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Wood Buffalo Environmental Association

# ANNUAL REPORT – VOLUME 3 SITE DOCUMENTATION

March 2021



Operations, Data Collection, QA/QC, Data Validation and Reporting by: Wood Buffalo Environmental Association

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# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Bertha Ganter – Fort McKay

LAST UPDATED: JANUARY 31, 2020

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  | THE | Methane |   | 60  |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2 | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х   | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |     |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |     |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |     |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |     |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | х       |   |     | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |     |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х   |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |     |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |     |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |     |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |     |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |     |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х   |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |     |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |     |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |     |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х               | Х  | х                   | Х   |                  | х   | х       |   |     |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |     |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |     |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |     |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |     |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |     |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |     |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |     |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |     |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |     |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |     |                 |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 01                     |
|--------------------------|----------------------------|
| Station name             | Fort McKay – Bertha Ganter |
| Date station established | October 1997               |

#### Location

| Station street address | NA              |
|------------------------|-----------------|
| Legal land description | 13-25-094-11 W4 |
| Latitude               | 57°11'21.94"N   |
| Longitude              | 111°38'26.10"W  |
| UTM East               | 461284          |
| UTM North              | 6338654         |
| Nearest community      | Fort McKay      |
| Community population   | 750             |

### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association         |
|------------------|--|
| Name of Approval | NA   |
| Holder           |  |
| Approval number  | NA   |
| Contact Name     | Wood Buffalo Environmental Association         |
| Address          | Unit 3 – 805 Memorial Drive, Fort McMurray, AB |
| Phone number     | 780-799-4420                                   |
| Email address    | info@wbea.org                                  |

### Site Description

|                       | 0 – 90 degrees          | Forest and Residential         |  |  |
|-----------------------|-------------------------|--------------------------------|--|--|
| Land use by sector    | 91 – 180 degrees        | Residential and Water services |  |  |
| Land use by sector    | 181 – 270 degrees       | Forest and Residential         |  |  |
|                       | 271 – 360 degrees       | Forest and Residential         |  |  |
| Site elevation        | 270                     |                                |  |  |
| (above sea level)     |                         |                                |  |  |
| Angle of elevation to | Greatest angle          | 0 degree                       |  |  |
| nearby buildings      | Building direction      | None                           |  |  |
|                       | North                   | None                           |  |  |
| Airflow rostrictions  | East                    | Trees                          |  |  |
| AITIOW restrictions   | South                   | None                           |  |  |
|                       | West                    | Trees                          |  |  |
| Sample manifold       | Туре                    | All glass                      |  |  |
| Sample mannoid        | Inlet height above roof | 1 meter                        |  |  |
|                       | Туре                    | Cup and vane                   |  |  |

| Meteorological | Height above ground   | 10 m                                  |
|----------------|-----------------------|---------------------------------------|
| Sensors        | Distance from station | Attached to north side of the station |

Site Influences

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

| Туре      | Distance (m) | Description  |
|-----------|--------------|--|
| Snow dump | 100          | Occasionally heavy truck and graders parked in the |
|           |              | area.  |
|           |              |  |
|           |              |  |
|           |              |  |

### **Roadway Influences**

| Туре        | Traffic Volume | Distance (m) | Description                   |
|-------------|----------------|--------------|-------------------------------|
| Gravel road | Low            | 50           | Access road                   |
| Gravel road | Medium         | 200          | Access road – Range road 110A |
|             |                |              |                               |
|             |                |              |                               |

### Major Point Sources

| Facility Name           | Source Type      | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|-------------------------|------------------|------------------------|----------------------------|-----------------------------------|
| CNRL Albian<br>Sands    | Oil sands mining | 340,000 bpd            | 10                         | NE                                |
| Syncrude Canada<br>Ltd. | Oil sands mining | 350,000 bpd            | 10                         | SE                                |
|                         |                  |                        |                            |                                   |
|                         |                  |                        |                            |                                   |
|                         |                  |                        |                            |                                   |

# Analytical Equipment

| Parameter                  | Owner | Make              | Model            | Serial Number         | Date<br>Installed     |
|----------------------------|-------|-------------------|------------------|-----------------------|-----------------------|
| Sulfur Dioxide             | WBEA  | Thermo Scientific | 43i              | 1501301448            | June 17, 2015         |
| Total Reduced Sulfur       | WBEA  | Thermo Scientific | 43i-TLE          | 1218153461            | 2012                  |
| TRS converter              | WBEA  | CD Nova           | CDN-101          | 470                   | 2012                  |
| Oxides of Nitrogen         | WBEA  | Thermo Scientific | 42i              | 1218153357            | 2012                  |
| Non-Methane<br>Hydrocarbon | WBEA  | Thermo Scientific | 55i              | 1152430012            | November 25,<br>2015  |
| Ammonia                    | WBEA  | Teledyne API      | T201             | 475                   | June 13, 2018         |
| Ammonia converter          | WBEA  | Teledyne API      | M501             | 484                   | June 13, 2018         |
| Ozone                      | WBEA  | Teledyne API      | T400             | 1107                  | January 24,<br>2017   |
| Aethalometer 33            | WBEA  | Magee             | AE-33            | E33-S03-00299         | October 26,<br>2018   |
| Particulate Monitor        | WBEA  | Teledyne API      | T640             | 306                   | May 07, 2018          |
| CO Analyzer                | WBEA  | Teledyne API      | Т300             | 3520                  | 2019                  |
| CO2 Analyzer               | WBEA  | Teledyne API      | T360             | 284                   | 2019                  |
| Temperature/RH             | WBEA  | Vaisala           | HMP 155          | NA                    | 2015                  |
| Temperature/RH             | WBEA  | Vaisala           | HMP 155          | NA                    | 2015                  |
| Wind speed                 | WBEA  | Met One           | 010C-1           | P10041                | 2015                  |
| Wind direction             | WBEA  | Met One           | 020C-1           | 13602                 | 2015                  |
| Precipitation Gauge        | WBEA  | ОТТ               | Pluvio 2         | 363524                | September<br>24, 2015 |
| Solar Radiation            | WBEA  | Eppley Radiometer | 8-48             | 38279                 | 2010                  |
| Hi-VOL PUF                 | WBEA  | Tisch             | TE-1000          | 1001060               | 2018                  |
| Partisol 2.5A              | WBEA  | Thermo Scientific | Partisol – 2000i | 200012 0456 1405      | 2018                  |
| Partisol 10A               | WBEA  | Thermo Scientific | Partisol – 2000i | 200012 0457 1405      | 2018                  |
| Partisol 2.5B              | WBEA  | Thermo Scientific | Partisol – 2000i | 200012 04871408       | 2018                  |
| Partisol 10B               | WBEA  | Thermo Scientific | Partisol – 2000i | 200012 04841408       | 2018                  |
| Partisol EC/OC             | WBEA  | Thermo Scientific | Partisol – 2000i | 200012 022 1205       | 2018                  |
| Precip Sampler             | WBEA  | N-CON             | ADS 00-120       | 60192                 | 2018                  |
| Precip Sampler             | WBEA  | TPC               | TPC-3000         | 164                   | 2018                  |
| VOC                        | WBEA  | Tisch             | TE123            | 1028                  | 2018                  |
| Hi-Vol PUF                 | ECCC  | Tisch             | TE-1000          | 004                   | 2018                  |
| SASS                       | ECCC  | MET One           | SuperSASS        | P15905                | 2018                  |
| Dichot A                   | ECCC  | Thermo Scientific | 2000i-D          | 2000iD-2-<br>01101102 | 2018                  |
| Dichot B                   | ECCC  | Thermo Scientific | 2000i-D          | 2000iD-01161103       | 2018                  |
|                            |       |                   |                  |                       |                       |
|                            |       |                   |                  |                       |                       |
|                            |       |                   |                  |                       |                       |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 9036          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | T701           | 262           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 2 ton          | NA            |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | NA            |
| Gas Dilution<br>Calibrator | Mass flow controller gas dilution                          | Teledyne/API        | Т700Р          | 2464          |
| Datalogger                 | Logger for camera and<br>AE33                              | Campbell Scientific | CR1000         | 23051         |
| Datalogger                 | Logger for Pluvio and N-<br>Con sampler                    | Campbell Scientific | CR310          | 5016          |
| Hydrogen<br>generator      | Hydrogen generator for<br>NMHC                             | AMA                 | HG 300         | 171067041     |
| Nitrogen generator         | N2 generator for CO2                                       | Peak Scientific     | NG5000A        | 271046102     |



Figure 2.0 – Area Topographic map showing AMS 01



Figure 3.0 - Plan view sketch for AMS 01 site



Figure 4.0 – Aerial photo showing AMS 01

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 - Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 - Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 - Windrose (2015-2019)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Mildred Lake

LAST UPDATED: FEBRUARY 1, 2021

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

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Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  | THE | Methane |   | <b>60</b> |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | x       |   |           | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х               | Х  | х                   | Х   |                  | х   | х       |   |           |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |           |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |                 |

Table 1.0 - Pollutant parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 02                      |
|--------------------------|-----------------------------|
| Station name             | Mildred Lake                |
| Date station established | June 1 <sup>st</sup> , 1979 |

#### Location

| Station street address | Located at the south end of the Syncrude airstrip, 400m west of HWY 63 |
|------------------------|--|
| Legal land description | 8-08-093-10 W4   |
| Latitude               | 57° 2'59.79"North  |
| Longitude              | 111°33′50.73″ West   |
| UTM East               | 465775   |
| UTM North              | 6323094  |
| Nearest community      | Fort Mackay  |
| Community population   | 742 (2016)   |

# Owner/Operator/Approval Holder

| Operating Agency | ency Wood Buffalo Environmental Association        |  |  |
|------------------|--|--|--|
| Name of Approval | Syncrude Canada Limited                            |  |  |
| Holder           |  |  |  |
| Approval number  | 026-02-00  |  |  |
| Contact Name     | Brooke Bennett                                     |  |  |
| Address          | Bag 4009, MD 4160, Fort McMurray, Alberta, T9H 3L1 |  |  |
| Phone number     | 780-790-5692                                       |  |  |
| Email address    | Bennett.Brooke@syncrude.com                        |  |  |

### Site Description

|                       | 0 – 90 degrees     | Quonset, airstrip waiting room<br>trailers, washroom facilities, paved<br>parking area, open field |
|-----------------------|--------------------|--|
| Land use by sector    | 91 – 180 degrees   | Air strip gate and access road   |
|                       | 181 – 270 degrees  | Wooded area  |
|                       | 271 – 360 degrees  | Airstrip waiting room trailers,  |
|                       |                    | Syncrude Air Strip   |
| Site elevation        | 314 m              |  |
| (above sea level)     |                    |  |
| Angle of elevation to | Greatest angle     | N/A  |
| nearby buildings      | Building direction | North  |
|                       | North              | Yes  |
| Airflow restrictions  | East               | No   |
|                       | South              | No   |

|                           | West                    | No           |  |
|---------------------------|-------------------------|--------------|--|
| Sampla manifold           | Туре                    | All glass    |  |
| Sample manifold           | Inlet height above roof | 1 metre      |  |
| Matagralagiaal            | Туре                    | Cup and vane |  |
| Meteorological<br>Sensors | Height above ground     | 10 m         |  |
|                           | Distance from station   | 0 m          |  |

Site Influences

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

| Туре     | Distance (m) | Description             |
|----------|--------------|-------------------------|
| Quonset  | 2            | Airstrip building       |
| Trailer  | 15           | Airstrip Building #1489 |
| Trailer  | 15           | Toilet facilities       |
| Trailer  | 20           | Airstrip building #1722 |
| Trailer  | 20           | Airstrip Waiting Room   |
| Airstrip | 20           | Syncrude Airstrip       |

### Roadway Influences

| Туре        | Traffic Volume | Distance (m) | Description                              |
|-------------|----------------|--------------|--|
|             |                |              | Paved secondary road for industrial      |
| Access Road | Low            | 50           | access frequented by pick-up trucks,     |
|             |                |              | heavy equipment, and tractor trailers    |
|             |                |              | Provincial highway frequented by tractor |
| Highway 63  | Medium         | 300          | trailers, heavy equipment and light      |
|             |                |              | vehicles                                 |

### **Major Point Sources**

| Facility Name | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-----------------|------------------------|----------------------------|-----------------------------------|
| Syncrude      | Oil Sands Plant | 350,000                | 5                          | West                              |
| Suncor        | Oil Sands Plant | 194,000                | 20                         | South East                        |

# Analytical Equipment

| Parameter                   | Owner | Make    | Model  | Serial Number | Date<br>Installed |
|-----------------------------|-------|---------|--------|---------------|-------------------|
| Sulfur Dioxide              | WBEA  | Thermo  | 43i    | JC1404901075  | January 2015      |
| Hydrogen Sulfide            | WBEA  | Thermo  | 450i   | 0815129107    | N/A               |
| Non-Methane<br>Hydrocarbons | WBEA  | Thermo  | 55i    | 1170050130    | November<br>2019  |
| Temperature/RH              | WBEA  | Vaisala | HMP155 | N2910507      | N/A               |
| Wind speed                  | WBEA  | Met One | 010C-1 | E5130         | N/A               |
| Wind direction              | WBEA  | Met One | 020C-1 | B1462         | N/A               |

# Support Equipment

| Name                           | Description  | Make                | Model          | Serial Number |
|--------------------------------|--|---------------------|----------------|---------------|
| Data Logger                    | Data Logger  | Campbell Scientific | CR3000         | 8790          |
| Zero Air Generator             | Zero Air Generator   | Teledyne API        | T701           | 825           |
| Hydrogen<br>Generator          | Support gas for NMHC                                       | AMA                 | HG300          | 171067035     |
| Mitsubishi Electric<br>Mr Slim | Heating and air<br>conditioning system.<br>Wall mount unit | R410A               | MUY-GE15NA     | 30025603T     |
| Shelter / Building             | Air monitoring portable                                    | CNB                 | 8 x 16 trailer | SBB81408      |
| Gas Dilution<br>Calibrator     | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 1185          |



Figure 2.0 – Area topographic map showing AMS 02 – Mildred Lake



Figure 3.0 – Plan view sketch for AMS 02 – Mildred Lake



Figure 4.0 – Aerial photo showing AMS 02 – Mildred Lake

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environment looking north



Figure 5.1 – Environment looking east



Figure 5.2 – Environment looking south



Figure 5.3 – Environment looking west



Figure 5.4 – Meteorological tower

### Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photos showing the inlet and sample manifold



Figure 6.1 – Curb shot of AMS 02 – Mildred Lake



Figure 6.2 – Photos of the front and back of the instrument rack


Figure 7.0 - Windrose (2016 - 2020)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Lower Camp Met Tower

LAST UPDATED: MARCH 2, 2021

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

Table 1 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | SO2 | NO/NO <sub>2</sub> /<br>NO <sub>x</sub> | <b>O</b> <sub>3</sub> | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO2 | NH3 |
|------------|------------------------------|------------------------------|-----|---|-----------------------|-------------------|-----|-----|-----|-----------------|----|-----|-----|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  | х   | х   |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | Х   |   |                       |                   |     | х   | х   | х               |    |     |     |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |   |                       |                   |     |     |     |                 |    |     |     |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                                       | х                     | х                 |     | х   | х   | х               |    |     |     |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |   |                       |                   |     | х   | х   | х               |    |     |     |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     | х   |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  |     |     |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                                       | х                     | х                 |     |     |     |                 | х  | х   |     |
| 9          | ATTRIBUTION                  | BARGE LANDING                | х   | х                                       |                       | х                 | Х   |     | Х   | х               |    |     |     |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х   |   |                       |                   |     | х   | х   | х               |    |     |     |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     |     |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | x                                       | х                     | x                 | х   |     | х   | x               |    |     |     |
| 17         | COMPLIANCE                   | WAPASU                       | Х   | х                                       | х                     | х                 |     | х   | х   |                 |    |     |     |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                                       | х                     | х                 | х   |     | х   | x               | х  | х   |     |
| 19         | COMPLIANCE                   | FIREBAG                      | Х   | х                                       |                       |                   |     | х   | Х   |                 |    |     |     |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |     |
| 21         | COMMUNITY                    | CONKLIN                      | Х   | х                                       | х                     | х                 | Х   |     | Х   | х               |    |     |     |
| 22         | COMMUNITY                    | JANVIER                      | Х   | х                                       | Х                     | х                 | Х   |     | х   | х               |    |     |     |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х   | х                                       |                       | х                 | Х   |     | х   | х               |    |     |     |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |   |                       |                   |     | х   |     |                 |    |     |     |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                                       |                       |                   |     | х   |     |                 |    |     |     |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                                       |                       |                   |     | х   |     |                 |    |     |     |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х   | х                                       |                       | Х                 |     | Х   | Х   |                 |    |     |     |
| 30         | COMPLIANCE                   | ELLS RIVER                   | Х   | х                                       |                       | х                 | Х   |     |     | х               |    |     |     |
| 501        | COMPLIANCE                   | LEISMER                      | Х   | х                                       |                       |                   |     | х   | Х   |                 |    |     |     |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х   | Х                                       |                       |                   |     | Х   | Х   |                 |    |     |     |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х   | х                                       |                       |                   | Х   |     |     |                 |    |     |     |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                                       |                       |                   |     | Х   | Х   |                 |    |     |     |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|------------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | Х           | х  | Х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN            | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING             | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                       | Х           | Х  |    | Х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | Х           | х  |    | х             | х                 |                           | x                  | x             | х               |
| 19         | COMPLIANCE                   | FIREBAG                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х           | х  |    | Х             | х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>lons     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | Х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 3                |
|--------------------------|----------------------|
| Station name             | Lower Camp Met Tower |
| Date station established | 1993                 |

#### Location

| Station street address | Located by the Athabasca River Valley at about 115 meters NW of the Syncrude pump house |
|------------------------|---|
| Legal land description | 4-02-093-10 W4  |
| Latitude               | 57.0321738  |
| Longitude              | -111.506355   |
| UTM East               | 469266.90   |
| UTM North              | 6321111.10  |
| Nearest community      | Fort McMurray   |
| Community population   | 66,573  |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association         |
|------------------|--|
| Name of Approval | Sunshine Oilsands Ltd.                         |
| Holder           |  |
| Approval number  | 305529-00-00                                   |
| Contact Name     | Brooke Bennett                                 |
| Address          | PO Bag 4009, MD X203 Fort McMurray, AB T9H 3L1 |
| Phone number     | (780) 790-5692                                 |
| Email address    | Bennett.brooke@syncrude.com                    |

### Site Description

|                       | 0 – 90 degrees          | Athabasca River and forest    |  |  |  |
|-----------------------|-------------------------|-------------------------------|--|--|--|
| Land use by sector    | 91 – 180 degrees        | Athabasca River and forest    |  |  |  |
| Land use by sector    | 181 – 270 degrees       | Suncor Base Plant             |  |  |  |
|                       | 271 – 360 degrees       | Syncrude plant and operations |  |  |  |
| Site elevation        | 239m                    |                               |  |  |  |
| (above sea level)     |                         |                               |  |  |  |
| Angle of elevation to | Greatest angle          | 0                             |  |  |  |
| nearby buildings      | Building direction      | N/A                           |  |  |  |
|                       | North                   | No                            |  |  |  |
| Airflow rostrictions  | East                    | No                            |  |  |  |
| AITIOW restrictions   | South                   | No                            |  |  |  |
|                       | West                    | No                            |  |  |  |
| Sample manifold       | Туре                    | N/A                           |  |  |  |
| Sample manifold       | Inlet height above roof | N/A                           |  |  |  |

| Mataaralagiaal | Туре                                 | Ultrasonic              |  |
|----------------|--------------------------------------|-------------------------|--|
| Soncore        | Height above ground                  | 20, 45, 100, 167 metres |  |
| 26112012       | Distance from station Mounted on tow | Mounted on tower        |  |

Site Influences

# Localized Sources (within 20 metres of station)

| Type Distance (m) |           | Description                 |  |  |  |
|-------------------|-----------|-----------------------------|--|--|--|
| Laydown           | 79.21m W  | Equipment Laydown           |  |  |  |
| Water Pond        | 136.8m SW | Reservoir                   |  |  |  |
| Athabasca River   | 33.8m E   | River                       |  |  |  |
| Pumping Station   | 114m SE   | Syncrude Water Pump Station |  |  |  |

### Roadway Influences

| Туре        | Traffic Volume | Distance (m) | Description                         |
|-------------|----------------|--------------|-------------------------------------|
| Gravel road | Low            | 20           | Road access to lay down and pumping |
|             |                |              | station                             |
|             |                |              |                                     |
|             |                |              |                                     |
|             |                |              |                                     |

## Major Point Sources

| Facility Name | Source Type               | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|---------------------------|------------------------|----------------------------|-----------------------------------|
| Suncor Energy | Oil refinery              |                        | 2                          | South West                        |
| Syncrude      | Oil refinery/open mining  |                        | 3                          | West                              |
| Suncor Energy | Open mining<br>operations |                        | 4                          | South East                        |
|               |                           |                        |                            |                                   |
|               |                           |                        |                            |                                   |

# Analytical Equipment

| Parameter       | Owner | Make         | Model  | Serial Number | Date<br>Installed |
|-----------------|-------|--------------|--------|---------------|-------------------|
| 20 Metre WS/WD  | WBEA  | Climatronics | 81000  | 01263         | 2018              |
| 45 Metre WS/WD  | WBEA  | Climatronics | 81000  | 03143         | 2018              |
| 100 Metre WS/WD | WBEA  | Climatronics | 81000  | 03144         | 2018              |
| 167 Metre WS/WD | WBEA  | Climatronics | 81000  | 03142         | 2018              |
| 20 Metre AT/RH  | WBEA  | Vaisala      | HMP155 | G4340017      | 2018              |
| 45 Metre AT/RH  | WBEA  | Vaisala      | HMP155 | G4340036      | 2018              |
| 100 Metre AT/RH | WBEA  | Vaisala      | HMP155 | G4340037      | 2018              |
| 167 Metre AT/RH | WBEA  | Vaisala      | HMP155 | N2910501      | 2018              |
|                 |       |              |        |               |                   |
|                 |       |              |        |               |                   |
|                 |       |              |        |               |                   |
|                 |       |              |        |               |                   |
|                 |       |              |        |               |                   |
|                 |       |              |        |               |                   |
|                 |       |              |        |               |                   |

# Support Equipment

| Name       | Description | Make                   | Model  | Serial Number |
|------------|-------------|------------------------|--------|---------------|
| Datalogger | Datalogger  | Campbell<br>Scientific | CR3000 | 5728          |
|            |             |                        |        |               |
|            |             |                        |        |               |
|            |             |                        |        |               |
|            |             |                        |        |               |



Figure 2.0 – Area Topographic map showing AMS 3



Figure 3.0 – Plan view sketch for AMS 3 site



Figure 4.0 – Aerial photo showing AMS 3



Figure 5.0 - elevation sketch of AMS 3

# Site photos

The following photos show the environment surrounding the monitoring station.

## Figure 6.0 – Environ Looking North

Figure 6.1 – Environ Looking East



Figure 6.2 – Environ looking South

# Figure 6.3 – Environ Looking West



Figure 6.4 – Meteorological Tower

### Station Photos



Figure 7.0 – Curb shot of the monitoring station



Figure 8.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# **Buffalo View Point**

LAST UPDATED: 11-25-2020

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | SO2 | NO/NO <sub>2</sub> /<br>NO <sub>x</sub> | <b>O</b> <sub>3</sub> | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO2 | NH <sub>3</sub> |
|------------|------------------------------|------------------------------|-----|---|-----------------------|-------------------|-----|-----|-----|-----------------|----|-----|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | X                                       | Х                     | х                 | х   |     | х   | x               | х  | x   | x               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |   |                       |                   |     |     |     |                 |    |     |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | x                                       | х                     | х                 |     | х   | x   | x               |    |     |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                                       | х                     | х                 | х   |     | х   | x               |    |     | х               |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  |     |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                                       | х                     | х                 |     |     |     |                 | х  | х   |                 |
| 9          | ATTRIBUTION                  | BARGE LANDING                | х   | х                                       |                       | Х                 | х   |     | х   | х               |    |     |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                                       | х                     | х                 | х   |     | х   | x               |    |     |                 |
| 17         | COMPLIANCE                   | WAPASU                       | Х   | х                                       | Х                     | Х                 |     | Х   | Х   |                 |    |     |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                                       | х                     | х                 | х   |     | х   | x               | х  | х   |                 |
| 19         | COMPLIANCE                   | FIREBAG                      | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х   | х                                       | х                     | Х                 | Х   |     | х   | х               |    |     |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х   | х                                       | х                     | х                 | Х   |     | х   | х               |    |     |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х   | х                                       |                       | Х                 | Х   |     | Х   | х               |    |     |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х   |   |                       |                   |     | х   |     |                 |    |     |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                                       |                       |                   |     | Х   |     |                 |    |     |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                                       |                       |                   |     | х   |     |                 |    |     |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х   | х                                       |                       | Х                 |     | х   | х   |                 |    |     |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | Х   | х                                       |                       | х                 | Х   |     |     | х               |    |     |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х   | х                                       |                       |                   |     | Х   | х   |                 |    |     |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х   | х                                       |                       |                   | Х   |     |     |                 |    |     |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х   | x                                       |                       |                   |     | х   | Х   |                 |    |     |                 |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | x           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | x           | х  |    | х             | x                 |                           | x                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | x           | х  | Х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | x                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORTHILLS                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 04             |
|--------------------------|--------------------|
| Station name             | Buffalo View Point |
| Date station established | 1979               |

### Location

| Station street address | NA             |
|------------------------|----------------|
| Legal land description | 9-19-092-10 W4 |
| Latitude               | 56°59′46.17″N  |
| Longitude              | 111°35′38.22″W |
| UTM East               | 461284         |
| UTM North              | 6338654        |
| Nearest community      | Fort McKay     |
| Community population   | 742            |

### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | Syncrude Canada Ltd                    |
| Holder           |  |
| Approval number  | 026-02-00                              |
| Contact Name     | Brooke Bennett                         |
| Address          | NA                                     |
| Phone number     | 780-881-3304                           |
| Email address    | bennett.brooke@syncrude.com            |

### Site Description

|                       | 0 – 90 degrees          | Oil Sands Plant |  |
|-----------------------|-------------------------|-----------------|--|
|                       | 91 – 180 degrees        | Forest          |  |
| Land use by sector    | 181 – 270 degrees       | Forest          |  |
|                       | 271 – 360 degrees       | Oil Sands Plant |  |
| Site elevation        | 315m                    |                 |  |
| (above sea level)     |                         |                 |  |
| Angle of elevation to | Greatest angle          | 0               |  |
| nearby buildings      | Building direction      | NA              |  |
|                       | North                   | None            |  |
| Airflow rostrictions  | East                    | None            |  |
| AITIOW restrictions   | South                   | None            |  |
|                       | West                    | None            |  |
| Sample manifold       | Туре                    | All glass       |  |
| Sample mannolu        | Inlet height above roof | 1 metre         |  |
|                       | Туре                    | Cup and vane    |  |

| Meteorological | Height above ground   | 10m                                 |  |
|----------------|-----------------------|-------------------------------------|--|
| Sensors        | Distance from station | Attached to North end of Monitoring |  |
|                |                       | Shelter                             |  |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре | Distance (m) | Description |
|------|--------------|-------------|
|      |              |             |
|      |              |             |
|      |              |             |
|      |              |             |

### **Roadway Influences**

| Туре    | Traffic Volume | Distance (m) | Description                         |
|---------|----------------|--------------|-------------------------------------|
| Dirt    | Very Low       | 2 North      | Access road to AMS 4                |
| Dirt    | Medium         | 147 North    | Road used to access North           |
|         |                |              | American/Syncrude Area              |
| HighWay | High           | 758 East     | Paved Highway mostly used by public |
|         |                |              |                                     |

### Major Point Sources

| Facility Name | Source Type    | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|----------------|------------------------|----------------------------|-----------------------------------|
| Syncrude      | Oilsands Plant | 350,000                | 5.12                       | North                             |
| Suncor        | Oilsands Plant | 194,000                | 7.8                        | SouthEast                         |
| Syncrude      | Buffalo Farm   |                        | 0.32                       | NorthWest                         |
| Syncrude      | Tailings Pond  |                        | 0.8                        | North East                        |

