



Proposed Revisions to the Operations Manual for Air Quality Monitoring in Ontario

Marinha Antunes, Air Quality Analyst
Central Region, Technical Support Section

Outline

- The ministry's Operations Manual for Air Quality Monitoring in Ontario
 - History and objectives.
 - Proposed revisions to the 2008 Operations Manual.
 - Status of the revised Operations Manual.



History of the Operations Manual

- Pre 2003
 - Compliance-based monitoring stations.
 - Operated by ministry's Operations Division or emitters.
 - Audited by the Ministry.
 - 2003 transfer of monitoring responsibility to emitter.
 - No monitoring guidance from the Ministry of the Environment.



Operations Manual Objective

- Standardize air quality monitoring across Ontario.
- Confidence in quality and accuracy of data.
 - US EPA/EC approved methods where possible.
 - Ministry approved Monitoring Plan.
 - Guidance on appropriate siting criteria.
 - Standards for instrumentation capabilities.

History of the Operations Manual

- 2003 - First edition - “*Operations Manual for Point Source Air Quality Monitoring*”
 - Based on US EPA and Environment Canada monitoring protocols.
 - Targeted industrial facilities.
 - Included QA/QC guidelines and reporting requirements.
 - Included standard operating procedures (SOPs) for equipment operation.

Operations Manual for Point Source Air Quality Monitoring

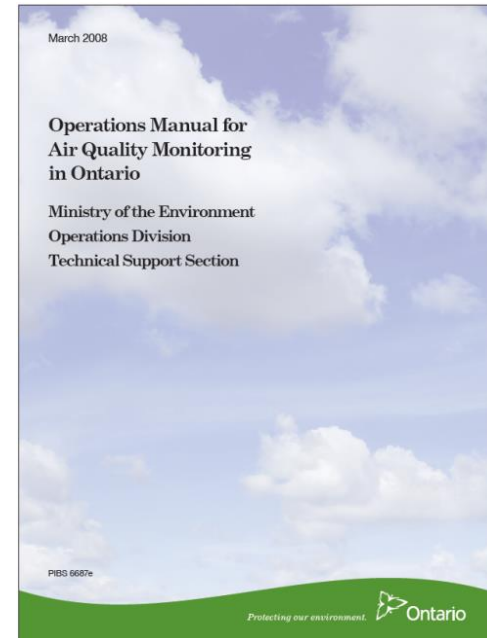


Ministry of the Environment
Operations Division - Technical Support Section



History of the Operations Manual

- 2008 - Second edition - “*Operations Manual for Air Quality Monitoring in Ontario*” PIBS 6687e
 - Introduction of O. Reg. 419/05.
 - New monitoring technologies.
 - Harmonized air quality monitoring across Ontario.
 - Included more details regarding data validation and reporting.
 - Introduction of a “Monitoring Plan” to be completed prior to station set up.



Operations Manual Users

- All air quality monitoring activities in Ontario that:
 - Are requirements of legal instruments (e.g. control orders, ECAs, Environmental Assessment conditions), memoranda of understanding or abatement plans.
 - Are part of CAMM assessments conducted under section 11(3) of O. Reg. 419/05.
 - Result in monitoring data being submitted
 - To the ministry.
 - For presentation to health units and/or to the public of Ontario.

Revised Operations Manual

- 2016 - Third edition - DRAFT “*Operations Manual for Air Quality Monitoring in Ontario*”
 - Broadened application of
 - CAMM procedures.
 - Use of monitoring in technical standards and background studies.
 - Additional QA/QC
 - Station and instrumentation documentation.
 - Instrument performance specifications.
 - SOPs
 - SHARP 5030.
 - Asbestos sampling.
 - Passive sampling monitors.
 - Changes to audit program
 - Clearly defines audit criteria and conditional pass.



Revised Operations Manual - Continued

- Clarifies role of SOPs – minimum guidance to be used in conjunction with reference documents.
- Includes performance targets for discrete sampling.
- Integrates Hi-Vol sampling and submission guide into manual and SOPs.
- Clarifies reporting requirements for the monitoring program.
- Integrates calculation procedures for method detection limit.
- Provides a central email address for monitoring data submission (does not replace submission to the District).

