Wood Buffalo Environmental Association

Progress Report

2024-2025

Q4: January- March

SUBMITTED APRIL 2025

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1. Contract Scope and Delivery

This Progress Report is submitted quarterly by the Wood Buffalo Environmental Association (WBEA) on behalf of its members to Alberta Environment and Protected Areas (EPA) in accordance with the services and deliverables listed in Schedule A of the Government of Alberta contract 24RSD823 and 24RSD828, as amended.

As per the Alberta EPA contracts (Table 1), the WBEA provides environmental monitoring services based on the annual Oil Sands Monitoring (OSM) work plans and associated costs.

The WBEA received notice that its 2024-2025 workplan and budget had been approved by the OSM Program on April 9th, 2024.

Table 1. 2024-2025 Alberta EPA Contracts and Work Plans

Alberta EPA Contract	Work Plan Name	Work Plan Reference
24RSD823	Atmospheric Pollutant Active Monitoring Network	A-LTM-S-1-2425
24RSD828	Integrated Atmospheric Deposition Monitoring	A-PD-6-2425

2. Introduction

The WBEA is a multi-stakeholder, community-based, not-for-profit association that operates in the largest municipality in Canada. The WBEA monitors the air in the Regional Municipality of Wood Buffalo (RMWB) 24 hours a day, 365 days a year and conducts a variety of air, land, and odour monitoring programs. The information collected from all the WBEA's air monitoring stations between Conklin and Fort Chipewyan, most of which are located at or near oil extraction plants, is openly and continuously shared with stakeholders and the public on the WBEA's website (https://wbea.org/) and through annual reports, community engagement, and outreach activities.

An Air Quality Task Force was established in 1985 to address environmental concerns raised by the Fort McKay First Nation related to oil sands development. In 1990, this Task Force became the Regional Air Quality Coordinating Committee. Then in 1996 the area was endorsed as a regional airshed by the Clean Air Strategic Alliance (CASA). The WBEA was incorporated as an Alberta Non-Profit Society in 1997 and assumed responsibility for air quality monitoring within the boundaries of the RMWB. The WBEA became a working partner of the Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA) in 2014. With the dissolution of AEMERA on June 30th, 2016, the WBEA began working with the OSM Program and Alberta EPA to fulfill its mandate to provide independent ambient air monitoring in the region.

The WBEA submits annual work plans to the OSM Program. Once the work plans, and any required changes, are approved, the WBEA receives a contract with deliverables for the work from Alberta EPA. This Progress Report is a quarterly update on the work agreed to in the OSM Work Plans and the associated Alberta EPA Contract and includes program updates, exceedances and non-compliances, research and development overviews and adaptive monitoring progress.

Note: Ambient air and laboratory data must be quality assured and controlled prior to submittal to Alberta Environment's Air Data Warehouse and upload to the WBEA website. The data validation process follows one month behind the current month (i.e., data from May is reviewed throughout June and submitted by the end of June). **To ensure reporting of the most accurate data, this progress report will include data and statistics from the previous quarter (2024-2025 Q3) that have already been validated, where applicable.**

3. Atmospheric Pollutant Active Monitoring Network, 2024-2025 Work Plan Reference A-LTM-S-1-2425

The components of the Atmospheric Pollutant Active Monitoring Network Work Plan that are fulfilled, or supported, by the WBEA are described below:

(1) ***Long-term core ambient air monitoring network*** *– includes continuous and time-integrated air monitoring. The Wood Buffalo Environmental Association (WBEA) operates 29 ambient air monitoring stations (AMSs) in the Athabasca Oil Sands Region (including the acute air monitoring station in Fort McKay - Waskōw ohci Pimâtisiwin). The Lakeland Industry and Community Association (LICA) operates 4 AMSs in the Cold Lake Oil Sands Region, and the Peace River Area Monitoring Program (PRAMP) operates 5 AMSs in the Peace River Oil Sands Region. All three airsheds collect time-integrated samples for the National Air Pollution Surveillance (NAPS) program and other parameters that cannot be collected through continuous monitoring. The long-term core air monitoring network was developed to fulfill EPEA Approval compliance monitoring requirements and satisfy community and scientific interests. Both the WBEA and PRAMP core ambient air monitoring networks are undergoing assessments to develop a series of recommendations to rationalize/optimize the network. The results of these assessments are not expected until late 2022 or early 2023 but recommendations can start informing network changes in 2023/24.*

(2) ***Recommendations 14/15 in the report "Recurrent Human Health Complaints Technical Information Synthesis – Fort McKay Area"*** *(Alberta Energy Regulatory and Alberta Health, 2016) – continue to be implemented. Implementation of these recommendations will improve air monitoring consistency within 30 km of Fort McKay and allow improved characterization of the air pollutants and their sources that cause air quality and odour concerns in the community. Some aspects of this monitoring are intended to be short-term or focused, as described in Section 10.0 Work Plan Approach/Methods.*

(3) ***Odour Monitoring*** *– The WBEA created an odour monitoring app (COMP) that allows the public to provide anonymous information on the odours they experience. The app collects information such as odour type, intensity, duration, timing and location. The collected information is compared to data at WBEA ambient air monitoring stations to determine if or how ambient air quality trends are related to odours. All submitted odour observations and annual reports can be found at* https://comp.wbea.org/*.*

(4) ***Transition to an Adaptive Monitoring Approach*** *– will continue in 2023-24. This will involve a structured approach to: (a) reviewing the existing monitoring network and document the purpose or objective for each station and for each parameter monitored at each station; (b) developing a shared understanding of regulatory and community expectations that will guide any OSM adaptive monitoring framework based adjustments required to the current long-term surveillance program; (c) determining which air quality parameters are applicable for the Adaptive Monitoring approach; (d) quantifying baselines for selected parameters; and (e) establishing limits of change for selected parameters.*

In addition, the Atmospheric Pollutant Active Monitoring Network work plan includes collaboration with two community-based (FMFN and Fort McKay Metis Nation (FMMN)) monitoring projects, one for dust and one for odour that were by that were approved for funding and commenced in 2022-23.

Lastly, the Oski-ôtin air monitoring station in Fort McKay has been decommissioned. This was formerly a standalone component of this work plan. No funds will be requested in 2023/24 for Oski-ôtin, although several reporting products involving Oski-ôtin measurements will be released in 2023/24.

The objectives of the 2023-24 work plan are:

(1) To measure impacts from Oil Sands development on ambient air quality.
(2) To provide ambient air data that citizens, industrial members, and regulatory bodies can use to make informed decisions on health, facility compliance, and environmental management policy.
(3) To provide ambient air data for community needs, including the Air Quality Health Index (AQHI), the Fort McKay Air Quality Index (FMAQI), and measuring representative ambient concentrations in populated areas.
(4) Implement ambient air monitoring approved by the Fort McKay Air Quality and Odour (FMAQO) Advisory Committee (specific to Recommendations 1, 14 and 15).
(5) To measure air parameters in Fort McKay that will assist in odour identification and source characterization/attribution during air quality and odour events.
(6) To understand the impacts of Oil Sands development on the odours experienced in communities in the AOSR.
(7) To understand the relationship between the odours experienced by community members and the ambient air data collected at active air monitoring stations.
(8) To measure air parameters in Fort McKay that will assist in dustfall identification and source characterization during dustfall and low visibility events.
(9) To understand the impacts of Oil Sands development on the dustfall experienced in Fort McKay.
(10) To understand the relationship between the dustfall experienced by community members in Fort McKay and the ambient air data collected at active air monitoring stations.
(11) To ensure that monitoring carried out in the region is relevant to the concerns of community members.
(12) To implement the adaptive monitoring approach, as directed by the OSM Program Oversight Committee, where appropriate in the Atmospheric Pollutant Active Monitoring Network.
(13) Create an Indigenous-led air monitoring program in the Peace Athabasca Delta and at reserve locations in partnership with WBEA.
(14) Expand the Fort Chipewyan air monitoring capabilities to fill the air quality data gap with time integrated sampling.
(15) Build community capacity through training of ACFN and MCFN Personnel for sampling program operations and maintenance.

The following section provides details on the Q4 2024-2025 milestones and objectives under Workplan A-LTM-S-1-2425 (Atmospheric Pollutant Active Monitoring Network). Deliverables are from the Government of Alberta contract 24RSD823.

3.1 Continuous Monitoring – Operate 29 ambient air monitoring stations including the acute air monitoring station in Fort McKay (Waskōw ohci Pimâtisiwin - FMAQOAC Recommendation 1).

i. Complete monthly calibrations at all ambient air monitoring stations in the WBEA network in compliance with Alberta's Air Monitoring Directive (AMD). Perform preventative maintenance and repairs, as required.

