

# **AMBIENT AIR QUALITY OBJECTIVES PROJECT REPORT**

April 2021



**CASA**  
Clean Air Strategic Alliance

## About the Clean Air Strategic Alliance

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CASA is a multi-stakeholder partnership. It is composed of representatives selected by industry, government, and non-government organizations to provide strategies to assess and improve air quality for Albertans, using a collaborative consensus process. Every partner is committed to a comprehensive air quality management system for Alberta.

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# Contents

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<b>Acronyms</b> .....	3
<b>Executive Summary</b> .....	5
Recommendation 1 .....	6
Recommendation 2 .....	5
<b>Introduction</b> .....	7
<b>Project Scope and Objectives</b> .....	7
<b>Methodology</b> .....	8
Jurisdictional Review .....	7
Report on Considerations when Discussing Revisions to AAQOs.....	7
Health and Environment Effects.....	7
Regulatory Experts.....	7
AEP Air Quality Model Guideline .....	8
Project Team and CASA Board Process .....	8
<b>Outcomes</b> .....	8
Fine Particulate Matter (PM <sub>2.5</sub> ) .....	8
Ozone (O <sub>3</sub> ) .....	8
Total Reduced Sulphur (TRS) and Hydrogen Sulphide (H <sub>2</sub> S).....	9
Nitrogen Dioxide (NO <sub>2</sub> ).....	9
Sulphur Dioxide (SO <sub>2</sub> ) .....	9
<b>CASA Recommendations</b> .....	9
Prioritization of Substances .....	9
Performance Measure.....	10
Performance Indicator .....	10
<b>Process Evaluation and Lessons Learned</b> .....	10
<b>Conclusion</b> .....	12
<b>Appendix I – Consensus Recommendation for a PM<sub>2.5</sub> AAQO</b> .....	13
<b>Appendix II – Consensus Recommendation for a O<sub>3</sub> AAQO</b> .....	14
<b>Appendix III – Perspectives on a H<sub>2</sub>S AAQO and TRS Guideline</b> .....	15
<b>Appendix IV – Perspectives for NO<sub>2</sub> and SO<sub>2</sub> AAQOs</b> .....	43
<b>Appendix V – Membership Lists</b> .....	70
<b>Appendix VI – Project Charter</b> .....	73

## Acronyms

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AAC	Alberta Airsheds Council
AAF	Alberta Agriculture and Forestry
AAQO	Ambient Air Quality Objective
AAQOSAC	Ambient Air Quality Objectives Stakeholder Advisory Committee
ADM	Assistant Deputy Minister
AEN	Alberta Environmental Network
AENV	Alberta Environment
AEP	Alberta Environment and Parks
AQHI	Air Quality Health Index
AQMG	Air Quality Model Guideline
AWC	Alberta Water Council
BATEA	Best Available Technology (or Treatment) Economically Achievable
BLIERs	Base-level Industrial Emission Requirements
CAAQS	Canadian Ambient Air Quality Standards
CAMS	Comprehensive Air Quality Management System
CAPP	Canadian Association of Petroleum Producers
CCME	Canadian Council of Ministers of the Environment
CEPA	Canadian Environmental Protection Act
EPEA	Alberta <i>Environmental Protection and Enhancement Act</i>
GHG	Greenhouse Gases
GoA	Government of Alberta
H <sub>2</sub> S	Hydrogen sulphide
NO <sub>2</sub>	Nitrogen dioxide
O <sub>3</sub>	Ozone
PM	Project Manager
PM <sub>2.5</sub>	Fine particulate matter
SO <sub>2</sub>	Sulphur dioxide
TRS	Total Reduced Sulphur
WBEA	Wood Buffalo Environmental Association

## Executive Summary

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The CASA Ambient Air Quality Objectives (AAQO) Project Team was established in 2017 following the CASA Board's approval of a statement of opportunity from Alberta Environment and Parks (AEP). The team was tasked with recommending new, revised, or reconfirmed AAQOs, including rationale, for six substances: fine particulate matter (PM<sub>2.5</sub>), ozone (O<sub>3</sub>), total reduced sulphur (TRS) and hydrogen sulphide (H<sub>2</sub>S), nitrogen dioxide (NO<sub>2</sub>), and sulphur dioxide (SO<sub>2</sub>).

For each substance, the team completed jurisdictional reviews, health and environmental scans, and statistical analyses and obtained information and guidance from regulatory experts. The outcomes for the six substances are as follows:

### Fine particulate Matter (PM<sub>2.5</sub>)

Consensus recommendation to revise the current 24-hour PM<sub>2.5</sub> AAQO of 30 µg/m<sup>3</sup> to 29 µg/m<sup>3</sup> as a 24-hour concentration.

### Ozone (O<sub>3</sub>)

Consensus recommendation to revise the current 1-hour daily maximum O<sub>3</sub> AAQO of 160 µg/m<sup>3</sup> (82 ppb) to 150 µg/m<sup>3</sup> (76 ppb).

### Total Reduced Sulphur (TRS) and Hydrogen Sulphide (H<sub>2</sub>S)

CASA reached agreement in the following areas:

- The current 1-hour AAQO for H<sub>2</sub>S is odour-based but is not adequate to address odour.
- The current 24-hour AAQO for H<sub>2</sub>S is protective of health but is not adequate to address odour.
- There is currently an AAQO gap in the management tools available to address odour issues in Alberta. A TRS Guideline could potentially bridge this gap.
- A 30-minute TRS Guideline of 5 ppb would be useful as an odour management tool.

CASA was unable to make a consensus recommendation because of different perspectives on how the TRS Guideline should be applied. The scope of the project was to recommend new, revised, or reconfirmed AAQOs, and this issue was outside the mandate of the project team and proved to be a barrier to achieving full consensus. Perspectives on the issue were submitted by stakeholders.

### Nitrogen Dioxide (NO<sub>2</sub>)

CASA agreed the science supports lowering the Alberta AAQOs for NO<sub>2</sub> from the current levels to levels that are more protective of human and environmental health. However, CASA could not reach agreement on a revised 1-hour or annual NO<sub>2</sub> AAQO due, at least in part, to uncertainty about the impacts of a lower NO<sub>2</sub> AAQO on NO<sub>x</sub> emission modelling and associated emission control requirements on project approval and renewal requirements. Perspectives on the issue were submitted by various stakeholders.

## Sulphur Dioxide (SO<sub>2</sub>)

CASA agreed the science supports lowering the 1-hour Alberta AAQO for SO<sub>2</sub> from the current levels to levels that are more protective of human health. However, the team could not reach agreement on a revised SO<sub>2</sub> AAQO due, at least in part, to uncertainty about the impacts of a lower SO<sub>2</sub> AAQO on SO<sub>2</sub> emission modelling and associated emission control requirements on project approval and renewal requirements. Perspectives on the issue were submitted by stakeholders.

The consensus recommendations and perspectives documents were transmitted to AEP for consideration in its decision-making process for AAQOs and Guidelines.

## Recommendation 1

CASA recommends through a multi-stakeholder project team, undertake a substance prioritization to identify the parameters that should be the focus of the next AAQO review. The following is a possible process for this review:

1. Develop and distribute an overview document from AEP, potentially including substance information and a list of AEP's priorities.
2. Contact sector groups and request the following:
  - a. A shortlist of their priority substances
  - b. Rationale for inclusion of each substance in the next round of AAQO review
  - c. Any suggestions for criteria to evaluate the substances (e.g., new health or environmental effects information, ability to monitor, whether the substance has been included in the previous CASA AAQO review)
3. Combine the information received from each sector into an information package and return the package to sector representatives with adequate time to review.
4. Hold a workshop to discuss the information package and narrow the priority substance list to a final list for inclusion in the next AAQO review process.

## Recommendation 2

CASA has provided the following recommendations for a performance measure and a performance indicator to assess the success of the project:

### Performance Measure

The "Advice for Future Reviews" included in this report are considered during the next AAQO revision process, which would include an assessment of the barriers and challenges faced by the 2017 CASA AAQO Project Team and how these can be addressed so that the next project is completed within the project timeline and the CASA process is followed.

### Performance Indicator

By the end of 2023, the AAQOs for PM<sub>2.5</sub>, O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, and H<sub>2</sub>S have been reviewed and either endorsed as still appropriate or amended (compared to the objectives before the initiation of the 2017 CASA AAQO project), and a TRS Guideline or another tool has been implemented to address the gap in odour management that is not addressed through the H<sub>2</sub>S AAQOs.

## Introduction

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Ambient air quality objectives (AAQOs) are an important part of Alberta's air quality management system that help protect the health of Albertans and the environment. Alberta Environment and Parks (AEP) sets AAQOs for the province under section 14(1) of the *Environmental Protection and Enhancement Act* (EPEA). It is important that objectives be reviewed on a regular basis to confirm that they reflect the latest science and meet the needs of Albertans and that new objectives are established when there is a need.

From 2001 to 2015, AEP worked with a multi-stakeholder committee, the Alberta Ambient Air Quality Objective Stakeholder Advisory Committee (AAQOSAC), to develop and review AAQOs. The committee successfully developed or reviewed 30 objectives in that time. The committee was disbanded in 2015.

At its December 2016 board meeting, the CASA Board of Directors approved a statement of opportunity from AEP for the formation of a CASA AAQO Project Team. The priority substances for review set for the project team were based on the following:

- a recommendation from the previous AAQOSAC that "Alberta Environment (AENV) commit to a further review of the NO<sub>2</sub> ambient air quality objective in 5 years with the goal to a further reduction. The reduction would be based on the science and technology of the time."
- the carry forward of two substances from the previous AAQOSAC work plan, TRS and H<sub>2</sub>S
- the development of Canadian Ambient Air Quality Standards (CAAQS) for PM<sub>2.5</sub>, O<sub>3</sub>, NO<sub>2</sub>, and SO<sub>2</sub>

## Project Scope and Objectives

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The CASA Board tasked the AAQO Project Team with recommending AAQOs based on careful review and consideration of the following:

- scientific information, adverse health, and ecosystem effects specific to the substance
- technological and economic factors

The project objectives, as outlined in the project charter, are as follows:

1. Recommend a new, revised, or reconfirmed AAQO for PM<sub>2.5</sub> by March 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
2. Recommend a new, revised, or reconfirmed AAQO for O<sub>3</sub> by September 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
3. Recommend a new, revised, or reconfirmed AAQO for H<sub>2</sub>S and TRS by December 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
4. Recommend a new, revised, or reconfirmed AAQO for NO<sub>2</sub> by September 2019. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
5. Recommend a new, revised, or reconfirmed AAQO for SO<sub>2</sub> by December 2019. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
6. Provide a final summary report on the team's process and success by March 2020.

With an exception to a change in the timeline, these project objectives guided the project. The team strove to reach consensus recommendations where possible, which were submitted to AEP for consideration in government decision making. Where consensus was not possible, all stakeholders were required to submit perspectives documents on the substance, which were also provided to AEP. The detailed documentation of positions within the perspectives documents was to act as information and context to assist AEP in its decision on the AAQO in question. The project team recognized that AEP has a subsequent review and approval process for proposed AAQOs, and consensus recommendations from CASA could, in some circumstances, not be adopted by AEP.

## Methodology

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Shortly after its creation, the AAQO Project Team struck several sub-groups that were tasked with developing substance-specific draft recommendations and support materials for the project team to consider. The sub-groups used several sources of information for each substance, as described below.

### Jurisdictional Review

Alberta AAQOs for specific substances were compared to criteria, guidelines, objectives, and/or standards for the substance from other jurisdictions, including other provinces and countries. Different averaging times and the basis for the AAQO (if available) were noted and considered in the comparisons.

### Report on Considerations when Discussing Revisions to AAQOs

These reports were developed by AEP staff to be used as one source of information when discussing revisions to the AAQOs. The reports summarized the results of the statistical analysis (linear and logarithmic regressions) used to relate the four CAAQS substances to AAQO values and identify an AAQO that was consistent with each of the CAAQS. The analyses used 15 years of the most recent ambient air data from Alberta monitoring stations. The analyses were done because the short-term CAAQS are statistically based values whereas the AAQO values are averages for their respective averaging times (e.g., 1-hour, 24-hour).

The reports also presented an analysis of how well exceedance or achievement of the AAQO would predict exceedance or achievement of the CAAQS, and the numbers of exceedances of the current AAQO and various potential AAQO values. The statistical analysis did not consider potential interactions with modelling.

### Health and Environment Effects

These reports summarized health and environmental impact information available from recent scientific literature for the specific substance. The primary and preferred information source relied on by the project team were documents prepared by Health Canada and Environment and Climate Change Canada for use in the CAAQS process. They provided information on observed health and environmental effects at different exposure times and exposure levels.

### Regulatory Experts

The project team requested assistance from regulatory experts, as necessary. The experts attended a project team meeting to answer questions from project team members in the following areas:



- how regulators interpret and use model based NO<sub>2</sub> levels when determining emission control requirements
- how discrepancies between model-predicted values and measurement-based values are addressed.
- the proposed revisions to AEP's Air Modelling Guidelines
- the potential to recommend changes to AEP's "Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring" as an option to address concerns
- challenges for industry and AEP/AER with modelling in permit approvals as the AAQOs for NO<sub>2</sub> and SO<sub>2</sub> potentially become more stringent

### AEP Air Quality Model Guideline

As a part of the review of the NO<sub>2</sub> and SO<sub>2</sub> AAQOs, the team members deemed it necessary to see the revised draft AEP Air Quality Model Guideline (AQMG). The AQMG outlines requirements and methods for air quality dispersion modelling in Alberta and references the AAQOs. The team wanted to determine if the proposed revisions to the AQMG would materially impact the discussion regarding the update to the AAQOs for NO<sub>2</sub> and SO<sub>2</sub>. The AQMG was being revised at the time of the NO<sub>2</sub> and SO<sub>2</sub> sub-group work; therefore, the project timeline was adjusted to accommodate release of the draft revised guideline. The project team decided to postpone discussions on NO<sub>2</sub> and SO<sub>2</sub> to await the draft AQMG in October 2019 and resumed these discussions when the draft guideline was available in June 2020. The draft revised guideline provided additional context on modelling requirements and methods, but as outlined in the "Outcomes" section of this report, the project team was not able to achieve consensus on the NO<sub>2</sub> and SO<sub>2</sub> AAQOs.

### Project Team and CASA Board Process

Materials developed by sub-groups were then reviewed and approved by the project team. Consensus recommendations were incorporated into a final substance report and provided to the CASA Board for approval. Once approved by the CASA Board, the substance-specific report was submitted to AEP as advice to inform its decision-making process. Where agreement was not reached, each stakeholder developed a perspectives document outlining the rationale for its proposed AAQO and other positions. The suite of perspectives documents was forwarded to AEP for its consideration following approval by the CASA Board.

## Outcomes

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The project team completed its objective for each substance as outlined below. The documents for each substance that were provided to the Board for decision are found in Appendices I – V.

### Fine Particulate Matter (PM<sub>2.5</sub>)

The project team presented a consensus recommendation on a revised PM<sub>2.5</sub> AAQO to the CASA Board in April 2018. The recommendation was to revise the current 24-hour PM<sub>2.5</sub> AAQO of 30 µg/m<sup>3</sup> to 29 µg/m<sup>3</sup>.

The CASA Board approved the AAQO Project Team's recommendation and transmitted it to AEP in March 2018.

### Ozone (O<sub>3</sub>)

The project team presented a consensus recommendation on a revised O<sub>3</sub> AAQO to the CASA Board in September 2018. The recommendation was to revise the current 1-hour daily maximum O<sub>3</sub> AAQO of 160 µg/m<sup>3</sup> (82 ppb) to 150 µg/m<sup>3</sup> (76 ppb).

The CASA Board approved the AAQO Project Team's recommendation and transmitted it to AEP in September 2018.

### Total Reduced Sulphur (TRS) and Hydrogen Sulphide (H<sub>2</sub>S)

The AAQO Project Team reached agreement in the following areas:

- The current 1-hour AAQO for H<sub>2</sub>S is odour-based but is not adequate to address odour.
- The current 24-hour AAQO for H<sub>2</sub>S is protective of health but is not adequate to address odour.
- There is currently an AAQO gap in the management tools available to address odour issues in Alberta. A TRS Guideline could potentially help bridge this gap.
- A 30-minute TRS Guideline of 5 ppb would be useful as an odour management tool.

The team was unable to make a consensus recommendation because of different perspectives on how the TRS Guideline should be applied. The scope of the project was to recommend new, revised, or reconfirmed AAQOs, and implementation of a guideline was outside the mandate of the project team and proved to be a barrier to achieving full consensus. Perspectives on the issue were submitted by stakeholders.

The CASA Board approved the perspectives documents and transmitted them to AEP in December 2018.

### Nitrogen Dioxide (NO<sub>2</sub>)

The AAQO Project Team agreed that the science supports lowering the Alberta AAQOs for NO<sub>2</sub> from the current levels to levels that are more protective of human and environmental health. However, the team could not reach agreement on a revised 1-hour nor annual NO<sub>2</sub> AAQO due, at least in part, to uncertainty about the impacts of a lower NO<sub>2</sub> AAQO on NO<sub>x</sub> emission modelling and associated emission control requirements on project approval and renewal requirements. Perspectives on the issue were submitted by stakeholders.

The CASA Board approved the perspectives documents and transmitted them to AEP in September 2020.

### Sulphur Dioxide (SO<sub>2</sub>)

The AAQO Project Team agreed that the science supports lowering the 1-hour Alberta AAQO for SO<sub>2</sub> from the current levels to levels that are more protective of human health. However, the team could not reach agreement on a revised SO<sub>2</sub> AAQO due, at least in part, to uncertainty around the impacts of a lower SO<sub>2</sub> AAQO on SO<sub>2</sub> emission modelling and associated emission control requirements on project approval and renewal requirements. Perspectives on the issue were submitted by stakeholders.

The CASA Board approved the perspectives documents and transmitted them to AEP in September 2020.

## **CASA Recommendations**

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CASA made recommendations on prioritization of substances for the next round of AAQO reviews, a performance measure to measure the success of the CASA AAQO process, and a performance indicator for assessment of continuous improvement.