# Analytical Equipment

| Parameter              | Owner | Make                | Model               | Serial Number   | Date<br>Installed |
|------------------------|-------|---------------------|---------------------|-----------------|-------------------|
| Sulfur Dioxide         | WBEA  | Thermo              | 43i                 | 1327300932      | May 2017          |
| Hydrogen Sulfide       | WBEA  | Thermo              | 450i                | 1336160094      | May 2017          |
| Oxides of Nitrogen     | WBEA  | Teledyne/API        | T200                | 1035            | May 2017          |
| Ozone                  | WBEA  | Teledyne/API        | T400                | 2961            | May 2017          |
| PM2.5                  | WBEA  | Teledyne/API        | T640                | 844             | Sep 2020          |
| Methane non<br>Methane | WBEA  | Thermo              | 55i                 | 1331259520      | Jan 2019          |
| Temperature/RH         | WBEA  | Vaisala             | HMP155              | N2860003        | May 2017          |
| Wind speed             | WBEA  | Met One             | 010C-1              | E5131           | May 2017          |
| Wind direction         | WBEA  | Met One             | 020C-1              | G3857           | May 2017          |
| Visibility             | WBEA  | Viasala             | PWD22               | H5030007        | May 2017          |
| Hi Vol Puf             | ECCC  | Tisch               | TE-1004BL           | 3821            | May 2017          |
| Dichot                 | ECCC  | Thermo              | Partisol-<br>2000iD | 200ID2 01301103 | May 2017          |
| Dichot                 | ECCC  | Thermo              | Partisol-<br>2000iD | 200ID2 01271103 | May 2017          |
| SASS                   | ECCC  | Met One Instruments | SASS                | T16914          | May 2017          |
|                        |       |                     |                     |                 |                   |

## Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number    |
|----------------------------|--|---------------------|----------------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 2635             |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701H           | 362              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          | 330N122967779-01 |
| Shelter / Building         | Air monitoring portable                                    | National            | 8 x 16 trailer | NA               |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | Т700Р          | 2445             |
| Hydrogen<br>generator      | Hydrogen Generator   | AMA                 | HG300          | 171067037        |



Figure 2.0 – Area Topographic map showing AMS 04



Figure 3.0 – Plan view sketch for AMS 04 site



Figure 4.0 – Aerial photo showing AMS 04

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Wood Buffalo Environmental Association Wind Rose 2016 - 2020





Figure 7.0 – Windrose (5 Year)
# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Mannix

LAST UPDATED: MARCH 2, 2021

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPF                         | STATION NAME                 | SO <sub>2</sub> | NO/NO <sub>2</sub> / | 0, | PM <sub>a</sub> c | TRS  | H <sub>2</sub> S | тнс | Methane | со | CO. | NHa   |
|------|------------------------------|------------------------------|-----------------|----------------------|----|-------------------|------|------------------|-----|---------|----|-----|-------|
| ID   |                              |                              | 302             | NO <sub>x</sub>      | 03 | 1 1012.5          | 1113 | 1125             | inc | NMHC    |    | 202 | 14113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х                    | х  | х                 | х    |                  | х   | х       | х  | х   | х     |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                      |    |                   |      | х                | х   | х       |    |     |       |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                      |    |                   |      |                  |     |         |    |     |       |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х                    | х  | х                 |      | х                | х   | x       |    |     |       |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                      |    |                   |      | х                | х   | х       |    |     |       |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х                    | х  | х                 | х    |                  | х   | х       |    |     | х     |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х                    | х  | х                 | х    |                  | х   | х       | х  |     |       |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х                    | х  | х                 |      |                  |     |         | х  | х   |       |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х               | Х                    |    | Х                 | х    |                  | Х   | х       |    |     |       |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                      |    |                   |      | х                | х   | х       |    |     |       |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х                    | х  | х                 | х    |                  | х   | х       |    |     |       |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х                    | х  | х                 | х    |                  | х   | x       |    |     |       |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х                    | Х  | Х                 |      | Х                | Х   |         |    |     |       |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х                    | х  | х                 | х    |                  | х   | x       | х  | х   |       |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х                    |    |                   |      | Х                | х   |         |    |     |       |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | х               | х                    |    |                   |      | х                | х   |         |    |     |       |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | х                    | Х  | Х                 | Х    |                  | Х   | х       |    |     |       |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х                    | Х  | х                 | Х    |                  | х   | х       |    |     |       |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | Х                    |    | Х                 | Х    |                  | Х   | х       |    |     |       |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                      |    |                   |      | х                |     |         |    |     |       |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х                    |    |                   |      | Х                |     |         |    |     |       |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | х               | х                    |    |                   |      | х                |     |         |    |     |       |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х               | Х                    |    | Х                 |      | Х                | Х   |         |    |     |       |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х                    |    | х                 | х    |                  |     | х       |    |     |       |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х                    |    |                   |      | х                | Х   |         |    |     |       |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х                    |    |                   |      | х                | х   |         |    |     |       |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х                    |    |                   | Х    |                  |     |         |    |     |       |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х                    |    |                   |      | Х                | Х   |         |    |     |       |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | x           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | x           | х  |    | х             | х                 |                           | x                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | Х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | x                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>lons     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 05 |
|--------------------------|--------|
| Station name             | Mannix |
| Date station established | 1975   |

### Location

| Station street address | On the west side of Range Road 101, approximately 700 meters south of the Base Plant Road intersection |
|------------------------|--|
| Legal land description | 9-11-092-10 W4   |
| Latitude               | 56°58'4.67" North  |
| Longitude              | 111°28′55.56″  |
| UTM East               | 470688   |
| UTM North              | 6313923  |
| Nearest community      | Fort McMurray  |
| Community population   | 66,000 (2016)  |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |  |  |  |
|------------------|--|--|--|--|
| Name of Approval |  |  |  |  |
| Holder           | Suncor Energy Inc.                     |  |  |  |
| Approval number  | 094-03-00                              |  |  |  |
| Contact Name     | Nelia Heydenreich                      |  |  |  |
| Address          | Base Plant Rd, Wood Buffalo, AB        |  |  |  |
| Phone number     | 780-788-8504                           |  |  |  |
| Email address    | nheydenreich@suncor.com                |  |  |  |

### Site Description

|                      | 0 – 90 degrees     | Gravel parking lot, Suncor base plant road. |  |  |
|----------------------|--------------------|---|--|--|
| Land use by sector   | 91 – 180 degrees   | Gravel parking lot, Suncor base plant road. |  |  |
|                      | 181 – 270 degrees  | Wooded area.                                |  |  |
|                      | 271 – 360 degrees  | 150m met tower, electronics stations.       |  |  |
| Site elevation       | 222 m              |   |  |  |
| (above sea level)    | 552 11             |   |  |  |
| Angle of elevation   | Greatest angle     | N/A   |  |  |
| to nearby buildings  | Building direction | N/A   |  |  |
|                      | North              | No  |  |  |
| Airflow roctrictions | East               | No  |  |  |
| Almow restrictions   | South              | No  |  |  |
|                      | West               | No  |  |  |

| Sample manifold | Туре                    | All glass             |  |  |
|-----------------|-------------------------|-----------------------|--|--|
| Sample mannolu  | Inlet height above roof | 1 metre               |  |  |
| Matagralagical  | Туре                    | Ultrasonic Anemometer |  |  |
| Sonsors         | Height above ground     | 20, 45, 75, 90 m      |  |  |
| Selisors        | Distance from station   | 22.5 m                |  |  |

### Site Influences

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

| Туре | Distance (m) | Description |
|------|--------------|-------------|
| N/A  | N/A          | N/A         |

## Roadway Influences

| Туре           | Traffic Volume | Distance (m) | Description                             |  |  |
|----------------|----------------|--------------|---|--|--|
| Pango road 101 |                |              | Paved road frequented by heavy          |  |  |
| (Acabalt)      | Medium         | 100          | equipment, tractor trailers, and pickup |  |  |
| (Asphalt)      |                |              | trucks.                                 |  |  |
| Llighway 62    | Lliab          | 400          | Provincial highway frequented by all    |  |  |
| Fighway 63     | пign           | 400          | types of traffic.                       |  |  |

### **Major Point Sources**

| Facility Name     | Source Type             | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|-------------------|-------------------------|------------------------|----------------------------|-----------------------------------|
| Suncor Base Plant | Oil Sands Plant         | 194,000 bbls/d         | < 5                        | North                             |
| NA                | Storage tank<br>complex | NA                     | 0.2                        | East                              |

## Analytical Equipment

| Parameter                   | Owner | Make         | Model  | Serial Number | Date<br>Installed |
|-----------------------------|-------|--------------|--------|---------------|-------------------|
| Sulfur Dioxide              | WBEA  | Thermo       | 43i    | 1008841399    | N/A               |
| Hydrogen Sulfide            | WBEA  | Thermo       | 450i   | 0815129108    | N/A               |
| Total<br>Hydrocarbons       | WBEA  | Thermo       | 51i    | 1180540021    | May 2018          |
| Non-Methane<br>Hydrocarbons | WBEA  | Thermo       | 55i    | 1180320039    | April 2019        |
| AT/RH – 2 M                 | WBEA  | Vaisala      | HMP155 | K2870007      | September<br>2020 |
| AT/RH – 20 M                | WBEA  | Vaisala      | HMP155 | H5110035      | September<br>2020 |
| AT/RH – 45 M                | WBEA  | Vaisala      | HMP155 | G4340067      | September<br>2020 |
| AT/RH – 75 M                | WBEA  | Vaisala      | HMP155 | H5110029      | September<br>2020 |
| AT/RH – 90 M                | WBEA  | Vaisala      | HMP155 | H5110017      | September<br>2020 |
| Anenometer 20m              | WBEA  | Climatronics | 81000  | 4000          | September<br>2020 |
| Anenometer 45m              | WBEA  | Climatronics | 81000  | N3960         | September<br>2020 |
| Anenometer 75m              | WBEA  | Climatronics | 81000  | 3998          | September<br>2020 |
| Anenometer 90m              | WBEA  | Climatronics | 81000  | 3999          | September<br>2020 |

## Support Equipment

| Name                       | Description  | Make                | Model               | Serial Number    |
|----------------------------|--|---------------------|---------------------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000              | 2580             |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701                 | 146              |
| Hydrogen Generator         | Hydrogen Generator   | AMA Instruments     | HG 300              | 171067039        |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | W12A2-<br>A05EPXXXJ | 330C132993376-01 |
| Shelter / Building         | Air monitoring<br>portable                                 | Monitoring Shelter  | 8 x 16 wood         | SAA81407         |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700                | 997              |



Figure 2.0 – Area topographic map showing AMS 05 – Mannix



Figure 3.0 – Plan view sketch for AMS 05 – Mannix



Figure 4.0 – Aerial photo showing AMS 05 – Mannix

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environment looking north



Figure 5.1 – Environment looking east



Figure 5.2 – Environment looking south



Figure 5.3 – Environment looking west



Figure 5.4 – Meteorological tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Patricia McInnes

LAST UPDATED: FEBRUARY 1, 2021

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#### Vision

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### Mission

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Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         | STATION NAME                 | s0. | NO/NO <sub>2</sub> / | 0. | PM.      | TRS  | H.S  | тнс | Methane | 0 | <u>.</u> | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|----------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002      | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | Х                    | х  | Х        | х    |      | х   | х       | х | х        | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |          |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |          |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |          | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |          |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х        |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | х    |      | Х   | Х       |   |          |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | Х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |          |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | х       | х | х        |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |          |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |          |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |          |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | Х   | х       |   |          |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | х                    |    | Х        | Х    |      | х   | х       |   |          |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                      |    |          |      | х    |     |         |   |          |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |          |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |          |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | х                    |    | Х        |      | Х    | х   |         |   |          |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | Х   | Х                    |    | Х        | х    |      |     | х       |   |          |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | Х    | Х   |         |   |          |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |          |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |          |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |          |      |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

| WBEA ID | ТҮРЕ                            | STATION NAME             | voc | PM <sub>2.5</sub> Mass,<br>Metals and<br>Ions | PM2.5<br>Mass, ECOC | PM <sub>10</sub> Mass,<br>Metals and<br>Ions | РАН | PRECIP |
|---------|---------------------------------|--------------------------|-----|---|---------------------|--|-----|--------|
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х   | х                   | х  | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х   |                     | х  | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х   |                     | Х  | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |   |                     |  |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |   |                     | Х  |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х   |                     | х  | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |   | х                   |  |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |   | х                   |  |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х   |                     | Х  | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х   |                     | х  | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |   |                     | х  |     |        |

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 06           |
|--------------------------|------------------|
| Station name             | Patricia McInnes |
| Date station established | 1998             |

### Location

| Station street address | Carteret Street, Fort McMurray |
|------------------------|--------------------------------|
| Legal land description | 10-26-089-10 W4                |
| Latitude               | 56°45′4.96″ North              |
| Longitude              | 111°28'36.10" West             |
| UTM East               | 470849                         |
| UTM North              | 6289812                        |
| Nearest community      | Located in Fort McMurray       |
| Community population   | 67,000                         |

### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association         |
|------------------|--|
| Name of Approval | WBEA   |
| Holder           |  |
| Approval number  | N/A  |
| Contact Name     | Wood Buffalo Environmental Association         |
| Address          | Unit 3 – 805 Memorial Drive, Fort McMurray, AB |
| Phone number     | 780-799-4420                                   |
| Email address    | info@wbea.org                                  |

### Site Description

|                       | 0 – 90 degrees          | Residential    |  |  |
|-----------------------|-------------------------|----------------|--|--|
|                       | 91 – 180 degrees        | Residential    |  |  |
| Land use by sector    | 181 – 270 degrees       | Sports Grounds |  |  |
|                       | 271 – 360 degrees       | Sports Grounds |  |  |
| Site elevation        |                         | 362 m          |  |  |
| (above sea level)     |                         |                |  |  |
| Angle of elevation to | Greatest angle          | 0              |  |  |
| nearby buildings      | Building direction      | NA             |  |  |
|                       | North                   | No             |  |  |
| Airflow rostrictions  | East                    | No             |  |  |
| AITIOW restrictions   | South                   | No             |  |  |
|                       | West                    | No             |  |  |
| Comple manifold       | Туре                    | All glass      |  |  |
| Sample manifold       | Inlet height above roof | 1 metre        |  |  |
|                       | Туре                    | Cup and vane   |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 1 m  |

Site Influences

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

|    | Туре        | Distance (m)     | Description                                   |
|----|-------------|------------------|---|
| Re | ecreational | About 20-50      | Maintenance of sports fields and recreational |
|    | Complex     | meters, North to | complex, possible PM and NOx sources.         |
|    |             | North West of    |   |
|    |             | Station          |   |
| R  | Residential | S and SW of      | Wood burning in household stoves and backyard |
| S  | ubdivision  | station about    | firepits.                                     |
|    |             | 100m             |   |

### **Roadway Influences**

| Туре             | Traffic Volume | Distance (m) | Description |
|------------------|----------------|--------------|-------------|
| Residential Road | Medium         | 30           | Paved road  |
|                  |                |              |             |
|                  |                |              |             |
|                  |                |              |             |

## Major Point Sources

| Facility Name   | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|-----------------|-----------------|------------------------|----------------------------|-----------------------------------|
| Fort McMurray   | Water treatment | NA                     | 4                          |                                   |
| Water Treatment | plan.           |                        |                            |                                   |
| Plant           |                 |                        |                            |                                   |
| Eveready        | Ashphalt        | NA                     | 4                          |                                   |
|                 | Production      |                        |                            |                                   |
| Suncor/Syncrude | Oil Sands       | NA                     | 15                         |                                   |
|                 | Production      |                        |                            |                                   |

## Analytical Equipment

| Parameter          | Owner         | Make               | Model     | Serial Number   | Date<br>Installed |
|--------------------|---------------|--------------------|-----------|-----------------|-------------------|
| Sulfur Dioxide     | WBEA          | Thermo             | 43i       | 1160290013      | NA                |
| TRS                | WBEA          | Teledyne/API       | 43i-TLE   | 1218153358      | NA                |
| CH4/NMHC           | WBEA          | Thermo             | 55i       | 1180320037      | NA                |
| Oxides of Nitrogen | WBEA          | Thermo             | 42i       | 1172750022      | NA                |
| NH3                | WBEA          | API                | T 201     | 152             | NA                |
| NH3                | WBEA          | Los Gatos Research | Eaa-911   | 3K430000001913  |                   |
| 03                 | WBEA          | Thermo             | 49i       | 1300156234      | NA                |
| PM 2.5             | WBEA          | Teledyne/API       | T640      | 766             | NA                |
| Temperature/RH     | WBEA          | Vaisala            | HMP155    | N3840525        | NA                |
| Wind speed         | WBEA          | Met One            | 010C-1    | W15275          | NA                |
| Wind direction     | WBEA          | Met One            | 020C-1    | E4854           | NA                |
| PM 2.5 A           | WBEA          | Partisol           | 2000i     | 2000 202151205  | NA                |
| PM 2.5 B           | WBEA          | Partisol           | 2000i     | 20001203861308  | NA                |
| PM 10 A            | WBEA          | Partisol           | 2000i     | 20001204851408  | NA                |
| PM 10 B            | WBEA          | Partisol           | 2000i     | 2000IW205251411 | NA                |
| РАН                | WBEA          | Tisch              | TE-1004BL | 1001059         | NA                |
| РАН                | WBEA          | Tisch              | TE-1004BL | 1001054         | NA                |
| VOC                | WBEA          | Tisch              | TE-123    | 1021            | NA                |
| Particulate Matter | Health Canada | Omni               | 400       | 2044            | NA                |
|                    |               |                    |           |                 |                   |

## Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number    |
|----------------------------|--|---------------------|----------------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 10957            |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 135              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 2 ton          | 314H183561152-02 |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | 09 14786         |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 2447             |
| Thermal Oxidizer           | H2S Converter  | CDN                 | 101            | 521              |
| Thermal Oxidizer           | NH3 Converter  | API                 | T501           | 217              |



Figure 2.0 – Area Topographic map showing AMS 06 – Patricia McInnes



Figure 3.0 – Plan view sketch for AMS 06 – Patricia McInnes



Figure 4.0 – Aerial photo showing AMS 06 – Patricia McInnes

## Site photos

The following photos show the environment surrounding the monitoring station.



### Figure 5.0 – Environ Looking North

Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 - Environ Looking West



Figure 5.4 – Meteorological Tower



**Station Photos** 

The following photos show the monitoring station and instrumentation.

Figure 6.0 – Photo showing the inlet and sample manifold





Figure 6.1 – Curb shot of the monitoring station

Figure 6.2 – Photo of front and back of instrument rack






Figure 7.0 – Windrose Patricia McInnes (5 year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Athabasca Valley

LAST UPDATED: FEBRUARY 1, 2021

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | SO2 | NO/NO <sub>2</sub> /<br>NO <sub>x</sub> | <b>O</b> <sub>3</sub> | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO2 | NH <sub>3</sub> |
|------------|------------------------------|------------------------------|-----|---|-----------------------|-------------------|-----|-----|-----|-----------------|----|-----|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | X                                       | Х                     | х                 | х   |     | х   | x               | х  | x   | x               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |   |                       |                   |     |     |     |                 |    |     |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | x                                       | х                     | х                 |     | х   | x   | x               |    |     |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                                       | х                     | х                 | х   |     | х   | x               |    |     | х               |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  |     |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                                       | х                     | х                 |     |     |     |                 | х  | х   |                 |
| 9          | ATTRIBUTION                  | BARGE LANDING                | х   | х                                       |                       | Х                 | х   |     | х   | х               |    |     |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                                       | х                     | х                 | х   |     | х   | x               |    |     |                 |
| 17         | COMPLIANCE                   | WAPASU                       | Х   | х                                       | Х                     | Х                 |     | Х   | Х   |                 |    |     |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                                       | х                     | х                 | х   |     | х   | x               | х  | х   |                 |
| 19         | COMPLIANCE                   | FIREBAG                      | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х   | х                                       | х                     | Х                 | Х   |     | х   | х               |    |     |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х   | х                                       | х                     | х                 | Х   |     | х   | х               |    |     |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х   | х                                       |                       | Х                 | Х   |     | х   | х               |    |     |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х   |   |                       |                   |     | х   |     |                 |    |     |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                                       |                       |                   |     | Х   |     |                 |    |     |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                                       |                       |                   |     | х   |     |                 |    |     |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х   | х                                       |                       | Х                 |     | х   | х   |                 |    |     |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | Х   | х                                       |                       | х                 | Х   |     |     | х               |    |     |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х   | х                                       |                       |                   |     | Х   | х   |                 |    |     |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х   | х                                       |                       |                   | Х   |     |     |                 |    |     |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х   | x                                       |                       |                   |     | х   | Х   |                 |    |     |                 |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | х           | х  |    | x             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 07           |
|--------------------------|------------------|
| Station name             | Athabasca Valley |
| Date station established | 1977             |

### Location

| Station street address | Located on MacDonald Drive, Near the Athabasca river and |
|------------------------|--|
|                        | McDonald Island  |
| Legal land description | 9-20-089-09 W4   |
| Latitude               | 56°44′00.21″N  |
| Longitude              | 111°23′25.80″W   |
| UTM East               | 476108   |
| UTM North              | 6287777  |
| Nearest community      | Fort McMurray  |
| Community population   | 66,573   |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association        |
|------------------|---|
| Name of Approval | None  |
| Holder           |   |
| Approval number  | None  |
| Contact Name     | Wood Buffalo Environmental Association        |
| Address          | Unit 3- 805 Memorial Drive, Fort McMurray, AB |
| Phone number     | 780-799-4420                                  |
| Email address    | info@wbea.org                                 |

### Site Description

|                       | 0 – 90 degrees          | Residential |  |  |
|-----------------------|-------------------------|-------------|--|--|
|                       | 91 – 180 degrees        | Residential |  |  |
| Land use by sector    | 181 – 270 degrees       | Residential |  |  |
|                       | 271 – 360 degrees       | River       |  |  |
| Site elevation        | 250                     |             |  |  |
| (above sea level)     |                         |             |  |  |
| Angle of elevation to | Greatest angle          | 3°          |  |  |
| nearby Sculpture      | Sculpture direction     | Ν           |  |  |
|                       | North                   | None        |  |  |
| Airflow rostrictions  | East                    | None        |  |  |
| AITIOW restrictions   | South                   | None        |  |  |
|                       | West                    | None        |  |  |
| Sample manifold       | Туре                    | All glass   |  |  |
|                       | Inlet height above roof | 1 metre     |  |  |

|                | Туре                  | Cup and vane                        |  |  |
|----------------|-----------------------|-------------------------------------|--|--|
| Meteorological | Height above ground   | 10m                                 |  |  |
| Sensors        | Distance from station | Attached to North End of monitoring |  |  |
|                |                       | Station                             |  |  |

Site Influences

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

| Туре | Distance (m) | Description |
|------|--------------|-------------|
|      |              |             |
|      |              |             |
|      |              |             |
|      |              |             |

### **Roadway Influences**

| Туре         | Traffic Volume | Distance (m) | Description                         |
|--------------|----------------|--------------|-------------------------------------|
| Asphalt road | High           | 15           | Access road to McDonald Island Park |
| Highway      | High           | 309          | Road to go across the city          |
| Asphalt      | High           | 328          | Road goes to city                   |
|              |                |              |                                     |

### **Major Point Sources**

| Facility Name   | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|-----------------|-----------------|------------------------|----------------------------|-----------------------------------|
| Fort McMurray   | Water treatment |                        | 1.22                       | SW                                |
| Water treatment | Plant           |                        |                            |                                   |
| Plant           |                 |                        |                            |                                   |
| McDonald Island | Sports Complex  |                        | 0.265                      | NE                                |
| Eveready        | Asphalt Plant   |                        | 3.71                       | NW                                |
| Fort McMurray   | Waste Water     |                        | 3.84                       | NW                                |
| Waste Water     | Treatment Plant |                        |                            |                                   |
| Treatment Plant |                 |                        |                            |                                   |
| Diversified     | Main Bus Depo   |                        | 4.48                       | NW                                |
| Suncor          | Oil Sands Plant | 194,000                | 26.81                      | Ν                                 |
| Suncor          | Tailings Pond   |                        | 15.81                      | Ν                                 |
| LaFarge         | Concrete Plant  |                        | 3.06                       | NW                                |
| Inland          | Concrete Plant  |                        | 3.32                       | NW                                |
| Burnco          | Concrete Plant  |                        | 4.24                       | NW                                |

## Analytical Equipment

| Parameter                   | Owner               | Make                            | Model          | Serial Number    | Date<br>Installed |
|-----------------------------|---------------------|---------------------------------|----------------|------------------|-------------------|
| Sulfur Dioxide              | Alberta Environment | Thermo                          | 43i-LTE        | 1507864683       | May 2018          |
| TRS                         | Alberta Environment | Thermo                          | 43i-LTE        | 1180540018       | May 2018          |
| Converter for TRS           | Alberta Environment | CD Nova                         | CDN-101        | 551              | May 2018          |
| Oxides of Nitrogen          | Alberta Environment | Thermo                          | 42i            | 1160120024       | Feb 2018          |
| Oxides of Nitrogen          | WBEA                | Thermo                          | 42Y            | 1160350002       | March 2018        |
| Oxides of Nitrogen          | WBEA                | Thermo                          | 42i            | 1118148496       | March 2018        |
| Photolytic NO2<br>Converter | WBEA                | Global Analyzer<br>Systems Ltd. | G48PNC         | 2017-109         | 2019              |
| Carbon Monoxide             | Alberta Environment | Thermo                          | 48i            | 1408761381       | 2016              |
| Continuous PM2.5            | Alberta Environment | API                             | T640           | 322              | June 2020         |
| Ozone                       | WBEA                | Thermo                          | 49i            | 1507964700       | Sept 2018         |
| Methane Non<br>methane      | WBEA                | Thermo                          | 55i            | 1426262594       | Feb 2018          |
| VOC                         | WBEA                | Tisch                           | TE123          | 1029             | 2016              |
| Hi-Vol Puf                  | WBEA                | Tisch                           | TE-1004BL      | 1326             | 2016              |
| PM2.5                       | WBEA                | Thermo                          | Partisol 2000i | 200012 0433 1312 | 2016              |
| PM2.5                       | WBEA                | Thermo                          | Partisol 2000i | 200012 0355 1305 | 2016              |
| PM10                        | WBEA                | Thermo                          | Partisol 2000i | 200012 0561 1306 | 2016              |
| PM10                        | WBEA                | Thermo                          | Partisol 2000i | 200012 0382 1308 | 2016              |
| Opera Sampler               | Health Canada       | OMNI                            | 400            | 2126             | 2017              |
| Pressure Sensor             | WBEA                | Young                           | 61302V-10      | BPA4395          | 2016              |
| Temperature/RH              | WBEA                | Vaisala                         | HMP155         | G4340069         | 2016              |
| Wind speed                  | WBEA                | Met One                         | 010C-1         | P10039           | Aug 2018          |
| Wind direction              | WBEA                | Met One                         | 020C-1         | NA               | Aug 2018          |

## Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 8205          |
| Datalogger                 | Datalogger   | Campbell Scientific | CR1000X        | 1394          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701H           | 692           |
| Zero Air Generator         | Zero Air Generator   | Teledyne/API        | 701H           | 198           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 2 ton          | 314K182321-02 |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | NA            |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 3813          |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 3805          |



Figure 2.0 – Area Topographic map showing AMS 07

| W B E A | Station Name: AN  | 1S 07 - Athab<br>4            | asca Valley                |
|---------|-------------------|-------------------------------|----------------------------|
|         |                   | 2                             |                            |
|         | Obstacle          | Distance from the station (m) | Height of the Obstacle (m) |
|         | 1 Athabasca River | 80                            | 0                          |
| N       | 2 The Snye        | 100                           | 0                          |
| W-E     | 3 Trees           | 145                           | 20                         |
| Ś       | 4 Trees           | 160                           | 20                         |

