Feedback and Responses on Revised CEMS Code Draft 2

The following table provides the feedback received during the public review of draft 2 of the revised CEMS Code over October 13 - November 30, 2020. It also contains responses to the comments and questions and identifies any changes made in in the final 2021 revised CEMS Code in response to feedback. Note that the clause numbering referred to in the feedback column coincides to the clause numbering in draft 2, while section numbers and clauses in the response column correspond to the final 2021 revised CEMS Code.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
General Feedback	
Draft 2 is a vast improvement over Draft 1, and appears to have addressed many of the major concerns from industry members. In general, there are no critical issues that we have identified in Draft 2. Thank you for a job well done. Thank you for listening to the comments/feedback to Draft 1.	Thank you
The draft 2 code is clearly designed to more closely align Alberta requirements with the federal standard set by Protocols and performance specifications for continuous monitoring of gaseous emissions from thermal power generation (also known as PG/7). This type of standardization between regions is appropriate and we support further alignment. We are also pleased to see the requirement for dual-range analyzers removed. The oil and gas industry has already made significant investments in CEMS units to meet current code requirements for measurement of 1.5 times the approved emissions limits. CEMS analyzers are always purchased with an expectation that they will have a long lifespan, in some cases operators have purchased them recently. Existing CEMS units are long lived assets (~20 years) that are integrated with the emissions sources. In saying this, we support AEP's decision that industry will no longer be required to purchase new analyzers.	Thank you
We are appreciative of AEP accepting much of the stakeholder feedback provided on the first draft CEMS code and utilizing that feedback to create the draft 2 code which is more cost-effective for industry, while still ensuring that the Government's goal of improved CEMS data quality remains achievable. At the same time, we are concerned that the draft 2 code has some significant changes in performance requirements from the current code and its implementation will be challenging in certain instances. Please find attached some recommendations that we believe will help build upon the improvements already presented.	Thank you
I would first like to express our sincere appreciation for the work undertaken by Alberta Environment and Parks (AEP) Air Policy team to carefully review the extensive stakeholder feedback received in the March 2019 consultation for version 1 of the proposed CEMS code. We note that a significant portion of the feedback and recommendations received appears to have been considered and incorporated into the updated CEMS Code version 2 of the proposed Alberta CEMS Code revisions.	Thank you
I would like to commend everyone involved with the writing of Draft 2 on developing a very strong document, well done!	Thank you
We commend the Air Policy team for its continued efforts to work closely with stakeholders to ensure the changes are operationally achievable with meaningful improvements to emissions management. IPL is also pleased to see the draft 2 code is also better aligned with the federal standard set by C260 Protocols and performance specifications for continuous monitoring of gaseous emissions from thermal power generation (also known as PG/7). While IPL understands that source emissions monitoring is an important part of the regional picture along with the achievement of national and provincial air quality targets and objectives; we feel strongly that the draft 2 code still has some work ahead to resolve performance achievability.	Thank you

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Thank you for providing industry the opportunity to provide feedback on the CEMS Code Draft 2. I believe this to be a very useful collaborative process to identify the logistical challenges of conducting robust emissions monitoring and will help guide meaningful regulations.	Thank you
Our members continue to support the need for an efficient and up-to-date system of continuous emission monitoring for the most commonly monitored emissions and parameters in Alberta. CEMS is an important tool for gathering emissions data from regulated Environmental Protection and Enhancement Act (EPEA) approval holders. We understand and appreciate that the proposed revisions to the CEMS code v2 are intended to better align Alberta requirements with the Canada standard under PG7 and the standard set by US EPA. Our comments below are intended to reaffirm and convey our interest in ensuring that the proposed update to the CEMS code will achieve this alignment without imposing unwarranted or unnecessary operational, cost and reporting burden on obligated parties compared to the current CEMS code.	Thank you
Please provide clarification regarding system response time requirements. As these are no longer part of the code, are they to be captured in the QAP or internal procedures?	Response time is no longer dictated by the Code. Rather, there are requirements for data completeness and data resolution. The monitoring plan requires inclusion of response time for each analyzer, from the manufacturer's specifications (2.0-I(h)).
After reviewing the latest draft Continuous Emission Monitoring System (CEMS), as well as the Predictive Emission Monitoring System (PEMS) Methodology document, I believe it would be beneficial for the documents to undergo a thorough review by a third-party editor in order to correct various minor typographical and formatting errors throughout the documents. See page 29, Clause 4.1-B for an example of sentences ending in prepositions. Additionally, it would be beneficial to provide some examples related to the use of the various equations provided in the PEMS Methodology document. I have no comments with regards to the technical content of these documents.	The documents are reviewed with an editorial lens prior to finalizing. This was our first cut at the PEMS method and it will likely evolve over time. We do provide examples in the document as necessary.
It is good to see the drafting team is incorporating the requirement of new CEMS be able to calibrate with flowing gases. In our opinion, it is about time that proponents of new CEMS based on dry analyzers be required to a) estimate the stack gas moisture at all possible operating conditions, and b) if necessary, propose a method to adjust the dry-to-wet factor in between RATAs (e.g. for different excess combustion air levels).	We have not prescribed methods for moisture adjustments and we will not be adding that in the revised Code at this time. Facilities correct for moisture according to the methods they describe in their QAP and the Code requires that they specify what basis their data is reported in and that they remain consistent with either wet or dry basis. We have the requirement for RM and CEMS to be correlated on same basis (6.2-A). It is in the best interest of the facility to track moisture fluctuation and correct for moisture to avoid RATA failure. Added guidance below 7.1-D.
3.1 Please provide guidance on wet/ dry measurement and correction and whether moisture correction systems (factors, analyzers) are required to meet the same requirements as the pollutant analyzer performance test, operation, maintenance requirements.	The facility would follow manufacturer specifications and describe in their monitoring plan and QAP how moisture sensors will be verified and how any data correction will be handled. Facilities should be aware of and track moisture fluctuations that could affect results and take actions according to their QAP, as appropriate. We are not adding prescriptive specifications for moisture sensors at this time. Guidance added below 7.1-D.

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Please indicate what are considered as standard conditions/reference conditions for reporting (25°C; 1 atm) Over the years there have been a few instances of variance between how certain facilities monitor (dry vs. wet, normalized flow rates, data correction to standard conditions, etc.) We have always taken an approach that best practice dictates that data should be corrected to STP conditions, specifically when comparing to reference methods, and further that in-stack conditions are wet, and compliance against limits in these conditions should be reported as such. We were hoping to have standard conditions explicitly stated, and in-stack conditions expressed as wet. Another consideration is that volumetric flow rate should be displayed in the DAS and reported at standard conditions/reference conditions for reporting (25°C; 1 atm). This will ensure consistency with reporting volumetric flow rates across all industries at standard reference conditions and reference methods (RATAs). As far as RATA testing goes, our recommendation is to stipulate the 25°C and 1 atm (760 mmHg) reference standard, as this would ensure that RATA comparisons are required to be standardized making comparisons simpler to assess. While this is stipulated in the Stack Sampling Code, it is not on the radar for a number of facilities, and this may be helpful.	Yes volumetric flow (wet or dry) is generally reported using standard temp and pressure and the calculation is provided in the Stack Sampling Code. 6.2-A requires that RM results be correlated to CEMS measurements on the basis of temperature, pressure, moisture, etc. We added back definitions for standard pressure and temperature in Appendix A. at 25 deg C (from the 1998 Code). We added guidance in section 9.0 about reporting flow to standard temperature and pressure, and added a reference to section 6.2.1 for comparable data between RM and CEMS. 6.2-GG also requires that RATA data be correlated on the same basis (for moisture, pressure, temperature, etc.).
When Section Nos. are provided in this draft, they are not capitalized. But this should be capitlaized throughout the document (i.e., Section 8.0 in Page 25 Paragraph 1).	Agreed. This change has been made.
General Feedback - Further Engagement	
It was noted in the draft 2 code that the CEMS User Manual is being updated. CAPP is in support of this update and we recommend providing it in conjunction with a third iteration of the code. A review of the CEMS User Manual in conjunction with a review of the code will ensure consistency and clarity.	We are preparing to have the user manual posted shortly after the finalized Code. It is a guide for data submission, not a directive or monitoring code. If facilities have questions or concerns on data submission they can always raise them by emailing CEM.UserCoord@gov.ab.ca. If the user manual needs to be amended at a future date, before the Code takes effect, that is possible.
We encourage AEP Air Policy team to review all stakeholder comments and consider sharing the changes incorporated prior to the finalization of the AB CEMS code.	We will not be circulating a third draft. This was made clear at the information webinar, that we were taking comments on draft 2 to develop the final revised CEMS Code.
We propose that AEP updated CEMS User Manual and released it for review and comment along with the code's publication.	We are preparing to have the user manual posted shortly after the finalized Code. It is a guide for data submission, not a directive or monitoring code. If facilities have questions or concerns on data submission they can always raise them by emailing CEM.UserCoord@gov.ab.ca. If the user manual needs to be amended at a future date, before the Code takes effect, that is possible.
Industry stakeholders should also be able to review and provide feedback to the CEMS User Manual when it is updated. Ideally it is preferred to review the Manual prior to the CEMS Code finalization.	We are preparing to have the user manual posted shortly after the finalized Code. It is a guide for data submission, not a directive or monitoring code. If facilities have questions or concerns on data submission they can always raise them by emailing CEM.UserCoord@gov.ab.ca. If the user manual needs to be amended at a future date, before the Code takes effect, that is possible.
1.0 Introduction	
1.1 US EPA promulgated Methods should be used only for the test scenarios for which they are designed. For example US EPA 19 should not be used for determining flow (unless authorized by the director).	These methods are referred to in AMD Chapter 4. They are all accepted methodologies, but for their specific intended purpose. We expect methods to be applied in the correct situation and context. The methods specify what they are intended for. The operator would take a risk in using a method for a purpose outside of the specified intent.

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Summary of CEMS Code Requirements (Page 10; Figure 1) We understand "5.1" is the "purpose of the tests" and not the tests themselves, but that creates confusion - CGA test is basically Linearity Test - to check for linearity - RATA is to test for relative accuracy Is it possible to call the linearity Test CGA to avoid confusion? also it seems to be missing Stratification test described in Sec 4.4 (see below) Also it is not quite correct in 5.1 saying RATA is done during Operational Period, as we understand RATA can be done during the Operational Period or immediately after.	Updated Figure 1 for Certification and Recertification section. The stratification test is required before completion of certification and is covered in this figure under installation.
1.2-A Implementation Timeline	
We are also pleased to see that the draft 2 code includes a phased-in approach to compliance, with an effective date of January 1, 2022. This will allow industry and consultants more time to adjust to the required changes such as modifying programming, switching out equipment, and updating CEMS procedures. However, CAPP is only in support of a January 1, 2022 compliance date as long as the code is published by March 2021 as initially proposed. Operators will require these 9 months to ensure their CEMS and DAS are in compliance. Additional flexibility may be required by some operators, in which case providing them the ability to discuss further compliance options with the Director would be beneficial.	Agreed. Nine months is a reasonable time frame to prepare for implementation of the revised Code. There is always flexibility for one-off situations where facilities can work with their approval coordinator (as per 1.2-B) on either timelines or deviations that can be substantiated.
1.2-A: "The person responsible must comply with the requirements of the CEMS Code as of and from [proposing January 1, 2022], unless otherwise specified in the CEMS Code." Operators will require time to implement changes prior to the enforcement date, such as updates to their Data acquisition Systems (DAS) in order to accommodate new valid hour requirements. We recommend allowing operators to implement new CEMS Code requirements prior to the draft 2 code enforcement date.	We are working on updating the CEMS User Manual (including the addition of flags that correspond to the revised Code) and AMD reporting forms. When those are complete facilities can begin implementing the new requirements before the Jan 2022 effective date so that they can prepare and test their data systems.
1.2-A We recommend that Section 3.1 include a provision to adopt the new CEMS Code requirements prior to 1/1/2022 for sources that are implementing CEMS and/or DAHS upgrades in 2021.	We are working on updating the CEMS User Manual (including the addition of flags that correspond to the revised Code) and AMD reporting forms. When those are complete we should be able to allow facilities to begin implementing the new requirements before the Jan 2022 effective date so that they can prepare and test their data systems.
1.2-A If the final CEMS Code is to be released March 2021 and the Code will take effect January 2022, this only allows nine (9) months to implement. Given the numerous changes proposed in the code this does not provide enough time to enact all changes. It is recommended to extend the implementation date to January 1, 2023.	Yes that is officially 9 months, however draft 2 was shared in October 2020. The overall intent of the revised Code has not changed since draft 1 was released in 2018. Clarifications on the final Code will be shared as quickly as possible to allow facilities to prepare for implementation. AEP thinks that 9 months is a reasonable time frame to prepare for implementation of the revised Code. There is always flexibility for one-off situations where facilities can work with their approval coordinator (as per 1.2-B) on either timelines or deviations that can be substantiated.
1.2-A Request at least one year is provided between the release of the final CEMS Code and the effective date. During the COVID pandemic site resources are restricted and workforce planning is affected by these limitations. Many industries are taking a cautious approach, and have a more stringent stance on workplace restrictions than Alberta Health guidelines, due to the essential services performed at site by operations and maintenance workers and the risk to production if essential workers get infected. This will lead to delays in work performed and resources available in 2021.	AEP thinks that 9 months is a reasonable time frame to prepare for implementation of the revised Code. There is always flexibility for one-off situations where facilities can work with their approval coordinator (as per 1.2-B) on either timelines or deviations that can be substantiated.

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Clause 1.2 A page 8 The Final CEMS code is to be released March 2021 with the in effect date of January 2022, leaving 9 months for implementation. Depending on the outcome of the 2nd draft clarifications (e.g. requirements for monitoring plans for existing CEMS) the current timeline is considered too tight. Consider extending the implementation date to January 1, 2023 to provide sufficient time that allows for planning logistics and corporate budget support to complete necessary retrofit/upgrades.	Yes that is officially 9 months, however draft 2 was shared in October 2020. The overall intent of the revised Code has not changed since draft 1 was released in 2018. Clarifications on the final Code will be shared as quickly as possible to allow facilities to prepare for implementation. AEP thinks that 9 months is a reasonable time frame to prepare for implementation of the revised Code. There is always flexibility for one-off situations where facilities can work with their approval coordinator (as per 1.2-B) on either timelines or deviations that can be substantiated.
1.2-A Application and Implementation "The person Responsible must comply with the requirements of the CEMS code as of and from [Proposed January 1, 2022] , unless otherwise specified in the CEMS code." To ensure 100% compliance with the new CEMS code, operators may need additional time to determine the required changes to the existing CEMs units and update DAS. The new code is expected to be published in March 2021, and that would only give operators nine months to initiate changes to comply with the new regulation. Due to the COVID-related situation and other economic uncertainties and constraints, we suggest that AEP allow additional compliance phase-in time. We propose the enforcement date be moved to January 1, 2023, instead of the proposed January 1, 2022. There will also be situations that operators complete the changes before January 2023. In such cases, we propose that AEP provide provisions in the CEMS code to implement parts of the new CEMS code requirements before the enforcement date. Recommendation: The person Responsible must comply with the requirements of the new CEMS code on or before January 1, 2023. Note : this means the currently 1998 code would remain in place until December 2022.	Facilities will officially have 9 months, however draft 2 was shared in October 2020. The overall intent of the revised Code has not changed since draft 1 was released in 2018. Clarifications on the final Code will be shared as quickly as possible to allow facilities to prepare for implementation. AEP thinks that 9 months is a reasonable time frame to prepare for implementation of the revised Code. There is always flexibility for one-off situations where facilities can work with their approval coordinator (as per 1.2-B) on either timelines or deviations that can be substantiated. We are working on updating the CEMS User Manual (including the addition of flags that correspond to the revised Code) and AMD reporting forms. When those are complete we should be able to allow facilities to begin implementing the new requirements before the Jan 2022 effective date so that they can prepare and test their data systems.
1.2 Proposed enactment date -- under ordinary circumstances, we would say that the date of Jan 1st, 2022 would be reasonable; however, given the coronavirus I would say a more suitable date would be Oct 1st, 2022 or later. Given that not all Canadians will not be vaccinated until the end of 2021, the opportunity for vendor visits to determine the best equipment to meet some of the new specs in the CEMS Code, we are suggesting Oct 1st, 2022 as this will give us 2021 to budget, the first quarter / half to shop around and the summer / fall maintenance shutdown to install. I am, of course, assuming not many facilities scheduled a maintenance shutdown after Oct 1st. (In our case, we anticipate having to replace our entire DAS. We will in all likelihood buy it off the shelf, but will need and want significant training and installation support.)	AEP thinks that 9 months is a reasonable time frame to prepare for implementation of the revised Code. There is always flexibility for one-off situations where facilities can work with their approval coordinator (as per 1.2-B) on either timelines or deviations that can be substantiated.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
1.2, 1.4 Administrative	
1.2-D If the approval requires CEMS monitoring for a parameter not included in the CEMS Code, the person responsible must get written authorization from the Director…Does person responsible submit (a) through (d) of proposed system for approval or does Director issue these as separate requirements? Timeline for this?	The person responsible submits their proposed testing and specifications for review by the director (e.g., HCl, VOCs). Obligation is on the person responsible to meet the Code and provide alternates for parameters outside of Code requirements. For the most part this would be first signed off by the Director, and then described within the monitoring plan submitted before CEMS monitoring begins, according to the timeline in the Code for monitoring plan submission. Manufacturer specifications or other jurisdictions requirements are often used to determine specifications and testing and maintenance practices. Then the QAP would need to also specify these for the facility's use. The Department needs a heads up of any new parameters for electronic data submission, as new coding may be required. The revised Code requires that any authorizations from the Director are handled outside of the monitoring plan (as going forward from 2022 on the monitoring plan will not be authorized by the Director) and 1.2-D does require Director authorization for parameters that are not covered by the Code.
1.4 The first word of Line 2 must be 'with' and not 'against'.	Agreed. Change made.
1.5 The specifications in the CEMS Code require the use of independent, certified gases. What about "cross-stack" type path analyzers where this is not possible in the installed configuration? Is a "filter box audit" acceptable, which requires the analyzer Sender/Receiver unit be mounted to a audit box and test gases injected?	The alternative to CGAs prescribed in the Code is a biannual audit with a portable analyzer, but Table 3 specifies test gas injection requirements for path-type analyzers. So if an audit box is used that meets those requirements for introduction of test gas, it would meet the requirements for a linearity test. The only downside to the audit box is that any possible issues with the cross-stack reflector (misalignment, etc.) would not be caught.
1.6-A Data Retention	
1.6-A(d) This section notes that Raw Data must be retained for a minimum of 3 years, item (d) notes the QAP. Keeping numerous copies of the QAP could cause quality issues. Recommendation: suggest changing this to either remove QAP from the list or altering the wording.	Changed bullet (d) to "revisions made to the QAP". Older versions of the QAP would be clearly marked as superseded, as per Quality System records control measures.
1.6-A (d) Please clarify if by QAP you mean revisions made to the QAP	Both the original and revisions to the QAP are used to audit a ‘Change Management System’. Changed bullet (d) to "revisions made to the QAP".
1.6-A, 1.6-B Raw data -- We think AEP needs to define a minimum scan time for CEMS and opacity meters. We believe AEP had a minimum scan time in DRAFT V1. AEP does define minimum scan time for ambient monitors, does it not? We will comment some more on this in later comments.	"Raw data" is defined currently as "the original, un-manipulated value obtained from an analyzer or device". Guidance was added referring to 3.4-B (retention of 1-minute base averages at a minimum), recognizing that not all analyzers are able to produce 1-mintute averages (e.g., CGs). Yes AMD Ch 6 requires 1-second scan rates for met parameters and "scan rates at least as fast as actual instrument response times for continuous parameters". We are not prescribing scan a rate as it can vary depending on the analyzer. We are requiring 1-minute averages be used for determining a 1-hour average, unless the analyzer has a scan rate > 1 minute.
1.6-A Must retain all raw CEMS data. Based on the definition of a "Data Point" does this include all one second data or can we summarize 1-second data into 1-minute averages? If an analyzer has a scan rate of 700 times per second it wood be difficult to get a DAS that can store that high resolution of data so it is recommended to define a minimum data point of "1-Minute or less".	"Raw data" is defined currently as "the original, un-manipulated value obtained from an analyzer or device". No, 1-second data is not required to be retained according to this clause. Added guidance from 1998 Code "Raw data defined in Appendix A and should provide for demonstration of quality control activities as defined in the CEMS Code and the QAP." Guidance was added referring to 3.4-B (retention of 1-minute base averages at a minimum).

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2.0 Monitoring Plan	
2.0 Please clarify that facilities without existing monitoring plans are not required to create monitoring plans. Sources older than the CEMS Code may not have monitoring plans.	Section 2.0 is specific that monitoring plans must be submitted for "a new CEMS installation". Adjusted guidance below 2.0-A that facilities with an existing CEMS do not need to submit or resubmit a plan.
2.0-A It was stated during the webinar that any deviations were to be approved prior to submission of the monitoring plan, however there is no process for this outlined within the CEMS Code Draft. Please advise more clearly on the process involving approval of deviations, ensuring those are captured fully and completely; and ensuring what is stated in the monitoring plan is what is physically installed.	Clause 2.0-B was intended to cover that requirement - "must receive written authorization from the Director for any deviation from the CEMS Code or Stack Sampling Code prior to submitting a CEMS monitoring plan". There is also clause 1.2-B "The person responsible must receive written authorization from the Director prior to commencing any (a) CEMS monitoring or (b) CEMS reporting which deviates from the requirements specified in the CEMS Code". Approval of deviations must come from the Director (written authorization). Added reference to 1.2-B below 2.0-B.
2.0-A (Page 15) "The person responsible must submit a CEMS monitoring plan that meets the requirements of the CEMS Code to the Director a minimum of 90 days prior to planned commencement of a new CEMS installation" Please provide definition of "new CEMS": 1) if CEMS not working, is installing an identical (same manufacturer, same model) replacement CEMS considered New CEMS? (like-kind in Definition) 2) Is replacement of the temperature probe, and/or the velocity probe but not the analyzer (e.g. NOx), considered New CEMS? 3) if CEMS is still functional, but assembly is taken out (e.g. for stack replacement - new stack with same material/dimension/configuration), and put back in the new stack, considered New CEMS?	"New" was meant to indicate new installations - i.e., no existing CEMS in place (and therefore no monitoring plan history). If it is a replacement to an existing CEMS, you would follow the recertification section and provide notification of what changed from the original monitoring plan. If it is just the change out of an analyzer, then no, that is not a new CEMS installation - again follow section 5.2 for replacements. There would already be a monitoring plan in place - no updated monitoring plan required, follow 5.2-D for notification of changes that require recertification. Added guidance below 2.0-A and reference to section 5.2. Added guidance also to 4.0-A (installation specs must be met for new CEMS installations going forward and don't apply to installations prior to effective date).
Clause 2.0 B page 15 There are times when changes to a monitoring plan are discovered later in the process for various reasons. These could result in deviations which were not known about prior to submission. Currently, any changes would be outlined in an update letter. Seeking clarity: Add a mechanism for resubmitting or updating the monitoring plan later in the process.	Any deviations after monitoring plan submission would need authorization from the Director in writing - see 1.2-B. This may not require resubmission of the monitoring plan, but would definitely require written authorization from the Director. Section 5.2 (recertification) addresses any major CEMS changes that require recertification (and notification of that).
2.0-C Please clarify how AEP plans to regulate receiving monitoring plans that do not conform with CEMS Code requirements if there is no approval process in place for their review/approval?	This clause has been removed to avoid contradiction with 2.0-B. The facility is required to meet the requirements of the Code (monitoring plan and CEMS requirements), unless they have been provided written authorization to deviate. There would be communication with the facility from the approvals coordinator if the department requires a change. However, the facility is required to follow the CEMS Code by default and if they can't they are required to request authorization from the Director. The onus is on the facility to meet all requirements.
2.0-D Please clarify that submission of monitoring plans are only required for new CEMS and no additional documentation will be required for existing CEMS.	(now 2.0-C) Section 2.0 is specific that monitoring plans must be submitted for "a new CEMS installation". Adjusted guidance below 2.0-A that facilities with an existing CEMS do not need to submit or resubmit a plan.

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2.0-F(a)(iv) Reconsider the need to include schematic drawing of emissions control equipment. This equipment may be no where near the CEMS and location could be something we don't want as public knowledge. For some of our sources these diagrams could be very complex and offer little to no value to AEP.	(now 2.0-E) We want an explicit record of the CEMS location in relation to the siting criteria (to show it is far enough away from a flow disturbance). It is importance to understand possible flow disturbances from equipment (e.g., flue gas recirculation units). Removed sub bullet on emission control equipment and rather added it to the example of flow disturbances in sub bullet (1).
2.0-F(d) "listing of any granted letters of authorization to deviate from the CEMS Code" With additional parameters added to the CEMS code will authorizations be assumed or are authorization letters required, despite not being new CEMS?	(now 2.0-E) No, authorizations are not assumed. Current authorizations to deviate are based on the 1998 Code requirements. We have added requirements for additional parameters that were not in the 1998 Code and these apply going forward. If an authorization to deviate is required and can be substantiated for the new Code, written authorization would need to be sought from your approvals coordinator based on the 2021 Code. This clause however requires that any deviations authorized must be listed in a monitoring plan for new CEMS installations from the effective date onward.
2.0-H(c) Please clarify: If approval does not dictate operating times for source, does this section need to be completed? CEMS online and offline periods are not the same as source online and offline periods. Note: When the unit (source) if offline, the CEMS can be offline without affecting the online monthly calculation. By default, CEMS is online during source offline periods.	(now 2.0-G) This section of the monitoring plan is required whether or not the approval specifically dictates source operation times. The facility must explain how they will determine source operating times (and therefore the times when the CEMS must be operating).
2.0-K Sensor comment codes may be difficult to include prior to valid monitoring codes being provided; Can the Regulator please advise on if the provision of these codes will align with his timing?	(now 2.0-J) We want these in the monitoring plan because the User Manual gives very generic codes and we would like definitions of the codes that the facility will be using. So the facility's specific codes would be provided in response to the generic codes in the CEMS User Manual. Knowing the mode codes and sensor comment codes allow AEP to provide the Electronic Codes for Reporting. Facility needs to take the codes from the User Manual and define how the codes will be applied by the particular facility CEMS.
3.0 Design Specs	
The biggest problem with the old code, and your new draft, is the phrase “of RM”. Some consultants didn’t under statistics and/or the RA calculation. They took this to mean 10% of the RM value. So if RM was 100ppm they could be +/- 10 ppm (which is wrong). Worse when they read the “footnote” in the old code, they thought they could be +/- 10% of the full scale reading. What was intended was to replace RM with FS in the RA calculation. Since your new code does not discuss any calculation with full scale for RA, it is best no to say “of RM” at all. It is just not needed. Relative accuracy just needs to be less than or equal to 10%. Below are some imagines from ECCC 1/PG/7 and EPA Spec. 2. Both just give a percentage RA. No “of”. If you remove “of RM” in the RA column it will be a lot clearer.	In the draft we did provide sample calculations in the appendix that should make it clear how to calculate RA and how to compare to the alternative RA specification when emissions meet the low emission criterion. We've removed footnote 7A from the 1998 Code and removed "of RM" from the specification tables to avoid confusion.
3.1 In the third paragraph of this section (Page 20), 'availability, however' must be replaced with 'availability. However,'	Agreed. Change made.