### Prioritization of Substances

CASA recommends through a multi-stakeholder project team, undertake a substance prioritization to identify the parameters that should be the focus of the next AAQO review. The following is a possible process for this review:

1. Develop and distribute an overview document from AEP, including substance information and a list of AEP's priorities.
2. Contact sector groups and request the following:
  - a. a shortlist of their priority substances
  - b. rationale for inclusion of each substance in the next round of AAQO review
  - c. any suggestions for criteria to evaluate the substances (e.g., new health or environmental effects information, ability to monitor, whether the substance has been included in the previous CASA AAQO review)
3. Combine the information received from each sector into an information package and return it to sector representatives with adequate time to review.
4. Hold a workshop to discuss the information package and narrow the priority substance list to a final list for inclusion in the next AAQO review process.

The group that undertakes this process will also need to be aware of the capacity (resources, time, and expertise) for substances to be reviewed in the AAQO project and how many priority substances should be selected. The group will also need to identify a selection process for arriving at final substances. A review of the 2009 prioritization of substances should also be undertaken for lessons learned and for potential evaluation parameters for use in the current process.

#### Performance Measure

The "Advice for Future Reviews" included in this report are considered during the next AAQO revision process, which would include an assessment of the barriers and challenges faced by the 2017 CASA AAQO Project Team and how these can be addressed so that the next project is completed within the project timeline and the CASA process is followed.

#### Performance Indicator

By the end of 2023, the AAQOs for PM<sub>2.5</sub>, O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, and H<sub>2</sub>S have been reviewed and either endorsed as still appropriate or amended (compared to the objectives before the initiation of the 2017 CASA AAQO project) and a TRS Guideline or another tool has been implemented to address the gap in odour management that is not addressed through the H<sub>2</sub>S AAQOs.

## **Process Evaluation and Lessons Learned**

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Following the completion of its review of the five substances, the AAQO Project Team undertook a critical evaluation of the process. The project team discussion focused on the successes and value added through the CASA process and project team, the barriers and challenges that were faced, and how they could be improved for future projects.

### Successes

CASA's multi-stakeholder process allowed team members to gain a common understanding of the AAQOs themselves, how they are used, and how they link with the Canadian Ambient Air Quality Standards (CAAQS) in Alberta's air quality management system. The broad representation on the project team allowed for a well-rounded discussion and provided team members with the opportunity to engage with subject matter experts to discuss the multi-faceted implications of lowered AAQO values.

Some of the project team felt the CASA multi-stakeholder process was a good forum to learn about and discuss perspectives to better inform respective positions in the AAQO review process. There is value in this process continuing for future reviews.

## Challenges

The project team faced challenges in several key areas, including the application of the CASA process, the differences between the purpose and usage of AAQOs and the CAAQS within provincial air quality management, and the project timeline.

CASA Project Teams rely on team members to follow process guidelines to ensure a successful project, whether the outcome is consensus or non-consensus. Throughout the process, there were several instances where member organizations did not follow the CASA process guidelines, resulting in a lack of transparency and loss of trust in team member discussions. The two main areas where this occurred were instances of team members not honouring informal commitments and team members failing to offer alternatives when those proposed by others did not meet their needs.

The different purposes and uses of AAQOs and CAAQS also presented a challenge for team discussions. The CAAQS for PM<sub>2.5</sub>, O<sub>3</sub>, NO<sub>2</sub>, and SO<sub>2</sub> were drivers for the selection of these substances for the current AAQO review because new health information that was used to develop the CAAQS indicated the current AAQOs should be reviewed. Some participants were of the view that the AAQOs and the CAAQS should be broadly consistent, while others questioned whether the CAAQS and the AAQOs should be explicitly linked given their different intended purposes, i.e. the focus of AAQOs on managing current air quality and specific sources of air emissions and the focus of CAAQS on long-term air quality management. These conversations, as well as the process challenges previously listed, were exacerbated by changes in CASA project managers throughout the process.

Lastly, the project experienced several delays and the project extended well beyond the original deadline of December 2019 for substance advice and March 2020 for the final report. Some of these delays were outside CASA's control, such as reduced engagement during the 2019 provincial election and the 2020 COVID-19 pandemic resulting in the team being unable to meet for several months. Some delays were within the team's control, including the decision to pause for 10 months while waiting for the draft of the revised AQMG.

### Advice for Future AAQO Review Processes

The team discussed potential ways to address the challenges they identified and provided the following advice:

- While consensus was not reached on all substances, CASA remains a valuable forum to discuss perspectives and better inform positions. Even if consensus is not sought as a deliverable, multi-stakeholder engagement via CASA should continue.
- Information on the Government of Alberta's perspective on the different uses and purposes of CAAQS and AAQOs was provided early in the process, but more focus is required throughout the project to ensure team members have a common understanding of this issue.
- The team should be aware of any potential mechanisms for flexibility that are available to help them reach consensus, such as making recommendations for modification of documents related to the AAQOs and their implementation (e.g., recommending changes to the "Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring" document).

- The team undertaking the work would benefit from stricter timelines and deadlines for each substance.
- A pre-established range of acceptable values that is already endorsed by senior AEP leadership and provided to the team at the start of discussions on each substance would improve the CASA team's efficiency and improve the probability of consensus.
- A project lead-up time for completion of science assessments, or allocation of resources for any needed literature reviews or data analysis, may increase capacity and the ability of the team to make progress within stricter timelines.
- Where the team is unable to reach consensus on a specific substance, an economic analysis (e.g., industry provides the additional cost of the technology required to meet the new or revised AAQO) would be valuable information to provide to AEP to assist in its decision making. The specifics of what is included in the analysis should be discussed at the initiation of the next AAQO review process.
- A tiered approach should be discussed and decided on for jurisdictional reviews, such that some categories of jurisdictions are given more weight for team discussions than others. For example, a team may decide that standards and how they are applied in Canada are more relevant than those used in other countries or continents.
- If future AAQO reviews are undertaken through CASA, CASA staff should ensure team members honour commitments and provide any alternative views or proposals in a timely manner when points of potential non-consensus are identified.

## Conclusion

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CASA's AAQO Project Team completed the objectives outlined in its project charter, and while not all advice provided to AEP were consensus recommendations, the multi-stakeholder CASA process and forum allowed participants to ensure their views were understood and considered. Some members deem that CASA was a valuable addition to the AAQO review process and may be used in some form going forward. The process was not without its challenges, however, and the team hopes the lessons learned through this project can be used to improve the experience of future AAQO review teams.

# Appendix I – Consensus Recommendation for a PM<sub>2.5</sub> AAQO

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## CASA's Ambient Air Quality Objective Project Team PM<sub>2.5</sub> Advice to the Government of Alberta Backgrounder

### Introduction

In 2016, Alberta Environment and Parks (AEP) asked CASA to convene a multi-stakeholder group to provide advice on setting ambient air quality objectives (AAQOs) for fine particulate matter (PM<sub>2.5</sub>), ozone, nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide and total reduced sulphur. AAQOs are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks (AEP) sets ambient air quality objectives for the province under section 14(1) of the *Environmental Protection and Enhancement Act* (EPEA).

Fine particulate matter (PM<sub>2.5</sub>) refers to airborne solid or liquid particles that are 2.5 microns or less in diameter. It is either emitted directly (primary PM) or formed in the atmosphere (secondary PM) from precursor emissions. Important precursors of secondary PM are nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), ammonia (NH<sub>3</sub>), and volatile organic compounds (VOCs). The chemical composition of PM<sub>2.5</sub> can vary widely and depends on location, time of year, and weather.

### Process

The process for the AAQO Project Team's evaluation of a revised PM<sub>2.5</sub> objective involved the following steps:

1. A jurisdictional review was conducted to compare the Alberta AAQO for PM<sub>2.5</sub> to other jurisdictions, including Canada, Ontario, and the United States EPA. In doing this review, it was noted that different averaging methods exist, and this was considered in the comparison.
2. A statistical evaluation was used to compare the existing 24-hour average AAQO to the Canadian Ambient Air Quality Standards (CAAQS) 24-hour standard, recognizing that the Alberta AAQO is the 24-hour average concentration, whereas the CAAQS calculation is a three-year average of the annual 98<sup>th</sup> percentile of the daily 24-hour average concentrations. It was concluded that Alberta's existing 24-hour average AAQO is already more stringent than the CAAQS and that adding an annual limit would be duplicative to the annual CAAQS requirement.
3. A health and environment scan was created to detail the impacts of PM<sub>2.5</sub> on a continuum.
4. A facilitated discussion was held to define the range of issues and concerns with the proposals under consideration.
5. An examination of a proposal and alternatives was undertaken by the sub-group and Project Team to arrive at a recommendation.

### Recommendation

Revise the current 24-hour PM<sub>2.5</sub> AAQO of 30µg/m<sup>3</sup> to 29µg/m<sup>3</sup> as a 24-hour concentration.

## **Appendix II – Consensus Recommendation for an O<sub>3</sub> AAQO**

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### **CASA's Ambient Air Quality Objective Project Team** Ozone Advice to the Government of Alberta Backgrounder

#### **Introduction**

In 2016, Alberta Environment and Parks (AEP) asked CASA to convene a multi-stakeholder group to provide advice on setting ambient air quality objectives (AAQOs) for fine particulate matter (PM<sub>2.5</sub>), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), and total reduced sulphur. AAQOs are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks sets ambient air quality objectives for the province under section 14(1) of the *Environmental Protection and Enhancement Act*.

Ozone is a highly reactive, colourless gas that is normally present in the troposphere resulting from naturally occurring photochemical and meteorological processes. Ground level ozone is formed through complex chemical reactions between precursor emissions of volatile organic compounds (VOCs) and nitrogen oxides in the presence of heat and sunlight.

#### **Process**

The process for the AAQO Project Team's evaluation of a revised ozone objective involved the following steps:

1. A jurisdictional review was conducted to compare the Alberta AAQO for ozone to other jurisdictions, including Canada, Ontario, and the United States EPA.
2. A statistical evaluation was used to compare the existing 1-hour daily maximum AAQO and a range of options for a revised AAQO to the Canadian Ambient Air Quality Standards (CAAQS) 8-hour standard, recognizing that the Alberta AAQO is the 1-hour daily maximum concentration, whereas the CAAQS calculation is a three-year average of the annual 4<sup>th</sup> highest daily maximum 8-hour concentration.
3. A health and environment scan was created to detail the impacts of ozone on a continuum.
4. A facilitated discussion was held to define the range of issues and concerns with the proposals under consideration.
5. An examination of a proposal and alternatives was undertaken by the sub-group and Project Team to arrive at a recommendation.

#### **Recommendation**

Revise the current 1-hour daily maximum ozone AAQO of 160 µg/m<sup>3</sup> (82 ppb) to 150 µg/m<sup>3</sup> (76 ppb).

# Appendix III – Perspectives on a H<sub>2</sub>S AAQO and TRS Guideline

## CASA's Ambient Air Quality Objective Project Team

Hydrogen Sulphide (H<sub>2</sub>S) and Total Reduced Sulphur (TRS) Advice to the Government of Alberta

### Introduction

In 2016, Alberta Environment and Parks (AEP) asked CASA to convene a multi-stakeholder group to provide advice on setting ambient air quality objectives (AAQOs). AAQOs are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks sets AAQOs for the province under section 14(1) of the *Environmental Protection and Enhancement Act*.

Hydrogen sulphide is a colourless organic gas that has a characteristic rotten egg odour. It is poisonous, corrosive, and flammable. Total reduced sulphur is the total of reduced sulphur compounds, including H<sub>2</sub>S.

The current 1-hour AAQO for H<sub>2</sub>S is 10 ppb (14 µg/m<sup>3</sup>) and the 24-hour AAQO is 3 ppb (4 µg/m<sup>3</sup>). There is currently no AAQO or guideline in place for TRS.

### Process

The process for the AAQO Project Team's evaluation of a revised H<sub>2</sub>S AAQO and potential new TRS guideline involved the following steps:

1. A jurisdictional review of H<sub>2</sub>S and TRS objectives/standards in other jurisdictions was done, including Canada, Ontario, and the United States EPA.
2. A health and environment scan was done to detail the impacts of H<sub>2</sub>S.
3. A facilitated discussion was held to define the range of issues and concerns with the proposals under consideration.
4. An examination of proposals and alternatives was undertaken by the sub-group and reviewed by the Project Team.

### Areas of Agreement

The AAQO Project Team reached consensus in the following areas:

1. The current 24-hour and 1-hour AAQOs for H<sub>2</sub>S are protective of health.
2. The current 24-hour and 1-hour AAQOs for H<sub>2</sub>S are not adequate to address odour.
3. Odour issues in Alberta can be a concern, and there is a gap in the management tools available to address this issue. A TRS Guideline could potentially bridge this gap.
4. A 30-minute TRS Guideline of 5 ppb (7 µg/m<sup>3</sup>) would be useful as an odour management tool.

### Reasons for Non-Consensus

Application of a TRS Guideline was outside the mandate of the AAQO Project Team and was a barrier to full consensus.

Various approaches were discussed with varying levels of support from the Project Team. Perspectives on this issue have been submitted by stakeholders and are appended to this document.



## **Government of Alberta Perspective Document**

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The GoA has been an engaged and transparent participant throughout the substance sub-group processes. GoA's goal was to work collaboratively and attain consensus on the parameters in the work plan. We are pleased that this has occurred with some parameters and metrics. The GoA perspectives documents were written for the sub-groups, Project Team, and CASA Board audience, and not the general public, to provide insight on GoA's interests. As written, they do not contain the full context to inform the general public on how the GoA articulated its interests. It should be noted that AEP remains the designated Director, under Section 14(1) of the *Environmental Protection and Enhancement Act* (EPEA), and even though the perspectives document is not suitable for general public release, it may be utilized to inform the decision on the final AAQOs. GoA's perspectives documents are owned and released at the discretion of AEP. As such, it has been decided that these GoA perspectives should not be included in the Project Team final report.



November 26, 2018

Katie Duffett  
Project Manager  
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#1400, 9915 – 108<sup>th</sup> Street  
Edmonton, AB T5K 2G8

via email: [kduffett@awc-casa.ca](mailto:kduffett@awc-casa.ca)

Dear Ms. Duffett:

**Re: Perspectives document on the creation of a guideline for Total Reduced Sulphur (TRS)**

The Canadian Association of Petroleum Producers (CAPP) represents companies, large and small, that explore for, develop and produce natural gas and oil throughout Canada. CAPP's member companies produce about 80 per cent of Canada's natural gas and oil. CAPP's associate members provide a wide range of services that support the upstream oil and natural gas industry. Together CAPP's members and associate members are an important part of a national industry with revenues from oil and natural gas production of about \$101 billion a year.

The Canadian Fuels Association (Canadian Fuels) is a national association of Canadian refiners and marketers of petroleum products. Our purpose is to serve and represent these sectors of the petroleum industry with respect to environment, health and safety, and business issues. Canadian Fuels supports the alignment and harmonization of practices and regulations that protect human health and the environment, supplemented by appropriate, effective and efficient administration processes for industry and government. There are four petroleum refineries in Alberta operated by Imperial, Shell Canada, Suncor and North West Redwater Partnership, and an asphalt refinery operated by Husky. In addition, our members operate the province's network of primary fuel distribution terminals and a significant portion of the retail and commercial fueling network in Alberta.

We appreciate the opportunity to provide our perspective on the development of a guideline for total reduced sulphur (TRS). We recognize the potential odour that may result from the release of TRS from our industry as well as other industrial, commercial, agricultural, and natural sources. We take this issue seriously as we believe it is directly linked to the public's confidence in our operations. As part of the Clean Air Strategic Alliance's (CASA) multi-stakeholder review of the Alberta Ambient Air Quality Objectives (AAQOs), we worked with our ENGO and Alberta government counterparts to develop an ambitious, but appropriate, guideline for TRS. The

proposed guideline would set a clear standard, in the form of a guideline, for TRS concentrations in residential and recreational areas: areas where it is appropriate to manage odour.

At low concentrations, TRS may not necessarily pose a risk to human health or the environment, but odour is frequently an irritant to the public. Numerous anthropogenic and non-anthropogenic sources can contribute to the concentration of TRS that leads to detectable odours. Oil and gas operations, pulp and paper mills, agricultural operations, sewage treatment facilities, swamps, hot springs, bogs, lakes, and marshes are all sources of measurable TRS emissions.<sup>1</sup> The variety of potential TRS sources and the regional importance of addressing odour in populated areas presents two particular challenges for setting an AAQO for TRS. First, while there is clear value in setting an ambitious target for TRS in populated areas to address odour, applying the same target provincially would place a burden on industry that would not be environmentally or socially justifiable. Second, due to the challenge of attributing a wide variety of sources of any TRS exceedance, it is not appropriate to link exceedances with regulatory compliance.

To address these challenges, stakeholders worked through CASA and achieved a near-consensus proposal that would have set an ambitious threshold of  $7 \mu\text{g m}^{-3}$  (5 ppb) of measurable TRS sustained for 30-minutes. This guideline would provide community reassurance of odour management through a clear trigger for residential and recreational areas. The  $7 \mu\text{g m}^{-3}$  threshold would be one of only a few provincial TRS standards with Ontario notably setting a TRS limit of a ten minute exposure to  $13 \mu\text{g m}^{-3}$  of TRS.<sup>2</sup>

The ambitious nature of the proposed guideline means that it cannot reasonably be associated with regulatory compliance since non-industrial, non-permitted, and non-reported emissions sources such as agriculture have been shown to be capable of exceeding the proposed threshold.<sup>3</sup> A monitored exceedance of the guideline should not be stigmatized as being unlawful by way of triggering a compliance response; sources can vary and regional expectations of odourless air can vary dramatically. Furthermore, if linked to compliance, a threshold established to address residential odour concerns could be applied to remote, uninhabited areas. This would place an unnecessary and unjustified burden on industry and contradict the intent of a standard for TRS: odour management.

Similarly, if a TRS standard is linked to facility compliance, a guideline created for odour management in residential areas could be inappropriately applied during the approvals process.

