



Wood Buffalo Environmental Association  
**Ambient Air Monitoring Station  
Site Documentation**

# Jackfish 1

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## WBEA Monitoring Network

### Vision

Empower all stakeholders and rights holders with environmental data to make informed decisions.

### Mission

A multi-stakeholder, consensus-based organization providing world-class environmental monitoring and reporting.

### The Region

From north-central Alberta to the borders of Saskatchewan and the Northwest Territories, the Regional Municipality of Wood Buffalo ([www.woodbuffalo.ab.ca](http://www.woodbuffalo.ab.ca)) covers 68,454 square kilometres, making it the second largest municipality in Canada. It was established in 1995 through an amalgamation of the City of Fort McMurray and Improvement District No. 143. The Athabasca Oil Sands Region (AOSR) is within the municipality, and includes both traditional bitumen mining operations and in situ oil production. The region also encompasses the communities of Fort McMurray, Fort Chipewyan, Fort McKay, Anzac, Janvier, and Conklin.

### The Network

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 28 permanent continuous monitoring locations, each measuring various air quality parameters. The continuously measured air quality parameters include Sulphur Dioxide (SO<sub>2</sub>), Hydrogen Sulfide (H<sub>2</sub>S), Total Reduced Sulphur (TRS), Ozone (O<sub>3</sub>), Total Oxides of Nitrogen (NO<sub>x</sub>), Nitric Oxide (NO), Nitrogen Dioxide (NO<sub>2</sub>), Ammonia (NH<sub>3</sub>), Carbon Monoxide (CO), Carbon Dioxide (CO<sub>2</sub>), Particulate Matter less than 2.5µm (PM<sub>2.5</sub>), Total Suspended Particulates (TSP), Total Hydrocarbon (THC), Methane and Non-Methane Hydrocarbons (NMHC). All sites also measure ambient air temperature (AT), wind speed (WS), wind direction (WD), and relative humidity (RH). Selected sites measure barometric pressure (BP), global radiation (GR), precipitation (PC), leaf wetness (LW), vertical wind speed (VWS), vertical temperature gradient VTG) and Present Weather Detector (PWD). The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1.

The WBEA also maintains and operates six portable monitoring stations. Five of these stations are used for compliance monitoring at sites that require less than 12 months per year. One portable is set up for gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

### Time Integrated Sampling

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH at permanent monitoring sites. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods.

In 2012, the WBEA moved to Hivol PUF sampling for PAH compounds from the previous low volume method. This was done to achieve a lower detection limit for the target analytes. In 2015, the WBEA moved to duplicate sampling for the PM<sub>10</sub> and PM<sub>2.5</sub> time integrated parameters for 2 reasons; (1) to have duplicate mass measurements for QA purposes, (2) to have separate filters for subsequent metals and ion analysis. Elemental and Organic Carbon (ECOC) sampling began on August 7, 2012 at the Bertha Ganter site. ECOC was added and the Wapasu and Stony Mountain sites on May 1, 2018. All time-integrated samples in the WBEA ambient air monitoring network are collected on the National Air Pollution Surveillance (NAPS) schedule every 6 days for a 24-hour period.

The WBEA also collects precipitation samples for chemistry analysis through the National Atmospheric Deposition Program (NADP) at three sites; Bertha Ganter, Wapasu and Stony Mountain. These samples are collected every Tuesday at 12:00.

In 2022, the WBEA added a dustfall sampling network to better understand the larger size settleable particulate in the region. These sites are currently located at the community sites and are collected on a monthly frequency.

The time-integrated parameters for each station are summarized in Table 1.2.

Table 1.0 provides a listing of stations with their names and corresponding WBEA identification number and the air quality parameters measured by continuous methods at each site. Parameters measured include; sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>), particulate matter less than 2.5µm (PM<sub>2.5</sub>), total reduced sulphur (TRS), hydrogen sulphide (H<sub>2</sub>S), total hydrocarbons (THC), non-methane hydrocarbons (NMHC), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), ammonia (NH<sub>3</sub>). Sites are categorized by their station type based on the monitoring objectives for the site.