A total of 251 pieces of continuous monitoring equipment were operated in the network for quarter three, which includes 130 air quality analyzers and 121 meteorological sensors. Average operational uptimes are included in Table 2.

Monthly calibrations were completed at all air monitoring stations, in compliance with the Air Monitoring Directive (AMD). Preventative maintenance and repairs were completed as needed.

Table 2. WBEA Continuous Monitoring Equipment Statistics, by Month, July to September 2024

Month	Average Operational Time (%)	# of Monitoring Equipment with Average Operational Uptime (%)						Total # of Equipment
		< 90*	90 to 92	93 to 94	95 to 96	96 to 98	98 to 100	
October 2024	99.0	3	4	8	7	15	214	251
November 2024	98.7	6	4	4	12	11	214	251
December 2024	98.6	10	3	2	6	9	221	251

*For details on equipment operating at less than 90% uptime, please refer to Section 3.10.ii: Table 8.

ii. Perform annual calibrations on meteorological sensors at air monitoring stations.

Annual meteorological calibrations at each station are conducted throughout the year. Three calibrations on WS/WD sensors were completed this quarter.

iii. Provide locations of Portable Stations in the WBEA Network.

The locations of portable stations in the WBEA Network for 2024-2025 Q4 are listed in Table 3.

Table 3. Location of Portable Stations in WBEA Network, January to March 2025

WBEA Portable Number	October	November	December
AMS 101	WBEA Centre	WBEA Centre	WBEA Centre
AMS 102	Jackfish 1	Jackfish 1	Jackfish 1
AMS 103	Hangingstone Expansion	Hangingstone Expansion	Hangingstone Expansion
AMS 104	WBEA Centre	WBEA Centre	WBEA Centre
AMS 105	Bertha Ganter – Fort McKay	Bertha Ganter – Fort McKay	Bertha Ganter – Fort McKay
AMS 106	WBEA Centre	WBEA Centre	WBEA Centre
AMS 28	Kirby North	Kirby North	Kirby North

iv. Provide continuous analyzer operation statistics, by month.

Continuous air quality analyzer operation statistics are provided in Table 4. These totals do not include meteorological sensors. A total of 3 analyzers operated below 90% uptime between October and December 2024; all analyzers in operational non-compliance were THC analyzers for quarter 3.

Table 4. Continuous Analyzer Operation Statistics by Parameter, October to December 2024

Month	No. of analyzer(s) below 90%	SO_2	H_2S	TRS	THC	O_3	NO_2	CO	CO_2	NH_3	$PM_{2.5}$
October 2024	0	0	0	0	0	0	0	0	0	0	0
November 2024	2	0	0	0	2	0	0	0	0	0	0
December 2024	1	0	0	0	1	0	0	0	0	0	0
Numbers of analyzers in the network		26	15	12	20	11	22	4	3	2	15
Total Number of non- compliances In 12 months		2	3	1	14	0	3	0	1	2	1
Percentage of non-compliance by parameter		3.6%	5.4%	1.8%	25.0%	0.0%	5.4%	0.0%	1.8%	3.6%	1.8%

3.2 Time-Integrated Monitoring – Operate and maintain the WBEA's time-integrated sampling network, maintenance, and sample results.

i. Complete routine deployment and collection of time-integrated sampling. Perform preventative maintenance and repairs, as required.

The WBEA collected and deployed a total of 932 samples from October to December 2024 (See Appendix B for time-integrated equipment present at each AMS location). The number of samples decreased from October to November due to the completion of the Regional Dustfall Monitoring study. Details on sample collection incidents and recovery percentages are provided below in Table 5. Most of the incidents during this quarter were due pump and motor failures.

Preventative maintenance and repairs were conducted by Deposition Technicians, as needed. Examples of maintenance conducted this quarter included troubleshooting issues and replacing or readjusting motors.

Table 5.Time Integrated Sample Collection - Incidents and Recovery, October to December 2024

Month	No. of Incidents	Total No. of samples	% Recovery	# NAPS days	Incidents per Sample Type							
					$PM_{2.5}$	PM_{10}	EC/OC	VOC	PAH	Precip	TSP	Dustfall
October 2024	2	314	99.4	5	1	0	0	1	0	0	0	0
November 2024	3	309	99.0	5	0	0	0	0	3	0	0	0
December 2024	1	309	99.7	5	0	0	0	0	1	0	0	0
Q3 Total	**6**	**942**	**99.4**	**15**	**1**	**0**	**0**	**1**	**4**	**0**	**0**	**0**

ii. Perform quarterly calibrations and audits of sampling equipment.

Quarterly calibrations and audits of time-integrated sampling equipment are to be completed at all stations. Thirty-one calibrations were completed this quarter, with all of them completed in February and March.

iii. Make time-integrated data available online.

Time-Integrated data can be accessed online at https://wbea.org/data/time-integrated-data-search/

iv. Submit time-integrated data with annual data report.

Time-Integrated data is submitted as part of the annual data report in Volume 2. The WBEA 2024 Ambient Data Annual Report was submitted March 31st 2025, and can be found at https://wbea.org/resources-section/annual-data-report/

3.3 Continue the WBEA's Quality Assurance Program

i. Maintain the WBEA's Reference Centre, including monthly calibrations on reference analyzers, perform CGAs, and maintain primary reference materials.

Over the last quarter, regular maintenance and monthly calibrations were carried out on instruments in WBEA's Reference Centre. Ten cylinder gas audits were conducted; all cylinders passed audit criteria.

ii. Complete annual internal audits at all WBEA ambient air monitoring stations.

The WBEA has an internal audit program that follows the same procedures as the Alberta EPA, however, the WBEA applies stricter audit criteria allowing the WBEA to initiate investigations and potential maintenance repairs before an AMS analyzer would fail Alberta EPAs audit. Five internal audits were completed this quarter (Table 6).

Table 6. WBEA Internal Audits of AMS Stations, January to March 2025

Air Monitoring Station	Audit Date	Parameters Audited	Audit Response	Follow-up
Stony Mountain	Jan 15 & 22, 2025	SO2, TRS, NMHC, O3, NOX, CO, CO2, PM2.5	TRS - average response 8.9% high, investigation showed analyzer drift was positive and remaining difference attributed to site calibration gas NMHC - average response for NMHC 8.1% high, some drift observed but majority of difference attributed to site calibration gas (~4-5%) CO2 - baseline operating high due to site N2 generator source, average response 6.4% high with bottom point 12.1% (AF zero ~55 ppm)	SO2/C3H8/CH4 and H2S calibration gas to be replaced next scheduled calibration CO2 requires further investigation, suspect the elevated analyzer zero source is N2 generator installed Jan 3, 2025
Bertha Ganter – Fort McKay	Feb 5-6, 2025	SO2, TRS, H2S, NMHC, O3, NOX, NH3, CO, CO2	No issues observed with audit.	None required.
Waskōw ohci Pimâtisiwin	Feb 20, 2025	SO2, H2S	No issues observed with audit.	None required.
Fort Chipewyan	Mar 4-5, 2025	SO2, TRS, O3, NOX, CO, CO2, PM2.5	NOX passed audit criteria but molybdenum converter is showing signs of conversion loss (~3%), will require future replacement	Monitor calibration activities when part is replaced.
Janvier	Mar 13, 2025	SO2, TRS, O3, NMHC, NOX	No issues observed with audit.	None required.

3.4 Operate the Community Odour Monitoring Program (COMP) App.

The Community Odour Monitoring Program (COMP) was launched in September 2017 with the goal to understand the link between odours experienced in the communities and ambient air quality. Users submit odour observations through the WBEA COMP App. Annual reports of the COMP data were produced between 2018 and 2023 and can be found at https://comp.wbea.org/

A five-year data review was created to examine the link between odour observations and ambient air quality measurements. The data review was first conducted for observations from within the city of Fort McMurray, with the goal to use the same statistical methods for other communities with odour observations. In 2025 the details from the report will be made available online as well as published in a manuscript.

On October 2nd, 2024, a Special Meeting of the OMP committee was held to decide the future of the COMP program and OMP committee. The COMP program was deemed to have met its goal in understanding the link between odour observations and ambient air quality measurements through the results of the 5-year review. The proposed and accepted future direction included:

- Maintaining the COMP app, which can be repurposed for other specific studies.
- Ending the creation of the COMP annual reports.
- Releasing the manuscript and website-based public report of the 5-year study results.
- Ending the OMP committee and moving all odour related activities under the purview of the AATC committee. The AATC accepted the transfer of the activities.

i. Create awareness of the COMP and COMP App for community members.

