



Alberta Environment and Parks (AEP)
 Environmental Response Centre
 1st fl Twin Atria Building
 4999 - 98 Avenue
 Edmonton, AB T6B 2X3
 Fax: 780 427-1044
erc.environment@gov.ab.ca

August 5, 2016

RE: One-hour average hydrogen sulphide concentration above AAAQO in the Town of Bonnyville
Reference #313107, 313106, 313156, 313157, 313866, 313905, 313944, 314090, 314042, 314139, 314195, 314207, 314309, 314363, 314404, 314452, 314667

LICA has notified AEP about a number of contraventions of the 1-hour Ambient Air Quality Objective (AAAQO) for hydrogen sulphide (10 ppb). There have also been 10 contraventions of the 24-hour AAAQO for hydrogen sulphide (3 ppb). These contraventions were measured at LICA's Portable Air Monitoring System (PAMS) which is currently located in the Town of Bonnyville at the Alberta Energy Regulator's Office:

Reference #	Date of Reporting	Reported by	Event
313107	June, 27 2016	Bim Adeniji	Bonnyville H ₂ S 1-hr contravention 10.6 ppb for June 26 @06:00
313106	June, 27 2016	Bim Adeniji	Bonnyville H ₂ S 1-hr contravention 17.1 ppb for June 27 @00:00
313106	June, 27 2016	Bim Adeniji	Bonnyville H ₂ S 1-hr contravention 24.7 ppb for June 27 @01:00
313106	June, 27 2016	Bim Adeniji	Bonnyville H ₂ S 1-hr contravention 25.8 ppb for June 27 @02:00
313106	June, 27 2016	Bim Adeniji	Bonnyville H ₂ S 1-hr contravention 23.8 ppb for June 27 @03:00
313106	June, 27 2016	Bim Adeniji	Bonnyville H ₂ S 1-hr contravention 28.2 ppb for June 27 @05:00
313156	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 11.7 ppb for June 27 @06:00
313156	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 11.3 ppb for June 27 @21:00
313156	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 22.3 ppb for June 27 @22:00
313156	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 40.7 ppb for June 27 @23:00
313156	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 24-hr contravention 8.9 ppb for June 27
313157	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 44.6 ppb for June 28 @00:00
313157	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 54.5 ppb for June 28 @01:00
313157	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 21.8 ppb for June 28 @02:00
313157	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 58.0 ppb for June 28 @04:00
313157	June 28, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 26.8 ppb for June 28 @05:00
313157	June 29, 2016	Cheri Sinclair	Bonnyville H ₂ S 1-hr contravention 12.6 ppb for June 28 @06:00
313157	June 30, 2016	Cheri Sinclair	Bonnyville H ₂ S 24-hr contravention 10.3 ppb for June 28
313866	July 15, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 12.2 ppb for July 15 @ 01:00
313866	July 15, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 10.8 ppb for July 15 @ 03:00
313866	July 15, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 11.1 ppb for July 15 @ 04:00
313866	July 15, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 14.6 ppb for July 15 @ 05:00
313866	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 11.5 ppb for July 15 @ 06:00
313866	July 16, 2016	Limin Li	Bonnyville H ₂ S 24-hr contravention 4.1 ppb for July 15
313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 12.3 ppb for July 16 @ 00:00



