



AIR QUALITY

Fort McKay Specific Assessment

Appendix 2-2

An Assessment of Air Quality in Fort McKay in 2008: Based on Health Canada's Air Quality Health Index (AQHI) and Fort McKay's related Community AQHI Criteria

**Fort McKay
Industry Relations Corporation**

March 2010

**An Assessment of Air Quality in Fort McKay in 2008:
Based on Health Canada's Air Quality Health Index (AQHI) and
Fort McKay's related Community AQHI Criteria**

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Report Summary

This report was prepared to determine if the Air Quality Health Index (AQHI) related air quality criteria that the Community of Fort McKay is proposing as part of its Air Quality Management Plan. This Air Quality Management Plan is part of the Community's Healing the Earth Strategy.

Air quality deterioration and related health and environmental effects is one the Community of Fort McKay's principle concerns with the extensive oilsands development occurring in the region and in particular on its traditional lands and adjacent to the Community of Fort McKay. To address this concern, Fort McKay has established health, odour, clean area and air emission control strategies, goals and/or criteria. One of these criteria involves the use of Health Canada's AQHI which attempts to address the short term health impacts associated with the combination of nitrogen dioxide, ozone and fine particulate matter pollutants in air. Since these pollutants are present in Fort McKay's air, sometimes at elevated levels, and are often associated with industrial emissions, the AQHI was considered an appropriate air management tool for the Community.

This report reviewed AQHI data for Fort McKay in 2008 relative to the Community's AQHI criteria. The review determined that the AQHI criteria were not exceeded and that overall the air quality in Fort McKay was very good based on the AQHI criteria. It must be noted however that the AQHI does not address chronic air pollution health impacts, trace air contaminants or odours and is therefore only one indicator of air quality. It is nevertheless considered a reasonable indicator to assess the occurrence of events with mixtures of common ambient air pollutants that are important from a public health point-of-view.

The assessment indicates that for those key common air contaminants of relevance to Community i.e. NO₂, O₃ and PM_{2.5}, upon which the AQHI is based, air quality is generally good. The few higher AQHI values recorded (readings of "6" which represented only 6 out of 5513 readings in 2008 and which were still only in the moderate health risk category) occurred when winds were from the south and reflect the influence that industrial emissions have on Community air quality at times. The report provides an assessment of some factors that may have influenced AQHI levels in the Community but a larger data set i.e. more years of data, and a more detailed analysis is required to fully address the factors affecting AQHI readings and their relative significance.

The report recommends AQHI values be included in the ongoing air quality data trending analysis and reporting that it is anticipated that WBEA will be undertaking. It also recommends that the type of high-level Community AQHI assessment undertaken in this report be continued and include a review of air quality in the Community relative to all the air quality criteria established in the

Healing the Earth Strategy. This will give the Community their own assessment of air quality that can be tailored to their needs and interests.

The report notes that Fort McKay's AQHI criteria should be considered preliminary since the AQHI is a new air quality/health management tool and will undoubtedly evolve over time. In this regard the Community's AQHI criteria will need to be informed by, and possibly modified as a result of, this evolution and new or better air-related health effects information.

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Table of Contents

Report Summary	i
Introduction.....	1
The Air Quality Health Index (AQHI) and Fort McKay's AQHI-related Air Quality Criteria	2
The AQHI Index	2
Health Messages	3
Fort McKay's Use of the AQHI.....	4
AQHI Values in Fort McKay in 2008.....	5
An Evaluation of the 2008 AQHI values in Fort McKay	8
* Since these values are three hour trailing averages the range of values in the 3 hour period used to calculate the AQHI are shown	14
Conclusions and Recommendations	14
References.....	15
Appendix 1.....	16
An Example of Environment Canada's Daily AQHI Summaries for Air Monitoring Stations in Alberta (which includes the Fort McKay Air Monitoring Station)	16
Appendix 2.....	21
An Example of the Monthly and the Annual Excel Spreadsheets used to Record, Analyze and Plot AQHI Data.....	21

List of Figures

Figure 1: Number of Days and Percentage of Days in Fort McKay in 2008 that noted AQHI Values were Equaled or Exceeded.....	6
Figure 2: Percentage of the Time the noted AQHI Value was Observed in Fort McKay in 2008	7
Figure 3: The Number of Hours that each AQHI Value Occurred in Fort McKay in 2008.....	8
Figure 4: AQHI Values in Fort McKay in 2008 by Month	9
Figure 5: Percentage of Time Hourly NO ₂ Levels in Fort McKay are above 21 ppb and above 18 ppb at the Syncrude UEI Station when the wind is from the noted Direction (January 1, 2005 to October 31, 2008 data period)	11
Figure 6: Percentage of Time Hourly PM _{2.5} Levels in Fort McKay are above 28.34ug/m ³ when the wind is from the noted Direction (January 1, 2005 to October 31, 2008 data period)	12
Figure 7: Percentage of Time Hourly Ozone Levels in Fort McKay are above 49ppb when the wind is from the noted Direction (January 1, 2005 to October 31, 2008 data period).....	13

List of Tables

Table 1: AQHI Categories and Messages ¹	3
Table 2: Air Quality Health Index Criteria for the Community of Fort McKay	5
Table 3: Air Quality Health Index Values in Fort McKay in 2008 Relative to Fort McKay's AQHI Criteria for the Community	7
Table 4: The Date, Time, Wind Direction and AQHI Parameter Pollutant Levels for the Six Occurrences of an AQHI Level of "6" in Fort McKay in 2008.....	14

Introduction

The Community of Fort McKay is located in the center of the mineable oilsands region in the Fort McMurray region. Its air quality at times is influenced by emissions from the Syncrude and Suncor industrial developments located to the south of the Community and from the Syncrude Aurora North and Albion mines located to the northeast of the Community. Other regional industrial developments, adjacent roadway transportation sources and within Community activities also have influence on its air quality. As the number and size of oilsands developments in the region increases, the impacts of the associated increase in industrial emissions can be expected to have a greater influence on Fort McKay's air quality.