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3.1.1 Operating Range / Dual Range Analyzers	
3.1 We recommend that the CEMS Code include more defined specifications to determine when a dual-range analyzer is required. For guidance, AEP may want to reference Section 2.1.2.4, Appendix A, 40 CFR Part 75.	2.1.2.4 in Part 75 Appendix A is based on how to determine if two spans are required for NOx and different fuel blends. https://www.law.cornell.edu/cfr/text/40/appendix-A_to_part_75 We had more prescriptive criteria for dual-range analyzers in draft1 but it did not allow for facilities to make a decision based on the specific circumstances of facility operations. There are many different scenarios in the province where dual range would be suitable, but others where monitoring with the current technology of analyzers can be well managed with a single range. Some analyzers have large dynamic ranges but maintain accuracy throughout the range.
3.1.1 Dual-range analyzer -- when to implement dual-range analyzers is as vague as in the current CEMS Code. We would want some hard, fast rules. I suppose AEP could rely on the Approval Writers to specify dual-range analyzer upon review of the data, although Approval renewals come by once every 10 years, which can be a relatively long time. Furthermore, you are expecting Approval Writers to be familiar with the concept of out-of-range, which won't necessarily be the case for new Approval Writers. DRAFT V1 had firm rules around dual-range analyzers.	It is the facility's responsibility to determine the best analyzers to operate based on their approval conditions and the particulars of their operation, while meeting the CEMS Code. We had more prescriptive criteria for dual-range in draft1 but it did not allow for facilities to make a decision based on the specific circumstances of facility operations. There are many different scenarios in the province where dual range would be suitable, but others where monitoring with the current technology of analyzers can be well managed with a single range. Some analyzers have large dynamic ranges but maintain accuracy throughout the range.
3.1.1 The statement of "If measured emission concentrations fall outside the operating range of the analyzer, the data are not quality assured and cannot be used towards percent availability, however the person responsible is still required to report the out of range data." may cause CEMS data providers to only measure up to full scale thus never accounting for data outside of the operating range. This would be highly possible in CEMS analyzers that only use analog (4-20mA) outputs instead of digital protocols like ModbusTCP. How would data be reported when at full scale (potentially over) but technically measured do to analog limitations?	We don't explicitly require monitoring outside of the operating range, but we do require that the facility set the operating range to capture all possible emissions, including exceedance of approval limits. So if emissions are greater than what can be measured or reported, then due diligence would require reporting the inability to report emissions above their approval limit. Under EPEA and the approval, a facility is required to report any exceedance or potential for adverse impacts. The DAS could be a limiting measure in being able to sense values outside the operating range. The data in the situation you've describe would not be able to be reported. It is a situation that should be avoided. If there are values outside the operating range more that once, the operating range may need to be reconsidered.
3.1.1 "Data may be post-validated" - Please clarify the requirements for conducting linearity testing in back validating CEMS data over the full scale range of the CEMS; Is this conducted as a multi-point test over the entire (new) range of the analyzer or with a single point on the new span (similar to calibration)? Is this just to back validate in this instance? Does this apply for future instances? Can a facility then just increase their range	This should be a rare occurrence. If they have exceeded their range, they are exceeding their approval limit. The important point is that this is reported, along with the required follow-up. Post-validation confirms the validity of the measurement, and thereby whether a limit has been exceeded. The operating range is set to capture emissions that will be measured, including exceedances of emission limits. We have left the procedure for post-validation open to the facility to determine and set out in their QAP. A one-point span check could be conducted, like a daily span check. We are not asking for a full CGA in this case, but that is possible if the facility wanted to do that. It is meant to back validate for that specific instance, not to increase the operating range going forward. If the facility was frequently seeing values outside their operating range they should consider changing their operating range.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
Is the operating range of expected emissions between 20-80% of the analyzer full scale a strict requirement only for new CEMS units that are installed after Jan 1st, 2022 and not existing CEMS units installed prior to this date? At the end of life of existing analyzers that were installed prior to Jan 1st, 2022, or if the analyzer is to be replaced, does it need to conform to this new CEMS code requirement of anticipated emission concentrations needing to fall between 20-80% of the analyzer full scale?	In the revised Code, mandatory requirements are in the clauses which are indexed, in italics and boxed. The requirement is in 3.1-A and requires adherence to Table 1 for any new gas analyzers installed from the effective date forward. The requirement in Table 1 is that operating range encompasses all anticipated concentrations for SO2, NOx and CO. The quote you provided from 3.1.1 is guidance only. Ideally emissions would fall within 20-80% of full scale, but this is not a requirement. It is guidance only. So no, emissions between 20-80% of full scale is not a requirements for new CEMS analyzers. The requirement is to follow Table 1 for any analyzer installed from Jan 1, 2022 going forward. There is no requirement to change operating range or full scale of existing analyzers.
3.3 Design Specs for Flow	
3.3 - Table 2 Physical Design subpoint (b) Not all emission sources can completely prevent interference from moisture. The low temperatures and low dew point of some emission source emissions combined with an inability to heat the analyzer create potential interference from moisture. Recommend changing the Physical Design subpoint (b.) to "minimal interference from moisture"	This is a current 1998 Code requirement (Table 5) for flow monitors. This is referring to the design specifications of the flow analyzer. Flow analyzers commercially available should meet this design spec, as they would be designed to not have interference from moisture.
Table 2 'No interference from moisture' (Physical design) Please clarify if this means physically in terms of possible moisture accumulation on ultrasonic flow transducers or is more with respect to in stack moisture and subsequent data correction.	Yes this is a design specification, not a performance specification, and refers to physical design - moisture impacting the flow transducers from measuring flow. It is a current requirement in the 1998 Code.
3.3 Table 2 The 1.0 m/s specification is a very low number for flow analyzers such as pitot tubes, and it is unlikely that measurements at or near this velocity would be accurate. Please consider changing lower detection limit to a functional specification similar to that for Operating Range, which is that the flow analyzer must be capable of detecting the minimum expected flow.	This is a current 1998 Code requirement (Table 5) for flow monitors. It is a design specification from the manufacturer for flow analyzers purchased.
3.4.1, 3.4.2 DAS Requirements	
3.4.1 Over range values (values outside of the analyzer range) are recorded by the DAS but are considered invalid (not QAD). Are data points which are over the monitors range (full scale) considered invalid as per the CEMS User Manual definition? How are these data points treated in terms of availability and backfilling requirements? Please Clarify.	They are still reported and the Code provides guidance that these values are invalid because they are not quality assured. The data are flagged as missing as per the CEMS User Manual. Section 3.1.1 does give guidance that post-validation of data outside of the operating range is possible, with the facility following the QAP on how they will challenge the analyzer to determine linearity outside of the operating range. Edited guidance in 3.4.1.
The DAS captures data within the calibrated operating range (operating range set as per sections 3.1 to 3.3), but also records values in a buffer outside of that range. What is this buffer? Is it a certain percentage of operating range?	We do not require monitoring outside of the operating range, but the DAS may be set up to capture data outside of the operating range. The operating range is required to be set to capture the range of emissions that will be seen, including exceedances of the approval limit. Edited guidance to say the DAS "may" record values outside the range.
Clause 3.4 A - Specifications for Data Acquisition and Handling “The person responsible must capture CEMS data for all times that the source is operating” The text in italicized box suggests that 100% CEMS availability is required and does not account for the CEMS downtime. Recommend removing: "The person responsible must capture CEMS data for all times that the source is operating ". Changing to: "The person responsible must REPORT CEMS data for all times when the CEMS unit is in operation."	This ties in with 9.0-A (must report CEMS data for all periods the source is operating). We already have a clause on reporting. We have removed 3.4-A and added guidance referring to 9.0-A (requirement to report data for all times the source is operating) and the specifications for CEMS availability in Section 6.1.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
3.4-B (v) The person responsible must (a) install and (b) operate a DAS that meets the following requirements: … (v) records and computes daily zero and span drifts Some CEMS systems conduct QAQC on a manual basis external to the data acquisition system. Although the data is recorded, these recordings are separate from the facility-wide DAS, they can't be included in the system easily. Recommendation: add "(if applicable)" to this clause.	(Is now 3.4-A) Zero and span drift frequency was changed to a weekly minimum for ethylene and ethylene oxide analyzers to allow for manual zero and span checks. Changed bullet (v) to read "records and computes automated zero and span drifts". So this requirement for the DAS is limited to automated drift checks only, not manual.
3.4.2 Data Resolution / Scan Rates	
3.4-B Please advise on how analyzers with a one-second resolution will be assessed, especially with respect to coupling this requirement with 3.4-C.	(Is now 3.4-A) Changed 3.4-B to require 1-minute base averages.
3.4-C Contradicts 3.4-B (i): "DAS must … accept the signal output of all associated (1) gas analyzers, (2) flow analyzers, (3) temperature sensors, and (4) any other measurement components for all times that the CEMS is in operation" Needs more clarification.	(Is now 3.4-B) Updated 3.4-B to require retention of 1-minute base averages.
3.4.2 We will speak to scan times here. We are in agreement with the 75% data recovery concept; our issue is with "all possible data points". We currently scan once every 5 seconds, but the 5 sec data is then averaged to one minute. If we lose a sec or 59 seconds within a minute because of a glitch, we consider that inconsequential as long as we have a data point for that minute. And then we do the 75% data recovery for a valid hour. The consolidation to one-minute avoids the data burden of carrying and counting 576 data points every hour, considering we operate 350 days a year 24/7 that is a lot of data to track. If AEP insists on counting "all possible data points" and does not specific a minimum scan, we will probably re-program our DAHS to only scan every minute. Scanning once every 3 minutes as in your second example, certainly makes a mockery of the word continuous in CEMS. If, that is going to be permitted, why don't we stick with the current requirement which is one scan per 15-minute block is sufficient for a valid quarter. Furthermore, given that RATAs are usually done these days using an analyzer as the reference method, should the reference, i.e. RATA analyzer not have a scanning minimum dictated. This type of RATA requirement would presumably show up / fail stack analyzers with inadequate scan times.	What you have outlined is good practice and what we would expect, following our intent in this section for data resolution. Validity is tracked at the 1-hour level, on the base averages you use to calculate the 1-hour average (so 75% of the 1-minute averages). We updated clauses to require 1-minute base averages be used to calculate a 1-hour average (unless analyzer is incapable due to scan rates > 1 minute; e.g., GCs). Reference to scan rates was removed. Updated 1.6-A to point to 1-minute base averages for retention of raw data as well as the definition for raw data. Removed reference to "data point". Updated example to include 1-minute base averages.
3.4.2 Recommend creating 1-hour averages using 1-minute averages which require 75% valid 1-second readings (assuming 1-second analyzer data points) then the 1-hour average requires 75% valid 1-minute data points. The only outlier here would be that any value with an AMH code would be allowed into the average but would be an invalid status. This way there is an audit trail on hourly averages so they can be verified and proven. If 1-second datapoints are used to create the 1-hour average then we will not have anything to go back on to prove as we cannot store 1-second data on a long term basis due to the amount of SQL Server storage it would require. Would also recommend creating any summary data (averages or totals at a time interval of 1-hour) from the 1-hour averages or totals as they contain the missing data generated values that are applied to the 1-hour data. Summary data would then require 75% valid 1-hour averages or totals.	Removed reference to "data points" and scan rate and changed requirement to 1-minute base averages to calculate a 1-hour average. Validity is tracked at the 1-hour level, on the base averages you use to calculate the 1-hour average (so 75% of the 1-minute averages). This is what was originally intended with draft 1 (1-minute averages), but was not communicated well. Updated 1.6-A to point to 1-minute base averages for retention of raw data as well as the definition for raw data.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
3.4-E Recommending a revision to drop 'all available data points' to create an average - all valid one-second data to validate a one minute reading, and using a valid one-minute readings to validate an hour; You can't prove anything if you can't show one-sec data;	(Is now 3.4-D) Removed reference to "all available data points" for generating a partial hour. The 1-minute base average is the minimum requirement for retention. Depending on the analyzer, not all facilities are scanning and/or storing at a 1-second interval. The QAP should outline how 1-minute base averages are generated and the facilities process for troubleshooting and assessing data quality.
3.4-D(b) Specifications for Data Acquisition and Handling "Determine data validity for each 1-hour average calculated such that a valid hour contains at least 75% of the possible data points within the hour." If an analyzer scan or averaging rate is once every 1 sec, that represents a significant number of data points and may require a lot of processing power to determine hourly validity. If we are required to save our 1-second data then the amount of data we have to store would be 60x more. Recommend that data points be taken as fast as the analyzer scan rate or response time, but the data be reduced to 1-minute averages and stored as "raw" data within the DAS. This approach would allow the lowest "raw data" used to calculate 75% validity to consistently be 1-min data points across all Operators and still qualify for high-resolution data capture. Moreover, this DAS technique averaging raw scan rates to 1-min averages and then only storing the raw 1-min averages "as raw" analyzer data is common.	(Is now 3.4-C) This clause does not require retention of data at the scan rate of the analyzer. The revised Code does not require any change to the scan rate that analyzers are currently using. The DAS currently used would need to reconcile data from the analyzer at the scan rate currently being used to obtain a 1-hour average value, so that is not changing. Removed reference to "data points" and scan rate and changed requirement to 1-minute base averages to calculate a 1-hour average. Validity is tracked at the 1-hour level, on the base averages you use to calculate the 1-hour average (so 75% of the 1-minute averages). This is what was originally intended with draft 1 (1-minute averages), but was not communicated well. Updated 1.6-A to point to 1-minute base averages for retention of raw data as well as the definition for raw data.
Section 3.4.1 and 3.4.2, Clause 3.4-D (b) Concern with the change to 75% valid data points for the following reasons mainly being data storage capacity and management. Currently our analyzers scan a 1-second intervals. This means we have to have 75% valid 1-second readings to validate a 1-hour average. Recommendation to a change to allow 1-minute averages based on 75% valid 1-second averages, then create the 1-hour averages based on 75% valid 1-minute averages. This would be better as you can easily archive the 1-minute data and use it as an audit trail on your 1-hour average data. If we are required to save our 1-second data then the amount of data we have to store would be 60x more.	(Is now 3.4-C) Removed reference to "data points" and scan rate and changed requirement to 1-minute base averages to calculate a 1-hour average. Validity is tracked at the 1-hour level, on the base averages you use to calculate the 1-hour average (so 75% of the 1-minute averages). This is what was originally intended with draft 1 (1-minute averages), but was not communicated well. Updated 1.6-A to point to 1-minute base averages for retention of raw data as well as the definition for raw data.
Determine data validity for each 1-hour average calculated such that a valid hour contains at least 75% of the possible data points within the hour. It will be difficult to program a DAS to perform hour validation based on criteria that could be different for each pollutant or facility. Once the DAS has obtained data points equal to the scan rate of the analyzer then the minute data would be populated every minute, even if the information reported for that minute was obtained at a prior minute. Based on this, it is our feeling that basing the hour validation on obtaining 75% of the online minutes in an hour would achieve the same thing and be easier to automate in data acquisition systems.	(Is now 3.4-C) Removed reference to "data points" and scan rate and changed requirement to 1-minute base averages to calculate a 1-hour average. Validity is tracked at the 1-hour level, on the base averages you use to calculate the 1-hour average (so 75% of the 1-minute averages). Updated 1.6-A to point to 1-minute base averages for retention of raw data as well as the definition for raw data.
3.4-H: For in-stack opacity monitors, the person responsible must use a 10-second scan rate, at a minimum. Does this statement mean that the scan-rate can be greater than 10- seconds (i.e. 1-minute) or should the statement say a maximum scan rate of 10-seconds?	(Is now 3.4-E) Yes - have changed requirement to 10-second scan rate at a "maximum".