Figure 3.0 – Plan view sketch for AMS 07 site



Figure 4.0 – Aerial photo showing AMS 07

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

### Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (5 Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Fort Chipewyan

LAST UPDATED: FEBRUARY 1, 2021

### WBEA Moitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  | THE | Methane |   | <b>60</b> |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | x       |   |           | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х               | Х  | х                   | Х   |                  | х   | х       |   |           |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |           |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |                 |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 08         |
|--------------------------|----------------|
| Station name             | Fort Chipewyan |
| Date station established | 1998           |

#### Location

| Station street address | Fort Chipewyan            |
|------------------------|---------------------------|
| Legal land description | 6-07-112-07 W4            |
| Latitude               | 58°42'33.25" North        |
| Longitude              | 111°10'29.98" West        |
| UTM East               | 489862                    |
| UTM North              | 6507689                   |
| Nearest community      | Located in Fort Chipewyan |
| Community population   | 852                       |

### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association         |
|------------------|--|
| Name of Approval | Syncrude                                       |
| Holder           |  |
| Approval number  | 026-02-00                                      |
| Contact Name     | Wood Buffalo Environmental Association         |
| Address          | Unit 3 – 805 Memorial Drive, Fort McMurray, AB |
| Phone number     | 780-799-4420                                   |
| Email address    | info@wbea.org                                  |

### Site Description

|                       | 0 – 90 degrees          | Residential       |  |  |
|-----------------------|-------------------------|-------------------|--|--|
|                       | 91 – 180 degrees        | Residential, Lake |  |  |
| Land use by sector    | 181 – 270 degrees       | Residential, Lake |  |  |
|                       | 271 – 360 degrees       | Residential       |  |  |
| Site elevation        |                         | 221 m             |  |  |
| (above sea level)     |                         |                   |  |  |
| Angle of elevation to | Greatest angle          | 0                 |  |  |
| nearby buildings      | Building direction      | NA                |  |  |
|                       | North                   | No                |  |  |
| Airflow rostrictions  | East                    | No                |  |  |
| AITIOW restrictions   | South                   | No                |  |  |
|                       | West                    | No                |  |  |
| Comple manifold       | Туре                    | All glass         |  |  |
|                       | Inlet height above roof | 1 metre           |  |  |
|                       | Туре                    | Cup and vane      |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0 m  |

Site Influences

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

| Туре  | Distance (m)  | Description                           |
|-------|---------------|---------------------------------------|
| House | About 20      | Local residential house. Wood burning |
|       | meters, South |                                       |
|       |               |                                       |

## Roadway Influences

| Туре        | Traffic Volume | Distance (m) | Description                 |
|-------------|----------------|--------------|-----------------------------|
| Driveway    | Low            | 10           | Dirt road, residential use  |
| Local roads | Low            | 100          | Paved road, very low volume |
|             |                |              |                             |
|             |                |              |                             |

### Major Point Sources

| Facility Name    | Source Type             | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|------------------|-------------------------|------------------------|----------------------------|-----------------------------------|
| Suncor/ Syncrude | Oil Sands<br>Production | NA                     | 160                        | South                             |

## Analytical Equipment

| Parameter          | Owner | Make    | Model          | Serial Number | Date<br>Installed |
|--------------------|-------|---------|----------------|---------------|-------------------|
| Sulfur Dioxide     | WBEA  | Thermo  | 43i-TLE        | 1136451241    | NA                |
| CO                 | WBEA  | API     | T300           | 3505          | Feb '19           |
| CO2                | WBEA  | API     | T360           | 289           | Feb '19           |
| Oxides of Nitrogen | WBEA  | API     | T200u          | 172           | NA                |
| 03                 | WBEA  | API     | T400           | 1020          | NA                |
| PM 2.5             | WBEA  | API     | T 640          | 216           | NA                |
| Precipitation      | WBEA  | OTT     | Pluvio 2 – 400 | 10077         | NA                |
| Temperature/RH     | WBEA  | Vaisala | HMP155         | K2510021      | NA                |
| Wind speed         | WBEA  | Met One | 010C-1         | B4129         | NA                |
| Wind direction     | WBEA  | Met One | 020C-1         | E4853         | NA                |
| Leaf Wetness       | WBEA  | NA      | NA             | NA            | NA                |
| Solar Radiation    | WBEA  | NA      | 8-48           | 38243         | NA                |
|                    |       |         |                |               |                   |

## Support Equipment

| Name                       | Description  | Make                | Model           | Serial Number    |
|----------------------------|--|---------------------|-----------------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000          | 11039            |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701             | 197              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton           | 314B132990230-02 |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 10 x 20 trailer | 13 15920         |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700            | 2656             |
|                            |  |                     |                 |                  |



Figure 2.0 – Area Topographic map showing AMS 08 – Fort Chipewyan



Figure 3.0 - Plan view sketch for AMS 08 - Fort Chipewyan



Figure 4.0 – Aerial photo showing AMS 08 – Fort Chipewyan

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North







Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 - Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack


Total Number of Valid Hours: 43308

SE

SSE

s

Figure 7.0 – Windrose (five year)

SW

SSW

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Barge Landing

LAST UPDATED: FEBRUARY 1, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>X</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>X</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         | STATION NAME                 | s0. | NO/NO <sub>2</sub> / | 0. | PM.      | TRS  | H.S  | тнс | Methane | 0 | <u>.</u> | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|----------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002      | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | Х                    | х  | Х        | х    |      | х   | х       | х | х        | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |          |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |          |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |          | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |          |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х        |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | х    |      | Х   | Х       |   |          |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | Х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |          |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | х       | х | х        |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |          |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |          |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |          |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | Х   | х       |   |          |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | х                    |    | Х        | Х    |      | х   | х       |   |          |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                      |    |          |      | х    |     |         |   |          |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |          |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |          |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | х                    |    | Х        |      | Х    | х   |         |   |          |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | Х   | Х                    |    | Х        | х    |      |     | х       |   |          |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | Х    | Х   |         |   |          |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |          |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |          |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |          |      |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 09        |
|--------------------------|---------------|
| Station name             | Barge Landing |
| Date station established | 2000          |

### Location

| Station street address | Northeast of the Barge Landing Road, approximately 460 meters northwest of the Highway 63 intersection |
|------------------------|--|
| Legal land description | 7-31-094-10 W4   |
| Latitude               | 57°11'53.47" North   |
| Longitude              | 111°35'58.35" West   |
| UTM East               | 463778   |
| UTM North              | 6339606  |
| Nearest community      | Fort Mackay  |
| Community population   | 742 (2016)   |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | Canadian Natural Ungrading Limitod     |
| Holder           | Canadian Natural Opgrading Limited     |
| Approval number  | 20809-02-00                            |
| Contact Name     | Tina Ding                              |
| Address          | Albian Sands, P.O. Box 5670            |
| Phone number     | 780-713-4454                           |
| Email address    | Tina.Ding@cnrl.com                     |

### Site Description

|                                     | 0 – 90 degrees          | Wooded area |  |  |
|-------------------------------------|-------------------------|-------------|--|--|
| Land use by sector                  | 91 – 180 degrees        | Wooded area |  |  |
| Land use by sector                  | 181 – 270 degrees       | Wooded area |  |  |
|                                     | 271 – 360 degrees       | Wooded area |  |  |
| Site elevation<br>(above sea level) | 282 m                   |             |  |  |
| Angle of elevation to               | Greatest angle          | N/A         |  |  |
| nearby buildings                    | Building direction      | N/A         |  |  |
|                                     | North                   | Trees       |  |  |
| Airflow rostrictions                | East                    | Trees       |  |  |
| AITTIOW TESTFICTIONS                | South                   | Trees       |  |  |
|                                     | West                    | Trees       |  |  |
| Sample manifold                     | Туре                    | All glass   |  |  |
| Sample manifold                     | Inlet height above roof | 1 meter     |  |  |

| Meteorological Sensors | Туре                  | Cup and vane |
|------------------------|-----------------------|--------------|
|                        | Height above ground   | 10 m         |
|                        | Distance from station | 0 m          |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре | Distance (m) | Description |
|------|--------------|-------------|
| N/A  | N/A          | N/A         |

### Roadway Influences

| Туре                  | Traffic Volume | Distance (m) | Description  |
|-----------------------|----------------|--------------|--|
| Barge Landing<br>Road | Very low       | 70           | Well maintained dirt access road<br>frequented by pickup trucks and heavy<br>equipment |
| Highway 63            | Medium         | 400          | Provincial highway frequented by tractor trailers and pickup trucks.                   |

## Major Point Sources

| Facility Name | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-----------------|------------------------|----------------------------|-----------------------------------|
| CNRL Albian   | Oil Sands Plant | 340,000                | 10                         | North East                        |
| CNRL Horizon  | Oil Sands Plant | 100,000                | 20                         | North West                        |

# Analytical Equipment

| Parameter                 | Owner | Make         | Model     | Serial Number | Date<br>Installed |
|---------------------------|-------|--------------|-----------|---------------|-------------------|
| Sulfur Dioxide            | WBEA  | Thermo       | 43i       | 1118148498    | November<br>2018  |
| Total Reduced<br>Sulfides | WBEA  | Thermo       | 43i-TLE   | 1331259320    | N/A               |
| Oxides of Nitrogen        | WBEA  | Thermo       | 42i       | 1426262593    | November<br>2018  |
| Total<br>Hydrocarbons     | WBEA  | Thermo       | 55i       | 1181490018    | N/A               |
| Particulate Matter        | WBEA  | Teledyne API | T640      | 321           | December<br>2018  |
| Temperature/RH            | WBEA  | Vaisala      | HMP155    | N/A           | N/A               |
| Barometric<br>Pressure    | WBEA  | RM Young USA | 61302V-10 | BPA4394       | November<br>2018  |
| Wind speed                | WBEA  | Met One      | 010C-1    | B4128         | N/A               |
| Wind direction            | WBEA  | Met One      | 020C-1    | E4852         | N/A               |
| VOC Sampler               | WBEA  | Tisch        | TE-123    | 1027          | N/A               |

# Support Equipment

| Name                           | Description  | Make                | Model      | Serial Number |
|--------------------------------|--|---------------------|------------|---------------|
| Data Logger                    | Data Logger  | Campbell Scientific | CR3000     | 5564          |
| Gas Dilution<br>Calibrator     | Mass flow controlled gas dilution calibrator               | Teledyne API        | T700       | 3055          |
| Zero Air Generator             | Zero Air Generator   | Teledyne API        | T701       | 4888          |
| Hydrogen Generator             | Hydrogen Generator   | AMA Instruments     | HG 300     | 171067036     |
| TRS Converter                  | Thermal Oxidizer   | CD Nova             | CDN-101    | 519           |
| Mitsubishi Electric<br>Mr Slim | Heating and air<br>conditioning system.<br>Wall mount unit | R410A               | MUY-GE15NA | 3002509T      |
| Shelter / Building             | Air monitoring portable                                    | Monitoring Shelter  | 10 x 20    | 2N9MMFY3615   |



Figure 2.0 – Area topographic map showing AMS 09 – Barge Landing



Figure 3.0 - Plan view sketch for AMS 09 - Barge Landing



Figure 4.0 – Aerial photo showing AMS 09 – Barge Landing

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environment looking north



Figure 5.1 – Environment looking east



Figure 5.2 – Environment looking south



Figure 5.3 – Environment looking west



Figure 5.4 – Meteorological tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of AMS 09 – Barge Landing



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Lower Camp

LAST UPDATED: FEBRUARY 04, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>X</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>X</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  | THE | Methane |   | <b>60</b> |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | Х               | Х  | х                   | Х   |                  | х   | х       |   |           |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | х   |         |   |           |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |                 |

Table 1.0 - Pollutant parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | Х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 11     |
|--------------------------|------------|
| Station name             | Lower Camp |
| Date station established | 1975       |

### Location

| Station street address | Located by the Athabasca River Valley at about 115 meters south |
|------------------------|---|
|                        | of the syncrude pump house                                      |
| Legal land description | 11-35-092-10 W4   |
| Latitude               | 57° 1'36.45"N   |
| Longitude              | 111°30'2.95"W   |
| UTM East               | 469598  |
| UTM North              | 6320480   |
| Nearest community      | Fort McMurray   |
| Community population   | 66,000 (2016)   |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | Super Energy Inc.                      |
| Holder           | Suncor Energy Inc.                     |
| Approval number  | 094-03-00                              |
| Contact Name     | Nelia Heydenreich                      |
| Address          | Base Plant Rd, Wood Buffalo, AB        |
| Phone number     | 780-788-8504                           |
| Email address    | nheydenreich@suncor.com                |

### Site Description

|                                     | 0 – 90 degrees          | Syncrude open mining operations |  |  |
|-------------------------------------|-------------------------|---------------------------------|--|--|
| Land use by sector                  | 91 – 180 degrees        | Athabasca River                 |  |  |
| Land use by sector                  | 181 – 270 degrees       | Athabasca River                 |  |  |
|                                     | 271 – 360 degrees       | Syncrude open mining operations |  |  |
| Site elevation<br>(above sea level) | 235 m                   |                                 |  |  |
| Angle of elevation to               | Greatest angle          | 0                               |  |  |
| nearby buildings Building direction |                         | N/A                             |  |  |
|                                     | North                   | No                              |  |  |
| Airflow rostrictions                | East                    | No                              |  |  |
| AITTOW TESTICTIONS                  | South                   | No                              |  |  |
|                                     | West                    | No                              |  |  |
| Sample manifold                     | Туре                    | All glass                       |  |  |
| Sample mainolu                      | Inlet height above roof | 1 meter                         |  |  |

| Meteorological Sensors | Туре                      | Cup and vane |
|------------------------|---------------------------|--------------|
|                        | Height above ground (m)   | 10           |
|                        | Distance from station (m) | 7            |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре            | Distance (m) | Description                                      |
|-----------------|--------------|--|
| Laydown         | 79.21        | Equipment Laydown                                |
| Water Pond      | 136.8        | Reservoir  |
| Athabasca River | 33.8         | River  |
| Pumping Station | 114          | Syncrude Water Pump Station                      |
| Deck            | 4            | Has Precipitation, PM2.5, and PUF samplers on it |

### **Roadway Influences**

| Туре        | Traffic Volume | Distance (m) | Description                         |
|-------------|----------------|--------------|-------------------------------------|
| Gravel road | Low            | 20           | Road access to lay down and pumping |
|             |                |              | station                             |

### Major Point Sources

| Facility Name | Source Type               | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|---------------------------|------------------------|----------------------------|-----------------------------------|
| Suncor Energy | Oil refinery              | 330,000 bbl/day        | 2                          | South                             |
| Syncrude      | Oil refinery/open mining  | 225,000 bbl/day        | 3                          | West                              |
| Suncor Energy | Open mining<br>operations | NA                     | 4                          | East                              |

# Analytical Equipment

| Parameter                     | Owner | Make    | Model  | Serial<br>Number | Date Installed |
|-------------------------------|-------|---------|--------|------------------|----------------|
| Sulfur Dioxide                | WBEA  | Thermo  | 43i    | 100841398        | January 2015   |
| Hydrogen Sulfide              | WBEA  | Thermo  | 450i   | 1410661328       | October 2015   |
| Non-Methane<br>Hydrocarbons   | WBEA  | Thermo  | 55i    | 1180320040       | November 2019  |
| Temperature/RH                | WBEA  | Vaisala | HMP155 | K2510020         | 2016           |
| Wind Speed                    | WBEA  | Met One | 010C-1 | N11710           | 2017           |
| Wind Direction                | WBEA  | Met One | 020C-1 | P19941           | 2017           |
| Present Weather<br>Visibility | WBEA  | Vaisala | PWD22  | H5030008         | February 2013  |

# Support Equipment

| Name                    | Description                                     | Make                | Model          | Serial Number |
|-------------------------|---|---------------------|----------------|---------------|
| Data Logger             | Data Logger                                     | Campbell Scientific | CR3000         | 2403          |
| Data Logger             | Data Logger                                     | Campbell Scientific | CR1000         | 10865         |
| Gas Dilution Calibrator | Mass flow controlled gas<br>dilution calibrator | Teledyne API        | T700           | 1222          |
| Zero Air Generator      | Zero Air Generator                              | Teledyne API        | T701 H         | 196           |
| HVAC                    | Heating and air<br>conditioning                 | BARD                | 1 ton          | NA            |
| Shelter / Building      | Air monitoring portable                         | ITB                 | 8 x 16 trailer | 1410661328    |



Figure 2.0 – Area topographic map showing AMS 11 – Lower Camp

| W B E A | Station Name: AMS 11 - L   | ower Camp                                |
|---------|--|--|
|         |  |  |
|         |  |  |
|         |  | Height of the                            |
|         | 2<br>Obstacle Distance from<br>the station (m)   | Height of the<br>Obstacle (m)            |
| N       | 2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>2<br>3<br>3<br>3<br>3<br>3<br>3<br>3<br>3<br>3<br>3<br>1<br>3<br>3<br>1<br>3<br>3<br>1<br>3<br>3<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | Height of the<br>Obstacle (m)<br>0<br>12 |

Figure 3.0 – Plan view sketch for AMS 11 – Lower Camp



Figure 4.0 – Aerial photo showing AMS 11 – Lower Camp

# Site Photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environment looking north



Figure 5.1 – Environment looking east



Figure 5.2 – Environment looking south



Figure 5.3 – Environment looking west
### Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of AMS 11 – Lower Camp



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Fort McKay South

LAST UPDATED: FEBRUARY 4, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | 0  | DNA                 | TDC |                  | тис | Methane |   | <b>60</b> |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | Х               | Х  | х                   | Х   |                  | х   | х       |   |           |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |           |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |                 |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 13           |
|--------------------------|------------------|
| Station name             | Fort McKay South |
| Date station established | 2002             |

### Location

| Station street address | None           |
|------------------------|----------------|
| Legal land description | 4-13-094-11 W4 |
| Latitude               | 57°8′57.03″N   |
| Longitude              | 111°38′32.44″W |
| UTM East               | 461136         |
| UTM North              | 6334175        |
| Nearest community      | Fort McKay     |
| Community population   | 742            |

### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | Syncrude Canada Ltd                    |
| Holder           |  |
| Approval number  | 026-02-00                              |
| Contact Name     | Brooke Bennett                         |
| Address          | NA                                     |
| Phone number     | 780-881-3304                           |
| Email address    | Bennett.brooke@syncrude.com            |

### Site Description

|                       | 0 – 90 degrees          | Forest       |  |  |  |
|-----------------------|-------------------------|--------------|--|--|--|
| Land use by sector    | 91 – 180 degrees        | Forest       |  |  |  |
| Land use by sector    | 181 – 270 degrees       | Forest       |  |  |  |
|                       | 271 – 360 degrees       | Forest       |  |  |  |
| Site elevation        | 268                     |              |  |  |  |
| (above sea level)     |                         |              |  |  |  |
| Angle of elevation to | Greatest angle          | None         |  |  |  |
| nearby buildings      | Building direction      | None         |  |  |  |
|                       | North                   | None         |  |  |  |
| Airflow rostrictions  | East                    | None         |  |  |  |
| Airnow restrictions   | South                   | None         |  |  |  |
|                       | West                    | None         |  |  |  |
| Comple manifold       | Туре                    | All glass    |  |  |  |
|                       | Inlet height above roof | 1 metre      |  |  |  |
|                       | Туре                    | Cup and vane |  |  |  |

| Meteorological                | Height above ground | 10m                                  |  |  |
|-------------------------------|---------------------|--------------------------------------|--|--|
| Sensors Distance from station |                     | Attached to North side of Monitoring |  |  |
|                               |                     | Station                              |  |  |

Site Influences

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

| Туре | Distance (m) | Description |
|------|--------------|-------------|
|      |              |             |
|      |              |             |
|      |              |             |
|      |              |             |

### Roadway Influences

| Туре    | Traffic Volume | Distance (m) | Description                      |
|---------|----------------|--------------|----------------------------------|
| Asphalt | High           | 326          | Main Road to Fort McKay and CNRL |
|         |                |              | Horizon                          |
| Dirt    | Low            | 99           | Road to AMS 13                   |
| Dirt    | Very Low       | 10           | Access Road to AMS 13            |
|         |                |              |                                  |

### Major Point Sources

| Facility Name    | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|------------------|-----------------|------------------------|----------------------------|-----------------------------------|
| CNRL Horizon     | OilSands Plant  | 250,000                | 21.9                       | Ν                                 |
| Syncrude         | Tailings pond   | 350,000                | 6.2                        | SW                                |
| Syncrude         | OilSands Plant  |                        | 12.3                       | S                                 |
| Fort McKay       | Laydown Yard    |                        | 1                          | SE                                |
| Enterprises Ltd. |                 |                        |                            |                                   |
| Bouchier Group   | LayDown Yard    |                        | 1                          | SE                                |
| BME Ltd.         | Laydown Yard    |                        | 1                          | SE                                |
| Wood Buffalo     | Water           |                        | 4.9                        | Ν                                 |
| Water Treatment  | Treatment Plant |                        |                            |                                   |
| Plant            |                 |                        |                            |                                   |
| CNRL Albian      | Tailings pond   |                        | 9.2                        | NE                                |
| CNRL Albian      | Oilsands Plant  | 255,000                | 14.1                       | NE                                |

# Analytical Equipment

| Parameter                         | Owner | Make         | Model          | Serial Number    | Date<br>Installed |
|-----------------------------------|-------|--------------|----------------|------------------|-------------------|
| Sulfur Dioxide                    | WBEA  | Teledyne/API | T100           | 599              | 2016              |
| Total Reduced<br>Sulfur           | WBEA  | Thermo       | 43i-LTE        | 1180540017       | 2016              |
| Total Reduced<br>Sulfur Converter | WBEA  | Thermo       | CDN-101        | 456              | 2016              |
| Oxides of Nitrogen                | WBEA  | Thermo       | 42i            | 1410661329       | 2016              |
| Hydrocarbon                       | WBEA  | Thermo       | 55i            | 1193585647       | 2016              |
| Ozone                             | WBEA  | Teledyne/API | T400           | 3873             | 2016              |
| Temperature/RH                    | WBEA  | Vaisala      | HMP155         | G4340047         | 2016              |
|                                   |       |              |                |                  |                   |
| Continuous PM2.5                  | WBEA  | Teledyne/API | T640           | 319              | 2018              |
| PM10                              | WBEA  | Thermo       | Partisol-2000i | 200012 0386 1408 | 2016              |
| PM10                              | WBEA  | Thermo       | Partisol-2000i | 200012 0492 1408 | 2016              |
| VOC                               | WBEA  | Tisch        | TE123          | 1023             | 2016              |
| Wind speed                        | WBEA  | Met One      | 010C-1         | U11127           | 2018              |
| Wind direction                    | WBEA  | Met One      | 020C-1         | N13744           | 2018              |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 11038         |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 1117          |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | Intertherm          | E2EB-010HB     | E2E011101302  |
| Shelter / Building         | Air monitoring portable                                    | C&B                 | 8 x 16 trailer | 5201657       |
| Hydrogen<br>Generator      | Hydrogen Generator   | AMA                 | HG300          | 171067044     |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 2448          |





Figure 3.0 – Plan view sketch for AMS 13 site



Figure 4.0 – Aerial photo showing AMS 13

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



### Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South







Figure 5.4 – Meteorological Tower

### Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (5 year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Anzac

LAST UPDATED: FEBRUARY 4, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         | STATION NAME                 | s0. | NO/NO <sub>2</sub> / | 0. | PM.      | TRS  | H.S  | тнс | Methane | 0 | <u> </u> | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|----------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002      | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | Х                    | х  | Х        | х    |      | х   | х       | х | х        | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |          |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |          |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |          | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |          |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х        |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | х    |      | Х   | Х       |   |          |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | Х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |          |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | х       | х | х        |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |          |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |          |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |          |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | Х   | х       |   |          |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | х                    |    | Х        | Х    |      | х   | х       |   |          |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                      |    |          |      | х    |     |         |   |          |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |          |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |          |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | х                    |    | Х        |      | Х    | х   |         |   |          |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | Х   | Х                    |    | Х        | х    |      |     | х       |   |          |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | Х    | Х   |         |   |          |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |          |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |          |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |          |      |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 14           |
|--------------------------|------------------|
| Station name             | Anzac            |
| Date station established | January 1, 2006. |

### Location

| Station street address | Stony Mountain Road |
|------------------------|---------------------|
| Legal land description | 16-09-086-07 W4     |
| Latitude               | 56.448908           |
| Longitude              | -111.037975         |
| UTM East               | 497659              |
| UTM North              | 6256044             |
| Nearest community      | Anzac               |
| Community population   | 548                 |

### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | Nexen Energy ULC                       |
| Holder           |  |
| Approval number  | 137467-01-00; 236394-00-00             |
| Contact Name     | Clementina Okoforo                     |
| Address          | NA                                     |
| Phone number     | 780-742-6873                           |
| Email address    | NA                                     |

### Site Description

|                       | 0 – 90 degrees          | Trees        |
|-----------------------|-------------------------|--------------|
| Land use by sector    | 91 – 180 degrees        | Trees        |
| Land use by sector    | 181 – 270 degrees       | House        |
|                       | 271 – 360 degrees       | Trailer      |
| Site elevation        | 497 m                   |              |
| (above sea level)     |                         |              |
| Angle of elevation to | Greatest angle          | 18           |
| nearby buildings      | Building direction      | West         |
|                       | North                   | None         |
| Airflow rostrictions  | East                    | None         |
| AITIOW restrictions   | South                   | None         |
|                       | West                    | House        |
| Comple manifold       | Туре                    | All glass    |
|                       | Inlet height above roof | 1 metre      |
|                       | Туре                    | Cup and vane |

| Meteorological | Height above ground   | 20 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0    |

Site Influences

Localized Sources (within 20 metres of station)

| Type Distance (m) |      | Description             |  |  |
|-------------------|------|-------------------------|--|--|
| Trailer           | 17 m | Telus trailer and tower |  |  |
| House             | 18   | House W of station      |  |  |

### **Roadway Influences**

| Туре        | Traffic Volume | Distance (m) | Description                |
|-------------|----------------|--------------|----------------------------|
| Pavement    | low            | 62mS         | Main road of Anzac         |
| Access road | Low            | 16mE         | Access road to station     |
| Railway     | low            | 70 m         | Railway track E of station |

### Major Point Sources

| Facility Name   | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|-----------------|-------------|------------------------|----------------------------|-----------------------------------|
| Nexen Long lake | SAGD        | 70,000 bbl/day         | 4.38                       | SW                                |

# Analytical Equipment

| Parameter                     | Owner | Make                   | Model     | Serial Number   | Date Installed |
|-------------------------------|-------|------------------------|-----------|-----------------|----------------|
| Sulfur Dioxide                | WBEA  | Thermo Instruments     | 43i       | 1152430005      | 2016-08-02     |
| Total reduced<br>Sulphur      | WBEA  | Thermo Instruments     | 43i-TLE   | 1180540019      | 2013-05-21     |
| Oxides of Nitrogen            | WBEA  | Thermo Instruments     | 42i       | 1426262592      | 2015-01-08     |
| Temperature/RH                | WBEA  | Vaisala                | HMP155    | G4330054        |                |
| Wind speed                    | WBEA  | Met One                | 010C-1    | D6359           | 2016-02-22     |
| Wind direction                | WBEA  | Met One                | 020C-1    | Z1048           | 2016-02-22     |
| Methane Non<br>Methane        | WBEA  | Thermo Instruments     | 55i-LT    | 1218153355      | 2016-04-21     |
| Ozone                         | WBEA  | Thermo Instruments     | 49i       | 1426262595      | 2015-01-09     |
| PM <2.5 um in<br>diameter     | WBEA  | API                    | T640      | 825             | 2020           |
| Leaf wetness<br>sensor        | WBEA  | Decagon Devices        | LWS       | NA              | 2018-10-01     |
| Partisol sampler              | WBEA  | Thermo Instruments     | 2000i     | 20001204821408  | 2014-09-11     |
| Partisol sampler              | WBEA  | Thermo Instruments     | 2000i     | 20001204581405  | 2014-06-23     |
| Partisol sampler              | WBEA  | Thermo Instruments     | 2000i     | 20001203871308  | 2017-02-10     |
| Partisol sampler              | WBEA  | Thermo Instruments     | 2000i     | 2000IW205911510 | 2015-12-11     |
| Volatile organic<br>compounds | WBEA  | Tisch                  | TE-123    | 1024            | 2016-11-15     |
| Precipitation<br>Gauge        | WBEA  | Met One<br>Instruments | 375       | N1505A          | 2016           |
| PAH Sampler                   | WBEA  | Tisch Environmental    | TE-PUF+BL | 1001055         | 2016           |