WBEA ID	TYPE	STATION NAME	SO <sub>2</sub>	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>2.5</sub>	TRS	H <sub>2</sub> S	THC	NMHC	CO	CO <sub>2</sub>	NH <sub>3</sub>
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X	X	X	X	X	X
2	COMPLIANCE	MILDRED LAKE	X					X	X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER											
4	COMPLIANCE	BUFFALO VIEWPOINT	X	X	X	X		X	X	X			
5	COMPLIANCE/METEOROLOGICAL	MANNIX	X					X	X	X			
6	COMMUNITY	PATRICIA MCINNES	X	X	X	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X	X	X	X		X	X	X		
8	COMMUNITY/COMPLIANCE	FORT CHIPEWYAN	X	X	X	X	X				X	X	
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X	X			
11	COMPLIANCE	LOWER CAMP	X					X	X	X			
13	COMPLIANCE/ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X	X			
14	COMPLIANCE/COMMUNITY	ANZAC	X	X	X	X	X		X	X			
17	COMPLIANCE	WAPASU	X	X	X	X		X	X				
18	BACKGROUND	STONY MOUNTAIN	X	X	X	X	X		X	X	X	X	
19	COMPLIANCE	FIREBAG	X	X				X	X				
20	COMPLIANCE	MACKAY RIVER	X	X				X	X				
21	COMMUNITY	CONKLIN	X	X	X	X	X		X	X			
22	COMMUNITY	JANVIER	X	X	X	X	X		X	X			
23	COMPLIANCE	FORT HILLS	X	X		X	X		X	X			
25	EMERGENCY RESPONSE	WASKOW OHCI PIMATISIWIN	X					X					
26	COMPLIANCE	CHRISTINA LAKE	X	X				X					
27	COMPLIANCE	JACKFISH 2/3	X	X				X					
29	COMPLIANCE	SURMONT 2	X	X		X		X	X				
30	COMPLIANCE	ELLS RIVER	X	X		X	X		X	X			
501	COMPLIANCE	LEISMER	X	X				X					
505	COMPLIANCE	SAWBONES BAY	X	X				X					
506	COMPLIANCE	JACKFISH 1	X	X				X					
507	COMPLIANCE	KIRBY SOUTH	X	X				X	X				
508	COMPLIANCE	KIRBY NORTH	X	X				X	X				

Table 1.0 - Pollutant parameters monitored in the WBEA network

Table 1.1 provides a listing of stations and meteorological parameters measured by continuous methods. Parameters measured include ambient temperature (AT), relative humidity (RH), barometric pressure (BP), wind speed (WS), wind direction (WD), vertical wind speed (VWS), global radiation (GR), total precipitation (PC), and leaf wetness (LW). Sites are categorized by their station type based on the monitoring objectives for the site.

WBEA ID	TYPE	STATION NAME	AT	RH	BP	WS	WD	VWS	GR	PC	LW
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X		X	X		X	X	X
2	COMPLIANCE	MILDRED LAKE	X	X		X	X				
3	METEOROLOGICAL	LOWER CAMP MET TOWER	X	X		X	X	X			
4	COMPLIANCE	BUFFALO VIEWPOINT	X	X		X	X				
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	X	X		X	X	X			
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X				
7	COMMUNITY	ATHABASCA VALLEY	X	X	X	X	X				
8	COMMUNITY/ COMPLIANCE	FORT CHIPEWYAN	X	X		X	X		X		X
9	ATTRIBUTION	BARGE LANDING	X	X	X	X	X				
11	COMPLIANCE	LOWER CAMP	X	X	X	X	X				
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X		X	X				
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X				X
17	COMPLIANCE	WAPASU	X	X		X	X			X	
18	BACKGROUND	STONY MOUNTAIN	X	X		X	X		X	X	X
19	COMPLIANCE	FIREBAG	X	X		X	X				
20	COMPLIANCE	MACKAY RIVER	X	X		X	X			X	
21	COMMUNITY	CONKLIN	X	X		X	X				
22	COMMUNITY	JANVIER	X	X		X	X				
23	COMPLIANCE	FORT HILLS	X	X		X	X				
25	EMERGENCY RESPONSE	WASKOW OHCI PIMATISIWIN	X	X		X	X				
26	COMPLIANCE	CHRISTINA LAKE	X	X		X	X				
27	COMPLIANCE	JACKFISH 2/3	X	X		X	X				
29	COMPLIANCE	SURMONT 2	X	X		X	X				
30	COMPLIANCE	ELLS RIVER	X	X		X	X		X		
501	COMPLIANCE	LEISMER	X	X		X	X				
505	COMPLIANCE	SAWBONES BAY	X	X		X	X				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				
507	COMPLIANCE	KIRBY SOUTH	X	X		X	X				
508	COMPLIANCE	KIRBY NORTH	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