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
3.4.2 Given that we can expect greater reliance on CEMS monitoring, should we not provide a greater allowance than 15 minutes per hour for daily calibration activities. Even under the guidance in this DRAFT Code, it is possible for an Approval Holder to be required to monitor on one stack SO2, NOx, TRS, CO, O2, opacity, flow (and possibly HCl and Dust, in the near future) would 15 minutes be sufficient for daily cal allowances even if those 15-minute periods are saddled across two consecutive 1-h periods.	There is no "allowance" or maximum provided for daily calibration activities when it comes to valid hour determination. The requirement for a valid hour (75%) is based on a statistical representation of the hour (75% chosen as the majority of the hour, and therefore representative of the hour). QA and QC activities are not counted as downtime for the calculation of percent availability. However, a valid hour, for reporting purposes, needs 75% of the hour to report it as a representative (valid) hour. The guidance above 3.4-F is encouraging the planning of zero/spans to avoid losing a reportable hour, however we understand this is not always possible, depending on the analyzer.
3.4.2 We recommend that a minimum of 50% of the data points within a hour to be considered valid when conducting CEMS maintenance and QA/QC tests. This would provide more flexibility in when maintenance and QA tests can be performed in a manner not resulting in monitor downtime.	The requirement for a valid hour (75%) is based on a statistical representation of the hour (75% chosen as the majority of the hour, and therefore representative of the hour). QA and QC activities are not counted as downtime for the calculation of percent availability. However, a valid hour, for reporting purposes, needs 75% of the hour to report it as a representative (valid) hour. We are not willing to allow a 1-hour average to be reported as valid and representative of the hour when only half the hour was sensed.
In this section of the rule, an example of how to validate an hour average is provided. The example contained in the draft rule is based on a scenario where 75% of the possible data points is a whole number. What happens in situations where 75% of the possible data points does not equal a whole number? Would standard rounding convention apply? CEMTEK Example: A partial operating hour in which the unit operated for 26 minutes and the scan rate is equal to 2 minutes. This would yield 13 possible data points. 75% of those possible data points would be 9.75 data points. Would the DAS be required to obtain 9 or 10 data points in order to calculate a valid average value for that hour?	We have added the requirement to obtain 1-minute base averages, unless the analyzer is not capable (e.g. with GCs). However, yes, standard rounding rules would always apply. In this case, 9.75 would round up to a minimum of 10 data points needed to obtain 75% of the data points in the hour. If you used only 9 data points (69.2%) that would not meet the 75% requirement. We are looking for 75% of the data period to be available.
3.4.2 For dual range CEMS systems, the daily zero and span drift test naturally takes longer than in a single range system, a little more than 15 minutes. It is not unreasonable to set the regularly scheduled test so that it occurs in two different clock hours. However, there are times when an unscheduled zero and span drift test must be initiated for system troubleshooting, or sometimes several tests. For dual range analyzers, the limit should be increased to 25 minutes to allow for the longer time required.	The 75% requirement for a valid hour is based on statistically representing the majority of the hour. If we allowed 25 min of missing data points within 1 hour, that would leave only 35 minutes of data, which is just over half. That is not a good representation of the hour. If you are not able to report an hour where a zero/span is conducted, the hour would be flagged as maintenance. This would still be counted toward percent availability because it is regular, planned maintenance, as per the QAP (see guidance below 3.4-K). If conducting an unscheduled zero and span and troubleshooting, the hour would be considered missing if 75% of the hour is not captured. When responding to analyzer failure, it does not count towards CEMS availability. We don't provide an allowance for analyzer issues, whether dual span or single - that is downtime.
3.4.2 A time interval is invalid if greater than 25% of the hourly averages within the interval are invalid….. , the reporting interval is considered missing. Please clarify if a missing data generation is expected to be applied and what methods are available. If the time interval is created using hourly values that were generated from missing data, whether it is 10% to 90%, would a General Comment stating "Missing Data" be applicable?	If an interval is missing due to not meeting the valid interval criteria, yes we expect missing data to be estimated for that interval. According to the CEMS User Manual you would include a general comment to denote which missing data method was used (e.g., 1, 2, 3 or 4). The User Manual has guidance on interval readings - using the methods in section 10 of the manual but subbing in the interval rather than an hour. You could also estimate missing individual hours. Note that the User Manual will be updated and posted after the Code.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
3.4.3 Availability	
Section 3.4.3 page 25 If CEMS availability isn't calculated until after the CEMS is certified, does that mean, when a new CEMS is installed on an existing stack, an uptime exceedance is likely to occur? Installation and certification of the CEMS take more than the allowable downtime to carryout. Provide clarification.	If you are certifying a new CEMS, you wouldn't calculate percent availability until after certification of the CEMS. However if you are replacing an analyzer (so for example replacing one NOx analyzer with a different NOx analyzer), you would have a break in data availability. We have added a section in the revised draft on allowance for when the replacement is pre-planned and preventative (percent availability would not need to be met). If you replace an analyzer because of analyzer failure or repairs needed as a result of failure, then that would be missing data (or you would put replacement monitoring in place to avoid downtime).
Section 3.4.3, guidance under 3.4-K "If starting up a new CEMS, percent availability is not calculated until after certification of the CEMS." Not clear even though this is not part of the CEMS Code: If we elect to have the Conditional Test Period of 128 hours (7 days), we cannot have certification during CTP. But the source is running. So t=128 hours for that 7 days. But availability = zero??	(Is now 3.4-J) You are not required to report percent availability (meet the 90% availability) until after certification. So if you conduct a Conditional Test Period, you are not reporting percent availability for that period. However, any data collected prior to certification, while the source is operating, will be submitted in the electronic data file, and flagged as pre-certification. There are flags for CTP and OTP as well. Changed guidance to "If starting up a new CEMS, percent availability is not required to meet the percent availability performance specification until after certification of the CEMS".
3.4-K (Page 25) "The person responsible must calculate percent availability for all times that the source is operating, using Equation 1, for each CEMS analyzer corresponding to the Codes for Electronic Reporting, as referenced in the CEMS User Manual" Is this "t" = "time the source is operating", the same as cell B23 of the monthly CEMS Summary AMD2 Form "Stack Exhaust Hours for the Month"? For example: for September (30 days = 720 hours) if the source is not operating for 100 hours, t = 720-100 = 620 hours. Should cell B23 of AMD2 be 620 hours?	(Is now 3.4-J) Yes that is correct. AMD2, cell B23 asks for "stack exhaust hours". That would be the source operating hours for the month and yes that is equal to "t" in Equation 1. According to your example scenario, yes, if the source did not operate for 100 hours in the 30-day month, t would equal 720-100=620 hours and that is what would be put in cell B23 on the AMD2 form. Note that in the electronic CEMS data submission, the time where the source did not operate would be time-stamped as specified in the CEMS User Manual (Station Status record). Note also that the revised Code explains that "source operating" includes all times the stack is exhausting, even in times when unit may be off (e.g., cool down/shutdown).
3.4-L "If the person responsible pre-plans replacement of a CEMS analyzer and cannot meet percent availability specification inspection 6.1 during the month, the person responsible is exempt from meeting percent availability requirements for that analyzer in that month, as long as : (a) the timeline for analyzer replacement in 5.2-C is met, and (b) percent availability is still reported, including a comment explaining the analyzer replacement" Note says "The exemption 3.4-L does not apply to replacement of an analyzer or installation of a temporary analyzer in response to analyzer malfunction …" it means anytime when there is an analyzer malfunction such that the analyzer has to be replaced, the entire period of time until the new analyzer is certified, is deemed CEMS unavailable?	(Is now 3.4-K) Yes that is correct and should be how it works currently. The time respond to analyzer failure or malfunction, and any replacement and/or recertification required cannot be considered uptime. You have missing data until CEMS is certified/recertified. The only way there could be uptime is if there is quality-assured replacement monitoring put in place (e.g., third-party CEMS, spare analyzer, reference method). This is where section 8.0 comes in and why we have added that requirement to the Code - to limit downtime.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
3.4.3 In Equation 1, normal and pre-planned QA and QC activities (i.e. those described in the QAP) are included in the total available analyzer hours (ta). Operators would require both non-routine preventative maintenance [unscheduled] and routine preventive maintenance [scheduled] flagging to discern the difference between normal pre-planned QA and QC activities and corrective actions. Recommend providing additional clarity on the application of equation 1 to include provisions for both non-routine preventative maintenance [unscheduled] and routine preventive maintenance [scheduled].	This is also part of the current 1998 Code - section 2.5.3 says "Time periods necessary for CEMS calibration, quality control checks or backpurging, shall not be considered as downtime when calculating Ta." So you are not removing the time for regular, planned maintenance activities in the calculation of % availability. However operators are reconciling this currently with their DAS can be continued. Example 2 in 3.4.3 shows the subtraction of hours used for unplanned maintenance. The CEMS User Manual will be updated with guidance on flagging planned vs. unplanned maintenance.
3.4.3 In the example (1) a CGA is specifically referenced as not affecting the available hours, however performance testing such as RATA's and CGA's are not referenced as examples in the notes on QA/QC activities, please note in the text that performance tests such as RATA's and CGA's are considered operational time to make this clear.	Made guidance below 3.4-J more specific. Note that during a RATA, the CEMS is measuring actual emission levels, so there is no disruption in capture of quality-assured data during a RATA. A CGA is different as you are adding test gases and therefore not measuring actual emissions.
3.4.3 Regarding maintenance that is considered valid (routine) and maintenance that is invalid (non routine), it is presumed that this is predicated on sensor comment codes from AEP in revisions to User Manual (upcoming); Using qualifier 8 to determine data validity can be extremely tricky and inadequate.	Qualifier 8 Data Quality Flags are given in Table 10 of the User Manual. There are specific purposes for the use of these. You would not use these flag for routine maintenance activities (like a zero/span). The CEMS User Manual will be updated with guidance on flagging planned vs. unplanned maintenance.
3.4.3 "Source operation (or time the source operated) is the total time the source combusted fuel or effluent was discharged." There is potential for misapplying the requirement if both combusted fuel or effluent discharge requirements are specified. Source combusted fuel is a limiting factor, and creates room for interpretation. Recommend the following text change : Remove the " source combusted fuel" from the requirement to read - "… total time the ~~source combusted fuel~~ or effluent was discharged."	"Source operating" is defined in the Appendix as "any time during which effluent was discharged (any time that the source is emitting), which could include start-up, cool down, and purge modes, catalyst regeneration or catalyst burnout even if the unit(s) are not actively processing" Updated the guidance in 3.4.3 to align.
3.4.3 In the first paragraph of Page 27, 'Chapter 9), However' must be replaced with 'Chapter 9). However,'.	Agreed. Change made.
3.4.3 Historian (Back-up Data System) Use	
3.4.4 Please consider use of 'alternate' or 'backup" rather than 'historian'.	Agreed. Changed "historian" to "back-up data source" throughout.
3.4-M(a) Please clarify what is meant by 'identical CEMS data' with respect to Data Historian use. Does the Historian or "alternate or backup" data set need to have the same sensor comment codes, qualifier 8 codes, and averaging methodologies? If a DAS gives a 4-20mA analog outputs to DCS for data averaging to save in a historian it will never be identical due to analog drift and potential time differences between the systems.	(Is now 3.4-L) We would be looking for the alternate back-up data source to meet the same requirements of the Code (so meet requirements of 3.4-A for the DAS), but yes no two data sources would be configured completely identically. We are looking at the resultant data (i.e., concentration reported) to be identical, regardless of data system.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
3.4-M "The person responsible must only use historian data as a temporary back-up during periods of primary DAS reporting loss …" So back-filled data can be used and count towards CEMS availability. How is this related to Section 3.4L? > is data back-fill required even though there is exemption from availability requirement? > can back-fill data be used towards "replacement of an analyzer or installation of a temporary analyzer in response to analyzer malfunction? Good to have clarification.	(Is now 3.4-L) This clause provides conditions for the use of data from a back-up data system. So it is more "you can only use the back-up data system in place of your primary DAS data when you meet these criteria…". If data from the back-up data source is identical to the primary data set then it can be reported as quality-assured data, and therefore be counted as operational time. Use of a back-up data source is not "backfilling" data. Historian or another system of back-up data is just a back up to the primary DAS - a separate repository for primary, quality-assured CEMS data. It is the same data - just held in a different repository. You need to ensure that the data in the Historian or back-up data source is identical to primary DAS data. We no longer use the term "backfill". Rather, missing data can be estimated, according to the CEMS User Manual. This estimated missing data is not QA/QC'd and does not count as operational time (as it is not real emissions data).
3.4.4 Please advise if you will be adding data flags for data historian use in the upcoming revision of the CEMS User Manual? Or will it be in General Comments	A new flag will be added to the CEMS User Manual for use of back-up data. Other flags will also be added to coincide with changes to requirements in the revised Code.
3.5 Certificate of Conformance (Interference / Temp Response)	
3.5 Interference rejection certificates should not be required within 3 months of manufacture. This is costly and adds no value since analyzers will not be different from date to date unless a design modification was implemented. Perhaps only require updated certificate upon major device modification or Annually similar to the European TUV Certifications.	This is a requirement from the 1998 Code carried forward, so the requirement has not changed. Facilities have the choice to either conduct the test or to obtain a certificate from the manufacturer that shows that the analyzer meets the design specification.
3.5-B There is a space before the comma must be removed.	Thank you. Corrected.
4.1 Analyzer Location	
4.1-C(ii) - Add general 'flow disturbance' as part of (1)/(2)/(3); Please advise if the person responsible is to disclose what that flow disturbance is, perhaps as part of the monitoring plan.	Added flow disturbances to bullet (ii)(3). This aligns with the Stack Sampling Code. Yes flow disturbances need to be shown on the schematic diagrams and described as part of monitoring plan requirements (2.0-F).
4.1-C (ii) (3): "at least two equivalent stack, duct or flue diameters downstream from: (1) the nearest control device; (2) the point of emission generation; and (3) other points at which a change in the emission concentration or emission rate may occur" Please provide more clarification describing what these other points may include. This statement is too vague and may be interpreted different than what was intended.	This wording was taken from the 1998 Code. Added in "flow disturbance" to sub bullet (3). It is anything that could impact measurement. We are looking at monitoring being representative of emissions coming out of the stack. This was intended as a catch all to cover anything in the stack that could impact emission measurement.
4.1-C(iv) - The code should state the installation requirements for ultrasonic flow analyzers	This is added to ensure RM measurements are not impacted by the CEMS. Cross stack ultrasonic flow analyzers may be set up at an angle which makes it difficult to meet the required distance from RM ports. This allows them to be installed below RM ports. Ultrasonic systems are still required to be installed at a location that is representative of emissions (4.3).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
4.4 Stratification Test	
Sec 4.4 Stratification Test (page 31-32) If Stratification and /or Cyclone tests are part of certification - why is this in a separate section and not part of the Section 5.1 Certification Requirement, described later?	The stratification is not always "part" of certification, but it is completed "prior to completing" certification. It should be part of CEMS placement - but this is not always possible. This is why it is in the installation section. The ideal is that it is conducted to inform placement of sensors, but it can be completed as part of certification. We've updated clause to say "prior to or at certification". Removed guidance in 5.1 that said stratification tests are conducted prior to certification.
Section 5.1 Certification Requirements / Clauses 4.4 A & 4.4 B Stratification and Cyclonic flow test, Page 31 32, 34 4.4 A and 4.4 B mandates stratification and cyclonic flow test be done prior to completing CEMS certification. Can it be made clear if there is an expected time lapse between the stratification/cyclonic flow tests and CEMS certification tests (RATA/CGA) that is acceptable? Provide more clarification in Section 5.1 or clauses 4.4 A and 4.4 B such as" stratification/cyclonic flow tests can be conducted just before commencing (during) CEMS certification tests i.e., RATA/CGA". This will help with scheduling and completing CEMS certification in a timely and efficient manner saving on multiple trips by the 3rd party.	The stratification is not always "part" of certification. This clause requires that it be conducted "prior to completing CEMS certification". So the requirement is to have the test conducted anytime before certification is complete. It is often part of CEMS placement - but this is not always possible. This is why it is in the installation section. It is up to the facility and dependant on each individual installation and certification schedule, which is why we have not been prescriptive on what exact time it must be conducted, as long as it is completed before certification is complete. There is no reason why the testing cannot be conducting as part of certification, and therefore using the third party at that time. We've updated clause to say "prior to or at certification". Removed guidance in 5.1 that said stratification tests are conducted prior to certification.
4.4-A & 4.4-B "For new CEMS installations from [proposing Jan 1, 2022] forward, prior to completing CEMS certification, the person responsible must test ..." Stratification and cyclonic tests have historically been completed as part of the certification. These tests are completed by the RATA company (third party tester) just prior to commencing the RATA in order to confirm the absence of stratification or cyclonic flow, during stack design. The draft #2 wording suggests that these tests would be completed sometime prior to the commencement of the certification, requiring additional site visits by third-party testers. We recommend the following change : Remove "forward, prior to completing CEMS certification" and replace it with "during CEMS certification". Change to: For new CEMS installations from [proposing Jan 1, 2022] ~~forward, prior to completing~~ during CEMS certification, the person responsible must test ….. It is recommended that 'Section 4 Stratification and Cyclonic Flow Tests' be moved to 'Section 5.0 Certification, Recertification and Component Replacement', as these tests are a part of CEMS certification or recertification.	The stratification is not always "part" of certification. This clause requires that it be conducted "prior to completing CEMS certification". So the requirement is to have the test conducted anytime before certification is complete. It is often part of CEMS placement - but this is not always possible. This is why it is in the installation section. It is up to the facility and dependant on each individual installation and certification schedule, which is why we have not been prescriptive on what exact time it must be conducted, as long as it is completed before certification is complete. There is no reason why the testing cannot be conducting as part of certification, and therefore using the third party at that time. Updated clause to say "prior to or at certification". We've removed guidance in 5.1 that said stratification tests are conducted prior to certification.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
4.4 Please clarify if stack testers will be required to perform stratification and cyclonic flow testing prior to certification as well as during the RATA as part of certification? (This will be a large additional cost to clients)	The stratification is not always "part" of certification. This clause requires that it be conducted "prior to completing CEMS certification". So the requirement is to have the test conducted anytime before certification is complete. It is often part of CEMS placement - but this is not always possible. This is why it is in the installation section. It is up to the facility and dependant on each individual installation and certification schedule, which is why we have not been prescriptive on what exact time it must be conducted, as long as it is completed before certification is complete. There is no reason why the testing cannot be conducting as part of certification, and therefore using the third party at that time. Updated clause to say "prior to or at certification". We've removed guidance in 5.1 that said stratification tests are conducted prior to certification.
In conjunction with the gas stratification and flow stratification tests described in 4.4-B, is a temperature stratification test also required?	Temperature is assessed during the RATA at certification, but there is no requirement to test temperature during the stratification test. The temperature probe is required to be installed at a location that is representative of emissions (4.3).
4.4-D States that must use 2 analyzers (a), and repeat the measurement at the initial measurement point (b) and compare using against the average following equation 2. Would two analyzers be required and if so what is the purpose of comparing to the initial sample point? Is there a limit for that percent change? Equation 2 does not have any requirement for entering a second analyzer reading, and is the same equation for determining stratification with a single analyzer.	It says in the guidance that one of the analyzers can be the installed CEMS, so you would just have another analyzer that is traversing the stack to gauge spatial variability. The check at the initial sampling point at the end of the test is to check temporal variability. If the difference is >10% it is recommended to repeat the test at another time when conditions are more stable. Moved stratification procedure to Appendix B.
4.4-E For flow stratification, would the application of a flow profile correction factor be acceptable as corrective action?	(now in Appendix B) A flow profile correction factor could change at different flow rates or loads. So a correction factor may not be suitable for all loads. Stratification can change temporally as process load or other conditions change.
Section 4 - Flow Stratification test (4.4-E) Clause 4.4-E (i) for flow stratification is overly stringent, as even fully developed turbulent flow exceeds the ± 10% limit. Greater number of traverse points increases the so defined "stratification", as the first and last points get closer to the stack wall. Clause says flow stratification must be tested prior to certification on new CEMS installations. Expensive CFD modelling may be the only avenue to fulfill this requirement on new sources. It's difficult to justify this requirement for CEMS serving a single combustion unit from a location that meets the 8 & 2 diameter Method 1 criteria. They should be exempt.	Removed requirement for flow stratification. Cyclonic flow test and gas stratification must be completed. Computational Fluid Dynamics modelling is an option, but is not required. Moved stratification procedure to Appendix B.
The velocity "stratification" limit was set at the same level as the concentration stratification (< 10% of Avg, 4.4-E (i)). The clause is not met if any of the traverse points exceeds the limit. This limit is overly stringent (as per my experience, and the attached Power Law modeling spreadsheet). Gas stratification can approach ~0% for well mixed streams but flow always have a velocity profile due to the stack wall. The gas velocity at the traverse point closest to the stack wall is likely to be < 10% of average, particularly when that point may be as close as 1 inch from the wall (US EPA Method 1 clause 11.3.2.1). In US, >90% of CEMS pass RATA at < 7.5% RA. Does the RATA record of AB sources merit the additional tightening of CEMS location for new installations?	Removed requirement for flow stratification. Cyclonic flow test and gas stratification must be completed. Moved stratification procedure to Appendix B. Matches requirements that were in the 1998 Code for stratification.
4.4-E spelling error: "restest"	Thank you. Corrected. Now in Appendix B.
4.4-E(b) This clause should begin with 'retest' and not 'restest'	Thank you. Corrected. Now in Appendix B.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
4.4-G How long must the results of the Stratification Test be retained at the industrial operation?	(now in Appendix B) Data retention requirements are in Section 1.6. Data summaries and reports are required to be retained for a minimum 10 years.
5.0 Certification	
5.0 We would recommend that the first sentence in this chapter be re-written as follows -- After installing a CEMS, certification is achieved when the person responsible demonstrates that the CEMS meets all performance specifications in the CEMS Code, unless otherwise authorized by the Director in writing. This has the flexibility to allow the Director to address and manage unusual situations where the full imposition of Chapter 5 is unwarranted, e.g. the Director requires a CEMS for monitoring purposes, but not compliance. It is necessary to recognize that RATAs are a barrier to the adoption of continuous monitors for monitoring / emission inventory development, because RATAs are very costly and difficult to schedule. We believe industry maybe quite willing to adopt continuous monitors to eliminate manual stack sampling if RATAs are not required for non-compliance monitors. (substituting CGAs for RATAs in such non-compliance cases should be sufficient.) Certainly, we would say that everyone can agree that continuous monitors are more valuable and complete in develop emission inventories than twice yearly stack tests, which only provide a snapshot in time under generally ideal conditions.	There is always the possibility to receive authorization from the Director to deviate from the Code, if warranted. This is covered by 1.2-B. With the revised Code having finite, indexed requirements in clause form, it will be easier for the Director to nail down which requirements an authorization to deviate is in respect to. We understand that RATAs cost money, but they are the one independent/outside test on the CEMS system and are very important in assuring that the data captured by the CEMS are accurate and representative of actual emissions. Manual stack surveys are similar, but provide only a snapshot in time. The approval is the mechanism to dictate whether it is stack sampling or continuous monitoring that is required to determine emission levels and compliance with limits.
5.1 The first line of Page 37 must state 'Section 5.1.1' instead of '5.1.1'.	Thank you. Corrected.
5.1 If a director sign-off is not required for certification of a CEMS, who will be responsible for this certification?	The facility is responsible to complete all requirements in Section 5.1 and report the results (5.1-N and guidance at bottom of Section 5.1.1). Certification is complete when all requirements have been met. No, there is no Director sign-off.
In the past (~2016/2017) when we changed out the CEMS to a new model – we did linearity test, RATA etc., and submitted one report (Certification). As you know, the Linearity Test is just CGA in another name. This time after we changed out the stack, and put the CEMS back in place – we did again the certification tests. Question: How do we submit the “certification report” as now we are required to submit also AMD Forms? Do we submit the CGA report + AMD Form 4, and separately submit the RATA report + AMD Form9? Is there no provision of AMD Form to submit a “combined” report for certification?	Yes the changes in reporting CEMS certification/recertification stem from updates to the AMD (and are now referenced in the revised draft CEMS Code). That is correct that you would submit the individual performance test results: RATA report and AMD9 form; CGA report and AMD4 form. Anyone with CEMS is also required to submit the AMD2 form (CEMS Summary) monthly, and there is a field to indicate certification or recertification. This replaced the former quarterly CEMS reports under the 1998 Code. That is correct, there is no provision for reporting of a “combined certification report”. The AMD summary forms and reports are required any time a RATA or CGA is conducted. So in a sense, there is no “additional” report for certification. Section 5.2 of the Code requires notification when recertification is conducted. You would also mention any recertification conducted in the monthly report (or annual in the case of no monthly), indicating the reason for recertification.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
Section 5.1, guidance below 5.1-M "A RATA performed for certification can be used towards meeting the RATA frequency requirements in section 7.3" What about linearity test performed during OTP: can it be used towards meeting the CGA frequency requirements?	No. The requirement for frequency of RATAs and CGAs is that they are spaced 30 days apart. The intent is to have a performance audit roughly each quarter - covered by CGAs and RATAs. So if the certification RATA is used to count as one of the 2 required per year, the CGA cannot count as one of the required CGAs as it is not spaced a minimum of 30 days from the RATA. You could use either the RATA or the CGA at certification for counting towards the annual requirement in 7.3, but not both.
5.1 Please clarify if the RATA and CGA tests conducted during a certification can be used to fulfill the calendar year performance test criteria.	There is guidance in 5.1 (above 5.1-N) that the RATA conducted during certification can be used toward meeting RATA frequency requirements. However the RATA and CGA conducted during certification cannot both be used towards fulfilling the annual frequency requirement because the two tests for certification are not spaced at least 30 days apart, as per 7.3-D requirements. The intent is to have a performance audit roughly each quarter - covered by CGAs and RATAs. You could use either the RATA or the CGA at certification for counting towards the annual requirement in 7.3, but not both. We note the RATA in guidance as this is a more costly test and we assumed facilities would use that test to fulfill the annual requirement. Amended guidance on this in Code (above 5.1-N and below 7.3-D) as well as 7.3-D to make this more clear.
5.1-D (a) (ii) Indicates that operating the CEMS normally includes measuring diluent gases - are diluent gas measurements required when not listed in the approval? i.e. dry extractive systems with a fixed moisture concentration for the mass emission calculation, or dilution, or in-situ CEMS. Should this have "as required"?	No, the use of diluent gas is not a requirement of the CEMS Code, but dependent on the CEMS principle of operation. Changed this clause to say "where applicable" for bullet (a) (ii).
5.1-B Certification Timeline	
5.1-B Please clarify that the timelines in this section are for original certification only as they differ from the timelines listed in 5.2-C for recertification.	Yes, the timeline in 5.1-B refers to certification in clause 5.1-A, which specifies for "new" CEMS installations.
5.1-B: “For the certification in 5.1-A, the person responsible must meet all CEMS performance specifications in section 6.1 within (a) 90 unit operating days or (b) 180 consecutive calendar days, whichever occurs first, from the date that emissions first exit to the atmosphere through the stack, duct or flue.” 90 unit operating days is logistically challenging and will be too stringent for the operator to mobilize contractors on site and complete the certification, especially during wintertime. It offers little time to account for scheduling, troubleshooting, and completion of testing requirements. We recommend extending the 90 operating days to 120 operating days to allow additional operational flexibility	Changed 90 unit operating days to 120 unit operating days. Kept the 180 calendar day maximum for certification. Note: facilities do now need to report pre-certification data (9.0-A).
5.1-B What is the rationale for reducing the time allowed for certification from 180 days to 90 operating days?	Changed 90 unit operating days to 120 unit operating days. Kept the 180 calendar day maximum for certification. Note: facilities do now need to report pre-certification data (9.0-A).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
5.1-B With no commitment by AEP to review monitoring plans and full onus of compliance is on the facility, reducing the time frame for certification to 90 operating days is insufficient. For sources that operate for almost 365 days a year, the 90 unit operating days would occur first, thus significantly reducing the time allowed for the certification from the old CEMS Code (6 months to 90 days). This reduction in time allowed will cause a significant constraint on facilities bringing new sources online, as time is required to streamline operations. All of the requirements for certification include "normal operation" of the source which will take time to achieve on new sources. AEP should consider increasing the time allowed for certification to "180 operational days or 180 consecutive calendar days (whichever comes first)" to allow sufficient time for facilities to stabilize operations and ensure CEMS equipment is functioning properly prior to certification.	Changed 90 unit operating days to 120 unit operating days. Kept the 180 calendar day maximum for certification. Note: facilities do now need to report pre-certification data (9.0-A).
Clause 5.1 B page 34 Based on experience, 90 unit operating days will be too stringent for the operator to mobilize contractors on site and complete the certification, especially during inclement weather and during unforeseen circumstances. 90 operating days currently given in version 2 is too logistically challenging for operators, and offers little time to account for scheduling, troubleshooting, and completion of the test requirements. Recommend extending 90 operating days to 120 operating days to allow additional operational flexibility and to accommodate for unforeseen circumstances - to provide sufficient time carryout the work.	Changed 90 unit operating days to 120 unit operating days. Kept the 180 calendar day maximum for certification. Note: facilities do now need to report pre-certification data (9.0-A).
5.1-M and 5.1-N Certification Reporting / Certification RATA	
5.1-M Please clarify or add additional context to avoid the interpretation that facilities that fail RATA during or after certification, may only have to pass a RATA. Please state explicitly that if a RATA is failed as part of the operational test period that the entire certification must be restarted. Currently it could be interpreted that failure of a RATA conducted during OTP causes entire OTP to restart whereas failure of a RATA conducted post-OTP only requires the RATA to be conducted again.	Agreed. Added to 5.1-M that you "must restart the Operational Test Period" when a RATA fails, in addition to conducting another RATA. Additional time is provided for the RATA (i.e., can be conducted after the OTP). But if any performance test fails, the OTP needs to be restarted - including a repeated RATA. A RATA failure denotes a major issue. The passed RATA from certification counts toward the annual requirement.
5.1.1, last paragraph on pg 37, under 5.1-N Please clarify what monthly report is referred to in this paragraph, "…and the results of the certification would be summarized in the monthly report." Some facilities do not have requirements to complete monthly air reports. Or is this referring to the CEMS electronic reporting.	Yes - would be mentioned in the MDF file (specific code for pre certification). RATAs are flagged in the MDF file as well. This section of the Code was referring to the monthly IAM report and AMD2 Form (which come in monthly - these replaced the quarterly CEMS reports from the 1998 CEMS Code). There is a field in the AMD2 form to identify certification and recertification. Updated guidance to say "monthly reporting", rather than "monthly report".
5.1-J K-factor (also 5.2 - Table 4)	
5.1-J Changing the cP factor for a pitot tube or annubar should not require director authorization. Notification to the director should be sufficient to change a factor. Annubars can physically change over time as they are exposed to stack gas and require an update to the cP factor. Authorization is not required for any other “major changes”.	Removed requirement for Director authorization from 5.1-J. While small changes may be needed periodically, flow factors should not change markedly from year to year - unless there is a change to the source (stack or process). Flow factors should not be changed due to a RATA failure. Rather, the cause of the failure needs to be investigated and corrected. For example, is there something really wrong with the analyzer, is maintenance required? It may be identified that rather than changing the correction factor, the issue is due to plugging or misalignment. Investigation is required. In Table 4, added requirement to conduct a RATA for diagnostic purposes if the flow factor/correlation equation changes by > 5% annually. The flow factor should only change when really needed, due to changes in stack conditions. It affects mass flow and therefore comparison to the emission limit, so is very important. Data must be flagged as per the CEMS User Manual to denote a change in coefficients/factors (see 9.0-E).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
5.1-J We strongly disagree with the requirement that the flow monitor correction factor (k-factor or polynomial coefficients) cannot be changed without written approval from the Director. Experience in the United States Acid Rain Program and Cross-State Air Pollution Rule which rely on 40 CFR Part 75 for the monitoring, recordkeeping and reporting requirements shows that that the flow monitor "k-factors" are periodically changed for a variety of reasons. Part 75 does require that a 3-level flow RATA be conducted following a change to the "k-factor(s) or polynomial coefficient. This is considered a diagnostic test event as opposed to a recertification event. However, the rule does not require EPA approval to change a k-factor. Would the flow monitor be considered "out-of-control" until the source obtained approval to change the k-factor(s)?	Removed requirement for Director authorization from 5.1-J. While small changes may be needed periodically, flow factors should not change markedly from year to year - unless there is a change to the source (stack or process). Flow factors should not be changed due to a RATA failure. Rather, the cause of the failure needs to be investigated and corrected. It may be identified that rather than changing the correction factor, the issue is due to plugging or misalignment. Investigation is required. In Table 4, added requirement to conduct a RATA for diagnostic purposes if the flow factor/correlation equation changes by > 5% annually. The flow factor should only change when really needed, due to a change in stack conditions. It affects mass flow and therefore comparison to the emission limit, so is very important. Data must be flagged as per the CEMS User Manual to denote change in coefficients/factors (see 9.0-E).
5.1 J Typically flow correction factors (if applicable) will be default at the time of installation or adjusted based on emission profile modelling during design. During certification testing the Qperator can determine if an adjustment to the correction factor is warranted based on the results from the reference method testing. It will be impractical / unreasonable to establish correction factor prior to certification, as this would require the third party tester to mobilize to site prior to certification test, creating additional resource draws and logistical challenges. Correction factors or correlation equation adjustments have historically not required Director approval, as these types of adjustments are made at the CEMS operational/maintenance level. These adjustments are currently reported under the AMD (2016) using the AMD2 Form. Recommend removing the condition (a) and (c) from 5.1 J. Condition (b) would allow the responsible person to attain the same outcome. There is no added advantage in determining the correction factor prior to certification or requiring Director approval for future adjustments.	Flow factors are normally established during the RATA, so prior to completion of (during) certification. Changed clause text to "prior to or at of certification" in 5.1-J(a) Removed requirement for Director authorization from 5.1-J (bullet (c). While small changes may be needed periodically, flow factors should not change markedly from year to year - unless there is a change to the source (stack or process). Flow factors should not be changed due to a RATA failure. Rather, the cause of the failure needs to be investigated and corrected. It may be identified that rather than changing the correction factor, the issue is due to plugging or misalignment. Investigation is required. In Table 4, added requirement to conduct a RATA for diagnostic purposes if the flow factor/correlation equation changes by > 5% annually. The flow factor should only change when really needed, due to a change in stack conditions. It affects mass flow and therefore comparison to the emission limit, so is very important. Data must be flagged as per the CEMS User Manual to denote change in coefficients/factors (see 9.0-E).
5.2-A Potential to compare flow before a RATA, change to Kq as corrective maintenance; restart RATA with adjusted Kq (thereby validating new Kq and completing a RATA simultaneously). (GREY) The issue being if a Facility adjusts a Kq immediately prior to a RATA the flow data prior to the RATA is not being tested but rather the adjusted data. The Table should state that the “as-found” criterion of the RATA’s / CGA’s must still be met regardless.	In Table 4, added requirement to conduct a RATA for diagnostic purposes if the flow factor/correlation equation changes by > 5% annually. The flow factor should only change when really needed, due to a change in stack conditions. It affects mass flow and therefore comparison to the emission limit, so is very important. Clauses 6.2-Q and 6.2-CC require that the CGA and RATA are performed as as-found challenges to the CEMS, with no adjustments prior to. So you are not permitted to change a k-factor before conducting an as-found RATA. If it is determined after a RATA that the k-factor required adjusting, Table 4 sets out that a RATA is required as a diagnostic test if the factor changes by > 5% annually.
5.2 - Table 4 Please confirm if "Change in correlation coefficients/correction factors" includes changing the Cp factor of the pitot tube / annubar measuring flow.	Yes. In Table 4, added requirement to conduct a RATA for diagnostic purposes if the flow factor/correlation equation changes by > 5% annually. The flow factor should only change when really needed, due to a change in stack conditions. It affects mass flow and therefore comparison to the emission limit, so is very important. Data must be flagged as per the CEMS User Manual to denote change in coefficients/factors (see 9.0-E).
5.1-J AEP speaks of the calibration factor for flow meters; however, do the same prohibitions against changing these values also apply to moisture correction factors for facilities reporting dry flow? Even, if the changing of the moisture correction factor is covered off in the facility's QAP?	No this would not apply to correction factors for moisture. Moisture conditions can be variable, based on process, so moisture correction may change over time. Yes the facility handles moisture correction procedures in the QAP.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
5.2 - Table 4 - Like-Kind Analyzer Replacement	
Table 4 - Definition of "like -kind" in Appendix A "like-kind" means the same type analyzer or device as the primary (i.e. monitors the same parameter by the same measurement principle, make and model). The same make and model requirement in the definition of "like-kind" is too restrictive. Generally, manufacturing companies may change/update their model numbers for the same kind of equipment, which would inhibit the Operator treating the replacement analyzer as "like-kind." Like-kind analyzer typically refers to instruments that monitor the same parameter via the same measurement principle, whereas "in-kind" is similar but also must be of the same make and model. Recommend changing the definition of "like-kind" analyzers to "the same type analyzer or device as the primary (i.e. monitors the same parameter by the same measurement principle), ~~make and model~~."	Definition of "like-kind" was taken from the USEPA, Part 75. The allowance to conduct a CGA rather than a full recertification is provided with the caveat that the analyzer being put in place is the same as the original, therefore the risk of impairment to the system or data accuracy is much lower than if a different analyzer type is put in place. Companies make changes to analyzers when they come out with a new model, and there can be very different analyzers that use the same measurement principle. Swapping in one of these analyzers is not the same as swapping in one of the same make and model - there is inherently more risk, which is why recertification is required.
5.2 - Table 4 - Long-term Shutdown	
Section 5.2, Table 4 - Performance testing for major component replacement and recertification Last row "Following long term source offline…" Is it possible to have some guideline on definition of Long Term? 2-weeks, 1-2 months?	Added >180 days in place of "long term" in Table 4.
5.2 - Table 4 Please provide guidance on what is considered long-term for a source to be offline? 6 months? 1 year? Please revise 'exposed to ambient conditions' as there is uncertainty with what this is specifically referring to.	Added >180 days in place of "long term" in Table 4. Removed reference to "exposed to ambient conditions".
5.2 - Table 4 Following long-term source offline or shutdown: specify what constitutes "long-term"	Added >180 days in place of "long term" in Table 4.
5.2 - Table 4, Row 8 Please provide clarity/definition of long-term and shut down as well as clarity on impairments that can cause performance issues to the system.	Added >180 days in place of "long term" in Table 4.
5.2-Table 4 "Following long-term source offline or shut down" - Please define long-term in terms of actual timeframes.	Added >180 days in place of "long term" in Table 4.
5.2 - Table 4 Permanently replace any gas analyzer, flow analyzer or moisture sensor with like-kind: A CGA would offer no valuable information if a flow analyzer or moisture sensor were replaced.	Changed Table 4 from CGA to include RATA if CGA is not possible for like-kind analyzer replacement. This doesn't "add" a requirement, as the 1998 Code required recertification for all analyzer change-outs. Removed "moisture sensor" from Table 4 since Code does not have specifications for moisture sensors - this should be based on the QAP.
5.2 - Table 4 - Critical Orifice and System Optics Change	
5.2 - Table 4 Please revise “change to critical orifice” to "change to critical orifice size". Appendix B (appropriately) includes an orifice change with an orifice of the same size as a minor component replacement (orifice size change is more significant and should require more extensive validation). Table 4 makes it appear that replacing a like for like critical orifice requires re-certification of the CEMS. We agree that based on Appendix B it should not.	Changed wording in Table 4 to "change in critical orifice size".