313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 20.9 ppb for July 16 @ 01:00
313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 20.3 ppb for July 16 @ 02:00
313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 29.3 ppb for July 16 @ 03:00
313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 26.3 ppb for July 16 @ 04:00
313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 23.4 ppb for July 16 @ 05:00
313905	July 16, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 19.0 ppb for July 16 @ 06:00
313905	July 17, 2016	Limin Li	Bonnyville H ₂ S 24-hr contravention 6.7 ppb for July 16
313944	July 18, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 19.9 ppb for July 18 @ 02:00
313944	July 18, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 18.1 ppb for July 16 @ 03:00
313944	July 18, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 26.8 ppb for July 16 @ 04:00
313944	July 18, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 35.7 ppb for July 16 @ 05:00
313944	July 18, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 15.3 ppb for July 16 @ 06:00
313944	July 19, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 24-hr contravention 5.9 ppb for July 18
314090	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 24-hr contravention 3.3 ppb for July 19
314090	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 11.6 ppb for July 19 @ 22:00
314042	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 14.3 ppb for July 20 @ 00:00
314042	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 26.7 ppb for July 20 @ 01:00
314042	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 24.5 ppb for July 20 @ 02:00
314042	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 30.1 ppb for July 20 @ 03:00
314042	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 30.4 ppb for July 20 @ 04:00
314042	July 20, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 17.6 ppb for July 20 @ 05:00
314042	July 21, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 24-hr contravention 6.7 ppb for July 20
314139	July 22, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 12.5 ppb for July 22 @ 03:00
314195	July 24, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 20.6 ppb for July 24 @ 02:00
314195	July 24, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 21.0 ppb for July 24 @ 03:00
314195	July 24, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 19.4 ppb for July 24 @ 04:00
314195	July 24, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 18.5 ppb for July 24 @ 05:00
314195	July 24, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 10.6 ppb for July 24 @ 06:00
314195	July 25, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 17.4 ppb for July 25 @ 04:00
314207	July 25, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 24-hr contravention 5.1 ppb for July 24
314309	July 27, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 16.4 ppb for July 27 @ 04:00
314309	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 24-hr contravention 3.3 ppb for July 27
314309	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 16.0 ppb for July 27 @ 06:00
314363	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 10.5 ppb for July 28 @ 00:00
314363	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 10.6 ppb for July 28 @ 02:00
314363	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 16.7 ppb for July 28 @ 03:00
314363	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 18.5 ppb for July 28 @ 04:00
314363	July 28, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 19.4 ppb for July 28 @ 05:00
314363	July 29, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 13.4 ppb for July 28 @ 06:00
314363	July 29, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 24-hr contravention 4.4 ppb for July 28
314404	July 29, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 14.7 ppb for July 29 @ 02:00
314404	July 29, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 20.9 ppb for July 29 @ 03:00
314404	July 29, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 17.8 ppb for July 29 @ 04:00
314404	July 29, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 16.4 ppb for July 29 @ 05:00
314404	July 30, 2016	Limin Li	Bonnyville H ₂ S 24-hrs contravention 4.4 ppb for July 29
314452	July 30, 2016	Limin Li	Bonnyville H ₂ S 1-hr contravention 15.3 ppb for July 30 @ 01:00
314667	August 5, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 13.4 ppb for August 5 @ 03:00
314667	August 5, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 13.4 ppb for August 5 @ 04:00
314667	August 5, 2016	Wunmi Adekanmbi	Bonnyville H ₂ S 1-hr contravention 10.9 ppb for August 5 @ 05:00

These ongoing elevated hydrogen sulphide concentrations are believed to be caused by Jessie Lake, a waterbody that runs the east-west length of Bonnyville which is directly south of the air monitoring station. In the spring, summer, and fall months, Bonnyville residents often detect odours thought to be emanating from Jessie Lake; these odour events may be related to the die-off and decomposition of aquatic vegetation. There are a number of monitoring objectives that LICA intends to fulfill by relocating the PAMS to Bonnyville including gathering air quality data to potentially quantify these anecdotal odour observations related to Jessie Lake.

The wind rose below (**Figure 1**) shows the frequency distribution of 1-hour average hydrogen sulphide concentrations from June 2nd to midday on August 5th, 2016 (the entire period of monitoring since the PAMS commenced operations in Bonnyville). Nearly all concentrations above the 1-hour AAAQO were measured at night (shown in **Figure 2**) during calm wind conditions when the wind was coming from a southeast to west-southwest direction; air masses moving from these directions place the PAMS downwind from Jessie Lake. This pattern of elevated hydrogen sulphide concentrations is expected to continue over the warm summer months and into the fall due to increased biogenic activity in Jessie Lake.