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<sup>1</sup> <http://airdata.alberta.ca/aepContent/Pollutants/HydrogenSulphide.aspx>

<sup>2</sup> <https://www.ontario.ca/page/ontarios-ambient-air-quality-criteria-sorted-contaminant-name#fn11>

<sup>3</sup> A 2004 study on TRS from agriculture (cattle) showed that TRS levels can easily average 13ppb in and around cattle farms with downwind fence lines regularly experiencing 30-minute concentrations above 100ppb.

<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1003&context=biosysengfacpub>

Koelsch, R. *et al.* Total Reduced Sulfur Concentrations in the Vicinity of Beef Cattle Feedlots *Applied Engineering in Agriculture* University of Nebraska (2004) Vol 20(1) 77-85.

November 26, 2018

Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the creation of a guideline for Total Reduced Sulphur (TRS)

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Without clear direction to the contrary, we are concerned that any guideline would require TRS levels to be modelled as part of the approval process for new development. This poses a major concern for industry as a modelling requirement could restrict project development for reasons disconnected from residential odour concerns. TRS is the combination of all possible reduced sulphur compounds and our industry's contribution can vary dramatically based on the particular oil and gas reservoir. For new development and cases where reservoir composition details are not well-known, conservative estimates will be used for modelling and will inflate predicted TRS concentrations beyond what would be measured.

Conservative estimates, in conjunction with an ambitious emissions standard, create a high likelihood of modelled exceedances. In addition, beyond our industry's contribution, many sources of TRS are non-industrial, non-permitted, and non-reported and as such are exceedingly difficult to model. In cases of uncertainty, models err toward conservatism. Modelling potential TRS odours based on the confluence of extreme events: maximum industry emissions occurring in conjunction with peak potential emissions from agriculture and natural sources during exacerbating meteorological conditions, creates an unreasonable standard for odour management.

Our industry is further concerned that a requirement to link a TRS standard with compliance and modelling will extend the scope of application to the entire province, well beyond residential and recreation areas. This approach would place an inappropriate burden on industry, requiring operators to prevent odours where there are no receptors (people).

An exceedance of the proposed guideline should not be used to determine facility compliance. Instead, the guideline should be used as a regional trigger for consultation, analysis, and action. If the proposed guideline is exceeded in certain areas, we believe regional responses are best equipped to determine the source of odour (from regulated and non-regulated sources) and to determine if a response to any given exceedance is appropriate. The frequency of exceedance will be an important regional consideration as sporadic monitored exceedances may not justify action, especially if they are not accompanied by residential odour complaints. On this basis it is important to stress that an exceedance of the  $7 \mu\text{g m}^{-3}$  guideline cannot be linked to compliance. A monitored exceedance may not result in an odour issue. The frequency, duration, source, and public sentiment will all need to be considered when determining the appropriate regional response to an exceedance of the guideline. An exceedance of the threshold should trigger regional investigation and community dialogue, but not necessarily force a change in industry practice.

Different approaches to odour management were discussed at the CASA table. Our industry's preference is to set a low threshold for odour which is applied through real-world scenarios (measured not modelled). This approach will balance our operational needs with residential concerns of real odour exceedances. A modeled approach will likely result in significant restrictions on industry that are unnecessary for odour management given that there may be no risk to human health or environment.

November 26, 2018

Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the creation of a guideline for Total Reduced Sulphur (TRS)

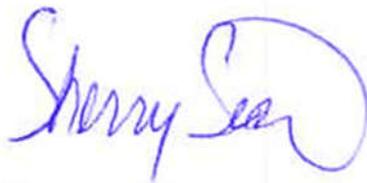
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To implement this standard, the new Ambient Air Quality Guideline for TRS will need to be accompanied by clear language specifying its application and limitations. Our industry continues to recommend adding the standard for TRS to Table 2 “Alberta Ambient Air Quality Guidelines” of the *Alberta Ambient Air Quality Objectives and Guidelines Summary* using the following language:

Parameter	Guideline	Effective
<b>Total Reduced Sulphur (TRS)</b>		
30-minute	7 µg m <sup>-3</sup>	An odour management tool for airshed management in residential and recreational areas; not for assessing facility compliance.

Our industry appreciates the engagement and discussion through CASA and regret that consensus could not be found for the issue. If there are any questions or concerns related to our perspectives as outlined in this document please contact Alison Miller at [alison.f.miller@esso.ca](mailto:alison.f.miller@esso.ca) and Rob Hoffman at [robhoffman@canadianfuels.ca](mailto:robhoffman@canadianfuels.ca) with a cc to Don McCrimmon at [don.mccrimmon@capp.ca](mailto:don.mccrimmon@capp.ca).

Sincerely,



Sherry Sian  
Manager, Environment  
Canadian Association of Petroleum Producers



Rob Hoffman  
Director, Government & Stakeholder Relations  
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# ENGO Perspective and Recommendation on an Ambient Air Quality Objective/Guideline for Total Reduced Sulphur

(November 21, 2018)

## Introduction:

Odour is an important air quality characteristic and issue and is incorporated into the CASA Vision for air quality in the province which is:

*“The air will have no adverse odour, taste or visual impact and have no measurable short or long term adverse effects on people, animals or the environment.”*

The challenge is characterizing and/or quantifying in measurable terms what constitutes “adverse odour”.

In 2013 CASA initiated a Project on odour management that addressed the following issues related to odours:

- Complaints,
- Health,
- Prevention and Mitigation,
- Enforcement/Role of Regulation,
- Education/Communication/Awareness, and
- Continuous Improvement.

The project resulted in a “*Good Practices Guide for Odour Management in Alberta: from Prevention and Mitigation to Assessment and Complaints*” (CASA 2015) (hereafter referred to as “Guide”).

In the “*Regulatory-related Odour Management*” section of the Guide it was noted that:

*“No one approach will apply to all situations or industries and, therefore, some flexibility is critical. Implementing more than one approach is likely beneficial, as it can help deal with a wider variety of situations, giving both facilities and the regulator additional options.”*

The Guide noted that many jurisdictions in the world have ambient concentration criteria for individual odorants and the strengths of this approach were:

- Out of all methods arguably the most quantifiable.
- Odour thresholds are known for many compounds.
- Ambient concentrations can be measured and quantified.
- Concentrations can be predicted with dispersion modelling.

Another regulatory management option for odour identified in the Guide was the use of ambient concentration criteria for odours e.g. odour units, which is also a quantifiable odour measurement tool that is a direct measurement of the level of odours but requires an odour panel.

The current Alberta Ambient Air Quality Objectives (AAAQOs) have objectives for three parameters based on odours. These are ammonia (NH<sub>3</sub>), carbon disulphide (CS<sub>2</sub>) and hydrogen sulphide (H<sub>2</sub>S). The CASA AAQO Project Team was asked to review the current AAAQOs for H<sub>2</sub>S and to consider an odour based AAAQO for TRS. The Team reached consensus recommendations on a 24 hour (health based) and a 1 hour (facility design based) AAAQOs for ambient concentration H<sub>2</sub>S. However, from an ENGO community perspective, the consensus for the 1 hour H<sub>2</sub>S limit of 10 ppb was based on an understanding that a TRS limit would be set which would replace the 1 hour H<sub>2</sub>S limit as an odour management tool which is one of the current uses of the 1 hour limit. As discussed later 10 ppb is much too high an ambient H<sub>2</sub>S level to be an effective odour management tool.

The CASA AAQO Project Team also attempted to develop a strictly odour-based ambient total reduced sulphur (TRS) objective and/or guideline but consensus could not be reached for a number of reasons. Continuous TRS monitors measure all, or nearly all, reduced sulphur compounds (RSCs) present in the ambient air. Since RSCs are responsible for, or contribute to, most air quality odour events, the ENGOS considered that a TRS limit would advance odour management in the province and provide a somewhat integrated measurement of odour potential, impact and management needs which single odorant measurements like H<sub>2</sub>S cannot, and do not, do. The following represents the ENGO perspective on establishing an ambient TRS limits and recommendations on this issue.

### **ENGO Interest:**

As a significant air quality issue in Alberta, there is a need for Alberta to develop a more formal and effective provincial approach for managing odours. This was one of the objectives of the CASA Odour Project and the development of *“Good Practices Guide for Odour Management in Alberta: from Prevention and Mitigation to Assessment and Complaints”* (CASA 2015). The ENGO community wants to have a meaningful role in developing a provincial odour management approach. Such a provincial approach will require the development and use of some quantifiable measure(s) of odour. While not a perfect measure of odours or odorants, TRS represents a quantifiable measure of an important class of odorants i.e. RSCs, and as such it represents an ambient air quality measurement that, in conjunction with other odour management approaches, would assist in understanding and more effectively addressing odour issues in Alberta. ENGOS would therefore like to see the AAAQOs include an objective or guideline for TRS.

### **Context:**

There are a number of factors which collectively indicate that there is a need for AEP to set an ambient objective or guideline for TRS. These are:

1. **Current ambient TRS Monitoring:** There are a number of continuous air monitoring stations in Alberta which monitor for TRS (see attached Table 1) and yet there is no air quality objective or guideline to assess whether or not the TRS levels measured at these stations are representative of acceptable air quality and/or dictate that some follow-up odour based air quality management actions are required.

2. **TRS versus H<sub>2</sub>S as an Odorant Parameter:** H<sub>2</sub>S is often used as a surrogate for TRS levels but as odour studies by the AER in Peace River and Fort McKay have clearly indicated there are many reduced sulphur compounds that contribute to odours and H<sub>2</sub>S measurement is therefore not a good indicator of potential odour impacts. This issue is discussed on the Odotech website (<http://www.odotech.com/en/h2s-monitoring-finally-merged-odor-monitoring/>) which notes that:

*“It is well known that, in several industrial sectors, H<sub>2</sub>S (hydrogen sulphide – rotten egg odor) is the contributor to odors, with a perception threshold as low as 0.4 ppb. Because of this, it was convenient in the past to base on H<sub>2</sub>S several environmental performance requirements and regulations. However, it has been scientifically demonstrated over the last decade that H<sub>2</sub>S is only partially responsible for the odors perceived offsite. Monitoring H<sub>2</sub>S for odor problems may lead to underestimations of the odor intensity or completely missing the contribution of other odorous compounds (VOCs, ammonia & amines, other sulfurous compounds, etc.).”*

Another more comprehensive measure of ambient odorant levels is therefore desirable.

3. **Use of the Current H<sub>2</sub>S Objectives:** As noted above, H<sub>2</sub>S is not likely to be the only odorant contributing to odours as noted above. In addition to this issue, the current reliance on the existing AAAQO for H<sub>2</sub>S as the best (a good) indicator of ambient air quality levels of odour is inappropriate because the current hourly ambient air quality objective for H<sub>2</sub>S is 10 ppb for a 1 hour period whereas the odour threshold for H<sub>2</sub>S is 0.41 ppb (Nagata 2003) and odour perception occurs almost immediately upon exposure i.e. in seconds (CASA 2015).

AEP (2017) indicates that the AAAQOs are used:

- *to determine adequacy of facility design;*
- *to establish required stack heights and other release conditions; and*
- *to assess compliance and evaluate facility performance.*

As an industrial H<sub>2</sub>S emissions management assessment tool and as an air quality at industrial fencelines criteria the current 1 hour H<sub>2</sub>S objective has application and relevance. However, for odour management in residential or recreational areas, a shorter term and lower H<sub>2</sub>S ambient objective would be required to minimize odour issues but as noted above there is a need for a parameter that addresses other odorants and TRS provides such a measurement.

4. **A TRS Objective or a TRS Guideline?** The issue of whether or not a TRS limit should be an objective or guideline was discussed at length by the CASA H<sub>2</sub>S/TRS Sub-group. AEP indicated that an objective should apply in all locations of the province. There was general agreement by Sub-group that a TRS limit was intended to address areas where odour was an issue which did not include industrial areas or industry fencelines that were distant from residential or public

use areas. On this basis a TRS guideline was considered more appropriate than an objective. AEP (2017) indicates that a guideline is to be used:

- *for airshed planning and management;*
- *as a general performance indicator; and*
- *to assess local concerns.*

These uses are consistent with intent of a TRS limit.

Industry was concerned that, despite the above stated uses of a guideline, a TRS guideline might be used for assessing industry performance and compliance and requested some qualifying wording in any TRS guideline confirming that the TRS guideline would not be used to assess industry performance. The Government rejected such a qualifier on the basis that it did not want to unnecessarily restrict the application of the guideline and that the current guideline use criteria addressed industry's concern.

The ENGO community has no objection to the proposed guideline with qualifying wording as proposed by industry and if consensus can be achieved on the proposal then the qualifying wording is supported. However the ENGO community believes the qualifiers are not necessary as the current criteria for AAAQO guideline use clearly indicate that guidelines are not intended to be used to assess industry performance as this is the clearly stated purpose of objectives. A TRS limit is to address odour issues which are by their very nature are a "*local concern*". Nevertheless, a TRS guideline may in certain circumstances result in an assessment of general industry performance and the requirement for additional emissions management. Such a situation would arise only if an odour issue has been identified. Such an issue could in part be defined and/or qualified by a TRS guideline. Requirements for control action, would not be driven solely by a TRS reading above the guideline, in contrast to an exceedance of an objective.

5. ***TRS Limits and Averaging Times:*** The WHO (2000) has a H<sub>2</sub>S ambient air criteria based on odour nuisance/annoyance that is:

*"In order to avoid substantial complaints about odour annoyance among the exposed population, hydrogen sulfide concentrations should not be allowed to exceed 7 µg/m<sup>3</sup>, with a 30-minute averaging period."*

New Zealand has a similar guideline for H<sub>2</sub>S except the averaging period is 1 hour i.e. 7 µg/m<sup>3</sup> (1-hour average). The guideline notes:

*"Unlike other guideline values, the value for hydrogen sulphide (H<sub>2</sub>S) is based on preventing odour annoyance and the resulting impacts on well-being rather than specific health effects."*

A recent study by the Bay of Plenty Regional Council in New Zealand conducted an in depth review of the odour properties of H<sub>2</sub>S including extensive olfactometry testing to determine the

odour threshold for H<sub>2</sub>S (Bay of Plenty Regional Council 2012). The report confirmed that the odour threshold for H<sub>2</sub>S is in the range of 0.35 to 0.8 ppb and noted that:

*“... using the threshold determined in this investigation the acceptable low sensitivity receiving environment values would only be in the order of 3.5 to 7 µg/m<sup>3</sup>...”*

The review of ambient air quality criteria related to H<sub>2</sub>S and TRS in other jurisdictions conducted by the CASA H<sub>2</sub>S/TRS Sub-group found that:

- 30 minutes is the most common shorter term i.e. less than 1 hour, averaging time for odorant parameters with the other averaging periods being: 3 minutes; 4 minutes; and 10 minutes.
- Ambient air quality criteria for H<sub>2</sub>S limits for different odorant sources e.g. feedlots, kraft mills, wastewater treatment plants, vary significantly between jurisdictions i.e. 6 µg/m<sup>3</sup> (4.3 ppb) to 108 µg/m<sup>3</sup> (78 ppb).
- In terms of TRS limits, Ontario was the only jurisdiction found that had a non-industry specific source odour based ambient air quality TRS limit which is 13 µg/m<sup>3</sup> (9.3 ppb) based on a 10 minute averaging time. It should be noted that this Ontario's TRS standard is based on a consideration of only 4 reduced sulphur compounds i.e. dimethyl disulphide, dimethyl sulphide, hydrogen sulphide and methyl mercaptan. Also the odour thresholds used by Ontario to set its TRS limit are considered to be too high based on Nagata (2003).

This information provides context for setting a shorter time period (i.e. less than 1 hour) ambient TRS limit for odour management.

6. **TRS Limit Setting Considerations:** There is an issue regarding how to set a TRS limit that has general application since the range of odour thresholds of the RSC that are measured by TRS span several orders of magnitude e.g. 55 ppb for carbonyl sulphide, 0.41 ppb for H<sub>2</sub>S and 0.0068 ppb for isopropyl mercaptan (Nagata 2003). The odour threshold is the level at which 50% of population would be expected to detect the presence of an odour but it is at the recognition threshold that the character and pleasantness or unpleasantness of the odour becomes noticeable. Table 2 shows the ratio of the odour threshold to the recognition threshold for a number of RSC. These values were taken from a New Zealand Review of Odour Management Report (New Zealand Ministry for the Environment 2002). They are presented to illustrate that, based on recognition thresholds, a TRS limit of 1 to 5 ppb would appear to be appropriate in that it would provide an indication of odorant levels that are not only detectable but also recognizable and as such produce a response that depending on the character and offensiveness of the odour result in annoyance and possible complaints. Some of the odour thresholds noted in Table 2 are much higher than those noted by Nagata (2003). The report also notes that:

*“The detection and recognition thresholds can change markedly from these levels if several odorants are present in a mixture and act synergistically to produce either a greater or lesser-perceived odour strength than their individual components.”*

Therefore while the recognition thresholds in Table 2 provide some guidance on what an appropriate TRS limit might be, it is clear that the response to mixtures of different odorants is difficult to predict and it is only through the application of a TRS limit in different situations that will determine whether or not it is a useful odour management tool and what represents an the appropriate TRS limit.

7. **Issues considered by the CASA H<sub>2</sub>S/TRS Sub-group:** The CASA H<sub>2</sub>S/TRS Sub-group discussed in detail all aspects of setting a TRS guideline or objective limit which included:
- a. TRS versus H<sub>2</sub>S monitoring methods and the limitations of current monitoring methods,
  - b. The health effects of H<sub>2</sub>S and how these effects could or couldn't be applied to TRS measurements,
  - c. How H<sub>2</sub>S and TRS levels were or might be related,
  - d. What stations monitored for TRS and what stations monitored for H<sub>2</sub>S and how it was decided which parameter should be monitored at a particular location,
  - e. Odour based H<sub>2</sub>S and/or TRS ambient criteria in other jurisdictions including averaging period and where and how the criteria was applied e.g. for modelling purposes, at specific locations e.g. feedlots, etc.
  - f. The difference between guidelines and objectives in terms of use and exceedance reporting requirements with reporting requirements of particular interest to airsheds and the possible follow-up reporting/assessment requirements of particular interest to industry, and
  - g. The number of exceedances of different levels at stations monitoring for TRS.