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
5.2 - Table 4, Row 3 The use of the word “change” can be misconstrued as meaning 'replace'. This does not seem like the intention, as Appendix B does give some clarity on this. Recommend rewording this statement and/or replacing the word 'change'. Consider rewording to “Any modification to the critical orifice, path length, probe or system optics from original specifications/design i.e.: change in critical orifice or path length size.”	Changed wording in Table 4 to "change in critical orifice size".
5.2 - Table 4 For dilution-extractive CEMS, changing to a functionally identical critical orifice does not constitute a major component replacement and should not trigger recertification. This change should be treated as a like-kind replacement and require only a manufacturer-recommended minor performance test as specified in the QAP. Only if the new critical orifice is different than the one being replaced should more stringent performance testing be required.	Changed wording in Table 4 to "change in critical orifice size".
5.2 - Table 4 Change to critical orifice, path length, probe or system optics: specify that change is not like-kind	Changed wording in Table 4 to "change in critical orifice size".
5.2 - Table 4 Please clarify system optics. Would changing a mirror in an in situ system require a recertification?	We are looking for recertification when system operation could be impacted (see 5.2-A). Mirror change-out is listed in Appendix C as a minor component replacement.
5.2 - Table 4 - Testing for Major Component Replacement (General)	
Section 5.2, Table 4 - Performance testing for major component replacement and recertification Very useful Table to add to the CEMS Code. Thank you.	Thank you
5.2-A If the person responsible deems that a change does not affect the accuracy of the system/data integrity, can they ignore Table 4 requirements?	No. Table 4 gives the minimum testing requirements for those changes. Added reference to Table 4 in 5.2-A.
5.2 - Table 4 Recommend updating the testing requirements for permanent replacement of gas analyzer, flow analyzer to include either a "CGA or a RATA".	A CGA can always be replaced with a RATA. So facility can use a RATA in place of a CGA to replace with a like-kind analyzer. See guidance below 7.3-D.
5.2 If recertification of a CEMS is required, who will be responsible for this recertification?	The facility (person responsible, as defined in Code) is responsible to complete all requirements for recertification (as per 5.1 and 5.2) and report the results (5.1-N and guidance at bottom of section 5.1.1). Certification is complete when all requirements have been met.
5.2 Can the conditionally valid data procedures be used during recertification and/or diagnostic test events addressed in Sections 5.2 and 5.3? The use of the conditionally valid data procedures would be beneficial mechanism to reduce monitor downtime during these events. See comment below concerning Section 8.	The conditional validation in section 8.0 is on the basis of temporary monitoring being put in place to avoid data loss. For recertification following permanent replacement, the analyzer change (or other change as per Table 4) is permanent going forward so it is important to fully recertify (proving QA'd data) before calling the data quality assured.
5.2; Table 4 (page 38) Similar comment in using "Linearity Test" and "CGA" as with Figure 1. In Table 4 the tests are called CGA but they were referred to, as linearity check or linearity test previously.	CGA is the test for linearity. Updated Figure 1 to "CGA", and will keep "CGA" in Table 4.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
Table 4: "Third party short-term continuous monitoring operated for >720 hours (see section 8.0) - full recertification required." The current interpretation is that this is referring to the verification requirement of third party equipment if operated greater than >720 hours, as outlined in Section 8.0. For clarity, recommend removing from Table 4, and keeping Table 4 for testing requirements only. This requirement is already specified in Section 8.0.	This is the requirement to conduct a recertification, when third party short-term continuous monitoring is used beyond the 720 hours allotted for temporary use in section 8.0. That is why it is listed here in section 5.2 for recertification. Beyond 720 hours is no longer considered temporary so recertification is required in order to continue to use. Removed requirement to certify third party analyzer beyond 720 hours from section 8 (was 8.0-E).
5.2-B RATA performed for recertification purposes - What if a RATA was performed inside of 30 days? We just wanted to clarify that this did include the RATA (as required). We have always erred on the side that only one of the (re)certification performance tests should count as a an annual compliance requirement in trying to honour the 30 days separation as best as possible.	That is the requirement - to complete recertification testing (so RATA) within a maximum of 30 days from the time the primary analyzer ceased monitoring (5.2-C). Yes this clause includes the RATA when it states "performance testing in 5.2-A must include". That is correct. RATAs or CGAs for fulfillment of the frequency requirements in 7.3 must be spaced at least 30 days apart.
5.2-C Recertification Timeline	
5.2-C: “The person responsible must (a) complete the testing in Table 4 and (b) meet any associated CEMS performance specifications from section 6.1 within a maximum 30 calendar day period from the time the primary CEMS or analyzer ceases monitoring, unless otherwise specified in Table 4.” Mobilizing contractors to conduct a full recertification within 30 days will be difficult, in some cases impossible, especially during the wintertime. The current CEMS code (1998) provides operators 180 days to complete the same test. Suggest AEP allow for a more reasonable time frame. For full recertifications, we recommend replacing 30 calendar days to 120 operating days or 180 consecutive calendar days to allow additional operational flexibility and match the recommendation for Section 5.1-B.	The 30-day requirement was added to reduce CEMS downtime and ensure the CEMS is up and running again as soon as possible. Section 8.0 of the Code now requires that a combination of missing data estimation and temporary replacement monitoring be put in place to ensure that emissions data can be reported during outage periods. Changed requirement to 90 calendar days for recertification. We are not matching the requirement in 5.1-B as certification is much more involved and is the initial start up of a CEMS. Recertification should be completed as quickly as possible to get the CEMS back up and running. An allowance was added (3.4-K) for pre-planned analyzer replacement not having to meet percent availability. We have restricted this to 2 months maximum and the analyzer must be replaced within 30 days that month. Because this is a pre-planned analyzer replacement, this should be feasible.
5.2-C "30 calendar days from the time the primary CEMS or analyzer ceases monitoring" is insufficient, as prior to determination of a change, troubleshooting and possible repair is undertaken. This is standard practice prior to permanent replacement. Having to complete the troubleshooting/repair phase and the list of requirements for recertification within 30 days is unachievable and places undo hardship on industry. Procuring a new analyzer in some instances can take months, and sourcing a third party continuous monitoring system, depending on schedule, could take days to a week. This significantly decreases the time available to perform the requirements of recertification within the time frame allowed. Procuring EPA Protocol gases for the 7-day calibration drift test within 30 days is unachievable for facilities that do not have any on hand. Typically it takes longer than 30 days to receive these cylinder gases from the supplier.	The 30-day requirement was added to reduce CEMS downtime and ensure the CEMS is up and running again as soon as possible. Section 8.0 of the Code now requires that a combination of missing data estimation and temporary replacement monitoring be put in place to ensure that emissions data can be reported during outage periods. Changed requirement to 90 calendar days for recertification. An allowance was added (3.4-K) for pre-planned analyzer replacement not having to meet percent availability. We have restricted this to 2 months maximum and the analyzer must be replaced within 30 days that month. Because this is a pre-planned analyzer replacement, this should be feasible.
5.2-C 30 days to achieve full recertification of a major change component seems a very short time allowance, particularly to schedule a RATA after an unplanned change-out due to failure of the instrumentation. Given that most, if not all facilities, would have to contract out RATA testing, we would suggest 90 days would be much more reasonable.	Changed requirement to 90 calendar days for recertification. Section 8.0 of the Code now requires that a combination of missing data estimation and temporary replacement monitoring be put in place to ensure that emissions data can be reported during outage periods.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
5.2-D (b): "must submit notification to the Director using the AMD Notification Template, including the following information, within 30 days following recertification: (a) a summary of what changes were made to the CEMS to require recertification; and (b) a listing of any changes made from the original CEMS monitoring plan." Please clarify this requirement for operations that do not have a CEMS monitoring plan due to the age of the source.	If the facility does not have a monitoring plan, bullet (b) would not apply (i.e., there would not be changes to an original monitoring plan, due to there not being a monitoring plan), so notification would just cover (a) "a summary of what changes were made to the CEMS to require recertification".
5.3 Although recertification is not required after minor component replacement, it states that the person "should" conduct a regular RATA shortly after modification. Instead, could it state that it is recommended that the person responsible conduct a RATA shortly after modification.	Agreed. Guidance edited.
6.1 Performance Specifications - General	
6.1 (first paragraph) We would recommend that an additional sentence be added to the first paragraph in this chapter as follows -- The performance specifications, tests and test frequencies may be adjusted by the Director, in writing, to address unusual circumstances. This has the flexibility to allow the Director to address and manage unusual situations where the full imposition of Chapter 6 is unwarranted, e.g. the Director requires a CEMS for monitoring purposes, but not compliance., and where RATA testing is a logistical and financial burden and where the quality of the data is not significantly improved. See also, comment under Chapter 5.	There is always the possibility to receive authorization from the Director to deviate, when warranted. This is covered by 1.2-B. With the revised Code having finite, indexed requirements in clause form, it will be easier for the Director to nail down which requirements an authorization to deviate is in respect to.
Table 5 Not sure where to best express this concern / comment, but will do it here. For gas analyzers that are corrected to a certain diluent concentration and have relatively tight limits, e.g. TRS corrected to 8% or 10%, is AEP going to recognize in the CEMS Code the allowance of using raw TRS values, rather than corrected TRS values, when O2 concentrations are greater than 15%. In O2 correction calculations, the reader can appreciate how the TRS corrected value goes to infinity when the O2 goes to 21% O2. This phenomena may also happen at other facilities with different parameters and different diluents, although the writer is not familiar with similar phenomena occurring other than with TRS and O2 at pulp and paper facilities.	You need to report your emissions in relation to your limit, so if the limit requires reporting on dry basis, correcting at 8% O2 for 15% O2 content in the effluent, that is what you are required to report. The approval would need to be amended for the limit value, if you were to no longer correct emissions. This issue needs to be brought to the approvals coordinator. It can't be addressed in the CEMS Code. The CEMS Code requires reporting in the units of the standard/limit.
6.1.1 - Table 5 For the purposes of consistency, we recommend that the performance specification for the zero drift be the same as the requirements for the span drift.	The response to zero is also tighter than for span - it is the same with ambient monitoring. When the zero is off it causes a baseline shift and effects all other concentration responses, so the zero drift spec is always more stringent. Manufacturer specifications are always tighter for the zero response than for full scale. There was a difference between the zero and span drift specs in the 1998 Code as well, however we did increase the tolerance (reduced stringency) for NOx and SO2 in the revised Code.
6.1.1- Table 5 Recommended revision to stipulate that availability has no impact on certification (referred to in Section 5)	Section 3.4.3 has guidance on percent availability not needing to be met until after certification of the CEMS. Also 3.4-L would apply when recertifying due to planned analyzer replacement.
6.1.1, guidance after 6.1-B "critierion" spelling?	Thank you. Corrected.
6.1.1 Performance Specification for Typical Gas analyzers / Clause 6.1-F. Please correct “Table 4” it should be changed to “Table 5” where performance specification is listed. We believe this is a typo.	Yes, thank you. Correction has been made.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.1.1 - Table 5 - Linearity Spec	
Table 5 - SO2, NOX, CO linearity = < +2.0% of FS SO2, NOX (or NO, or NO2), CO linearity given in Table 5 is challenging to meet, especially for lower emissions, resulting in a lower full analyzer scale. Considering low analyzer full scales and calibration gas tolerances, and in the absence of an absolute difference alternative criteria (such as the reduced emitter criteria for RATAs), the current linearity performance criteria make CGA's performance tests difficult or almost impossible to pass and can be much more stringent than a RATA. Recommendations: The proposed CGA linearity performance criteria in draft 2 are much more stringent than the ECCC EPS 1 PG-7 [Section 6.3.1.6]. We propose the CGA linearity to match the ECCC EPS 1 PG-7 [Section 6.3.1.6]. If linearity performance criteria are not changed to match federal requirements, then an absolute difference should be provided as an alternative to the Full Scale (FS) based calculation.	The 2.0% linearity spec has not changed from the 1998 Code. It has remained consistent for 20+ years. We are not making changes to the linearity specs. Linearity is directly based on full scale and both PG7 and the EPA define full scale differently that Alberta does (value selected so that most of the data recorded during normal operation falls within 20.0% and 80.0% of it). We tried to make changes to full scale and operating range in draft 1, but that would have resulted in the need to replace analyzers so we did not pursue it. Full scale for some Alberta CEMS may be much higher (even double) as the PG7 full scale definition, so this makes the two linearity specifications nearly equivalent. We cannot both keep full scale/operating range as is and make the linearity spec less stringent. Upon reviewing CGA data from past 2 years, only 3% of all CGAs reported were unable to meet 2.0% linearity. Most of those indicated that corrective action was required. We believe this is an appropriate ratio as failing a CGA should indicate when there are issues with the analyzer and the need for repair or replacement.
6.1.3 - Table 7 - Flow Specs	
6.1.3 - Table 7 Flow Bias has not been historically required; it is recommended to change these to performance targets only.	True, the 1998 Code didn't specify bias requirements for flow. We have added the 5.0% bias requirement for flow to align with ECCC (PG7) requirements. As per revised Code, flow bias is required to be calculated and reported with RATA results (6.2-RR).
6.1.3-Table 7 Why is there no provision for low velocity? In the old CEMS Code there was a provision for sources with velocity less than 3 m/sec. This could potentially penalize sources with low flow rates in regards to passing a RATA. Recommendation: Add a provisions for sources with low velocity.	Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7.
6.1.3 - Table 7 There are uncertainties inherent in the reference method that make the relative accuracy and bias performance specification unreasonable. Recommend that the relative accuracy performance specification remain at 15%. See EPA-600/7-79-155 July 1979.	EPA-600/7-79-155 is Total PM Emission Sampling Errors. EPA Part 75 has RA specification for flow of ≤ 10.0% of RM or ≤2.0 fps at 3 load levels. We are keeping the 10.0% RA specification for flow, as this aligns with PG7 and EPA requirements in Part 75. Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7.
6.1.3 - Table 7 The relative accuracy for flow was kept at 10% (from draft 1). This is a decrease from the 1998 requirement of 15%. There is a lot of uncertainty in flow systems. The physical orientation of CEMS ports and sampling ports can cause flow disturbances during stack testing. The sampling probe may disrupt the flow of the CEMS causing an artificially low reading. Sometimes monitoring ports are directly below some of the CEMS ports which can disturb the flow and affect the flow accuracy. Moisture factors can also change the flow accuracy. A greater risk is variations in correction factors of the RM probe, wear and tear of pitot tubes used during stack testing, and fluctuation in flows not captured during instantaneous readings of the RM. Having a relative accuracy of 15% accounts for a lot of the uncertainty that can be physically built into the flow system. We recommend keeping the relative accuracy at 15% per the 1998 requirement.	The CEMS Code has requirements for CEMS installation for representative sampling to avoid flow and measurement disturbances. We are keeping the 10.0% RA specification for flow, as this aligns with PG7 and EPA requirements in Part 75. Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.0 There is a concern that the removal of the footnote pass for concentration and the reduction of the flow RA limit from 15 to 10% could be difficult to achieve for facilities that are operating at rates significantly lower that they were designed, specifically sour gas plants in Alberta. As acid gas rates to the incinerator decline, through increased recovery efficiency, and reduced field volumes, there is a greater probability of concentration and flow stratification. In this scenario, CEMS that meet the siting requirements listed in the CEMS Code may not be representative of the entire stack area. Altering the sampling location either by a change in technology or by changing the dimensions of the probes in use, wouldn't be a likely option, as other technologies aren't suitable for the temperatures in an incinerator i.e. in situ or cross stack devices, and increasing probe lengths would increase the weight of probes, and potentially lead to excessive sag where the Pitot tube would not be perpendicular to the effluent stream. The high temperature also limits any modification to the inside of the stack. Alternatively, any operational changes to the SRU, like increasing excess O2 may help with flow readings, but would increase error in the concentration reading, and would counter other initiatives, by increasing GHG emissions (increase fuel gas to maintain stack top temperature). To help mitigate for this particular concern, could a low emission criterion be added for velocity, as it was in the 1998 CEMS Code : "within 0.5m/s" though adjusted for the change from 15% RA on flow to 10%, so it would apply to velocities less than 5 m/s. For concentration could there be a more relaxed low emission criterion added based on % of operational rate of the facility as the proposed low emission criterion is more specific to monitoring technology (<50ppm).	The CEMS Code has requirements for CEMS installation for representative sampling to avoid flow and measurement disturbances. We are keeping the 10.0% RA specification for flow, as this aligns with PG7 and EPA requirements in Part 75. Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7. We are not reinstating footnote 7A, nor keeping an alternative that is based on where the facility is operating in relation to their emission limit. The low emission criterion is based on absolute low emissions, not emissions that are relatively lower than very high emission limits, but still quantitatively high.
Section 6.1.3, Clause 6.1-H Concern with RATA tests: For Table 7 having Flow RATA criteria reduced to 10% of RM from 15% (with 5% bias addition) could be difficult to achieve with larger incinerator stacks and lower flows of acid gas through the gas plants. Recommendation to add a low emission criterion for velocity – same as 1998 Code of “within 0.5m/s of ref method” though adjusted for the change from 15% to 10% so would apply to <5.0 m/s rather than the <3.0 m/s. Request to have the 1998 Code limits under these conditions for 15% RA flow.	We are keeping the 10.0% RA specification for flow with 5.0% bias, as this aligns with PG7. Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7.
6.1.3 - Table 7; Flow Relative accuracy < + 10,0% of RM Industry had recommended relative accuracy specification for flow to be minimum 15% in draft #1; but the value is kept at 10% in draft #2 also. The 10% requirement may elicit the need for hardware upgrades which will have minimal impact on CEMS data quality or actual emissions mitigation. We recommend that the 15% relative accuracy specification for flow, as referenced in the 1998 Code.	We are keeping the 10.0% RA specification for flow with 5.0% bias, as this aligns with PG7. Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7.
6.1.3 - Table 7 Strongly Recommend returning to a Flow RA% of 15%. Many stacks which pre-date the 1998 CEMS Code were not originally built to current code. If CEMS and sampling ports are vertically aligned or if there are any internal beams or obstructions within the stack the reference method testing may introduce flow disturbances which alter flow readings. Additional flexibility must be provided to account for higher variation due to pre-existing flow disturbances or original port designs. There is also higher variation due to various factors such as reference method pitot tubes wear and tear, partial cyclonic flows, moisture content, non-steady flow profiles and fluctuations caused by human error and measurements – all things not experienced by gas analyzers.	We can't set the performance specs to align with older equipment or CEMS installations that do no meet Code requirements (for installation/sampling locations that do not give representative emissions monitoring), nor to accommodate human error. We are keeping the 10.0% RA specification for flow with 5.0% bias, as this aligns with PG7. Added an alternative RA specification for flow of 0.6 m/s (this is an increase/less stringent from 0.5 m/s in 1998 Code). Removed criteria for low velocity that was in 1998 Code, so this alternative can be used at any velocity now. This now aligns with PG7.
6.1.3 - Table 7 Many Flow detectors do not have Zero & Span Drift testing nor orientation sensitivity testing capabilities are not capabilities of many analyzers on site, recommended to add clarity that this is not an expectation when the technology does not allow.	The performance specifications in Table 7 need to be met for certification at a minimum. Table 12 then gives the ongoing verification requirements. Common pitot tubes on the market should be capable of doing zero and span and orientation sensitivity tests.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.1-H - Table 7 Operation of many flow analyzers currently in use, do not have the capability of conducting Zero Drift and Span Drift tests daily. Please clarify that this is a one-time requirement confirmed either during installation process or during the manufacturing certification process.	The performance specifications in Table 7 need to be met for certification at a minimum. Ongoing verification of flow analyzer is found in section 7.2.2 and Table 12 and it is not a daily requirement. Table 12 requires zero and span for flow analyzers twice per year (or daily checks when capable). The specifications in Table 7 have not changed from the 1998 Code.
7.6-B What is in place for flow analyzers that are not capable of performing daily zero/span checks to ensure operation is at the same level of accuracy as flow analyzers performing daily zero/span checks?	The performance specifications need to be met for certification at a minimum. Ongoing verification of flow analyzer is found in section 7.2.2 and Table 12 and it is not a daily requirement. Table 12 requires zero and span for flow analyzers twice per year (or daily checks when capable). The specifications in Table 7 have not changed from the 1998 Code. See 7.2-N "For flow analyzers which are capable, the person responsible must perform daily diagnostic checks". Common pitot tubes on the market should be capable of doing zero and span tests. Facility should have verification checks outlined in the QAP.
6.1.4 - Table 9 - Exotic Targets	
6.1.4 - Table 9 Since ammonia RATAs compare analyzer to wet chemistry there is an inherently high bias. Comparing it to a target offers no value.	Reference method is chosen because it has "standing" and is deemed to be true. We want to get an idea if data is comparable. The target has been set at 35.0% RA. Our data show that your facility can meet this (for some of the RATAs reported in the past year, but not all). Facilities need to report against the targets, but there is no compliance aspect to meeting them at this time. We encourage facilities to investigate large discrepancies between NH3 CEMS and RM. We can revisit the targets in the future if necessary, but currently the targets allow us to gather information on where these analyzers are at and how they are performing. We have pulled NH3 out into a separate specification table (Table 9A).
6.1-J Requirements related to Zero Drift and Span Drift cannot be met with current Ethylene and Ethylene oxide analyzers until new technology can be installed. Update the clause to "The person responsible must report against the performance targets (when possible) in Table 9 [...].	We have changed the requirement to minimum weekly zero/span tests for ethylene and ethylene oxide analyzers to account for these tests being manual. We separated out ethylene and ethylene oxide analyzers into their own table for performance targets (Table 9B).
6.1.4 - Table 9 Historically, facilities developed performance specifications for parameters not in the CEMS Code and outlined them in their QAPs. Given that Performance Targets are now provided, please clarify what role is expected of the QAP in outlining CEMS specifications especially in a situation where one of the performance Targets cannot be measured (Zero and Span for example).	We would expect that performance targets would be added to the QAP and compared against. Under the revised Code facilities will be required to report against these, however they are not performance specifications that need to be met. We have changed the requirement to minimum weekly zero/span tests for ethylene and ethylene oxide analyzers to account for these tests being manual.
6.1-B - Linearity for NOx	
6.1-B Wanted to provide some positive feedback for consideration of NO2 measurement.	Thank you
6.1-B If the DAS just uses the total NOx channel will it be required to be updated to monitor the NO and NO2 channels?	No. This allowance is for analyzers that, by design, measure NO and NO2 on two separate channels, rather than internal conversion to capture NOx.
6.1-B Clarify how NO2 as a fraction of the source emission is to be determined and on what frequency over time should this value be re-evaluated.	This allowance is for analyzers that, by design, measure NO and NO2 on two separate channels, rather than internal conversion to capture NOx. So you would compare the ppm/volume of each of the NO and NO2 channels during the CGA to determine the ratio.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.1-B Does 'monitor individually' include an analyzer that monitors both species separately? (Chemiilluminescent analyzers have a single measurement channel)	Yes this allowance is for analyzers that, by design, measure NO and NO2 on two separate channels, rather than internal conversion to capture NOx.
6.1-B Please elaborate on what happens if NO2 is greater than 5% and explicitly state if linearity is required on NO2 in these cases as well if so.	If NO2 is not < 5% of total NO+NO2 (NOX), then for analyzers that, by design, measure NO and NO2 on separate channels, you would determine linearity on each channel (if they cannot assess total NOx). We were made to believe in draft 1 that assessing total NOx was not possible for some analyzers, however our specs are remaining for NOx, as that is what the approval requires continuous monitoring for.
6.2-U (a) As per 6.1-B, if NO2 constitutes less than 5% of total nitrogen oxides' - please explicitly state that "Where NO2 is less than 5%, linearity is not required on the NO2 channel separately." When/How is this determination made? For what period? Please specify how this is to be determined/regulated?	It states this in the guidance below 6.2-U and refers to the requirement in 6.1-B. No need to repeat a requirement in two clauses. The guidance provides the clarity that 6.1-B applies here to 6.2-U. Updated guidance wording.
6.1-B: “For nitrogen oxides, if the person responsible monitors nitric oxide and nitrogen dioxide individually to obtain total nitrogen oxides, and nitrogen dioxide constitute less than 5% of total nitrogen oxides, the person responsible is not required to meet the linearity specification in Table 5 for nitrogen dioxide.” In some instances, CEMS with independent measurement channels may have different NO and NO2 concentrations. Often the NO2 full scales are set very low. Passing a NO2 CGA at low full scales would be really difficult. Nitrogen dioxide gas blends are unstable at the low ranges required for calibration. Ordering and maintaining EPA protocol gasses at low ranges (<20% of NO2 FS) will be unnecessarily challenging. Considering low analyzer full scales, calibration gas tolerances, and in the absence of an alternative absolute difference criteria (such as the lower emitter criteria for RATAs) the current linearity performance criteria makes CGA's difficult or almost impossible to pass and much more stringent than a RATA. We suggest two options for compliance: (1) that the CGA linearity performance criteria for NO and NO2 CGAs be updated to match ECCC’s Environmental Performance Standard 1 PG-7. As this is the first time that industry is required to conduct NO2 CGAs, and there is no previous experience or data on this testing approach, it is recommended to set this criteria as a performance target, with a similar approach to that of ethylene, ammonia, ethylene oxide performance criteria. (2) Change the requirement to apply if NO2 constitutes less than 15% of total NOX. Please also specify if this is mass or volume percent.	We do not want CGAs conducted on NO2. The approval gives monitoring requirements and limits for NOx and the CEMS Code gives specifications only for NOx. We have added in the provision for NO2 only for those analyzers that, by design, measure NO and NO2 on separate channels. The linearity requirement in Table 5 is for NOx. There is no need to measure and report NO2 unless an approval explicitly required that and there is no need to assess linearity on NO and NO2 separately. PG7 does not have linearity specs for NO and NO2 separately. Alberta's linearity specs are not directly comparable to PG7 and EPA, as we have different definitions of full scale (and requirements for operating range). We are keeping the linearity spec at 2.0%, as it has not changed in 20+ years and data over the last two years shows that facilities are not having trouble meeting the spec. You would compare the ppm/volume of each of the NO and NO2 channels during the CGA to determine the ratio (same units as the linearity assessment).
6.1-B Nitrogen dioxide gas blends are unstable at the low ranges required for calibration. Ordering and maintaining EPA protocol gasses at low ranges (<20% of NO2 FS) will be unnecessarily challenging. Suggest changing this requirement to apply if NO2 constitutes less than 15% of total NOX. Also please specify if this is mass or volume percent.	This allowance is for analyzers that, by design, measure NO and NO2 on two separate channels, rather than internal conversion to capture NOx. This clause doesn't add a requirement to measure NO2 separately nor conduct linearity tests on NO2. You would compare the ppm/volume of each of the NO and NO2 channels during the CGA to determine the ratio. The 5% came from European Union requirements and are meant to represent when NO2 is a small fraction of total NOx, so 15% would not be appropriate.
6.1-B States when a NO2 linearity is not required (<5% of total NOx) but there is no statement that requires an NO2 linearity. Could it be stated when a linearity test is required (NO2 >= 5%)?	Linearity specs in the Code are based on NOx, as the approval monitoring requirement and limits are for NOx. We have added in the provision for NO2 only for those analyzer that, by design, measure NO and NO2 on separate channels, rather than internal conversion to capture NOx. The linearity requirement in Table 5 is for NOx. There is no need to measure NO2 (unless the approval explicitly requires it) nor assess linearity on NO2.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.1-B New revision states if NO2 is less than 5% of NOX than linearity of NO only needs to meet 2%. No mention of TRS minimal sulphur components. This is the same issue as with NO2. Our analyzer measures each sulphur component and sums them to achieve Total Residual Sulphur. However some components like Mercaptans (DMS, DMDS) represent well under 5% of total TRS an nearly impossible to measure to 2% accuracy. Please include TRS with similar statement as NO2 or advise how we can gain approval of our system to measure TRS without needing to measure DMS and DMDS to 2% linearity.	We haven't seen a need for this from the regulated community in Alberta. As we are not able to address this at the timeline that we are under for completion of the revised Code, this would have to be deferred to a future iteration.
6.1-C - Alternative RA Spec and Low Emission Criterion	
Table 5 - Relative Accuracy for SO2 and CO We think AER has done a nice job of addressing an alternative relative accuracy (RA) specification for low emission criterion for sources operating at less than 50 ppm. Nice to recognize that a 10% RA could be challenging to meet as the actual emissions become lower and lower. Very thoughtful in Section 7.3-F to include an alternative to meeting 7.5% RA to reduce RATA frequency by allowing RATA frequency reduction if a low emitter is less than 3 ppm difference can be obtained.	Thank you
6.1-C and D (Page 41) … if the person responsible cannot meet (a) …and the following (b) is met … then the person must meet 6.1D It is confusing especially the conditions also reference Table 5. Question: does 6.1-C (b) mean that the only criterion for "low emission" is " the average measured gas concentration .. for NO2, or SO2, or CO, or CO2, or O2 is <50ppm??	The alternate relative accuracy specification only applies to SO2, NOx and CO, and it only applies if the average measured gas concentration of that gas (from reference method runs) meets the low emission criterion of < 50 ppm. Yes that is the only criterion for low emissions. No, O2 and CO2 are not covered, they have alternative RA specs in Table 5, as do TRS and H2S. We added a footnote to Table 5 that refers to 6.1-C - only applies to SO2, NOx and CO.
6.1-C (b) Suggest adding a decimal to 50 ppm so it's 50.0 ppm.	We kept the low emission criterion at 50 ppm so that 50.4 ppm would be acceptable. This allows a little more leeway for this alternative.
6.1-D (b) Suggest adding a decimal to 4ppm so it's 4.0 ppm otherwise the rounding to the performance means 4.45	Agreed. Added decimal point to absolute average difference alternative relative accuracy performance spec to be inline with the other performance specs.
6.1-C (b) The 50-ppm threshold as written in 6.1-C (b) obscures the intent of the alternative specification and is unnecessarily unfair. The absolute difference as stated in 6.1-D demonstrates system accuracy and this is true despite RM or CEMS concentration. Strongly recommend removing the 50-ppm clause. Situational example: the RM results are 52 ppm the CEMS reads 48 ppm. The difference is 4 ppm but the RA% is 8.75%. The accuracy of this result is completely acceptable, but it does not meet the requirement of 6.1-C (b) and fails to meet the RATA reduction criteria.	AEP does not see this as unfair and feels that 50 ppm is already "lenient" as representing low emissions, as 50 ppm is a significant emission concentration. The allowance for the relative accuracy specification is for low emissions only (as it is harder to meet the RA spec under a low emissions scenario). So there needs to be a criterion for low emissions. This is set for those performing well and meeting environmental outcomes (low emissions). This alternative is not open to all emission levels - the standard RA spec is for the general majority. The original footnote in the 1998 Code was intended to do the same for low emissions, but has been misused. The bottom line is that the CEMS needs to be close to RM for quality-assured data. Just because a facility meets the low emission criterion, doesn't mean they have to meet the alternative specification - they could meet the 10.0% minimum RA spec. The revised Code requires you to report against both when the alternative is used. The RATA reduction criteria in 7.3.1 are meant for exceptional performance, which is why it is a hard bar to hit. In the case you provide, the facility has passed the RATA (< 10.0%) and that is what counts.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
We would like AER to consider an alternative for sources that are above 50 ppm, but still significantly below the limit stated in the operating approval. Primarily we are thinking of situations with sulfur recovery units that typically operate at less than 20% of the approval limit. For example: If a CEMS is meeting the +-2% of Full Scale for linearity on a 0-10,000ppm range, it could be off by almost 200ppm and still pass Table 5 linearity criteria. If operating at 1500ppm the unit would fail a RATA if off by more than 150 ppm. In the past, the use of the FS in the RA calculation was the alternative approach that helped reduce the concerns of failing a RATA when actual operations were significantly lower than approval limits. Could AER consider an alternative RA calculation or RA standard that could be applied to these types of sources (sources operating significantly lower than their approval limit)? A source in this situation could operate a dual range system to help alleviate this concern, but that seems to be an unnecessary burden when considering the source is operating in a very efficient manner. Also, this situation could encourage an operator to run less efficient during RATAs or all the time. Perhaps a way to use the applicable approval limit in calculating the RA could help resolve this situation or an alternative that might allow the FS to continue to be used in the RA calculation, or calculate the Bias in these situations to show it is still less than 5% of FS. We could see this situation also applying to sources monitoring for CO, where normal operation is significantly lower that approval limits and ranges are set high to capture significant spikes (i.e. wood burning sources).	This is the situation we were seeing - that facilities were passing a RATA on footnote 7A in the 1998 Code when emissions were way off from reference method - CEMS measurements were not representative of emissions. The focus is now on providing an allowance for facilities with low emission levels as it is harder to meet RA when emissions are low. We don't see why emissions measurement should be allowed to be way off when emissions are at ~1000 ppm just because the facility has a very high emissions limit. We are moving away from providing an allowance for CEMS measurements that off (not accurate) and have very high limits in place. We don't want accuracy to be able to degrade due to being able to use a very large full scale to pass a RATA. If the system is not accurately measuring, corrective action is needed. The standard RA spec is the minimum, while the alternate is provided for those operating under low absolute emissions (not just relatively lower than a limit). The bottom line is that the CEMS needs to be close to RM for quality-assured data.
Section 6.1.1, Clauses 6.1-C, 6.1-D and 6.1-E Concerns with RATA tests: With the Table 5 – removal of “footnote” pass criteria could be challenging to pass RATA's especially as acid gas into plants decreases through increased recovery efficiency, and reduced field volumes, there is a greater probability of concentration and flow stratification. The current proposed low emission criterion concentration <50 ppm doesn’t apply for SO2 emissions from our Operated gas plants, which don't have emissions that low. Recommendation as an alternative is to allow for a greater low emission criterion concentration limit for plants operating at less than 50% of their overall designed throughput specifications. Request to have the 1998 Code limits under these conditions and the footnote reinstated, if possible.	The low emission criterion was developed for absolute low emissions (i.e., from low-NOx burners), providing an allowance for the relative accuracy specification (as it is harder to meet the RA spec under a low emissions scenario). This is set for those performing well and meeting environmental outcomes (low emissions). 50 ppm is not a small amount of pollutants exiting the stack and we will be keeping the low emission criterion at that level. The standard RA spec (10%) is the minimum, while the alternate is provided for those operating under low absolute emissions (not just relatively lower than their limit). The original footnote was intended to do the same, but has been misused. The bottom line is that the CEMS needs to be close to RM for quality-assured data. The footnote from the 1998 is not being reinstated. We are moving away from providing an allowance for CEMS measurements that are off (not accurate) and have very high limits in place. We don't want accuracy to be able to degrade due to being able to use a very large full scale to pass a RATA. If the system is not accurately measuring, corrective action is needed.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.1-C, 6.1-D The alternate relative accuracy specification was kept as is, based on the low emission criterion of 50 ppm. The 50 ppm low emission threshold is difficult to achieve on some stacks. Emissions depend on the size and efficiency of equipment. The 50 ppm threshold is tough on operators that are already close to this threshold. As equipment ages, the efficiency for some equipment is not as high and 50 ppm is very low. If an operator is slightly above the 50 ppm low emission threshold but meets the 4 ppm average absolute difference and less than 10% absolute accuracy, they would now have to do additional RATA testing even though the relative difference was very acceptable. The 50 ppm threshold does not appear to be scientifically justified. Please provide sound justification for this 50 ppm threshold. Alternatively, we suggest either of the following: (1) If operators meet the average absolute difference it should apply throughout all different ranges. Instead of having a low emission threshold of 50 ppm, there should be a fixed 5 ppm acceptable relative difference between the reference method and the CEMS (increased to 5 ppm instead of 4 ppm). If that number is met then the system should be deemed as running solid. It would be applicable in all cases (not simply based on if the reference method readings are below 50 ppm). (2) Raise the low emission threshold to 100 ppm to account for aging of equipment. EXAMPLE: for some of our lower emitting sources we hover around the 50 ppm threshold for alternative criteria. As the code is written the alternate criteria only applies when the reference method is below 50ppm. This has led to past situations where the emissions of the facility CEMS and the reference method may be within 4ppm or less yet not apply for the alternative criteria. Subsequently this can disadvantage facilities with low emissions, small absolute difference between the reference method and the CEMS. One improvement I see, is removing the 50 ppm threshold and replaced with a fixed absolute difference or increase the 50 ppm limit to 65 ppm such that the borderline emissions do not experience any penalty.	The low emission criterion was developed for low-NOx burners. With this equipment, the throughput doesn't change. We set the low emission criterion based on low emitting equipment as well as a review of emissions and RATA results submitted to AEP. The idea of the low emission criterion is to single out facilities with low absolute emissions (not just lower in relation to a very high limit). 50 ppm is not a small amount of pollutants exiting the stack. 100 ppm (double that) is not acceptable to be considered "low emissions". It is contrary to the equipment out there. We are not going to provide an exception to the exception, nor cater to old or aging equipment. Source standards (e.g., through MSAPR) are phasing out obsolete equipment. New equipment has emissions way below 50 ppm (low NOx burners). The alternative RA spec is provided specifically for facilities that are meeting the environmental outcome of low emissions. If we chose 65 ppm, or any other level, there would still be borderline cases for that level. The bottom line is that the CEMS needs to be close to RM to provide quality assured data. We don't feel that these two recommended options are in the spirit of improved data quality and analyzer performance, which is a focus of the CEMS Code revision. We have examples of facilities passing on footnote 7A, with very large differences from RM (in some cases under reporting emissions), while other similar facilities are able to meet 10% RA without the need of the footnote or any alternative. The 10% RA specification is a North American-wide requirement.
6.1-D / 3.1.1 Low emission criterion listed for meeting performance testing requirements, could this be extended to CEMS operating range minimums for SO2, NOx and CO of 40ppm?	The low emission criteria applies to emissions during the RATA of less than 50 ppm (average measured gas concentration of all reference method runs). The low emission criteria is based on the emissions level during the RATA, not on the operating range.
Your new footnote says: 6.1-D If the low emission criterion …. At a minimum: (a) ≤ 10% absolute accuracy from RM or (b) ≤ +/- 4 ppm average absolute difference Again this is confusing. Is (a) referring to relative accuracy or just +/- 10% of the RM value? If you mean the RM value, this is not really need as (b) will almost always apply. I would suggest (a) be changed to "≤ 10% RA substituting the full scale setting of the analyzer for the value of RM in the relative accuracy calculation in Equation 8.". This wording is similar to the 1/PG/7 phrase ("When the pollutant gas concentrations are less than 250 [[m, the FS setting of the analyzer must be substituted for the value of RM when calculating the relative accuracy..."). The EPA says to substitute the emission standard/limit for RM in the RA calculation. I like that a lot as I want industry to be relatively accurate to what they are allowed to emit.	We would like to move away from subbing in the emission limit or full scale in the denominator, as not all facilities have emission limits, and some facilities have very large limits for pollution abatement failures but operate at a much lower emission level nearly exclusively. We have a wide diversity of limits and sectors in Alberta using CEMS. We have removed the absolute accuracy alternative and just kept the absolute average difference alternative. The absolute average difference alternative was raised from 4.0 ppm to 5.0 ppm.
6.1.1 The alternative relative accuracy performance specification (6.1-D) is still too stringent. Notably, if a facility is operating with a measured stack concentration between 40 and 50 ppm, the alternative specification actually makes it more difficult to pass the RATA, as the effective relative accuracy requirement is 10% or less (±4 ppm is less than 10% of, say, 45 ppm). This is the opposite of what the alternative relative accuracy performance specification is meant to achieve, which is to avoid penalizing operators for periods where pollution abatement equipment is performing well. Consider changing 6.1-D(b) to read "<± 8 ppm average absolute difference".	We have removed the absolute accuracy alternative and just kept the absolute average difference alternative. The absolute average difference alternative was raised from 4.0 ppm to 5.0 ppm.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.1-D Strongly Recommend increasing the acceptable absolute difference to 5 ppm based on the variable uncertainties of Calibration gases as well as the systemic errors associated with both test method calibrations and potential sampling variations.	We have removed the absolute accuracy alternative and just kept the absolute average difference alternative. The absolute average difference alternative was raised from 4.0 ppm to 5.0 ppm.
6.1-D (a) Is 'Absolute Accuracy' a sum (or averages) of all % difference during the 9 runs of gas during a RATA?	We have removed the absolute accuracy alternative and just kept the absolute average difference alternative
6.1-D(a) The equation to calculate absolute accuracy is only provided in Appendix C. This equation is not mentioned in the body of the CEMS Code Draft 2 and thus, does not have a Equation Number. It will be very convenient to provide a reference in this section to where the equation is located. It will also be helpful to include this equation in the body of the document.	We have removed the absolute accuracy alternative and just kept the absolute average difference alternative
6.2 Performance Specification Test Procedures - General	
6.2 Suggest requiring US EPA 205 for use of dilution systems.	Have added Method 205 "Verification of Gas Dilution Systems for Field Instrument Calibrations" as guidance for dilution of gases in 6.2-S. The Code requires established procedures as part of the QAP. It's in the user/operator's best interest to generate accurate test gas concentrations.
6.2.3 For dual range CEMS systems, often measurements in the upper range are only observed during an upset condition. It follows that performing a calibration drift test of the upper range would require initiating an upset condition or bypassing pollution abatement equipment, which are obviously unacceptable.	Tests are conducted under normal operating conditions. The test is conducted using cal gal to introduce the high range gas, so it is not ramping up operations and shouldn't have anything to do with bypassing pollution controls. The requirement to test both ranges for dual range analyzers has been in place since 1998. For verification of flow analyzers, we are not requiring ramping up to test at varying load levels.
6.2.4 For linearity tests would the calibration gas used for daily span drift tests be included as part of the CEM System? Specifically if the certified concentration does not match the actual concentration and is greater than 2% of the full scale would that be considered a failed performance test? Alternatively could a failed CGA be negated if it was determined that the cylinder used for the linearity was found to not match the certified concentration. I only mention as it is more common to encounter gases that don't match the certificate and it's not specific to one or two vendors. If upon the initial run of the CGA high gas is >2% and the daily span is within 2% - (alternatively could be demonstrated by running the mid gas and it should be approximately out by the same percentage of value (not full scale) as the high gas) then it would not be a failed CGA and a calibration into the correct gas would be permitted?	No. Calibration gases used for daily drift tests or those used for linearity testing is not considered part of the CEMS. Test gases have a known error band (in the case of a CGA, EPA Protocol Gas) and therefore are assumed to be the "true value". These undergo stringent protocols and are certified with an expiry date. Gases have the expiry date because of possibility of change over time, depending on the stability of gas. Protocol gases used for the CGA are considered the true value unless there was empirical evidence to suggest otherwise. A failed CGA could indicate that the gas used for calibrations or span checks are inaccurate or there are other issues with quality control. An investigation is required following a CGA failure. The 2.0% linearity spec is based on full scale (i.e., 2.0% of FS) and should not be confused with the 2% accuracy spec on protocol gases that the gas manufacturer reports against. There should no be issues with CGAs not passing as a result of Protocol Gas - it is rare that the gas would be the source of the failure.
6.2-B(a): "The person responsible must meet the following minimum requirements for the use of test gases: (a) EPA Protocol Gas, matching the gas being tested, must be used for conducting all: (i) CGAs; (ii) alternate biannual audits; and (iii) 7-day calibration drift tests for certification." EPA Protocol Gases are not always available for all required gas concentrations. We recommend changing the draft 2 code to say "Where EPA Protocol Gases are not available, an equivalent primary standard can be used".	Added guidance below 6.2-B that in the rare occurrence that EPA Protocol gas is not available, the person responsible may use a gas manufacturer standard accurate to 2 percent.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2.2 The definition for “Zero air material” precludes the use of conditioned instrument air for the daily zero drift of systems that do not utilize dilution. Please expand this definition to include both types of systems (dilution and no dilution) as any accuracy gained by using bottled zero air is minimal at significant increased cost.	Changed definition to: (c) conditioned and purified ambient air provided by a conditioning system. Removed reference to dilution system. As well the definition says "could include", so as long as what is used meets the specs in the definition it is appropriate.
6.2.5 RATA - General	
6.2.5 Please clarify if a RATA is aborted due to safety or operational issues, do you have to immediately inform AEP and provide a notification to AEP, as to when the test will continue? Or do you just have to send in a notification?	Guidance is provided in the Out-of-Control section (below 7.6-A) that if a RATA retest is required following failure or aborting the test, "the person responsible would retest as soon as possible and submit the AMD Manual Stack Survey and RATA Notification Form to notify of a rescheduled test date along with rationale. The person responsible may then go ahead with the retest, unless otherwise directed by the Director." So no, you would not be required to call in immediately. Added this guidance as well to 6.2.5.
6.2-CC (Page 51) "For a CEMS installed on (a) a bypass stack or (b) combined sources exhausting into a common stack, the person responsible must conduct a RATA on each CEMS installed to monitor the individual sources, when the sources are operating." Section is confusing: it said that there is only ONE CEMS installed in the common stack, then how can one does a RATA on EACH CEMS - when there is only one CEMS? Does it mean that, for example, if 3 heaters have a common stack and one CEMS, it is necessary to turn off 2 heaters so that the CEMS can measure each heater's output individually?	This clause was brought in from the 1998 Code, but was worded incorrectly. The intent was that for combined sources, you have to ensure over time that all sources are covered/challenged with a RATA. Overall we are looking for representative conditions for the RATA. This is covered in 6.2-AA and 6.2.BB so we have removed this clause.
6.2-FF (b): "For the RATA in 6.2-AA, it has been demonstrated using the procedure outlined in section 4.4 that there is no stratification, the person responsible must meet the following requirements for reference method sampling for gas analyzers: (a) conduct reference method sampling at a single test point at a minimum; (b) the tip of the reference method probe must be located: (i) at least 7.5 cm from the wall of the stack, duct or flue; (ii) for in-situ point systems, at least 30 cm from the CEMS probe ; and (iii) for in-situ path systems, at least 30 cm from the inner 50% of the measurement path " Ensuring at least 30 cm from CEMS probe or inner 50% of the measurement path would be very difficult to measure, and in some cases may be unsafe, unpractical, or may interfere with the test results. It is unclear why in-situ point systems are called out individually. Recommend removing" at least 30 cm" to a more generic statements such as 'near to the CEMS sampling location and plane'. Recommend replacing "(ii) for ~~in-situ~~ point systems, …"	(is now 6.2-EE(b)) These sampling location requirements have not changed from the 1998 Code and are consistent with requirements in other jurisdictions (PG7 and EPA). It is important that the RM probe not be too close to the CEMS so as to not interfere. The sampling location requirements in section 4.0 has more on this. RM sampling must also be representative of emissions - the stack wall can influence sampling results. The minimum of 30 cm (at least 30 cm) insinuates to be as far from the CEMS as possible - so you absolutely do not want the RM probe near the CEMS. In-situ systems have a larger area of measurement (zone of influence) as opposed to an extractive system that pulls from just one point. So with in-situ analyzers there is more possibility of interference with the CEMS. Path systems have a zone from the instrument to the mirror/receiver on the other side of the stack (so you need to be sure not to interfere with that path - which can often be diagonal).
6.2-EE (b)(ii) This gives the option of 3 points that are representative of the gas flow over the period of the test - this could lead to users choosing points that are representative of the CEMS reading rather than representative of the effluent stream.	(now is 6.2-DD) It does say that the 3 points chosen need to be representative, and also 6.2-A requires that the RM be conducted to provide representative results. So if the points chosen were not representative the two clauses would not be met.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2.5 In the last line of Page 55, the text must be 't-value' instead of 't-table value'	Agreed. Change made.
6.2.5 Before Clause 6.2-PP, it may be helpful to add the following clause: 'If the relative accuracy specifications provided in Table 5 for (a) Sulphur Dioxide (b) Nitrogen Oxides or (c) Carbon Monoxide are met, and the average measured gas concentration of all reference method runs during the RATA is <50 ppm, then the alternative relative accuracy performance specification provided in Section 6.1-D must be met.'	This is already a requirement in 6.1-C. Rather, added guidance in 6.2.5 referring to 6.1-C and 6.1-D for the alternative relative accuracy specification and low emission criterion.
6.2-P and 6.2-BB 90% Production for CGA and RATA	
6.2-P (b): "The person responsible must conduct the CGA in 6.2-O while : (a) the source is (i) combusting the primary fuel normal for that unit or (ii) producing the primary product normal for that unit, as applicable ; and (b) the source is operating at a rate of at least 90% of the average production rate from the previous 30 days." CGA's should not be required to be conducted >=90% of the average production rate from the previous 30 days. The load rate requirement has no impact on the performance test, nor is the data used for emission calculations or comparison against emission limits. Some sources undergo seasonal variability, and postponing or increasing rates to complete this test is unwarranted and unnecessary. Operating to ensure the pressures and temperatures inside the stack are representative under normal measurement conditions is appropriate. Recommend removing the requirement 6.2-P (b). The source operating at normal operating conditions under 6.2-P (a) would ensure more flexibility to the operator without comprising the accuracy of the test.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
6.2.4 6.2-P(b) states the source must be operating at a rate of at least 90% of the average production rate from the previous 30 days. Often the production rate of a source is dictated by product inventory or marketing concerns, which cannot be easily addressed. Also, it is not necessarily true that CEMS or pollution abatement equipment performance are materially different at higher or lower production rates. Recommend that the verbiage be changed to require that the source is operated at a typical production rate, where typical is defined as a production rate that can be maintained indefinitely.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
6.2-P(b) What is the reasoning for the source rate above 90%? Normal operating conditions can vary drastically through the total load output capability. Air flows will have no impact on properly performing a CGA. This requirement may necessitate moving CGA testing dates. In an in-situ analyzer it is purging all process from the measuring cavity with test gas. In an extractive system the process is blocked while test gas is introduced to the probe. Process conditions would have no effect on system while performing a CGA. Recommend removing clause. Suggest facility only needs to be operating at a normal load condition.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
Clause 6.2 P(b) page 48 Unit rates do not influence the accuracy of a CGA. Recommend removing this requirement.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
Section 6.2.4, Claus 6.2.P b) CGA testing: Having the operating rate of at least 90% of the average production rate from the previous 30 days shouldn't be required provided the CEMS operation is not dependent on stack operating conditions either by demonstration or by stated by the manufacturer. Recommend removing this requirement or having an option to prove the CEMS operation is not dependent on stack operating conditions.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-P(b) Since operating rates do not influence the accuracy of a CGA, the percent production rate should not be required to be 90% of the previous month. At most, require the unit to be online, with representative flows.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
6.2-P (b) Please provide guidance on why the source must be operating at a rate of at least 90% during a localized linearity test on an analyzer. If a CEMS is capable of performing a CGA while the source is "offline" and the production %, stack temperature, and stack pressure do not affect the results could they be allowed? This would allow for CGA's during periods of Unit Offline as to maximize the measured stack gas during times of operation.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
6.2-P (b) Unit rates do not influence the accuracy of a CGA. Recommend removing this requirement.	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
6.2-P CGAs must be completed while the plant is operating at 90% of the previous month –should this be required provided the CEMS operation is not dependent on stack operating conditions either by demonstration or by stated by the manufacturer?	Changed 6.2-P to require that the source is operating and producing effluent representative of normal facility operation. Removed 90% requirement for CGA.
Section 6.2.4, 6.2-P CGAs validate the linearity of the analyzer in question across the range of the analyzer and are rate independent. Why is there the requirement for the CGA to be conducted at operating rates at least 90% of the averaging rate from the previous 30 days?	Removed 90% production rate requirement for CGAs. Instead are requiring that CGA is conducted under conditions representative of normal facility operation. Audit must be representative of the quarter it is meant to represent - no change in conditions prior to the test.
6.2.5 6.2-BB(b) states the source must be operating at a rate of at least 90% of the average production rate from the previous 30 days. Often the production rate of a source is dictated by product inventory or marketing concerns, which cannot be easily addressed. Also, it is not necessarily true that CEMS or pollution abatement equipment performance are materially different at higher or lower production rates. Recommend that the verbiage be changed to require that the source is operated at a typical production rate, where typical is defined as a production rate that can be maintained indefinitely.	Keeping the requirement to conduct the RATA when production rate is 90% of average production from previous 30 days. This is meant to represent normal operation (representative conditions - no changes in operations prior to the test). We are looking for normal operation. As far as we know, facilities are not having trouble meeting this, however facilities could work with their approval coordinator if this is a one-off issue for a specific situation (e.g., for consumer-products type facilities with cyclical production nature, as alluded to here). This is not a new requirement. It was in the 1998 Code and has provided good indication of normal operations for the majority of facilities with CEMS.
6.2-BB (Page 51) (b) the source is operating at a rate of at least 90% of the average production rate from the previous 30 days "30 days previous to the RATA does not work sometimes. For example: the source may be offline/down for 1-2 weeks for CEMS replacement, stack replacement, analyzer repair etc. Perhaps re-phrase that as "previous 30 days of normal production etc."?	Requirement to have production rate during RATA 90% of production rate over the previous 30 days is to ensure normal operation during the test. If you don't have 30 continuous days prior to the RATA because of a facility shut down, you would average 30 days before and after the disruption, not including the shut-down period.
6.2-Q and 6.2-DD No Changes Prior to CGA and RATA	
6.2.5 "No adjustments can be made prior to the audit (e.g. within the 2-week RATA notification period) based on third-party or reference method results." How would this information be available prior to the audit? Please clarify that maintenance can be performed on the analyzer whether it be scheduled or unscheduled, as required to keep the analyzer operational.	We know that "pre-RATA checks" are occurring, where testing company is asked to check the system before officially beginning the RATA. Adjustments in response to a third party test, such as that, are not permitted. Maintenance that is required to keep the CEMS in operation (i.e., routine, planned activities, as set out in the QAP) are allowable. This is part of the guidance below 6.2-Q. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC. Changed timeline to 24 hours prior to (as well as during) the CGA/RATA.
6.2-Q Please provide clarity on “prior to” as your example implies no maintenance within two weeks of a CGA.	Added "at least 24 hours prior to" and during a CGA.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-Q Please define a specific time frame for "prior to". Does this allow the person responsible to adjust the CEMS the morning of a CGA? This is still very much open to interpretation and may cause confusion for the various parties involved in a CGA.	Added "at least 24 hours prior to" and during a CGA. Added that normal operation of the CEMS, as required by the QAP, is acceptable (so zero/span, etc.). If a calibration adjustment occurs just before a CGA it is problematic as the CGA would then not be an as-found test that is representative of the quarter it is conducted in. It would be like tweaking the system in order to pass the test.
6.2-Q and 6.2-DD Please define a timeframe as to what is "prior to".	(6.2-DD is now 6.2-CC) Added "at least 24 hours prior to" and during a CGA/RATA.
6.2-DD Please provide clarity on a specific time as to how long prior to RATA when maintenance must not be conducted.	(B263now 6.2-CC) Added "at least 24 hours prior to" and during a RATA.
6.2-Q Prior to a CGA there are requirements that adjustments must not be conducted, but no timeline is given. An effective period, ie: during the calendar day, one hour period prior, etc. would be essential information. Calibration is also not listed, would it be allowable? If an output adjustment is required after a span check, are adjustments allowed prior to a CGA, as this would be considered normal maintenance in the QAP?	Added "at least 24 hours prior to" and during a CGA. Adjustments done based on third-party testing prior to a CGA or RATA are not allowed. However, you are able to test and make changes that are part of normal QA/QC, as set out in the QAP and that is discussed the guidance below the clause. A facility cannot adjust or correct based on third-party results before a RATA or CGA. You should not be calibrating prior to a CGA, unless this is part of normal, QAP-defined quality control. If a calibration occurs just before a CGA it is problematic as the CGA would then not be an as-found test that is representative of the quarter it is conducted in. It would be like tweaking the system in order to pass the test. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.
When performing maintenance on the system as per a PM described in a QAP, is it possible to adjust coefficients/correction factors without invalidating data back to the previous passed CGA or RATA? What is the difference between “calibration adjustments” mentioned throughout the code and “adjustments” mentioned in 6.2-Q (d)?	Calibration adjustment is defined in the Code as "the steps taken to establish a quantitative relationship between the actual value of a reference standard and an analyzer’s or device’s response". In 6.2-Q, a facility cannot adjust or correct based on third-party results before a RATA or CGA. You should not be calibrating prior to a CGA, unless this is part of normal, QAP-defined quality control. If a calibration occurs just before a CGA it is problematic as the CGA would then not be an as-found test that is representative of the quarter it is conducted in. It would be like tweaking the system in order to pass the test. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC. Adjusting factors or coefficients (i.e., correction factors) for flow analyzers is different from a calibration adjustment. See 5.1-J, 6.2-MM and Table 4.
6.2-DD Prior to a RATA there are requirements that adjustments must not be conducted, but no timeline is given. An effective period, ie: during the calendar day, one hour period prior, etc. would be essential information. Calibration is also not listed, would it be allowable? If an output adjustment is required after a span check, are adjustments allowed prior to a RATA, as this would be considered normal maintenance in the QAP?	(now 6.2-CC) Added "at least 24 hours prior to" and during a RATA. With this clause we were mostly looking to prohibit the “pre-RATA” which we know is occurring in some cases. Adjustments done based on third-party testing prior to a RATA are not allowed. However you are able to test and make changes that are part of normal QA/QC, as set out in the QAP, and that is discussed the guidance below the clause. A facility cannot adjust or correct based on third-party results before a RATA. You should not be calibrating prior to a RATA, unless this is part of normal, QAP-defined quality control. If a calibration occurs just before a RATA it is problematic as the RATA would then not be an as-found test that is representative of the quarter it is conducted in. It would be like tweaking the system in order to pass the test. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-Q Please provide a timeline for which it is unacceptable to make adjustments on the system prior to conducting a CGA (please define as-found).	As found is defined in the Appendix as "the output value of the measurement device that corresponds to the reference value input before a calibration drift check or adjustment".
6.2-Q Please add specific the timeline to this clause. Recommended change: "Within 12 hours prior to and during the CGA, the person responsible must not conduct any of the following if not prescribed for in the QAP […]" The constraint of limiting testing, repairs or preventative/corrective maintenance is likely to add unnecessary complication and rework. Allowing actions that are captured in the QAP is also important as quality assurance work must occur to ensure the test gas delivery system is operational prior to initiating the CGA.	Added "at least 24 hours prior to" and during a CGA. Adjustments done based on third-party testing prior to a CGA or RATA are not allowed. However you are able to test and make changes that are part of normal QA/QC, as set out in the QAP, and that is discussed the guidance below the clause. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.
6.2-DD Indicates no adjustments can be made within the 2-week RATA notification period, using reference method results. If a component is adjusted for calibration (output adjustment) etc. would this invalidate the RATA? Or require rescheduling? Require clarification on minor/major component, ie: filter changes within the 2-week notification period. It is difficult to manage this timeline of no adjustments if calibrations are conducted twice per month.	(now 6.2-CC) Added "at least 24 hours prior to" and during a CGA. You are able to test and make changes that are part of normal QA/QC, as set out in the QAP, and that is part of the guidance below the clause (so filter change would be included in regular CEMS operation). A facility cannot adjust or correct based on third-party results before a RATA or CGA. And any adjustments needed outside of normal CEMS operation (set out in the QAP) indicate that the CEMS is not operating properly and it may be advisable in that case to reschedule the RATA. If normal QAP quality control process are being followed, there is no need to reschedule the RATA. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.
6.2-Q & 6.2-DD - Performance Specifications and Test Procedures The timeline for activities that can and cannot be done before RATA/CGA needs further clarification. On the top of pg. 52, the Code suggests that an Operator should only perform daily checks and preventative maintenance within the two weeks prior to the RATA being conducted. Two weeks is a too long period. For example, if corrective actions were initiated within the two-week window, following the recommendation would cause short notice scheduling and notification changes. Often, Operators plan to make changes (i.e., adjustments) close to a RATA or CGA, as they look to the RATA to verify any changes made and minimize potential OOC time. In addition, suggesting a time period but not providing a concrete timeline introduces a “grey” area in the Code, adding confusion and causing facilities to follow different interpretations. Recommendations: Under the AMD(2016) Operators are required to submit the hourly CEMS data to the Regulator for the period 12 hours before a RATA test. A 12 hour window is a reasonable time frame, minimizing the potential of rescheduling and notifying for tests and minimizing potential downtime. Suggest the following changes to 6.2-Q and 6.2-DD: 6.2 -Q - <u>12-hours prior</u> to and during a CGA, the person responsible must not conduct any of the following on any portion of the CEMS, or any other actions that could interfere with conducting the CGA under as found conditions. 6.2- DD - <u>12-hours prior</u> to and during a RATA, the person responsible must not conduct any of the following on any portion of the CEMS, or any other actions that could interfere with conducting the RATA under as found conditions.	(6.2-DD is no 6.2-CC) With this clause we were mostly looking to prohibit the “pre-RATA” which we know is occurring in some cases. Adjustments done based on third-party testing prior to a CGA or RATA are not allowed. However you are able to test and make changes that are part of normal QA/QC, as set out in the QAP, and that is part of the guidance below the clause. A facility cannot adjust or correct based on third-party results before a RATA or CGA. Added "at least 24 hours prior to" and during a CGA/RATA. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
The explanatory text of 6.2-DD states that no adjustments can be made to the CEMS in the two-week period prior to a RATA. This is unreasonable as a RATA would not be impacted by a zero or span out of control after a corrective maintenance has been completed.	With this clause we were mostly looking to prohibit the “pre-RATA” which we know is occurring in some cases. Adjustments done based on third-party prior to a CGA or RATA are not allowed. However you are able to test and make changes that are part of normal QA/QC, as set out in the QAP, and that is part of the guidance below the clause. A facility cannot adjust or correct based on third-party results before a RATA or CGA. Added "at least 24 hours prior to" and during a CGA/RATA. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.
6.2-DD Please add specific timeline to this clause. Suggested change: "Within 12 hours prior to and during the RATA, the person responsible must not conduct any of the following if not prescribed for in the QAP […]" The constraint of limiting testing, repairs or preventative/corrective maintenance is likely to add unnecessary complication and rework.	(now 6.2-CC) With this clause we were mostly looking to prohibit the “pre-RATA” which we know is occurring in some cases. Adjustments done based on third-party prior to a CGA or RATA are not allowed. However, you are able to test and make changes that are part of normal QA/QC, as set out in the QAP, and that is part of the guidance below the clause. A facility cannot adjust or correct based on third-party results before a RATA or CGA. Added "at least 24 hours prior to" and during a CGA/RATA. Added exception for maintenance that is required in the QAP to clause 6.2-Q and 6.2-CC.
6.2-H Alternatives to Test Gas	
6.2-H Please revise to include analyzer optical span checks as being considered equivalent to the internal checks utilized by in-situ systems.	Clause 6.2-H was added to allow in-situ analyzers, which may be currently using internal verification methods for daily checks, to continue to do so without requiring Director authorization. We are however requiring that these analyzers, when replaced, be able to conduct a CGA with test gas. At this time we prefer to keep analyzers that are using test gas for daily verifications using test gas and not reduce requirements for these. Independent checks are preferable.
6.2-N Cal Drift Test	
Section 6.2.3 Calibration drift Test page 44 47 The guidance statement below clause 6.2 N on page 47 states" calibration drifts test results are acceptable for CEMS certification if none of the daily calibration drift test results exceed the applicable CEMS performance specifications in section 6.1" Does this mean the rest of performance specifications in Table 5 and referenced in clause 5.1 A can be waived? Please provide more clarification	The guidance below 6.2-N is applicable to results of calibration drift test, and in this case drift tests during the Operational Test Period for certification. The other specifications in Table 5 are required to be met as per 6.1-A and 5.1-B. This guidance for drift tests does not negate the other requirements within the Code.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-O and 6.2-RR RATAs and CGAs for Exotics	
6.2-O & 6.2-AA: General, requirements for RATAs and CGAs on a quarterly basis Ethylene and Ethylene Oxide analysis is complex, particularly in streams where the concentrations are low and there is substantial moisture content. The technology to measure streams like this is not in common use in Alberta, making it relatively rare and expensive. Similar technology for this type of CEMS in other jurisdictions have a one-time initial RATA to confirm operational set points for temperature and oxygen to the CATOX equipment. It is not an ongoing requirement to conduct complicated and expensive RATAs. Current estimates suggest that expanding the RATA to include Ethylene and Ethylene Oxide linearity will double the cost of compliance. Recommendation: Eliminate RATA requirements for elements on table 9. Alternately, reduce the frequency of RATAs of Ethylene and Ethylene Oxide analyzers to once a year or less. This change could be included by adding Ethylene and Ethylene Oxide monitors to section 7.3-E, allowing reduced frequency of testing based on good performance.	Removed RATA requirement for ethylene and ethylene oxide analyzers (so business as usual, as RATAs were not being conducted on these systems - gas chromatographs). CGAs twice per year will continue to be required. We separated out ethylene and ethylene oxide analyzers into their own table for performance targets (Table 9B). We continue to want to gain more information on the operation and performance of these analyzers, therefore reporting against performance targets is required.
6.2-S CGA Procedure	
6.2-S (c) (iii) (2) Many CGA's are conducted via electronically programed sequence. Requiring changes to alternating gas injection produces extra burden without providing value. Recommend removing requirement (2).	This is not a new requirement. It came from the 1998 Code (section 4.5.4 (d)). You cannot add the gases in succession, nor in the same sequence for each run. They must be alternated. It is a best practice to challenge the analyzer response between differing concentrations. You want to challenge the CEMS like a source would – randomly. If it has trouble between low to high, it likely would in sample mode as well. If you always run the test in sequence you are not fully challenging the analyzer response. No changes were made to the clause.
6.2-S (e) Suggest adding PROBE for in-situ analyzers (eg. GPP).	Edited this bullet to match requirement for introduction of test gas in Table 4.
6.2-S (f) PLEASE specify what constitutes stability for the purposes of linearity testing? How long? Be specific.	We've steered away from being specific about this in the past. It is difficult to define this without getting really prescriptive, as each system is unique and there is a variety of methods for determining the stable response. This should be captured in the CEMS QAP (or third-party QAP) so the facility or stack tester is consistent from test to test. For example, once the operator is satisfied that readings have leveled off they could use 5 1-minute readings to make an average for that point. This would work to give an average response. The raw data is provided in the CGA report appendix.
6.2-S (i) This is going to result in an increased cost to perform a CGA, as extra test gases will be required for each parameter tested. EPA Protocol gases are expensive, and this will further the burden of an already costly compliance monitoring program.	EPA Protocol gases have always been required under the 1998 CEMS Code for CGAs (section 4.5.4 (b)) - this is not a change to requirements. This matches requirements in PG7 and the US EPA. This will ensure equity of cost between facilities - as most are using Protocol gas now for CGAs.
6.2-S Maintaining low range gasses (1-20%) will be challenging and cost prohibitive for ethylene and ethylene oxide. Stability at low concentrations is unsatisfactory and access to the product is limited. Recommend that ethylene and ethylene oxide be exempt from this requirement.	You are still allowed up to 20% of FS for the low level gas. If cal gas is available for the mid- and high-point it should be available at 20% of FS. Guidance on dilution of gases is provided. Added guidance below 6.2-B that in the rare occurrence that EPA Protocol gases is not available, the person responsible may use a gas manufacturer standard accurate to 2 percent.
6.2-S (a) (i) low level range of 1-20% - just wanted to comment that I appreciate this addition.	Thank you