To date the most tangible impact of industrial emissions on air quality in Fort McKay has been related to odours. Odours are a frequent occurrence in the Community and one of the major complaints and concerns of Community members. Odours influence Community members' perception of risk and concerns regarding the potential health impacts of the odourous compounds and other air contaminants that may be present. This results in air-related stress and quality of life issues that remain unresolved.

To address these issues and concerns regarding the effects of industrial development on its Community, Fort McKay is developing a "Healing the Earth Strategy" which outlines the Community's expectations with respect to the management of air, land, water and wildlife within and around their reserve lands and on their traditional lands. The Healing the Earth Strategy includes an "air quality management" plan. This plan consists of the following general elements:

1. Health and odour based air quality criteria for the Community,
2. "Keeping Clean Areas Clean" based air quality criteria for the Community,
3. Tracking of air quality changes and trends in the Community,
4. A notification protocol for poor air quality episodes in the Community or emission events that could significantly impact the Community's air quality, and
5. The Community's expectations regarding management of regional air emissions.

Collectively these elements are considered to represent a proactive approach to protecting and managing air quality in the Community and provide companies and governments with clear direction on the air quality criteria and management approaches that the Community expects will be applied to projects that can affect their air quality and health.

As part of its Community health and odour based air quality criteria, Fort McKay is using

Health Canada's recently developed health-based air quality index (AQHI) as one of the measures to define and assess safe air quality. Fort McKay adopted this index because it is health based, integrates the health effects of three air pollutants of relevance to Fort McKay (nitrogen dioxide, fine particulate and ozone), was developed in Canada and is supported by Health Canada and Environment Canada. The index represents a new approach to air quality indexing and it is expected that the AQHI will evolve and that Fort McKay's use of index may therefore also have to evolve.

The Community has established "maximum frequency of exceedence" criteria related to AQHI levels. The purpose of this assessment is, in part, to determine if these criteria were exceeded in 2008, and is also in part to fulfill the "tracking of air quality changes and trends in the Community" recommendation in the Healing the Earth Strategy. Finally, this assessment attempts to determine if there are any patterns to Community AQHI levels and the conditions under which higher AQHI occur.

This is the first annual assessment of AQHI levels in the Community. It is envisioned that it will be the initial year in ongoing trend analysis of Community AQHI values.

The Air Quality Health Index (AQHI) and Fort McKay's AQHI-related Air Quality Criteria

The AQHI Index

The AQHI is a health-based air quality index that has been developed by the Government of Canada (http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/air_quality-eng.php last visited on Dec. 26, 2008). The scientific bases for the AQHI, and the index's actual structure, as well as its limitations, are outlined by Stieb *et al.* (2008). It is based on epidemiological research that support a statistical link between certain levels of common air pollutants and adverse health impacts which are supported by clinical and mechanistic health effects research (Pope III and Dockery, 2006. <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=194645> (last visited Jan. 9, 2009) http://www.epa.gov/ttn/naaqs/standards/ozone/data/ozone_ra_final_tsd_7-2007.pdf (last visited on Jan.9, 2009). Table 1 summarizes the AQHI categories/values and related health messages.

Table 1: AQHI Categories and Messages ¹

Health Risk	Air Quality Health Index	Health Messages	
		At Risk Population*	General Population
Low	1 - 3	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities.
Moderate	4 - 6	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	No need to modify your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High	7 - 10	Reduce or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very High	Above 10	Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	Reduce or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation

¹ <http://www.ec.gc.ca/cas-aqhi/default.asp?lang=En&n=79A8041B-1> last visited on Dec. 26, 2008

* People with heart or breathing problems are at greater risk. Follow your doctor's usual advice about exercising and managing your condition.

The equation for determining the AQHI is expressed as follows (Mintz, pers.com. 2007):

$$AQHI = \left(\frac{1000}{10.4} \right) \left[\left(e^{0.000871[NO_2]} - 1 \right) + \left(e^{0.000537[O_3]} - 1 \right) + \left(e^{0.000487[PM_{2.5}]} - 1 \right) \right]$$

Where: AQHI = air quality health index
 [NO₂] = ambient air NO₂ concentration in ppb, 3-hour average
 [O₃] = ambient air O₃ concentration in ppb, 3-hour average
 [PM_{2.5}] = ambient air PM_{2.5} concentration in µg/m³, 3-hour average

It is calculated hourly using the trailing three hours of air quality data. In this review AQHI values generated by Environment Canada were used (see appendix 1 for an example of the daily AQHI/AQI (air quality index) summary provided by Environment Canada for Alberta air monitoring stations). NO₂ concentrations are weighted more than O₃ or PM_{2.5} concentrations in the determination of AQHI values. To give near real-time AQHI values, Environment Canada uses raw data from stations that have not undergone final quality control checks and therefore values may be slightly different from those calculated using

final corrected data. Any such differences should be minor and would not be expected to have a significant or even noticeable effect on the results of this assessment. Future retrospective assessments of AQHI data could be, and probably should be, undertaken by generating a yearly AQHI data set using corrected data from the CASA data warehouse (<http://www.casadata.org/index.asp> last visited on Dec. 27, 2008).

The index does not include sulphur dioxide (SO₂) or carbon monoxide (CO) as these pollutants were found to have a smaller association with mortality than NO₂, O₃ and PM_{2.5}/PM₁₀. SO₂ and CO levels are generally quite low in Fort McKay, with the exception of the occasional high SO₂ level associated with industrial upset or normal pollution control equipment downtime conditions at Syncrude or Suncor. Therefore the index is generally considered applicable as it covers the common air contaminants of most relevance to Fort McKay from a public health point-of-view.

