



Global Analyzer Systems

PROPOSED REGULATORY CHANGES FOR CONTINUOUS EMISSION MONITORING OF ALBERTA'S INDUSTRIAL POINT SOURCES

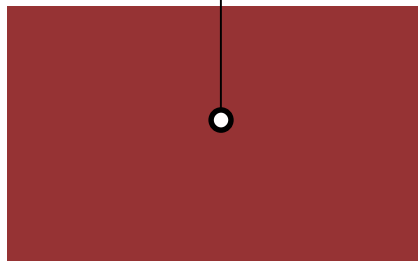
EnviroTech

Calgary, Alberta
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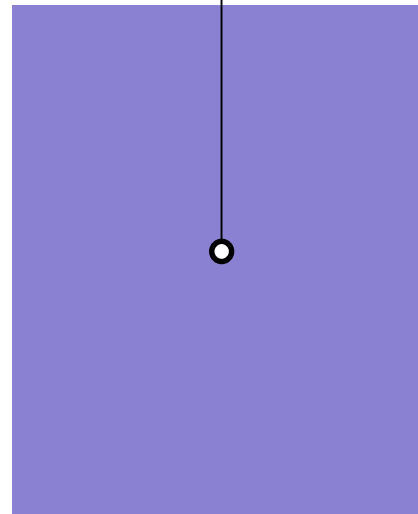
AGENDA

Proposed Changes

Overview

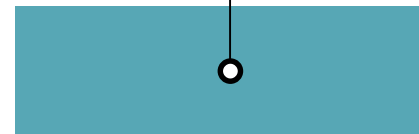


Slides 3 - 10



Slides 11 - 28

Summary



Slides 29 - 32

Q&A



Slide 33

OVERVIEW

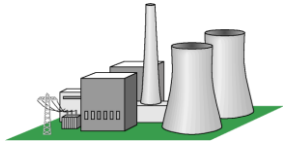
*Brief introduction to continuous emission monitoring
in Alberta*



WHAT IS A CONTINUOUS EMISSION MONITOR?

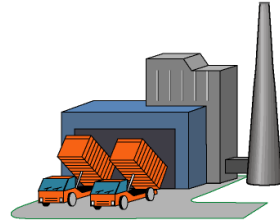
Continuous Emission Monitoring System(s) (CEMS) measure emissions levels in real-time from stationary sources.

WHERE DO WE FIND CEMS?



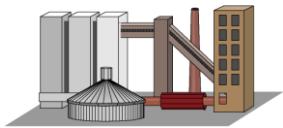
Power Generation

NO_x, NH₃ slip, CO₂ quantification, process monitoring



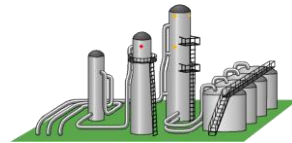
Waste Incineration

Multi-parameter monitoring, opacity, NH₃ slip, CO₂ quantification, process monitoring



Cement

Multi-parameter monitoring, opacity, NH₃ slip, CO₂ quantification, process monitoring



Oil & Gas

NO_x, SO₂ emission monitoring CO₂ quantification
Process control and monitoring



EPEA Approval

- ✓ A facilities EPEA approval may require continuous emission monitoring
- ✓ The approval will indicated which sources are required to have CEMS and what substances/parameters will need to monitored and reported

WHY DO WE HAVE CEMS?



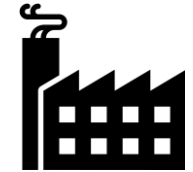
Public

- Transparency of environmental management and assessment
- Accountability of effectiveness and efficiency of environmental systems
- Promotion of public trust, goodwill and credibility



Regulator

- Evaluate Emissions Compliance
- Identify Periods of Excess Emissions
- Monitor Emissions (for management)
- Tool for Emissions Trading, Credit Validation or Tax
- Public Perception Reporting



Industry

- Evaluate Emissions Compliance
- Identify Periods of Excess Emissions
- Monitor Emissions (for management)
- Emissions Trading, Credit Validation or Tax
- Public Perception Reporting