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-U (a) Is this an average of the 3 runs for the low, mid and high runs or the result for each run on the low, mid and high runs?	Parameter "A" is defined in Equation 4 as "the average of the three system responses to either the low-, mid-, or high-level test gas". So linearity is calculated for each of the three gas levels, based on the average of the three runs.
6.2-V Alternate Biannual Audit	
6.2-V For clarity, recommend adding the requirement that the gas used to calibrate the portable analyzer must be EPA Protocol Gas as specified in 6.2-B.	Added guidance under 6.2-V, pointing to 6.2-B.
Section 6.2.4 / Clause 6.2-V Alternative abbreviated RATA is proposed for in-situ analyzers that cannot be calibrated with flowing gases. These analyzers measure wet basis concentrations. Clause 6.2-V has specifications for the portable analyzers to be used as reference, which are assumed to measure on dry basis. Is it acceptable in the alternative CGA audit to use the last RATA average moisture to relate the measurements of these two systems? Will have the portable measuring at a dry basis (most likely) and comparing to in-situ analyzer measuring at wet basis.	Some portable analyzers have the option to measure on wet or dry basis. If the portable analyzer measures on dry basis, results would need to be correlated to the in-situ CEMS via moisture correction. Added guidance below biannual audit section (6.2-V) Clause 7.1-D(f) requires that the QAP include QA and QC for all the components listed (including moisture sensors) - IF the facility has a moisture sensor. Clause 7.1-D does not in itself require a moisture sensor. We don't have any prescriptive requirements for moisture sensors in the Code. If a facility corrects for moisture, the data is verified during the RATA. Moisture correction is one aspect that would need to be investigated should a RATA fail.
6.2-X (i) The text for '±15%' must remain on the same line	Agreed. Change made.
6.2-X(ii) The text for '12 ppm' must remain on the same line	Agreed. Change made.
6.2-GG and 6.2-NN Flow RATA	
6.2-GG: "When conducting a flow RATA for certification, the person responsible must collect a minimum of 9 manual flow traverse measurements at each load condition." There is a concern that stack testing companies will find work-arounds to conducting full 30 minute runs for Flow/Temp RATAS.	(Now 6.2-FF and 6.2 HH) We have made this a requirement in the revised Code, both in 6.2-HH and the guidance below. So if 30 minute runs were not completed, the CGA would not meet the requirement of the Code. The annual evaluation would identify this as a deficiency.
6.2-GG and 6.2-NN In the first draft comments, it was made very clear that changing load conditions cannot be done instantaneously with many facility processes. In the feedback and responses from draft 1 it was indicated the load conditions were only recommended not required. These clauses still state "load conditions" which may be a cause of confusion. Recommendation: Change the wording of these clauses to remove the assumption of "load conditions".	(now 6.2-FF and 6.2 MM) Testing at different load conditions is recommended. The facility would bear the risk if accuracy changes with load level, and the CEMS fails at a different load rate in the future. CEMS performance can change with load conditions. We have removed the reference to load conditions in 6.2-FF and removed reference to certification in 6.2-FF, as this is now the normal RATA procedure for flow (from 1998 Code): 9 manual traverse measurements. In 6.2-MM we added "if applicable" for multiple load conditions.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-GG When conducting a flow RATA - Do each of the 9 manual flow traverses need to be 30 minutes in length, or do they just need to fall within the 30-minute test window? As manual flow traverses do not usually take 30 minutes, please confirm expectations for timing on flow RATA's. Please also confirm whether this applies to certification flow RATA's only, or all flow RATA's? When conducting a RATA only for flow/temperature, must each test be spaced 30 minutes apart?	(now 6.2-FF) 6.2-HH states "For every RATA conducted… sample to obtain 30 minutes of valid [data] for each test run" and the guidance below says this "applies to all parameters, including … temperature and flow". So yes, when conducting a RATA for flow or temperature, each test run must be 30 minutes. Reference method flow tests may not take a full 30 min, but the RM needs to ensure 30 minutes of data are used. Requiring 30 minutes per run ensures a representative and consistent sample is taken. We know that many facilities have been doing 30 min runs for flow.
6.2-GG: "When conducting a flow RATA for certification, the person responsible must collect a minimum of 9 manual flow traverse measurements at each load condition." The clause uses the word "must" and is in an italicized box, which would mean that the operator will need to comply. In some cases reducing load rates may be unsafe or impossible. Suggest removing this requirement or updating this clause wording to be as a recommendation. When conducting a flow RATA for certification, the person responsible ~~must~~ may collect a minimum of 9 manual flow traverse measurements at each load condition whenever possible.	(now 6.2-FF) We have removed the reference to load conditions in 6.2-FF.
6.2-II 30-Minute RATA Runs	
6.2-II (b) Are 30-minute valid Reference Method data values required for each test run? Only CEMS is defined in this section. If not, what is the minimum number of valid 1-minute points that are required for reference method values?	(now 6.2-HH) Yes the RM runs must also be 30-minutes minimum to provide paired data with the CEMS - RM must correlate to CEMS data, representative of emissions and aligning with the CEMS measurements (6.2-A). Added "30 minutes of valid CEMS and reference method data for each test run" to clause for clarity. If there is a fluctuation in flow, the 30 minutes of data will ensure a representative sample. Best practice is to do the RM over 30 minutes and now this is clearly mandated.
6.2-II (b) Requiring 30 minute of valid CEMS data to be obtained for each test run may create inconsistency. If the time it takes to traverse the stack only takes 12 minutes additional CEMS data may result in variation not included in the sampling data. Also, this may unnecessarily increase testing time. Please provide further clarification or justification.	(now 6.2-HH) We have made this requirement more clear (from 4.5.8 (f) in the 1998 Code) to make this a more consistent practice from parameter to parameter and facility to facility. The 30 minutes ensures a representative sample is taken (average from 30 minutes of sampling). The RM needs to be representative and correlate with the CEMS data (6.2-A and 6.2-HH).
6.2-II Notes indicate all parameters including temperature and flow require a RATA, and 30 minute runs required for each parameter. If the Approval does not require temperature and flow be measured, and no such analyzers are present, please clarify this is not required.	(now 6.2-HH) The clause says "for every RATA conducted" so would not apply to parameters that are not measured. 6.2-HH does however require that temperature and flow RATAs have 30-min runs (see guidance below clause).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
6.2-QQ Aborting a RATA for Safety Reasons	
6.2-QQ Clarify that RATA's aborted for safety/health reasons or issues with Stack Testing Reference Method equipment do not trigger OOC conditions or count against the RATA reduction requirements. Strongly Recommend that the clause include exemption for abnormal production conditions, unit upsets, illness, safety concerns or malfunction of any stack testing Reference Method equipment.	(now 6.2-PP) Aborting a RATA that is deemed to fail, which is the focus of this clause, is not the same as aborting a RATA for safety reasons. This clause refers to failed RATAs or RATAs that are aborted because they are failing (as does 7.3-H for RATA reduction). A failed RATA means an out-of-control CEMS, and reduced RATA frequency could not be maintained. The clause is clear that it applies to failure to "meet the relative accuracy performance specifications" or aborting RATA "when test runs indicate that the RATA will fail to meet the relative accuracy performance specifications". There is guidance under clause 6.2-KK that allows aborting a RATA due to safety, plant operational, or RM issues - so that has been covered. We've added to that guidance.
6.2-QQ: “If a RATA (a) fails to meet the relative accuracy performance specifications or (b) is aborted when test runs indicate that the RATA will fail to meet the relative accuracy performance specifications, the person responsible must deem the CEMS out-of-control and follow the requirements for out-of-control periods in section 7.6.” Aborting a RATA for safety related, health and safety, plant upsets, or contractor error should not be counted against your reduced RATA frequency. If the operator is under the relative accuracy % threshold for the gas analyzer and meets the temperature and flow performance specifications for four (4) consecutive RATAs, then the RATA frequency is reduced to one RATA per year. However, if the operator has an issue (for whatever reason) and has to abort the test half way through then it must be reported and that automatically triggers the operator to have to do a higher frequency of RATAs for the next 2 years. If there are specific reasons to abort a RATA such as a plant upset, safety concerns, or if there was an issue with contractor equipment it should not be counted as out-of-control or against your reduced RATA frequency. We recommend including a clause that excludes safety related reasons, abnormal production conditions, unit upsets, illness, or malfunction of any stack testing Reference Method Equipment from having to report a RATA as out-of-control and have it count against your reduced RATA frequency.	(now 6.2-PP) Aborting a RATA that is deemed to fail, which is the focus of this clause, is not the same as aborting a RATA for safety reasons. This clause refers to failed RATAs or RATAs that are aborted because they are failing (as does 7.3-H for RATA reduction). A failed RATA means an out-of-control CEMS, and reduced RATA frequency could not be maintained. The clause is clear that it applies to failure to "meet the relative accuracy performance specifications" or aborting RATA "when test runs indicate that the RATA will fail to meet the relative accuracy performance specifications". There is guidance in under clause 6.2-KK that allows aborting a RATA due to safety, plant operational, or RM issues - so that has been covered. We've added to that guidance.
Clause 6.2 QQ page 57 Clarify that RATA's aborted for safety/health reasons or issues with Stack Testing Reference Method equipment do not trigger OOC conditions or count against the RATA reduction requirements. Recommend that the clause include exemption for abnormal production conditions, unit upsets, illness, safety concerns or malfunction of any stack testing Reference Method equipment.	(now 6.2-PP) Aborting a RATA that is deemed to fail, which is the focus of this clause, is not the same as aborting a RATA for safety reasons. This clause refers to failed RATAs or RATAs that are aborted because they are failing (as does 7.3-H for RATA reduction). A failed RATA means an out-of-control CEMS, and reduced RATA frequency could not be maintained. The clause is clear that it applies to failure to "meet the relative accuracy performance specifications" or aborting RATA "when test runs indicate that the RATA will fail to meet the relative accuracy performance specifications". There is guidance in under clause 6.2-KK that allows aborting a RATA due to safety, plant operational, or RM issues - so that has been covered. We've added to that guidance.
6.2-VV Orientation Sensitivity Test	
6.2-VV Suggest that orientation sensitivity tests can also be conducted prior to installation in wind tunnels	(Now 6.2-UU) Agreed. Added this in guidance above 6.2-UU.
6.2.VV(a) This statement makes it seem mandatory to conduct the flow sensitivity testing at multiple load rates while the explanatory text underneath says it is recommendation. Please clarify.	(Now 6.2-UU) Removed "at each load" in 6.2-UU(a)