Work on H<sub>2</sub>S/TRS objectives started in May 2017 and went through to October 24, 2018. There were some concerns raised late in the process regarding the science behind the proposed TRS limit. While there are challenges in setting a TRS guideline or objective there is clearly sufficient scientific data and understanding, as well as jurisdictional precedence, to set a TRS guideline or objective. Scientific assessment of the validity and application of a particular TRS limit is best obtained by setting a limit and evaluating it in real odour situations. In the end there was consensus reached on the numerical guideline value for a TRS limit i.e. 7 µg/m<sup>3</sup> (5 ppb) based on a 30 minute average but not on the guidance/qualifiers that should accompany the guideline so a consensus on a TRS guideline was not reached.

#### **ENGO Position/Recommendation:**

From the work of the CASA H<sub>2</sub>S/TRS Sub-group, and the work in the development of the CASA *'Good Practices Guide for Odour Management in Alberta: from Prevention and Mitigation to Assessment and Complaints'*, ENGOs conclude that there is a clear need for the establishment of an odour based provincial ambient air quality limit for TRS and that sufficient information and knowledge exists to establish such an ambient TRS limit. While ENGOs support the TRS limit value that had consensus, since a consensus recommendation could not be reached the ENGO community would like AEP to give consideration to a lower limit. From information in other jurisdictions, a 10 to 30 minute guideline in the range of 2.5 to 5 ppb represents an odour

management level that would have public credibility based on stringency relative to those jurisdictions and would provide a good degree of protection against annoyance level odour issues. ENGOs support/recommend that any TRS limit be a guideline based on the uses of guidelines versus objectives as outlined in the AAAQO summary document.

The following is the form of a TRS Guideline that the ENGOs recommend:

Parameter	Guideline	Effective
<b>Total Reduced Sulphur (TRS)</b>		
10, 15 or 30-minutes	Between 2.8 µg m <sup>-3</sup> to 7 µg m <sup>-3</sup> (2 ppb to 5 ppb)	To be used for odour management where odour affects people 2019

Since odours are a sensory based response to air quality, it is only through “*real world*” application and experience that a chemical measurement odour management tool like a TRS objective or guideline can be evaluated. Therefore, whatever TRS objective or guideline is established, it should be reviewed in 5 years and revised as necessary based on the experience and understanding gained over the 5 years. It is also recommended that in the application of any TRS objective or guideline a program should be established to evaluate its relevance as an indicator of odour levels in different odour issue situations. This evaluation should include comparison with olfactometry odour measurement and detailed air quality characterization during odour events.

**Possible non-consensus on the 1 hour H<sub>2</sub>S AAAQO.** AEP has indicated that, since consensus could not be obtained on the qualifiers around how the agreed to TRS limit would or should be applied, that AEP may not set a TRS limit as part of the current AAAQO updating/revision work. If AEP does not set a TRS limit it indicated that it would then likely be requesting a review of the current 1 hour H<sub>2</sub>S objective in the next AAAQO review. The ENGO community believes that there is a strong need for a TRS limit to help manage odour issues. Such a limit could be part of the provincial odour management policy that the Government is currently developing. The ENGO community believes that such a policy is absolutely necessary.

If a TRS limit is not set somewhere to aid in odour management then it is likely the 10 ppm 1-hr H<sub>2</sub>S objective will de facto continue to be the air quality odour management tool. This is unacceptable to the ENGO community. The current consensus agreement that has been reached on the 10 ppm 1-hr H<sub>2</sub>S objective is valid for emissions management not odour management. ENGOs withdraw support for this number if it is to be used for odour management in public areas. The ENGO community considers the 1-hr H<sub>2</sub>S objective and a shorter period TRS guideline as an essential package for the management of reduced sulphur- related air quality issues in the province.

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**Table 1: Continuous Air Monitoring Stations in Alberta that Monitored for Total Reduced Sulphur in 2017**

Station Name
Anzac
Barge Landing
Bentley-Town
Bertha Ganter - Fort McKay
Caroline
Cold Lake South
Conklin
Evergreen Park
Fort Hills
Fort McKay South
Fort McMurray-Athabasca Valley
Fort McMurray-Patricia McInnes
Grande Prairie (Henry Pirker)
Harmattan 2
Hinton
Horizon
Janvier
Lancaster
Nordegg
PRAMP_842
PRAMP_986
PRAMP_Reno
Red Deer Range Road 272
Rycroft - Portable
Smoky Heights
South McDougal Flats
Stony Mountain
Three Hills (Portable)

**Table 2: Comparison of Odour Threshold and Recognition Threshold Values for a Number of Reduced Sulphur Compounds (New Zealand Ministry for the Environment 2002)**

<b>Reduced Sulphur Compound</b>	<b>Odour Threshold (OT) (ppb)</b>	<b>Recognition Threshold (RT) (ppb)</b>
<b>Allyl mercaptan</b>	<b>0.1</b>	<b>1.5</b>
<b>Benzyl mercaptan</b>	<b>0.2</b>	<b>2.6</b>
<b>Dimethyl sulfide</b>	<b>1</b>	<b>1</b>
<b>Diphenyl sulfide</b>	<b>0.1</b>	<b>2.1</b>
<b>Ethyl mercaptan</b>	<b>0.3</b>	<b>1</b>
<b>Hydrogen sulfide</b>	<b>0.5</b>	<b>4.7</b>
<b>Methyl mercaptan</b>	<b>0.5</b>	<b>1</b>
<b>Phenyl mercaptan</b>	<b>0.3</b>	<b>1.5</b>
<b>Propyl mercaptan</b>	<b>0.5</b>	<b>20</b>

## Agriculture Industry Perspective on TRS Guideline

The agriculture industry participated in the H<sub>2</sub>S/TRS Subgroup under the Ambient Air Quality Objectives (AAQOs) Project Team. This subgroup worked to develop a TRS guideline that could be used as a management tool to address odour issues. The agriculture industry understands the importance of addressing odour issues, but will not support a 30 minute TRS guideline of 5 ppb unless the guideline clearly states that it will only be used in residential or recreational areas where people might be adversely affected by odours, it will not be used for facility compliance, and it will not be applied at facility boundaries or at monitoring stations not located in residential or recreational areas.

The agriculture industry recognizes that section 116(2) of the *Environmental Protection and Enhancement Act* exempts agricultural operations following generally accepted practices from environmental protection orders regarding odour. However, this exemption from regulatory action provides no protection for the industry from the public trust issues that would arise from agricultural operations being out of compliance with a TRS guideline. We strongly believe that agricultural operations following generally accepted practices should be in compliance with AAQOs and guidelines. We will not support a guideline where the application of the guideline could put agricultural operations following generally accepted practice out of compliance. This would have an unacceptable impact on the social license of our industry.

Respectfully submitted by

Rich Smith  
Agriculture Industry Representative  
CASA Board of Directors



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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[wbea.org](http://wbea.org)

November 27, 2018

Katherine Duffett  
Clean Air Strategic Alliance & Alberta Water Council  
#1400, 9915-108<sup>th</sup> Street  
Edmonton AB T5K 2G8

### **RE: WBEA Perspective on CASA Sub-Group Proposed 30-minute TRS Guideline**

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A document was requested from members of the Clean Air Strategic Alliance (CASA) Total Reduced Sulphur (TRS)/Hydrogen Sulphide (H<sub>2</sub>S) sub-group of their perspectives on the proposed 30-minute TRS guideline. The following document was authored by the Wood Buffalo Environmental Association, and endorsed by the following Alberta airsheds:

Alberta Capital Airshed  
Calgary Region Airshed Zone  
Lakeland Industry and Community Association  
Palliser Airshed Society  
Parkland Airshed Management Zone  
Peace River Area Monitoring Committee  
West Central Airshed Society

If you have any questions or concerns regarding the document, please contact the undersigned at (780) 799-4420.

Regards,

Sanjay Prasad  
Executive Director  
Wood Buffalo Environmental Association



## WBEA Perspective on Proposed Total Reduced Sulphur Guideline

### Background

The Clean Air Strategic Alliance (CASA) created a multi-stakeholder sub-group to discuss the addition of a total reduced sulphur (TRS) guideline to the Ambient Air Quality Guidelines. The World Health Organization (WHO) hydrogen sulphide (H<sub>2</sub>S) guideline for avoiding odour annoyances of 5 ppb within a 30-minute averaging period (WHO Regional Office for Europe, 2000) is being considered as the guideline for TRS in Alberta. The sub-group reached a non-consensus on the proposed guideline, and this document serves to represent the view of the Wood Buffalo Environmental Association (WBEA) airshed.

The WBEA is requesting clarification on the issues that currently exist with the application and reporting of the Alberta Ambient Air Quality Objectives and Guidelines, and more clarity on how a TRS guideline would be practically implemented, prior to supporting the adoption of a TRS guideline for odours in Alberta.

### Current Issues with the reporting the Alberta Ambient Air Quality Objective and Guidelines

In the Alberta Ambient Air Quality Objective and Guidelines Summary (Government of Alberta, 2018), the Alberta Ambient Air Quality Objectives and the Alberta Ambient Air Quality Guidelines are explicitly referenced as different standards. The Summary document outlines that the Objectives are used to determine adequacy of facility design, to establish required stack heights and other release conditions, and to assess compliance and evaluate facility performance. Alternatively, the Guidelines may be used for airshed planning and management, as a general performance indicator, and to assess local concerns. It also states that, “all industrial facilities must be designed and operated such that the ambient air quality remains below Ambient Air Quality Objectives,” and that, “exceedances of ambient air quality objectives must be reported.” However, in Chapter 1 of the Alberta Air Monitoring Directive (AMD), the definition of AAAQO “means Alberta Ambient Air Quality Objectives and Guidelines, as listed in the Alberta Ambient Air Quality Objectives and Guidelines Summary” (Government of Alberta, 2016). The incongruity of this definition has led to confusion within Alberta airsheds.

The WBEA does not currently report exceedances of the Guidelines, as the Summary document does not state that the Guidelines should be reported or that they are required for compliance purposes. However, Chapter 9 of the AMD comes into effect on January 1, 2019. In Chapter 9, Clauses RC 4-A/RC 14-A (Industrial Exceedance/Alberta Airshed Exceedance) state, “The person responsible must immediately report to the Director any monitoring results that show ambient air concentrations exceeding the AAAQOs” (Government of Alberta, 2016). Since AAAQO is defined in the AMD as including both Objectives and Guidelines, to be in compliance with the AMD, the impression is airsheds will be required to report exceedances of both the Objectives and the Guidelines—though the Guidelines are not defined in the Summary document for compliance monitoring purposes. If the Objectives and the Guidelines are to be applied in the same manner, it is uncertain as to why the two different standards exist. However, if they are not the same standard, as would be suggested by how they both are outlined in the Summary document, this should be reflected in the AMD, and only exceedances of Objectives should be reported.



An additional complication is the timeframe in which exceedances are to be reported. As noted previously, Clauses RC 4-A and 14-A of Chapter 9 states that, “exceedances must be immediately reported to the Director,” however, the term “immediately” is not defined in the AMD. One statement in the AMD seems to attempt clarification by stating, “In clauses RC 14-A through RC 14-F, immediate constitutes due diligence. For example, reporting an AAAQO exceedance once it becomes known. This does not require 24-7 or ‘on-call’ reporting by Alberta airsheds.” However, this statement is not applied to Clause RC 4-A (Industrial Exceedance) which leads to a different expectation depending on the type of station, as well as confusion for the airsheds that operate and report both Industrial Compliance stations and Community Stations. This lack of clarity has led airsheds to adopt individual definitions of immediately – while the WBEA reports within the hour, some airsheds only report during business hours, and there are varying criteria depending on the air parameter or station type being reported.

### 30-minute TRS Guideline

As stated previously, the WBEA supports a creation of a guideline for TRS to be used for odour. However, the WBEA believes there are significant outstanding questions related to the 30-minute TRS guideline application, reporting, and follow-up which need to be answered prior to a guideline being implemented.

If Guidelines must be reported as of January 2019, there must be guidance on who is responsible for the subsequent 7-day letter, as required by “A Guide to Release Reporting” (Alberta Environment, 2000), in the event of an exceedance of the TRS guideline. As Guidelines are not for industrial compliance, the WBEA has the following questions: Would industry members be required to submit the 7-day letter, or would that be the responsibility of the airshed? What would the reporting requirement be if the guideline exceedance occurred at a Community station? Most airsheds in Alberta do not have the capacity or technical expertise to perform an industrial investigation to determine the cause of a release.

Additionally, some Environmental Protection and Enhancement Act industrial approvals already require TRS ambient air monitoring. This TRS monitoring is conservatively reported against the Objective for H<sub>2</sub>S, as no Objective currently exists for TRS. If a Guideline for TRS is created for odour monitoring purposes, clarification for the application of the standard to TRS monitors is required, especially when the purpose of the monitors was industrial compliance. Direction will also be required for reporting against both the Objective for H<sub>2</sub>S and the Guideline for TRS.

The proposed 30-minute averaging time for the Guideline is also a concern as all current airshed infrastructures support 1-hour and 24-hour averaging periods. It would require substantial cost and effort for airsheds to re-configure their data collection systems to calculate 30-minute concentrations for the purpose of reporting the TRS guideline. Additionally, clear direction is needed in the event of two 30-minute TRS Guideline exceedances and a 1-hour H<sub>2</sub>S Objective exceedance. Will all three be required to be reported, or does the Objective exceedance supersede the Guideline exceedances?

Finally, in Peace River and the Regional Municipality of Wood Buffalo, there are existing odour reporting protocols, created by the Alberta Energy Regulator. The WBEA is seeking clarification as to whether this protocol will be integrated with the TRS guideline or remain separate.



## Conclusion

One of the findings from the Recurrent Human Health Complaints Technical Information Synthesis (Alberta Energy Regulator and Alberta Health, 2016) was the lack of regulatory consistency in the Fort McKay area in terms of regulatory approvals and operating conditions. The development of the proposed TRS guideline has highlighted the confusion regarding the implementation of the Alberta Ambient Air Quality Objectives and Guidelines, as well the differences in airshed reporting protocols. The WBEA believes this is an excellent opportunity to remedy the outstanding issues, and ensure explicit information is disseminated around the adoption of a TRS guideline to make certain that it is applied consistently throughout the province.



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November 29, 2018

Katie Duffett, Project Manager  
Clean Air Strategic Alliance  
#1400, 9915 – 108<sup>th</sup> Street  
Edmonton, AB T5K 2G8

Dear Ms. Duffett:

Re: Perspective document on a guideline for Total Reduced Sulphur

Alberta Pacific Forest Ind. (Al-Pac) and the Peace River Pulp Division of Daishowa-Marubeni International Ltd. (PRP) are the two largest Kraft pulp mills in Alberta. We produce both hard wood and softwood Kraft pulp, biomass based energy and bio-methanol as part of our individual operations. Together we directly and indirectly employ over 1800 people. Al-Pac and PRP are not members of the Alberta Forest Products Association (AFPA) and are thus submitting our own perspective. We unfortunately did not become aware of the Clean Air Strategic Alliance (CASA) Ambient Air Quality Objective work on Total Reduced Sulphur until October 30, 2018; therefore, we have not participated in the working group. Going forward, we welcome the opportunity to take part in the CASA working groups for nitrogen dioxide (NO<sub>2</sub>) and sulphur dioxide (SO<sub>2</sub>).

Al-Pac and PRP have read the Canadian Association of Petroleum Producers (CAPP) perspective on this issue (attached) and have the same concerns they have expressed. We are in agreement that to “implement this standard, the new Ambient Air Quality Guideline for TRS will need to be accompanied by clear language specifying its application and limitations” (CAAP, 2018). We agree with the language proposed by CAAP.

If there are any questions concerning this perspective please contact Jamie Percy at [jamie.percy@alpac.ca](mailto:jamie.percy@alpac.ca).

Sincerely,

A handwritten signature in blue ink, appearing to read "Jamie Percy".

Jamie Percy, P.Eng.  
Technical Business Unit Leader  
Alberta-Pacific Forest Industries Inc.

A handwritten signature in black ink, appearing to read "T. Tarpey".

T. Tarpey M.Eng.  
Environmental Manager  
DMI - Peace River Pulp

***Alberta-Pacific Forest Industries Inc.***

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November 26, 2018

Katie Duffett  
Project Manager  
Clean Air Strategic Alliance  
#1400, 9915 – 108<sup>th</sup> Street  
Edmonton, AB T5K 2G8

via email: [kduffett@awc-casa.ca](mailto:kduffett@awc-casa.ca)

Dear Ms. Duffett:

**Re: Perspectives document on the creation of a guideline for Total Reduced Sulphur (TRS)**

The Canadian Association of Petroleum Producers (CAPP) represents companies, large and small, that explore for, develop and produce natural gas and oil throughout Canada. CAPP's member companies produce about 80 per cent of Canada's natural gas and oil. CAPP's associate members provide a wide range of services that support the upstream oil and natural gas industry. Together CAPP's members and associate members are an important part of a national industry with revenues from oil and natural gas production of about \$101 billion a year.

The Canadian Fuels Association (Canadian Fuels) is a national association of Canadian refiners and marketers of petroleum products. Our purpose is to serve and represent these sectors of the petroleum industry with respect to environment, health and safety, and business issues. Canadian Fuels supports the alignment and harmonization of practices and regulations that protect human health and the environment, supplemented by appropriate, effective and efficient administration processes for industry and government. There are four petroleum refineries in Alberta operated by Imperial, Shell Canada, Suncor and North West Redwater Partnership, and an asphalt refinery operated by Husky. In addition, our members operate the province's network of primary fuel distribution terminals and a significant portion of the retail and commercial fueling network in Alberta.

We appreciate the opportunity to provide our perspective on the development of a guideline for total reduced sulphur (TRS). We recognize the potential odour that may result from the release of TRS from our industry as well as other industrial, commercial, agricultural, and natural sources. We take this issue seriously as we believe it is directly linked to the public's confidence in our operations. As part of the Clean Air Strategic Alliance's (CASA) multi-stakeholder review of the Alberta Ambient Air Quality Objectives (AAQOs), we worked with our ENGO and Alberta government counterparts to develop an ambitious, but appropriate, guideline for TRS. The

November 26, 2018

Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the creation of a guideline for Total Reduced Sulphur (TRS)

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proposed guideline would set a clear standard, in the form of a guideline, for TRS concentrations in residential and recreational areas: areas where it is appropriate to manage odour.