### Support Equipment

| Name                       | Description  | Make                | Model           | Serial Number |
|----------------------------|--|---------------------|-----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000          | 2582          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | T701 H          | 357           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton           | NA            |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 10 x 20 shelter | 2N9MF53785    |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700            | 3807          |



Figure 2.0 – Area Topographic map showing AMS 14



Figure 3.0 – Plan view sketch for AMS 14 site



Figure 4.0 – Aerial photo showing AMS 14

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 - Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Horizon

LAST UPDATED: 01-28-2020

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 24 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

Table 1 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA<br>ID | ТҮРЕ                                  | STATION NAME                 | SO <sub>2</sub> | NO/NO₂/<br>NOx | <b>O</b> 3 | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO <sub>2</sub> | NH₃ |
|------------|---------------------------------------|------------------------------|-----------------|----------------|------------|-------------------|-----|-----|-----|-----------------|----|-----------------|-----|
| 1          | COMMUNITY                             | BERTHA GANTER-<br>FORT MCKAY | Х               | Х              | х          | х                 | Х   |     | Х   | х               | х  | Х               | х   |
| 2          | COMPLIANCE                            | MILDRED LAKE                 | х               |                |            |                   |     | х   | Х   | х               |    |                 |     |
| 3          | METEOROLOGI<br>CAL                    | LOWER CAMP MET<br>TOWER      |                 |                |            |                   |     |     |     |                 |    |                 |     |
| 4          | COMPLIANCE                            | BUFFALO<br>VIEWPOINT         | х               | х              | х          | Х                 |     | х   | х   | х               |    |                 |     |
| 5          | COMPLIANCE/<br>METEOROLOGI<br>CAL     | MANNIX                       | х               |                |            |                   |     | х   | х   | х               |    |                 |     |
| 6          | COMMUNITY                             | PATRICIA MCINNES             | х               | х              | х          | х                 | Х   |     | Х   | Х               |    |                 | х   |
| 7          | COMMUNITY                             | ATHABASCA VALLEY             | Х               | х              | х          | х                 | Х   |     | Х   | х               | х  |                 |     |
| 8          | COMMUNITY/<br>COMPLIANCE              | FORT CHIPEWYAN               | х               | х              | х          | х                 |     |     |     |                 | х  | х               |     |
| 9          | ATTRIBUTION                           | BARGE LANDING                | Х               | х              |            | х                 | Х   |     | Х   |                 |    |                 |     |
| 11         | COMPLIANCE                            | LOWER CAMP                   | Х               |                |            |                   |     | х   | х   | х               |    |                 |     |
| 13         | COMPLIANCE/<br>ATTRIBUTION            | FORT MCKAY<br>SOUTH          | х               | х              | х          | х                 | Х   |     | х   |                 |    |                 |     |
| 14         | COMPLIANCE/<br>COMMUNITY              | ANZAC                        | Х               | х              | х          | х                 | х   |     | х   | х               |    |                 |     |
| 15         | COMPLIANCE                            | HORIZON                      | Х               | Х              |            | Х                 | Х   |     | Х   |                 |    |                 |     |
| 17         | COMPLIANCE                            | WAPASU                       | х               | х              | х          | х                 |     | х   | Х   |                 |    |                 |     |
| 18         | ENHANCED<br>DEPOSITION/<br>BACKGROUND | STONY MOUNTAIN               | х               | х              | х          | х                 | х   |     | х   | х               | х  | х               |     |
| 19         | COMPLIANCE                            | FIREBAG                      | х               | х              |            |                   |     | х   | Х   |                 |    |                 |     |
| 20         | COMPLIANCE                            | MACKAY RIVER                 | Х               | х              |            |                   |     | Х   | Х   |                 |    |                 |     |
| 21         | COMMUNITY                             | CONKLIN                      | Х               | х              | х          | х                 | Х   |     | Х   | х               |    |                 |     |
| 22         | COMMUNITY                             | JANVIER                      | Х               | х              | х          | х                 | Х   |     | Х   | х               |    |                 |     |
| 23         | COMPLIANCE                            | FORT HILLS                   | х               | х              |            | х                 | х   |     | х   |                 |    |                 |     |
| 25         | EMERGENCY<br>RESPONSE                 | WASKOW OHCI<br>PIMATISIWIN   | х               |                |            |                   |     | х   |     |                 |    |                 |     |
| 26         | COMPLIANCE                            | CHRISTINA LAKE               | Х               | х              |            |                   |     | х   |     |                 |    |                 |     |
| 27         | COMPLIANCE                            | JACKFISH 2/3                 | Х               | х              |            |                   |     | х   |     |                 |    |                 |     |
| 29         | COMPLIANCE                            | SURMONT 2                    | Х               | х              |            | х                 |     | х   | х   |                 |    |                 |     |
| 501        | COMPLIANCE                            | LEISMER                      | Х               | х              |            |                   |     | х   |     |                 |    |                 |     |
| 505        | COMPLIANCE                            | SAWBONES BAY                 | х               | х              |            |                   |     | х   |     |                 |    |                 |     |
| 508        | COMPLIANCE                            | KIRBY NORTH                  | х               | х              |            |                   |     | х   | х   |                 |    |                 |     |

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

Table 2 provides a listing of stations and meteorological parameters measured by continuous methods. Parameters measured include ambient temperature, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness.

| WBEA<br>ID | ТҮРЕ                                  | STATION NAME                 | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wet<br>ness |
|------------|---------------------------------------|------------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|---------------------|
| 1          | COMMUNITY                             | BERTHA GANTER-<br>FORT MCKAY | Х           | х  |    | Х             | Х                 |                           | х                  | Х             | х                   |
| 2          | COMPLIANCE                            | MILDRED LAKE                 | Х           | х  |    | х             | х                 |                           |                    |               |                     |
| 3          | METEOROLOGI<br>CAL                    | LOWER CAMP MET<br>TOWER      | х           | х  |    | х             | х                 | х                         |                    |               |                     |
| 4          | COMPLIANCE                            | BUFFALO VIEWPOINT            | х           | х  |    | х             | Х                 |                           |                    |               |                     |
| 5          | COMPLIANCE/<br>METEORLOGIC<br>AL      | MANNIX                       | Х           | х  |    | х             | Х                 | x                         |                    |               |                     |
| 6          | COMMUNITY                             | PATRICIA MCINNES             | х           | Х  |    | х             | Х                 |                           |                    |               |                     |
| 7          | COMMUNITY                             | ATHABASCA VALLEY             | Х           | х  | х  | х             | Х                 |                           |                    |               |                     |
| 8          | COMMUNITY/<br>COMPLIANCE              | FORT CHIPEWYAN               | Х           | х  |    | х             | х                 |                           | х                  | Х             | х                   |
| 9          | ATTRIBUTION                           | BARGE LANDING                | Х           | Х  | Х  | х             | Х                 |                           |                    |               |                     |
| 11         | COMPLIANCE                            | LOWER CAMP                   | Х           | х  |    | х             | х                 |                           |                    |               |                     |
| 13         | COMPLIANCE/<br>ATTRIBUTION            | FORT MCKAY SOUTH             | х           | х  |    | х             | х                 |                           |                    |               |                     |
| 14         | COMPLIANCE/<br>COMMUNITY              | ANZAC                        | х           | х  |    | Х             | х                 |                           |                    | х             | х                   |
| 15         | COMPLIANCE                            | HORIZON                      | Х           | Х  |    | х             | Х                 |                           | Х                  | Х             |                     |
| 17         | COMPLIANCE                            | WAPASU                       | х           | х  |    | х             | х                 |                           |                    | х             |                     |
| 18         | ENHANCED<br>DEPOSITION/<br>BACKGROUND | STONY MOUNTAIN               | х           | х  |    | х             | Х                 |                           | х                  | Х             | х                   |
| 19         | COMPLIANCE                            | FIREBAG                      | Х           | х  |    | х             | Х                 |                           |                    |               |                     |
| 20         | COMPLIANCE                            | MACKAY RIVER                 | Х           | х  |    | х             | Х                 |                           |                    | Х             |                     |
| 21         | COMMUNITY                             | CONKLIN                      | Х           | х  |    | х             | х                 |                           |                    |               |                     |
| 22         | COMMUNITY                             | JANVIER                      | Х           | х  |    | х             | Х                 |                           |                    |               |                     |
| 23         | COMPLIANCE                            | FORT HILLS                   | Х           | х  |    | х             | х                 |                           |                    |               |                     |
| 25         | EMERGENCY<br>RESPONSE                 | WASKOW OHCI<br>PIMATISIWIN   | х           | х  |    | х             | х                 |                           |                    |               |                     |
| 26         | COMPLIANCE                            | CHRISTINA LAKE               | Х           | х  |    | х             | Х                 |                           |                    |               |                     |
| 27         | COMPLIANCE                            | JACKFISH 2/3                 | Х           | х  |    | х             | Х                 |                           |                    |               |                     |
| 29         | COMPLIANCE                            | SURMONT 2                    | Х           | х  |    | х             | х                 |                           |                    |               |                     |
| 501        | COMPLIANCE                            | LEISMER                      | Х           | Х  |    | Х             | Х                 |                           |                    |               |                     |
| 505        | COMPLIANCE                            | SAWBONES BAY                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                     |
| 508        | COMPLIANCE                            | KIRBY NORTH                  | х           | Х  |    | Х             | Х                 |                           |                    |               |                     |

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC), particulate matter less than 2.5  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

| WBEA<br>ID | ТҮРЕ                                  | STATION NAME                | voc | PM <sub>2.5</sub><br>Mass,<br>Metals<br>and Ions | PM <sub>2.5</sub><br>ECOC | PM <sub>10</sub><br>Mass,<br>Metals<br>and<br>Ions | РАН | PRECIP |
|------------|---------------------------------------|-----------------------------|-----|--|---------------------------|--|-----|--------|
| 1          | COMMUNITY                             | BERTHA GANTER-FORT<br>MCKAY | Х   | Х  | х                         | х  | х   | х      |
| 6          | COMMUNITY                             | PATRICIA MCINNES            | х   | х  |                           | х  | х   |        |
| 7          | COMMUNITY                             | ATHABASCA VALLEY            | х   | х  |                           | х  | Х   |        |
| 9          | ATTRIBUTION                           | BARGE LANDING               | х   |  |                           |  |     |        |
| 13         | COMPLIANCE/<br>ATTRIBUTION            | FORT MCKAY SOUTH            | х   |  |                           | х  |     |        |
| 14         | COMPLIANCE/<br>COMMUNITY              | ANZAC                       | Х   | х  |                           | х  | Х   |        |
| 15         | COMPLIANCE                            | HORIZON                     | Х   | х  |                           | х  |     |        |
| 17         | COMPLIANCE                            | WAPASU                      |     |  | х                         |  |     |        |
| 18         | ENHANCED<br>DEPOSITION/<br>BACKGROUND | STONY MOUNTAIN              |     |  | x                         |  |     | х      |
| 22         | COMMUNITY                             | JANVIER                     | х   |  |                           |  |     |        |

| Table 3: Summary of parameters | measured using integrated methods at WBEA sites |
|--------------------------------|---|
|                                |   |



# Figure 1.0 - WBEA Network Monitoring Sites

### General Site Information

### Station

| Station ID               | AMS 15  |
|--------------------------|---------|
| Station name             | Horizon |
| Date station established | 2007    |

### Location

| Station street address | Located at about 300 m northwest of the Total Joslyn camp. |
|------------------------|--|
| Legal land description | 12-04-096-11 W4  |
| Latitude               | 57.303689  |
| Longitude              | -111.739489  |
| UTM East               | 455445   |
| UTM North              | 6351434  |
| Nearest community      | Fort Mackay  |
| Community population   | 742  |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association      |
|------------------|---|
| Name of Approval | Canadian Natural Resources Ltd.             |
| Holder           |   |
| Approval number  | 149968-01-00                                |
| Contact Name     | Tina Ding                                   |
| Address          | 2100, 855 – 2 Street SW Calgary, AB T2P 4J8 |
| Phone number     | (780) 714-4436                              |
| Email address    | Tina.ding@cnrl.com                          |

### Site Description

|                       | 0 – 90 degrees     | Forest    |
|-----------------------|--------------------|-----------|
|                       | 91 – 180 degrees   | Forest    |
| Land use by sector    | 181 – 270 degrees  | Forest    |
|                       | 271 – 360 degrees  | Forest    |
| Site elevation        | 302                |           |
| (above sea level)     |                    |           |
| Angle of elevation to | Greatest angle     | N/A       |
| nearby buildings      | Building direction | N/A       |
|                       | North              | No        |
| Airflow rostrictions  | East               | No        |
| AITIOW restrictions   | South              | No        |
|                       | West               | No        |
| Sample manifold       | Туре               | All glass |

|                | Inlet height above roof | 1 metre      |
|----------------|-------------------------|--------------|
| Mataaralagiaal | Туре                    | Cup and vane |
| Soncore        | Height above ground     | 10           |
| 26112012       | Distance from station   | 7            |

### Site Influences

# Localized Sources (within 20 metres of station)

| Туре | Distance (m) | Description               |
|------|--------------|---------------------------|
| Camp | 300          | Total Joslyn workers camp |
|      |              |                           |
|      |              |                           |
|      |              |                           |

### **Roadway Influences**

| Туре      | Traffic Volume | Distance (m) | Description |
|-----------|----------------|--------------|-------------|
| Dirt road | High           | 3            |             |
|           |                |              |             |
|           |                |              |             |
|           |                |              |             |

# Major Point Sources

| Facility Name             | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------------------|-------------|------------------------|----------------------------|-----------------------------------|
| CNRL Horizon Oil<br>Sands | Oil plant   |                        | 2km                        | North                             |
| CNRL Horizon              | Open mining |                        | 15km                       | North / West                      |
|                           |             |                        |                            |                                   |

# Analytical Equipment

| Parameter                       | Owner | Make                     | Model  | Serial Number        | Date<br>Installed |
|---------------------------------|-------|--------------------------|--------|----------------------|-------------------|
| Sulfur Dioxide                  | WBEA  | Thermo Scientific        | 43i    | 710321322            | 2018              |
| Hydrogen Sulfide                | WBEA  | Thermo Scientific        | 43-TLE | 1410661331           | 2018              |
| Oxides of Nitrogen              | WBEA  | Thermo Scientific        | 42i    | 0710321429           | 2018              |
| Temperature/RH                  | WBEA  | Vaisala                  | HMP155 | F5010003             | 2018              |
| Wind speed                      | WBEA  | Met One                  | 010C-1 | J4337                | 2018              |
| Wind direction                  | WBEA  | Met One                  | 020C-1 | J2732                | 2018              |
| Total Hydrocarbon               | WBEA  | Thermo Scientific        | 51i    | 1327059295           | 2018              |
| SHARP Particulate               | WBEA  | Thermo Scientific        | 5030   | E — 1486             | 2018              |
| Solar Radiometer                | WBEA  | The Eppley<br>Laboratory | 8-48   | 38244                | 2018              |
| PM Mass Monitor                 | WBEA  | Teledyne/API             | T640   | 324                  | 2019              |
| Partisol Particulate<br>Sampler | WBEA  | Thermo Scientific        | 2000i  | 200012 0383 1308     | 2018              |
| Partisol Particulate<br>Sampler | WBEA  | Thermo Scientific        | 2000i  | 200012 0496 1409     | 2018              |
| Partisol Particulate<br>Sampler | WBEA  | Thermo Scientific        | 2000i  | 2000IW2 0601<br>1510 | 2018              |
| Partisol Particulate<br>Sampler | WBEA  | Thermo Scientific        | 2000i  | 200012 0523 1411     | 2018              |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 11040         |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 1004          |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          |               |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | 2N9MF73895    |
| Gas Dilution<br>Calibrator | Mass flow controlled gas<br>dilution                       | Teledyne/API        | T700           | 1223          |



Figure 2.0 – Area Topographic map showing AMS 15



Figure 3.0 – Plan view sketch for AMS 15 site



Figure 4.0 – Aerial photo showing AMS 15

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West

Figure 5.4 – Meteorological Tower

### Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 - Windrose (2015-2019)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Wapasu

LAST UPDATED: FEBRUARY 4, 2021

### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPF                         | <b>STATION NAME</b>          | 50. | NO/NO <sub>2</sub> / | 0. | PM       | TRS  | H.S  | тнс | Methane | 0 | <b>CO</b> 2 | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|-------------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002         | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | х                    | х  | х        | х    |      | х   | х       | х | х           | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |             |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |             |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |             |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |             |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |             | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |             |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х           |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | Х    |      | Х   | х       |   |             |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х   |                      |    |          |      | х    | х   | х       |   |             |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                    | х  | х        | х    |      | х   | х       |   |             |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | x       |   |             |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |             |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | x       | х | х           |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |             |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |             |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |             |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | х   | х       |   |             |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | Х                    |    | Х        | Х    |      | Х   | х       |   |             |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х   |                      |    |          |      | х    |     |         |   |             |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |             |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |             |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | Х                    |    | Х        |      | Х    | Х   |         |   |             |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х   | х                    |    | х        | х    |      |     | х       |   |             |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | х    | Х   |         |   |             |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |             |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |             |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |             |      |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | х           | х  |    | х             | х                 |                           | x                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | х           | х  |    | х             | x                 |                           | x                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORTHILLS                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 17        |
|--------------------------|---------------|
| Station name             | Wapasu        |
| Date station established | November 2013 |

# Location

| Station street address | Located northeast of Husky Sunrise. |
|------------------------|-------------------------------------|
| Legal land description | 9-22-095-07 W4                      |
| Latitude               | 57°15′33.11″ North                  |
| Longitude              | 111°2'18.90" West                   |
| UTM East               | 497672                              |
| UTM North              | 6346240                             |
| Nearest community      | Fort Mackay                         |
| Community population   | 742 (2016)                          |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | Husky Oil Operations Limited           |
| Holder           |  |
| Approval number  | 206355-01-00                           |
| Contact Name     | Sam Rageh                              |
| Address          | N/A                                    |
| Phone number     | 403-816-6144                           |
| Email address    | Sam.rageh@huskyenergy.com              |

### Site Description

|                       | 0 – 90 degrees     | Decommissioned well pad |  |  |
|-----------------------|--------------------|-------------------------|--|--|
|                       | 91 – 180 degrees   | Wooded area             |  |  |
| Land use by sector    | 181 – 270 degrees  | Wooded area             |  |  |
|                       | 271 – 360 degrees  | Site access road        |  |  |
| Site elevation        | 491 m              |                         |  |  |
| (above sea level)     |                    |                         |  |  |
| Angle of elevation to | Greatest angle     | N/A                     |  |  |
| nearby buildings      | Building direction | N/A                     |  |  |
|                       | North              | No                      |  |  |
| Airflow rostrictions  | East               | No                      |  |  |
| Arriow restrictions   | South              | No                      |  |  |
|                       | West               | No                      |  |  |
| Sample manifold       | Туре               | All glass               |  |  |

|                | Inlet height above roof | 1 metre      |
|----------------|-------------------------|--------------|
| Matagralagical | Туре                    | Cup and vane |
| Sensors        | Height above ground     | 10 m         |
|                | Distance from station   | 0 m          |

Site Influences

# Localized Sources (within 20 metres of station)

| Туре | Distance (m) | Description |
|------|--------------|-------------|
| N/A  | N/A          | N/A         |

# Roadway Influences

| Туре          | Traffic Volume | Distance (m) | Description                               |
|---------------|----------------|--------------|---|
| Access road   | Low            | 5            | Gravel access road used by pickup trucks. |
| Canterra Main | High           | 1500         | Heavily trafficked gravel road frequented |
| Road          |                |              | by heavy equipment, tractor trailers, and |
|               |                |              | pickup trucks.                            |

### Major Point Sources

| Facility Name  | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|----------------|-------------|------------------------|----------------------------|-----------------------------------|
| Suncor Firebag | Oilsands    | 157,500                | 10                         | SE                                |
|                | Operation   |                        |                            |                                   |
| Husky Sunrise  | Oilsands    | 346,000                | 2                          | SW                                |
|                | Operation   |                        |                            |                                   |

# Analytical Equipment

| Parameter              | Owner | Make         | Model    | Serial Number   | Date<br>Installed |
|------------------------|-------|--------------|----------|-----------------|-------------------|
| Sulfur Dioxide         | WBEA  | Thermo       | 43i      | 1218153459      | N/A               |
| Hydrogen Sulfide       | WBEA  | Thermo       | 450i     | 1218153583      | N/A               |
| Oxides of Nitrogen     | WBEA  | Teledyne/API | T200     | 833             | N/A               |
| Total Hydrocarbons     | WBEA  | Thermo       | 51i      | 1218153352      | N/A               |
| Ozone                  | WBEA  | Teledyne/API | T400     | 3870            | December<br>2017  |
| Particulate Matter     | WBEA  | Teledyne/API | T640     | 326             | October 2019      |
| Temperature/RH         | WBEA  | Vaisala      | HMP155   | G0840090        | N/A               |
| Wind speed             | WBEA  | Met One      | 010C-1   | N14664          | May 2018          |
| Wind direction         | WBEA  | Met One      | 020C-1   | P19942          | May 2018          |
|                        |       |              |          |                 |                   |
| Dichot                 | WBEA  | Partisol     | 2000i-D  | 2000ID201251103 | N/A               |
| Partisol EC/OC         | WBEA  | Partisol     | 2000i    | 20001204511404  | N/A               |
| Precipitation<br>Gauge | ECCC  | OTT          | Pluvio 2 | 31209514        | N/A               |
| Precip Sampler         | WBEA  | N-CON        | 00-120-2 | 60198           | N/A               |
| PAH Sampler            | ECCC  | Tisch        | TE-5007  | 1618            | N/A               |

# Support Equipment

| Name                       | Description  | Make                | Model               | Serial Number    |
|----------------------------|--|---------------------|---------------------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000              | 2633             |
| Datalogger                 | Datalogger   | Campbell Scientific | CR310               | 6009             |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701H                | 359              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | W24A1-<br>A05XPXXXJ | 314M122956387-02 |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 10 x 20 trailer     | ITB12-15686      |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700                | 3252             |



Figure 2.0 – Area Topographic map showing AMS 17 – Wapasu Station



Figure 3.0 – Plan view sketch for AMS 17 – Wapasu Station



Figure 4.0 – Aerial photo showing AMS 17 – Wapasu Station

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East


Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Stony Mountain

LAST UPDATED: FEBRUARY 4, 2021

### WBEA Monitoring Network

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Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TVDE                         |                              |                 | NO/NO₂/         | 0  | DM                  | PM <sub>2.5</sub> TRS |                  | тис | Methane |   | <b>60</b> |     |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----------------------|------------------|-----|---------|---|-----------|-----|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> |                       | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH3 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х                     |                  | х   | х       | х | х         | х   |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |                       | х                | х   | х       |   |           |     |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |                       |                  |     |         |   |           |     |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |                       | х                | х   | х       |   |           |     |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |                       | х                | х   | х       |   |           |     |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х                     |                  | х   | х       |   |           | х   |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х                     |                  | х   | х       | х |           |     |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |                       |                  |     |         | х | х         |     |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х                     |                  | х   | х       |   |           |     |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |                       | х                | х   | х       |   |           |     |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х                     |                  | х   | х       |   |           |     |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х                     |                  | х   | х       |   |           |     |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |                       | Х                | Х   |         |   |           |     |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х                     |                  | х   | х       | х | х         |     |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |                       | Х                | Х   |         |   |           |     |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |                       | х                | х   |         |   |           |     |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х                     |                  | Х   | х       |   |           |     |
| 22   | COMMUNITY                    | JANVIER                      | Х               | Х               | Х  | х                   | Х                     |                  | х   | х       |   |           |     |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х                     |                  | Х   | х       |   |           |     |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |                       | х                |     |         |   |           |     |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |                       | Х                |     |         |   |           |     |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |                       | х                |     |         |   |           |     |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |                       | Х                | х   |         |   |           |     |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х                     |                  |     | х       |   |           |     |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |                       | х                | Х   |         |   |           |     |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |                       | х                | Х   |         |   |           |     |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х                     |                  |     |         |   |           |     |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |                       | Х                | Х   |         |   |           |     |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 18         |
|--------------------------|----------------|
| Station name             | Stony Mountain |
| Date station established | June 2015      |

### Location

| Station street address | NA             |
|------------------------|----------------|
| Legal land description | 1-33-076-08 W4 |
| Latitude               | 55.621408      |
| Longitude              | -111.172686    |
| UTM East               | 489125         |
| UTM North              | 6163958        |
| Nearest community      | Conklin        |
| Community population   | 185            |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | NA                                     |
| Holder           |  |
| Approval number  | NA                                     |
| Contact Name     | NA                                     |
| Address          | NA                                     |
| Phone number     | NA                                     |
| Email address    | NA                                     |

## Site Description

|                       | 0 – 90 degrees          | Trees             |  |  |
|-----------------------|-------------------------|-------------------|--|--|
| Land use by sector    | 91 – 180 degrees        | Trees             |  |  |
|                       | 181 – 270 degrees       | Trees             |  |  |
|                       | 271 – 360 degrees       | Fire tower, trees |  |  |
| Site elevation        | 673                     |                   |  |  |
| (above sea level)     |                         |                   |  |  |
| Angle of elevation to | Greatest angle          | 0                 |  |  |
| nearby buildings      | Building direction      | NA                |  |  |
|                       | North                   | None              |  |  |
| Airflow rostrictions  | East                    | None              |  |  |
| AIMOW restrictions    | South                   | None              |  |  |
|                       | West                    | None              |  |  |
| Comple manifold       | Туре                    | All glass         |  |  |
|                       | Inlet height above roof | 1 metre           |  |  |
|                       | Туре                    | Cup and vane      |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0 m  |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре                | Distance (m)        | Description                            |
|---------------------|---------------------|--|
| Fire watch tower    | 100 m Nw of station | Fire lookout tower, operated by ESRD.  |
| Communication tower | 30 m E of station   | Fire lookout tower, operated by ESRD.c |

## **Roadway Influences**

| Туре        | Traffic Volume | Distance (m) | Description    |
|-------------|----------------|--------------|----------------|
| Access road | low            | 10 m         | Dirt/sand road |

### **Major Point Sources**

| Facility Name | Source Type | Production<br>Capacity              | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-------------|-------------------------------------|----------------------------|-----------------------------------|
| Cenovus       | SAGD        | 376,000 barrels per<br>day (bbls/d) | 12.26 km                   | SE                                |
| CNRL          | SAGD        | 105,000 bbl/day                     | 15 km                      | SE                                |