CEMS REGULATIONS

ECCC's
EPS 1/PG/7



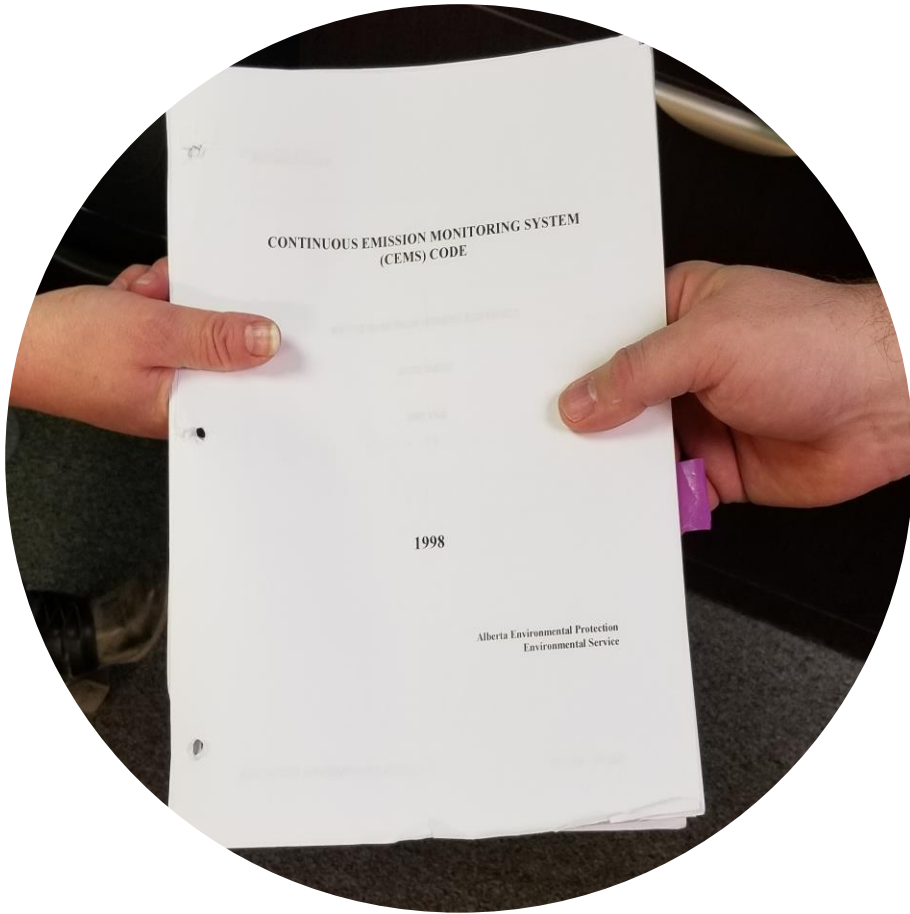
Alberta
CEMS
Code of Practice



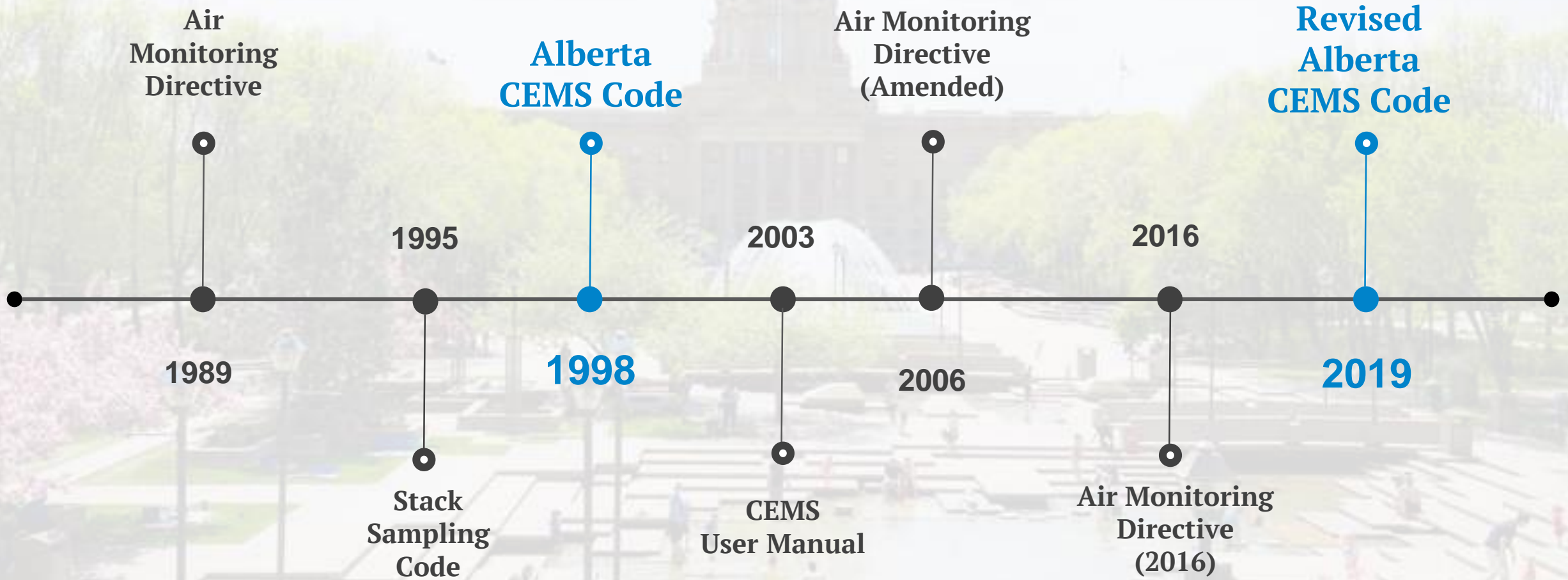
USEPA
Part 60 & 75

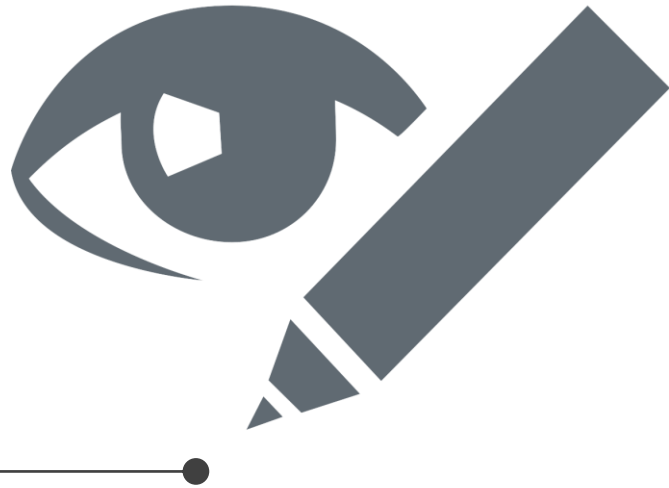


THE ALBERTA CEMS CODE OF PRACTICE



- Establishes requirements for installation and operation
- Ensures effective measurement of emissions
- Establish QA/QC requirements
- Establishes requirements for alternative monitoring systems
- Provides guidance for meeting CEMS requirements





Alberta

- Analyzer performance*
- Data quality*
- Data integrity (data loss)*

PROPOSED MAJOR CHANGES

Highlights of the proposed updates and changes in the new Draft CEMS Code

○ Specifications for additional monitoring parameters

- Mercury (Hg)
- Hydrogen sulphide (H₂S)
- Ammonia (NH₃)
- Ethylene (C₂H₄)
- Ethylene oxide (C₂H₄O)