At low concentrations, TRS may not necessarily pose a risk to human health or the environment, but odour is frequently an irritant to the public. Numerous anthropogenic and non-anthropogenic sources can contribute to the concentration of TRS that leads to detectable odours. Oil and gas operations, pulp and paper mills, agricultural operations, sewage treatment facilities, swamps, hot springs, bogs, lakes, and marshes are all sources of measurable TRS emissions.<sup>1</sup> The variety of potential TRS sources and the regional importance of addressing odour in populated areas presents two particular challenges for setting an AAQO for TRS. First, while there is clear value in setting an ambitious target for TRS in populated areas to address odour, applying the same target provincially would place a burden on industry that would not be environmentally or socially justifiable. Second, due to the challenge of attributing a wide variety of sources of any TRS exceedance, it is not appropriate to link exceedances with regulatory compliance.

To address these challenges, stakeholders worked through CASA and achieved a near-consensus proposal that would have set an ambitious threshold of  $7 \mu\text{g m}^{-3}$  (5 ppb) of measurable TRS sustained for 30-minutes. This guideline would provide community reassurance of odour management through a clear trigger for residential and recreational areas. The  $7 \mu\text{g m}^{-3}$  threshold would be one of only a few provincial TRS standards with Ontario notably setting a TRS limit of a ten minute exposure to  $13 \mu\text{g m}^{-3}$  of TRS.<sup>2</sup>

The ambitious nature of the proposed guideline means that it cannot reasonably be associated with regulatory compliance since non-industrial, non-permitted, and non-reported emissions sources such as agriculture have been shown to be capable of exceeding the proposed threshold.<sup>3</sup> A monitored exceedance of the guideline should not be stigmatized as being unlawful by way of triggering a compliance response; sources can vary and regional expectations of odourless air can vary dramatically. Furthermore, if linked to compliance, a threshold established to address residential odour concerns could be applied to remote, uninhabited areas. This would place an unnecessary and unjustified burden on industry and contradict the intent of a standard for TRS: odour management.

Similarly, if a TRS standard is linked to facility compliance, a guideline created for odour management in residential areas could be inappropriately applied during the approvals process.

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<sup>1</sup> <http://airdata.alberta.ca/aepContent/Pollutants/HydrogenSulphide.aspx>

<sup>2</sup> <https://www.ontario.ca/page/ontarios-ambient-air-quality-criteria-sorted-contaminant-name#fn11>

<sup>3</sup> A 2004 study on TRS from agriculture (cattle) showed that TRS levels can easily average 13ppb in and around cattle farms with downwind fence lines regularly experiencing 30-minute concentrations above 100ppb.

<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1003&context=biosysengfacpub>

Koelsch, R. *et al.* Total Reduced Sulfur Concentrations in the Vicinity of Beef Cattle Feedlots *Applied Engineering in Agriculture* University of Nebraska (2004) Vol 20(1) 77-85.

Without clear direction to the contrary, we are concerned that any guideline would require TRS levels to be modelled as part of the approval process for new development. This poses a major concern for industry as a modelling requirement could restrict project development for reasons disconnected from residential odour concerns. TRS is the combination of all possible reduced sulphur compounds and our industry's contribution can vary dramatically based on the particular oil and gas reservoir. For new development and cases where reservoir composition details are not well-known, conservative estimates will be used for modelling and will inflate predicted TRS concentrations beyond what would be measured.

Conservative estimates, in conjunction with an ambitious emissions standard, create a high likelihood of modelled exceedances. In addition, beyond our industry's contribution, many sources of TRS are non-industrial, non-permitted, and non-reported and as such are exceedingly difficult to model. In cases of uncertainty, models err toward conservatism. Modelling potential TRS odours based on the confluence of extreme events: maximum industry emissions occurring in conjunction with peak potential emissions from agriculture and natural sources during exacerbating meteorological conditions, creates an unreasonable standard for odour management.

Our industry is further concerned that a requirement to link a TRS standard with compliance and modelling will extend the scope of application to the entire province, well beyond residential and recreation areas. This approach would place an inappropriate burden on industry, requiring operators to prevent odours where there are no receptors (people).

An exceedance of the proposed guideline should not be used to determine facility compliance. Instead, the guideline should be used as a regional trigger for consultation, analysis, and action. If the proposed guideline is exceeded in certain areas, we believe regional responses are best equipped to determine the source of odour (from regulated and non-regulated sources) and to determine if a response to any given exceedance is appropriate. The frequency of exceedance will be an important regional consideration as sporadic monitored exceedances may not justify action, especially if they are not accompanied by residential odour complaints. On this basis it is important to stress that an exceedance of the  $7 \mu\text{g m}^{-3}$  guideline cannot be linked to compliance. A monitored exceedance may not result in an odour issue. The frequency, duration, source, and public sentiment will all need to be considered when determining the appropriate regional response to an exceedance of the guideline. An exceedance of the threshold should trigger regional investigation and community dialogue, but not necessarily force a change in industry practice.

Different approaches to odour management were discussed at the CASA table. Our industry's preference is to set a low threshold for odour which is applied through real-world scenarios (measured not modelled). This approach will balance our operational needs with residential concerns of real odour exceedances. A modeled approach will likely result in significant restrictions on industry that are unnecessary for odour management given that there may be no risk to human health or environment.

November 26, 2018

Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the creation of a guideline for Total Reduced Sulphur (TRS)

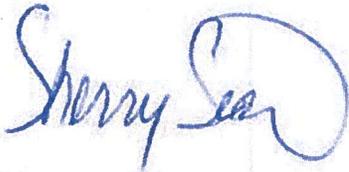
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To implement this standard, the new Ambient Air Quality Guideline for TRS will need to be accompanied by clear language specifying its application and limitations. Our industry continues to recommend adding the standard for TRS to Table 2 “Alberta Ambient Air Quality Guidelines” of the *Alberta Ambient Air Quality Objectives and Guidelines Summary* using the following language:

Parameter	Guideline	Effective
<b>Total Reduced Sulphur (TRS)</b>		
30-minute	7 µg m <sup>-3</sup>	An odour management tool for airshed management in residential and recreational areas; not for assessing facility compliance.

Our industry appreciates the engagement and discussion through CASA and regret that consensus could not be found for the issue. If there are any questions or concerns related to our perspectives as outlined in this document please contact Alison Miller at [alison.f.miller@esso.ca](mailto:alison.f.miller@esso.ca) and Rob Hoffman at [robhoffman@canadianfuels.ca](mailto:robhoffman@canadianfuels.ca) with a cc to Don McCrimmon at [don.mccrimmon@capp.ca](mailto:don.mccrimmon@capp.ca).

Sincerely,



Sherry Sian  
Manager, Environment  
Canadian Association of Petroleum Producers



Rob Hoffman  
Director, Government & Stakeholder Relations  
Canadian Fuels Association

December 6, 2018

Clean Air Strategic Alliance  
1400, 9915 108<sup>th</sup> Street  
Edmonton Alberta

Attention: Katie Duffett

Re: Recommendation to Government of Alberta on Total Reduced Sulphur Guideline.

Dear Katie:

On behalf of AFPA member companies, I am writing to express our concern with the recommendation of a guideline for Total Reduced Sulphur.

The Pulp and Paper industry currently has a limit for H<sub>2</sub>S emissions, derived from the measurement of TRS, that are at times challenging to meet. A reduction of the TRS guideline will force companies into a non-compliance situation which is not acceptable to the industry. These facilities are sophisticated manufacturing plants that cannot simply reduce one aspect of emissions by tweaking one component of the plant.

Several years ago, CASA had a project team (Odour Management Team 2012- 2015) that developed guidelines and best practices for the management of odours.

The "Good Practices Guide for Odour Management in Alberta" remains a very relevant and comprehensive document for odour management for industry in the province and many industrial facilities have adopted some or all of the recommendations.

The AFPA is of the opinion that we would rather see more widespread adoption of the Best Practices document and avoid creating a regulatory guideline that will be challenging to meet.

We have also reviewed the perspectives document from CAPP and the Canadian Fuels Association and are in agreement with their perspective.

Regards



Keith Murray  
Director, Industry/Government Relations  
Alberta Forest products Association.

## Appendix IV – Perspectives for NO<sub>2</sub> and SO<sub>2</sub> AAQOs

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### CASA's Ambient Air Quality Objective Project Team Nitrogen Dioxide (NO<sub>2</sub>) Advice to the Government of Alberta

#### Introduction

In 2016, Alberta Environment and Parks (AEP) asked CASA to convene a multi-stakeholder group to provide advice on setting ambient air quality objectives (AAQOs). AAQOs are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks sets AAQOs for the province under section 14(1) of the *Environmental Protection and Enhancement Act*.

Nitrogen Dioxide occurs naturally in the environment due to forest fires, lightning discharges, and biogenic oxidation of nitrogen containing compounds in soil. It is a reddish-orange-brown gas with an irritating, acrid, characteristic pungent odour.<sup>1</sup>

Industry is the largest point and non-point source of NO<sub>x</sub> emissions in Alberta, accounting for 70% of total anthropogenic emissions. Transportation is the second largest source of NO<sub>x</sub> emissions in Alberta, representing 23% of anthropogenic emissions.<sup>2</sup> The location of the emissions also needs to be considered. In urban areas, transportation has a greater impact on air quality due to the combination of ground level emissions from vehicles and their predominance in higher population areas.

The current 1-hour average AAQO for NO<sub>2</sub> is 300 µg/m<sup>3</sup> (159 ppb) and is based on respiratory effects. The annual average AAQO for NO<sub>2</sub> is 45 µg/m<sup>3</sup> (24 ppb) and is based on vegetation.

#### Process

The process for the AAQO Project Team's evaluation of a revised NO<sub>2</sub> AAQO involved the following steps:

1. A jurisdictional review of NO<sub>2</sub> objectives/standards in other jurisdictions was done, including but not limited to Canada, Ontario, and the United States EPA.
2. A health and environment scan was done to detail the impacts of NO<sub>2</sub>.
3. Regulatory experts were invited to a team meeting to answer questions on the implications of a proposed revised NO<sub>2</sub> AAQO.
4. A facilitated discussion was held to define the range of issues and concerns with the proposals under consideration.
5. An examination of proposals and alternatives was undertaken by the sub-group and reviewed by the Project Team.

#### Areas of Consensus

The AAQO Project Team agreed the science supports lowering the Alberta AAQOs for Nitrogen Dioxide from the current levels to be more protective of human and environmental health.

#### Areas of Non-Consensus

The AAQO Project Team could not reach agreement on a revised 1-hour or annual NO<sub>2</sub> AAQO due to uncertainty around modelling requirements for project approvals and renewals and the impact of a lowered NO<sub>2</sub> AAQO on that process.

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<sup>1</sup> <https://open.alberta.ca/dataset/836cdc25-935a-426b-8f95-d89506679ff1/resource/c6c530d5-c03a-4d8d-932f-b3198eaaff48/download/2011-aaqo-nitrogendioxide-jun2011.pdf>

<sup>2</sup> <https://pollution-waste.canada.ca/air-emission-inventory/>

Various approaches were discussed with varying levels of support from the Project Team. Perspectives on this issue have been submitted by stakeholders and are appended to this document.



# **CASA's Ambient Air Quality Objective Project Team Sulphur Dioxide (SO<sub>2</sub>) Advice to the Government of Alberta**

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## **Introduction**

In 2016, Alberta Environment and Parks (AEP) asked CASA to convene a multi-stakeholder group to provide advice on setting ambient air quality objectives (AAQOs). AAQOs are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks sets AAQOs for the province under section 14(1) of the *Environmental Protection and Enhancement Act*.

Sulphur Dioxide is a colourless, non-flammable gas with a sharp, pungent odour. Human activities that lead to the release of SO<sub>2</sub> are fossil fuel combustion, petroleum refining, and smelting sulphide ores.<sup>3</sup>

The current AAQOs for SO<sub>2</sub> are:

- 1-hour average: 450 µg/m<sup>3</sup> (172 ppb) based on pulmonary effects
- 24-hour average: 125 µg/m<sup>3</sup> (48 ppb) based on human health
- 30-day average: 30 µg/m<sup>3</sup> (11 ppb)
- annual average: 20 µg/m<sup>3</sup> (8 ppb) adopted from the European Union, which is based on ecosystem protection

## **Process**

The process for the AAQO Project Team's evaluation of a revised SO<sub>2</sub> AAQO involved the following steps:

1. A jurisdictional review of SO<sub>2</sub> objectives/standards in other jurisdictions was done, including but not limited to Canada, Ontario, and the United States EPA.
2. A health and environment scan was done to detail the impacts of SO<sub>2</sub>.
3. Regulatory experts were invited to a team meeting to answer questions on the implications of a proposed revised SO<sub>2</sub> AAQO.
4. A facilitated discussion was held to define the range of issues and concerns with the proposals under consideration.
5. An examination of proposals and alternatives was undertaken by the sub-group and reviewed by the Project Team.

## **Areas of Consensus**

The AAQO Project Team agreed the science supports lowering the 1-hour Alberta AAQO for Sulphur Dioxide from the current levels to be more protective of human health.

## **Areas of Non-Consensus**

The AAQO Project Team could not reach agreement on revised SO<sub>2</sub> AAQOs due to uncertainty around modelling requirements for project approvals and renewals and the impact of a lowered SO<sub>2</sub> AAQO on that process.

Various approaches were discussed with varying levels of support from the Project Team. Perspectives on this issue have been submitted by stakeholders and are appended to this document.

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<sup>3</sup> <https://open.alberta.ca/dataset/f7925f51-1395-4c95-9a2d-dc4a339ddd8/resource/657df534-14dd-424f-9d80-90daf715e8e3/download/2011-aaqo-sulphurdioxide-feb2011.pdf>

## Government of Alberta Perspective Document

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The GoA has been an engaged and transparent participant throughout the substance sub-group processes. GoA's goal was to work collaboratively and attain consensus on the parameters in the work plan. We are pleased that this has occurred with some parameters and metrics. The GoA perspectives documents were written for the sub-groups, Project Team and CASA Board audience, and not the general public, to provide insight on GoA's interests. As written, they do not contain the full context to inform the general public on how the GoA articulated its interests. It should be noted that AEP remains the designated Director, under Section 14(1) of the *Environmental Protection and Enhancement Act* (EPEA), and even though the perspectives document is not suitable for general public release, it may be utilized to inform the decision on the final AAQOs. GoA's perspectives documents are owned and released at the discretion of AEP. As such, it has been decided that these GoA perspectives should not be included in the Project Team final report.

# ENGO Perspective and Recommendation on Ambient Air Quality Objectives for Nitrogen Dioxide

## Introduction

Alberta's environmental non-government organizations (ENGOS) as represented through the Alberta Environmental Network (AEN) share a broad vision of *"a healthy, sustainable Alberta."* AEN member organizations have been part of the Clean Air Strategic Alliance since its inception, collaborating in the development of CASA's vision that *"the air will have no adverse odour, taste, or visual impact and have no measurable short- or long-term adverse effects on people, animals, or the environment"* and CASA's three air quality management goals: (1) protect the environment by preventing short and long-term adverse effects on people, animals and the ecosystem; (2) optimize economic efficiency; (3) promote pollution prevention and continuous improvement. Applied to the setting of ambient air quality objectives, these goals signify that revised objectives should be protective, attainable and progressive.

## Background

Canada's Air Quality Management System provides a comprehensive approach for collaborative actions to improve air quality across Canada to further protect the health of Canadians and the environment. Among the key elements of this system are Canadian Ambient Air Quality Standards (CAAQS), which are based on protecting human health and the environment and are to provide the drivers for air quality improvement across the country. CAAQS are not *"pollute-up-to levels"*, especially as some pollutants can affect human health even at concentrations lower than the standards. They also encourage actions that prevent deterioration in air quality, promote continuous improvement (CI), and encourage keeping clean areas clean (KCAC) in air zones with pollutant levels well below the CAAQS (CCME 2019).

Federal, provincial and territorial governments work together to develop CAAQS through a consensus-based process with industry stakeholders, non-governmental health and environmental organizations, and Indigenous organizations. CAAQS are designed to become increasingly more stringent over time and are periodically reviewed to ensure continuous improvement to further protect the health of Canadians and the environment (CCME 2019).

CAAQS were not developed as facility level regulatory standards. CAAQS are intended to be used in air zones as standards to guide air zone management actions for the reduction of ambient concentrations below the CAAQS and prevent CAAQS exceedances (CCME 2019).

In contrast, the Alberta Ambient Air Quality Objectives (AAAQOs) are used to determine adequacy of facility design, to establish required stack heights and other release conditions, and to assess compliance and evaluate facility performance. The AAAQOs are also compared to actual air quality measurements to report on the current air quality through the Air Quality Health Index (GoA 2017). These two uses of AAAQOs can result in a situation where an AAAQO is met yet the AQHI indicates very poor air quality. For example, the current 1-hour AAAQO for NO<sub>2</sub> of 159 ppb represents, by itself, an AQHI of ~14 which indicates very poor air quality.

The difference in metrics makes conversion from CAAQS to AAAQOs a challenging problem. The CAAQS hourly metric for NO<sub>2</sub> is the 3-year average of the annual 98th percentile of the daily-maximum 1-hour average concentrations. The AAAQO metric is a 1-h concentration not to be exceeded.

### ENGO Recommendation

There needs to be consistency between the CAAQS limits for NO<sub>2</sub> and the AAAQO limits for NO<sub>2</sub>. Alberta Environment and Parks used a log transformation regression analysis to derive a predictive relationship between CAAQS values and 1-h average concentrations of nitrogen dioxide (AEP 2019). For Alberta to achieve the 1-h average 2020 CAAQS for nitrogen dioxide requires an AAAQO of 79 ppb and to achieve the 1-h average 2025 CAAQS for nitrogen dioxide requires an AAAQO of 58 ppb.