# Analytical Equipment

| Parameter                  | Owner | Make                     | Model                 | Serial Number   | Date<br>Installed |
|----------------------------|-------|--------------------------|-----------------------|-----------------|-------------------|
| Sulfur Dioxide             | WBEA  | Thermo Instruments       | 43i                   | 1501301453      | 2015              |
| Total reduced<br>Sulphur   | WBEA  | Thermo Instruments       | 43i-TLE               | 1336160090      | 2015              |
| Oxides of Nitrogen         | WBEA  | Thermo Instruments       | 42i                   | 1336160088      | 2015              |
| Carbon Monoxide            | WBEA  | Teledyne API             | Т300                  | 3521            | 2019              |
| Non-Methane                | WBEA  | Thermo                   | 55i                   | 1180320038      | 2016              |
| Carbon Dioxide             | WBEA  | Teledyne API             | T360                  | 288             | 2019              |
| Temperature/RH             | WBEA  | Vaisala                  | HMP155                | G0840106        | 2016              |
| Wind speed                 | WBEA  | Met One                  | 010C-1                | U11125          | 2015              |
| Wind direction             | WBEA  | Met One                  | 020C-1                | R14654          | 2015              |
| Ozone                      | WBEA  | API                      | T400                  | 825             | 2016              |
| PM 2.5                     | WBEA  | Thermo Instruments       | SHARP 5030            | E-1107          | 2015              |
| PM 2.5                     | WBEA  | API                      | T640                  | 320             | 2020              |
| Precipitation              | WBEA  | OTT                      | Pluvio                | 363526          | 2016              |
| Leaf Wetness               | WBEA  | Decagon Devices          | LWS-L                 | E33-S03-00307   | 2016              |
| Global Radiation           | WBEA  | Pacwill<br>Environmental | 8-48 Solar Rad        | 38008           | 2015              |
| Black Carbon               | WBEA  | Magee                    | AE33                  |                 |                   |
| Dichot A                   | ECCC  | Thermo Instruments       | Partisol –<br>2000i-D | 200ID201181103  | 2016              |
| Dichot B                   | ECCC  | Thermo Instruments       | Partisol –<br>2000i-D | 200ID201341103  | 2016              |
| SASS                       | ECCC  | Met One Instruments      | SuperSASS             | R20401          | 2016              |
| Hi-VOL PUF                 | ECCC  | Tisch                    | TE-1000               | 1416242         | 2016              |
| Partisol EC/OC             | WBEA  | Thermo Instruments       | 2000i                 | 2000IW206911702 | 2016              |
| PM - Dichot                | WBEA  | Thermo                   | 2025i                 | 202DIW201651303 | 2016              |
| Precipitation<br>Collector | WBEA  | Yankee<br>Environmental  | TPC-3000              | 165             | 2016              |

# Support Equipment

| Name               | Description  | Make                | Model  | Serial Number |
|--------------------|--|---------------------|--------|---------------|
| Datalogger         | Datalogger   | Campbell Scientific | CR3000 | 66062         |
| Datalogger         | Logger   | Campbell Scientific | CR1000 | 66062         |
| Datalogger         | Logger   | Campbell Scientific | CR310  | 5017          |
| Zero air generator | Zero Air Generator   | Teledyne/API        | T701 H | 360           |
| HVAC               | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton  | NA            |

| Shelter / Building         | Air monitoring portable           | ITB                     | 8 x 16 trailer | ITB-14-16019 |
|----------------------------|-----------------------------------|-------------------------|----------------|--------------|
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution | Teledyne/API            | Т700Р          | 3811         |
| Themal oxidizer            | TRS converter                     | CD Nova                 | CDN- 101       | 522          |
| Nitrogen Generator         | Nitrogen generator                | Peak Scientific         | NG5000A        | 771057148    |
| Hydrogen<br>Generator      | H2 supply for 55i                 | Parker Hannifin<br>Corp | 14950646       | 16HMD0131    |



Figure 2.0 – Area Topographic map showing AMS 18



Figure 3.0 – Plan view sketch for AMS 18 site



Figure 4.0 – Aerial photo showing AMS 18

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station





Figure 6.2 – Photos of Instrument racks and sampling equipment



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Firebag

LAST UPDATED: FEBRUARY 4, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         | STATION NAME                 | s0. | NO/NO <sub>2</sub> / | 0. | PM.      | TRS  | H.S  | тнс | Methane | 0 | <u> </u> | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|----------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002      | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | Х                    | х  | Х        | х    |      | х   | х       | х | х        | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |          |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |          |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |          | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |          |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х        |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | х    |      | Х   | Х       |   |          |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | Х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |          |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | х       | х | х        |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |          |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |          |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |          |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | Х   | х       |   |          |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | х                    |    | Х        | Х    |      | х   | х       |   |          |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                      |    |          |      | х    |     |         |   |          |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |          |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |          |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | х                    |    | Х        |      | Х    | х   |         |   |          |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | Х   | Х                    |    | Х        | х    |      |     | х       |   |          |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | Х    | Х   |         |   |          |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |          |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |          |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |          |      |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 19     |
|--------------------------|------------|
| Station name             | Firebag    |
| Date station established | July, 2014 |

### Location

| Station street address | Firebag Camp    |
|------------------------|-----------------|
| Legal land description | 5-15-095-06 W4  |
| Latitude               | 57° 14′ 22.31″  |
| Longitude              | 110 °53′ 52.78″ |
| UTM East               | 506157          |
| UTM North              | 6344054         |
| Nearest community      | Fort Mackay     |
| Community population   | 742             |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |  |  |
|------------------|--|--|--|
| Name of Approval | Suncor                                 |  |  |
| Holder           |  |  |  |
| Approval number  | 80105-01-00                            |  |  |
| Contact Name     | AJ Janis                               |  |  |
| Address          | Suncor Energy, Fort McMurray           |  |  |
| Phone number     | 780-788-1865                           |  |  |
| Email address    | ajanis@suncor.com                      |  |  |

## Site Description

|                       | 0 – 90 degrees          | Oil sands development |  |  |
|-----------------------|-------------------------|-----------------------|--|--|
| Land use by sector    | 91 – 180 degrees        | Oil sands development |  |  |
| Land use by sector    | 181 – 270 degrees       | Oil sands development |  |  |
|                       | 271 – 360 degrees       | Oil sands development |  |  |
| Site elevation        | 587                     |                       |  |  |
| (above sea level)     |                         |                       |  |  |
| Angle of elevation to | Greatest angle          | 0                     |  |  |
| nearby buildings      | Building direction      | NA                    |  |  |
|                       | North                   | No                    |  |  |
| Airflow rostrictions  | East                    | No                    |  |  |
| Airnow restrictions   | South                   | No                    |  |  |
|                       | West                    | No                    |  |  |
| Comple manifold       | Туре                    | All glass             |  |  |
|                       | Inlet height above roof | 1 metre               |  |  |
|                       | Туре                    | Cup and vane          |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0 m  |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре           | Distance (m) | Description                             |
|----------------|--------------|---|
| Suncor Firebag | 0            | Oil sands development                   |
| Firebag Camp   | 20           | Camp housing, cafeteria, heating system |
|                |              |   |
|                |              |   |

## **Roadway Influences**

| Туре             | Traffic Volume | Distance (m) | Description  |
|------------------|----------------|--------------|--------------|
| Local Camp roads | Low            | 20           | Camp traffic |
|                  |                |              |              |
|                  |                |              |              |
|                  |                |              |              |

### **Major Point Sources**

| Facility Name  | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|----------------|-------------|------------------------|----------------------------|-----------------------------------|
| Suncor Firebag | Oilsands    | NA                     | 0                          | NA                                |
| Husky          | Oilsands    | NA                     | 10                         | WNW                               |
|                |             |                        |                            |                                   |
|                |             |                        |                            |                                   |

# Analytical Equipment

| Parameter          | Owner | Make    | Model  | Serial Number | Date<br>Installed |
|--------------------|-------|---------|--------|---------------|-------------------|
| Sulfur Dioxide     | WBEA  | Thermo  | 43i    | 1410661308    |                   |
| H2S                | WBEA  | Thermo  | 450i   | 0815129098    |                   |
| THC                | WBEA  | Thermo  | 51i    | 1336160089    |                   |
| Oxides of Nitrogen | WBEA  | Thermo  | 42i    | 1410661309    |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
| Temperature/RH     | WBEA  | Vaisala | HMP155 | K2870021      |                   |
| Wind speed         | WBEA  | Met One | 010C-1 | Y3176         |                   |
| Wind direction     | WBEA  | Met One | 020C-1 | U11347        |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number    |
|----------------------------|--|---------------------|----------------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 6466             |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | T701 H         | 688              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          | 330B143093513-01 |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | ITB 14 16269     |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 1607             |
| Hydrogen<br>Generator      | Hydrogen Generator   | AMA                 | HG 300         | 171067043        |



Figure 2.0 – Area Topographic map showing AMS 19 – Firebag



Figure 3.0 – Plan view sketch for AMS 19 – Firebag


Figure 4.0 – Aerial photo showing AMS 19 - Firebag

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 - Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 - Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Mackay River

LAST UPDATED: MARCH 8, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>X</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>X</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  |     | тис  | Methane |     | <b>60</b> | NH |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|------|---------|-----|-----------|----|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC | 0       | CO2 | NH3       |    |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х    | х       | х   | х         |    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х    |         |     |           |    |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |      |         |     |           |    |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х    |         |     |           |    |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х    |         |     |           |    |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | х    |         |     | х         |    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х    | х       |     |           |    |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |      | х       | х   |           |    |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х    |         |     |           |    |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х    |         |     |           |    |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х    |         |     |           |    |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х    |         |     |           |    |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |      |         |     |           |    |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х    | х       | х   |           |    |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |      |         |     |           |    |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |      |         |     |           |    |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х    |         |     |           |    |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х               | Х  | х                   | Х   |                  | х   | х    |         |     |           |    |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х    |         |     |           |    |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |      |         |     |           |    |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |      |         |     |           |    |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |      |         |     |           |    |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | Х   |      |         |     |           |    |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х    |         |     |           |    |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |      |         |     |           |    |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | х   |      |         |     |           |    |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |      |         |     |           |    |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |      |         |     |           |    |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 20           |
|--------------------------|------------------|
| Station name             | Mackay River     |
| Date station established | January 07, 2016 |

#### Location

| Station street address | NA              |
|------------------------|-----------------|
| Legal land description | 10-01-090-14 W4 |
| Latitude               | 56°46'45.49"N   |
| Longitude              | 112° 5'19.48"W  |
| UTM East               | 433447          |
| UTM North              | 6293395         |
| Nearest community      | Fort McMurray   |
| Community population   | 112000          |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | PetroChina Canada Ltd.                 |
| Holder           |  |
| Approval number  | 254465-00-00                           |
| Contact Name     | Matt Going                             |
| Address          | NA                                     |
| Phone number     | 780-446-0779                           |
| Email address    | environment@petrochinacanada.com       |

## Site Description

|                       | 0 – 90 degrees          | Forest and SAGD project |  |  |  |
|-----------------------|-------------------------|-------------------------|--|--|--|
| Land use by sector    | 91 – 180 degrees        | Forest and SAGD project |  |  |  |
| Land use by sector    | 181 – 270 degrees       | Forest                  |  |  |  |
|                       | 271 – 360 degrees       | Forest                  |  |  |  |
| Site elevation        | 498                     |                         |  |  |  |
| (above sea level)     |                         |                         |  |  |  |
| Angle of elevation to | Greatest angle          | 0 degree                |  |  |  |
| nearby buildings      | Building direction      | None                    |  |  |  |
|                       | North                   | None                    |  |  |  |
| Airflow rostrictions  | East                    | None                    |  |  |  |
| Airnow restrictions   | South                   | None                    |  |  |  |
|                       | West                    | Yes                     |  |  |  |
| Comple manifold       | Туре                    | All glass               |  |  |  |
|                       | Inlet height above roof | 1 meter                 |  |  |  |
|                       | Туре                    | Cup and vane            |  |  |  |

| Meteorological | Height above ground   | 10 m                                 |  |  |
|----------------|-----------------------|--------------------------------------|--|--|
| Sensors        | Distance from station | Attached to north end of the station |  |  |

Site Influences

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

| Туре | Distance (m) | Description |
|------|--------------|-------------|
|      |              |             |
|      |              |             |
|      |              |             |
|      |              |             |

## **Roadway Influences**

| Туре        | Traffic Volume | Distance (m) | Description |
|-------------|----------------|--------------|-------------|
| Gravel road | Low            | 30           | Access road |
|             |                |              |             |
|             |                |              |             |
|             |                |              |             |

### **Major Point Sources**

| Facility Name | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-------------|------------------------|----------------------------|-----------------------------------|
| Petrochina    | Oil and Gas | 35000 b/ day           | 5                          | North                             |
| Canada Ltd.   | industry    |                        |                            |                                   |
|               |             |                        |                            |                                   |
|               |             |                        |                            |                                   |
|               |             |                        |                            |                                   |
|               |             |                        |                            |                                   |

# Analytical Equipment

| Parameter              | Owner | Make              | Model    | Serial<br>Number | Date Installed     |
|------------------------|-------|-------------------|----------|------------------|--------------------|
| Sulfur Dioxide         | WBEA  | Thermo Scientific | 43i      | 1501301450       | January 07, 2016   |
| Hydrogen Sulfide       | WBEA  | Teledyne/API      | T101     | 196              | January 07, 2016   |
| Oxides of Nitrogen     | WBEA  | Thermo Scientific | 42i      | 1505164379       | January 07, 2016   |
| Total Hydrocarbons     | WBEA  | Thermo Scientific | 51i      | 1501663727       | January 07, 2016   |
| Temperature/RH         | WBEA  | Vaisala           | HMP155   | F5010002         | September 26, 2018 |
| Wind speed             | WBEA  | Met One           | 010C-1   | P22395           | January 07, 2016   |
| Wind direction         | WBEA  | Met One           | 020C-1   | N9937            | January 07, 2016   |
| Precipitation<br>Gauge | ECCC  | OTT               | Pluvio 2 | 363524           | 2020               |

## Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 9627          |
| Datalogger                 | Datalogger   | Campbell Scientific | CR310          | 6239          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 4766          |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          | NA            |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | ITB-15-16552  |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 1220          |
| Hydrogen<br>generator      | H2 for THC analyzer  | AMA                 | HG 300         | 171067042     |



Figure 2.0 – Area Topographic map showing AMS 20



Figure 3.0 – Plan view sketch for AMS 20 site



Figure 4.0 – Aerial photo showing AMS 20

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 - Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 - Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Wood Buffalo Environmental Association Wind Rose 2016 - 2020 Wind Speed (WS) - km/h Mackay River



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Conklin

LAST UPDATED: FEBRUARY 5, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPF                         | <b>STATION NAME</b>          | 50. | NO/NO <sub>2</sub> / | 0. | PM       | TRS  | H.S  | тнс | Methane | 0 | <b>CO</b> 2 | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|-------------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002         | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | х                    | х  | х        | х    |      | х   | х       | х | х           | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |             |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |             |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |             |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |             |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |             | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |             |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х           |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | Х    |      | Х   | х       |   |             |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х   |                      |    |          |      | х    | х   | х       |   |             |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                    | х  | х        | х    |      | х   | х       |   |             |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | x       |   |             |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |             |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | x       | х | х           |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |             |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |             |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |             |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | х   | х       |   |             |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | Х                    |    | Х        | Х    |      | Х   | х       |   |             |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х   |                      |    |          |      | х    |     |         |   |             |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |             |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |             |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | Х                    |    | Х        |      | Х    | Х   |         |   |             |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х   | х                    |    | х        | х    |      |     | х       |   |             |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | х    | Х   |         |   |             |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |             |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |             |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |             |      |

Table 1.0 - Pollutant Parameters monitored in the WBEA network.

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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



Figure 1.0 – WBEA Network Monitoring SitesGeneral Site Information

Station

| Station ID               | AMS 21         |
|--------------------------|----------------|
| Station name             | Conklin        |
| Date station established | April 01, 2016 |

#### Location

| Station street address | Father Mercredis Trail |
|------------------------|------------------------|
| Legal land description | 15-31-076-07 W4        |
| Latitude               | 55°37'56.39"N          |
| Longitude              | 111° 4'43.84"W         |
| UTM East               | 495034                 |
| UTM North              | 6165163                |
| Nearest community      | Conklin                |
| Community population   | 190                    |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association         |
|------------------|--|
| Name of Approval | NA   |
| Holder           |  |
| Approval number  | NA   |
| Contact Name     | Wood Buffalo Environmental Association         |
| Address          | Unit 3 – 805 Memorial Drive, Fort McMurray, AB |
| Phone number     | 780-799-4420                                   |
| Email address    | info@wbea.org                                  |

## Site Description

|                       | 0 – 90 degrees          | Forest and Residential              |  |  |
|-----------------------|-------------------------|-------------------------------------|--|--|
| Land use by costor    | 91 – 180 degrees        | Forest and Residential              |  |  |
| Land use by sector    | 181 – 270 degrees       | Forest and Residential              |  |  |
|                       | 271 – 360 degrees       | Forest and Residential              |  |  |
| Site elevation        | 562                     |                                     |  |  |
| (above sea level)     |                         |                                     |  |  |
| Angle of elevation to | Greatest angle          | 0 degree                            |  |  |
| nearby buildings      | Building direction      | South – CRDAC office                |  |  |
|                       | North                   | Trees                               |  |  |
| Airflow rostrictions  | East                    | None                                |  |  |
| AITIOW restrictions   | South                   | None                                |  |  |
|                       | West                    | Conklin Rec center, about 2 km west |  |  |
| Comple manifold       | Туре                    | All glass                           |  |  |
| Sample manifold       | Inlet height above roof | 1 meter                             |  |  |
| Meteorological        | Туре                    | Cup and vane                        |  |  |
| Sensors               | Height above ground     | 10 m                                |  |  |

| Distance from station | Attached to north site of the station |
|-----------------------|---------------------------------------|
|-----------------------|---------------------------------------|

## Site Influences

## Localized Sources (within 20 metres of station)

| Туре           | Distance (m) | Description  |
|----------------|--------------|--|
| Wetlands       | 20           | Peat bog / Marshes – Variety of reeds and grasses. |
| Admin building | 20           | Conklin Resource Development Advisory              |
|                |              | Committee Office                                   |
|                |              |  |
|                |              |  |

## **Roadway Influences**

| Туре   | Traffic Volume | Distance (m) | Description                          |
|--------|----------------|--------------|--------------------------------------|
| Gravel | Medium         | 50           | Father Mercredis Trail – Access Road |
| Paved  | Medium         | 200          | Northland Drive                      |
|        |                |              |                                      |
|        |                |              |                                      |

## Major Point Sources

| Facility Name  | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|----------------|-------------|------------------------|----------------------------|-----------------------------------|
| Meg Energy     | Oil and Gas | 210,000 bpd            | 25                         | NE                                |
| Cenovus Energy | Oil and Gas | 50, 000 bpd            | 14                         | SE                                |
|                |             |                        |                            |                                   |
|                |             |                        |                            |                                   |
|                |             |                        |                            |                                   |

# Analytical Equipment

| Parameter                  | Owner | Make                | Model        | Serial<br>Number     | Date<br>Installed |
|----------------------------|-------|---------------------|--------------|----------------------|-------------------|
| Sulfur Dioxide             | WBEA  | Thermo Scientific   | 43i          | 1428701363           | March 20, 2016    |
| Total Reduce Sulfur        | WBEA  | Thermo Scientific   | 43i-TLE      | 1236656116           | June 16, 2016     |
| TRS converter              | WBEA  | CD Nova             | CDN-101      | NA                   | March 20, 2016    |
| Ozone                      | WBEA  | Thermo Scientific   | 49i          | 1501663734           | March 20, 2016    |
| Oxides of Nitrogen         | WBEA  | Thermo Scientific   | 42i          | 1501663731           | March 20, 2016    |
| Non-Methane<br>Hydrocarbon | WBEA  | Thermo Scientific   | 55i          | 1152430011           | March 20, 2016    |
| Particulate matter 2.5     | WBEA  | ΑΡΙ                 | T640         | 871                  | March 20, 2016    |
| Temperature/RH             | WBEA  | Vaisala             | HMP155       | K2870011 2014        | March 20, 2016    |
| Wind speed                 | WBEA  | Met One             | 010C-1       | Y18363               | 2020              |
| Wind direction             | WBEA  | Met One             | 020C-1       | P22886               | March 20, 2016    |
| Particulate Sampler        | WBEA  | Thermo              | 2000i        | 2000IW2 0881<br>2002 | 2020              |
| Particulate Sampler        | WBEA  | Thermo              | 2000i        | 2000IW2 0884<br>2002 | 2020              |
| Particulate Sampler        | WBEA  | Thermo              | 2000i        | 2000IW2 0882<br>2002 | 2020              |
| Particulate Sampler        | WBEA  | Thermo              | 2000i        | 2000IW2 0883<br>2002 | 2020              |
| VOC Sampler                | WBEA  | TISCH               | TE-123       | 1019                 | 2020              |
| PUF Sampler                | WBEA  | Tisch Environmental | TE-PUFPLUSBL | 1001100              | 2020              |
|                            |       |                     |              |                      |                   |
|                            |       |                     |              |                      |                   |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 9628          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 263           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          | NA            |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | ITB-14-16423  |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 2658          |
| Hydrogen<br>generator      | Hydrogen generator for<br>THC analyzer                     | AMA                 | HG 300         | 16HMD0141     |
| Nitrogen Generator         | N2 Supply for NMHC   | Peak Scientific     | NG5000A        | 771056247     |



Figure 2.0 – Area Topographic map showing AMS 21

| W B E A |   | Station Name:                                  | AMS 21 -  | Connklin  |
|---------|---|--|---|---|
|         |   |  |   |   |
|         | 4 | Obstacle                                       | Distance from   | Height of the                                       |
|         | 4 | Obstacle<br>1 Trees                            | Distance from<br>the station (m)                          | Height of the<br>Obstacle (m)                       |
|         | 4 | Obstacle<br>1 Trees<br>2 Trees                 | Distance from<br>the station (m)<br>30<br>40              | Height of the<br>Obstacle (m)<br>5<br>13            |
| N       | 4 | Obstacle<br>1 Trees<br>2 Trees<br>3 Treeline   | Distance from<br>the station (m)<br>30<br>40<br>100       | Height of the<br>Obstacle (m)<br>5<br>13<br>13      |
| N E     | 4 | Obstacle 1 Trees 2 Trees 3 Treeline 4 Building | Distance from<br>the station (m)<br>30<br>40<br>100<br>60 | Height of the<br>Obstacle (m)<br>5<br>13<br>13<br>4 |

Figure 3.0 – Plan view sketch for AMS 21 site



Figure 4.0 – Aerial photo showing AMS 21
## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 - Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Janvier

LAST UPDATED: FEBRUARY 5, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>X</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>X</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | 0  | DM                  | трс |                  | тис | Methane |   | <b>60</b> |     |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH3 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х   |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |     |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |     |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |     |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |     |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | x       |   |           | х   |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |     |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |     |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |     |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |     |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |     |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |     |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |     |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |     |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |     |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |     |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |     |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х               | Х  | х                   | Х   |                  | х   | х       |   |           |     |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |     |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |     |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |     |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |     |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |     |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |     |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |     |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |           |     |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |     |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |     |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | voc | Metals and<br>Ions      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 22       |
|--------------------------|--------------|
| Station name             | Janvier      |
| Date station established | October 2016 |

#### Location

| Station street address | Block 4; Lot 135 - Adjacent to Nokohoo Road between Teed Ave |
|------------------------|--|
|                        | and Lapouse Ave.   |
| Legal land description | 6-05-80-05-W4  |
| Latitude               | 55.903242  |
| Longitude              | -110.749744  |
| UTM East               | 515647   |
| UTM North              | 6195323  |
| Nearest community      | Janvier  |
| Community population   | 104  |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | NA                                     |
| Holder           |  |
| Approval number  | NA                                     |
| Contact Name     | NA                                     |
| Address          | NA                                     |
| Phone number     | NA                                     |
| Email address    | NA                                     |

#### Site Description

|                       | 0 – 90 degrees          | Trees                                |  |  |
|-----------------------|-------------------------|--------------------------------------|--|--|
|                       | 91 – 180 degrees        | Main road                            |  |  |
| Land use by sector    | 181 – 270 degrees       | Main road                            |  |  |
|                       | 271 – 360 degrees       | Trees and House                      |  |  |
| Site elevation        | 471                     |                                      |  |  |
| (above sea level)     |                         |                                      |  |  |
| Angle of elevation to | Greatest angle          | 10°                                  |  |  |
| nearby buildings      | Building direction      | SE                                   |  |  |
|                       | North                   | None                                 |  |  |
| Airflow rostrictions  | East                    | None                                 |  |  |
| AITIOW restrictions   | South                   | None                                 |  |  |
|                       | West                    | Trees (45 m from station, 17 m high) |  |  |
| Sample manifold       | Туре                    | All glass                            |  |  |
|                       | Inlet height above roof | 1 metre                              |  |  |

| Mataaralagigal | Туре                  | Cup and vane |  |
|----------------|-----------------------|--------------|--|
| Sensors        | Height above ground   | 10 m         |  |
| Sensors        | Distance from station | 0            |  |

Site Influences

## Localized Sources (within 20 metres of station)

| Type Distance (m) |           | Description  |  |  |  |
|-------------------|-----------|--------------|--|--|--|
| Vehicles          | 25 m East | Main road    |  |  |  |
| Residence         | 20 m West | Housing area |  |  |  |

## Roadway Influences

| Туре             | Traffic Volume | Distance (m) | Description |
|------------------|----------------|--------------|-------------|
| Main access road | low            | 25 m         | Paved       |

## Major Point Sources

| Facility Name  | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|----------------|-------------|------------------------|----------------------------|-----------------------------------|
| ConocoPhillips | SAGD        | 140 MBOED              | 33.38                      | NW                                |
| Tervita        | Landfill    | Unknown                | 11 kms                     | NW                                |

## Analytical Equipment

| Parameter                     | Owner | Make               | Model        | Serial Number    | Date<br>Installed |
|-------------------------------|-------|--------------------|--------------|------------------|-------------------|
| Sulfur Dioxide                | WBEA  | Thermo Instruments | 43i          | 1152430006       | 2016              |
| Total reduced<br>Sulphur      | WBEA  | Thermo Instruments | 43iTLE       | 1152430006       | 2018              |
| Oxides of Nitrogen            | WBEA  | Teledyne/API       | T200         | 722              | 2017              |
| Non-methane                   | WBEA  | Thermo             | 55i          | 1172750023       | 2018              |
| Temperature/RH                | WBEA  | Vaisala            | HMP155       | G4330042         | 2018-12-27        |
| Wind speed                    | WBEA  | Met One            | 010C-1       | U11126           | 2016              |
| Wind direction                | WBEA  | Met One            | 020C-1       | U11346           | 2016              |
| Ozone                         | AEP   | Thermo Instruments | 49i          | 1227254861       | 2016              |
| Volatile organic<br>compounds | WBEA  | Tisch              | TE-123       | 1019             | 2018              |
| PM 2.5                        | WBEA  | Teledyne/ API      | T640         | 325              | 2018              |
| Particulate Sampler           | WBEA  | Thermo Instruments | 2000i        | 200012 0388 1308 | 2019              |
| Particulate Sampler           | WBEA  | Thermo Instruments | 2000i        | 200012 04891408  | 2019              |
| PAH Sampler                   | WBEA  | Tisch              | TE-PUFPLUSBL | 1001099          | 2019              |
|                               |       |                    |              |                  |                   |
|                               |       |                    |              |                  |                   |

## Support Equipment

| Name                       | Description  | Make                | Model    | Serial Number    |
|----------------------------|--|---------------------|----------|------------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000   | 2586             |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701      | 138              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton    | 314P143189505-02 |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 10x20    | ITB-15-16494     |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700     | 2657             |
| Hydrogen<br>Generator      | H2 supply for NMHC   | Parker Hannifin     | 14950646 | 16HMD0142        |
| TRS converter              | Thermal oxidizer   | CD Nova             | CDN-101  | 565              |



Figure 2.0 – Area Topographic map showing AMS 22



Figure 3.0 – Plan view sketch for AMS 22 site



Figure 4.0 – Aerial photo showing AMS 22

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Fort Hills

LAST UPDATED: FEBRUARY 5, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

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Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>X</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>X</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