Performance Targets

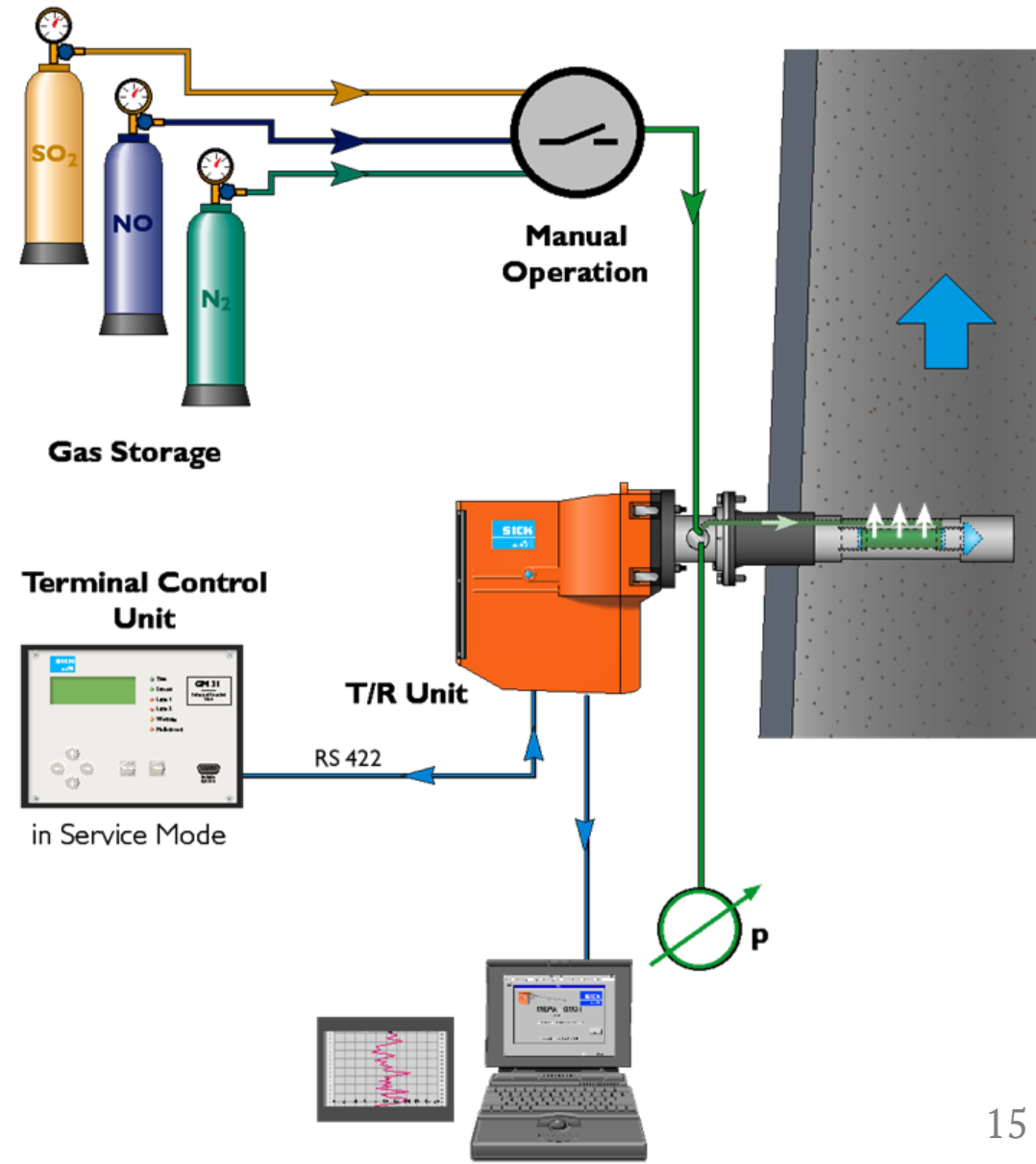
CONTINUOUS OPACITY MONITORING SYSTEMS (COMS)

- For design, installation and operation in-stack opacity analyzers required to follow:
 - ASTM D6216
 - USEPA Performance Specification 1
- 10-second minimum data resolution for opacity
- Must perform a quarterly check using attenuation filters ($\leq \pm 3.0\%$ span)

- Effluent analyzers will require range changes under the proposed guidelines
 - No longer in relation to emission limit provided in EPEA approval
 - Instead, range must be 40-75% of average monthly concentration
 - A dual range analyzer may be a required depending on the facility operation
 - If average falls outside range for >3 months, must re-range analyzer
 - Phase in date is proposed to be 1 year after the Code enforcement date

DESIGN SPECIFICATIONS

- Use of flowing calibration gas for calibration drift tests and linearity tests will be required
- Applicable to new installations
- May impact the CEMS equipment available to industrial operators



OUT-OF-CONTROL CONDITIONS

- Continuous emission monitors are required to undergo daily calibration drift checks
- Zero and span out-of-control (OOC) conditions have changed
 - Drift limits have been adjusted (increased) to match federal requirements
 - CEMS is OOC the first time the analyzer measures **x2** the stated calibration drift tolerance, as opposed to waiting five consecutive days
 - This is more stringent than the previous **x4** calibration drift tolerance

OUT-OF-CONTROL CONDITIONS

$$\text{Calibration Drift (\%)} = \frac{\text{Expected} - \text{Actual}}{\text{Analyzer Range}} \times 100$$

Range change?



- New drift limits are set to take effect 1 year after CEMS Code enforcement date (same as range rule)

DATA AVAILABILITY

- CEMS percent availability calculation has changed from using hours to minutes

$$Availability = \frac{t_a}{t} \times 100\%$$

t_a = total time in minutes during the month for which the system or analyzer generated quality assured data; and

t = total time in minutes that source operated during the month.