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.1 QAP	
Section 7.1, Table 11 (Page 61) - CEMS QAP Requirements The prescribed QAP elements include Calibration, Maintenance, Operations, Evaluation/Testing, Data reporting … but there is no section on Reporting (monthly report, annual report, use of AMD forms etc.). So there are no requirements to reference AMD-forms in AMD Chapter 9 in the QAP at all?	In the QAP section, #11 covers reports and records, and in the QC section #12 covers data reporting. It doesn't specifically refer to the AMD in the QAP table contents. The QAP is the facility's and it would be best practice to describe reporting procedures in the QAP, including submission of AMD-required data and reports and who is responsible for that reporting.
7.1-A Is it appropriate to have one QAP for all CEMS? Or is this based on the same rationale as for a monitoring plan (same make & model etc.)?	The QAP is critical to the continued successful operation of the CEMS and they need to be clear and usable by operators. There is no requirement that each CEMS/source must have a dedicated QAP, however, every CEMS needs to be covered by a QAP. AEP thinks a QAP would be more difficult to use if it is for more than one CEMS/source, but we leave this up to the facility as it is their document.
7.1-A “The person responsible must (a) develop, (b) implement and (c) maintain a Quality Assurance Plan (QAP) for all installed CEMS to manage the quality of CEMS measurements”. Greater clarity is needed. Is it appropriate to have one QAP for all CEMS? Or is this based on the same rationale as for a monitoring plan (same make & model etc)?	The QAP is critical to the continued successful operation of the CEMS and they need to be clear and usable by operators. There is no requirement that each CEMS/source must have a dedicated QAP, however, every CEMS needs to be covered by a QAP. AEP thinks a QAP would be more difficult to use if it is for more than one CEMS/source, but we leave this up to the facility as it is their document.
7.1-C Suggest extending this to January 1, 2023 to give operations 1 year from the release date to have QAPs updated.	Extending for that long would go against the concept of a Quality System. That would mean that the QAP, which is for use by the industrial operation, could be out of date and show practices and procedures that are not in alignment with the revised CEMS Code for a full year after the revised Code takes effect. Seven months (from January to September 2022) is all that we are willing to offer for extra time to update the QAP. This should allow CEMS audits to still take place against the revised CEMS Code in 2022.
Section 7.0 / Clause 7.1-D Clause 7.1-D (f) cites moisture sensors as possible CEMS components, although Table 1 has no specifications for this component. Annual or biannual RATA include the determination of stack gas moisture as part of the RM test runs. Is it acceptable for CEMS based on dry analyzers to use the RATA average moisture to convert concentrations from dry to wet basis until the completion of the next RATA? Have heard from contractors that facilities are using factor from RATA until next RATA (long period) for moisture correction. Moisture varies throughout year/seasons. Moisture content requirements should be addressed in the Code.	Revised Code requires that RATA results specifically state whether they are in wet basis or dry basis (6.2-JJ). We leave it up to the facility to determine how they will account for moisture and whether or not moisture correction is required. As well, 9.0-F requires that reported CEMS data be consistently either wet or dry basis, and that moisture basis (wet or dry) be reported with the data. The Code does not dictate procedure for moisture correction. Moisture is not highly variable for most applications in Alberta. Important thing we stress is that a consistent basis be used for reporting results (wet or dry basis) and comparing to reference method (6.2.1). Clause 7.1-D(f) requires that the QAP include QA and QC for all the components listed (including moisture sensors) - IF the facility has a moisture sensor. Clause 7.1-D does not in itself require a moisture sensor. We don't have any prescriptive requirements for moisture sensors in the Code. We have not seen issues with moisture correction, so don't feel we need to prescribe restrictions or requirements in the Code at this time. If a facility corrects for moisture, the data is verified during the RATA. Moisture correction is one aspect that would need to be investigated should a RATA fail. Added guidance under 7.1-D.

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7.2 - QA/QC Frequency - Table 12	
7.2 - Table 12 Can the flow and temperature analyzer zero and span frequency be changed to the same frequency as the RATA (2/yr) as opposed to at the same time as the RATA? Scheduling and completing RATAs can be challenging without adding additional elements. Preferable to complete this performance check at a different time.	Agreed. Made change to Table 12 to say 2/yr, as opposed to "at RATA". Up to facility if they want to conduct at the RATA or not.
7.2 - Table 12 Zero and Span drift checks are not possible for all Temperature systems or flow analyzers. Recommend updating the matrix to include the caveat (where possible) also rather than specifying this be conducted "at RATA" change to "annually, where possible".	It is important to verify temperature and flow analyzers regularly. These analyzers are tested at certification so should also be able to be tested after that. Removed requirement to conduct "at RATA". Up to facility if they want to conduct at the RATA or not.
7.2.3 Periodic calibration of analyzers (e.g. monthly) is necessary for the proper maintenance of most analyzers. Allowing the analyzers to be out of control before calibrating would only result in data loss and downtime. This is the situation that the explanatory text seems ask for. Please clarify.	The QAP would outline calibration procedures and frequency. Some analyzers may require regular calibrations, as per manufacturer specifications. Calibration may be triggered by an event or threshold as identified in the facility QAP. Calibration frequency for analyzers is not prescribed by the CEMS Code. This guidance does say that calibration is required when specifications are not met. The Out-Of-Control requirements in 7.3 specify that corrective action be taken following failure to meet specifications (7.6-A), which may include calibration. Added guidance to 7.2.3.
7.3.1 and Table 12 Please confirm that 2 RATAs/year and 2 alternate biannual audits are required each calendar year for gas analyzers that are not designed to accept flowing test gas.	That is correct. Table 12 says "CGA or alternate biannual audit". Added guidance under 7.3-C that alternate biannual audit may replace CGA in annual frequency requirement, referring to section 6.2.4. Note that in order to reduce RATA frequency (section 7.3.1) one of the requirements is to conduct CGAs with flowing test gas (7.3-E(d)).
7.2-B Flow Analyzer Inspection	
7.2-B Visual inspection of many flow analyzers is not possible without removing them from the stack. This is completed with the annual inspection. How is the regular visual inspection in 7.2-B (a) different from 7.2-B (b)?	Removed requirement to remove flow analyzer from stack.
7.2-B (b) Removing the analyzer is very invasive and increases the risk of damage. If signs of misalignment and plugging can be done visually through regular inspections there should be no requirement to remove the analyzer from the stack. Furthermore, if the flow analyzer has the ability for daily zero/span checks, daily diagnostics will be in place to identify operational issues. RATA's are also being conducted, which will indicate any operational issues that may exist. Recommendation: Eliminate the requirement to remove the flow analyzer from the stack annually.	Removed requirement to remove flow analyzer from stack.
7.2-B What about scenarios where access does not allow. Are in-stack inspections allowed?	Removed requirement to remove flow analyzer from stack.
7.2-B (b) Annual removal of the flow meter causes a greater risk of changing, damaging or introducing error to the system. This also poses an unnecessary risk to people. Some flow meters are over 18 feet long, operate at 400 C and require cranes for removal. Visual inspection and comparison to performance testing results is the safest method. Strongly Recommend revising clause to omit "by removing analyzer from the stack".	Removed requirement to remove flow analyzer from stack.

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7.2-F Drift Test Frequency for Exotics	
7.2-F - Table 12 The person responsible must verify individual CEMS component performance at the minimum frequency specified in Table 12, or as per the QAP for analyzers not listed in Table 12. Table 12 requires daily zero and span drift measurements for gas analyzers from tables 5, 8 and 9, which includes Ethylene and Ethylene Oxide analyzers. Comments provided in draft 1 of the CEMS indicated that the Gas Chromatographs which quantify Ethylene and Ethylene Oxide are not designed to take automated calibration gas. Consequently, calibration drift tests are manually run on a weekly basis. While daily span tests are possible, our system is not equipped to also conduct daily zero measurements. Performing both tests daily would require significant increases in resources and is not practical. Recommendation: Split the requirements based on whether they apply to analyzers from table 5, 8 or 9. For analyzers in table 9, allow alternate frequencies based on what is described in the QAP (this may include a daily verification check, but should include some flexibility to allow for compliance in systems which can not be automated). This recommendation is consistent with AEP's response to the comments in draft 1: "There should be some daily verification check for every type of gas analyzer to ensure it is operating properly. Procedures for daily quality control checks must be documented in the CEMS QAP. Weekly drift tests are not a bad compromise here if there is some other method for daily QC checks." and "Removed requirement to conduct daily drift tests using test gas".	We have changed the requirement to minimum weekly zero/span tests for ethylene and ethylene oxide analyzers to account for these tests being manual. We separated out ethylene and ethylene oxide analyzers into their own table for performance targets (Table 9B).
7.2 Verification and Calibration - General	
7.2-H Dual range analyzers are designed to operate on the lower range during normal operations. RATAs are conducted under normal operating conditions as such there is no way to conduct a RATA at the higher range. Please change this requirement to exclude RATAs.	This clause does not apply to RATAs, as RATAs are not conducted on a particular part of the operating range as CGAs and drift tests are. Updated clause 7.2-H to refer to drift tests. Clause 6.2-R requires that linearity be tested at both ranges.
7.2-K: "For zero and span verification of gas analyzers, the person responsible must allow enough time to pass to attain a steady output by the DAS before recording the result." Please define steady output.	We've steered away from being specific about this in the past. It is difficult to define this without getting really prescriptive, as each system is unique and there is a variety of methods for determining the stable response. This should be captured in the CEMS QAP (or third-party QAP) so the facility or stack tester is consistent from test to test.
7.2-O This statement is unclear. Is this requiring an additional zero and span drift check before and after calibration or is the daily zero and span drift sufficient?	The frequency of drift checks is given in 7.2-F and Table 12. This clause just requires that as-found and as-left values be recorded. The response to zero and calibration gas (as-found) must be recorded prior to adjustment. Post-calibration zero and cal gas responses must be recorded. So there is no additional test, but more than the scheduled daily checks when adjustments are made. Made some edits to this clause.
7.2-P Is a change in pitot or annubar factor considered a corrective action for (c) that can be taken before calibration in a wind tunnel.	Change to the correction factor could be corrective action when performance specs are not met, however investigation would be requires as per section 7.6 when performance specifications are not met. Flow factors should not be changed due to a RATA failure. Rather, the cause of the failure needs to be investigated and corrected. For example, is there something really wrong with the analyzer, is maintenance required? It may be identified that rather than changing the correction factor, the issue is due to plugging or misalignment. Investigation is required. See Table 4 for requirement to conduct a RATA for diagnostic purposes when the flow factor is changed by > 5% annually.