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| WBEA | TYPE                         | STATION NAME                 | s0. | NO/NO <sub>2</sub> / | 0. | PM.      | TRS  | H.S  | тнс | Methane | 0 | <u> </u> | NH.  |
|------|------------------------------|------------------------------|-----|----------------------|----|----------|------|------|-----|---------|---|----------|------|
| ID   |                              | STATION NAME                 | 302 | NO <sub>x</sub>      | 03 | F 1412.5 | 11.5 | 1125 | inc | NMHC    |   | 002      | 1113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | Х                    | х  | Х        | х    |      | х   | х       | х | х        | х    |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |    |          |      |      |     |         |   |          |      |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х  | х        |      | х    | х   | х       |   |          |      |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х  | х        | х    |      | х   | х       |   |          | х    |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х  | х        | х    |      | х   | х       | х |          |      |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х  | х        |      |      |     |         | х | х        |      |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                    |    | Х        | х    |      | Х   | Х       |   |          |      |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х   |                      |    |          |      | х    | х   | х       |   |          |      |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | Х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х  | х        | х    |      | х   | х       |   |          |      |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | Х                    | Х  | Х        |      | Х    | Х   |         |   |          |      |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х  | х        | х    |      | х   | х       | х | х        |      |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | х                    |    |          |      | Х    | х   |         |   |          |      |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |    |          |      | х    | х   |         |   |          |      |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х  | Х        | Х    |      | Х   | х       |   |          |      |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х  | х        | Х    |      | Х   | х       |   |          |      |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | х                    |    | Х        | Х    |      | х   | х       |   |          |      |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                      |    |          |      | х    |     |         |   |          |      |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |    |          |      | Х    |     |         |   |          |      |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |    |          |      | х    |     |         |   |          |      |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | х                    |    | Х        |      | Х    | х   |         |   |          |      |
| 30   | COMPLIANCE                   | ELLS RIVER                   | Х   | Х                    |    | Х        | х    |      |     | х       |   |          |      |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |    |          |      | Х    | Х   |         |   |          |      |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х   | Х                    |    |          |      | х    | х   |         |   |          |      |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |    |          | Х    |      |     |         |   |          |      |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |    |          |      | Х    | Х   |         |   |          |      |

Table 1.0 - Pollutant parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 23     |
|--------------------------|------------|
| Station name             | Fort Hills |
| Date station established | March 2017 |

#### Location

| Station street address | Located North of the Southwest Raw Water Pond. |
|------------------------|--|
| Legal land description | 15-24-096-11 W4                                |
| Latitude               | 57°20′56.04″ North                             |
| Longitude              | 111°38'22.89" West                             |
| UTM East               | 461505   |
| UTM North              | 6356406  |
| Nearest community      | Fort Mackay                                    |
| Community population   | 742 (2016)                                     |

#### Owner/Operator/Approval Holder

| Operating Agency | Agency Wood Buffalo Environmental Association |  |  |
|------------------|---|--|--|
| Name of Approval | Fort Hills Energy Corneration                 |  |  |
| Holder           | Fort Hills Energy Corporation                 |  |  |
| Approval number  | 151469-01-00                                  |  |  |
| Contact Name     | Sheri LePoudre                                |  |  |
| Address          | P.O. Box 4001 Fort McMurray, Alberta, T9H 3E3 |  |  |
| Phone number     | 403-296-8271                                  |  |  |
| Email address    | slepoudre@suncor.com                          |  |  |

#### Site Description

|                       | 0 – 90 degrees          | Water treatment building            |  |  |  |
|-----------------------|-------------------------|-------------------------------------|--|--|--|
| Land use by costor    | 91 – 180 degrees        | Raw Water Pond                      |  |  |  |
| Land use by sector    | 181 – 270 degrees       | Raw Water Pond                      |  |  |  |
|                       | 271 – 360 degrees       | Access road, drilling lay down yard |  |  |  |
| Site elevation        | 283 m                   | 292 m                               |  |  |  |
| (above sea level)     |                         |                                     |  |  |  |
| Angle of elevation to | Greatest angle          | 20°                                 |  |  |  |
| nearby buildings      | Building direction      | West                                |  |  |  |
|                       | North                   | No                                  |  |  |  |
| Airflow rostrictions  | East                    | No                                  |  |  |  |
| AITIOW restrictions   | South                   | No                                  |  |  |  |
|                       | West                    | No                                  |  |  |  |
| Sample manifold       | Туре                    | All glass                           |  |  |  |
|                       | Inlet height above roof | 1 metre                             |  |  |  |
|                       | Туре                    | Cup and vane                        |  |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0 m  |

Site Influences

Localized Sources (within 20 metres of station)

| Туре           | Distance (m) | Description                        |
|----------------|--------------|------------------------------------|
| Raw water pond | 20 m         | Storage pond for raw process water |

**Roadway Influences** 

| Туре        | Traffic Volume | Distance (m) | Description  |
|-------------|----------------|--------------|--|
| Gravel Road | Low            | 100          | Mine access road used by pickup trucks<br>and heavy equipment. |

Major Point Sources

| Facility Name | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-----------------|------------------------|----------------------------|-----------------------------------|
| Fort Hills    | Oil Sands Plant | 194,000                | 0                          | N/A                               |
| CNRL Horizon  | Oil Sands Plant | 100,000                | 10                         | South West                        |
| CNRL Albian   | Oil Sands Plant | 340,000                | 15                         | South                             |

## Analytical Equipment

| Parameter                 | Owner                | Make    | Model   | Serial Number | Date<br>Installed |
|---------------------------|----------------------|---------|---------|---------------|-------------------|
| Sulfur Dioxide            | Fort Hills<br>Energy | Thermo  | 43i     | 1160290012    | March 2017        |
| Total Reduced<br>Sulfides | Fort Hills<br>Energy | Thermo  | 43i-TLE | 1150840012    | March 2017        |
| Oxides of Nitrogen        | Fort Hills<br>Energy | Thermo  | 42i     | 1152430007    | March 2017        |
| Total<br>Hydrocarbons     | Fort Hills<br>Energy | Thermo  | 55i     | 1193585648    | 2020              |
| Particulate Matter        | Fort Hills<br>Energy | ΑΡΙ     | T640    | 875           | 2020              |
| Temperature/RH            | Fort Hills<br>Energy | Vaisala | HMP155  | G0840086      | March 2017        |
| Wind speed                | Fort Hills<br>Energy | Met One | 010C-1  | Y18361        | March 2017        |
| Wind direction            | Fort Hills<br>Energy | Met One | 020C-1  | Y17469        | March 2017        |

## Support Equipment

| Name  | Description                       | Make                   | Model          | Serial Number     |
|---|-----------------------------------|------------------------|----------------|-------------------|
| Data Logger   | Data Logger                       | Campbell<br>Scientific | CR3000         | 7882              |
| Gas Dilution<br>Calibrator                                      | Mass flow controlled gas dilution | Teledyne/API           | T700           | 451               |
| Hydrogen Generator  | Hydrogen Generator                | Parker Balston         | H2PD-150NA     | F2SL7LQ1          |
| Zero Air Generator  | Zero Air Generator                | Teledyne API           | T701           | 4522              |
| TRS Converter   | Thermal Oxidizer                  | CD Nova                | CDN-101        | 517               |
| Heating and air<br>HVAC conditioning system.<br>Wall mount unit |                                   | BARD                   | 1 ton          | 330K102733451-01  |
| Shelter/Building  | Air monitoring portable           | ITB                    | 8 x 14 trailer | 2C9UAB2G9B1044004 |





Figure 3.0 – Plan view sketch for AMS 23 – Fort Hills



Figure 4.0 – Aerial photo showing AMS 23 – Fort Hills

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environment looking north


Figure 5.1 – Environment looking east



Figure 5.2 – Environment looking south



Figure 5.3 – Environment looking west



Figure 5.4 – Meteorological tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of AMS 23 – Fort Hills



Figure 6.2 – Photos of the front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Waskōw ohci Pimâtisiwin

LAST UPDATED: FEBRUARY 5, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  | тис | Methane |   | <b>60</b> |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    |   | CO2       | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | Х               | Х  | х                   | Х   |                  | х   | х       |   |           |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |           |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |                 |

Table 1.0 - Pollutant parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological parameters monitored in the WBEA network

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | Х          | Х                      | х   | х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | x                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 25                  |
|--------------------------|-------------------------|
| Station name             | Waskōw ohci Pimâtisiwin |
| Date station established | July 2017               |

### Location

| Station street address | Environment and Climate Change Canada Oski Otin compound |
|------------------------|--|
| Legal land description | 5-25-94-11 W4  |
| Latitude               | 57°11′1.21″ N  |
| Longitude              | 111°38′21.94″ W  |
| UTM East               | 461344   |
| UTM North              | 6338008  |
| Nearest community      | Fort Mackay  |
| Community population   | 742 (2016)   |

### Owner/Operator/Approval Holder

| Operating Agency        | Wood Buffalo Environmental Association                 |
|-------------------------|--|
| Name of Approval Holder | N/A  |
| Approval number         | N/A  |
| Contact Name            | WBEA   |
| Address                 | Unit 3 – 805 Memorial Drive, Fort McMurray, AB T9K 0K4 |
| Phone number            | 780-799-4420   |
| Email address           | info@wbea.org  |

# Site Description

|                       | 0 – 90 degrees          | Wooded area                       |  |  |  |
|-----------------------|-------------------------|-----------------------------------|--|--|--|
|                       | 91 – 180 degrees        | Wooded area                       |  |  |  |
| Land use by sector    | 181 – 270 degrees       | Oski-otin compound                |  |  |  |
|                       | 271 260 dogroop         | Oski-otin compound, gravel access |  |  |  |
|                       | 271 – 360 degrees       | road                              |  |  |  |
| Site elevation        | 266 m                   |                                   |  |  |  |
| (above sea level)     | 200 111                 |                                   |  |  |  |
| Angle of elevation to | Greatest angle          | N/A                               |  |  |  |
| nearby buildings      | Building direction      | N/A                               |  |  |  |
|                       | North                   | No                                |  |  |  |
|                       | East                    | No                                |  |  |  |
| Airnow restrictions   | South                   | No                                |  |  |  |
|                       | West                    | No                                |  |  |  |
| Common montifold      | Туре                    | All glass                         |  |  |  |
| Sample manifold       | Inlet height above roof | 1 metre                           |  |  |  |
|                       | Туре                    | Cup and vane                      |  |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0 m  |

Site Influences

Localized Sources (within 20 metres of station)

| Туре    | Distance (m) | Description            |  |  |  |
|---------|--------------|------------------------|--|--|--|
| Trailer | 5            | Air monitoring trailer |  |  |  |

### **Roadway Influences**

| Туре         | Traffic Volume | Distance (m) | Description                               |
|--------------|----------------|--------------|---|
| Main roadway | Low            | 30           | Main roadway used by residential vehicles |

### **Major Point Sources**

| Facility Name | Source Type     | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-----------------|------------------------|----------------------------|-----------------------------------|
| CNRL Albian   | Oil Sands Plant | 340,000                | 10                         | Northeast                         |
| Syncrude      | Oil Sands Plant | 350,000                | 15                         | South                             |
| CNRL Horizon  | Oil Sands Plant | 100,000                | 20                         | Northwest                         |

# Analytical Equipment

| Parameter                | Owner | Make         | Model   | Serial<br>Number | Date<br>Installed |
|--------------------------|-------|--------------|---------|------------------|-------------------|
| Sulfur Dioxide           | WBEA  | Thermo       | 43i     | 1160290014       | September<br>2017 |
| Hydrogen Sulfide         | WBEA  | Thermo       | 43i-TLE | 1170050146       | May 2019          |
| Total Reduced<br>Sulphur | WBEA  | Thermo       | 43iQ    | 1200025752       | 2020              |
| Total Sulfur             | WBEA  | Teledyne API | T108    | 552              | January 2021      |
| Temperature/RH           | WBEA  | Vaisala      | HMP155  | K2510022         | July 2017         |
| Wind speed               | WBEA  | Met One      | 010C-1  | Y18364           | 2019              |
| Wind direction           | WBEA  | Met One      | 020C-1  | U11345           | July 2017         |

# Support Equipment

| Name                       | Description  | Make                | Model               | Serial Number    |
|----------------------------|--|---------------------|---------------------|------------------|
| Data Logger                | Data Logger  | Campbell Scientific | CR3000              | 2632             |
| Data Logger                | Data Logger  | Campbell Scientific | CR1000              | 62004            |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution calibrator               | Teledyne API        | T700                | 747              |
| Zero Air Generator         | Zero Air Generator   | TeledyneAPI         | 701                 | 261              |
| H2S Converter              | Thermal Oxidizer   | Thermo              | 340-C               | 328702539        |
| TRS converter              | Thermal Oxidizer   | Thermo              | CDN-101             | 461              |
| Total Sulphur<br>Converter | Thermal Oxidizer   | Teledyne API        | T501TS              | 685              |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | W24A2-<br>A05WPXXXJ | 314D153220503-02 |
| Shelter / Building         | Air monitoring<br>portable                                 | ITB                 | 10 x 20 trailer     | ITB-15-16517     |



Figure 2.0 – Area topographic map showing AMS 25 – Waskow ohci Pimâtisiwin



Figure 3.0 - Plan view sketch for AMS 25 - Waskow ohci Pimâtisiwin



Figure 4.0 – Aerial photo showing AMS 25 – Waskōw ohci Pimâtisiwin

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 - Environment looking north



Figure 5.1 – Environment looking east



Figure 5.2 – Environment looking south



Figure 5.3 – Environment looking west



Figure 5.4 – Meteorological tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of AMS 25 – Waskōw ohci Pimâtisiwin



Figure 6.2 – Photos of front of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Christina Lake

LAST UPDATED: FEBRUARY 5, 2021

### WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA<br>ID | туре                         | STATION NAME                 | SO2 | NO/NO <sub>2</sub> /<br>NO <sub>X</sub> | <b>O</b> <sub>3</sub> | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO2 | NH <sub>3</sub> |
|------------|------------------------------|------------------------------|-----|---|-----------------------|-------------------|-----|-----|-----|-----------------|----|-----|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  | х   | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | х   |   |                       |                   |     | х   | Х   | х               |    |     |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |   |                       |                   |     |     |     |                 |    |     |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                                       | х                     | х                 |     | х   | х   | x               |    |     |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                                       | х                     | х                 | х   |     | х   | x               |    |     | х               |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  |     |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                                       | х                     | х                 |     |     |     |                 | х  | x   |                 |
| 9          | ATTRIBUTION                  | BARGE LANDING                | х   | х                                       |                       | х                 | х   |     | х   | х               |    |     |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х   |   |                       |                   |     | х   | х   | х               |    |     |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                                       | х                     | х                 | х   |     | х   | x               |    |     |                 |
| 17         | COMPLIANCE                   | WAPASU                       | Х   | х                                       | х                     | х                 |     | х   | Х   |                 |    |     |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                                       | х                     | х                 | х   |     | х   | x               | х  | х   |                 |
| 19         | COMPLIANCE                   | FIREBAG                      | Х   | х                                       |                       |                   |     | Х   | Х   |                 |    |     |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х   | х                                       | х                     | х                 | Х   |     | х   | х               |    |     |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х   | х                                       | х                     | х                 | Х   |     | х   | х               |    |     |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х   | х                                       |                       | х                 | х   |     | Х   | х               |    |     |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х   |   |                       |                   |     | х   |     |                 |    |     |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | х   | х                                       |                       |                   |     | х   |     |                 |    |     |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                                       |                       |                   |     | х   |     |                 |    |     |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | х   | х                                       |                       | х                 |     | х   | Х   |                 |    |     |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | х   | Х                                       |                       | Х                 | х   |     |     | Х               |    |     |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х   | х                                       |                       |                   |     | х   | Х   |                 |    |     |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х   | Х                                       |                       |                   |     | Х   | Х   |                 |    |     |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х   | х                                       |                       |                   | Х   |     |     |                 |    |     |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                                       |                       |                   |     | Х   | Х   |                 |    |     |                 |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | x             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | Х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | х           | х  |    | х             | х                 |                           | х                  | Х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | Х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 26         |
|--------------------------|----------------|
| Station name             | Christina Lake |
| Date station established | May 30, 2018   |

### Location

| Station street address | Located close to a non-operational well-pad 3-16 at Cenovus |
|------------------------|---|
|                        | SAGD site   |
| Legal land description | 3-16-76-6 W4  |
| Latitude               | 55.579149   |
| Longitude              | -110.876018   |
| UTM East               | 507816.30   |
| UTM North              | 6159248.60  |
| Nearest community      | Conklin   |
| Community population   | 185   |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association   |
|------------------|--|
| Name of Approval | Cenovus Energy Inc.                      |
| Holder           |  |
| Approval number  | 48522-01-00                              |
| Contact Name     | Rene Morales                             |
| Address          | 500 Centre Street SE Calgary, AB T2P 0M5 |
| Phone number     | (403) 874-0107                           |
| Email address    | Rene.morales@cenovus.com                 |

### Site Description

|                       | 0 – 90 degrees          | SAGD Operations |  |
|-----------------------|-------------------------|-----------------|--|
|                       | 91 – 180 degrees        | SAGD Operations |  |
| Land use by sector    | 181 – 270 degrees       | SAGD Operations |  |
|                       | 271 – 360 degrees       | SAGD Operations |  |
| Site elevation        | 576m                    |                 |  |
| (above sea level)     |                         |                 |  |
| Angle of elevation to | Greatest angle          | N/A             |  |
| nearby building       | Building direction      | N/A             |  |
|                       | North                   | No              |  |
| Airflow rostrictions  | East                    | No              |  |
| AITIOW restrictions   | South                   | No              |  |
|                       | West                    | No              |  |
| Sample manifold       | Туре                    | All glass       |  |
|                       | Inlet height above roof | 1 meter         |  |

| Motoorological | Туре                  | Cup and vane |
|----------------|-----------------------|--------------|
| Sensors        | Height above ground   | 10           |
| Sensors        | Distance from station | 7            |

Site Influences

# Localized Sources (within 20 metres of station)

| Туре     | Distance (m) | Description                       |
|----------|--------------|-----------------------------------|
| Well-pad | 100          | Non-operational well pad. Capped. |
|          |              |                                   |
|          |              |                                   |
|          |              |                                   |

### Roadway Influences

| Туре        | Traffic Volume | Distance (m) | Description          |
|-------------|----------------|--------------|----------------------|
| Dirt/gravel | Medium         | 20           | Used by site workers |
|             |                |              |                      |
|             |                |              |                      |
|             |                |              |                      |

# Major Point Sources

| Facility Name             | Source Type   | Production<br>Capacity | Distance from<br>site (m) | Compass<br>direction from<br>site |
|---------------------------|---------------|------------------------|---------------------------|-----------------------------------|
| Cenovus Christina<br>Lake | SAGD Facility |                        | 300                       | Ν                                 |
|                           |               |                        |                           |                                   |
|                           |               |                        |                           |                                   |
|                           |               |                        |                           |                                   |
|                           |               |                        |                           |                                   |

# Analytical Equipment

| Parameter          | Owner   | Make               | Model  | Serial Number | Date<br>Installed |
|--------------------|---------|--------------------|--------|---------------|-------------------|
| Sulfur Dioxide     | Cenovus | Thermo Instruments | 431    | 1173410001    | May 30, 2018      |
| Hydrogen Sulfide   | Cenovus | Thermo Instruments | 4501   | 1180030032    | May 30, 2018      |
| Oxides of Nitrogen | Cenovus | Thermo Instruments | 421    | 117348006     | May 30, 2018      |
| Temperature/RH     | Cenovus | Vaisala            | HMP155 | G4330034 2011 | May 30, 2018      |
| Wind speed         | Cenovus | Met One            | 010C-1 | W23536        | May 30, 2018      |
| Wind direction     | Cenovus | Met One            | 020C-1 | W23733        | May 30, 2018      |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |
|                    |         |                    |        |               |                   |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 7881          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 953           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          |               |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer |               |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 3654          |



Figure 2.0 – Area Topographic map showing AMS 26



Figure 3.0 - Plan view sketch for AMS 26 site



Figure 4.0 – Aerial photo showing AMS 26

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East


Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

# **Station Photos**

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Jackfish 2/3

LAST UPDATED: FEBRUARY 5, 2021

## WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

## Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA | TYPE                         | STATION NAME                 | <b>SO</b> 2 | NO/NO <sub>2</sub> / | 0. | PMar     | TRS | H-S | тнс | Methane | co | CO2 | NH. |
|------|------------------------------|------------------------------|-------------|----------------------|----|----------|-----|-----|-----|---------|----|-----|-----|
| ID   |                              |                              |             | NO <sub>x</sub>      | -3 | 1 11 2.5 |     | -   |     | NMHC    |    |     |     |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х           | х                    | х  | х        | х   |     | х   | х       | х  | х   | х   |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | Х           |                      |    |          |     | Х   | Х   | Х       |    |     |     |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |             |                      |    |          |     |     |     |         |    |     |     |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х           | х                    | х  | х        |     | х   | х   | х       |    |     |     |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х           |                      |    |          |     | х   | х   | х       |    |     |     |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х           | х                    | х  | х        | х   |     | х   | х       |    |     | х   |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | Х           | х                    | х  | х        | х   |     | х   | х       | х  |     |     |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х           | х                    | х  | х        |     |     |     |         | х  | х   |     |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х           | Х                    |    | Х        | х   |     | Х   | Х       |    |     |     |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х           |                      |    |          |     | х   | х   | х       |    |     |     |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х           | х                    | х  | х        | х   |     | х   | х       |    |     |     |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | Х           | х                    | х  | х        | х   |     | х   | х       |    |     |     |
| 17   | COMPLIANCE                   | WAPASU                       | Х           | х                    | Х  | Х        |     | Х   | Х   |         |    |     |     |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х           | х                    | х  | х        | х   |     | х   | х       | х  | х   |     |
| 19   | COMPLIANCE                   | FIREBAG                      | Х           | х                    |    |          |     | Х   | х   |         |    |     |     |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | х           | х                    |    |          |     | х   | Х   |         |    |     |     |
| 21   | COMMUNITY                    | CONKLIN                      | Х           | х                    | Х  | Х        | Х   |     | х   | х       |    |     |     |
| 22   | COMMUNITY                    | JANVIER                      | Х           | Х                    | Х  | Х        | х   |     | Х   | Х       |    |     |     |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х           | х                    |    | х        | Х   |     | х   | х       |    |     |     |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х           |                      |    |          |     | х   |     |         |    |     |     |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х           | х                    |    |          |     | Х   |     |         |    |     |     |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | х           | х                    |    |          |     | Х   |     |         |    |     |     |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х           | х                    |    | Х        |     | Х   | Х   |         |    |     |     |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х           | х                    |    | х        | х   |     |     | х       |    |     |     |
| 501  | COMPLIANCE                   | LEISMER                      | Х           | х                    |    |          |     | Х   | Х   |         |    |     |     |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | Х           | Х                    |    |          |     | Х   | Х   |         |    |     |     |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х           | х                    |    |          | Х   |     |     |         |    |     |     |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х           | Х                    |    |          |     | Х   | Х   |         |    |     |     |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | х           | х  |    | х             | Х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | Х             | Х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 27       |
|--------------------------|--------------|
| Station name             | Jackfish     |
| Date station established | Sep 15, 2018 |

### Location

| Station street address | Located SE of CNRL Jackfish Lodge, left side of the road right after |
|------------------------|--|
|                        | CNRL Energy Plant  |
| Legal land description | 15-23-75-7-W4  |
| Latitude               | 55.518694  |
| Longitude              | -110.976000  |
| UTM East               | 501515.38  |
| UTM North              | 6152513.90   |
| Nearest community      | Conklin  |
| Community population   | 185  |

# Owner/Operator/Approval Holder

| Operating Agency                                    | Wood Buffalo Environmental Association        |  |  |
|---|---|--|--|
| Operating Agency                                    |   |  |  |
| Name of Approval Canadian Natural Resources Limited |   |  |  |
| Holder  |   |  |  |
| Approval number                                     | 224816-00-00                                  |  |  |
| Contact Name  | Lauri Louis - Environment EHS Supervisor      |  |  |
| Address   | 2100, 855 - 2 Street S.W. Calgary, AB T2P 4J8 |  |  |
| Phone number  | 403-693-1622                                  |  |  |
| Email address                                       | Lauri.Louie@cnrl.com                          |  |  |

# Site Description

|                       | 0 – 90 degrees          | SAGD Operations |  |  |  |
|-----------------------|-------------------------|-----------------|--|--|--|
|                       | 91 – 180 degrees        | SAGD Operations |  |  |  |
| Land use by sector    | 181 – 270 degrees       | SAGD Operations |  |  |  |
|                       | 271 – 360 degrees       | SAGD Operations |  |  |  |
| Site elevation        | 670m                    |                 |  |  |  |
| (above sea level)     |                         |                 |  |  |  |
| Angle of elevation to | Greatest angle          | 23 degrees      |  |  |  |
| nearby buildings      | Trees direction         | South           |  |  |  |
|                       | North                   | No              |  |  |  |
| Airflow rostrictions  | East                    | No              |  |  |  |
| AITIOW restrictions   | South                   | No              |  |  |  |
|                       | West                    | No              |  |  |  |
| Sample manifold       | Туре                    | All glass       |  |  |  |
|                       | Inlet height above roof | 1 meter         |  |  |  |

| Mataaralagigal | Туре                  | Cup and vane |  |
|----------------|-----------------------|--------------|--|
| Sonsors        | Height above ground   | 10m          |  |
| Sensors        | Distance from station | 7m           |  |

Site Influences

# Localized Sources (within 20 metres of station)

| Туре | Distance (m) | Description |
|------|--------------|-------------|
|      |              |             |
|      |              |             |
|      |              |             |
|      |              |             |

# Roadway Influences

| Туре        | Traffic Volume | Distance (m) | Description          |
|-------------|----------------|--------------|----------------------|
| Dirt/gravel | Medium         | 100          | Used by site workers |
|             |                |              |                      |
|             |                |              |                      |
|             |                |              |                      |

# Major Point Sources

| Facility Name | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|---------------|-------------|------------------------|----------------------------|-----------------------------------|
| Devon Energy  | SAGD Plant  |                        | 1                          | NW                                |
| Devon Energy  | SAGD Plant  |                        | 2                          | E                                 |
|               |             |                        |                            |                                   |
|               |             |                        |                            |                                   |
|               |             |                        |                            |                                   |

# Analytical Equipment

| Parameter          | Owner | Make         | Model  | Serial Number | Date<br>Installed |
|--------------------|-------|--------------|--------|---------------|-------------------|
| Sulfur Dioxide     | WBEA  | Teledyne/API | T100   | 4007          | Sep 15, 2018      |
| Hydrogen Sulfide   | WBEA  | Teledyne/API | T101   | 621           | Sep 15, 2018      |
| Oxides of Nitrogen | WBEA  | Teledyne/API | T200   | 4460          | Sep 15, 2018      |
| Temperature/RH     | WBEA  | Vaisala      | HMP155 | N2910512      | Sep 15, 2018      |
| Wind speed         | WBEA  | Met One      | 010C-1 | X16480        | Sep 15, 2018      |
| Wind direction     | WBEA  | Met One      | 020C-1 | X16496        | Sep 15, 2018      |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |
|                    |       |              |        |               |                   |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 12310         |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 364           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          |               |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer |               |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 3253          |



