for the Redwater or Fort Saskatchewan facilites in 2018.

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	Yes and a copy was provided
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	None outside the fenceline
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	No improvements or corrective actions No N/A

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	None N/A N/A
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	No audit/self assessments conducted
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No noise complaints received

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 Northeast Capital Industrial Association	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

Pembina NGL Corporation – Redwater Facilities

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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	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.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	Two points were monitored in 2018 (NCIA locations 8c and 11) as part of the RFS I/ROF Model Update.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	RFS I, ROF and Perimeters Noise Survey and subsequent Noise Model was completed/updated in 2018. The updated model was incorporated in to the NCIA Regional Noise Model.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	A new 45 MW Cogen facility will start up in April 2019. The theoretical model is already included in the site noise model. Once the Cogen is operational, a noise survey will be completed in 2019 to update the model with actual data.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	None completed.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No complaints received.

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	The Facility has an Environmental Noise Management Practice. The practice is part of PMC's Operational Management System (FSK-P-36-00-12).
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	No monitoring/assessments were completed in 2018.
Disclose any improvements/corrective actions implemented in 2017 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Construction activities concluded on the construction of a mercaptan oxidation plant. The expansion has resulted in the site conducting a noise impact assessment which was subsequently used to update the Regional Noise Model in 2014 and 2018. SLR Consulting conducted the NIA and updated the model with the information in 2018.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	The Facility will be installing new pumps to support cavern storage activities and additional earthworks to facilitate required surface water drainage upgrades. 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. An update, if required, will be conducted in conjunction with the next regional noise model update.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	No audits or self-assessment evaluations were completed in 2018.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No noise complaints were received by the Facility in 2018.

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 Northeast Capital Industrial Association	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

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	In 2019, Shell Scotford updated Noise Management Plan Document attached.  Shell Scotford Site Noise Management
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	No monitoring/assessments completed in 2018
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Site model updates were done for Refinery HCU Debottleneck Project and Refinery Fin-Fan Cooler in 2018 .

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	No improvements/projects approved for 2019 that would impact the noise level output for the site
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	Scheduled for December of 2019.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No noise complaints received in 2018.

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.

Scotford Site	Area: Noise Monitoring	Code: SCM-TO-002
	Title: Shell Scotford Site Noise Management Plan	Revision: 2019-10-24
Document Owner: Environment Manager Responsible Manager: TBD	Document Focal Point: Noise Focal Point	

Date (Y/M/D)	Rev. No.	Revision Type	Description of Revision	Contributors name (First/Last)
2019-10-24	0	Create New	New Controlled Document replacing SUG.HSSE.ENV.AIR.NOIS.M.002	Ludmila Shustova

CONTENTS ..... Error! Bookmark not defined.

Scotford Site	**Area: Noise Monitoring**	**Code: SCM-TO-002**
	Title: Shell Scotford Site Noise Management Plan	**Revision: 2019-10-24**
Document Owner: Environment Manager **Responsible Manager: TBD**	**Document Focal Point: Noise Focal Point**	

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 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 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.

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).

2.2 Roles and Responsibilities

Department or Title	Roles
Community Affairs	• Notification to neighbours for planned activities. • Reactive communications to neighbours concern. • Monitor operations response to public concern.
Shift Supervisor or Designate	• Initiate investigation for public concern for operating units • Perform fence-line noise surveys. • If required follow-up with concern in off-hours (PA during normal hours).
Environment Department	• Support to Operations for investigation of noise concern, conducting fence-line noise surveys & regulatory notifications. • Data analysis and external noise surveys. • Maintain site noise model.
Industrial Hygiene	• Primary support for onsite noise monitoring.
Security	• Initial contact for public concern.

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 Site and was updated in 2018.

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 2018 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

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.

- 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.

NCIA Northeast Capital Industrial Association	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

Sherritt International Corporation

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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	The Site has implemented the referenced standard and developed a Code of Practice which has been previously submitted to NCIA. There were no updates made to the Code of Practice in 2018.
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	Fence line monitoring was not completed in 2018.
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	None in 2018. The Site noise model does not require updating at this time.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	None in 2019. The Site noise model does not require updating at this time.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	In 2018 there were 4 noise assessments completed at the Site. There was no significant noise identified; therefore, the Site noise model does not require updating at this time.
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	An offsite complaint was received on Jul. 3/18 regarding a noise (described as truck motor, low rumble with vibration) observed on Jul. 1/18. An investigation was initiated to determine potential issues that occurred during the time and date identified. There was no source found. The external stakeholder was contacted once the investigation was completed. The sites complaint process and findings of the investigation were discussed.

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 Northeast Capital Industrial Association	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

Umicore 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

Input Description	Member Site Comments
Confirmation that site has implemented a best management practice to address environmental noise as per NCIA Noise Management Plan Standard 2010-003 issued 3-Sep-10, revised 5-Mar-13, revised 14-Apr-14, revised 31-Mar-16 including the Procedure/Practice/Standard reference. Note, if you have not provided an electronic copy of your site plan to NCIA, please do so.	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)
Provide a summary of any monitoring (fence line outward completed in 2018. Note, you are not required to conduct any off-site monitoring.	Not applicable – noise monitoring conducted inside the plant from an industrial hygiene perspective
Disclose any improvements/corrective actions implemented in 2018 or status thereof that would impact the noise level output for your site (either up or down). Did those changes result in a requirement to update your site noise model? If so, have you provided your updated site model to SLR Consulting for incorporation into the NCIA Regional Noise Model as per the process outlined for this purpose?	Management of Change (MOC) program includes elements to identify potential changes/ impacts with respect to noise exposure. There were not however any projects that impacted noise exposures up or down.

Disclose any improvements/projects that are approved for 2019 that would impact the noise level output for your site (either up or down). Will these changes result in a requirement to update your site noise model? If so, when do you anticipate having an updated site model available?	Many of the projects approved for 2019 will not have any effect on the noise level. All circuits for the most part are located inside of Umicore proper buildings and maintain a rating of approximately 81 - 83 db. No requirement to update site noise model.
Disclose any audit/self-assessment evaluation (qualitative evaluation only, with senior site leader sign-off) completed for your site noise management plan in 2018.	Not applicable – noise monitoring conducted inside the plant from an industrial hygiene perspective
Provide a Noise Complaint summary for all noise complaints received in 2018 including any actions taken to address them.	No complaints received in 2018.

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.