The CAAQS have been determined through a multi-stakeholder process that considered health and environmental protection as well as achievability. ENGOs are comfortable adopting an AAAQO derived from the CAAQS through AEP’s regression analysis.

Monitoring data show that the annual CAAQS number for nitrogen dioxide is achievable. ENGOs recommend an annual AAAQO that is the same as the annual CAAQS, 17 ppb for 2020 and 12 ppb for 2025.

Revising the AAAQOs for nitrogen dioxide to the numbers given above will maximize Alberta’s ability to meet the Canadian Ambient Air Quality Standards and minimize adverse effects on environment and health.

ENGOs recognize that Industry has some concerns about the implementation of revised AAAQOs, particularly with respect to likely over-prediction by the air quality models used in the approvals process. Alberta Environment and Parks have both the modelling guideline (AEP 2020) and an interpretation document (AESRD 2013) to address these concerns outside of the objective-setting process. ENGOs do not think this modelling issue should be a barrier to improving ambient objectives. The use of AAAQOs as an air quality indicator in the Province requires that the AAAQOs for NO<sub>2</sub> be generally consistent with the CAAQS.

The ambient air quality objectives for nitrogen dioxide recommended by Alberta ENGOs are summarized in the following table:

Averaging Period	ppbv		Basis
	2020	2025	
1-hour	79	58	Consistent with CAAQS 2020 (60 ppb) and 2025 (42 ppb) using a log transformation regression analysis
Annual	17	12	Same as CAAQS 2020 and 2025 values

## References

Alberta Environment and Parks. 2020. Draft Air Quality Model Guideline

Alberta Environment and Parks. 2019. Considerations when Discussing Revisions to the Alberta Ambient Air Quality Objective for Nitrogen Dioxide. Prepared for the CASA Ambient Air Objectives Project Team

Alberta Environment and Sustainable Resource Development. 2013. Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring

Canadian Council of Ministers of the Environment. 2019. Guidance Document on Air Zone Management. PN 1593 ISBN 978-1-77202-050-2 PDF

Government of Alberta. 2017. Alberta Ambient Air Quality Objectives and Guidelines Summary. Alberta Environment and Parks, Air Policy, 2016, No. 2

# ENGO Perspective and Recommendation on Ambient Air Quality Objectives for Sulphur Dioxide

## Introduction

Alberta's environmental non-government organizations (ENGOS) as represented through the Alberta Environmental Network (AEN) share a broad vision of *"a healthy, sustainable Alberta."* AEN member organizations have been part of the Clean Air Strategic Alliance since its inception, collaborating in the development of CASA's vision that *"the air will have no adverse odour, taste, or visual impact and have no measurable short- or long-term adverse effects on people, animals, or the environment"* and CASA's three air quality management goals: (1) protect the environment by preventing short and long-term adverse effects on people, animals and the ecosystem; (2) optimize economic efficiency; (3) promote pollution prevention and continuous improvement. Applied to the setting of ambient air quality objectives, these goals signify that revised objectives should be protective, attainable and progressive.

## Background

Canada's Air Quality Management System provides a comprehensive approach for collaborative actions to improve air quality across Canada to further protect the health of Canadians and the environment. Among the key elements of this system are Canadian Ambient Air Quality Standards (CAAQS), which are based on protecting human health and the environment and are to provide the drivers for air quality improvement across the country. CAAQS are not *"pollute-up-to levels"*, especially as some pollutants can affect human health even at concentrations lower than the standards. They also encourage actions that prevent deterioration in air quality, promote continuous improvement (CI), and encourage keeping clean areas clean (KCAC) in air zones with pollutant levels well below the CAAQS (CCME 2019).

Federal, provincial and territorial governments work together to develop CAAQS through a consensus-based process with industry stakeholders, non-governmental health and environmental organizations, and Indigenous organizations. CAAQS are designed to become increasingly more stringent over time and are periodically reviewed to ensure continuous improvement to further protect the health of Canadians and the environment (CCME 2019).

CAAQS were not developed as facility level regulatory standards. CAAQS are intended to be used in air zones as standards to guide air zone management actions for the reduction of ambient concentrations below the CAAQS and prevent CAAQS exceedances (CCME 2019).

In contrast, the Alberta Ambient Air Quality Objectives (AAAQOs) are used to determine adequacy of facility design, to establish required stack heights and other release conditions, and to assess compliance and evaluate facility performance. The AAAQOs are also compared to actual air quality measurements to report on the current air quality through the Air Quality Health Index (GoA 2017).

The difference in metrics makes conversion from CAAQS to AAAQOs a challenging problem. The CAAQS hourly metric for SO<sub>2</sub> is the 3-year average of the annual 99th percentile of the daily-maximum 1-hour average concentrations. The AAAQO metric is a 1-h concentration not to be exceeded.

## ENGO Recommendation

There needs to be consistency between the CAAQS limits for SO<sub>2</sub> and the AAAQO limits for SO<sub>2</sub>. Alberta Environment and Parks used historical sulphur dioxide monitoring data to determine how well various potential objectives would predict achievement of CAAQS. The True Positive Rate analysis for the 2020 sulphur dioxide CAAQS reached 100% at an AAAQO value of 94 ppb.

The CAAQS have been determined through a multi-stakeholder process that considered health and environmental protection as well as achievability. ENGOs are comfortable adopting an AAAQO derived from the CAAQS through AEP's comparability analysis.

Monitoring data show that the annual CAAQS number for sulphur dioxide is easily achievable. ENGOs recommend an annual AAAQO that is the same as the annual CAAQS, 5 ppb for 2020 and 4 ppb for 2025.

For 24-hour averages the World Health Organization (2005) has published a guideline value of 20 µg/m<sup>3</sup> (8 ppb at 25 C and 1013 mb) based on hospital admissions and mortality. However, in recognition of the difficulty of reaching such a low concentration, WHO provided an Interim Target (IT-2) of 50 µg/m<sup>3</sup> (19 ppb). Alberta ENGOs recommend that Alberta move toward this interim number by adopting 30 ppb for 2020 and 20 ppb for 2025.

The longer 30-day average is for the protection of the environment. The World Health Organization (2000) reported that critical levels for the protection of lichens, forests, natural vegetation and agricultural crops range from 10 to 30 µg/m<sup>3</sup> (4 - 11 ppb) as long term averages. Alberta ENGOs recommend that Alberta adopt 10 ppb as a 30-day average for the protection of vegetation.

Revising the AAAQOs for sulphur dioxide to the numbers given above will maximize Alberta's ability to meet the Canadian Ambient Air Quality Standards and minimize adverse effects on environment and health.

ENGOs recognize that Industry has some concerns about the implementation of revised AAAQOs, particularly with respect to likely over-prediction by the air quality models used in the approvals process. Alberta Environment and Parks have both the modelling guideline (AEP 2020) and an interpretation document (AESRD 2013) to address these concerns outside of the objective-setting process. ENGOs do not think this modelling issue should be a barrier to improving ambient objectives. The use of AAAQOs as an air quality indicator in the Province requires that the AAAQOs for SO<sub>2</sub> be generally consistent with the CAAQS.

The ambient air quality objectives for sulphur dioxide recommended by Alberta ENGOs are summarized in the following table:

Averaging Period	ppbv		Basis
	2020	2025	
1-hour	94	94	Consistent with CAAQS 2020 (70 ppb) using a True Positive Rate analysis.
24-hour	30	20	WHO Interim Target-2 (50 µg/m <sup>3</sup> =19 ppb at 25C and 1013 mb).
30-day	10	10	European critical levels for protection of vegetation
Annual	5	4	Same as CAAQS 2020 and CAAQS 2025 values

## References

Alberta Environment and Parks. 2020. Draft Air Quality Model Guideline

Alberta Environment and Parks. 2019. Considerations when Discussing Revisions to the Alberta Ambient Air Quality Objective for Sulphur Dioxide. Prepared for the CASA Ambient Air Objectives Project Team

Alberta Environment and Sustainable Resource Development. 2013. Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring.

Canadian Council of Ministers of the Environment. 2019. Guidance Document on Air Zone Management. PN 1593 ISBN 978-1-77202-050-2 PDF

Government of Alberta. 2017. Alberta Ambient Air Quality Objectives and Guidelines Summary. Alberta Environment and Parks, Air Policy, 2016, No. 2.

World Health Organization. 2005. Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. Global update 2005. Summary of risk assessment.

World Health Organization. 2000. Air Quality Guidelines for Europe. 2<sup>nd</sup> edition

August 26, 2020

Ms. Katie Duffett  
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via email: [kduffett@awc-casa.ca](mailto:kduffett@awc-casa.ca)

Dear Ms. Duffett:

**Re: Perspectives document on the update of Alberta Ambient Air Quality Objectives for nitrogen dioxide and sulphur dioxide**

The Canadian Association of Petroleum Producers (CAPP) represents companies, large and small, that explore for, develop and produce natural gas and oil throughout Canada. CAPP's member companies produce about 80 per cent of Canada's natural gas and oil. CAPP's associate members provide a wide range of services that support the upstream oil and natural gas industry. Together CAPP's members and associate members are an important part of a national industry with revenues from oil and natural gas production of about \$109 billion a year.

The Alberta Forest Products Association (AFPA) represents member forest companies operating and investing in Alberta. The AFPA supports its member companies in conducting their activities in an environmentally and socially acceptable manner. Alberta's forest industry supports 20,000 direct jobs and creates thousands of spin-off jobs through our economic activity. The industry supports \$7 billion in economic activity. At a time when Alberta's economy has been severely damaged forestry has helped to mitigate the harm by providing steady jobs in communities throughout the province.

We appreciate the opportunity to provide our perspective on the Clean Air Strategic Alliance (CASA) discussions regarding updating the Alberta Ambient Air Quality Objectives (AAQOs) for nitrogen dioxide (NO<sub>2</sub>) and sulphur dioxide (SO<sub>2</sub>). CAPP, AFPA, and our members recognize the important role that these objectives play in protecting Alberta's environment and the health of Albertans. We also acknowledge the complex relationship that the AAQOs have with the Canadian Ambient Air Quality Standard (CAAQS). With new CAAQS taking effect in 2020 for NO<sub>2</sub> and SO<sub>2</sub>, it is necessary for Alberta to review the ongoing suitability of the AAQOs.

*Intended purpose of the CAAQS and AAQOs*

In 2016, partly as a result of the then pending 2020 CAAQS, AEP requested that CASA review the AAQOs for NO<sub>2</sub> and SO<sub>2</sub> recommend AAQOs in consideration of scientific information as well as technological and economic factors. As the NO<sub>2</sub> and SO<sub>2</sub> CAAQS represent air quality targets which are more ambitious than

August 26, 2020

Ms. Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the update of Alberta Ambient Air Quality Objectives for nitrogen dioxide and sulphur dioxide

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the current AAQOs, it is reasonable to consider whether or not the AAQOs should be updated to support federal-provincial alignment. However, simply aligning the AAQOs with the CAAQS will create significant challenges in the province: the CAAQS were designed to apply to one specific aspect of air quality management whereas the AAQOs apply to multiple criteria for managing air quality, including regulatory permitting.

The CAAQS were designed as a driver for air quality improvement and as a standard to be applied to ambient air quality monitoring. They apply at remote monitoring stations which may not be directly impacted by industrial facilities' emissions and at community stations.<sup>1</sup> The CAAQS are not compliance standards and were set with an expectation that they may not be achieved in all areas of the country at the time of implementation.<sup>2</sup> The CAAQS are not intended to be applied at fence-line monitoring stations<sup>3</sup> or for facility regulatory permitting including facility approvals/renewals.<sup>4</sup> This is a critical point as modelled and fence-line NO<sub>2</sub> and SO<sub>2</sub> concentrations can be higher than ambient levels. It is also reasonable and expected as modelled air quality can be elevated due to modelling uncertainty and conservatism and fence-line emissions may be elevated above ambient levels due to their proximity to emissions sources.

The CAAQS were established with recognition that modelled, fence-line, and ambient air quality should not be addressed by a single air quality standard as these three air quality criteria should not be expected to be equal to one another. CAAQS assessment and modelling intentionally excluded data from multiple Alberta industrial fence-line stations, such as Mannix and Lower Camp, due their not being indicative of, or a point of reference for, ambient air quality.

In contrast to the CAAQS, the AAQOs are compliance standards which apply to ambient air quality stations, facility fence-line stations, and are used in air quality modelling for facility approvals and renewals. The use of a single air quality metric in Alberta for three different applications necessitates a compromise as an ideal numerical metric for one application will be sub-optimal for the others. An AAQO intended to manage CAAQS achievement in Alberta at ambient stations will result in exceedances in models and at fence-line monitors due to their routinely higher levels of NO<sub>2</sub> and SO<sub>2</sub>.

On this basis, we agree with the other members of the industry caucus that it is inappropriate and unnecessary to align the AAQOs with the CAAQS, either directly or through an extrapolation to convert the CAAQS' 3-year percentile metric to the AAQO's 1-hour threshold. The AAQOs have multiple applications and should be set higher than the CAAQS to account for modelling conservatism and fence-line monitors. This approach would not create a gap in ambient air quality management as the CAAQS will apply in Alberta, in parallel with the AAQOs, as a purpose-built metric for ambient air quality monitoring.

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<sup>1</sup> Canadian Council of Ministers of the Environment (CCME), "Ambient Air Monitoring and Quality Assurance/Quality Control Guidelines (AMQAQCG), 2019, page 30, Section 7.2.3 "Site Types".

<sup>2</sup> CAAQS Development and Review Working Group discussions and confidential documentation shared among the working group (including CAPP and AEP).

<sup>3</sup> CCME, "AAMQAQCG" page 31: "Fence-line monitoring stations are not reported [to determine CAAQS]".

<sup>4</sup> CCME, "Guidance Document on Air Zone Management", page 4: "CAAQS were not developed as facility level regulatory standards"

August 26, 2020

Ms. Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the update of Alberta Ambient Air Quality Objectives for nitrogen dioxide and sulphur dioxide

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**Recommendation 1: Use the CAAQS as designed as the provincial metric for monitoring ambient air quality and set distinct higher AAQOs for NO<sub>2</sub> and SO<sub>2</sub> to manage fence-line monitoring compliance and regulatory permitting.**

### *Modelling of the AAQOs*

The methodology for modelling a facility's emissions and how emissions are compared to AAQOs for the purpose of regulatory permitting is described by the Alberta *Air Quality Modelling Guideline (AQMG)* and the companion document: *Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring*. In June, AEP released a new draft of the AQMG for consultation. Upon initial review, it appears to represent a positive development in term of how facility emissions modelling is calculated and interpreted for facility applications and renewals.

The draft AQMG provides the ability to calculate and submit both "maximum" and "typical" emissions scenarios. This could allow approvals to be made more appropriately by considering how a facility's actual emissions might impact regional achievement of the AAQOs. At the same time, the draft AQMG does not clearly describe how "typical" emissions scenarios will be considered in the approvals/renewals process. This absence of clarity is an important issue for CAPP members since determining an appropriate AAQO will be dependent on understanding exactly how it will be applied to facilities' approvals and renewals modelling.

As amended AAQOs potentially approach current or predicted Alberta air quality, there is an increased likelihood that modelled "maximum" emissions scenarios, constructed with conservative emissions inputs, will exceed the AAQOs. Maximum emissions scenarios represent the relatively low probability of a facility, and all of its neighbours, simultaneously emitting their maximum approved emissions during the poorest meteorological conditions. In reality, many "approved" facilities have yet to be constructed, and many operating facilities' emissions are routinely below their maximum approved emissions.

This conservative approach to facilities' emissions is compounded by: the design of the model; the emission input data required for the model; and the way the model considers background concentrations in its calculation of cumulative effects.

To illustrate the impact of the current approach to background concentrations and modelling, a scan of 16 distinct oil and gas applications (rural & urban) from across the province was reviewed by the project team. It was noted that there was a 10% exceedance of the current AAQO when only the background sources are considered using dispersion modelling (project in question not yet under consideration). In the case of the proposed 1-hour NO<sub>2</sub> AAQO reductions, the % of scenarios with exceedances only from background increases. Based on the 16 applications reviewed, the implication is that approximately 40% of the cases would have exceedances from background alone at the government proposed 1-hr NO<sub>2</sub> AAQO value of 80 ppb.

August 26, 2020

Ms. Katie Duffett

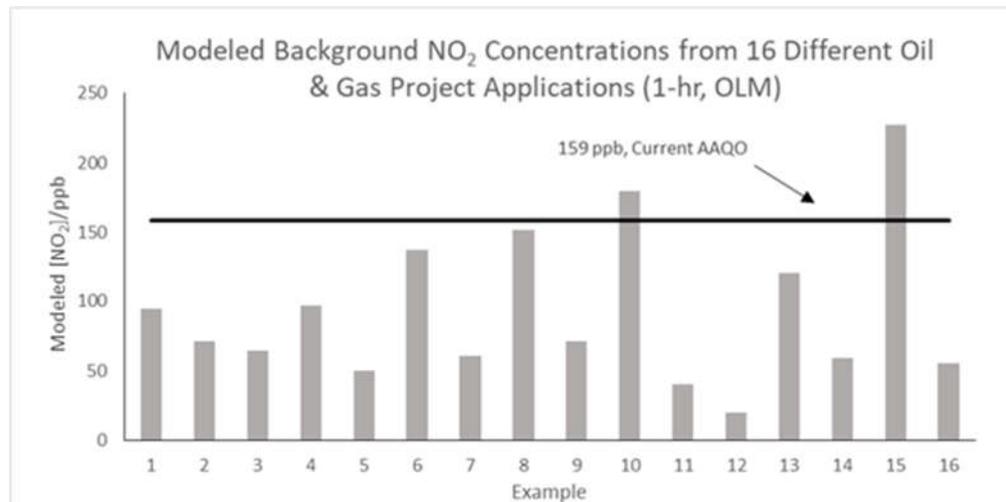
Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the update of Alberta Ambient Air Quality Objectives for nitrogen dioxide and sulphur dioxide

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Table 2. Example of Background NO<sub>2</sub> Impacts on Modeled Oil and Gas Applications



Contrasting modelled air quality to monitored air quality illustrates that a modelled AAQO exceedance based on maximum emissions does not mean that the AAQOs will be exceeded in practice. In 2017 and 2018 the 1-hour NO<sub>2</sub> AAQO was not exceeded at any Alberta monitoring station. Modelled emissions exceedances can, however, drive additional costs for facility operators, irrespective of measured air quality issues. These costs can come in the form of additional modelling, monitoring, and emissions abatement technologies.