See details above. No awareness campaigns will be conducted unless a specific study is developed and the use of the data the app collects is defined and approved by the AATC.

ii. Release publicly available annual report on the WBEA website.

See details above. It was decided to end the annual reports, so no report will be made for the 2024 data. Past reports from 2018 to 2023 can be found at https://comp.wbea.org/

3.5 Modify operations and reporting to meet new requirements in the Air Monitoring Directive (AMD).

The Alberta EPA released a new TRS guideline at 5 ppb per 30-min clock average, which came into effect on October 1, 2024. Reporting on this began January 1st, 2025, but WBEA began its reporting on December 12th, 2024, to ensure internal data processes were working.

3.6 Continue partnership with Athabasca Chipewyan First Nation (ACFN) and Mikisew Cree First Nation (MCFN) to create an Indigenous-led air monitoring program in the Peace Athabasca Delta.

The WBEA, ACFN, and MCFN successfully completed the three-year plan to expand the air monitoring capabilities within the community of Fort Chipewyan and support the Air Quality Monitoring in the Peace Athabasca Delta Indigenous Community Based Monitoring (ICBM) work plan. ACFN and MCFN staff operate and maintain the Fort Chipewyan AMS and change-out all time-integrated and deposition samples. This work is ongoing and is now considered routine network operations. Reporting of all data

collected through this initiative are included in the WBEA's routine monthly and annual reports, which are submitted to the Alberta EPA, and available on the WBEA's website.

3.7 Provide updates on Special Studies conducted by the WBEA to improve understanding of air quality in the RMWB region, monitoring methods, assessment of technology changes and method validation.

The WBEA conducts several special studies to ensure methods, technology, and data are of the highest quality. The following projects are currently being conducted by the WBEA:

Continuous Hydrocarbon Instrument Evaluation Study: The goal of this study is to ensure the WBEA hydrocarbon analyzers are accurately reporting ambient hydrocarbon concentrations. This study is separated into two phases:

Phase 1 (Complete) The intent of phase one was to compare Thermo 51i to Thermo 55i analyzers. This was done in a co-location study and any differences in the data response between the different analytical technologies was examined. The reason for this analysis was that the WBEA recently replaced Thermo 51i analyzers with Thermo 55i analyzers at several stations. Phase one results indicated that the Response factor (RF) for the 51iTHC analyzer was much lower than expected for propane only.

Phase 2 (Ongoing) Based on the findings of the phase one study, the WBEA determined it was important to better understand the differences in analyzer response factors for propane across multiple manufactured flame ionization detector systems. The WBEA decided to include five instruments in this study: Thermo 51i, Thermo 55i, API N901, Mocon 9000NMHC and Envea NMHC. The station with all required equipment was deployed May 21-25th, 2024. The equipment has been operational and is collecting data.

Continuous Particulate Instrument Evaluation Study: The goal of this study is to understand the differences in PM monitoring technologies and how they may influence PM data in the WBEA Network. This study is separated into two phases:

Phase 1 (Complete) This portion of the study was completed in 2021-2022 and included a co-located study of the old and new $PM_{2.5}$ continuous monitoring technology. The purpose was to (1) understand any differences in response between the technologies, (2) to collect PM_{10} and $PM_{2.5}$ federal reference method (FRM) data to compare to both technologies for reference, and (3) to compare T640 PM_{10} data to the FRM for PM_{10} to validate the T640 as it is not a federal equivalent method (FEM) analyzer for PM_{10}.

Phase 2 (Ongoing) The purpose of phase two is to attempt to find differences in the PM monitoring methods to more accurately collect $PM_{2.5}$ data. The following instruments will be evaluated:

- API T640
- API T640x (FEM for PM 10 & PM 2.5)
- API T640 + BGI mini PM10 head
- SHARP 5030
- Partisol (PM 10)

The Fort McKay South AMS site compound was the chosen location for this study as it has the space and power available to accommodate the study. The shelter, with instruments installed, was deployed to the Fort McKay South AMS compound in March 2023. Data collection and evaluation is now ongoing. Data review and analysis will begin soon.

3.8 Continue operating a Regional Dustfall Monitoring program.

The WBEA's Ambient Air Technical Committee (AATC) approved the proposed Regional Dustfall Monitoring Proposal at the September 14th, 2022, committee meeting. The study is focused on publicly accessible residential and recreational areas and will measure monthly collections of dustfall according to the American Society for Testing and Materials 1739-98 method. Sampling for this program began in November 2022 and was a two-year pilot study, ending in October 2024. Dustfall collectors were deployed at six community air monitoring stations: Bertha Ganter – Fort McKay, Patricia McInnes, Athabasca Valley, Anzac, Janvier, and Conklin.

At the conclusion of the study, a report was created and presented to the WBEA's AATC committee in December 2024. This report compared the dustfall measurements to continuous $PM_{2.5}$, PM_{10}, and TSP measurements, also taken at community AMS. After review and discussion on the program, the committee approved the decision to continue monitoring dustfall at Bertha-Ganter – Fort McKay starting January 2025. At the March 2025 AATC meeting, the opportunity to discuss a potential future regional dustfall program was opened to members but no pathway or action was determined.

3.9 Fulfill monitoring requests from the Fort McKay Air Quality and Odours Advisory Committee (FMAQOAC) Recommendations 14/15 committee in accordance with the schedule outlined in the approved OSM Program work plan. Document all activities completed.

i. Analysis and Reporting of VOC and RSC compounds for the Triggered Samplers.

This project was initiated through the Rec 14/15 committee. The intent was to design and build VOC canister and RSC tube sampling systems to capture triggered samples during events of semicontinuous NMHC and continuous TRS readings in the Fort McKay region. The WBEA designed and ordered two custom-made triggered samplers – one for RSC compounds, based on a methodology the WBEA developed in 2017, and one for VOCs. Both samplers were installed at Bertha Ganter – Fort McKay AMS in February 2022.

An analysis was conducted on all data from October 2022 to October 2024. The results were provided to the Rec 14/15 to determine the future of this sampling. After review of the report and data, the Rec 14/15 decided on the following path forward:

- Discontinue the VOC Triggered Samples since the VOC Gas Chromatograph data has proven to be reliable. The WBEA stopped the triggered VOC Sampling in October 2024.
- Move the RSC Triggered Samples to a process of manual trigger during times of odour experienced by community members in Fort McKay to allow for better understanding of RSC compounds during events of experienced odours within the community.

The RSC Triggered Samples have recently had issues with data validity. The WBEA has been troubleshooting this issue; leak checks were performed, and the instrument passed this test. The instrument will be sent back to the manufacturer for software updates and new sample tubes will be purchased in hopes of correcting the data issue.

ii. Operation and maintenance of the VOC and RSC Gas Chromatograph analyzers.

The VOC and RSC Gas Chromatographs (GCs) are operational and collecting data at the Bertha Ganter – Fort McKay AMS. Both instruments are collecting data and have been running relatively smoothly. Data processing and validation has been going well for the VOC GC but is a bit more laborious for the RSC GC as it requires manual calculation of concentrations.

Data from both the VOC GC and RSC GC are available on the WBEA website under "Other Data" at https://wbea.org/data/time-integrated-data-search/

3.10 Provide data from the WBEA's ambient air monitoring network.

i. Maintain processing, validation, and reporting of all WBEA ambient air quality data. Make all data available on the WBEA's website.

During the fourth quarter of 2024-2025, monthly ambient air data was reviewed, as per the WBEA's monthly data validation process. Quality controlled Level II data was made available on the WBEA's website 30 days after the end of the calendar month in which the data were collected (https://wbea.org/data/continuous-monitoring-data/)

WBEA time-integrated data was collected and centralized within a database. A catalogue containing sample types, number of data points, and date ranges is available to view on the WBEA website. The catalogue and download page are available at https://wbea.org/data/time-integrated-data-search/

ii. Report exceedances of the Alberta Ambient Air Quality Objectives and Guidelines, and non-compliances of the Air Monitoring Directive to the Alberta Government as established by WBEA's Immediate Reporting Protocol and the Fort McKay Acute Response Triggers (FMART) Process.

The WBEA notifies members of exceedances in the ambient air network using the Air Quality Events app. Exceedances are also reported at quarterly committee meetings and through the WBEA's ambient air monitoring monthly data reports. These reports can be found at https://wbea.org/monthly-continuous-data-and-calibration-reports/

In the third quarter of 2024-2025, there were a total of 40 recorded exceedances within the WBEA network (Table 7). Users can search all exceedances through the WBEA's Air Quality Events website (https://wbea.org/data/air-quality-events/).