Fort McKay's Use of the AQHI

Fort McKay has incorporated the AQHI into its Community air quality management system because it:

1. is strictly a health-based index, i.e. it is not based on air quality criteria that reflect technical or economic feasibility attainment factors,
2. is based on actual air quality-health assessments from a number of Canadian cities,
3. considers the collective impact of a number of common air contaminants i.e. is more representative of actual air pollutant exposures than single pollutant indexes,
4. is from a credible source i.e. Health Canada and Environment Canada, and
5. is calculated and made available electronically on an ongoing real-time basis by Environment Canada.

Overall the AQHI is considered to provide a truly health-based metric that reflects current science and which can be used as a general measure of Community air quality for certain key air quality parameters that regional industrial development are influencing. In this regard, it must be noted that the AQHI was derived based on health and ambient air quality data from Canadian cities and therefore its use in non-urban center can be questioned (Stieb *et al.* 2008). However, in the absence of any alternative health-based air quality index, the extrapolation and use of the AQHI to a Community like Fort McKay is considered reasonable on the basis that potential adverse health impact may be linked to deteriorating AQHI values and trends even if the absolute magnitude of these impacts is different than those observed in urban centers.

Fort McKay is using the frequency of various AQHI values as a measure of air quality in the Community. The following are the “maximum acceptable frequency of exceedence” of specific AQHI levels that the Community has established.

Note: these criteria should be considered preliminary and will be informed by, and possibly modified as a result of, this and future assessments and as the AQHI evolves based on new or better health effects information.

Table 2: Air Quality Health Index Criteria for the Community of Fort McKay

Risk Category ¹	Goal or Acceptable Frequency of Exceedence	Action Required if Exceeded
Low (AQHI value 1-3)	>95% of the hourly AQHI readings are 3 or less	Reviewed as part of annual trend analysis
Moderate (AQHI value 4-6)	< 30 days per year have any AQHI readings of above 4	Reviewed as part of annual trend analysis
High (AQHI value 7-10)	< 5 days per year have any AQHI readings above 6	Reviewed as part of annual trend analysis
Very High (AQHI value 10+)	no days per year have any AQHI readings above 10	Immediate reporting as per notification protocol

¹ Note: The AQHI values referred to are based on the use of PM_{2.5} in the AQHI formula and not PM₁₀. Fort McKay is prepared to reconsider the criteria in this table as experience on, and data from, the AQHI grows.

The first 2 AQHI related criteria in this table are not strictly based on health protection but rather on ensuring that air quality in Fort McKay is maintained at good levels and as such these can be considered “keeping clean areas clean” (KCAC) criteria. The latter 2 criteria are strongly health protection based. This assessment reviews 2008 AQHI values in Fort McKay in relation to these KCAC and health-based AQHI frequency criteria.

AQHI Values in Fort McKay in 2008

AQHI values for Fort McKay were extracted from Environment Canada’s daily summaries, transposed to a Microsoft Excel Program (2003) and analyzed and plotted using this Excel program. Appendix 2 provides an example of a monthly, and the annual, spreadsheet used to record and plot AQHI data. There were 302 days for which AQHI values were available. In interpreting this data it must be recognized that one year of data represents a very small data set and many factors e.g. plant upsets, unusual meteorological conditions, forest fires etc. can influence results. Therefore, additional years of data are necessary to put 2008 AQHI data into context. However, the data set does represent real and reliable data for 2008 and therefore it can be used to assess whether or not Fort McKay’s AQHI based air quality criteria were met.

Figure 1 shows the number of days and percentage of days in 2008 that specific AQHI values were equaled or exceeded in Fort McKay. Figure 2 shows the percentage of time each AQHI value occurred in Fort McKay in 2008. The data from these figures are presented in Table 3 which compares the values to the

maximum acceptable frequency of exceedence of specific AQHI levels that the Community has established.

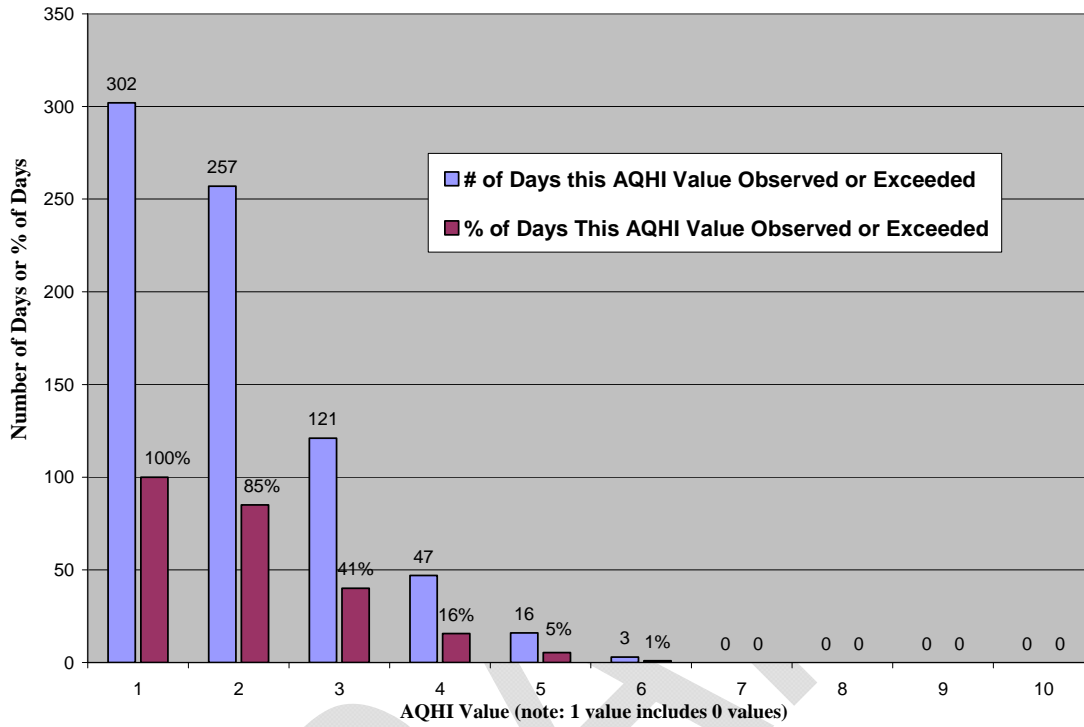


Figure 1: Number of Days and Percentage of Days in Fort McKay in 2008 that noted AQHI Values were Equaled or Exceeded