The AAQOs must be considered in conjunction with all relevant air modelling and approvals policies in order to ensure that renewals and approvals are efficient and reasonable. AAQOs designed alongside clear approvals and renewals modelling will also help to ensure that industrial air emissions abatement technologies are appropriately designed to cost-effectively meet measured air quality objectives.

At the outset of the CASA process, only AAQOs were under consideration for revision. This allowed CAPP and AFPA members to assess the impact of changing AAQOs relative to existing guidance around modeling (the AQMG) and how modeling is to be interpreted (*Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring*). With the proposed revision to the AQMG and the anticipated revision to the *Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring*, we are unable to now confidently assess the impact of changing the NO<sub>2</sub> and SO<sub>2</sub> AAQOs. The CASA process asks participants, in the case of non-consensus, to provide an alternative that would meet their interests. In this case, due to a lack of clarity around the relationship

August 26, 2020

Ms. Katie Duffett

Project Manager

Clean Air Strategic Alliance

Re: Perspectives document on the update of Alberta Ambient Air Quality Objectives for nitrogen dioxide and sulphur dioxide

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among the AAQOs; how they are modelled; and how applications are approved based on that modelling, we are unable to recommend specific AAQOs for NO<sub>2</sub> and SO<sub>2</sub>. In recognition of the CASA process, we propose the following path forward:

**Recommendation 2:**

**Finish revising the AQMG and associated policy documents before seeking recommendations for AAQOs for NO<sub>2</sub> & SO<sub>2</sub>. It is critical to understand how the AAQOs will be applied to monitoring, facility fence-line compliance, and approvals. With that clarity, all stakeholders will be in a stronger position to understand the full implications of AAQOs that are ambitious, protective of air quality, and achievable.**

A balance must be found between the AAQO metrics and their implementation through approvals and renewals modelling. A comparatively low AAQO should be accompanied by an approvals emphasis on “typical” emissions. This would ensure that the AAQOs are met without undue cost increases, a form of red-tape, resulting from inflated and unrealistic emissions modelling that predicts AAQO exceedances based on low-probability scenarios. An absence of balance, the implementation of aggressive AAQOs, and the creation of non-attainment zones, risk eroding public confidence in the Government’s management of the air quality as well as creating needless anxiety about overall air quality in the province.

Through the CASA process, CAPP and AFPA have been committed to engaging in this dialogue and exploring how AAQO advancement can be balanced with progressive approaches to air emissions modelling and its role in facility approvals/renewals. We remain committed to pursuing a comprehensive dialogue with government and other stakeholders on the AAQOs, approvals and renewals air emissions modelling, and all aspects of provincial air quality management.

Our industries appreciate the engagement and discussion through CASA and regret that consensus could not be found for the issue. If there are any questions or concerns related to our perspectives as outlined in this document please contact us at [don.mccrimmon@capp.ca](mailto:don.mccrimmon@capp.ca) and [kmurray@albertaforestproducts.ca](mailto:kmurray@albertaforestproducts.ca).

Sincerely,



Don McCrimmon  
Manager, Air  
Canadian Association of Petroleum Producers



Keith Murray  
Director, Industry/Government Relations  
Alberta Forest Products Association

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## CASA's Ambient Air Quality Objective Project Team

### Industry Perspectives

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#### **Industry Stakeholder Advice to the Government of Alberta on Nitrogen Dioxide (NO<sub>2</sub>) and Sulphur Dioxide (SO<sub>2</sub>) Air Quality Objectives**

On behalf of industry participants on the Clean Air Strategic Alliance Ambient Air Quality Objectives project team, we appreciate the collaborative approach to reviewing and setting ambient air quality objectives in Alberta. Although the Ambient Air Quality Objective Project Team was unable to reach consensus on proposals for NO<sub>2</sub> and SO<sub>2</sub> objectives, there was alignment that the science supports lowering the 1-hour Alberta Ambient Air Quality Objectives (AAQOs) from the current levels to be more protective of human health. Notably however, industry members share concerns that are summarized in this perspectives document. These perspectives are reflected in the proposal put forward by the industry stakeholders.

It is important to recognize that amongst the industry stakeholders that participated in the project, there was not consensus on the proposed NO<sub>2</sub> and SO<sub>2</sub> air quality standards provided. The Canadian Association of Petroleum Producers (CAPP) were not aligned with the proposed numbers, however many of the same concerns with the fundamental application and impacts of the revised air quality objectives are shared broadly by all industry participants. In subsequent discussions, the Alberta Forest Products Association (AFPA) expressed that they needed further certainty on the impacts of the new air modelling guidelines relative to any proposed Alberta Air Quality Objective and have opted to provide their own perspective document. This Industry Perspectives summary therefore excludes the specific opinions of CAPP and AFPA.

#### **Current State of Alberta's Air Quality is Good and Improving**

Alberta enjoys good air quality. In fact, ambient air quality in Alberta – along with other Canadian provinces - has shown significant and sustained improvement since 1990, and the improving trend for criteria air contaminants including SO<sub>2</sub> and NO<sub>2</sub>, is expected to continue because of actions already underway.<sup>1</sup>

Accordingly, we believe that the focus for Alberta should continue to be on existing actions and investment that are already driving the improving air quality for Albertans. Imposing unduly stringent AAQOs on Alberta's key industrial sectors at this critical time in our history will act as an impediment to the economic recovery conditions we are all striving to create. This is especially relevant now in 2020, when our collective efforts need to be clearly focussed on recovery from the Covid-19 pandemic.

There is significant economic risk for the Government of Alberta to consider when setting AAQOs, as in addition to serving as metrics to assess ambient air quality, AAQOs serve as compliance standards applied at facility fence line stations, and are used in modelling for facility approvals and renewals. If Alberta sets

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<sup>1</sup> Government of Canada. Canada's Air Pollutant Emissions Inventory Report 2020: Executive Summary. <https://www.canada.ca/en/environment-climate-change/services/air-pollution/publications/emissions-inventory-report-2020/executive-summary.html> (Accessed August 27, 2020)

SO<sub>2</sub> and NO<sub>2</sub> AAQOs at levels that creates undue non-attainment challenges for industry, existing industry operators will be forced to consider whether it is economic to invest in incremental controls that affect only their own emissions, and ultimately do not address the many other significant, and sometimes larger sources in their airsheds, such as the challenges that arise from mobile and non-point sources like transportation and buildings. This is especially relevant near larger urban centres like Calgary and Edmonton.

Potential new industrial facility investment proposals would also need to consider additional costs and compliance challenges if AAQOs become unduly stringent compared to other jurisdictions that aggressively compete for the same investment.

It would be an unfortunate and avoidable outcome if new, overly stringent air quality objectives result in:

1. The closure of uneconomic operations;
2. The location of new industry investment in other jurisdictions due to uneconomic investment hurdles in Alberta; and
3. Industry operators who are forced to invest in controls in airsheds where we will continue to notice improvement in air quality from all of the other actions already underway, rather than from any further incremental and facility specific investment action by industry operators.

Our comments outlined below provide more details.

### **Key Industry Perspectives**

1. The most significant difference in perspectives between industry and the other stakeholders on the project team is related to the relationship between the federal Canadian Ambient Air Quality Standards (CAAQS) and the AAQOs. The Government and Non-Government proposals are narrowly focused on the extrapolation from the CAAQS limits to convert from a 3-year percentile-based limit to a 1-hour AAQO and a direct conversion of the annual CAAQS value to the annual AAQO position. Industry is of the view that this is neither necessary nor appropriate given that CAAQS were not designed for fence line application.
2. Industry suggests that the government should be cautious with implementing increasingly stringent AAQOs that would drive additional investment by industry but continue to leave areas of non-attainment because of other emission sources. Air quality levels of NO<sub>2</sub> and SO<sub>2</sub> have been improving in Alberta since 2000<sup>2</sup> and substantial emission reductions are forecast in coming years related to activities already underway. Government must also take into consideration that increasingly stringent AAQOs also increases the risk and frequency of signaling poor air quality, which in turn could erode public confidence and create needless anxiety about air quality in Alberta.
3. Ambient air modelling used to determine facility Approvals and renewals in Alberta is directly related to the AAQOs. The current level of uncertainty related to proposed changes in the Alberta Air Quality Modelling Guideline (AQMG) has created substantial uncertainty and concern for industry members that has ultimately been a major barrier to achieving consensus on NO<sub>2</sub> and SO<sub>2</sub> proposed objectives within the industry sector.

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<sup>2</sup> Canadian Council of Ministers of the Environment. Canada's Air. <http://airquality-qualitedelair.ccme.ca/en/> (accessed August 25, 2020)

## Industry Proposals

The proposals by industry make specific reference to standards used by the US Environmental Protection Agency (USEPA) and the European Union (EU). In the cases of the 1-hour NO<sub>2</sub> and SO<sub>2</sub> objectives and the annual NO<sub>2</sub> objective, these proposals constitute a stepwise reduction from the current air quality objectives in Alberta. Similar to Alberta, these other jurisdictions also set ambient air quality standards based on factors including the protection of human health and the environment.

Table 1. Industry (excluding CAPP and AFPA) Proposed NO<sub>2</sub> AAQS

Averaging Period	ppbv		Basis
	2020	2025	
1-hour	100	100	Align with the USEPA NAAQS 1-hr standard ( <a href="https://www.epa.gov/criteria-air-pollutants/naaqs-table">https://www.epa.gov/criteria-air-pollutants/naaqs-table</a> ), noting that the US value is less stringent than the proposed AAQO value as the NAAQS are based on the 98th percentile of 1 hour daily maximums averaged over 3 years.
Annual	21	21	Align with EU annual standard ( <a href="https://ec.europa.eu/environment/air/quality/standards.htm">https://ec.europa.eu/environment/air/quality/standards.htm</a> )

Table 2. Industry (excluding CAPP and AFPR) Proposed SO<sub>2</sub> AAQS

Averaging Period	ppbv		Basis
	2020	2025	
1-hour	136	136	Align with the EU 1-hr standard ( <a href="https://ec.europa.eu/environment/air/quality/standards.htm">https://ec.europa.eu/environment/air/quality/standards.htm</a> )
24-hour	48	48	Hold at 48 ppb. Value is already more stringent than other jurisdictions which have a 24-hr value (ex. The EU 24-hr standard is 48 ppm, but 3 exceedances are permitted per year)
30-day	11	11	Hold at 11 ppb and the 30-day value is to only be used as a guideline for passive monitoring and complaint investigation, not for modeling & compliance. This aligns with a previous proposal made by the AAQOSAC, the CASA working group's predecessor. (AAQOSAC SO <sub>2</sub> sub-group recommendations, March 27, 2008).
Annual	8	8	Hold at 8 ppb, based on the principle that CAAQS were not intended to be applied at facility fence lines.

## A Measured Response is Necessary

A measured response is consistent with Alberta Environments own stated requirements for setting Ambient Air Quality Objectives, namely:

*The numerical value chosen for a particular ambient air quality objective not only considers health and environmental impacts but most often also reflects social, technological, economic and political factors. They try to balance the need to address public health and environmental concerns against air pollutant levels that can be practically maintained or achieved within a reasonable time period.<sup>3</sup>*

## NO<sub>2</sub> Emissions

While industrial NO<sub>x</sub> emissions contribute to a sizeable portion of overall NO<sub>x</sub> emissions in Alberta, it must be noted that many of the regional air quality challenges that Alberta is facing are primarily driven by ground-level transportation as the predominant emission source. This was recently illustrated by data collected during the height of the COVID-19 pandemic restrictions, which led to a significant reduction in vehicle traffic in the spring. This situation provides helpful context to assist in the understanding of

<sup>3</sup> Using Ambient Air Quality Objectives In Industrial Dispersion Modelling and Individual Industrial Sit Monitoring, Revised October 1, 2013, Alberta Government

Alberta air quality issues, as it effectively reduced the emissions from transportation, while industry continued to operate at near-normal levels.<sup>4</sup> Similarly, CAAQS predictions for non-industrial regions such as the City of Calgary are similar for regions like Edmonton, which is bordered by the Wabamun, Sherwood Park, and Industrial Heartland industrial areas.

The challenge with Ambient Air Quality Objective use in Alberta is that they are applied disproportionately to industrial emitters, since they are used not only for air quality monitoring but also provide an important reference point for air dispersion modeling related to new and existing facility Approvals. To add to this complexity, AAQOs are not applied to transportation activities, resulting in a disconnect when the regulator tries to mitigate regional CAAQS attainment issues via the application of lower AAQO limits. It should also be noted that Federal action has already begun to address NO<sub>x</sub> (and therefore NO<sub>2</sub>) emissions nationally. The Multi-Sector Air Pollutant Regulations (MSAPR) will yield substantial NO<sub>x</sub> reductions in Alberta primarily due to the high density of reciprocating engines in the province's oil & gas sector which are now obligated under that regulation. Similarly, a study of members in Alberta's Industrial Heartland region indicated a possible 20-30% reduction in NO<sub>x</sub> emissions related to the MSAPR regulations, mostly from boilers and heaters emission reductions in the Industrial Heartland.

Our proposal:

- Applies expectations to industry that are commensurate with their contribution to regional NO<sub>2</sub> challenges.
- Allows the province to signal and progress further emission reductions in Alberta while balancing the ability for industry to adapt.

### **SO<sub>2</sub> Emissions**

Alberta SO<sub>2</sub> emissions are more directly related to industrial activities and emissions in the province, as opposed to NO<sub>2</sub> that has a more diverse range of emission sources, both industrial and non-industrial. It is also important to recognize that SO<sub>2</sub> emissions are not projected to face the same challenges as NO<sub>2</sub> in terms of the CAAQS assessments in the future. Based on this context, industry suggests our proposal:

- Avoids undue pressure on industry, especially since existing SO<sub>2</sub> management practices have proven to be successful in ensuring SO<sub>2</sub> is not a significant air quality issue in Alberta.
- Allows the province to signal and progress further emission reductions in Alberta while balancing the ability for industry to adapt.

### **Economics Must be Considered**

Reductions in the AAQOs can ultimately drive industry to make changes to facilities to comply with the requirements and remain in operation. Important economic feasibility considerations include:

- For existing facilities, the costs to reduce emissions can be prohibitively expensive and they also require time to implement (e.g. facility turnarounds or outages).
- For new facilities, setting the emission requirements too stringently relative to competitive jurisdictions may be a factor that impairs the growth and competitiveness of industry in Alberta when compared with other jurisdictions, especially as the economy recovers from the COVID-19 pandemic.

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<sup>4</sup> David Thurton "Air pollution eases in 4 Canadian cities as pandemic measures keep people home" CBC News. April 1, 2020. Available at: <https://www.cbc.ca/news/politics/satellite-images-no2-smog-gta-vancouver-1.5516160> (Accessed August 25, 2020).

- Industry is faced with a broad spectrum of environmental requirements, and it is important for the regulator to balance priorities. For example, industry is also faced with a cost signal on GHG emissions, specific requirements under MSAPR for emission reductions on various equipment types (reciprocating engines, boilers and heaters), and the conversion from coal to gas in the electricity sector. In many cases, investments have already been made by industry to meet these compliance requirements.
- That responses to monitored exceedances should consider all sources in the airshed (i.e., not just industrial sources).

**Achievability is Important:**

The Alberta Government's document cited previously (see footnote 3), states that one of the considerations in setting air quality objectives is "*achievability within a reasonable time frame.*" Industry believes a measured, staged response addresses this requirement without compromising air quality. Industry believes that Alberta Environment and Parks should avoid setting increasingly stringent ambient objectives that fail to recognize that reductions are already happening but will take time to be implemented. Creating undue non-attainment zones would likely erode the public's confidence in the Government's management of air quality and create needless anxiety about overall air quality in the Province. In addition, both the public and private resources required to support investigations on exceedances from overly aggressive AAQOs would be substantial. As many instances of AAQO exceedances will be caused by transportation, poor meteorological conditions, or both, these resources would often be better utilized supporting other environmental initiatives.

The historical regulatory compliance focus on industry relative to other emitting sectors of the province like transportation must also be recognized when considering the implications of the proposed AAQO limits. In the NO<sub>2</sub> Considerations report reviewed by the project team, it was noted that, from 2002 to 2016, a 1-hour NO<sub>2</sub> objective of 86 ppb would have been exceeded 661 times; 79 ppb would have been exceeded 1075 times; 73 ppb would have been exceeded 1450 times; and 60 ppb (the 2020 CAAQS value) would have been exceeded 4519 times. A scenario where industry is reporting non-compliance events with regularity should be an undesirable outcome for all stakeholders and could negatively affect public confidence in both industry and regulators responsible for managing air quality in the province.

**Perspective on CAAQS**

It is critical to recognize that AAQOs are applied for additional purposes when compared to CAAQS. The use of AAQOs to understand air quality dispersion models in support of industrial facility applications and Approvals is a notable and important difference from CAAQS, which very clearly were not developed as facility level regulatory standards.<sup>5</sup> The proposed translation of CAAQS to AAQOs by the other project team stakeholders would result in this outcome.

It should also be recognized that CAAQS can play an important backstop role in Alberta. It is not necessary to extrapolate the AAQO from CAAQS, due to the reality that CAAQS apply in Alberta already.

Finally, differentiation between CAAQS and AAQOs allows Alberta to preserve their primary regulatory role in the management of air quality in Alberta.

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<sup>5</sup> Canadian Council of Ministers of the Environment. 2019. Guidance Document on Air Zone Management. Available online at: <https://www.ccme.ca/files/Resources/air/Guidance%20Document%20on%20Air%20Zone%20Management.pdf> (see page 4)

In terms of the difference in perspectives between industry and the other stakeholders on the project team, the other proposals were narrowly focused on the extrapolation from the CAAQS limits to convert from a 3-year percentile-based limit to a 1-hour AAQO and a direct conversion of the annual CAAQS value to the annual AAQO position. We maintain that this is neither necessary or appropriate given the purpose and design of CAAQS relative to the use of AAQOs.