Table 1.2 provides a listing of stations and air quality parameters measured by time integrated methods. Parameters measured include volatile organic compounds (VOC), particulate matter less than 2.5 µm aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10 µm aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), precipitation chemistry (PRECIP), and dustfall (DUSTFALL) samples.

WBEA ID	TYPE	STATION NAME	VOC	PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PAH	PRECIP	DUSTFALL
					ECOC				
1	COMMUNITY	BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X	X
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X		X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X		X
8	COMPLIANCE/COMMUNITY	FORT CHIPEWYAN	X	X		X	X		
9	ATTRIBUTION	BARGE LANDING	X						
13	COMPLIANCE/ATTRIBUTION	FORT MCKAY SOUTH	X			X			
14	COMPLIANCE/COMMUNITY	ANZAC	X	X		X	X		X
17	COMPLIANCE	WAPASU			X			X	
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN			X			X	
21	COMMUNITY	CONKLIN	X	X		X	X		X
22	COMMUNITY	JANVIER	X	X		X	X		X
23	COMPLIANCE	FORT HILLS	X			X			
30	COMPLIANCE	ELLS RIVER	X			X			

Table 1.2 – Time-Integrated Parameters monitored in the WBEA network



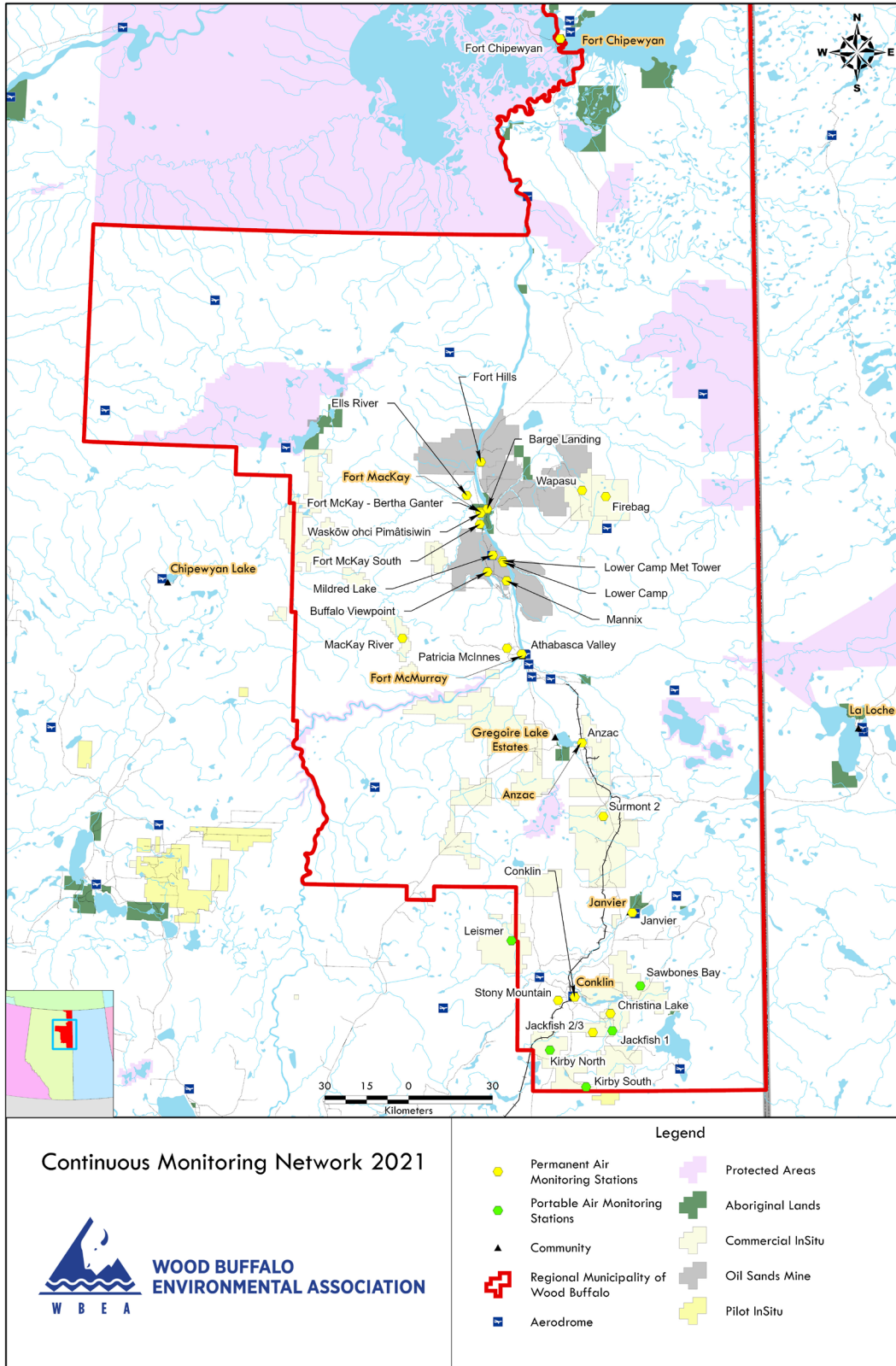


Figure 1.0 – WBEA Network Monitoring Sites

## General Site Information

### Station

Station ID	AMS 506
Station name	Jackfish 1
Date station established	Aug 16, 2018

### Location

Station street address	Located SE of Jackfish construction camp
Legal land description	8-28-75-6-W4
Airshed Zone	Wood Buffalo Environmental Association
Latitude	55.523816