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7.2-P For flow analyzers, the person responsible must have a wind tunnel calibration conducted (a) before initial installation, (b) when visible damage has occurred, and (c) if corrective action is unable to bring flow system inaccuracy back in line with performance specifications. Please provide clarity on the statement 'when visible damage has occurred'. Probe materials and electronics are very robust. Damage may be repairable depending on the extent, and then verified to be working properly. Are items (b) and (c) related or does the "and" tie all items (a), (b) and (c) together. Recommend cleaning up this language.	Changed the clause to "when visible damage has occurred or if corrective action is unable to bring flow system inaccuracy back in line". So yes, if you can take corrective action to bring the flow analyzer back into spec that is ideal.
7.2-P Not all flow analyzers are able to be tested in a wind tunnel. The size of many is prohibitive. Strongly Recommend revising this clause to "the person responsible must have a wind tunnel calibration conducted (if practical) […]"	The probe would be supplied by the manufacturer with a calibration certificate and coefficient. If there are no facilities available locally, return it to the manufacturer for calibration and follow CEMS temporary analyzer requirements in Section 8.0.
7.3 RATA and CGA Frequency - General	
7.3 (last paragraph): "The data obtained during a RATA may be used toward fulfilling associated manual stack survey requirements in an approval. Refer to AMD Chapter 9 for how to report in this scenario." This paragraph should be struck. Stacks equipped with analyzers should not be subject to manual stack sampling for the parameter covered by the analyzer, particularly given the amount of QA/QC required for these analyzers are now subject to in the CEMS Code. It is redundant. In the late eighties and early nineties, when RATAs and CGAs were not part of the Alberta environmental lexicon, stack sampling was used as a "check" on the performance.	This is an approval requirement and is outside of the CEMS Code. The manual stack survey also includes parameters that are not continuously monitored. This is not redundant, but rather while the stack sampling crew is on site for a RATA, the manual stack sampling requirement for these non-continuous parameters can be carried out at the same time (i.e., for PM). This guidance provides a reference for reporting RATA results when they are used to fulfill approval requirements to conduct a stack survey, as Ch 9 of the AMD allows this to be reported on one form. So in the case above, the facility would report one RATA form (AMD9) rather than both the RATA form and a Manual Stack Survey form (AMD7). Moved this guidance to the RATA section (6.2.5).
7.3.1 Reduced RATA Frequency	
7.3 If the CGA fails, which can occur often, does that automatically make you go back to 2 RATAs a year? Please provide clarity on if the reduced RATA frequency applies to a CGA failing.	Yes, if a CGA fails you must revert back to 2 RATAs per year. This is in clause 7.3-H "If at any time one of the following events occur …(vii) any CGA conducted (1) ends in an out-of-control event…"
7.3.1 If the four consecutive RATAs described in 7.3.1 cross over multiple years, does the RATA exemption take effect immediately or would the facility need to notify of the reduction for the following (or upcoming) year.	The reduced RATA frequency would begin in the next calendar year from when the all the criteria are met. No notification required, but need to report what frequency is being followed each month in the AMD2 CEMS Summary Form.
7.3.1 (Page 67) - Reduced RATA Frequency Present CEMS Code (1998) says that to reduce RATA frequency facility has to ask Director for permission. This requirement appears to have been waived. And apparently we only have to update the reduced RATA frequency in the QAP. Is it possible to clarify this in the new CEMS Code? If we meet the criteria of reduced RATA, we have to update the QAP; and then if the subsequent RATA failed to meet the criterion we have to revert back ... that means we may have 2-3 version of updated QAP within a year.	That is correct that you no longer need Director authorization to reduce RATA frequency. What IS required is: - must meet all criteria in 7.3.1 - must report frequency on AMD2 form The QAP should include the RATA frequency for facility's purpose, but the requirement is to include the frequency on the AMD2 form (which is reported every month). The QAP update would be only once per year for a change in RATA frequency. A QAP needs to be kept up to date with any changes in monitoring (7.1-A requires that the QAP be maintained). The change to RATA frequency is only applied on a calendar basis - so you would go to a reduction or revert back the next calendar year (so at most only one change in a year). It is possible that the QAP can outline the RATA frequency requirements - based on whether 7.5% or 10.0% is met.

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7.3-E (Page 68) - … 4 consecutive RATAs Present CODE says we can ask to RATA reduction after passing the RATA 2 times. What is the rational of increasing this to four (4)? The criteria of remaining/maintaining reduced RATA status are already quite stringent. Suggest keeping the twice pass rather than 4x passes.	The 1998 Code said "1 year", which meant 2 RATAs, but it also required Director review and authorization. Now we are allowing automatic transition into reduced RATA frequency the following year with no authorization required (just need to meet all criteria). The facility has to show consistently that they are able to meet the enhanced specification. This really would apply more to new facilities coming online (which don't have the RATA history). Existing facilities have 4 past RATAs, so you likely already meet the criteria if you are consistently meeting the enhanced spec, but for new facilities, they need to take time to show they can consistently meet it before they are able to reduce. If facilities are going into and falling out of the reduced frequency it shows that performance is not consistent. It could be burdensome to change every year to a different frequency. When the revised Code takes effect, facilities can use past RATAs to apply the reduced RATA frequency, as long as all criteria have been met. If a facility fails to continue to meet the criteria and needs to revert back to 2 RATAs/year, they would revert back the next calendar year. They would then need to pass 4 RATAs meeting the enhanced specification before they are granted reduced frequency again (so 2 years of RATAs). This allowance is meant for those facilities that are performing very well, to reduce testing requirements because the risk of data loss is lower (because performance is consistently very good).
With regards to RATA reductions, do we qualify for the RATA reduction under section 7.3.1 if we replace an analyzer with a like-kind analyzer during the period of time outlined in section 7.3.1 (i.e. the qualifying period)? Please clarify.	Yes - you are able to obtain (and keep) the reduced RATA frequency as long as all of the criteria in 7.3-E and 7.3-H are met. Therefore the replacement analyzer would need to continue to meet the criteria in order to keep the reduced RATA frequency. The events in 7.3-H that require reverting back do not include change out of an analyzer.
7.3-A(c) “The person responsible must conduct RATAs on each gas analyzer with a minimum of two RATA per year compared to the performance targets in Table 9.” If the CEMS are able to exceed the performance targets consistently they should be able to reduce stack testing risks and risks of working at heights. We suggest including the gas analyzers from Table 9 to the eligible list for RATA reductions. Edit clause 7.3-A (c) to include " unless the criteria for reduced RATA frequency in 7.3-E are met". 7.3-E(a) Ethylene is not currently on the list of gas analyzers that qualify for a reduced RATA frequency when they meet a relative accuracy of 7.5% for four consecutive RATAs. Please add ethylene to the list of reduced RATA frequency eligibility. Past performance has well exceeded the reduction criteria.	Those who monitor ethylene and ethylene oxide do not conduct RATAs currently. We have removed requirement for RATAs on these analyzers in the final Code (Table 9B).
7.3-E (a) Did AEP inadvertently neglect to include Total Reduced Sulphur and Hydrogen Sulfide monitors in the list of monitors specified in paragraph 7.3-E?	Have added reference to all analyzers in Table 5, so H2S and TRS are now included.
7.3-F (ii) Is a note regarding low emission criterion for TRS and H2S monitors warranted here?	Have added reference to all analyzers in Table 5, so H2S and TRS are now included.

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7.3-E Table 8 refers to mercury analyzers which are required to meet CCME guidelines, which state two RATAs are required. Mercury is not listed in 7.3-E. Is there the intention to allow for mercury analyzers to have reduced RATA frequency, if conditions are met from 7.3-E? And if so, does this overrule the CCME guidelines for mercury.	Have changed reference in 7.3-E to all analyzers in Table 5. We are not adding mercury. The CCME guidelines set requirements for Hg nationwide.
7.3-F (ii) Suggest adding a decimal place to 3ppm so its states 3.0 , as this value can be interpreted as a performance specification rounding can significantly affect whether a system meets to criteria.	Agreed. Added decimal place to absolute average difference alternative relative accuracy performance spec for reduced RATA frequency so all performance specs are consistent. Increased alternative spec from 3.0 ppm to 3.5 ppm absolute average difference (so slightly less stringent).
7.3-A (Page 66) "(b) a minimum of two RATAs per year (calendar year basis) …" If we have already performed 1st RATA the first half of the year, and the CEMS is changed out in Q3, for example: 1) does the certification test (RATA) count as the required RATA? 2) do we still need to do two RATA's for the new CEMS even though there are only 3-4 months left? 3) what about if the CEMS is changed out in October/Nov - do we still need two RATAs squeezed into 1-2 months for the new CEMS? that would be impossible if we have to space CGAs and RATAs 30 days apart.	The recertification RATA would count for the annual requirement. The RATA frequency requirement is not "per analyzer" but per CEMS/stack. Two RATAs per year applies to the stack/CEMS station (and whatever multiple analyzers are in place as part of that CEMS). So in your example, the first RATA is complete and the recertification RATA would count as the second RATA, as long as the RATA includes all other subsystems as well (e.g., including temperature and flow, as applicable). Yes in order to count the two RATAs towards the annual frequency requirement, then need to be spaced apart by at least 30 days.
Sec 7.3-A (page 66): "a minimum of two RATAs per year must be compared …" What happens if the CEMS is changed out in Q3/4, for example? If we have done one RATA in Q1/Q2, and CEMS is changed out in Q3/4 - part of the certification is a RATA. Does one need to do another RATA in Q3/Q4 meaning 2 RATAs for the new CEMS? There will not be enough time to do two RATAs in one quarter ... Perhaps a provision saying if CEMS is replaced in Q3/Q4, the second RATA must be done by Q1 of the following year.	The RATA that is completed for certification of the new analyzer (recertification of CEMS) counts towards the facility's/CEMS 2 RATA/year requirement. RATA frequency is for the CEMS as a whole, not for each individual analyzer serial number. So in the case you provide, 2 RATAs were completed in that year, so there is no need to perform a third RATA because the analyzer was replaced. No need to perform 2 RATAs on that new analyzer. Not adding additional guidance on this, as it says that a RATA for recertification counts towards the RATA requirement for the year. In order to count the two RATAs towards the annual frequency requirement, then need to be spaced apart by at least 30 days.
7.3-C (b) Suggest adding “then a minimum of 3 CGAs are required"	This is already specified in 7.3-G. Added to Table 12 as well.
Sec 7.3-D (page 68) If for the purpose of certification/re-certification of CEMS, CGA = Linearity test, one cannot space the two tests apart because Linearity Test (CGA) has to be done during Operational Period, while RATA has to be done during Operational Period or immediately after ... Is it necessary to clarify this by saying "... CGA and RATA have to be spaced at least 30 days apart, except during CEMS certification or recertification ..."?	Amended the clause and guidance below the clause. Yes the CGA and RATA are both required for certification and recertification, however since they do not meet the 30-day spacing requirement in 7.3-D, they cannot <u>both</u> count towards the annual frequency requirement in section 7.3.
7.3-F (ii) The average absolute difference required for RATA reduction is unnecessarily challenging and unfairly penalizes low emitters from obtaining RATA reductions. It would be recommended to use a fixed absolute difference requirement that reasonably demonstrates CEMS accuracy. <u>Strongly Recommend</u> aligning this requirement with clause 6.1-D (b) and recommend increasing to 5 ppm.	The RATA reduction criteria are meant for exceptional performance, which is why it is a hard bar to hit. An alternate specification has been provided for low emissions to meet the reduced RATA frequency criteria. Removed absolute accuracy alternative specification and increased absolute average difference alternative specification from 3.0 ppm to 3.5 ppm for low emissions (so slightly less stringent).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.3-H (i) & (ii): "If at any time one of the following events occur, the person responsible who has reduced the frequency of RATAs to once per year must revert back to conducting (a) a minimum of two RATAs per year, and (b) a minimum of two CGAs per year in the next calendar year: (i) relative accuracy >7.5% for any of the analyzers in 7.3-E (a); (ii) failure to meet the alternative relative accuracy performance specification in 7.3F when low emission criterion is met;" We recommend changing the process of reverting to the increased RATA frequency to a two-strike system such that either two consecutive results must exceed 7.5% or 5 ppm before the testing reverts to two RATA's per year. Alternatively, the reduction may be ended if two out of three tests exceed the 7.5% or 5 ppm rule. This would prevent any issues with the RM from causing unnecessary penalties.	The criteria for reduced RATA frequency provides an incentive for keeping up enhanced performance - reduced testing for maintaining enhanced performance. If a facility is falling out of the reduction due to not meeting criteria, continued enhanced performance is not being met, so this would be allowing reduced testing when the criteria is not met and is not the intent. This is a high bar to hit and it is meant for exceptional performance. Reverting back is not an "increased RATA frequency", it is the normal, minimum requirement. The reduced frequency is a testing reduction allowance for meeting exceptional performance. Part of this criteria is maintaining it over time. An alternative is provided for low emissions. This alternative was increased from 3.0 ppm to 3.5 ppm absolute average different (so slightly less stringent).
7.3-F Line 3 of this clause mentions "following alternative relative accuracy', but the specifications provided are for 'absolute accuracy' and 'absolute difference'. Should this text simply say 'following alternative performance specification'?	The alternative specifications in bullets (i) and (ii) of 7.3-F are "alternative relative accuracy performance specifications". They are an alternative way of assessing relative accuracy, as determined by conducting a Relative Accuracy Test Audit (RATA). This terminology should be fine to keep, and is used consistently throughout the Code.
7.3-H Again, the text stating 'relative accuracy' may be removed from this clause.	Relative accuracy is the measure/parameter, so needs to remain. "Alternative relative accuracy performance measure" is still appropriate in this case.
7.4 In-Stack Opacity Calibration	
Section 7.4 states that the quarterly calibration error test for in-stack opacity monitors may be conducted in accordance with the requirements specified in Performance Specification 1 (PS-1) or Procedure 3 (Appendix F, 40 CFR Part 60). PS-1 specifies that the calibration filters (attenuators) be recalibrated semi-annually whereas Procedure 3 requires that the filters be recalibrated annually (Section 10.2(2)). We recommend that the CEMS Code be clarified to require an annual recalibration of the filters.	Agreed. Added minimum requirement to calibrate attenuation filters annually.
7.6 Out-of-Control Criteria	
7.6-B There is no reference to Table 13 anywhere in the italicized clauses. This table is a better representation of what is acceptable and not acceptable for out-of-control limits. Recommendation: Reference Table 13 in this clause rather than Table 5, 6, 7, or 8.	Table 13 is just a summary. The performance specifications are given in Tables 5 through 9 for zero and span drift and out-of-control periods are based on 2X those performance specifications. This is why Table 13 is not in a clause, as the clause refers to 2X the performance specification which is already specified in tables 5 through 9. Table 13 and the guidance above it are provided for ease of use.
Table 13 There is no indication that oxygen and carbon dioxide are in terms of absolute value. Recommendation: Add a footnote indicating oxygen and carbon dioxide are in terms of absolute value.	That is indicated in the specification itself - Table 5. Table 13 references the section 6 specifications in the footnote.
7.6 (under 7.6A and 7.6-F) "Quarterly performance test" is used throughout the Code. Tests may not be necessarily conducted quarterly (30-day separation requirement). Recommend text change of "quarterly" performance test with "CEMS performance test".	The general intent is to cover the year by conducting a performance test (audit) roughly quarterly, however yes the requirement for spacing RATAs and CGAs is 30 days. This is mainly due to seasonal constraints (facilities often avoid stack tests in the winter months). Have changed terminology to "performance audit" to distinguish from other performance tests (e.g., daily drift tests).
7.6 (under 7.6A and 7.6-F) Reference made to quarterly performance test (indicating CGA/RATA throughout the Code). Is there a requirement to do a CGA or RATA every quarter? If not, this term should not be used, conducting four tests per calendar year is not equal to quarterly.	The general intent is to cover the year by conducting a performance test (audit) roughly quarterly, however yes the requirement for spacing RATAs and CGAs is 30 days. This is mainly due to seasonal constraints (facilities often avoid stack tests in the winter months). Have changed terminology to "performance audit" to distinguish from other performance tests (e.g., daily drift tests).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.6-A: “For any out-of-control period, the person responsible must: (a) report the out-of-control condition (i) immediately for a failed RATA or CGA; or (ii) as part of CEMS monthly reporting for a failed zero and span verification or alternate biannual audit”. 7.6-B: “Following daily analyzer verifications in 7.2.2, the CEMS is out-of-control when either the (a) zero drift or (b) span drift exceeds twice the performance specification..” The draft 2 code has kept the revised out-of-control zero/span requirements. CEMS units are deemed out-of-control when either the zero drift or span drift exceeds twice its performance specifications. Out-of-control events are to begin immediately with no 2 or 5 day period lag. This poses a practicality problem for industry. Often CEMS data can take a day to simply be reviewed by the maintenance/environmental group to determine whether or not the CEMS is even out of control. It may take another day or more for troubleshooting before the repair can begin. The repair time duration is dependent on the complexity of the issue. By the time the data is reviewed and tracked and have had resources put towards solving the problem, it can sometimes take several days to rectify the issue. In some instances, the system in question can be in an upset condition or complex and having somebody knowledgeable about the system to examine it could also take several days. Without sufficient time to determine and report that the system is out of control, an operator’s minimum data availability requirements will be affected which only allows for 3 out of control days. We recommend that if zero and span drift 24 hrs (concentration T5 and flow T7) exceed 2x the performance specifications there should only be a notification through the AMD monthly report. The data is only slightly non-linear at this point and still valid. If zero and span drift 24 hrs (concentration T5 and flow T7) exceed 3x the performance specifications then there should be a 3 day period lag to bring down the percentage. An out of control system would have to be immediately reported on day 4 if the system stayed above 3x its performance specifications.	We are keeping the out-of-control criteria as is. No other jurisdiction allows the CEMS to be out-of-control for multiple days without taking action and acknowledging the impact to data quality. Other jurisdictions also use 2X the zero/span spec as the trip into out-of-control. PG7's criteria for out-of-control zero/span drift is the first occurrence of 2X the performance spec, as is the US EPA's. When CEMS analyzer drift is out of spec, it is not appropriate to keep it out of spec for a prolonged period - there is an issue that needs to be addressed. Data is not quality assured when the CEMS is out-of-control, therefore the data cannot be reported to the department as quality assured. By removing the 2X spec for 5 consecutive days and the 4X section from the Code, we have eliminated multiple levels of complexity. In the revision, for SO2 and NOx we increased the drift performance specifications from 2% and 4% (for zero and span drift respectively) to 2.5% and 5%, so this is now less stringent than it was in the 1998 Code, and 2X the performance spec for out-of-control designation subsequently becomes less stringent at 5% and 10%. This somewhat balances the changes to out-of-control period criteria Facilities request a “buffer period” before deeming the CEMS out-of-control, however there is a buffer period – it is when drift is between the acceptable (performance spec) and out-of-control (between the two sections of Table 13). This is the period where the facility should be investigating and taking action to avoid going out-of-control. Facilities should reset auto-notifications to take a look at the system at that level (outside of the allowable drift and before the CEMS is OOC). Zero and span drift should be the gauge facilities are looking at every day to assess the CEMS system and data quality (like an odometer).
Section 7.6 Out of Control Periods, Page 71-75 The draft 2 CEMS code defines out-of-control periods at 2X performance specification. This does not provide sufficient response time for industry partners in section 7.6-B. Recommend: include a clause in Section 7.6-B that states; exceeding 2X performance specification, but the analyzer is not considered out-of-control until the 5th day. The 5 days lag gives the facility operator a chance to rectify the situation, especially if in a remote area, or places where qualified staff are not available over the weekends. Specifically, gas analyzers i.e., H2S, TRS etc., reducing the performance specification by 50% is a significant step.	We are keeping the out-of-control criteria as is. No other jurisdiction allows the CEMS to be out-of-control for multiple days without taking action and acknowledging the impact to data quality. When CEMS analyzer drift is out of spec, it is not appropriate to keep it out of spec for a prolonged period - there is an issue that needs to be addressed. Data is not quality assured when the CEMS is out-of-control, therefore the data cannot be reported to the department as quality assured. In the revision, for SO2 and NOx we increased the drift performance specifications from 2% and 4% (for zero and span drift respectively) to 2.5% and 5%, so this is now less stringent than it was in the 1998 Code, and 2X the performance spec for out-of-control designation subsequently becomes less stringent at 5% and 10%. This somewhat balances the changes to out-of-control period criteria There is a buffer period before deeming the CEMS out-of-control – it is when drift is between the acceptable (performance spec) and out-of-control (between the two sections of Table 13). This is the period where the facility should be investigating and taking action to avoid going out-of-control. Facilities should reset auto-notifications to take a look at the system at that level (outside of the allowable drift and before the CEMS is OOC). Zero and span drift should be the gauge facilities are looking at every day to assess the CEMS system and data quality (like an odometer).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.6 This comment was submitted in the CEMS Code Version 1 consultation but it does not appear to have been addressed... Out-of-control criteria: We believe that the proposed change requiring immediate reporting of out-of-control (OOC) events immediately, instead of having a 5-day grace period before deeming a unit OOC, will substantially increase the administrative burden on AMD monthly reporting without much gain in CEMS performance.	We have largely removed the reporting requirement for these events. The focus here is on addressing the events, not just tallying them and reporting them. When CEMS analyzer drift is out of spec, it is not appropriate to keep it out of spec for a prolonged period - there is an issue that needs to be addressed and the data is of questionable quality. No other jurisdictions give multiple days leeway or a grace period where the CEMS can be out-of-control while calling the data "quality assured". There is a buffer period before deeming the CEMS out-of-control – it is when drift is between the acceptable (performance spec) and out-of-control (between the two sections of Table 13). This is the period where the facility should be investigating and taking action to avoid going out-of-control. Facilities should reset auto-notifications to take a look at the system at that level (outside of the allowable drift and before the CEMS is OOC). Zero and span drift should be the gauge facilities are looking at every day to assess the CEMS system and data quality (like an odometer).
7.6-F (b)(i): "the CEMS is out-of-control when either the (a) zero drift or (b) span drift exceeds twice the performance specification in: (iii) Table 7 for flow analyzers capable of assessing zero and span drift. Does zero and span verification include zero and span verifications WITHOUT flowing test gas or just daily span checks using flowing test gas?	Zero and span verifications referred to in 7.6-F refer to those required in 7.2-I, which yes do include those conducted without flowing test gas.
7.6 Out-of-Control Criteria - Reporting Failed RATAs and CGAs	
7.6-A(a)(i) This clause notes that failed RATAs or CGAs must be reported immediately (assume this means the 24-hr Reporting Line), where as other out-of-control situations would be reported in the monthly CEMS report. Please clarify why there are different reporting requirements for the out-of-control situations.	The purpose was to acknowledge the significance of these audits by calling them in – when they fail, the system is not meeting CEMS Code specifications, and therefore not meeting the approval condition to follow the CEMS Code. Because these failures are reported now through the AMD (via AMD4 and AMD9 reporting forms as well as in the PDF report), we have removed the requirement to immediately report RATA and CGA failures. The facility needs to investigate and act on the failure (including repeating the test) regardless (as per 7.6).
7.6-A(a)(i) An OOC period should not be immediately reported as a passed CGA may be possible within the same day. This is not an uptime contravention and is therefore not reportable.	The purpose was to acknowledge the significance of these audits by calling them in – when they fail, the system is not meeting CEMS Code specifications, and therefore not meeting the approval condition to follow the CEMS Code. Because these failures are reported now through the AMD (via AMD4 and AMD9 reporting forms as well as in the PDF report), we have removed the requirement to immediately report RATA and CGA failures. The facility needs to investigate and act on the failure (including repeating the test) regardless (as per 7.6).
7.6-A (a) (i) Recommend that failed RATAs or CGAs be reported in the monthly report only. It is unclear what is meant by "reported immediately." Failing a RATA/CGA does not contravene the approval requirements so reporting to the 24-hour industry hotline may cause confusion, misalignment, and regulatory risk. Please clarify why there are different reporting requirements for out-of-control situations.	The purpose was to acknowledge the significance of these audits by calling them in – when they fail, the system is not meeting CEMS Code specifications, and therefore not meeting the approval condition to follow the CEMS Code. Because these failures are reported now through the AMD (via AMD4 and AMD9 reporting forms as well as in the PDF report), we have removed the requirement to immediately report RATA and CGA failures. The facility needs to investigate and act on the failure (including repeating the test) regardless (as per 7.6).