Figure 2.0 – Area Topographic map showing AMS 27



Figure 3.0 – Plan view sketch for AMS 27 site



Figure 4.0 – Aerial photo showing AMS 27

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Surmont 2

LAST UPDATED: FEBRUARY 5, 2021

## WBEA Monitoring Network

### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

## Mission

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Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA | ТҮРЕ                         | STATION NAME                 | SO <sub>2</sub> | NO/NO <sub>2</sub> / | 0, | PM <sub>a</sub> c | TRS  | H-S  | тнс | Methane | со | CO. | NHa |
|------|------------------------------|------------------------------|-----------------|----------------------|----|-------------------|------|------|-----|---------|----|-----|-----|
| ID   |                              | SIAHONNAME                   | 302             | NO <sub>x</sub>      | 03 | 1 1012.5          | 1113 | 1125 | inc | NMHC    |    | 202 |     |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х                    | х  | Х                 | х    |      | х   | х       | х  | х   | х   |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                      |    |                   |      | х    | х   | х       |    |     |     |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                      |    |                   |      |      |     |         |    |     |     |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х                    | х  | х                 |      | х    | х   | x       |    |     |     |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                      |    |                   |      | х    | х   | х       |    |     |     |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х                    | х  | х                 | х    |      | х   | x       |    |     | х   |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х                    | х  | х                 | х    |      | х   | х       | х  |     |     |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | x                    | х  | х                 |      |      |     |         | х  | x   |     |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х                    |    | Х                 | Х    |      | Х   | х       |    |     |     |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х               |                      |    |                   |      | х    | х   | х       |    |     |     |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | Х                    | х  | х                 | х    |      | х   | х       |    |     |     |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х                    | х  | х                 | х    |      | х   | x       |    |     |     |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | х                    | х  | Х                 |      | х    | Х   |         |    |     |     |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х                    | х  | х                 | х    |      | х   | x       | х  | х   |     |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х                    |    |                   |      | Х    | х   |         |    |     |     |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х                    |    |                   |      | х    | х   |         |    |     |     |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | х                    | х  | х                 | Х    |      | х   | х       |    |     |     |
| 22   | COMMUNITY                    | JANVIER                      | Х               | Х                    | х  | х                 | Х    |      | Х   | х       |    |     |     |
| 23   | COMPLIANCE                   | FORT HILLS                   | х               | х                    |    | х                 | Х    |      | Х   | х       |    |     |     |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                      |    |                   |      | х    |     |         |    |     |     |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х                    |    |                   |      | х    |     |         |    |     |     |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х                    |    |                   |      | х    |     |         |    |     |     |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х                    |    | х                 |      | х    | Х   |         |    |     |     |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х                    |    | х                 | Х    |      |     | х       |    |     |     |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х                    |    |                   |      | х    | Х   |         |    |     |     |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | Х               | Х                    |    |                   |      | Х    | Х   |         |    |     |     |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х                    |    |                   | Х    |      |     |         |    |     |     |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х                    |    |                   |      | Х    | Х   |         |    |     |     |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|------------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN            | Х           | х  |    | х             | х                 |                           | x                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING             | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                       | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | Х           | х  |    | х             | х                 |                           | x                  | x             | х               |
| 19         | COMPLIANCE                   | FIREBAG                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | Х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 29         |
|--------------------------|----------------|
| Station name             | Surmont 2      |
| Date station established | March 12, 2019 |

### Location

| Station street address | NA            |
|------------------------|---------------|
| Legal land description | 7-7-83-6 W4   |
| Latitude               | 56°10'40.75"N |
| Longitude              | 110°56'8.18"W |
| UTM East               | 503997        |
| UTM North              | 6225891       |
| Nearest community      | Anzac         |
| Community population   | 548           |

# Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | ConocoPhillips Canada Resources Corp.  |
| Holder           |  |
| Approval number  | 48263-01-00                            |
| Contact Name     | Brooke Hartwick                        |
| Address          | NA                                     |
| Phone number     | 403-233-3947                           |
| Email address    | Brooke.Hartwick@conocophillips.com     |

# Site Description

|                       | 0 – 90 degrees          | Trees                           |  |
|-----------------------|-------------------------|---------------------------------|--|
|                       | 91 – 180 degrees        | Trees/shed/potable water access |  |
| Land use by sector    |                         | point                           |  |
|                       | 181 – 270 degrees       | Trees                           |  |
|                       | 271 – 360 degrees       | Trees/ laydown yard             |  |
| Site elevation        | 550                     |                                 |  |
| (above sea level)     |                         |                                 |  |
| Angle of elevation to | Greatest angle          | 0                               |  |
| nearby buildings      | Building direction      | NA                              |  |
|                       | North                   | None                            |  |
| Airflow rostrictions  | East                    | None                            |  |
| AITIOW restrictions   | South                   | None                            |  |
|                       | West                    | None                            |  |
| Sample manifold       | Туре                    | All glass                       |  |
|                       | Inlet height above roof | 1 metre                         |  |

| Mataaralagigal  | Туре                  | Cup and vane |  |
|-----------------|-----------------------|--------------|--|
| Nieteorological | Height above ground   | 10 m         |  |
| Sensors         | Distance from station | 0            |  |

Site Influences

# Localized Sources (within 20 metres of station)

| Туре     | Distance (m) | Description                    |
|----------|--------------|--------------------------------|
| Vehicles | 20 m NW      | Moving vehicles around station |

# Roadway Influences

| Туре             | Traffic Volume | Distance (m) | Description                          |
|------------------|----------------|--------------|--------------------------------------|
| Dirt/gravel road | low            | 20           | Used by site personnel for accessing |
|                  |                |              | various sections around plant.       |

# Major Point Sources

| Facility Name  | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|----------------|-------------|------------------------|----------------------------|-----------------------------------|
| ConocoPhillips | SAGD        | 140 MBOED              | 0.36 km                    | NW                                |
# Analytical Equipment

| Parameter                       | Owner          | Make               | Model  | Serial Number | Date<br>Installed |
|---------------------------------|----------------|--------------------|--------|---------------|-------------------|
| Sulfur Dioxide                  | ConocoPhillips | Thermo Instruments | 43i    | 1170050150    | 2017-09-08        |
| Hydrogen Sulfide ConocoPhillips |                | Thermo Instruments | 450i   | 1170050142    | 2017-09-08        |
| Oxides of Nitrogen              | ConocoPhillips | Thermo Instruments | 42i    | 1170050148    | 2017-09-08        |
| Temperature/RH                  | ConocoPhillips | Vaisala            | HMP155 | N2910512      | 2017-09-08        |
| Wind speed                      | ConocoPhillips | Met One            | 010C-1 | N10022        | 2017-09-08        |
| Wind direction                  | ConocoPhillips | Met One            | 020C-1 | W16101        | 2017-09-08        |
| FID Total<br>Hydrocarbon        | ConocoPhillips | Thermo Instruments | 51i    | 1327059297    | 2020-01-22        |
| PM 2.5                          | ConocoPhillips | Teledyne API       | T640   | 253           | 2018              |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 9037          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 691           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          | NA            |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | ITB-17-17154  |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 3808          |



Figure 2.0 – Area Topographic map showing AMS 29



Figure 3.0 - Plan view sketch for AMS 29 site



Figure 4.0 – Aerial photo showing AMS 29

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Ells River

LAST UPDATED: JANUARY 29, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| W BEA<br>ID | ТҮРЕ                         | STATION NAME                 | SO2 | NO/NO₂/<br>NO <sub>X</sub> | <b>O</b> 3 | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO2 | NH₃ |
|-------------|------------------------------|------------------------------|-----|----------------------------|------------|-------------------|-----|-----|-----|-----------------|----|-----|-----|
| 1           | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | Х                          | х          | x                 | х   |     | x   | х               | Х  | х   | х   |
| 2           | COMPLIANCE                   | MILDRED LAKE                 | Х   |                            |            |                   |     | Х   | Х   | х               |    |     |     |
| 3           | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                            |            |                   |     |     |     |                 |    |     |     |
| 4           | COMPLIANCE                   | BUFFALO<br>VIEW POINT        | Х   | х                          | Х          | х                 |     | х   | х   | х               |    |     |     |
| 5           | Compliance/<br>Meteorlogical | MANNIX                       | х   |                            |            |                   |     | х   | x   | x               |    |     |     |
| 6           | COMMUNITY                    | PATRICIA<br>MCINNES          | Х   | х                          | Х          | х                 | х   |     | х   | х               |    |     | х   |
| 7           | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | Х                          | х          | х                 | х   |     | х   | x               | х  |     |     |
| 8           | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | Х   | х                          | Х          | х                 |     |     |     |                 | х  | х   |     |
| 9           | ATTRIBUTION                  | BARGE LANDING                | Х   | Х                          |            | Х                 | Х   |     | X   | Х               |    |     |     |
| 11          | COMPLIANCE                   | LOW ER CAMP                  | Х   |                            |            |                   |     | Х   | Х   | Х               |    |     |     |
| 13          | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | x   | х                          | х          | x                 | х   |     | x   | x               |    |     |     |
| 14          | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | Х   | х                          | Х          | х                 | Х   |     | х   | х               |    |     |     |
| 17          | COMPLIANCE                   | WAPASU                       | Х   | Х                          | Х          | Х                 |     | Х   | X   |                 |    |     |     |
| 18          | BACKGROUND                   | STONY<br>MOUNTAIN            | Х   | х                          | Х          | х                 | х   |     | х   | х               | х  | х   |     |
| 19          | COMPLIANCE                   | FIREBAG                      | Х   | Х                          |            |                   |     | Х   | Х   |                 |    |     |     |
| 20          | COMPLIANCE                   | MACKAY RIVER                 | Х   | Х                          |            |                   |     | Х   | Х   |                 |    |     |     |
| 21          | COMMUNITY                    | CONKLIN                      | Х   | Х                          | Х          | Х                 | Х   |     | Х   | Х               |    |     |     |
| 22          | COMMUNITY                    | JANVIER                      | Х   | Х                          | Х          | Х                 | Х   |     | Х   | Х               |    |     |     |
| 23          | COMPLIANCE                   | FORT HILLS                   | Х   | Х                          |            | Х                 | Х   |     | Х   | Х               |    |     |     |
| 25          | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                            |            |                   |     | х   |     |                 |    |     |     |
| 26          | COMPLIANCE                   | CHRISTINA LAKE               | Х   | Х                          |            |                   |     | Х   |     |                 |    |     |     |
| 27          | COMPLIANCE                   | JACKFISH 2/3                 | Х   | Х                          |            |                   |     | Х   |     |                 |    |     |     |
| 29          | COMPLIANCE                   | SURMONT 2                    | Х   | х                          |            | х                 |     | х   | Х   |                 |    |     |     |
| 30          | COMPLIANCE                   | ELLS RIVER                   | Х   | Х                          |            | Х                 | Х   |     |     | Х               |    |     |     |
| 501         | COMPLIANCE                   | LEISMER                      | Х   | Х                          |            |                   |     | Х   | Х   |                 |    |     |     |
| 505         | COMPLIANCE                   | SAWBONES BAY                 | Х   | Х                          |            |                   |     | Х   | Х   |                 |    |     |     |
| 506         | COMPLIANCE                   | JACK FISH 1                  | Х   | Х                          |            |                   | Х   |     |     |                 |    |     |     |
| 508         | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                          |            |                   |     | Х   | Х   |                 |    |     |     |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness.

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|------------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | x           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN            | х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING             | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                       | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | Х           | х  |    | х             | х                 |                           | х                  | Х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | х           | х  |    | Х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>lons     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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 30     |
|--------------------------|------------|
| Station name             | Ells River |
| Date station established | 2020       |

#### Location

| Station street address | Located at about 300 m northwest of the Total Joslyn camp. |
|------------------------|--|
| Legal land description | 12-04-096-11 W4  |
| Latitude               | 57.2413040   |
| Longitude              | -111.7220072   |
| UTM East               | 456424   |
| UTM North              | 6344478  |
| Nearest community      | Fort Mackay  |
| Community population   | 742  |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association      |
|------------------|---|
| Name of Approval | Canadian Natural Resources Ltd.             |
| Holder           |   |
| Approval number  | 149968-01-00                                |
| Contact Name     | Malathi Velmurugan                          |
| Address          | 2100, 855 – 2 Street SW Calgary, AB T2P 4J8 |
| Phone number     | (780) 714-4436                              |
| Email address    | Malathi.Velmurugan@cnrl.com                 |

## Site Description

|                       | 0 – 90 degrees          | Pond             |  |
|-----------------------|-------------------------|------------------|--|
| Level of the second   | 91 – 180 degrees        | Forest / Highway |  |
| Land use by sector    | 181 – 270 degrees       | Forest           |  |
|                       | 271 – 360 degrees       | Forest           |  |
| Site elevation        | 304                     |                  |  |
| (above sea level)     |                         |                  |  |
| Angle of elevation to | Greatest angle          | 12 degrees       |  |
| nearby buildings      | Building direction      | East             |  |
|                       | North                   | No               |  |
| Airflow rostrictions  | East                    | No               |  |
| Airnow restrictions   | South                   | No               |  |
|                       | West                    | No               |  |
| Comple manifold       | Туре                    | All glass        |  |
|                       | Inlet height above roof | 1 metre          |  |
|                       | Туре                    | Cup and vane     |  |

| Meteorological | Height above ground   | 10 |
|----------------|-----------------------|----|
| Sensors        | Distance from station | 7  |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре       | Distance (m) | Description                                    |
|------------|--------------|--|
| Cell tower | 14           | Compound that holds the equipment for the cell |
| compound   |              | tower to function                              |
|            |              |  |
|            |              |  |
|            |              |  |

## **Roadway Influences**

| Туре       | Traffic Volume | Distance (m) | Description               |
|------------|----------------|--------------|---------------------------|
| Paved road | Very low       | 50 M West    | Old horizon highway       |
| Paved road | High           | 250 M East   | Horizon highway           |
| Dirt road  | Very low       | 100 M East   | Dirt road around the pond |
|            |                |              |                           |

## Major Point Sources

| Facility Name    | Source Type | Production<br>Capacity | Distance from<br>site (km) | Compass<br>direction from<br>site |
|------------------|-------------|------------------------|----------------------------|-----------------------------------|
| CNRL Horizon Oil | Oil plant   |                        | 10km                       | North                             |
| Sands            |             |                        |                            |                                   |
| CNRL Horizon     | Open mining |                        | 7km                        | North                             |
|                  |             |                        |                            |                                   |
|                  |             |                        |                            |                                   |
|                  |             |                        |                            |                                   |

# Analytical Equipment

| Parameter                  | Owner | Make                | Model    | Serial Number    | Date<br>Installed |  |
|----------------------------|-------|---------------------|----------|------------------|-------------------|--|
| Sulfur Dioxide             | WBEA  | Thermo Scientific   | 43i      | 710321322        | 2020              |  |
| Hydrogen Sulfide           | WBEA  | Thermo Scientific   | 43-TLE   | 1410661331       | 2020              |  |
| Oxides of Nitrogen         | WBEA  | Thermo Scientific   | 42i      | 0710321429       | 2020              |  |
| Non-Methane<br>Hydrocarbon | WBEA  | Thermo Scientific   | 55i      | 1193585650       | 2020              |  |
| Particulate Monitor        | WBEA  | API Teledyne        | T640     | 324              | 2020              |  |
| Temperature/RH             | WBEA  | Vaisala             | HMP155   | F5010003         | 2020              |  |
| Wind speed                 | WBEA  | Met One             | 010C-1   | J4337            | 2020              |  |
| Wind direction             | WBEA  | Met One             | 020C-1   | J2732            | 2020              |  |
| Particulate Sampler        | WBEA  | Thermo Scientific   | 2000i    | 200012 0383 1308 | 2020              |  |
| Particulate Sampler        | WBEA  | Thermo Scientific   | 2000i    | 200012 204961409 | 2020              |  |
| Particulate Sampler        | WBEA  | Thermo Scientific   | 2000i    | 200012 205231411 | 2020              |  |
| Particulate Sampler        | WBEA  | Thermo Scientific   | 2000i    | 200012 206011510 | 2020              |  |
| Summa Canister<br>Sampler  | WBEA  | Tisch Environmental | TE – 123 | 1030             | 2020              |  |
|                            |       |                     |          |                  |                   |  |
|                            |       |                     |          |                  |                   |  |
|                            |       |                     |          |                  |                   |  |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 11040         |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 1004          |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          |               |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | 2N9MF73895    |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 1223          |



Figure 2.0 – Area Topographic map showing AMS 30



Figure 3.0 – Plan view sketch for AMS 30 site



Figure 4.0 – Aerial photo showing AMS 30

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 - Windrose (2016-2020)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Leismer

LAST UPDATED: FEBRUARY 5, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA | ТҮРЕ                         | STATION NAME                 | SO <sub>2</sub> | NO/NO <sub>2</sub> / | 0, | PM <sub>a</sub> c | TRS | TRS H <sub>2</sub> S THO | тнс | Methane | со | 0 CO <sub>2</sub> | NHa   |
|------|------------------------------|------------------------------|-----------------|----------------------|----|-------------------|-----|--------------------------|-----|---------|----|-------------------|-------|
| ID   |                              |                              | 502             | NO <sub>x</sub>      | 03 | 1 1012.5          |     |                          | e   | NMHC    |    |                   | 14113 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х                    | х  | х                 | х   |                          | х   | х       | х  | х                 | х     |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                      |    |                   |     | х                        | х   | х       |    |                   |       |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                      |    |                   |     |                          |     |         |    |                   |       |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х                    | х  | х                 |     | х                        | х   | x       |    |                   |       |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                      |    |                   |     | х                        | х   | х       |    |                   |       |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х                    | х  | х                 | х   |                          | х   | x       |    |                   | х     |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | Х                    | х  | Х                 | х   |                          | х   | х       | х  |                   |       |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х                    | х  | х                 |     |                          |     |         | х  | х                 |       |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х               | х                    |    | х                 | Х   |                          | Х   | х       |    |                   |       |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х               |                      |    |                   |     | х                        | х   | х       |    |                   |       |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | Х                    | х  | х                 | х   |                          | х   | х       |    |                   |       |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х                    | х  | х                 | х   |                          | х   | x       |    |                   |       |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | х                    | х  | Х                 |     | Х                        | Х   |         |    |                   |       |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х                    | х  | х                 | х   |                          | х   | x       | х  | х                 |       |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х                    |    |                   |     | Х                        | х   |         |    |                   |       |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х                    |    |                   |     | х                        | х   |         |    |                   |       |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | х                    | х  | х                 | Х   |                          | х   | х       |    |                   |       |
| 22   | COMMUNITY                    | JANVIER                      | Х               | Х                    | х  | х                 | Х   |                          | х   | х       |    |                   |       |
| 23   | COMPLIANCE                   | FORT HILLS                   | х               | х                    |    | х                 | Х   |                          | х   | х       |    |                   |       |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                      |    |                   |     | х                        |     |         |    |                   |       |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х                    |    |                   |     | Х                        |     |         |    |                   |       |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х                    |    |                   |     | х                        |     |         |    |                   |       |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х                    |    | х                 |     | х                        | х   |         |    |                   |       |
| 30   | COMPLIANCE                   | ELLS RIVER                   | Х               | Х                    |    | Х                 | Х   |                          |     | х       |    |                   |       |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х                    |    |                   |     | Х                        | Х   |         |    |                   |       |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | Х               | Х                    |    |                   |     | Х                        | Х   |         |    |                   |       |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х                    |    |                   | Х   |                          |     |         |    |                   |       |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х                    |    |                   |     | Х                        | Х   |         |    |                   |       |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | Х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | Х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | Х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 501   |
|--------------------------|-----------|
| Station name             | Leismer   |
| Date station established | June 2013 |

#### Location

| Station street address | Located at the main gate of the Athabasca Oil Corporation SAGD |
|------------------------|--|
|                        |  |
| Legal land description | 4-01-079-10 W4   |
| Latitude               | 55.81294255  |
| Longitude              | -111.44054535  |
| UTM East               | 472392   |
| UTM North              | 6185349  |
| Nearest community      | Conklin  |
| Community population   | 185  |

# Owner/Operator/Approval Holder

| Operating Agency                           | Wood Buffalo Environmental Association |  |  |  |  |  |
|--|--|--|--|--|--|--|
| Name of Approval Athabasca Oil Corporation |  |  |  |  |  |  |
| Holder                                     |  |  |  |  |  |  |
| Approval number                            | 289664-00-00; 241311-00-00             |  |  |  |  |  |
| Contact Name                               | Peter Millman                          |  |  |  |  |  |
| Address                                    | NA                                     |  |  |  |  |  |
| Phone number                               | 403-817-1697                           |  |  |  |  |  |
| Email address                              | pmillman@atha.com                      |  |  |  |  |  |

#### Site Description

|                       | 0 – 90 degrees          | Gate/ Main road    |  |  |  |  |  |
|-----------------------|-------------------------|--------------------|--|--|--|--|--|
| Land use by costor    | 91 – 180 degrees        | Road/ Trees        |  |  |  |  |  |
| Land use by sector    | 181 – 270 degrees       | Trees              |  |  |  |  |  |
|                       | 271 – 360 degrees       | Trees/laydown yard |  |  |  |  |  |
| Site elevation        | 668m                    |                    |  |  |  |  |  |
| (above sea level)     |                         |                    |  |  |  |  |  |
| Angle of elevation to | Greatest angle          | 0                  |  |  |  |  |  |
| nearby buildings      | Building direction      | NA                 |  |  |  |  |  |
|                       | North                   | None               |  |  |  |  |  |
| Airflow rostrictions  | East                    | None               |  |  |  |  |  |
| AITIOW restrictions   | South                   | None               |  |  |  |  |  |
|                       | West                    | None               |  |  |  |  |  |
| Comple manifold       | Туре                    | All glass          |  |  |  |  |  |
| Sample manifold       | Inlet height above roof | 1 metre            |  |  |  |  |  |

| Mataaralagigal | Туре                  | Cup and vane |
|----------------|-----------------------|--------------|
| Sensors        | Height above ground   | 10 m         |
| Sensors        | Distance from station | 0 m          |

Site Influences

# Localized Sources (within 20 metres of station)

| Туре            | Distance (m) | Description                   |  |  |  |  |
|-----------------|--------------|-------------------------------|--|--|--|--|
| SAGD operations | 100 m        | Athabasca Oil SAGD operations |  |  |  |  |

#### Roadway Influences

| Туре    | Traffic Volume | Distance (m) | Description                      |
|---------|----------------|--------------|----------------------------------|
| Roadway | Medium         | 15 m         | Main road access into SAGD plant |

#### Major Point Sources

| Facility Name  | Source Type | Production<br>Capacity   | Distance from<br>site (km) | Compass<br>direction from<br>site |
|----------------|-------------|--------------------------|----------------------------|-----------------------------------|
| Atha Oil corp. | SAGD        | 37,500 – 40,000<br>boe/d | 100 m                      | West                              |

# Analytical Equipment

| Parameter          | Owner | Make               | Model  | Serial Number | Date<br>Installed |
|--------------------|-------|--------------------|--------|---------------|-------------------|
| Sulfur Dioxide     | WBEA  | Thermo Instruments | 43i    | 1160290011    | 2018              |
| Hydrogen Sulfide   | WBEA  | Thermo Instruments | 450i   | 0922436967    | 2019              |
| Oxides of Nitrogen | WBEA  | Thermo Instruments | 42i    | 1218153356    | 2018              |
| Temperature/RH     | WBEA  | Vaisala            | HMP155 | N2910504      | 2018              |
| Wind speed         | WBEA  | Met One            | 010C-1 | Y4520         | 2018              |
| Wind direction     | WBEA  | Met One            | 020C-1 | G3858         | 2018              |

# Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 9035          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 196           |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          | NA            |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | ITB1315940    |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 622           |



Figure 2.0 – Area Topographic map showing AMS 501



Figure 3.0 – Plan view sketch for AMS 501 site



Figure 4.0 – Aerial photo showing AMS 501

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 - Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Sawbones Bay

LAST UPDATED: FEBRUARY 5, 2021

#### WBEA Monitoring Network

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>X</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>X</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 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 hydrogen sulphide  $(H_2S)$ , total reduced sulphur (TRS), sulphur dioxide  $(SO_2)$ , nitrogen dioxide  $(NO_2)$ , total hydrocarbons (THC), methane  $(CH_4)$ , non-methane hydrocarbons (NMHC), ammonia  $(NH_3)$ , carbon monoxide (CO), and carbon dioxide  $(CO_2)$ . Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA | TVDE                         | <b>ΣΤΑΤΙΟΝΙ ΝΑΜΕ</b>         | 50  | NO/NO <sub>2</sub> / | 0              | DM       | трс | цε  | тис | Methane |   |   |       |
|------|------------------------------|------------------------------|-----|----------------------|----------------|----------|-----|-----|-----|---------|---|---|-------|
| ID   | ITFE                         | STATION NAME                 | 302 | NO <sub>x</sub>      | U <sub>3</sub> | P 1V12.5 | INJ | п23 | пс  | NMHC    |   |   | INIT3 |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | х                    | х              | х        | х   |     | х   | х       | х | х | х     |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | Х   |                      |                |          |     | х   | х   | х       |   |   |       |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |                      |                |          |     |     |     |         |   |   |       |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                    | х              | х        |     | х   | х   | х       |   |   |       |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |                      |                |          |     | х   | х   | х       |   |   |       |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                    | х              | х        | х   |     | х   | х       |   |   | х     |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                    | х              | х        | х   |     | х   | х       | х |   |       |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                    | х              | х        |     |     |     |         | х | х |       |
| 9    | ATTRIBUTION                  | BARGE LANDING                | Х   | х                    |                | Х        | Х   |     | Х   | х       |   |   |       |
| 11   | COMPLIANCE                   | LOWER CAMP                   | Х   |                      |                |          |     | х   | х   | х       |   |   |       |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | Х                    | х              | х        | х   |     | х   | х       |   |   |       |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | х                    | х              | х        | х   |     | х   | х       |   |   |       |
| 17   | COMPLIANCE                   | WAPASU                       | Х   | х                    | Х              | Х        |     | Х   | Х   |         |   |   |       |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                    | х              | х        | х   |     | х   | x       | х | х |       |
| 19   | COMPLIANCE                   | FIREBAG                      | Х   | Х                    |                |          |     | Х   | Х   |         |   |   |       |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                    |                |          |     | х   | х   |         |   |   |       |
| 21   | COMMUNITY                    | CONKLIN                      | Х   | х                    | Х              | Х        | Х   |     | Х   | х       |   |   |       |
| 22   | COMMUNITY                    | JANVIER                      | Х   | х                    | Х              | х        | Х   |     | х   | х       |   |   |       |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х   | х                    |                | х        | Х   |     | х   | х       |   |   |       |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |                      |                |          |     | х   |     |         |   |   |       |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х   | х                    |                |          |     | Х   |     |         |   |   |       |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                    |                |          |     | х   |     |         |   |   |       |
| 29   | COMPLIANCE                   | SURMONT 2                    | Х   | х                    |                | Х        |     | Х   | Х   |         |   |   |       |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х   | х                    |                | х        | х   |     |     | х       |   |   |       |
| 501  | COMPLIANCE                   | LEISMER                      | Х   | х                    |                |          |     | х   | Х   |         |   |   |       |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | Х   | Х                    |                |          |     | Х   | Х   |         |   |   |       |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х   | х                    |                |          | Х   |     |     |         |   |   |       |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                    |                |          |     | Х   | Х   |         |   |   |       |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|------------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN            | х           | х  |    | х             | х                 |                           | x                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING             | х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                       | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 21         | COMMUNITY                    | CONKLIN                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | x           | Х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                   | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                      | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |  |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|--|
| WBEA ID | ТҮРЕ                            | STATION NAME             | VOC | Metals and<br>lons      | Mass, ECOC | Metals and<br>Ions     | РАН | PRECIP |  |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |  |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |  |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |  |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |  |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | Х                      |     |        |  |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |  |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |  |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |  |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |  |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |  |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |  |

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 505      |
|--------------------------|--------------|
| Station name             | Sawbones Bay |
| Date station established | July 1, 2017 |

#### Location

| Station street address | Station located in laydown yard at Christina Lake facility |
|------------------------|--|
| Legal land description | 1-16-77-5 W4   |
| Latitude               | 55.667847  |
| Longitude              | -110.705711  |
| UTM East               | 518511   |
| UTM North              | 6169152  |
| Nearest community      | Conklin  |
| Community population   | 185  |

#### Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |
|------------------|--|
| Name of Approval | MEG Energy Corp.                       |
| Holder           |  |
| Approval number  | 00216466-01-00                         |
| Contact Name     | Bryan Wilson                           |
| Address          | NA                                     |
| Phone number     | 403-629-0853                           |
| Email address    | Bryan.wilson@megenergy.com             |