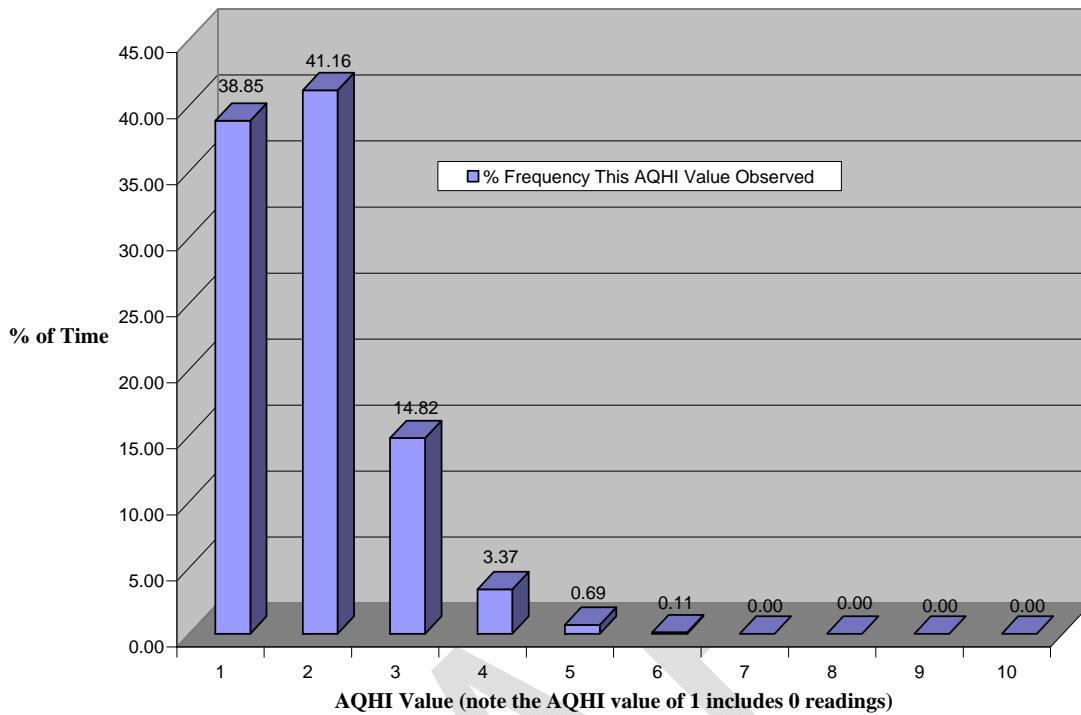


Figure 2: Percentage of the Time the noted AQHI Value was Observed in Fort McKay in 2008

Table 3: Air Quality Health Index Values in Fort McKay in 2008 Relative to Fort McKay's AQHI Criteria for the Community

Risk Category	Goal or Acceptable Frequency of Exceedence	Actual 2008 Value
Low (AQHI value 1-3)	>95% of the hourly AQHI readings are 3 or less	~95.5% of the AQHI values were 3 or less
Moderate (AQHI value 4-6)	< 30 days per year have any AQHI readings of above 4	16 days in 2008 had AQHI readings above 4
High (AQHI value 7-10)	< 5 days per year have any AQHI readings above 6	There were no days in 2008 that had AQHI reading above 7
Very High (AQHI value 10+)	no days per year have any AQHI readings above 10	There were no days in 2008 that an AQHI readings above 10

The assessment indicates that the AQHI based criteria Fort McKay has established as its initial best estimate of reasonable and protective air quality management targets were not exceeded in 2008. The criteria closest to being exceeded was the “>95% of the hourly AQHI readings are 3 or less” with 95.68% of the hourly AAQH readings being 3 or less. There were 16 days with hourly

AQHI values above 4 (the criteria is 30) but the actual number of hours with AQHI values above 4 was only 44 (out of a total of 5346 hourly AQHI values). There were no AQHI values above 6 so the “< 5 days per year have any AQHI readings above 6” and “no days per year have any AQHI readings above 10” criteria were easily met.

An Evaluation of the 2008 AQHI values in Fort McKay

A review of the hourly AQHI values indicates that most of the values are 2 or less i.e. approximately 80% of the hourly AAQH readings were at 0, 1 or 2 (See Figures 2 and 3). This indicates that, for those key common air contaminants of relevance to Community i.e. NO₂, O₃ and PM_{2.5}, air quality is generally good and potential short-term health impacts from these pollutants is likely very low and limited to short term episode events.