Table 7. Total number of Exceedances by Parameter, from October to December 2024

Event Type	Parameter							Total
	H_2S	$PM_{2.5}$	O_3	SO_2	Dustfall	TRS*	TSP	
AAAQG	-	5	-	-	0	2	-	7
AAAQO	31	1	0	1	-	-	0	33
Total	**31**	**6**	**0**	**1**	**0**	**2**	**0**	**40**

** TRS has been added to the table due to the new AAAQG*

Non-compliances of the AMD that occurred in the WBEA network in the third quarter of 2024-2025 are listed in Table 8. There were 19 non-compliances during the third quarter.

Table 8. WBEA Non-Compliances, October to December 2024

Reporting Period	Date Reported	Alberta EPA Reference Number	Location	Brief Description	Issue	Remedial Action
October	29-Oct-24	434706	Stony Mountain	The WS/WD sensor at the 20-meter elevation at Stony Mountain AMS operated less than 90% of October 2024, due to frozen sensor.	Throughout October, the WS/WD sensor froze due to weather conditions, resulting in inaccurate data. The sensor returned to normal operation when weather conditions changed, and the sensor thawed. Data from the freezing events were invalidated for a total of 79 hours, resulting in a sensor operational time of 89% for October.	N/A
October	04-Nov-24	434889	Jackfish 1	The wind speed and wind direction (WS/WD) sensor at the Jackfish 1 AMS operated less than 90% of October 2024, due to frozen sensor.	Throughout October, the WS/WD sensor froze due to weather conditions, resulting in inaccurate data. The sensor returned to normal operation when weather conditions changed, and the sensor thawed. Data from the freezing events were invalidated, resulting in a sensor operational time of 88% for October.	N/A
October	13-Nov-24	435156	Surmont 2	The wind speed and wind direction (WS/WD) sensor at the Surmont 2 AMS operated less than 90% of October 2024, due to frozen sensor.	Throughout October, the WS/WD sensor froze due to weather conditions, resulting in inaccurate data. The sensor returned to normal operation when weather conditions changed, and the sensor thawed. Data from the freezing events were invalidated, resulting in a sensor operational time of 88% for October.	N/A
November	17-Dec-24	436182	Stony Mountain	The wind speed and wind direction (WS/WD) sensor at the 10-meter elevation at Stony Mountain AMS operated less than 90% of December	On December 3, the WS/WD sensor was not reading properly so the tower was lowered for troubleshooting. The pulley mechanism was not operating normally, and in addition, the sensor was frozen to the tower crossarm due to weather conditions. On December 18, the pulley was repaired, and the sensor was properly deployed. Data from the event was	The sensor was repaired.

				2024, due to sensor not reading properly.	invalidated for a total of 340 hours, resulting in a sensor operational time of 46% for December.	
November	06-Dec-24	435901	Mannix	The relative humidity (RH) sensor at the 75m elevation at the Mannix air monitoring station (AMS) operated less than 90% of November 2024, due to over-ranging.	During monthly data validation, it was identified that the RH sensor data at the 75m elevation was intermittently out of normal range. The WBEA relies on a third-party contractor for sensor replacement, which is subject to their availability. On November 9, sensor replacement was attempted but was unsuccessful due to instrument communication errors. Data was invalidated during periods when RH measurements were inconsistent with comparable sensors in the WBEA ambient network, resulting in 86.67% operational time for November.	The WBEA is currently working with the contractor to schedule their return at the earliest available opportunity.
November	06-Dec-24	435904	Fort McKay South	The THC/NMHC/CH4 analyzer at the Fort McKay South AMS operated for less than 90% of November 2024, due to unstable baseline response.	During the month of November, the THC/NMHC/CH4 analyzer displayed periods of unstable baseline response and days when the daily QA span check failed to meet AMD criteria. WBEA performed maintenance throughout November to adjust the span response and the chromatogram window, and to replace the actuator in the analyzer. The problem persisted prompting analyzer replacement on November 25. Data from periods of maintenance and unstable operation were invalidated for a total of 98 hours, resulting in an analyzer operational time of 86.4% for November.	Replaced actuator and adjusted window timing.
November	12-Dec-24	436050	Fort Chipewyan	The routine monthly calibration was not conducted on the PM2.5 analyzer at Fort Chipewyan AMS for the month of November 2024, due to malfunction of the instrument used for calibration.	The routine monthly calibration for PM2.5 was attempted on November 29; however, it was not completed due to a malfunction of the instrument used for calibration of this analyzer. The WBEA worked with the local technicians to arrange for delivery of a replacement instrument and to reschedule the calibration. The calibration was completed on December 10, 2024. The data validation for November confirmed that the monthly calibrations performed prior to November, on	N/A

					October 22, and after, on December 10, both met the AMD calibration criteria, and daily quality checks during this period were also within AMD criteria; trending closely with the nearest station, Fort Hills, located 219 km south. In addition, there were no ground level concentration exceedances of the maximum 24-hour Alberta Ambient Air Quality Objective (29 µg/m³) and the 1-hour Alberta Ambient Air Quality Guideline (80 µg/m³) for the Fort Chipewyan or Fort Hills station, or any station across the network for the month of November. The highest maximum 24-hour and 1-hour concentration reported at Fort Chipewyan for November was 14.2 µg/m³ and 28.7 µg/m³, respectively.	
November	12-Dec-24	436051	Athabasca Valley	The barometric pressure (BP) sensor at Athabasca Valley AMS operated less than 90% of November 2024, due to local power outage.	On November 23, a local power outage occurred, impacting the station and causing the BP sensor signal to flatline. The WBEA reset the sensor, verified its performance, and resolved the issue on November 27. Data from this incident was invalidated for a total of 92 hours, resulting in an operational time of 87%.	Reset sensor on November 27.
November	13-Dec-24	436107	Conklin	The THC/NMHC/CH4 analyzer at the Conklin AMS operated for less than 90% of November, due to unstable baseline.	During daily system checks on November 16 and 17, the THC/NMHC/CH4 analyzer displayed unstable baseline readings and span response. The WBEA performed maintenance to adjust the span response and to replace the sample inlet filter. The problem persisted prompting analyzer replacement on November 18. Data from this incident were invalidated, resulting in an analyzer operational time of 89% for November.	Analyzer was recalibrated to adjust the span on November 18.

November & December	19-Dec-24	436271	Fort McKay - Bertha Ganter	The wind speed and wind direction (WS/WD) sensor at Bertha Ganter – Fort McKay AMS operated less than 90% of November and December 2024, due to odd signals.	Intermittently throughout November and December, the WS/WD sensor displayed odd signal outputs prompting an investigation. On December 4, the sensor was replaced, and normal operations resumed. Data from the event was invalidated for a total of 160 hours in November and 87 hours in December.	Sensor was replaced on December 4.
December	17-Dec-24	436182	Stony Mountain	The wind speed and wind direction (WS/WD) sensor at the 10-meter elevation at Stony Mountain AMS operated less than 90% of December 2024, due to inconsistent wind speed signals.	On December 3, the WS/WD sensor was not reading properly so the tower was lowered for troubleshooting. The pulley mechanism was not operating normally, and in addition, the sensor was frozen to the tower crossarm due to weather conditions. On December 18, the pulley was repaired, and the sensor was properly deployed. Data from the event was invalidated for a total of 340 hours, resulting in a sensor operational time of 46% for December.	Wind speed sensor was repaired on December 18.
December	28-Jan-25	437200	Lower Camp Met Tower	The WS/WD/VWS at the 100-meter and 163-meter elevation at Lower Camp Met Tower operated less than 90% of December 2024, due to ice fog events.	During the month of December 2024, the output signals from the WS/WD/VWS sensors at the 100-meter and 163-meter elevations experienced intermittent flat-line periods. These disruptions were likely caused by ice fog affecting the sonic sensors. The sensors returned to normal operation once the weather conditions improved. During the data validation process, a total of 92 hours of data at the 100-meter elevation and 196 hours at the 163-meter elevation were invalidated due to these sensor interruptions.	N/A

iii. Provide real-time air quality data from continuous air monitoring stations to EPA real-time website in the required format.

Real-time air quality data is provided on a continual basis to Alberta EPA via a secure file upload from the WBEA Data Management System.

iv. Submit Monthly Ambient Air Monitoring Report to the Alberta Government and submit data to the EPA Air Data Warehouse.

Table 9 lists the Monthly Air Monitoring Reports and Quality Assured Data that were submitted electronically via the Electronic Transfer System (ETS) to Alberta EPA.