DATA AVAILABILITY

- Uptime requirement remains the same at $\geq 90\%$ for calendar month, except for Hg analyzers $\geq 80\%$ calendar month
- What is considered a valid hour or interval has also changed
- Higher % availability values may be harder to achieve in some cases (no allowance for maintenance or QA/QC activities)

DATA AVAILABILITY

- Engineering estimates are permissible for missing data periods <168 hours
- For data loss ≥ 168 hours a back-up or alternate monitor is required
 - Replacement analyzer can only be used for up to 720 hours (30 days) in the calendar year
 - Recertification is required if the temporary replacement analyzer exceeds 720 hours

PERFORMANCE EVALUATIONS



Cylinder Gas Audit (CGA)

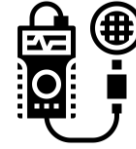
A linearity test conducted using flowing calibration test gas that is comprised of a certified reference material.



Relative Accuracy Test Audit (RATA)

A test which compares a continuous emission monitor to an independent reference method.

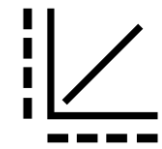
NEW



Alternate Quarterly Audit

An independent audit of the CEMS using a portable analyzer. Only required when the CEMS is unable to perform CGA's.

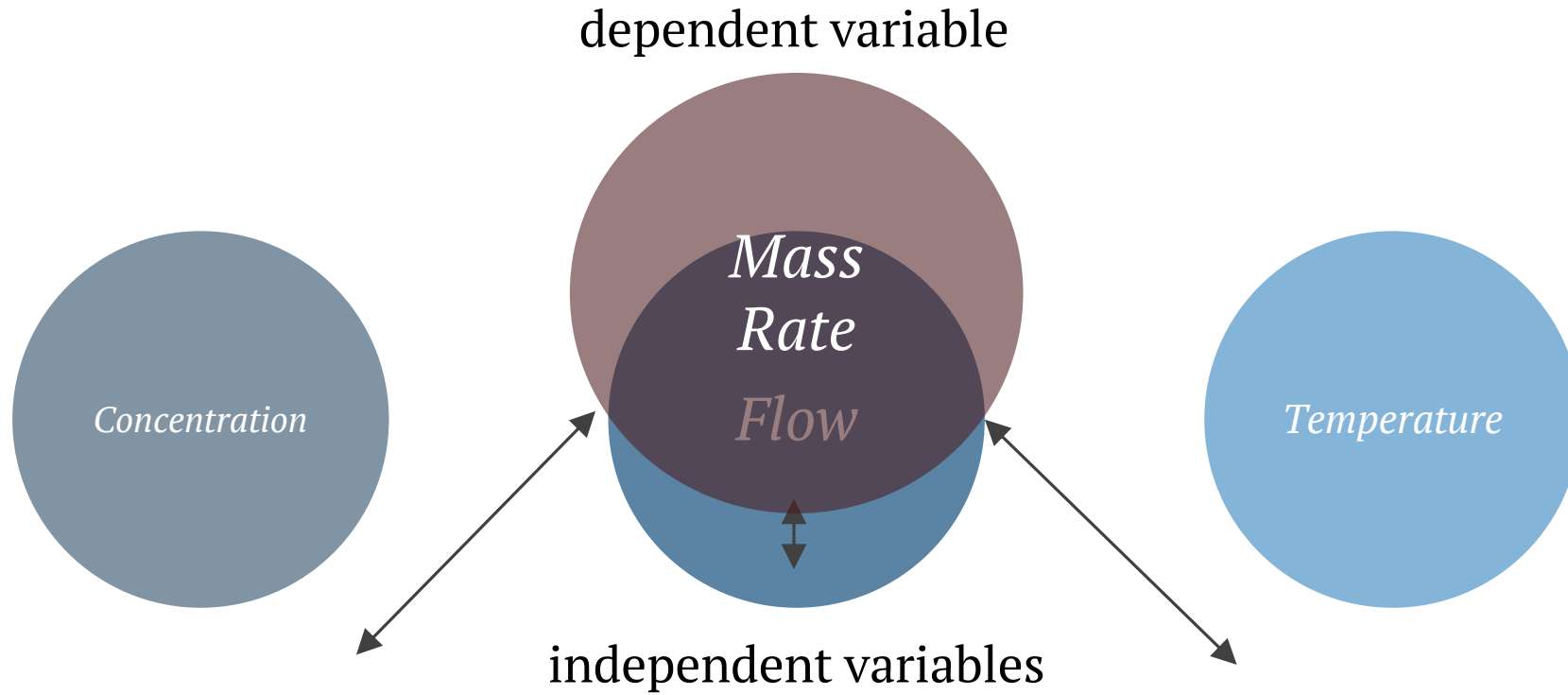
NEW



Flow-to-Load

A data analysis (ratio) used as an independent check of a flow analyzers performance.