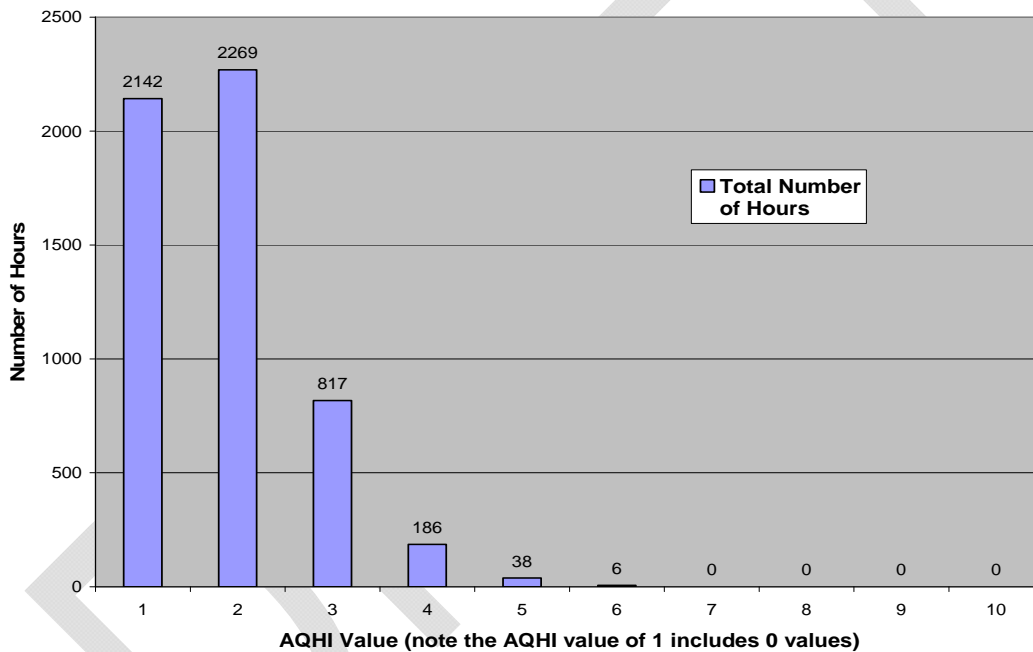


Figure 3: The Number of Hours that each AQHI Value Occurred in Fort McKay in 2008

Monthly Trends: To determine if there were months where AQHI values were better or worse than the annual average, AQHI values for each month in 2008 were plotted (see figure 4). This plot indicates that May and April had generally higher AQHI values than the other months and that September, October and November had generally lower AQHI values. Monthly average values of NO₂, O₃ and PM_{2.5} in Fort McKay in 2008 are also shown on Figure 4 (note: monthly data for November and December were not available from the CASA Data Warehouse (<http://www.casadata.org/>) at the time of writing of this report).

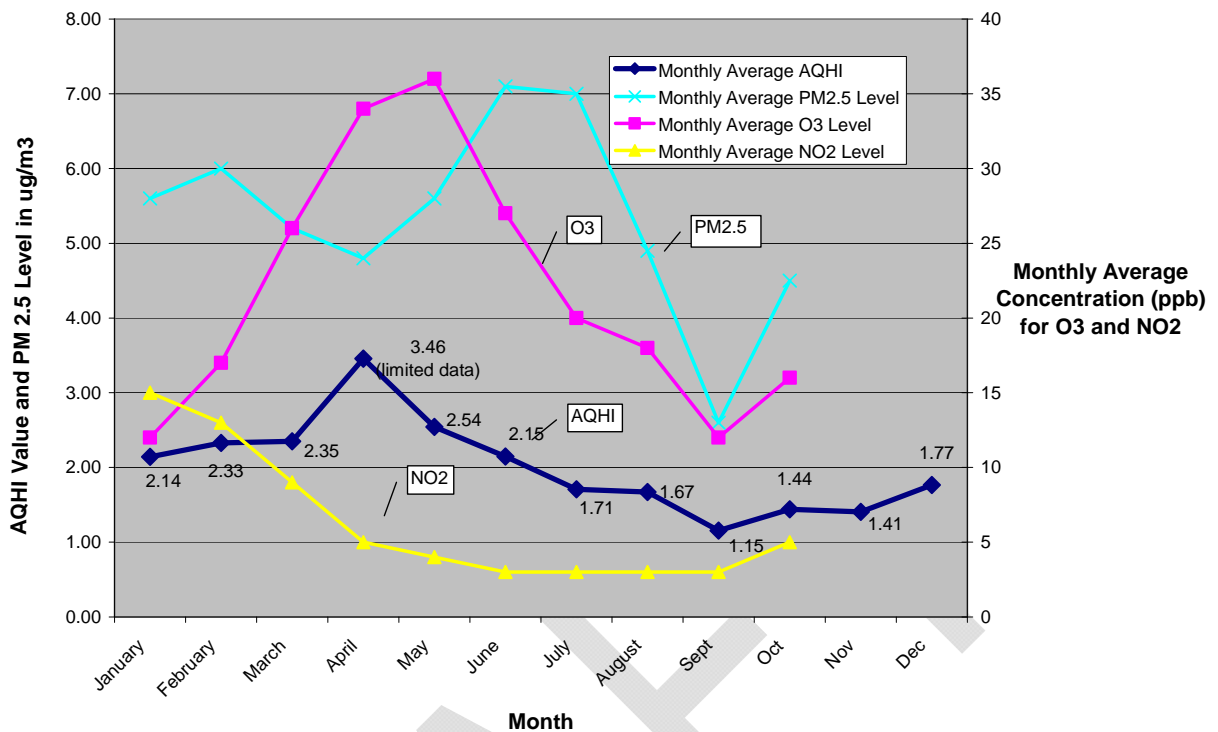


Figure 4: AQHI Values in Fort McKay in 2008 by Month

Figure 4 shows that as would be expected in general monthly average AQHI values track monthly average NO₂, O₃ and PM_{2.5} value. The higher average AQHI values in April and May therefore appear due to the higher ozone values during this period. These higher spring ozone levels are likely associated with “spring maximum” ozone levels often observed in northern latitudes (Campbell, I. M., 1986).

Whether or not these monthly differences and trends are reflective of varying regional meteorological and/or atmospheric chemistry conditions, emission patterns or are random would require a more detailed analysis which is beyond the scope of this assessment. As additional years of AQHI data are generated in the future, or if AQHI values for previous years are calculated, such an assessment could be undertaken.