Table 9. Schedule of Monthly Air Monitoring Reports and Quality Assured Data Submissions from October to December 2024

Monthly Air Monitoring Report and Quality Assured Data	Date Submitted
October 2024	November 29, 2024
November 2024	December 23, 2024
December 2024	January 31, 2025

v. Provide WBEA data to citizens, industry members, regulatory bodies, and governments so that it can be used to make informed decisions on health, facility compliance, and environmental management and policy. All data management and accessibility outcomes will be in alignment with the OSM Program direction.

The WBEA makes data accessible on the WBEA website. Data is further disseminated through the Alberta Data Warehouse, community outreach activities, and through WBEA committee meetings. The WBEA engages with members including Indigenous communities, industry, three levels of government, and non-government organizations. The WBEA works with Alberta EPA and OSM Program staff to ensure data management and accessibility outcomes are aligned.

vi. Any data not submitted to the Alberta Data Warehouse or not on the WBEA website will be provided directly to Alberta EPA in an agreed upon format within three months of data collection.

If data is not submitted to the Alberta Air Data Warehouse or not posted on the WBEA website, the WBEA will provide the data to Alberta EPA in an agreed-upon format within three months of data collection.

vii. Submit the WBEA Continuous Ambient Air Quality Monitoring Program Annual Report 2024 – Volume 1 Continuous Data; Volume 2 Integrated Data; and Volume 3 Site Documentation.

The 2024 Ambient Air Monitoring Data Annual Report was submitted March 31st 2025, and is available online at https://wbea.org/resources-section/annual-data-report/.

3.11 Participate in Oil Sands Monitoring (OSM) Program related to optimizing and improving the active air monitoring network in the Athabasca Oil Sands Region (AOSR).

i. Participate in OSM Program Committees, activities, workshops, and webinars.

From January to March 2025, the WBEA participated in the OSM Air and Deposition TAC meetings, as required.

ii. Implement any additions, deletions, or any other changes to the WBEA active air monitoring network consistent with approved OSM Program workplan(s).

Based on the 2024-2025 workplan, there were no additions, deletions, or other changes to the WBEA active air monitoring network that were not previously identified.

iii. Document any additions, deletions, or any other changes to the WBEA continuous or time-integrated air monitoring network not indicated previously. Identify and describe any deviations from the approved OSM Program.

Based on the 2024-2025 workplan, there were no additions, deletions, or other changes to the WBEA continuous or time-integrated air monitoring network that were not previously identified.

iv. Participate in development of Adaptive Monitoring Approach for Active Air Monitoring Network.

From January to March 2025, the WBEA participated in the OSM Air and Deposition TAC meetings, as required.

4. Integrated Atmospheric Deposition Monitoring, 2024-2025 Work Plan Reference A-PD-6-2425

Atmospheric deposition is a critical pathway that links stressors to responses. Deposition monitoring data are used by the Oil Sands Monitoring Program to assess responses, and to help determine the source(s) of stressors. The primary objectives for atmospheric deposition long-term monitoring are to:

(1) *Determine levels and changes of atmospheric deposition for specific pollutants that pose a likely risk for forest, river, lake, and wetland ecosystem function (OSM Objective #1 and #2)*

(2) *Quantify the contribution of OS emissions to deposition of pollutants of concern, particularly at ecological monitoring sites, and provide these data to ecological effects monitoring projects (OSM Objectives #1 and #2)*

(3) *Improve integration within and across themes, including continued model comparison and delivering deposition maps required by other themes (OSM Objective #3)*

This work plan monitors the spatial and temporal changes in deposition of pollutants of concern at relevant ecological monitoring sites, including: acidifying (e.g., nitrogen, sulphur, and base cations) and eutrophying (e.g., nitrogen) pollutants at forest and wetland sites; and contaminants (i.e., polycyclic aromatic compounds (PACs) and trace metals) at forest, wetland, and aquatic sites. This work plan also contains environmental effects monitoring related to deposition, including: soil and forest health indicators, and fen/bog indicators. These effects monitoring activities are co-located with deposition monitoring to allow for an assessment of if/how deposition is affecting the environment.

Source apportionment analyses and chemical transport models can both determine the contribution of specific OS and non-OS sources to deposition. Deposition modelling and GIS techniques will support the estimation of deposition at ecological monitoring sites where deposition is not actually measured, and allow for determination of contribution of OS sources. The key modelling tool that will enable the above is GEM-MACH, which is an observation-evaluated tool that simulates emissions, transport, transformation, and deposition, and is used for scenario testing. GEM-MACH will be used in a 'service delivery role by 2024 (e.g., providing annual deposition maps, scenario-testing), with transition to that role finishing 2022-23, including comparison against surface observations. Beyond 2024, GEM-MACH will undergo periodic evaluations and updates as emissions evolve and inputs/science improves.

Integration is an on-going and iterative process. The focus for 2023/24 will be: (i) completion of model comparison to surface monitoring network data, (ii) improvement using data from past studies and long-term monitoring, (iii) configuration of the model and its inputs to provide deposition maps and output to estimate change and for adaptive monitoring purposes, (iv) further alignment of deposition monitoring methods and approaches across the OS Regions, and (iv) continued transitioning, as appropriate, to the adaptive monitoring framework including formalizing baseline and limits of change for ambient deposition surveillance monitoring and modelling.

The following objectives relate to ambient deposition and effects surveillance monitoring (and should not be conflated with the OSM Program Objectives noted previously):

1) *Monitor air concentrations and deposition of nitrogen, sulphur, base cations, and ozone at forest and wetland sites in the Oil Sands Regions, as well as nitrogen and sulphur deposition at two downwind transboundary sites. These data are directly used with data from Objective #2 for assessing stressor-response links, as well as for model comparison (see Objective #9).*

2) *Monitor soil and vegetation parameters in the Athabasca and Cold Lake regions for indicators of vegetative changes and acidification. Soil measurements are integrated with measured and/or modelled deposition data to assess stressor-response linkages.*

3) *Monitor temporal and spatial changes in deposition through regional collection of lichen samples for trace metals, PAHs, total nitrogen, and total sulfur. Data derived from this biomonitoring provides critical information about the extent of stressors entering ecosystems via the deposition pathway. These data are also necessary for the Groundwater, Surface Water, and Terrestrial TACs to investigate effects and attribute these effects to specific sources.*

4) *Continue operating a monitoring site where all deposition measurement methods are co-located with an existing continuous monitoring station for the purpose of ensuring measurement comparability.*

5) *Test surrogate surface samplers, a method to quantify fugitive dust deposition, at a subset of air monitoring stations for the spring, summer and fall. If validated, these data will complement the wintertime snowpack measurements allowing for direct year-round quantification of fugitive dust deposition.*

The following section provides details on the Q4 2024-2025 milestones and objectives under Workplan A-PD-6-2425 (Integrated Atmospheric Deposition Monitoring) and is based off the deliverables in the Government of Alberta contract 24RSD828.

4.1 Operate and maintain the Denuder sampling program, including routine sample changeouts and equipment maintenance.

Routine denuder sample changeouts are completed monthly at all sites (Figure 1). Dates for this quarter's denuder changeouts are:

January 7th to 9th and 11th, 2025
February 3rd to 5th, 2025
March 3rd to 5th, 2025

In January, sites 2001 and 3009 could not be visited due to extreme weather conditions preventing helicopter access. Therefore, denuder samples at those sites were not changed out in January.

A denuder design update to improve temperature control and flow rate precision was started in August 2023. A review of the data and observations made by the Deposition Technicians indicated an issue with the flow rate. The actual flow rate differed from the rate logged by ~0.5. Denuder data is in the process of being reviewed and corrected, as the flow rate is used in the calculation of concentrations. Recent flow calibrations and audits have led to overall more consistent flow rates across the network.