Hydrogen Sulphide: LICA PAMS at Town of Bonnyville

One Hour Average Concentrations:
June 2, 2016 11:00 - August 5, 2016 11:00

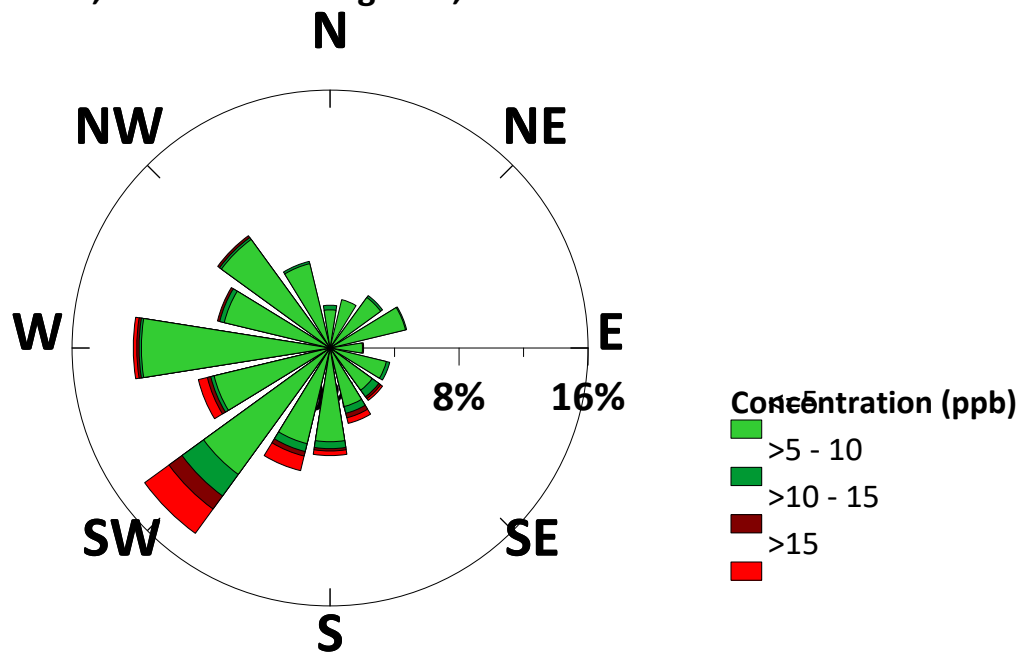
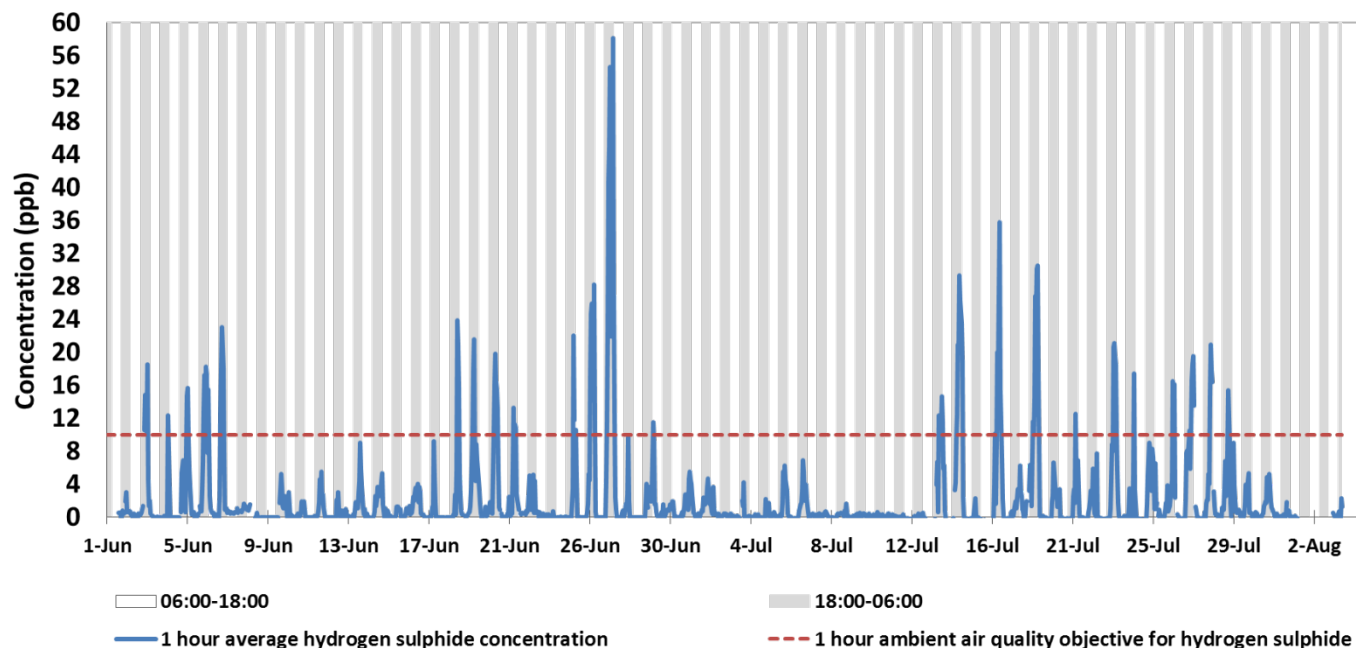


FIGURE 1: Frequency Distribution of Ambient Hydrogen Sulphide Measurements at the Town of Bonnyville

LICA Portable Air Monitoring System: Town of Bonnyville Hydrogen Sulphide (ppb)



**FIGURE 2: Ambient Hydrogen Sulphide Measurements
Superimposed on Day/Night Shading at the Town of Bonnyville**

As the source of these elevated hydrogen sulphide concentrations is believed to be caused by natural processes in Jessie Lake, (particularly the hydrologically isolated lagoon portion of the Lake), LICA is proposing that a monthly summary of hydrogen sulphide measurements is submitted rather than obtaining reference numbers for each exceedance event. Data will continue to be analyzed on a daily basis and if other, anthropogenic sources of hydrogen sulphide are identified, LICA will notify AEP.

Should you have any questions, please don't hesitate to contact me.

Respectfully,



Michael Bisaga
Manager, Environmental Monitoring Programs
Lakeland Industry and Community Association

cc (email): Colin Woods, Alberta Energy Regulator
Charmaine Code, LICA Office