Longitude	-110.865345
UTM East	508503
UTM North	6153091
Nearest community	Conklin
Community population	154
Census Year	2016

### Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Address of Operating Agency	Unit 3, 805 Memorial Drive, Fort McMurray, Alberta T9K 0K4
Name of Approval Holder	Canadian Natural Resources Limited
Approval number	224816-01-00
Contact Name	Shawn Milligan
Address	2100, 855 - 2 Street SW Calgary, Alberta, Canada T2P 4J8
Phone number	403 896-3109
Email address	shawn.milligan@cnrl.com

### Site Description

Land use by sector	0 – 90 degrees	SAGD Operations
	91 – 180 degrees	SAGD Operations
	181 – 270 degrees	SAGD Operations
	271 – 360 degrees	SAGD Operations
Site elevation (m) (above sea level)	620	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	Trees
	East	Trees
	South	Trees

	West	Trees
Distance to nearest trees (m)	North	100
	East	75
	West	40
	South	25
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
Meteorological Sensors	Type	Cup and vane
	Height above ground (m)	10
	Distance from station (m)	attached

### Site Influences

#### Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
none		

#### Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Dirt/gravel	Low	20	Used by site workers

#### Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
CNRL	SAGD Plant		400	N

## Station Equipment

Equipment Owner: WBEA

### Analytical Equipment

Parameter	Make	Model	Serial Number	Date Installed
SO2	Thermo Environmental	43i	1160290011	2022
H2S	Thermo Environmental	43iQ	1180540020	2023
NO2	Thermo Environmental	42i	1218153356	2022