RELATIVE ACCURACY TEST AUDITS (RATA)



PERFORMANCE EVALUATION RATA

- Mass rate relative accuracy is now required and reportable, but there is no performance criteria (pass/fail) requirement
- *'Footnote A'* removed from previous 1998 Code and replaced with *'low emitters criteria'*
- To meet the low emitters criteria source must emit less than **50 ppm** of the monitored substance; only applies to SO₂, NO_x, and CO

PERFORMANCE EVALUATION RATA

Low Emitters Rule:

$$\text{Absolute Accuracy} = \frac{\sum |X_i - Y_i|}{\sum RM_i} \times 100\% \leq 10.0\%$$
$$\text{Relative Accuracy} = \frac{\sum |\bar{d}| + |\bar{c}|}{RM} \times 100\% \leq 10.0\%$$
$$|\bar{d}| = \frac{1}{n} \sum_{i=1}^n (X_i - Y_i) \leq \pm 4 \text{ ppm}$$

PERFORMANCE EVALUATION RATA

- Flow relative accuracy has been lowered from 15% to 10%
- Bias is also measured during a relative accuracy test; this limit has been increased from $\pm 4\%$ to $\pm 5\%$ (for both flow and gas analyzers)
- No BAF adjustment (bias adjustment factor), unlike PG/7 and USEPA

PERFORMANCE EVALUATION RATA

- There is a RATA reduction criteria from one to two RATA's per year
 - RA ≤ **7.5%** for gas analyzers
 - RA ≤ **10%** for flow RATA
 - RA ≤ **10°C** for temperature
- Must meet criteria for four consecutive RATA's to qualify
- If an operator achieves this they must replace the skipped RATA with a CGA
 - However, must have flowing test gas to do the RATA reduction!

PERFORMANCE EVALUATION ALTERNATE QUARTERLY AUDITS

- If a gas analyzer cannot accept flowing test gas (therefore cannot perform a CGA), the facility must perform an alternate quarterly test audit
- Performed using a portable analyzer via EPS 1/RM/15
- This analogous to a simplified or modified RATA
 - Pass/fail criteria is \leq **15.0%** RA or **12 ppm** AD (0.5% AD for O₂ and CO₂)

PERFORMANCE EVALUATION FLOW-TO-LOAD

- A flow-to-load analysis is required quarterly
- The is to provide a correlation of flow analyzer data with plant load data
- Must be within an absolute percent difference of 10.0%
- Required to report only if $>10.0\%$

SUMMARY

Review and a conjectured look at the future

SUMMARY

- Greater alignment with federal guidelines (PG/7) and USEPA regulations
- A clear push for better CEMS performance
- Increase in data availability
- Emphasis on data quality
- Clearer identification between guidance vs. requirement

SUMMARY

- Proposed implementation date is September 1, 2019
- The new CEMS Code of Practice is still in DRAFT and is likely to change prior to the effective date
- The review period for the public and industry has ended
- Alberta Environment & Parks is currently reviewing comments received during the review period
- Questions & Comments: AEP.CEMSCode@gov.ab.ca

WHAT ABOUT THE FUTURE?

- Better guidance on Predictive Emission Monitoring Systems (PEMS) and for intermittent facilities (peaking facilities)
- Continuous emission monitoring of particulate matter (USEPA PS-11)
- NH_3 , ethylene and EtO enforcement of performance standards
- Mass rate performance criteria
- Greenhouse Gas (GHG) monitoring
- Introduction of Bias Adjustment Factors

THANKS!