#### Site Description

|                       | 0 – 90 degrees          | Forest          |  |  |
|-----------------------|-------------------------|-----------------|--|--|
| Land use by costor    | 91 – 180 degrees        | Forest          |  |  |
| Land use by sector    | 181 – 270 degrees       | SAGD operations |  |  |
|                       | 271 – 360 degrees       | Forest          |  |  |
| Site elevation        | 471                     |                 |  |  |
| (above sea level)     |                         |                 |  |  |
| Angle of elevation to | Greatest angle          | 0               |  |  |
| nearby buildings      | Building direction      | None            |  |  |
|                       | North                   | None            |  |  |
| Airflow rostrictions  | East                    | None            |  |  |
| AIMOW restrictions    | South                   | None            |  |  |
|                       | West                    | None            |  |  |
| Comple manifold       | Туре                    | All glass       |  |  |
| Sample manifold       | Inlet height above roof | 1 metre         |  |  |
|                       | Туре                    | Cup and vane    |  |  |

| Meteorological | Height above ground   | 10 m |
|----------------|-----------------------|------|
| Sensors        | Distance from station | 0 m  |

Site Influences

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

| Туре            | Distance (m)          | Description |
|-----------------|-----------------------|-------------|
| SAGD Operations | MEG Energy operations |             |
| Laydown yard    | Heavy equipment       |             |
|                 |                       |             |
|                 |                       |             |

# **Roadway Influences**

| Туре    | Traffic Volume | Distance (m) | Description        |
|---------|----------------|--------------|--------------------|
| Roadway | Low            | 100          | Gravel access road |
| Roadway | Low            | 500          | Gravel access road |
|         |                |              |                    |
|         |                |              |                    |

#### **Major Point Sources**

| Facility Name         | Source Type     | Production<br>Capacity     | Distance from<br>site (km) | Compass<br>direction from<br>site |
|-----------------------|-----------------|----------------------------|----------------------------|-----------------------------------|
| MEG Christina<br>Lake | SAGD operations | 100,000 barrels per<br>day | 500m                       | West                              |
|                       |                 |                            |                            |                                   |
|                       |                 |                            |                            |                                   |
|                       |                 |                            |                            |                                   |
|                       |                 |                            |                            |                                   |

# Analytical Equipment

| Parameter          | Owner | Make              | Model  | Serial Number | Date<br>Installed |
|--------------------|-------|-------------------|--------|---------------|-------------------|
| Sulfur Dioxide     | WBEA  | Thermo Scientific | 43i    | 710321323     | July 2017         |
| Hydrogen Sulfide   | WBEA  | Thermo Scientific | 450i   | 922436966     | July 2017         |
| Oxides of Nitrogen | WBEA  | Thermo Scientific | 42i    | 1152430008    | July 2017         |
| Temperature/RH     | WBEA  | Vaisala           | HMP155 | G0840077      | July 2017         |
| Wind speed         | WBEA  | Met One           | 010C-1 | P10040        | July 2017         |
| Wind direction     | WBEA  | Met One           | 020C-1 | R14655        | July 2017         |

# Support Equipment

| Name                       | Description   | Make                | Model          | Serial Number |  |
|----------------------------|---|---------------------|----------------|---------------|--|
| Datalogger                 | Datalogger  | Campbell Scientific | CR3000         | 6894          |  |
| Zero air generator         | Zero Air Generator  | Teledyne/API        | T701           | 5611          |  |
| Gas Dilution<br>Calibrator | Mass flow controlled gas<br>dilution                            | Teledyne/API        | T700           | 3566          |  |
| HVAC                       | Heating and air<br>HVAC conditioning system.<br>Wall mount unit |                     | 1 ton          | NA            |  |
| Shelter / Building         | Air monitoring portable   | ITB                 | 8 x 16 trailer | ITB1315941    |  |



Figure 2.0 – Area Topographic map showing AMS 505



Figure 3.0 – Plan view sketch for AMS 505 site



Figure 4.0 – Aerial photo showing AMS 505

# Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

# Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

# Wood Buffalo Environmental Association Ambient Air Monitoring Station Site Documentation

# Jackfish 1

LAST UPDATED: FEBRUARY 5, 2021

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Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

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| WBEA<br>ID | ТҮРЕ                         | STATION NAME                 | SO2 | NO/NO <sub>2</sub> /<br>NO <sub>x</sub> | <b>O</b> <sub>3</sub> | PM <sub>2.5</sub> | TRS | H₂S | тнс | Methane<br>NMHC | со | CO2 | NH3 |
|------------|------------------------------|------------------------------|-----|---|-----------------------|-------------------|-----|-----|-----|-----------------|----|-----|-----|
| 1          | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  | х   | х   |
| 2          | COMPLIANCE                   | MILDRED LAKE                 | Х   |   |                       |                   |     | х   | х   | х               |    |     |     |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |     |   |                       |                   |     |     |     |                 |    |     |     |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х   | х                                       | х                     | х                 |     | х   | х   | x               |    |     |     |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х   |   |                       |                   |     | х   | х   | х               |    |     |     |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     | х   |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY          | х   | х                                       | х                     | х                 | х   |     | х   | х               | х  |     |     |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х   | х                                       | х                     | х                 |     |     |     |                 | х  | х   |     |
| 9          | ATTRIBUTION                  | BARGE LANDING                | Х   | х                                       |                       | Х                 | Х   |     | Х   | х               |    |     |     |
| 11         | COMPLIANCE                   | LOWER CAMP                   | Х   |   |                       |                   |     | х   | х   | х               |    |     |     |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х   | х                                       | х                     | х                 | х   |     | х   | х               |    |     |     |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х   | x                                       | х                     | x                 | х   |     | х   | x               |    |     |     |
| 17         | COMPLIANCE                   | WAPASU                       | Х   | х                                       | х                     | х                 |     | х   | х   |                 |    |     |     |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN            | х   | х                                       | х                     | х                 | х   |     | х   | x               | х  | х   |     |
| 19         | COMPLIANCE                   | FIREBAG                      | Х   | х                                       |                       |                   |     | Х   | Х   |                 |    |     |     |
| 20         | COMPLIANCE                   | MACKAY RIVER                 | Х   | х                                       |                       |                   |     | х   | х   |                 |    |     |     |
| 21         | COMMUNITY                    | CONKLIN                      | Х   | х                                       | Х                     | х                 | Х   |     | Х   | х               |    |     |     |
| 22         | COMMUNITY                    | JANVIER                      | Х   | х                                       | Х                     | х                 | Х   |     | х   | х               |    |     |     |
| 23         | COMPLIANCE                   | FORT HILLS                   | Х   | х                                       |                       | х                 | Х   |     | х   | х               |    |     |     |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | Х   |   |                       |                   |     | х   |     |                 |    |     |     |
| 26         | COMPLIANCE                   | CHRISTINA LAKE               | Х   | Х                                       |                       |                   |     | Х   |     |                 |    |     |     |
| 27         | COMPLIANCE                   | JACKFISH 2/3                 | Х   | х                                       |                       |                   |     | х   |     |                 |    |     |     |
| 29         | COMPLIANCE                   | SURMONT 2                    | Х   | х                                       |                       | Х                 |     | Х   | х   |                 |    |     |     |
| 30         | COMPLIANCE                   | ELLS RIVER                   | Х   | х                                       |                       | х                 | Х   |     |     | х               |    |     |     |
| 501        | COMPLIANCE                   | LEISMER                      | Х   | х                                       |                       |                   |     | х   | Х   |                 |    |     |     |
| 505        | COMPLIANCE                   | SAWBONES BAY                 | Х   | Х                                       |                       |                   |     | Х   | Х   |                 |    |     |     |
| 506        | COMPLIANCE                   | JACKFISH 1                   | Х   | Х                                       |                       |                   | Х   |     |     |                 |    |     |     |
| 508        | COMPLIANCE                   | KIRBY NORTH                  | Х   | Х                                       |                       |                   |     | Х   | Х   |                 |    |     |     |

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, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | x           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | х           | х  |    | х             | х                 |                           | x                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | x           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | х           | х  |    | х             | Х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | х             | х                 |                           |                    |               |                 |

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  $\mu$ m aerodynamic diameter (PM<sub>2.5</sub>) and associated metals and ions, particulate matter less than 10  $\mu$ m aerodynamic diameter (PM<sub>10</sub>) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

|         |                                 |                          |     | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, | РАН | PRECIP |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID | ТҮРЕ                            | STATION NAME             | voc | Metals and<br>lons      | Mass, ECOC | Metals and<br>lons     |     |        |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | Х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | Х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | Х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ ATTRIBUTION         | FORT MCKAY SOUTH         | х   |                         |            | Х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | Х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | Х                      |     |        |

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                             |
| Latitude               | 55.523816                                |
| Longitude              | -110.865345                              |
| UTM East               | 508501.10                                |
| UTM North              | 6153091.90                               |
| Nearest community      | Conklin                                  |
| Community population   | 185                                      |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association                      |
|------------------|---|
| Name of Approval | Devon Canada Corporation                                    |
| Holder           |   |
| Approval number  | 224816-00-00  |
| Contact Name     | Garett White  |
| Address          | 333 West Sheridan Avenue Oklahoma City, Oklahoma 73102-5015 |
| Phone number     | (780) 799-1889  |
| Email address    | Garett.white@dvn.com  |

## Site Description

|                       | 0 – 90 degrees          | SAGD Operations |  |  |  |  |
|-----------------------|-------------------------|-----------------|--|--|--|--|
| Land use by sector    | 91 – 180 degrees        | SAGD Operations |  |  |  |  |
| Land use by sector    | 181 – 270 degrees       | SAGD Operations |  |  |  |  |
|                       | 271 – 360 degrees       | SAGD Operations |  |  |  |  |
| Site elevation        | 620m                    |                 |  |  |  |  |
| (above sea level)     |                         |                 |  |  |  |  |
| Angle of elevation to | Greatest angle          | 28 degrees      |  |  |  |  |
| nearby buildings      | Trees direction         | West            |  |  |  |  |
|                       | North                   | No              |  |  |  |  |
| Airflow rostrictions  | East                    | No              |  |  |  |  |
| AITIOW restrictions   | South                   | Trees           |  |  |  |  |
|                       | West                    | Trees           |  |  |  |  |
| Comple manifold       | Туре                    | All glass       |  |  |  |  |
| Sample manifold       | Inlet height above roof | 1 meter         |  |  |  |  |
|                       | Туре                    | Cup and vane    |  |  |  |  |

| Meteorological | Height above ground   | 10m |
|----------------|-----------------------|-----|
| Sensors        | Distance from station | 7m  |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре | Distance (m) | Description |
|------|--------------|-------------|
|      |              |             |
|      |              |             |
|      |              |             |
|      |              |             |

## **Roadway Influences**

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

#### **Major Point Sources**

| Facility Name | Source Type | Production<br>Capacity | Distance from<br>site (m) | Compass<br>direction from<br>site |
|---------------|-------------|------------------------|---------------------------|-----------------------------------|
| Devon Energy  | SAGD Plant  |                        | 400                       | Ν                                 |
|               |             |                        |                           |                                   |
|               |             |                        |                           |                                   |
|               |             |                        |                           |                                   |
|               |             |                        |                           |                                   |

## Analytical Equipment

| Parameter          | Owner | Make                               | Model                   | Serial Number | Date<br>Installed |
|--------------------|-------|------------------------------------|-------------------------|---------------|-------------------|
| Sulfur Dioxide     | WBEA  | Thermo Instruments                 | 43i                     | 1160290011    | 08/17/2018        |
| Hydrogen Sulfide   | WBEA  | Thermo Instruments 450i 0922436967 |                         | 08/17/2018    |                   |
| Oxides of Nitrogen | WBEA  | Thermo Instruments                 | 42i                     | 1218153356    | 08/17/2018        |
| Temperature/RH     | WBEA  | Vaisala                            | Vaisala HMP155 K1720033 |               | 08/17/2018        |
| Wind speed         | WBEA  | Met One                            | 010C-1                  | A1406         | 08/17/2018        |
| Wind direction     | WBEA  | Met One                            | 020C-1                  | Y3166         | 08/17/2018        |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |
|                    |       |                                    |                         |               |                   |

## Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger                 | Datalogger   | Campbell Scientific | CR3000         | 9035          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | 701            | 4865          |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          |               |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | ITB1315940    |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 622           |



Figure 2.0 – Area Topographic map showing AMS 506



Figure 3.0 - Plan view sketch for AMS 506 site



Figure 4.0 – Aerial photo showing AMS 506

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack



Figure 7.0 – Windrose (Five Year)

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

# Kirby North

LAST UPDATED: FEBRUARY 5, 2021

#### **BEA Monitoring Network**

#### Vision

People are empowered to make informed decisions to ensure a safe and healthy environment.

#### Mission

The Wood Buffalo Environmental Association is a multi-stakeholder, consensus-based organization that leads in state of the art environmental monitoring to enable informed decision-making.

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include SO<sub>2</sub>, H<sub>2</sub>S, TRS, O<sub>3</sub>, NO<sub>x</sub>, NO, NO<sub>2</sub>, NH<sub>3</sub>, CO, CO<sub>2</sub>, PM<sub>2.5</sub>, THC, NMHC, and CH<sub>4</sub>. All sites also measure ambient air temperature, wind speed, wind direction, and relative humidity. Selected sites measure barometric pressure, global radiation, precipitation, surface wetness, vertical wind speed, vertical temperature gradient, and visibility. The ambient air monitoring parameters for each station are summarized in Table 1.0 and 1.1. The WBEA also maintains and operates five portable monitoring stations. The configuration of these stations differs depending on their task. Three are configured for compliance monitoring and are equipped to measure SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, NO, NO<sub>2</sub>, THC, wind speed, wind direction, temperature. One portable is equipped to monitor all these compliance parameters as well as PM<sub>2.5</sub>. The last portable is set up to operate gas chromatography systems and currently has a Sulphur and VOC GC installed to collect speciated data for the Odour Monitoring Program within WBEA.

Since 1998 WBEA has maintained time-integrated sampling for PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. 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 time-integrated parameters for each station are summarized in Table 1.2.

| WBEA | TYPE                         |                              |                 | NO/NO₂/         | •  | DNA                 | TDC |                  | THE | Methane |   | <b>60</b> |                 |
|------|------------------------------|------------------------------|-----------------|-----------------|----|---------------------|-----|------------------|-----|---------|---|-----------|-----------------|
| ID   | TYPE                         | STATION NAME                 | 50 <sub>2</sub> | NO <sub>x</sub> | 03 | PIVI <sub>2.5</sub> | IKS | H <sub>2</sub> S | THC | NMHC    | 0 | CO2       | NH <sub>3</sub> |
| 1    | COMMUNITY                    | BERTHA GANTER-<br>FORT MCKAY | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         | х               |
| 2    | COMPLIANCE                   | MILDRED LAKE                 | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 3    | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER      |                 |                 |    |                     |     |                  |     |         |   |           |                 |
| 4    | COMPLIANCE                   | BUFFALO<br>VIEWPOINT         | х               | х               | х  | х                   |     | х                | х   | х       |   |           |                 |
| 5    | COMPLIANCE/<br>METEORLOGICAL | MANNIX                       | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 6    | COMMUNITY                    | PATRICIA<br>MCINNES          | х               | х               | х  | х                   | х   |                  | х   | x       |   |           | х               |
| 7    | COMMUNITY                    | ATHABASCA<br>VALLEY          | х               | х               | х  | х                   | х   |                  | х   | х       | х |           |                 |
| 8    | COMMUNITY/<br>COMPLIANCE     | FORT CHIPEWYAN               | х               | х               | х  | х                   |     |                  |     |         | х | х         |                 |
| 9    | ATTRIBUTION                  | BARGE LANDING                | х               | х               |    | Х                   | х   |                  | х   | х       |   |           |                 |
| 11   | COMPLIANCE                   | LOWER CAMP                   | х               |                 |    |                     |     | х                | х   | х       |   |           |                 |
| 13   | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH          | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 14   | COMPLIANCE/<br>COMMUNITY     | ANZAC                        | х               | х               | х  | х                   | х   |                  | х   | х       |   |           |                 |
| 17   | COMPLIANCE                   | WAPASU                       | Х               | Х               | Х  | Х                   |     | Х                | Х   |         |   |           |                 |
| 18   | BACKGROUND                   | STONY<br>MOUNTAIN            | х               | х               | х  | х                   | х   |                  | х   | х       | х | х         |                 |
| 19   | COMPLIANCE                   | FIREBAG                      | Х               | х               |    |                     |     | Х                | Х   |         |   |           |                 |
| 20   | COMPLIANCE                   | MACKAY RIVER                 | Х               | х               |    |                     |     | х                | х   |         |   |           |                 |
| 21   | COMMUNITY                    | CONKLIN                      | Х               | Х               | Х  | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 22   | COMMUNITY                    | JANVIER                      | Х               | х               | Х  | х                   | Х   |                  | х   | х       |   |           |                 |
| 23   | COMPLIANCE                   | FORT HILLS                   | Х               | х               |    | Х                   | Х   |                  | Х   | х       |   |           |                 |
| 25   | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN   | х               |                 |    |                     |     | х                |     |         |   |           |                 |
| 26   | COMPLIANCE                   | CHRISTINA LAKE               | Х               | х               |    |                     |     | Х                |     |         |   |           |                 |
| 27   | COMPLIANCE                   | JACKFISH 2/3                 | Х               | х               |    |                     |     | х                |     |         |   |           |                 |
| 29   | COMPLIANCE                   | SURMONT 2                    | х               | х               |    | Х                   |     | Х                | х   |         |   |           |                 |
| 30   | COMPLIANCE                   | ELLS RIVER                   | х               | х               |    | х                   | х   |                  |     | х       |   |           |                 |
| 501  | COMPLIANCE                   | LEISMER                      | Х               | х               |    |                     |     | х                | Х   |         |   |           |                 |
| 505  | COMPLIANCE                   | SAWBONES BAY                 | х               | Х               |    |                     |     | х                | Х   |         |   |           |                 |
| 506  | COMPLIANCE                   | JACKFISH 1                   | Х               | х               |    |                     | Х   |                  |     |         |   |           |                 |
| 508  | COMPLIANCE                   | KIRBY NORTH                  | Х               | Х               |    |                     |     | Х                | Х   |         |   |           |                 |

Table 1.0 - Pollutant Parameters monitored in the WBEA network

| WBEA<br>ID | ТҮРЕ                         | STATION NAME                | Temperature | RH | BP | Wind<br>Speed | Wind<br>Direction | Vertical<br>Wind<br>Speed | Solar<br>Radiation | Precipitation | Leaf<br>Wetness |
|------------|------------------------------|-----------------------------|-------------|----|----|---------------|-------------------|---------------------------|--------------------|---------------|-----------------|
| 1          | COMMUNITY                    | BERTHA GANTER<br>FORT MCKAY | x           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 2          | COMPLIANCE                   | MILDRED LAKE                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 3          | METEOROLOGICAL               | LOWER CAMP<br>MET TOWER     | х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 4          | COMPLIANCE                   | BUFFALO<br>VIEWPOINT        | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 5          | COMPLIANCE/<br>METEORLOGICAL | MANNIX                      | Х           | х  |    | х             | х                 | х                         |                    |               |                 |
| 6          | COMMUNITY                    | PATRICIA<br>MCINNES         | Х           | х  |    | х             | х                 |                           |                    |               |                 |
| 7          | COMMUNITY                    | ATHABASCA<br>VALLEY         | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 8          | COMMUNITY/<br>COMPLIANCE     | FORT<br>CHIPEWYAN           | Х           | х  |    | х             | х                 |                           | х                  |               | х               |
| 9          | ATTRIBUTION                  | BARGE<br>LANDING            | Х           | х  | х  | х             | х                 |                           |                    |               |                 |
| 11         | COMPLIANCE                   | LOWER CAMP                  | Х           | Х  |    | х             | Х                 |                           |                    |               |                 |
| 13         | COMPLIANCE/<br>ATTRIBUTION   | FORT MCKAY<br>SOUTH         | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 14         | COMPLIANCE/<br>COMMUNITY     | ANZAC                       | Х           | х  |    | х             | х                 |                           |                    |               | х               |
| 17         | COMPLIANCE                   | WAPASU                      | Х           | Х  |    | х             | х                 |                           |                    | Х             |                 |
| 18         | BACKGROUND                   | STONY<br>MOUNTAIN           | Х           | х  |    | х             | х                 |                           | х                  | х             | х               |
| 19         | COMPLIANCE                   | FIREBAG                     | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |
| 20         | COMPLIANCE                   | MACKAY RIVER                | Х           | Х  |    | х             | х                 |                           |                    | х             |                 |
| 21         | COMMUNITY                    | CONKLIN                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 22         | COMMUNITY                    | JANVIER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 23         | COMPLIANCE                   | FORT HILLS                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 25         | EMERGENCY<br>RESPONSE        | WASKOW OHCI<br>PIMATISIWIN  | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 26         | COMPLIANCE                   | CHRISTINA LAKE              | х           | х  |    | х             | х                 |                           |                    |               |                 |
| 27         | COMPLIANCE                   | JACKFISH 2/3                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 29         | COMPLIANCE                   | SURMONT 2                   | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 30         | COMPLIANCE                   | ELLS RIVER                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 501        | COMPLIANCE                   | LEISMER                     | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 505        | COMPLIANCE                   | SAWBONES BAY                | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 506        | COMPLIANCE                   | JACKFISH 1                  | Х           | Х  |    | х             | х                 |                           |                    |               |                 |
| 508        | COMPLIANCE                   | KIRBY NORTH                 | Х           | Х  |    | Х             | Х                 |                           |                    |               |                 |

Table 1.1 – Meteorological Parameters monitored in the WBEA network

|         | ТҮРЕ                            | STATION NAME             | voc | PM <sub>2.5</sub> Mass, | PM2.5      | PM <sub>10</sub> Mass, |     |        |
|---------|---------------------------------|--------------------------|-----|-------------------------|------------|------------------------|-----|--------|
| WBEA ID |                                 |                          |     | Metals and<br>lons      | Mass, ECOC | Metals and<br>lons     | РАН | PRECIP |
| 1       | COMMUNITY                       | BERTHA GANTER-FORT MCKAY | х   | х                       | х          | х                      | х   | Х      |
| 6       | COMMUNITY                       | PATRICIA MCINNES         | х   | х                       |            | х                      | х   |        |
| 7       | COMMUNITY                       | ATHABASCA VALLEY         | х   | х                       |            | х                      | х   |        |
| 9       | ATTRIBUTION                     | BARGE LANDING            | х   |                         |            |                        |     |        |
| 13      | COMPLIANCE/ATTRIBUTION          | FORT MCKAY SOUTH         | х   |                         |            | х                      |     |        |
| 14      | COMPLIANCE/COMMUNITY            | ANZAC                    | х   | х                       |            | х                      | х   |        |
| 17      | COMPLIANCE                      | WAPASU                   |     |                         | х          |                        |     | х      |
| 18      | ENHANCED DEPOSITION/ BACKGROUND | STONY MOUNTAIN           |     |                         | х          |                        |     | х      |
| 21      | COMMUNITY                       | CONKLIN                  | х   | х                       |            | х                      | х   |        |
| 22      | COMMUNITY                       | JANVIER                  | х   | х                       |            | х                      | х   |        |
| 30      | COMPLIANCE                      | ELLS RIVER               | х   |                         |            | х                      |     |        |

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 508     |
|--------------------------|-------------|
| Station name             | Kirby North |
| Date station established | 04/16/2019  |

#### Location

| Station street address | Industrial Pad    |
|------------------------|-------------------|
| Legal land description | Industrial - SAGD |
| Latitude               | 55.4616480        |
| Longitude              | -111.2188230      |
| UTM East               | 12U 486163mE      |
| UTM North              | 6146186mN         |
| Nearest community      | Conklin           |
| Community population   | 185               |

## Owner/Operator/Approval Holder

| Operating Agency | Wood Buffalo Environmental Association |  |  |
|------------------|--|--|--|
| Name of Approval | Canadian Natural Resources Ltd.        |  |  |
| Holder           |  |  |  |
| Approval number  | 149968-01-00                           |  |  |
| Contact Name     | Kale Bromley                           |  |  |
| Address          | 2100, 855 – 2 Street S.W. Calgary, AB  |  |  |
| Phone number     | (403) 517-6700                         |  |  |
| Email address    | Kale.Bromley@cnrl.com                  |  |  |

## Site Description

|                       | 0 – 90 degrees          | SAGD Plant         |  |
|-----------------------|-------------------------|--------------------|--|
| Land use by costor    | 91 – 180 degrees        | SAGD Land / Forest |  |
| Land use by sector    | 181 – 270 degrees       | SAGD Land / Forest |  |
|                       | 271 – 360 degrees       | SAGD Plant         |  |
| Site elevation        |                         | 700m               |  |
| (above sea level)     |                         |                    |  |
| Angle of elevation to | Greatest angle          | N/A                |  |
| nearby buildings      | Building direction      | N/A                |  |
|                       | North                   | None               |  |
| Airflow rostrictions  | East                    | None               |  |
| AITIOW restrictions   | South                   | None               |  |
|                       | West                    | None               |  |
| Comple manifold       | Туре                    | All glass          |  |
|                       | Inlet height above roof | 1 metre            |  |
|                       | Туре                    | Cup and vane       |  |

| Meteorological | Height above ground   | 10m |
|----------------|-----------------------|-----|
| Sensors        | Distance from station | 7m  |

Site Influences

## Localized Sources (within 20 metres of station)

| Туре     | Distance (m) | Description                                  |
|----------|--------------|--|
| SAGD Pad | 1            | Station is located on the SE side of the pad |
|          |              |  |
|          |              |  |
|          |              |  |

## **Roadway Influences**

| Туре      | Traffic Volume | Distance (m) | Description                        |
|-----------|----------------|--------------|------------------------------------|
| Dirt Road | Medium         | 50m West     | Road used to access the SAGD plant |
|           |                |              |                                    |
|           |                |              |                                    |
|           |                |              |                                    |

#### **Major Point Sources**

| Facility Name | Source Type | Production<br>Capacity | Distance from<br>site (m) | Compass<br>direction from<br>site |
|---------------|-------------|------------------------|---------------------------|-----------------------------------|
| Kirby North   | SAGD Plant  | N/A                    | 100                       | West                              |
|               |             |                        |                           |                                   |
|               |             |                        |                           |                                   |
|               |             |                        |                           |                                   |
|               |             |                        |                           |                                   |

## Analytical Equipment

| Parameter          | Owner | Make    | Model  | Serial Number | Date<br>Installed |
|--------------------|-------|---------|--------|---------------|-------------------|
| Sulfur Dioxide     | CNRL  | Thermo  | 43iQ   | 1182340007    | 2019-04-16        |
| Hydrogen Sulfide   | CNRL  | API     | T101   | 158           | 2020              |
| Oxides of Nitrogen | CNRL  | API     | T200   | 4259          | 2019-04-16        |
| Temperature/RH     | CNRL  | Vaisala | HMP155 | F5010010      | 2019-04-16        |
| Wind speed         | CNRL  | Met One | 010C-1 | X16479        | 2019-04-16        |
| Wind direction     | CNRL  | Met One | 020C-1 | X16495        | 2019-04-16        |
| Total Hydrocarbon  | CNRL  | Thermo  | 51i    | 1182340005    | 2019-04-16        |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |
|                    |       |         |        |               |                   |

## Support Equipment

| Name                       | Description  | Make                | Model          | Serial Number |
|----------------------------|--|---------------------|----------------|---------------|
| Datalogger Datalogger      |  | Campbell Scientific | CR3000         | 2372          |
| Zero air generator         | Zero Air Generator   | Teledyne/API        | T701H          | 4890          |
| Hydrogen<br>Generator      | H2 supply for THC  | AMA                 | HG300          | 180267050     |
| HVAC                       | Heating and air<br>conditioning system.<br>Wall mount unit | BARD                | 1 ton          |               |
| Shelter / Building         | Air monitoring portable                                    | ITB                 | 8 x 16 trailer | 17541-1       |
| Gas Dilution<br>Calibrator | Mass flow controlled gas dilution                          | Teledyne/API        | T700           | 3804          |



Figure 2.0 – Area Topographic map showing AMS 508



Figure 3.0 - Plan view sketch for AMS 508 site



Figure 4.0 – Aerial photo showing AMS 508

## Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East



Figure 5.2 – Environ looking South



Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

## Station Photos

The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 – Photo of front and back of instrument rack


Figure 7 – Windrose (Five Year)



## End of Report - Volume 3