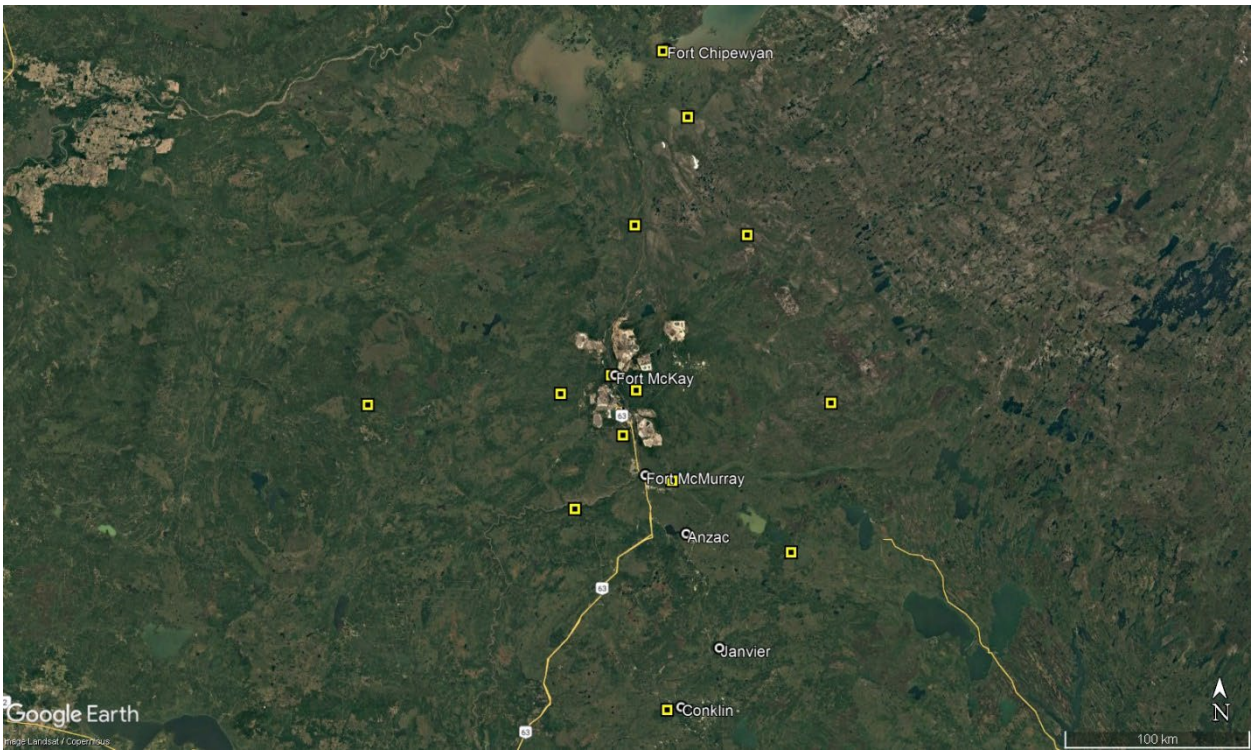

Figure 1. Map of the current denuder/passive locations (yellow symbols).

4.2 Operate and maintain the Passive sampling program, including routine sample changeouts and equipment and site maintenance.

All passives are co-located with a denuder (see Figure 1 for locations). Passives sample for Nitrogen Dioxide (NO_2), Ozone (O_3) and Sulphur Dioxide (SO_2). Passive sampler changeouts are completed monthly and dates for this quarter's passive changeouts are:

January 7th to 9th and 11th, 2025
February 3rd to 5th, 2025
March 3rd to 5th, 2025

In January, sites 2001 and 3009 could not be visited due to extreme weather conditions preventing helicopter access. Therefore, passive samples at those sites were not changed out in January.

4.3 Operate and maintain the Ion Exchange Resins network sampling program, including routine sample changeouts and equipment and site maintenance.

Equipment and site maintenance was conducted as needed throughout this quarter. The next routine sample changeout will occur in May 2025. Due to mine expansion, two IER sites (2050 and 3550) were decommissioned in January. All samples and equipment were retrieved from the sites.

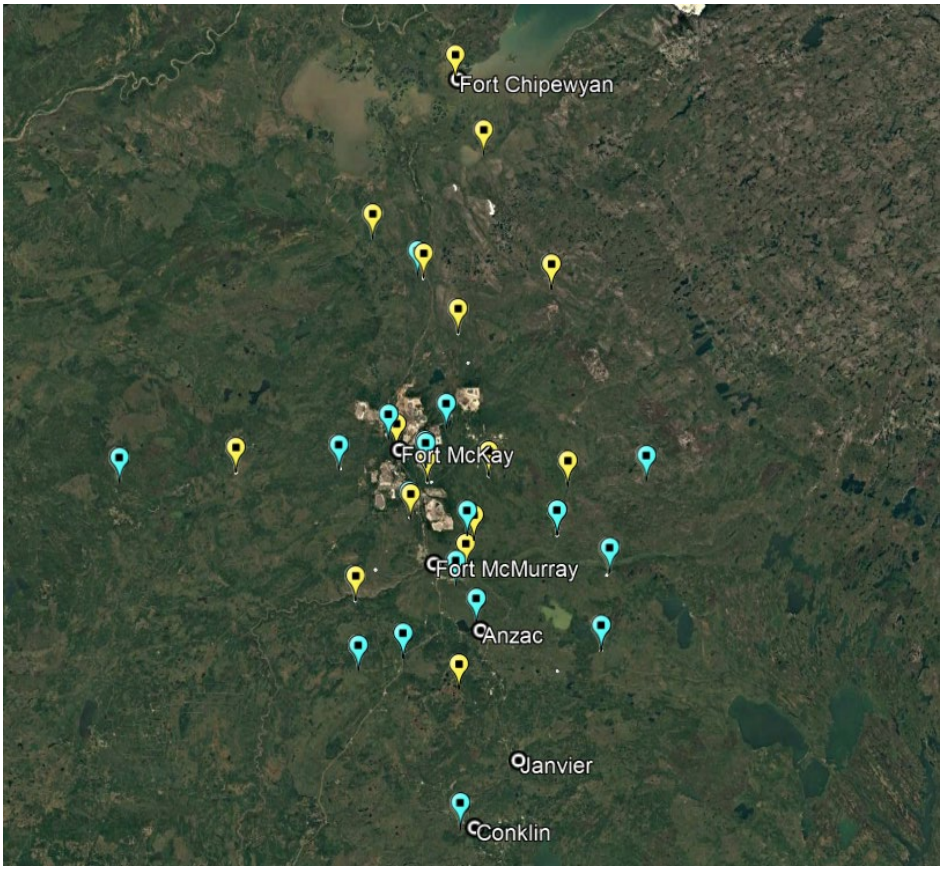

Figure 2. Map of the current IER freefall (yellow symbols) and throughfall (blue symbols) sites.

4.4 Operate and maintain the Turf Surrogate Surface Sampler pilot program, including routine sample changeouts, equipment and site maintenance, and data review.

The Turf Surrogate Surface Sampling (TSSS) project was initiated to collect dry-depositing gases using a method based on trials conducted in the USA. The TSSS consists of a disk-shaped airfoil supporting an artificial turf disk, which aims to collect the gases without altering the existing turbulent flow. Two TSSS collectors were deployed between June and October 2023. Data was reviewed and several issues were identified. In June 2024, the TEEM committee passed a motion to pause the project until these issues could be resolved.

4.5 Operate and maintain the Remote Ozone Network monitoring program, including routine and preventative maintenance, and data review.

The Remote Ozone Monitoring program was proposed to and approved by the TEEM Committee at the September 14th, 2022, meeting. The program was created to provide continuous 15-minute measurements of ozone and meteorological conditions in remote areas around the RMWB during the annual growing season (i.e., April through October). The two main objectives of the Remote Ozone Program are to (1) measure ground-level ozone increases due to stratosphere-troposphere exchange (STE), and (2) measure the transformation of ozone created as a secondary pollutant from oil sands emissions (ROM). Initial deployment of the equipment in 2022 indicated the equipment was very sensitive to cold temperatures. The WBEA purchased cold-weather kits for the unit and trialed deployment at Athabasca Valley AMS from November 2023 to February 2024. Results showed that although the unit turns off in extreme temperature drops, it will turn back on when temperatures rise and thus the ozone monitoring program was initiated in early 2024 at a total of four locations.

STE Program: On February 28th, 2024, an ozone analyzer was deployed remotely at site 2001; this site was chosen since it is to the north-west and therefore ozone levels would not be influenced by industrial emissions and could instead capture the stratosphere-troposphere exchange. The analyzer remains deployed and is collecting data.

ROM Program: Three ozone analyzers were deployed in early May 2024. Two analyzers were deployed at remote locations (4002 and 4914) and one analyzer was co-located at AMS 17 (Wapasu station) which has a continuous ozone monitor, allowing for comparison among the two equipment types.

All ozone units were removed from the field in October 2024. Post-field calibrations and audits on the equipment was completed.

4.6 Operate and maintain the Meteorological Towers data collection program, including tower inspections and maintenance, equipment maintenance, and annual calibrations.

The Regional Meteorological Network (MET) provides multi-level continuous, hourly measurements of meteorological conditions in remote areas around the Wood Buffalo region. The WBEA operates six meteorological towers. Data collected by these towers are used for deposition calculations and modelling. The data is reviewed weekly and validated monthly.

Tower conditions were checked visually during routine sampling, which generally occurs monthly. Maintenance was scheduled as needed. The annual meteorological sensor swap and calibrations occurred in early September for all remote towers.

4.7 Provide an update on the Forest Health Monitoring program, including site maintenance, data review, and planning for the 2024 campaign.