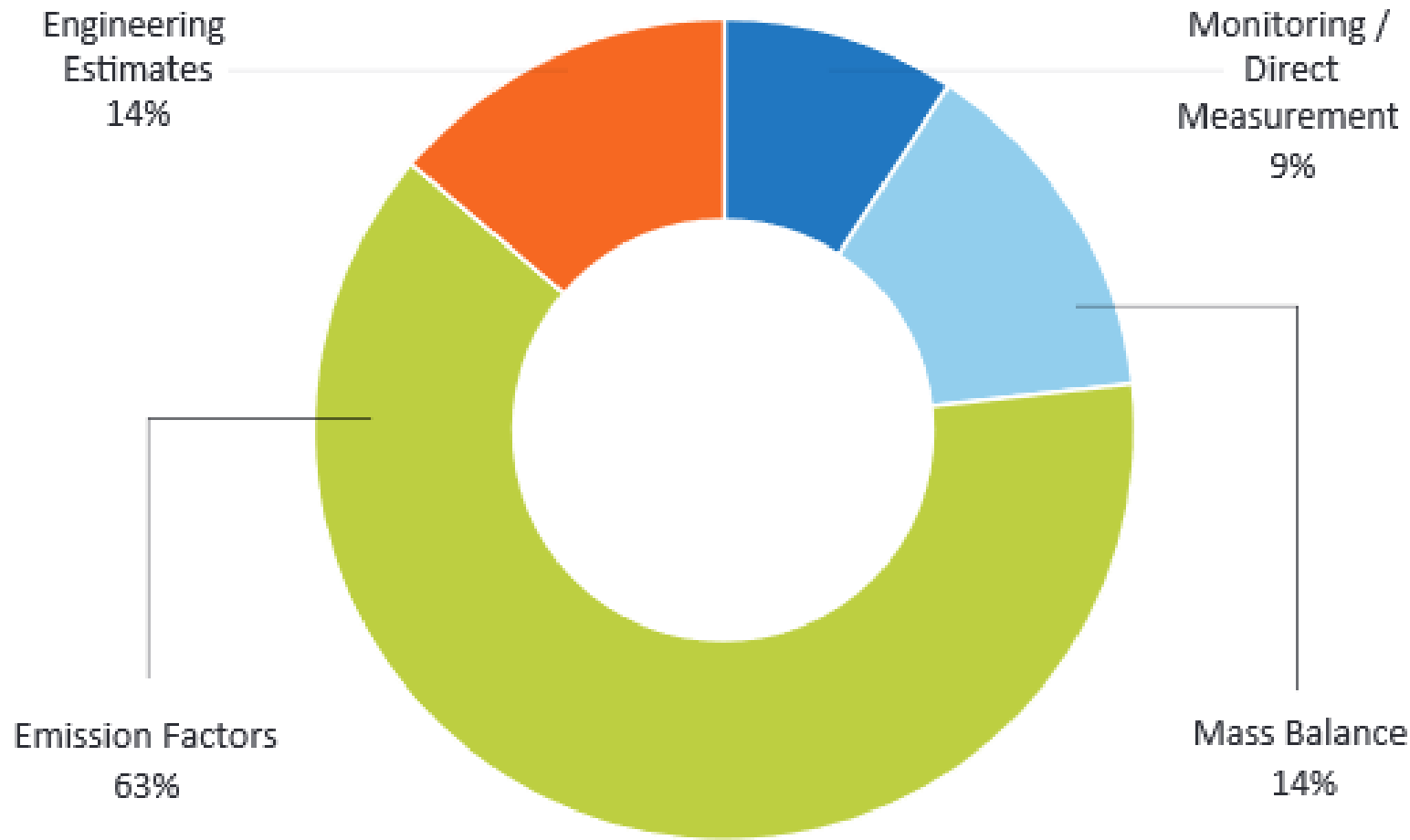
Any questions?

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Emission monitoring methods employed by industrial emitters