### Meteorological Equipment

Parameter	Make	Model	Serial Number	WMO Site Class	Date Installed
AT/RH	Vaisala	HMP155	K1720033	Class 3	2022
WS	Met One	010C-1	Y18362	Class 3	2022
WD	Met One	020C-1	R14654	Class 3	2022

### Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9035
Zero air generator	Zero Air Generator	Teledyne/API	701	4427
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB1315940
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2659
Tower	10 Metre crank up	Aluma	T-135	AT213029-Y-3-1
H2S converter	H2S converter	Global Analyzer Systems	G150	2022-218



Figure 2.0 – Area topographic map showing AMS 506



Figure 3.0 – Aerial image showing AMS 506



Figure 4.0 – Plan view image for AMS 506 site

The elevation view is currently not available for this site.

Figure 5.0 – Elevation view image for AMS 506 site



## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 6.0 – Environment looking North



Figure 6.1 – Environment looking East



Figure 6.2 – Environment looking South



Figure 6.3 – Environment looking West



Figure 6.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 7.0 – Photo showing the inlet and sample manifold



Figure 7.1 – Curb shot of the monitoring station



Figure 7.2 –Photo of the front and the back of instrument rack





Wood Buffalo Environmental Association  
Wind Rose 2018 - 2022

Wind Speed (WS) - km/h  
Jackfish 1

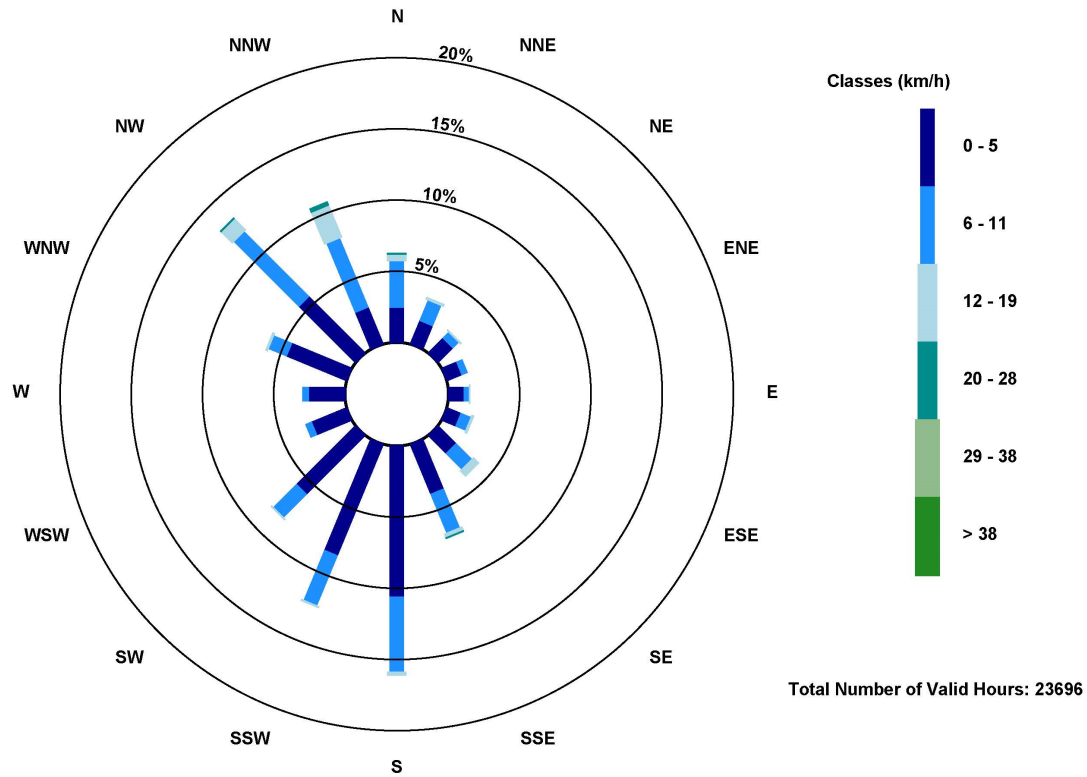


Figure 8.0 – Windrose (five year)