The Forest Health Monitoring (FHM) program was established in the 1990s to examine the effects of deposition on soil chemistry and vegetation in mature Jack Pine forests. Field work to collect data is completed every six years.

2024 FHM Field Campaign: The intensive field sampling campaign began August 1st, 2024. Twenty-four of the twenty-five Forest Health sites were completed; one site (4015) was burned in the 2024 wildfires and could not be sampled. Measurements of trees and understory vegetation, needle samples and soil samples were collected at each site. Some flight delays occurred due to heavy smoke and fog in the region. Fieldwork concluded on September 16th.

Tasks for this quarter focused on continued review of field data, initial reviews of laboratory data, and the beginnings of data analyses.

2024 FHM Focus Studies: Two focus studies were approved by the TEEM committee and added to the 2024-2025 OSM Workplan. This included:

> **Indigenous Indicator - Deposition Impacts on *Cladonia mitis* Lichen (Focus Study):** The WBEA proposed the addition of *Cladonia mitis* (Caribou lichen), a ground-dwelling lichen that is a key food source to the Woodland Caribou and makes up a major component to the understory biomass at the jack pine sites. The proposal included lichen collection at the 25 forest health sites at the same time as the long-running sampling of the epiphytic lichen (*Hypogymnia physodes*). Ecological observations were also collected on the health of the lichen and surrounding jack pine forest.
>
> The sampling program ran from September 9th to September 25th, 2024, *C mitis* was collected at 19 of the 25 Forest Health sites and *H physodes* was collected at 21 of the 25 Forest Health sites; past wildfires were the main reason for the absence of lichen at a site. Eight communities participated in the lichen collection. Ecological observations were collected at all sites visited.
>
> Tasks for quarter four focused on drafting and reviewing the Volume 1 – Ecological Observations of the Forest Health reports. These were presented to the TIKC, FH Workshop participants and TEEM for feedback. This quarter also focused on finalizing the grinding SOP and conducting the grinding of all lichen samples. This was completed in February and samples were shipped to the laboratories for analyses.
>
> **Indigenous Indicator – Deposition Impacts on Traditional Food (Focus Study):** The WBEA proposed the addition of blueberry collection and analysis at eight sites with known deposition levels. Ecological observations were also collected on the health of the blueberries.
>
> Seven sites were sampled between August 12 – 16th, 2024. Due to heavy smoke, one helicopter day was not possible, which corresponded to a loss of two sites; in response to this, one truck

accessible site was added to the program. Five communities participated in the blueberry collection. Ecological observations were collected at all sites visited. All samples were shipped to the labs for analysis in mid-August.

Tasks for quarter four included the drafting and reviewing of the Volume 1 – Ecological Observations of the Forest Health reports. These were presented to the TIKC, FH Workshop participants and TEEM for feedback. Data received from the laboratories was reviewed. Initial data analyses were conducted and communicated to the TEEM Committee and FH Workshop participants.

Forest Health Workshops: A series of planning workshops was initiated in 2023, with the goal to (1) align all WBEA members on the FHM objectives and history, and (2) review and determine the path forward of the FHM program. The first workshop was held November 7th and 8th 2023 where the history and results of the project to date were reviewed. The second workshop was held January 30th and 31st 2024 and topics included review of the previous workshop, a review of the TPP recommendations and the beginning of determining priority indicators for upcoming monitoring programs. A third Forest Health workshop was held April 10th and 11th, 2024 which included a presentation of other OSM programs, discussions around proposed additions of *Cladonia mitis* lichen and blueberries as focus studies to the 2024 campaign, and a review of key plants of interest to WBEA members. Workshops were paused for the summer and fall to allow WBEA staff to focus on the preparations for and execution of the field campaigns.

The fourth Workshop was hosted in quarter 3, on February 19th and 20th, 2025. This workshop saw the highest participation yet with 56 individuals in attendance. The workshop focused on reviewing the field programs, reviewing the draft reports for Volume 1 – Ecological Observations for both focus studies, reviewing the lichen program and starting discussions about the 2027 program, and reviewing potential future focus studies in the program.

4.8 Provide an update on the 2021 Lichen sampling program.

All lichen samples collected as part of the 2021 regional lichen monitoring program have undergone laboratory analysis and data has been received. The data was reviewed and issues with some of the data, particularly the trace metals, were noted. The contracted lab was contacted to attempt to figure out the issues and the WBEA's ASG lab also began running tests to figure out the data issue. Once data has been validated, the analyses can continue, and a report and publication are expected in 2025.

4.9 Data & Reporting

i. Maintain public access to WBA deposition data via the WBEA website.

Public access to the searchable deposition database, plus additional datasets in excel files, can be found at https://wbea.org/data/time-integrated-data-search/

ii. Provide support for ongoing analysis and interpretation of deposition monitoring and modeling data.

The WBEA Science Advisors continue to support the OSM Model-Measurement Intercomparison. In addition, support for analysis and interpretation of WBEA data is provided upon request.

iii. Provide WBEA data to citizens, industry members, regulatory bodies and governments, so that it can be used to make informed decisions on health, facility compliance, and environmental management policy. All data management and accessibility outcomes will be in alignment with the OSM Program direction.

Data collected under the Integrated Atmospheric Deposition Monitoring workplan is available to view on and/or download from https://wbea.org/data/time-integrated-data-search/. Users can search the WBEA's catalogue of data and can filter for specific sample types, date ranges, etc.

4.10 Changes to the Monitoring Network.

i. Participate in Oil Sands Monitoring (OSM) Program committees, activities, workshops and webinars related to optimizing and improving the atmospheric deposition monitoring network in the AOSR.

From January to March 2025, the WBEA participated in the OSM Air and Deposition TAC meetings, as required.

ii. Implement any additions, deletions or any other changes to the WBEA atmospheric deposition monitoring network consistent with approved OSM Program work plan(s).

Based on the 2024-2025 workplan, there were no additions, deletions, or other changes to the WBEA deposition monitoring network this quarter that were not previously identified.

iii. Document any additions, deletions or any other changes to the WBEA atmospheric deposition monitoring network not indicated previously. Identify and describe any deviations from approved OSM Program work plan(s).

Based on the 2024-2025 workplan, there were no additions, deletions, or other changes to the WBEA deposition monitoring network this quarter that were not previously identified.

5. Appendix A – Adhering to Contract Clauses

Clause 9

As per Clause 9, Personnel Replacement, of the WBEA Contracts with Alberta EPA, the WBEA is required to report any changes to the list of key personnel. The WBEA made no changes to its key personnel list during this reporting period. Any changes would be communicated to the Alberta EPA within five business days of the change.

Clause 12

As per Clause 21, Conflicts of Interest and Ethical Conduct, of WBEA's Contracts with Alberta EPA, the WBEA is required to report all potential or perceived conflicts of interest. The WBEA noted the following potential or perceived conflicts of interest during this reporting period (Table 10). These conflicts are communicated to the Alberta EPA via email within five business days of each meeting.

Table 10. Declared Conflicts of Interest in Q4, January to March 2025

Date	Meeting	Member (Name and Organization)		Declared Conflict of Interest
January 17, 2025	GC Meeting	Ryan Abel	Fort McKay First Nation	Participates on OSM Air and Deposition TAC and OSM Oversight Committee as alternate and OSM Indigenous Caucus
February 21, 2025	GC Meeting	Ryan Abel	Fort McKay First Nation	Participates on OSM Air and Deposition TAC and OSM Oversight Committee as alternate and OSM Indigenous Caucus
March 12, 2025	AATC	Courtney Brown	Canadian Natural	Participates on OSM Air and Deposition TAC
		Greg Wentworth	Alberta EPA	Works for EPA and participates on OSM Air and Deposition TAC
March 13, 2025	TEEM	Greg Wentworth	Alberta EPA	Works for EPA and participates on OSM Air and Deposition TAC
		Courtney Brown	Canadian Natural	Participates on OSM Air and Deposition TAC
		Carla Davidson	Fort McKay First Nation	Participates on OSM's Oversight committee
		David Spink	Fort McKay First Nation	Participates on OSM Air and Deposition TAC, participated in two Indigenous Community Based Monitoring (ICBM) project submissions that involve the WBEA (Fort McKay Métis Nation – odour project & Fort McKay First Nation – dust project)
March 14, 2025	GC Meeting	Ryan Abel	Fort McKay First Nation	Participates on OSM Air and Deposition TAC and OSM Oversight Committee as alternate and OSM Indigenous Caucus
March 19, 2025	GM Meeting	Chris Heavy Shield	Chipewyan Prairie Dene First Nation	Participates on the OSM Oversight Committee

		Ryan Abel	Fort McKay First Nation	Participates on OSM Air and Deposition TAC and Oversight Committee as alternate, and Indigenous Caucus
		Long Fu	AEPA	Works for AEPA
		Greg Wentworth	AEPA	Works for AEPA and participates on OSM Air and Deposition TAC

6. Appendix B – Summary of Air Monitoring Stations & Parameters in the WBEA Network

Continuous Monitoring Measurements

Table 11 provides a list of stations names and parameters measured by continuous methods, which include sulphur dioxide (SO_2), nitric oxide/nitrogen dioxide (NO/NO_2), ozone (O_3), $PM_{2.5}$, total reduced sulphur (TRS), hydrogen sulphide (H_2S), total hydrocarbons (THC), methane (CH_4), non-methane hydrocarbons (NMHC), carbon monoxide (CO), carbon dioxide (CO_2) and ammonia (NH_3).