Revised Operations Manual - Continued

Instruments	Parameter	Notes
<p>Recordum Airpointer (uses Thermo Scientific Inc.)</p>	<ul style="list-style-type: none"> ▪ SO₂ - Ultraviolet (UV) Fluorescent ▪ O₃ - Ultraviolet (UV) Photometric ▪ CO - Gas Filter Correlation Coefficient, Infrared Absorption Spectroscopy ▪ NO_x - Chemiluminescence ▪ PM - Nephelometry 	<ul style="list-style-type: none"> ▪ Not designated by US EPA ▪ Operation, service and maintenance of the analysers should be in accordance with the instruments manufacturer's operation manual ▪ Airpointer can be configured with up to 7 ambient air analysers
<p>SHARP 5030 (Synchronized Hybrid Ambient Real-Time Particulate)</p>	<ul style="list-style-type: none"> ▪ Inhalable Particulate Matter (PM_{2.5}) 	<ul style="list-style-type: none"> ▪ Reference Equivalent Method (http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf) ▪ Tape advance every 8 hours as per the US EPA requirements
<p>Trace Gas Passive Sampling</p>	<ul style="list-style-type: none"> ▪ Various Pollutants: SO₂, NO_x, O₃, H₂S 	<ul style="list-style-type: none"> ▪ Not designated by US EPA ▪ Technical and instructional information from suppliers of passive air sampling systems ▪ Sample changeover every 30 days (+/- 3 days)

Revised Operations Manual – Continuous Data

	2008 Version	Revised Version	Notes
New Parameters	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> CO, O₃ and Asbestos 	<ul style="list-style-type: none"> Monitoring programs to address different objectives (for example, community concerns)
Zero Drift	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> CO = 0.2 PPM O₃ = 2 PPB 	<ul style="list-style-type: none"> Zero adjustment is required
Data Editing	<ul style="list-style-type: none"> Edited data to be submitted in a resolution of half-hour means or alternate data resolutions depending on the ministry's regional office request 	<ul style="list-style-type: none"> Editing of continuous data in a resolution of either 5-minute or hourly data depending on the limits that apply 	<ul style="list-style-type: none"> Ministry may periodically request the editing and submission of data collected at a resolution of 5 minutes for example in the case of an exceedance or a spill Data collected with resolution times shorter than 5 minutes (e.g. 1 minute means) are to be left as is, as a permanent record

Revised Operations Manual – Non-Continuous Data

	2008 Version	Revised Version	Notes
Asbestos Sampling Analysis	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Mixed cellulose ester (MCE) filters in phase contrast microscopy (PCM) and analysis by transmission electron microscopy (TEM) - NIOSH 7400 and SOP# 2015 	<ul style="list-style-type: none"> Flow Controller capable of sampling 2400 L of air over 24 hours
30 day Sample Validity	<ul style="list-style-type: none"> +/- 5 days (Calendar Month) 	<ul style="list-style-type: none"> +/- 3 days (Calendar Month) 	<ul style="list-style-type: none"> To capture the exposure in that calendar month
Start and End Times	<ul style="list-style-type: none"> Midnight to Midnight 	<ul style="list-style-type: none"> Midnight to Midnight and alternate schedule. Start time may be altered with the approval of the ministry 	<ul style="list-style-type: none"> When midnight to midnight is not practicable. For example, hexavalent chromium sample degradation issues after 2 hours.

Revised Operations Manual – Proposed Audit Criteria

- An instrument will **FAIL** an audit if one or more of the following criteria are met:
 - Instrument parameters do not meet the quantified audit criteria.
 - The operator adjusts or calibrates the instrument after notification of an impending audit has been given.
 - Exception: daily spans/calibrations, routine maintenance, etc.
 - The instrument is not properly connected to the inlet.
 - The operator does not have or fails to keep current a log of calibration and maintenance activities.
- Consequences of audit failure
 - Increased audit frequency until 2 consecutive audits are passed.
- A **CONDITIONAL PASS** may be issued if the monitor meets the audit criteria but fails to provide the log or other documentation.

Revised Operations Manual – Station Instrument Documentation

- Date and time of service activities.
- All data relevant to calibration; calibration values and settings (span pot, zero pot, etc.).
- Span changes, zero changes, etc. and explanations.
- Description and reason for repairs (lamp replacement, quartz tube replacement, etc.).
- Description and date of equipment malfunction, modifications or replacement.
- Documentation of routine maintenance actions (perm tube replacement, filter exchange, etc.).

Proposed Revisions – Exceedance Protocol

- For the purposes of comparing monitoring data to O. Reg. 419/05 standards, URTs, or guidelines, the ministry requires the following information to be reported:
 - The date and time of exceedance.
 - The first running average exceedance.
 - All data points used to calculate the first running average exceedance.
 - The range of running averages for that specific averaging period (maximum and minimum running average concentrations).

Proposed Revisions – Exceedance Protocol Continued

- This guidance outlines the ministry's minimum expectations for reporting purposes only.
- It does not consider the total number of offences.
- Notification of exceedance must follow O. Reg. 419/05 requirements.