Diurnal and Day of Week Variations in AQHI Values: No attempt was made to determine if there were diurnal (within day) or day of the week trends in AQHI values. Visual observations seemed to show a trend towards higher AQHI values in the mid-morning/afternoon period which would be consistent with air quality trending analysis by Kindzierski et al. (2006) which showed that O₃ and PM_{2.5} levels in the Community tend to be higher during this part of the day. Kindzierski et al. (2006) did not note any day of the week trends in Fort McKay for NO₂, O₃ or PM_{2.5} (data period was 1999-2004 inclusive). These types of diurnal and day of week should be undertaken once additional years of AQHI data are available

and/or generated as it would help provide insights into possible meteorological factors and/or atmospheric reactions that are influencing AQHI levels and air quality in the Community.

Sources of Higher AQHI Values: As a multi-pollutant index based on a 3 hour average of NO₂, O₃ and PM_{2.5} concentrations, higher AQHI values occur when the concentrations of these air contaminants is highest. To determine the possible sources or explanations for when higher AQHI levels occur in Fort McKay, recognizing that the highest AQHI levels in the Community were only in the “moderate” category, pollutographs relating periods of higher NO₂, O₃ and PM_{2.5} levels in Fort McKay to wind direction were prepared. These pollutographs were prepared using the CASA Data Warehouse pollution/wind rose report generator (http://www.casadata.org/Reports/casareports_2.asp?PGID=1&RType=WR&Source=&CID=&ColTypes=1&CFlag=0&SFlag=1&PFlag=1&DFlag=1 last visited Jan. 10, 2009).

Figures 5, 6 and 7 show the pollutographs for NO₂, O₃ and PM_{2.5}. They clearly indicate that the frequency of higher NO₂, O₃ and PM_{2.5} levels in Fort McKay in 2008 are greatest when the wind is southerly directions. This would indicate, as would be expected, that industrial emission sources, are having the greatest influence on AQHI levels in Fort McKay. Figure 5 includes data from the Syncrude UE1 continuous air monitoring station which is approximately 4km due south of the Fort McKay station with no significant NO₂ emission sources between the two stations other than a road . The Fort McKay continuous air monitoring station is at the northern end of the Community and when winds are from the south would measure NO₂ sources within the Community. The strong southerly wind influence on NO₂ levels at both the Fort McKay and UE1 stations would indicate that sources to the south of both stations are responsible for most of the higher NO₂ readings at these stations.

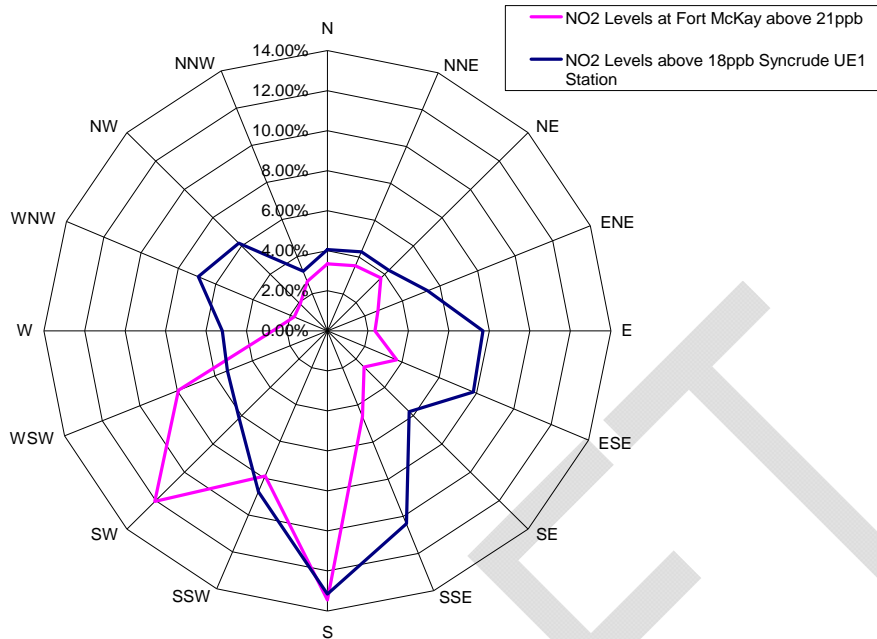


Figure 5: Percentage of Time Hourly NO₂ Levels in Fort McKay are above 21 ppb and above 18 ppb at the Syncrude UE1 Station when the wind is from the noted Direction (January 1, 2005 to October 31, 2008 data period)

Figures 5, 6 and 7 are read/interpreted as follows:

- 1. For Figure 5 for example when the wind is from the south 13.5% of the hourly NO₂ readings at Fort McKay are above 21ppb and when the winds are from the west 3% of the NO₂ reading are above 21ppb,**
- 2. For Figure 6 for example when the wind is from the south 1.8% of the hourly NO₂ readings at Fort McKay are above 28.34 ug/m³ and when the winds are from the west 0.4% of the NO₂ reading are above 28.34 ug/m³, and**
- 3. For Figure 7 (for example when the wind is from the southeast 5.25% of the hourly O₃ readings at Fort McKay are above 49ppb and when the winds are from the west 2.5% of the O₃ reading are above 49ppb.**