Table 11. Summary of stations and continuously measured parameters at WBEA AMS

Station name	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4	NMHC	CO	CO_2	NH_3
BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X	X	X	X	X	X	X
MILDRED LAKE	X					X	X	X	X			
BUFFALO VIEWPOINT												
MANNIX	X	X	X	X		X	X	X	X			
PATRICIA MCINNES	X					X	X	X	X			
ATHABASCA VALLEY	X	X	X	X	X		X	X	X			X
FORT CHIPEWYAN	X	X	X	X	X		X	X	X	X		
BARGE LANDING	X	X	X	X	X					X	X	
LOWER CAMP	X	X		X	X		X	X	X			
FORT MCKAY SOUTH	X					X	X	X	X			
ANZAC	X	X	X	X	X		X	X	X			
WAPASU	X	X	X	X	X		X	X	X			
STONY MOUNTAIN	X	X	X	X		X	X					
FIREBAG	X	X	X	X	X		X	X	X	X	X	
MACKAY RIVER	X	X				X	X					
CONKLIN	X	X				X	X					
JANVIER	X	X	X	X	X		X	X	X			
FORT HILLS	X	X	X	X	X		X	X	X			
WASKOW OHCI PIMATISIWIN	X	X		X	X	X	X	X	X			
JACKFISH 2/3	X	X				X						
SURMONT 2	X	x				X						
ELLS RIVER	X	X		X		X	X					
LEISMER	X	X		X		X	X	X	X			
SAWBONES BAY	X	X				X						
JACKFISH 1	X	X				X						
KIRBY SOUTH	X	X				X						
KIRBY NORTH	X	X				X	X					
BLACKGOLD	X	X				X	X					
HANGINGSTON EXPANSION	X	X				X						
MONDAY CREEK	X	X				X						
BLACKROD	X	X				X	X					

Continuous Meteorological Measurements

Table 12 provides a listing of stations and meteorological parameters measured by continuous methods. Parameters measured include ambient temperature (Temp), relative humidity (RH), barometric pressure (BP), wind speed (WS), wind direction (WD), vertical wind speed (VWS), global radiation, precipitation, and leaf wetness.

Table 12. Summary of stations and meteorological parameters measured continuously at WBEA AMS

Station name	Temp	RH	BP	WS	WD	VWS	Global Radiation	Precipitation	Leaf Wetness
BERTHA GANTER-FORT MCKAY	X[1,2]	X[1]		X[2]	X[2]		X	X	X
MILDRED LAKE	X[1]	X[1]		X[2]	X[2]				
LOWER CAMP MET TOWER	X[4]	X[4]		X[4]	X[4]	X[4]			
BUFFALO VIEWPOINT	X[1]	X[1]		X[2]	X[2]				
MANNIX	X[5]	X[5]		X[5]	X[5]	X[5]			
PATRICIA MCINNES	X[1]	X[1]		X[2]	X[2]				
ATHABASCA VALLEY	X[1]	X[1]	X	X[2]	X[2]				
FORT CHIPEWYAN	X[1]	X[1]		X[2]	X[2]		X	X	X
BARGE LANDING	X[1]	X[1]	X	X[2,3]	X[2,3]				
LOWER CAMP	X[1]	X[1]	X	X[2]	X[2]				
FORT MCKAY SOUTH	X[1]	X[1]		X[2]	X[2]				
ANZAC	X[1]	X[1]		X[3]	X[3]				X
WAPASU	X[1]	X[1]		X[2]	X[2]			X	
STONY MOUNTAIN	X[1]	X[1]		X[3]	X[3]		X	X	X
FIREBAG	X[1]	X[1]		X[2]	X[2]				
MACKAY RIVER	X[1]	X[1]		X[2]	X[2]			X	
CONKLIN	X[1]	X[1]		X[2]	X[2]				
JANVIER	X[1]	X[1]		X[2,3]	X[2,3]				
FORT HILLS	X[1]	X[1]		X[2]	X[2]				
WASKOW OHCI PIMATISIWIN	X[1]	X[1]		X[2]	X[2]				
JACKFISH 2/3	X[1]	X[1]		X[2]	X[2]				
SURMONT 2	X[1]	X[1]		X[2]	X[2]				
ELLS RIVER	X[1]	X[1]		X[2]	X[2]		X		
LEISMER	X[1]	X[1]		X[2]	X[2]				
SAWBONES BAY	X[1]	X[1]		X[2]	X[2]				
JACKFISH 1	X[1]	X[1]		X[2]	X[2]				
KIRBY SOUTH	X[1]	X[1]		X[2]	X[2]				
KIRBY NORTH	X[1]	X[1]		X[2]	X[2]				
BLACKGOLD	X[1]	X[1]		X[2]	X[2]				
HANGINGSTONE EXPANSION	X[1]	X[1]		X[2]	X[2]				
MONDAY CREEK	X[1]	X[1]		X[2]	X[2]				
BLACKROD	X[1]	X[1]		X[2]	X[2]				

[1] Parameter measured at 2m.
[2] Parameter measured at 10m.
[3] Parameter measured at 20m.
[4] Parameter measured at multiple elevations (i.e., 20m, 45m, 100m, 163m).
[5] Parameter measured at multiple elevations (i.e., 20m, 45m, 75m, 90m).

Time-Integrated Analysis Measurements

Table 13 provides a listing of stations and air quality parameters measured by time-integrated methods. Parameters measured include volatile organic compounds (VOC), particulate matter less than 2.5 µm aerodynamic diameter ($PM_{2.5}$) and associated metals and ions, elemental carbon-organic carbon (EC/OC), particulate matter less than 10 µm aerodynamic diameter (PM_{10}) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), precipitation samples, dustfall, and total suspended particulates (TSP).

Table 13. Summary of parameters measured using Time-integrated methods at WBEA AMS

Station name	VOC	$PM_{2.5}$	EC/OC	PM_{10}	PAH	Precip	TSP	Dustfall
BERTHA GANTER-FORT MCKAY	X	X	X	X	X	X		X
PATRICIA MCINNES	X	X		X	X			
ATHABASCA VALLEY	X	X		X	X			
FORT CHIPEWYAN	X	X	X	X	X			
BARGE LANDING	X							
FORT MCKAY SOUTH	X			X				
ANZAC	X	X		X	X			
WAPASU			X			X		
STONY MOUNTAIN			X			X		
CONKLIN	X	X		X	X			
JANVIER	X	X		X	X			
FORT HILLS	X			X				
ELLS RIVER	X			X			X	

Additional Continuous/Semi-continuous Measurements

Table 14 provides a list of stations and continuous/semi-continuous methods that are additional to standard monitoring techniques. Parameters measured include AE33 aethalometer (measures black carbon), visibility sensor, reduced sulphur compounds (RSC) gas chromatography (GC), volatile organic compounds (VOC) GC, and triggered RSC.

Table 14. Summary of stations and continuous/semi-continuous methods at WBEA AMS

Station name	AE33 Aethalometer	Visibility Sensor	RSC GC	VOC GC	Triggered RSC
BERTHA GANTER-FORT MCKAY	X		X	X	X
BUFFALO VIEWPOINT		X			
LOWER CAMP		X			
STONY MOUNTAIN	X				

Research and Development Measurements

Table 15 provides a list of stations and studies conducted by the WBEA for research and development purposes. Current studies conducted at WBEA Air Monitoring Stations include the Continuous Hydrocarbon Instrument Evaluation Study, and the Continuous Particulate Instrument Evaluation Study.

Table 15. Summary of stations and studies for research and development purposes at WBEA AMS

Station name	Continuous Hydrocarbon Instrument Evaluation Study	Continuous Particulate Instrument Evaluation Study
MANNIX	X	
FORT MCKAY SOUTH		X

7. Appendix C – Map of the WBEA Monitoring Network