PM₁₀ 24 Hour Running Average, Daily AAQC= 50 µg/m³

Date	Hour	1-Hour Avg.	PM ₁₀ 24-Hr Running Avg.
	EST	µg/m ³	µg/m ³
10-Aug	23:00	139	48
10-Aug	00:00	118	49
11-Aug	01:00	106	49
11-Aug	02:00	94	50
11-Aug	03:00	61	54
11-Aug	04:00	46	52
11-Aug	05:00	38	53
11-Aug	06:00	36	53
11-Aug	07:00	41	52
11-Aug	08:00	62	51
11-Aug	09:00	58	49
11-Aug	10:00	52	48
11-Aug	11:00	46	46
11-Aug	12:00	44	48
11-Aug	13:00	41	49
11-Aug	14:00	36	49
11-Aug	15:00	31	51
11-Aug	16:00	33	53
11-Aug	17:00	48	54
11-Aug	18:00	53	53
11-Aug	19:00	59	52
11-Aug	20:00	65	51
11-Aug	21:00	38	49
11-Aug	22:00	93	60
11-Aug	23:00	86	58
12-Aug	00:00	67	56
12-Aug	01:00	52	53
12-Aug	02:00	31	51
12-Aug	03:00	24	49
12-Aug	04:00	18	48
12-Aug	05:00	17	47
12-Aug	06:00	27	47

Date, Time and Non-Conformance Value Reported
Data that contributed to the first running average exceedance (August 10 th at 02:00 to August 11 th at 03:00)
Data that is considered to be 1 exceedance (August 11 th at 03:00 to August 12 th at 02:00)
Minimum of the range
Maximum of the range

1 Exceedance

- Exceedance reported to the ministry:
 - The 24 hour PM₁₀ AAQC of 50 µg/m³ was exceeded on August 11th at 03:00 with a 24 hour concentration of 54 µg/m³. The range of hourly running average concentrations during this exceedance was between 46 µg/m³ and 60 µg/m³.

SO₂ 1 Hour Running Average, 1 hour Standard = 250 ppb

Date	Hour	5 Min. Avg.	SO ₂ 1-Hr Running Avg.
	EST	ppb	ppb
09-Sep	6:35	119	113
09-Sep	6:40	126	113
09-Sep	6:45	134	114
09-Sep	6:50	162	117
09-Sep	6:55	178	121
09-Sep	7:00	203	129
09-Sep	7:05	224	138
09-Sep	7:10	239	149
09-Sep	7:15	247	162
09-Sep	7:20	334	182
09-Sep	7:25	384	205
09-Sep	7:30	367	226
09-Sep	7:35	341	245
09-Sep	7:40	307	260
09-Sep	7:45	283	272
09-Sep	7:50	266	281
09-Sep	7:55	286	290
09-Sep	8:00	209	291
09-Sep	8:05	193	288
09-Sep	8:10	187	284
09-Sep	8:15	161	277
09-Sep	8:20	202	266
09-Sep	8:25	257	255
09-Sep	8:30	298	249
09-Sep	8:35	316	247
09-Sep	8:40	362	252
09-Sep	8:45	237	248
09-Sep	8:50	213	243
09-Sep	8:55	124	230
09-Sep	9:00	298	237
09-Sep	9:05	278	244
09-Sep	9:10	261	251
09-Sep	9:15	235	257
09-Sep	9:20	213	258
09-Sep	9:25	198	253
09-Sep	9:30	168	242
09-Sep	9:35	124	226

Date, Time and Non-Conformance Value Reported
Data that contributed to the first running average exceedance (September 9 th at 6:45 to September 9 th at 7:40 and September 9 th at 7:45 to September 9 th at 8:40)
Data that is considered to be 1 exceedance (September 9 th at 7:40 to September 9 th at 8:35 and September 9 th at 8:40 to September 9 th at 9:35)
Minimum of the range
Maximum of the range

1 Exceedance

1 Exceedance

- Exceedance reported to the ministry:
 - The 1 hour SO₂ standard of 250 ppb was exceeded twice.
 - The first exceedance occurred on September 9th at 7:40 with a 1 hour concentration of 260 ppb. The range of 5 minute running average concentrations during this exceedance was between 247 µg/m³ and 291 µg/m³.
 - The second exceedance occurred on September 9th at 8:40 with a 1 hour concentration of 252 ppb. The range of 5 minute running average concentrations during this exceedance was between 226 ppb and 258 ppb.

Next Steps

- Circulate document to key external stakeholders for comment.
- Finalize the revised operations manual by December 2016.
- Implementation in 2017.

Questions?

Marinha Antunes

Air Quality Analyst, Central Region

Marinha.Antunes@ontario.ca