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.6 Out-of-Control Criteria - Invalidating Data When RATA/CGA Failure Not Known	
I liked the idea of not invalidating data if you could go back in time and find the root cause of a problem. That's a nice incentive for fixing problem systems.	Thank you. We agree.
Data would be invalidated back to the time when the root cause is determined to have occurred In situations where the zero or span drift check does not meet the performance criteria, and the data is considered out-of-control, the DAS will not be able to automatically invalidate data as it will not be able to identify the root cause. CEMTEK is requesting that AEP considers invalidating data backwards from the time of the failed test to the time of the last passing test and forward until a passing test is performed. CEMTEK realizes that this could be more punitive to the owner/operator, but it will eliminate the need for them to manually edit the DAS data to invalid once the root cause is identified.	Identification of the root cause requires manual investigation of the data and analyzer diagnostics, and possibly process data, to look for anomalies. Once a root cause and point in time are determined, data would need to be flagged accordingly and then resubmitted. If it is not possible to do this in the DAS software, it would need to be done manually. If a point in time cannot be determined, then data would be invalidated back to the last successful test (zero/span for a failed zero/span; most recent RATA or CGA for a failed RATA or CGA).
7.6-A For RATA or CGA failures, without a root cause determined, invalidating data to the last quarterly is overly conservative. Either to 1/2 way between (ie-assume error did not occur right after the last successful quarterly check) or, where a point can be identified where there was a change in the data stream (ie step change).	We want to avoid picking an arbitrary place to invalidate data back to. In a sense, that is what we had in the 1998 Code - the default of start of the failed test. It is about what data can be deemed quality assured and what cannot (or is questionable). The ideal is that the facility investigates data/diagnostics/process parameters and can pinpoint when things started to go awry in the data or a root cause. The reason to go back to last passed audit (CGA or RATA) is that with a failed audit and assumed passed zero/spans all along the way, it leaves all the data in question when a point-in-time cannot be determined from the investigation.
"The out-of-control period in 7.6-B, 7.6-D and 7.6-E begins with : (a) the time when the root cause is determined to have occurred; or (b) if the root cause timing cannot be determined: (i) the start time of the failed zero and span verification, for failed daily zero and span verification; and (ii) the end time of the last successfully passed RATA, CGA or alternate biannual audit, for failed RATAs, CGAs or alternate Biannual audits." When you fail your out of control period starts with the condition that caused the RATA or CGA to fail. If a CGA fails and the specific reason for/ point in time of the failure can't be tracked (e.g. gas flow to an analyzer that didn't arrive), the out of control period should not have to begin all the way back to the previous quarterly performance test if the failure is not within the mid-range. Having to go all the way back to the previous quarterly performance test is time consuming and a reporting burden on industry. Using the daily drift check data which covers the low and high range should be sufficient if the failure is in the high or low range. Facilities may also have long in- between periods for CEMS performance tests (i.e.. 6 months). This means that a failed test may result in invalidating data (using estimated data techniques) back several months. If it is unknown when the issue resulting in the failure took place (i.e. the CEMS parameters appeared normal/valid) then there is a high risk of invalidating real monitoring data that is representative. An Operator may potentially replace large amounts of quality assured data with estimated data that contains a larger error. The driver for this approach is not clear. We recommend two options: 1) Provide more clarification in Section 7.6 such as "If the CGA failure is not within the mid-range, a daily check which covers both the low and high range, should provide enough data validation to provide out of control data" or; 2) Maintain the requirements given in the current code. When the reason for a RATA/CGA failure is unknown, the out-of-control period should begin at the start of the performance test. Failed 24-hr zero and span drift verifications where the root cause is unknown would only have to go back 24 hours to the previously passed calibration.	That is correct, when a RATA or CGA fails, the out-of-control period begins with whatever condition caused the failure. The Code (1998 and revised version) requires an investigation into the root cause. The ideal is that the facility investigates data/diagnostics/process parameters and can pinpoint when things started to go awry in the data or a root cause. Then data is only invalidated back to that point. The reason to go back to the last passed audit (CGA or RATA) when a root cause or point in time cannot be identified is that with a failed audit and assumed passed zero/spans all along the way, it leaves all the data in question. Depending on the system - the zero/span check could be in question. The option of using the zero/span is not appropriate if the underlying issue has been with the zero/span test. Even in the case of 1 RATA per year, there would still be 3 CGAs, and you have to go back to the last passed CGA or RATA (either or - it doesn't have to match the failed test type). Worst case would be 6 months data loss, but more likely a max of 4 months. The current default of going back to the start of the performance test gives no incentive to investigate and find the issue and root cause of the failure. In fact there is a disincentive - a facility trying to avoid data loss and an uptime contravention may not identify a root cause when the default is to use the start of the failed test. By keeping this new requirement, it puts the onus on the facility to thoroughly investigate, determine the underlying issue and rectify it, rather than just calibrating to pass the repeat RATA and possibly masking an underlying issue that is detrimental to data quality. We are not requiring missing data estimation for the invalidated data period. Measured data can be kept in but must be resubmitted and flagged as "questionable" and missing (as per CEMS User Manual) and the data will not count towards percent availability.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.6-F We disagree with invalidating data back to the previous successful RATA, CGA or alternate biannual audit when a RATA, CGA or alternate biannual audit is failed. There is no similar requirement in the USEPA Part 75 or Part 60 regulations where a failed QA test results in data being invalidated back to the pervious successful QA test passed in the previous quarter. Under a worse case scenario, this could result in the invalidation of over five (5) months of data. For example, if the Q1 CGA was successfully completed on January 5 and the Q2 CGA was failed on June 15, this would potentially result in the invalidation of 4 months and 40 days of data. Moreover, this would require the source to resubmit five (5) MDF files for January, February, March, April and May). Instead, data should be considered invalid beginning with the hour of the failed test until the hour of completing a success test.	The requirement is to invalidate data back to the last passed audit (CGA or RATA - doesn't need to be the same test type), IF the root cause or point-in-time of issue cannot be determined following an investigation. The ideal is that after thorough investigation a point in time can be determined and you only invalidate back to that point that the data is questionable. Yes the data the data will need to be resubmitted, but we are not requiring missing data estimation for the invalidated data period. Measured data can be kept in but must be resubmitted and flagged as "questionable" and missing (as per the CEMS User Manual) and the data will not count towards percent availability. Better to investigate data and process data and look for any anomalies which would indicate a point of time when an event happened. Then only invalidate the data from the point of the root cause forward. We are not interested in keeping the current requirement of going back only to the start of the failed test as this provides no incentive for doing a thorough investigation of the data, including perhaps process parameters, to find the underlying root cause and address it. The current default can result in questionable data being submitted as quality-assured, when there is no proof that it is accurate with the failed performance test.
Clause 7.6-F If an analyzer goes out of control due to a RATA or CGA failure, and after investigation the point in time of root cause of failure cannot be determined, data will need to be invalidated back to the last successful quarterly performance audit (i.e. last CGA or RATA). Recommended change: invalidating data back as far as a quarter will create unnecessary burden on operators. If a root cause for failure cannot be found, data should be invalidated back to the last day on which daily checks (i.e. zero and span verifications) were correct.	This is not appropriate if it is the zero and span test that is the issue. When a RATA or CGA fail and a root cause cannot be identified, it is assumed that the zero and span tests have been passing (otherwise there would be corrective action performed when the zero/span fails). This leaves all the data quality questionable - why did the audit fail? The current requirements are a disincentive to doing a thorough investigation to find the root cause, because the default is to go back to the start of the failed test. We want to incent taking the time to conduct an investigation and determine a point in time when the data went awry and to address the underlying issue. We no longer want data that is questionable submitted after a failed performance test as if it is quality-assured. Data will need to be resubmitted and flagged as questionable and missing (as per the CEMS User Manual), and it will not count towards percent availability. The best case scenario is that the facility investigates data/diagnostics/process parameters and can pinpoint when things started to go awry in the data or a root cause. Then data is only invalidated back to that point.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.6-F If an analyzer fails a RATA or CGA it is considered out of control up until the last passed performance test. We request that the analyzer only be considered out of control from the last successful zero/drift or calibration check.	This is not appropriate if it is the zero and span test that is the issue. When a RATA or CGA fail and a root cause cannot be identified, it is assumed that the zero and span tests have been passing (otherwise there would be corrective action performed when the zero/span fails). This leaves all the data quality questionable - why did the audit fail? The current requirements are a disincentive to doing a thorough investigation to find the root cause, because the default is to go back to the start of the failed test. We want to incent taking the time to conduct an investigation and determine a point in time when the data went awry and to address the underlying issue. We no longer want data that is questionable submitted after a failed performance test as if it is quality-assured. Data will need to be resubmitted and flagged as questionable and missing (as per the CEMS User Manual), and it will not count towards percent availability. The best case scenario is that the facility investigates data/diagnostics/process parameters and can pinpoint when things started to go awry in the data or a root cause. Then data is only invalidated back to that point.
Should 7.6-F (b) not be written as follows?: (b) if the root cause can not be determined: (i) the start time of the failed zero and span verification, for failed daily and zero span verification; **or** (ii) the end time of the last successfully passed RATA, CGA, or alternate biannual audit, for failed RATAS, CGAs or alternate biannual audits; whichever is appropriate.	Yes, it would be appropriate, but this requirement is to set out the start time of the out-of-control period, and that includes for all of failed daily zero/spans and RATAs/CGAs and the biannual audit (clause references 7.6-B, 7.6-D and 7.6-E). That is why the "and" is in the clause. So sub-bullets (i) and (ii) refer to those three clauses, as appropriate, depending on the test and the OOC event as it occurs.
7.7 Annual Evaluation	
7.7-A Annual evaluation Processes can be disrupted, as Covid has shown. Item 6.2-C refers to intervals for drift testing “as close to 24-hour intervals as possible.” It may be difficult to meet every year. Recommend loosening up 12 “months plus or minus one month” to “as close as possible to 12 months” between annual audits.	Changed requirement that annual evaluation be conducted at least once every year, rather than exactly 12 months apart. Added guidance below that it should be as close as possible to 12 months apart.
7.7-A: "The person responsible must have an annual evaluation conducted on the CEMS and QAP at least every 12 months, plus or minus one month." The requirement to complete the annual evaluation within a reoccurring timeframe is too restrictive and unwarranted. Audits are typically completed annually within the calendar year, with the audit covering the time period back to the previous audit. We recommend updating the clause : "The person responsible must have an annual evaluation conducted on the CEMS and QAP at least annually. ~~at least every 12 months, plus or minus one month~~."	Agreed. Changed requirement that annual evaluation be conducted at least once every year, rather than exactly 12 months apart. Added guidance below that it should be as close as possible to 12 months apart.
7.7-A This should be "plus or minus 3 months". It is not always possible to schedule within one month and a year a QAP auditor. This pandemic year was a good illustration of that, even in a normal year it is not always possible.	Changed requirement that annual evaluation be conducted at least once every year, rather than exactly 12 months apart. Added guidance below that it should be as close as possible to 12 months apart.
7.7-B (c) Please define "independent of any CEMS testing, monitoring or reporting". Can this be an auditor from the same company as the CEMS testing provider, independent of the field testing and reporting provided by the testing firm?	The auditor must be an independent check on the CEMS system and functions, so it is not appropriate for the auditor to be someone who has been paid to test, audit or provide service to the CEMS. So it cannot be the same individual that has provided services like testing, monitoring or reporting, however we acknowledge that some contracting companies have several work divisions, so the auditor may be someone from the same company.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
7.7-B (Page 76) "The person responsible must use an auditor for the annual evaluation in 7.7-A that is (a) knowledgeable (b) independent of the daily CEMS operation; and independent of any CEMS testing …" If the criteria do not include "third party/independent", or "accreditation", can we have a corporate person from Head Office, who is knowledgeable about the CEMS system at the facility, and the CEMS Code, to perform the annual evaluation?	That is correct, a third party is not required to conduct the annual evaluation. However, whoever does conduct the annual evaluation must not be someone who is part of any day-to-day CEMS operations, testing or reporting. We are not requiring accreditation at this time.
7.7-C(f) It should not be the incumbent on the auditor to evaluate the response made to previous audit findings. This responsibility should fall on the facility. If an auditor finds something deficient then it should be a finding regardless of if it was brought up in a previous audit. This requirement seems to place the responsibility on the wrong party.	The idea here is accountability. We are aware that in some cases, audit findings provided from auditor to facility are not addressed, and therefore the finding is repeated in the following year's report. This requirement means the audit would note that (i.e., that it is not a new finding, but outstanding).
7.7-F The notes section on page 77 indicates that any non-compliance identified in the annual evaluation must be immediately reported to the Director but also reported in the monthly or Annual Reports. This seems counter to the reduction on reporting burden for industry and is an example of regulatory red-tape. Non-compliance should have to be reported in either the annual evaluation to the Director or in AMD Chapter 9, but not both.	This is just guidance (a reference to AMD Chapter 9). It is not a requirement of the CEMS Code, it stems from AMD Chapter 9. Compliance reporting will be reviewed in AMD Chapter 9. Non-compliance needs to be reported. It may be part of the auditor's report - the auditor is required to confirm whether or not the QAP and CEMS Code are being followed. The annual evaluation is not submitted to the Director, but may be requested.
7.7-F Is there meant to be a subtle but important difference between "recommendations" in the paragraph above 7.7-F and "observations and findings" in 7.7-F itself? If not, would it not be warranted to using consistency wording? If there was meant to be a difference, perhaps this should be explained or highlighted in the definitions section.	The guidance above 7.7-F is just guidance, indicating that an auditor may provide recommendations for improvement (i.e., not always contraventions of the Code). 7.7-F then gives responsibility to the facility to respond to the auditor's findings. Changed wording to "recommendations".
8.0 Temporary Replacement Monitoring	
Figure 2 Are these options additive? (ie. Estimate missing data for up to 168 hours and then use a reference method for an additional 14 days.) If so, this figure should be updated to reflect that, as it appears they all must start from day 1.	Yes these are options, some with their own timing restrictions, as indicated in the clauses (8.0-A to 8.0-E), so they are additive. The figure is just a simple summary, meant to show the timescale of each option. Added note to the figure caption that any combination of these options can be used in an additive manor.
8.0 There does not seem to be an allowance for the use of a temporary analyzer that is not “like-kind”. What would be the QA/QC requirements in this situation? The definition of “like-kind” should be expanded to include updated models of analyzers in the same series when the old model is no longer available.	If an analyzer is replaced with a different analyzer (not like-kind), then certification is required as per section 5.2, Table 4 (this is noted in Figure 2). The allowance to conduct a CGA rather than a full recertification is provided with the caveat that the analyzer being put in place is the same as the original, therefore the risk of impairment to the system or data accuracy is much lower than if a different analyzer type is put in place. Companies make changes to analyzers when they come out with a new model. Swapping in a new model is not the same as swapping in one of the same make and model - there is inherently more risk, which is why recertification is required. The RATA conducted for recertification can be used towards the annual frequency requirement. Added another bullet to 8.0-A for permanent replacement with analyzer that is not like-kind, referring to section 5.2.
8.0-A Are we to understand from the wording of 8.0-A that should we fail a RATA (or CGA) and enter an "out-of control" period under 7.6-A we can swap out the failed analyzer, complete a successful CGA, and start generating quality-assured data again, rather than schedule a RATA for the failed analyzer and associated OTP requirements to recertify it. 8.0-A certainly reads that way.	The person responsible must adhere to section 7.6 for actions following a failed RATA. The RATA needs to be repeated - that is one of the actions. If you put a like-kind replacement in place with a CGA, that would put you back "in control" technically, but the facility still has a failed RATA to report and needs to complete that RATA to meet the RATA frequency requirements of the Code. Section 8.0 is for maintaining data reporting during an outages either while an analyzer is being repaired or replaced, or for estimating missing data when an hour or more is lost.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
8.0-A (b) (c) How are flow and temperature monitoring systems verified in these scenarios?	Changed 8.0-A to refer only to analyzers in Table 5 and 7 (common gases, temperature and flow measurement). If other analyzers are replaced, the facility would follow Table 4 for replacement or the facility's QAP as to what performance testing is conducted to verify a replacement. For flow and temperature: since CGA is not possible, a RATA would have to be conducted. Added guidance on this.
8.0-A (d) Provide guidance how a reference method should be used including for flow system failures and replacement using ASSC Method 1/2. For example is one flow traverse acceptable for the entire 14 day period ? One traverse per day? , etc.	We removed reference method as an option in 8.0-A and added guidance that facility could work with the Director on a situation by situation basis for using non-continuous reference method, and how to report the data in that case.
8.0-B / 8.0-C(b) Consider a reference to in-stack opacity analyzer procedures, i.e.: performing 3-point linearity check, as these analysers are unable to perform CGA/RATA on in-stack opacity analyzers.	Updated section to apply only to gas analyzers in Table 5 and temperature and flow analyzers. If an in-stack opacity analyzer is replaced, the facility would follow the facility's QAP as to what performance testing they will conduct to verify the replacement.
8.0-A (e) Please elaborate on the rationale as to why a calendar month is used? Why not consecutive hours?	Calendar month is how electronic reporting is based, as well as percent availability and also some approval limits are on a calendar month basis. The CEMS Code defines "month" as a calendar month (see Appendix A).
Figure 2 Summary options for data reporting during primary CEMS outage. Unsure the difference between Use of a Reference Method and the use of a Third Party Short-term continuous monitoring? Please Clarify.	The intent of reference method was Manual Stack Survey. We removed reference method as an option in 8.0-A and added guidance that facility could work with the Director on a situation by situation basis for using non-continuous reference method, and how to report the data in that case.
8.0-A (Page 77) "(a) a redundant backup analyzer which (i) is fully certified …" Please clarify "fully certified" … perhaps in the Definition (Appendix A)	This means that the "hot spare" is a completely operational (i.e. records data), redundant CEMS that is installed in-stack, certified and has the same QA/QC and performance testing performed on it as the primary CEMS. Redundant backup analyzer is defined in the Appendix. Removed "fully" from certified in this clause. So it is certified in the same way as the primary CEMS.
8.0-B 168 hours is too short of a timeline for facilities that get a third party to complete their CGA's. The air monitoring programs are typically scheduled months and having a third party complete a CGA within 7 days would be too difficult to achieve. Recommendation: CGA's should be completed within 336 hours (two weeks) of beginning operation.	8.0-B requires that the CGA be conducted within 168 hours of beginning operation of the spare or third party monitoring, in order to get monitoring up quickly and avoid downtime. It is not 168 hour from the primary CEMS outage. There is the option for the facility to conduct the CGA (doesn't need to be a third party). We are aware of facilities that conduct their own CGAs. Extending the time to perform a CGA means a longer time period before the data is confirmed as quality assured. We would like the replacement to be up and running as soon as possible to avoid loss in quality assured data, and for facilities to plan ahead for these situations (contingency plan in the QAP).
8.0-A (Page 77) "(c) third party short-term continuous monitoring …" Does it mean a portable NOx analyzer, for example, qualifies as "third party continuous monitoring"? Does that third party analyzer have to be certified, or undergo RATA itself? The description seems to say that it is okay as long as a CGA test is performed and passes.	Third party short-term continuous monitoring is defined in the appendix and we have updated the definition. It needs to be continuous measurement and follow acceptable methods (in ASSC or EPA promulgated, instrumental methods). The third party system must pass a CGA for the data to be quality assured, and use is limited to short-term (< 720 hours) without certification. If it is used beyond that timeframe, certification would be required (as per Table 4). So no, use of a portable analyzer would not be suitable. In place of certification or RATA, a CGA is required to quality assure the data for the temporary monitoring period.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
8.0-D Please clarify if 'like-kind' refers to measurement technology on short duration replacement installations <720 hrs? (i.e. Thermo iQ, Thermo I, Thermo C, API T-200, API 200E etc…: All are chemiluminescence analyzers using the same operating principles and can be ranged to match the failed instrument).	Clause 8.0-D does not require "like-kind" for third party short-term continuous monitoring. The third party is open to use what analyzer they choose. The requirement is that a CGA must be passed in order to consider the data quality assured for the short time frame. The intent here is to get replacement monitoring up and going fast, and that a CGA is sufficient to assure data quality for a short-term basis. The third party CEMS would need to be certified if used > 720 hours (as per Table 4).
8.0-D Does this mean the third party short-term continuous monitoring system needs to be certified by the 721 hour? If so, 720 hours allowance prior to certification is too short of a time frame. In some situations repair/replacement of an analyzer may take longer than 720 hours and having to certify a CEMS for just over one month's use would be very costly. Recommendation: Increase the allowable third party continuous monitoring for up to 1440 hours before requiring certification.	It means that data is quality assured only for short-term use (defined as 720 hours). If temporary monitoring extends past the 720-hour criteria for "short-term" and certification is required or something else can be put in place as per 8.0-A. If use is extending up to 720 hours the facility could plan for another option (i.e., spare analyzer swap-in) or certify the third-party system. The intent is to get the primary analyzer back in place (or a replacement) as soon as possible, so as to not have to extend temporary monitoring. We've chosen 720 hours as the definition of temporary, after that it is no longer short-term monitoring.
Section 8 states that: "Data from a like-kind spare analyzer or third party short-term continuous monitoring may be conditionally validated with a calibration drift test until a CGA is passed." We appreciate the conditionally valid data provisions as a mechanism to potentially reduce monitor downtime. However, the rule does not clearly define how to implement the conditionally data procedures. Is there a time limit for completing the CGA? If the CGA is failed, then the conditionally failed data is invalidated back to the calibration drift test used to initiate the conditionally valid data period, correct?	Yes that is correct - if the CGA ends up failing you would need to invalidate the data (see 8.0-F). 8.0-B requires that the test be performed within 168 hours. So basically 7 days is worst case for data loss. Added guidance on conditional validation of data. Once a CGA has been successfully passed, the data back to the initial successful zero and span test can be considered quality assured for reporting purposes up to maximum of 168 hours (the timescale to perform the CGA in 8.0-B). Any subsequent checks (i.e., daily zero and span test) following the initial drift check would also need to be within specifications as per 8.0-H for quality assured data.
8.0 Missing Data Estimation	
8.0-A and 9.0-E Request that missing data must be estimated only for mass emissions data. For facilities with predictable operations (like a natural gas fired turbine) reporting emissions concentrations on a ppm limit, the effort to estimate and provide missing hourly concentration averages during normal operations offers minimal value. Given that this data is considered downtime, we don't believe the administrative effort is worthwhile.	Missing data is required to be estimated according to the CEMS User Manual - the User Manual currently specifies only mass emission data estimation methods and reporting of missing mass emissions data. The purpose of estimation is to ensure that all periods of source operation have emissions quantified.
Any data (1-hour, partial hour, average interval, total interval) generated by the DAS that are deemed invalid (not quality assured) are considered missing. Does the term average interval mean that missing data needs to be substituted at the minute level for all missing minutes, or just the reporting average interval (i.e. 1-hour, 3-hour, daily, etc.)?	Guidance has been updated to point back to section 3.4.2, which describes the determination of valid data (needing 75% of the data points within an hour for a valid hour). So no, you would not need to estimate missing minutes. Averaging intervals are defined in that section. No, missing data is estimated at the reporting interval (e.g., hour) not at the data acquisition level.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
8.0-A “For any analyzer that is unable to provide quality assured data while the source is operating, the person responsible must use any combination of the following methods to report emissions data: (a) a redundant backup analyzer which (i) is fully certified, (ii) is stack, duct-or flue-mounted, (iii) continuously records data, and (iv) is operated, maintained and quality assured in the same manner as the primary CEMS; (b) swapping in a like-kind spare analyzer, once a CGA is successfully passed; (c) third party short-term continuous monitoring, once a CGA is successfully passed; (d) a standard reference method for a maximum 14 days; or (e) estimating missing data, limited to a maximum of 168 hours per calendar month for each CEMS, using the methods described in the CEMS User Manual”. Most operators do not usually have a backup CEMS unit on site. It could take several days to have one brought to site depending on how remote the site is. Once a backup unit has been brought on site, the technician will have to be trained on safety procedures before even being able to enter the facility. This can sometimes take 2-3 days which cuts down on the amount of time available to work on the equipment. Additionally, once the technician has been able to inspect the unit and determine the cause of the issue, spare parts may need to be ordered. Sometimes certain parts are not available in Canada and so it can take time to be delivered. Operators do not always have the correct spare parts on hand. Troubleshooting could also be necessary in order to determine which part is required. Often times the technician is not readily available either. For example, some operators working on in-situ sites may have to get in touch with international support and time zones/shift work could delay the process. Between trouble shooting, getting in touch with a technician, safety training the technician, inspecting the issue, and potentially having to order spare parts, 7 days does not provide enough operational flexibility. We recommend extending the timeline for missing data estimation to being permissible for up to 12 days (288 hours), upon Director approval, to facilitate internal approvals and ensure the deployment of a back-up CEMS unit to remote sites.	The revised CEMS Code requires that facilities have contingency plans in place. If back-up monitoring is not put in place, 90% availability requirements are not met, which results in non-compliance which must be reported. Putting temporary replacement monitoring in place reduces or eliminates downtime and is required to avoid contraventions of the availability requirement. This has been added to stop the assumption that facilities can incur large periods of downtime while analyzers are being repaired or replaced. We have already extended the period of allowable missing data estimation from 120 hours to 168 hours. There is, however always the option to request Director authorization to deviate, with rationale provided. The approval requires continuous monitoring and 90% availability is used as the indicator of whether or not continuous CEMS operation is being met. AEP does not think due diligence is followed if these possible issues are known and the facility does not have a contingency plan for monitoring during unforeseen outages. The new Code requires a plan be in place and executed when such outages occur. The facility has the choice of option - the least desirable being contravening the 90% availability requirement.
9.0 Reporting	
9.0 All reporting requirements associated with CEMS should be taken out of the AMD and placed into Chapter 9 of the CEMS Code. The writer understands that AMD stands for Air Monitoring Directive; however, it reads like the Ambient Monitoring Directive. While ambient monitoring and CEMS monitoring share the same operating principles, they have effectively become separate disciplines with AEP's continued efforts and success in pushing ambient monitoring onto airsheds. CEMS monitoring, however, continues to be the domain of facility personnel. It really is unfair to expect facility personnel to switch back and forth between the CEMS Code and the AMD, particularly given the size and heft and difficultly in the AMD.	The AMD is the place where air monitoring reporting requirements are - for both facilities and airsheds. Chapter 9 separates out requirements for facilities and airsheds. Many facilities have both source and ambient monitoring requirements, and therefore may prefer to have all reporting requirements in one place. The reporting forms required under Ch 9 of the AMD include CEMS, but some apply to facilities that do not conduct CEMS monitoring as well. Reporting requirements will remain in the AMD. The CEMS Code adds some additional reporting requirements that are applicable to CEMS data submission. With electronic reporting that was launched with the new air data system in 2019, it was important to ensure consistent reporting practices. The CEMS User Manual continues to be the place for how to electronically submit monthly CEMS data, which did not change with the revisions to the AMD.
Currently our mdf file is pulling the stack top temperature for the U60 CEMS which I replace with the CEMS temperature (about mid stack). For other clients Global is using the stack top temp as the default stack temp reporting criteria. We have a limit on the stack top, which we report on in another form (Sulphur reporting), but the stack top temp is not part of our SO2 CEMS system. For RATA’s the CEMS temperature is only used. For the electronic reporting of CEMS data, I am assuming only those components of the actual CEMS system are reported. Is that your understanding or would you like the stack top temperature in lieu of the CEMS temp for electronic reporting (or both)?	Temperature measured at CEMS level and at stack-top should not markedly differ - but it depends on type of stack (e.g., lined or not). The assumption is that they are the same. If that is not the case, it should be looked at and tracked by the facility. The monitoring plan and QAP need to state where temperature is being measured and what is being reported. Normally it is the CEMS temperature that is reported in the MDF CEMS file, as this data is QA/QC'd by a RATA.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
9.0-G Clarify that 1-hr averages must be reported only for facilities that have Approval requirements for temperature sensors.	We've added this requirement to the Code to ensure consistent CEMS temperature reporting across the province. If temperature is monitoring continuously as part of the CEMS system, temperature is needed to determine mass emissions. The Code now requires that this data be reported with the emissions data.
10.0 PEMS (was Section 1.5 in draft 2)	
Section 1.5-C of the Revised CEMS Code Draft, is understood that a PEMS must be developed as stated within the Alberta's Predictive Emissions Monitoring System (PEMS) Method (DRAFT) and therefore if it doesn't adhere to the Method of Least Squares or Multi-Linear Regression then the PEMS would not be acceptable.	Method has been updated to include non-linear models. Method is now just a guide that is referred to in the Code and the mandatory elements have been brought into the Code.
1.5-D When this clause mentions 'commencement', does this mean that the PEMS Monitoring Plan must be submitted 90 days before the 'installation' of the unit?	(now 10.0-F) No it means that the PEMS plan must be submitted 90 days prior to when the facility plans to begin using it. Clause edited to say "90 days prior to planned commencement of PEMS operation to meet CEMS monitoring requirements in an approval".
1.5-E and 1.5-F mentions validation of the model and validation data. The draft code is not clearly defined what is validation and what is validation dataset. In machine learning practice, the dataset is classified to training data and test data. The training data is used to develop models. In the training dataset, modellers need to create a validate dataset in order select the best model. The methods to create validation dataset can be one-holdout validation or k - fold validation. The modellers can build many models, hundreds to thousands models. The validation dataset is used to select the best model(s) from the hundreds or thousands models. Test dataset is model's unseen data. It indicates model's predictive power and examine if the model selected from the validation is overfitted or not. As the test dataset is model unseen, the results from the test dataset are indicative to the model performance in future. EPA part 75 does not require the model tests using a test dataset, models are simply evaluated using the training data, which is not indicative of model performance, because the model is built on the training data. In common machine learning practice, a test dataset is often used.	(now 10.0-D and 10.0-E) That is true that the EPA does not require a training set and a validation set. We are improving on what the EPA requires. The EPA spec is also not conducive to machine learning and neural nets. We have updated the clauses in the CEMS Code. We want the validation set to be under the same time period that the training (or model) set is from. Yes the data can be randomly selected and one-hold out validation is possible. There are various ways you can do this, but we are requiring that the validation data set be made up of removing at least 30% of the full, model data set. The PEMS Guide will provide guidance on validation procedures. Have used the terms "validation data set" and "training data set".
1.5-G Clarify that a PEMS does or does not qualify for the RATA reduction criteria, given a PEMS will not have a CGA conducted then the reduction criteria should not apply. Ie always 2/yr RATA.	(now 10.0-G) That is correct. A PEMS would not meet the criteria for reduced RATA frequency. One of the conditions of reducing RATA frequency is that a CGA be performed. RATA frequency for PEMS is now prescribed in 10.0-G.
1.5 In the last paragraph of this section (Page 14), 'upon on' must be replaced by 'upon'.	(now 10.0) Agreed. Change made.
Appendices	
Why is there no Appendix illustrating the CGA calculations?	RATA calculations were provided in the 1998 Code and we have made changes to alternatives for the relative accuracy specification, so example calculations are provided. Calculations for linearity are more straight forward.
Appendix A (103) The definition needs to make it clear that this is an uncertified CEMS.	The Code already makes it clear that certification is not required for third party short-term continuous monitoring, and the other temporary monitoring methods listed in 8.0-A. Clause 8.0-H requires that all design, performance specs and QA requirements be met while the temporary monitoring is in place.
Definition (39) Request to update flow analyzer definition to include "detector and or instrument"	Updated definition to make it more generic, and not just related to an "analyzer".
When upgrading an analyzer, if the model changes but the make remains the same (i.e. SICK OMD-41 to a T100 for opacity), is it still considered "like-kind"?	Like-kind is defined in the appendix as "the same type analyzer or device as the primary (i.e., monitors the same parameter by the same measurement principle, make and model)". So in the example you provide, there is a change in model so it is not a like-kind replacement.

Feedback on Draft 2 (Draft 2 Section/Clause)	AEP Response (Final 2021 Code Section/Clause)
Table B.2 Is this only recommended? Having to complete a calibration drift test using EPA Protocol gases for minor replacement/repair is excessive. If this is a requirement the recommendation is to remove it. Facilities that perform daily zero/span checks with certified gases would not have EPA Protocol gases on hand to complete one day of testing as required by this "calibration drift test". Also, having to switch between certified gases and EPA Protocol gases every time routine maintenance is performed is a cause for further system issues.	(now Table C.2) This is suggested, not mandated. It is up to the facility to choose quality control checks that will ensure quality data following minor component replacement (5.3-A) - which is documented in the QAP.
Appendix C di is not defined in below the formula in Page 96 (standard deviation).	(now Appendix D) Added definition for di in standard deviation calculation in appendix to match Equation 6.
Appendix C When calculating the absolute average difference, the equation shows '(-28.60), but this is a positive value.	(now Appendix D) Correction made.
Appendix C The equation to estimate absolute accuracy does not have an Equation Number and the variables in this equation are not defined in Page 100. It is preferable that this equation is provided in the main body of the CEMS Code and that the variables are defined.	(now Appendix D) Removed absolute accuracy alternative performance specification.
Appendix C - Table C.1 The SO2 Diff ppm column in this table must be 13.4, not 13.3.	(now Appendix D - Table D.1) Correction made.
Appendix C Table C.2 is the same as Table 10. Should it be repeated in the CEMS Code?	(now Appendix D - Table D.2) It is provided for ease of use.