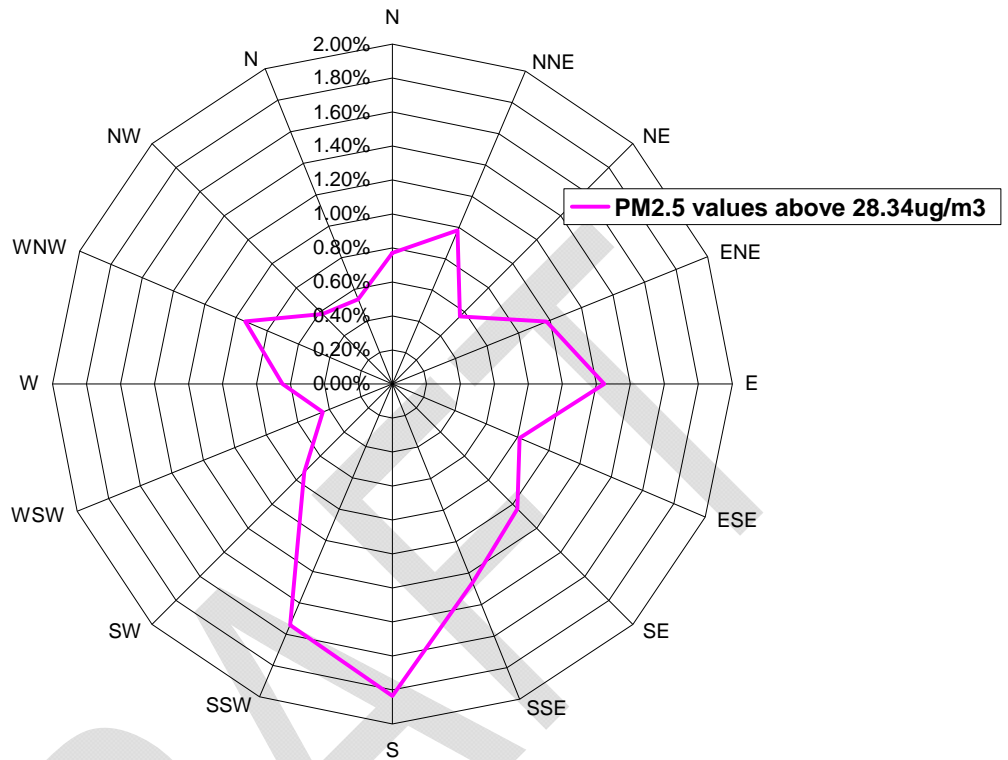


Figure 6: Percentage of Time Hourly PM_{2.5} Levels in Fort McKay are above 28.34 μg/m³ when the wind is from the noted Direction (January 1, 2005 to October 31, 2008 data period)

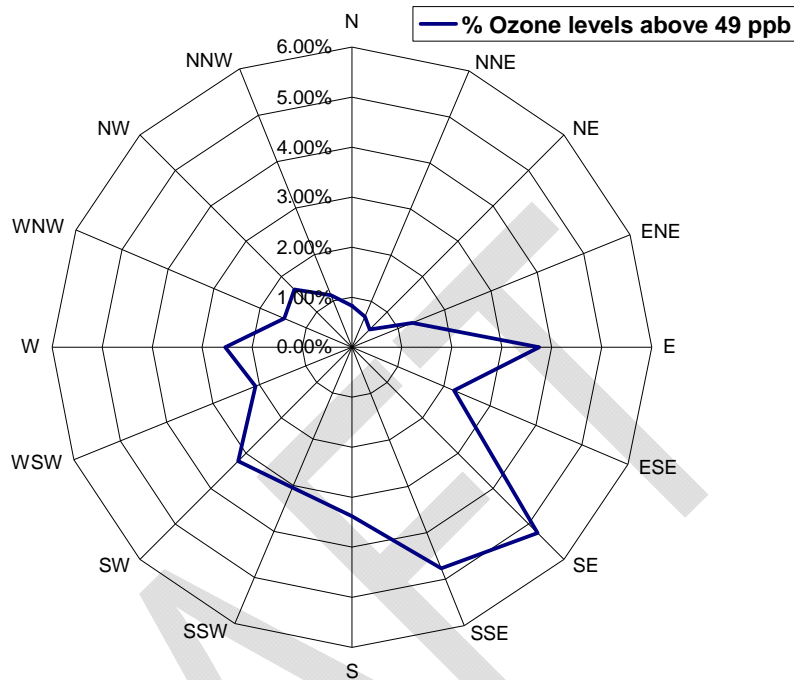


Figure 7: Percentage of Time Hourly Ozone Levels in Fort McKay are above 49ppb when the wind is from the noted Direction (January 1, 2005 to October 31, 2008 data period)

Highest AQHI Value Periods and Related Conditions: There were six AQHI values of “6” that occurred in 2008. Table 4 provides details on when these AQHI values occurred, the related concentrations of NO₂, O₃ and PM_{2.5} and the prevailing wind direction. These AQHI values of “6” were principally the result of O₃ and PM_{2.5} and four of the six values occurred on August 8 when a photochemical ozone event appears to have occurred i.e. ozone levels started to increase at approx. 10:00am (when O₃ levels were 41 ppb and the temperature was 24°C) and climbed until 6:00pm (when O₃ levels reached 78 ppb and the temperature was 34°C). Ozone levels in Fort McMurray, Fort Chipewyan and Anzac were 30-40ppb less than the peak ozone values that occurred in Fort McKay which would support the assumption of a precursor emission/photochemistry ozone event. All the AQHI value of “6” events occurred when there were southerly winds and therefore air quality was being influenced/affected by industrial emissions. While this is a small data set of higher AQHI values, and represents only three separate air quality event days, it shows the potential for higher AQHI events in Fort McKay under certain conditions.