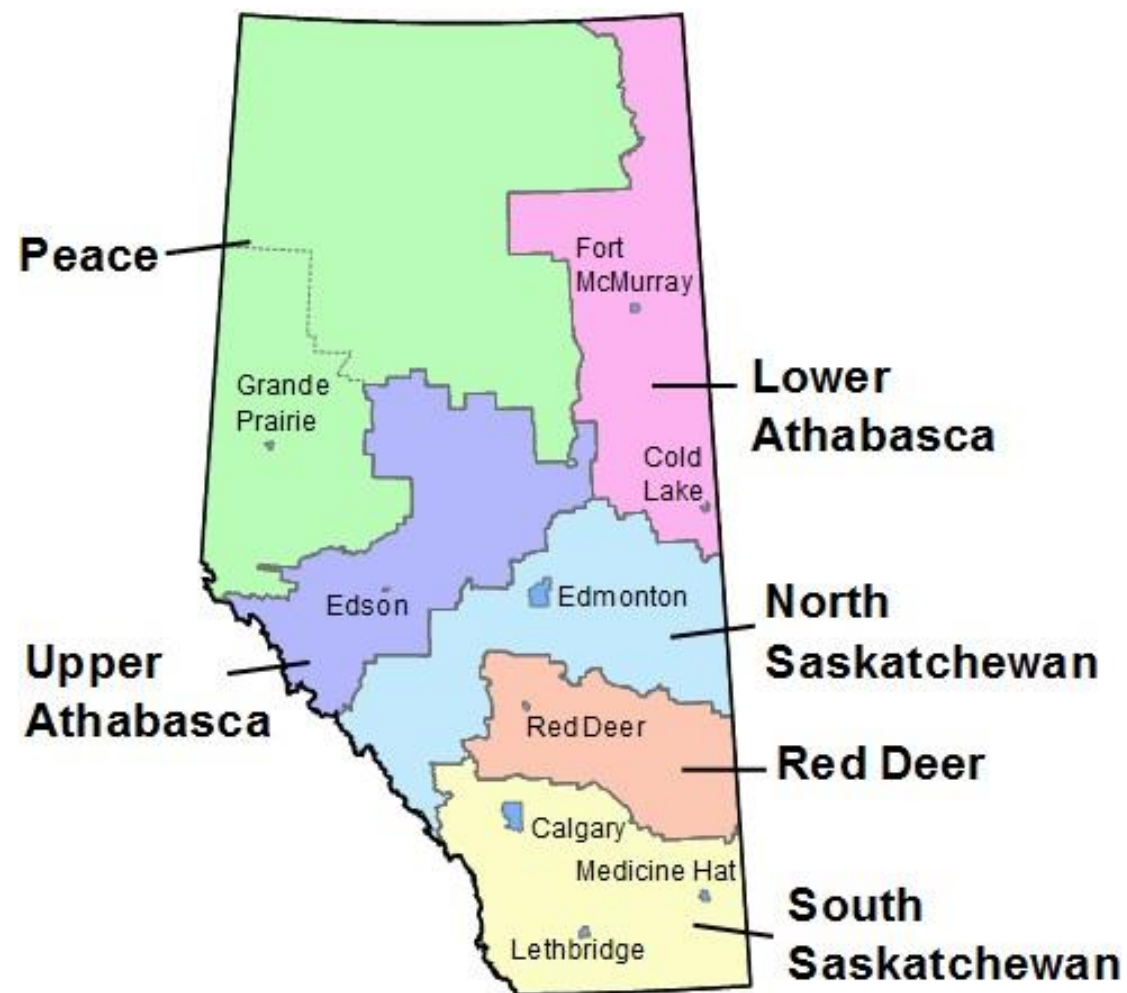
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Alberta is facing a variety of emerging and ongoing environmental issues, as well as experiencing many additional internal and external pressures requiring enhanced environmental management.

Canadian Ambient Air Quality Standards (CAAQS)

Averaging Time	Numerical Values		Statistical form
	Year 2020	Year 2025	
1-hour	60 ppb*	42 ppb	The 3-year average of the annual 98 th percentile of the NO ₂ daily-maximum 1-hour average concentrations.
Annual (1-year)	17.0 ppb	12.0 ppb	The average over a single calendar year of all the 1-hour average NO ₂ concentrations.

*ppb = parts per billion by volume.



TEN LARGEST SOURCES OF NO_x EMISSIONS IN ALBERTA (2014)

Sector Category	NO _x Emissions (kt)	% of Anthropogenic Total
Upstream Petroleum Industry (including oil sands)	343.3	50.1%
Electric Power Generation	82.1	12.0%
Off-road use of diesel	56.7	8.3%
Heavy-duty diesel vehicles	51.0	7.4%
Rail Transportation	50.9	7.4%
Light-duty gasoline trucks	17.2	2.5%
Chemical industry	13.5	2.0%
Petroleum product transportation and distribution	10.2	1.5%
Air Transportation	9.4	1.4%
Light-duty gasoline vehicles	8.9	1.3%

Insert reference here.