Table 4: The Date, Time, Wind Direction and AQHI Parameter Pollutant Levels for the Six Occurrences of an AQHI Level of "6" in Fort McKay in 2008

Date	Time	AQHI Value	NO ₂ * (ppb, range of values for 3-hour ave. period)	O ₃ * (ppb, range of values for 3-hour ave. period)	PM _{2.5} * (µg/m ³ , range of values for 3-hour ave. period)	Wind Direction
June 8, 2008	2:00pm	6	5-12	29-47	50.2-62.4	South
July 29, 2008	6:00pm	6	6-8	46-54	42.9-57.4	SE/SW
August 8, 2008	Noon	6	8-11	41-64	40.8-49.8	S/SE
August 8, 2008	1:00pm	6	9-11	51-67	37.9-49.8	S/SE
August 8, 2008	2:00pm	6	8-9	64-72	37.9-44.7	S/SE
August 8, 2008	3:00pm	6	4-9	67-72	17.5-44.7	S/SE

* Since these values are three hour trailing averages the range of values in the 3 hour period used to calculate the AQHI are shown

Conclusions and Recommendations

This assessment was undertaken to assess the 2008 air quality health index (AQHI) values for Fort McKay relative to AQHI based Community air quality criteria that are part of the Community's Healing the Earth Strategy. It must be noted that the AQHI does not address chronic air pollution health impacts, trace air contaminants or odours and is therefore only one indicator of air quality. It is nevertheless considered a reasonable indicator to assess the occurrence of events with mixtures of common ambient air pollutants that are important from a public health point-of-view. This assessment indicates that the AQHI based criteria Fort McKay has established as its initial best estimate of reasonable and protective air quality management targets were not exceeded in 2008. Further, the assessment indicates that for those key common air contaminants of relevance to Community i.e. NO₂, O₃ and PM_{2.5}, upon which the AQHI is based, air quality is generally good. The few higher AQHI values recorded (readings of "6" which represented only 6 out of 5513 readings in 2008 and which were still only in the moderate health risk category) occurred when winds were from the south and reflect the influence that industrial emissions have on Community air quality at times.

Additional years of AQHI data are required to assess whether or not there are diurnal, daily, weekly, monthly and or/annual trends in AQHI values and to determine the role of meteorology and emission patterns and variations have on AQHI values. In this regard it is recommended that AQHI values be included in the ongoing air quality data trending analysis and reporting that it is anticipated that WBEA will be undertaking. It is also recommended that the type of high-level Community AQHI assessment undertaken in this report be continued and include a review of air quality in the Community relative to all the air quality criteria

established in the Healing the Earth Strategy. This will give the Community their own assessment of air quality that can be tailored to their needs and interests.

Finally, it needs to again be noted that Fort McKay's AQHI criteria should be considered preliminary. The AQHI is a new air quality index and its ongoing use and related Community AQHI criteria, will be informed by, and possibly modified as a result of, this and future assessments and by any future changes to the AQHI as a result on new or better health effects information.

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Appendix 1

An Example of Environment Canada's Daily AQHI Summaries for Air Monitoring Stations in Alberta (which includes the Fort McKay Air Monitoring Station)

(Note: The index can be obtained daily via email by contacting Al Pankratz of Environment Canada at Al.Pankratz@ec.gc.ca)

From: al@doc.wxe.sk.ec.gc.ca
 Sent: Monday, November 24, 2008 2:50 AM
 To: dspink@shaw.ca

Subject: Alberta AQI daily summary: 23 NOV 2008

Daily Alberta AQI Summary - 23 NOV 2008 MST

WARNING: This product is based on raw data which has not been quality controlled. Use at your own peril.

		Green = GOOD Yellow = FAIR Red = POOR																							
STATION (IDENT)	INDEX	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Athabasca Valley (07WBEA)	abaqi	-	-	-	9	5	6	5	4	5	5	4	4	7	5	7	7	7	6	4	5	6	6	6	
	aqhi	-	-	-	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	1	
Beaverlodge (15AQM)	abaqi	-	-	-	1	1	0	1	1	1	1	1	1	1	1	1	1	1	8	9	1	1	9	1	
	aqhi	-	-	-	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Calgary East (02AQM)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	7	8	8	1	1	8	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3	4	4	
Calgary Northwest (04AQM)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Calgary Central2 (06AQM)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	9	1	1	1	1	1	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	4	4	4	4	
Calgary - average (CGYAVG)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	9	8	1	1	1	1	1	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	4	4	4	4	
Calgary - maximum (CGYMAX)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	9	1	1	1	1	1	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	4	4	4	4	
Carrot Creek (03WCAS)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cold Lake South (01LICA)	abaqi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	6	6	
	aqhi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	
Edmonton	aba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	8	8	6	6	5	6	

Appendix 2

An Example of the Monthly and the Annual Excel Spreadsheets used to Record, Analyze and Plot AQHI Data

Air Quality Health Index Summary for Fort McKay 2008

Date	Frequency of Hourly Average At Noted AQHI Value										
	1	2	3	4	5	6	7	8	9	10	
1/Jun	5	5	10								
2/Jun		4	6	7	1						
3/Jun	1	11	7	2							
4/Jun		8	11	1	1						
5/Jun	2	1	3	6							
6/Jun	6	4	11								
7/Jun	3	16									
8/Jun	5	5	4	3	3	1					
9/Jun	8	3	6	2							
10/Jun	1	11	7	2							
11/Jun	3	2	10	6							
12/Jun	3	7	6	5							
13/Jun	6	7	5	2	1						
14/Jun	7	4	7	2							
15/Jun	17	2									
16/Jun	7	12									
17/Jun	5	1									
18/Jun	4	15									
19/Jun	2	5	7								
20/Jun	3	15									
21/Jun	1	4	8	3	2						
22/Jun	3	6	10								
23/Jun	15	2									
24/Jun	10	7									
25/Jun	7	12									
26/Jun	11	8									
27/Jun	8	11									
28/Jun	1	14	3								
29/Jun	1	18									
30/Jun	4	15									
Total Frequency	149	235	121	41	8	1	0	0	0	0	
# Data Points Available This Month				555							
% Frequency This AQHI Value Observed in June	26.8	42.3	21.8	7.4	1.4	0.2	0.0	0.0	0.0	0.0	
# of Days this AQHI Value Observed	30	30	17	12	5	1	0	0	0	0	
# of Days Data Available This Month				30							
% of Days This AQHI Value Observed	100.0	100.0	56.7	40.0	16.7	3.3	0.0	0.0	0.0	0.0	
Monthly average AQHI Value	2.15										