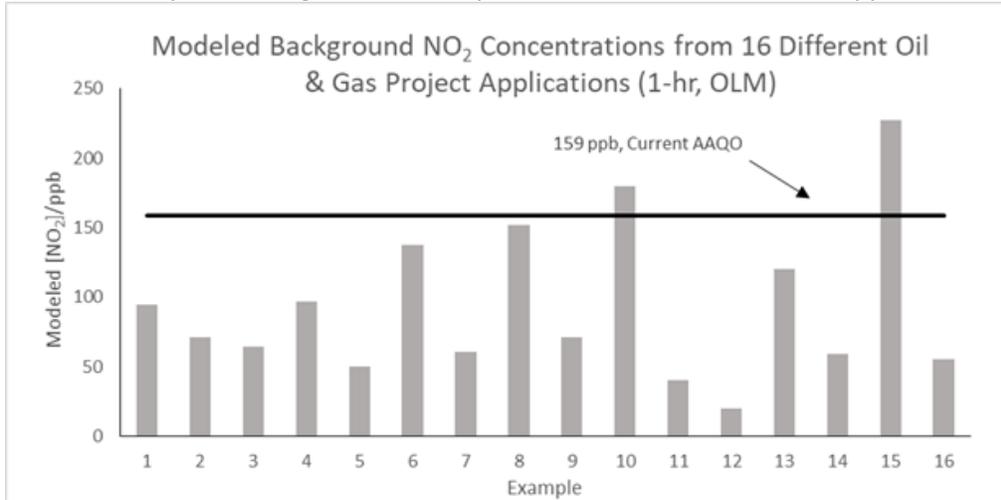
### **Monitoring vs Modeling Perspective**

Based on the analysis of recent Alberta ambient monitoring results, it appears that the proposed NO<sub>2</sub> and SO<sub>2</sub> limits are achievable for industry from an air monitoring point of view, with an increasing risk of additional air quality exceedances as the proposed air quality limits are reduced.

During the work of the project team, we were given an opportunity to review the draft changes proposed for the [Alberta Air Quality Modelling Guideline](#). Unfortunately, several of the proposed changes are highly technical and require further testing and analysis to understand the impact. Generally, the process for air quality modelling in the draft proposal remains highly conservative, which results in higher estimates of ground level ambient concentrations and additional AAQO exceedances. The conservatism includes the function of the model itself, the emission input data required for the model, as well as the approach to include the background concentration to compute cumulative effects. For example, an examination of recent ambient air quality data suggested that the highest 1-hour ambient NO<sub>2</sub> value in the province (under a “CAAQS-like” statistical treatment) was 64 ppb at the Calgary Downtown station, which we would assume is primarily driven by non-point sources. The application of this as a background value in regional industrial projects is problematic as the AAQO is further reduced.

Industry also remain concerned with uncertainty in how modelling results will inform project approvals or requirements, although we appreciate that Alberta Environment and Parks is attempting to address this by including a typical emissions scenario that can provide a more realistic understanding or a project compared to the more conservative worst-case approach. Even with this change however, industry notes that some projects might not get to the submission stage based on preliminary analysis relative to preliminary project assessments. Furthermore, new projects in regions without monitoring data lack monitoring results that can be used in lieu of modeling data, and face even higher uncertainty.

To illustrate this modelling risk, a scan of 16 distinct oil and gas applications (rural & urban) from across the province was reviewed by the project team. It was noted that there was a 10% exceedance of the current 1-hr NO<sub>2</sub> AAQO when only the background sources are considered using dispersion modelling (project in question not yet under consideration). In the case of the proposed 1-hour NO<sub>2</sub> AAQO reductions, the of scenarios with exceedances only from background increases. Based on the 16 applications reviewed, the implication is that approximately 40% of the cases would have exceedances from background alone at the government proposed 1-hr NO<sub>2</sub> AAQO value of 80 ppb.

Table 2. Example of Background NO<sub>2</sub> Impacts on Modeled Oil and Gas Applications

Industry members will provide additional feedback to Alberta Environment on the draft Air Quality Modeling Guideline as part of the review process. To better understand the implications of the proposed changes in the draft AQMG, further evaluation and testing of the AQMG might be warranted by Alberta Environment and Parks.

### Future Outlook

There are many important initiatives currently underway that will result in significant and meaningful emission reductions in Alberta in the coming years. These include:

- MSAPR activities will have a significant improvement in Alberta emissions - reciprocating engines mostly, but also from boilers and heaters improvements. Notably, CAPP shared information with the project team indicating that MSAPR changes, from only reciprocating engines, could result in 1%, 8%, and 20% NO<sub>x</sub> reduction provincially by 2020, 2025, and 2030, respectively.
- Emission reductions from the coal to gas conversions in the electricity sector are also significant.
- Revised provincial policy to manage acid deposition.
- Activities associated with future GHG regulations, including net-zero 2050 and the proposed *Clean Fuel Standard* which will likely influence industry substantially in the longer-term.
- Evolution of transportation (i.e. electric vehicle transition, hydrogen fuel, etc.) which will dramatically reduce measured ambient NO<sub>x</sub> levels.

### Additional Considerations:

As ambient objectives become more stringent, the potential impact of how conservative modeling results are applied to new or existing facilities becomes more critical. Currently the policy document "[Using Ambient Air Quality Objectives in Industrial Dispersion Modelling and Individual Industrial Site Monitoring](#)" is dated. To ensure a fair and reasonable application of modeling results and the more stringent AAQO's, a review and update of this policy document is also required. The three areas, modeling, AAQO and application policy should be addressed simultaneously to reflect the dependent and integrated nature of these subsets of an Air Quality Management program.

## Closure

Thank you for the opportunity to share the thoughts and perspectives of the industry participants on the AAQO project team. Industry members appreciate the inputs from all stakeholder members on the Project Team and would like to acknowledge the leadership of CASA to steward this process. We look forward to further consultation on air quality topics in the future.

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## Appendix V – Membership Lists

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CASA would like to thank all the Project Team and sub-group members who generously contributed their time and expertise to this project.

### AAQO Project Team Membership

<b>Name</b>	<b>Organization</b>
Alison Miller	Imperial Oil Ltd. (CAPP/CIAC)
Andrew Clayton	Alberta Environment and Parks
Anne Vigneau	Heartland Generation Ltd.
Atta Atia	Alberta Agriculture and Forestry
Bob Myrick	Alberta Environment and Parks
Chad Beegan	Alberta Health Services
Crissy Handziuk	NOVA Chemicals (CIAC)
Darcy Walberg	North West Redwater Partnership
David Spink	Prairie Acid Rain Coalition
Debra Hopkins	Alberta Environment and Parks
Garrett Hoeksema	Repsol
Gerald Feshuk	Alberta Energy Regulator
Ike Edeogu	Alberta Agriculture and Forestry
Jamie Percy	Alberta-Pacific Forest Industries Inc.
Jeremy Mattison	West Fraser Timber
Kaitlyn Wall	Alberta Environment and Parks
Kevin Warren	Alberta Airsheds Council
Laura Blair	Alberta Environment and Parks
Laurie Cheperdak	Alberta Health
Liz Stengl	NOVA Chemicals (CIAC)
Long Fu	Alberta Environment and Parks
Lynn Que	Alberta Health Services
Melissa Guglich	Alberta-Pacific Forest Industries Inc.
Nina Wang	Alberta Health
Opel Vuzi	Health Canada
Randy Angle	Prairie Acid Rain Coalition
Rich Smith	Alberta Beef Producers
Rob Hoffman	Canadian Fuels Association
Salina Fairbank	Alberta Environment and Parks
Sanjay Prasad	Alberta Airsheds Council
Sean Mercer	Imperial Oil Ltd. (CAPP/CIAC)
Wally Qiu	Alberta Energy Regulator

### PM<sub>2.5</sub> and O<sub>3</sub> Sub-group Membership

<b>Name</b>	<b>Organization</b>
Alison Miller	Imperial Oil Ltd (CAPP/CIAC)
Anne Vigneau	Heartland Generation Ltd.
Atta Atia	Alberta Agriculture and Forestry

Bob Myrick	Alberta Environment and Parks
Chad Beegan	Alberta Health Services
David Spink	Prairie Acid Rain Coalition
Debra Hopkins	Alberta Environment and Parks
Kevin Warren	Alberta Airsheds Council
Laura Blair	Alberta Environment and Parks
Laurie Cheperdak	Alberta Health
Liz Stengl	NOVA Chemicals (CIAC)
Long Fu	Alberta Environment and Parks
Nina Wang	Alberta Health
Randy Angle	Prairie Acid Rain Coalition
Rob Hoffman	Canadian Fuels Association

## H<sub>2</sub>S and TRS Sub-group Membership

<b>Name</b>	<b>Organization</b>
Alison Miller	Imperial Oil Ltd. (CAPP/CIAC)
Anne Simpson	Syncrude
Atta Atia	Alberta Agriculture and Forestry
David Spink	Prairie Acid Rain Coalition
Debra Hopkins	Alberta Environment and Parks
Gerald Feshuk	Alberta Energy Regulator
Ike Edeogu	Alberta Agriculture and Forestry
Kaitlyn Wall	Alberta Environment and Parks
Laura Blair	Alberta Environment and Parks
Laurie Cheperdak	Alberta Health
Long Fu	Alberta Environment and Parks
Lynn Que	Alberta Health Services
Nina Wang	Alberta Health
Rich Smith	Alberta Beef Producers
Salina Fairbank	Alberta Environment and Parks
Sanjay Prasad	Alberta Airsheds Council

## NO<sub>2</sub> & SO<sub>2</sub> Sub-group Membership

<b>Name</b>	<b>Organization</b>
Alison Miller	Imperial Oil Ltd. (CAPP/CIAC)
Andrew Clayton	Alberta Environment and Parks
Anne Vigneau	Heartland Generation Ltd.
Atta Atia	Alberta Agriculture and Forestry
Darcy Walberg	North West Redwater Partnership
David Spink	Prairie Acid Rain Coalition
Debra Hopkins	Alberta Environment and Parks
Jamie Percy	Alberta-Pacific Forest Industries Inc.
Jeremy Mattison	West Fraser Timber
Kaitlynn Wall	Alberta Environment and Parks
Laura Blair	Alberta Environment and Parks
Laurie Cheperdak	Alberta Health

Lynn Que  
Melissa Guglich  
Nina Wang  
Opel Vuzi  
Randy Angle  
Rob Hoffman  
Salina Fairbank  
Sanjay Prasad  
Sean Mercer  
Shane Lamden  
Wally Qiu

Alberta Health Services  
Alberta-Pacific Forest Industries Inc.  
Alberta Health  
Health Canada  
Prairie Acid Rain Coalition  
Canadian Fuels Association  
Alberta Environment and Parks  
Alberta Airsheds Council  
Imperial Oil Ltd. (CAPP/CIAC)  
NOVA Chemicals  
Alberta Energy Regulator

### CASA Project Managers

Matt Dance, Katie Duffett, Lauren Hall, Candice Sawchuk



## **Appendix VI – Project Charter**

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Clean Air Strategic Alliance  
Ambient Air Quality Objectives Project Team  
Project Charter

Updated September 2020

# Table of Contents

- Introduction ..... 13
- Background ..... 26
  - Clean Air Strategic Alliance’s Key Role ..... 26
  - Alignment with CASA Core Business ..... 27
- Scope..... 27
- Project Goal ..... 27
- Project Objectives ..... 27
- Project Deliverables ..... 28
- Unique Nature of the AAQO Project Team’s Work ..... 28
- Reporting Structure ..... 29
- Project Quorum ..... 29
- Stakeholder Engagement Plan ..... 30
- Project Schedule ..... 30
- Projected Resources and Costs ..... 30

## Introduction

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Ambient air quality objectives are an important part of Alberta's air quality management system as they help protect the health of Albertans and the environment. Alberta Environment and Parks (AEP) sets ambient air quality objectives for the province under section 14(1) of the *Environmental Protection and Enhancement Act* (EPEA). It is important that the objectives be reviewed on a regular basis and new objectives be developed when there is a need.

## Background

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Since 2001, AEP has worked with a multi-stakeholder committee, the Alberta Ambient Air Quality Objective Stakeholder Advisory Committee (AAAQOSAC), to develop and review ambient air quality objectives. The committee successfully developed or reviewed thirty objectives in that time. The committee was unsettled in December 2015.

At their December 2016 board meeting, the CASA Board of Directors approved a Statement of Opportunity from AEP for the formation of a CASA Ambient Air Quality Objectives Project Team (AAQO Project Team). The priorities are in response to the development of Canadian Ambient Air Quality Standards (CAAQS) for PM<sub>2.5</sub>, O<sub>3</sub>, NO<sub>2</sub>, and SO<sub>2</sub> and the carry forward of two substances from the previous AAAQOSAC work plan, TRS and H<sub>2</sub>S. CAAQS have been developed for long-term air zone management and are reported on annually. AAQOs are used in a number of ways, including to assess compliance near major industrial air emission sources and to report on the state of Alberta's atmospheric environment. These values are also applied in various assessments used to model and predict the impact on air quality and human and environmental health (e.g., Environmental Impact Assessments, Human Health Risk Assessments). AAQOs cover averaging periods ranging from 1 hour to 1 year (annual). Alberta is reviewing their current AAQOs considering recent CAAQS changes.

These priority substances are the focus of Alberta Environment and Park's work plan on ambient air quality objective development and review. One of the following approaches is used for the substances under consideration:

- Objective development is undertaken when no Alberta objective exists; and,
- Objective review occurs when an Alberta objective is already in place.

### Clean Air Strategic Alliance's Key Role

CASA's diverse membership makes it well positioned to bring stakeholders together to discuss air management issues. While it is preferred that the AAQO Project Team develop consensus recommendations, CASA recognizes that there may be different opinions around the table on what the objective should be. The intent for this team is to provide AEP with the range of perspectives from those CASA members participating on the Project Team while concurrently striving to reach consensus. If non-consensus recommendations are brought forward, it is the responsibility of the Project Team to document the views, rationale, and present it to the board. The board will formally approve the team's reports and submit to AEP for consideration in the setting of the AAQO.

## Alignment with CASA Core Business

The vision of CASA is “the air will have no adverse odour, taste or visual impact and have no measurable short- or long-term adverse effects on people, animals or the environment.” The development of ambient air quality objectives is in line with achieving this vision, and the use of a collaborative multi-stakeholder consensus approach is consistent with CASA’s mission. It is also in line with CASA’s goals: to protect the environment by preventing short and long-term adverse effects on people, animals and the ecosystem, to optimize economic efficiency and to promote pollution prevention and continuous improvement.

## Scope

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The AAQO Project Team is to recommend ambient air quality objectives for PM<sub>2.5</sub>, O<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>S, and TRS based on careful review and consideration of:

- scientific information, adverse health and ecosystem effects specific to the substance; and
- technological and economic factors.

The team will strive to reach consensus recommendations where possible. The reports will be sent to the board for approval. Once approved, the reports will be submitted to AEP for consideration.

## Project Goal

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The Ambient Air Quality Objectives Project Team will develop:

1. Reports with substance-specific AAQO recommendations according to the project schedule.
2. A final report that will summarize the substance-specific reports and provide additional process context including a summary introduction and conclusion.

The substance-specific reports and the final summary report will also provide a rationale for proposed ambient air quality objectives that considers the current science as well as technological and economic factors. A recommendation on a new, revised, or reconfirmed PM<sub>2.5</sub>, O<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>S, and TRS ambient air quality objective.

## Project Objectives

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1. Recommend a new, revised, or reconfirmed AAQO for PM<sub>2.5</sub> by March 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
2. Recommend a new, revised, or reconfirmed AAQO for O<sub>3</sub> by September 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
3. Recommend a new, revised, or reconfirmed AAQO for H<sub>2</sub>S and TRS by December 2018. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.

4. Recommend a new, revised, or reconfirmed AAQO for NO<sub>2</sub> by September 2020. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
5. Recommend a new, revised, or reconfirmed AAQO for SO<sub>2</sub> by September 2020. A rationale for the objective will be provided. If the recommendation is non-consensus, the range of positions and their underlying rationale will also be documented for AEP.
6. Provide a final summary report on the team's process and success by December 2020.

## Project Deliverables

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The AAQO Project Team will provide the CASA Board with a report for each of Project Objectives 1–5 for approval. The team will also provide a final summary report for Objective 6. The AAQO Project Team will recommend that the CASA Board approve each of these reports and forward them to AEP. Each of the substance reports will include:

1. A recommendation for a new, revised, or reconfirmed AAQO.
2. An overview of the scientific, technological, and economic information and factors that were reviewed and considered by the team.
3. If there are non-consensus views on a proposed recommendation, those stakeholders with the dissenting views will provide detailed description of those views, including why they don't agree with the proposed recommendation. They will also detail their preferred recommendation with a rationale.

In addition to the deliverables described above, the AAQO Project Team will keep the CASA Board apprised of their progress through frequent written and verbal updates. CASA acknowledges that this is high priority work for Alberta Environment and Parks and is striving to complete the work in a timely manner.

## Unique Nature of the AAQO Project Team's Work

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The nature of this team's work means it is possible to have non-consensus on proposed objectives. Some non-consensus recommendations are a possibility and should not be seen as a failure. The AAQO Project Team will strive for consensus, however, if they do not achieve consensus the report will outline non-consensus positions including a rationale for each position. This detailed documentation of positions will act as information and context to assist AEP in its decision on the ambient objective in question. It is also

recognized that AEP has a subsequent public review process for proposed AAQOs, and a consensus recommendation from CASA could, in some circumstances, not be adopted by AEP. Whether or not the team achieves consensus, the CASA Board will be asked to approve the team's report before it goes to AEP to ensure that process is adhered to and the report reflects CASA's vision, as opposed to a review of the technical content and recommendation.

### Roles and Responsibilities

Team members should establish effective communication with the decision makers in the organizations/groups they represent so that



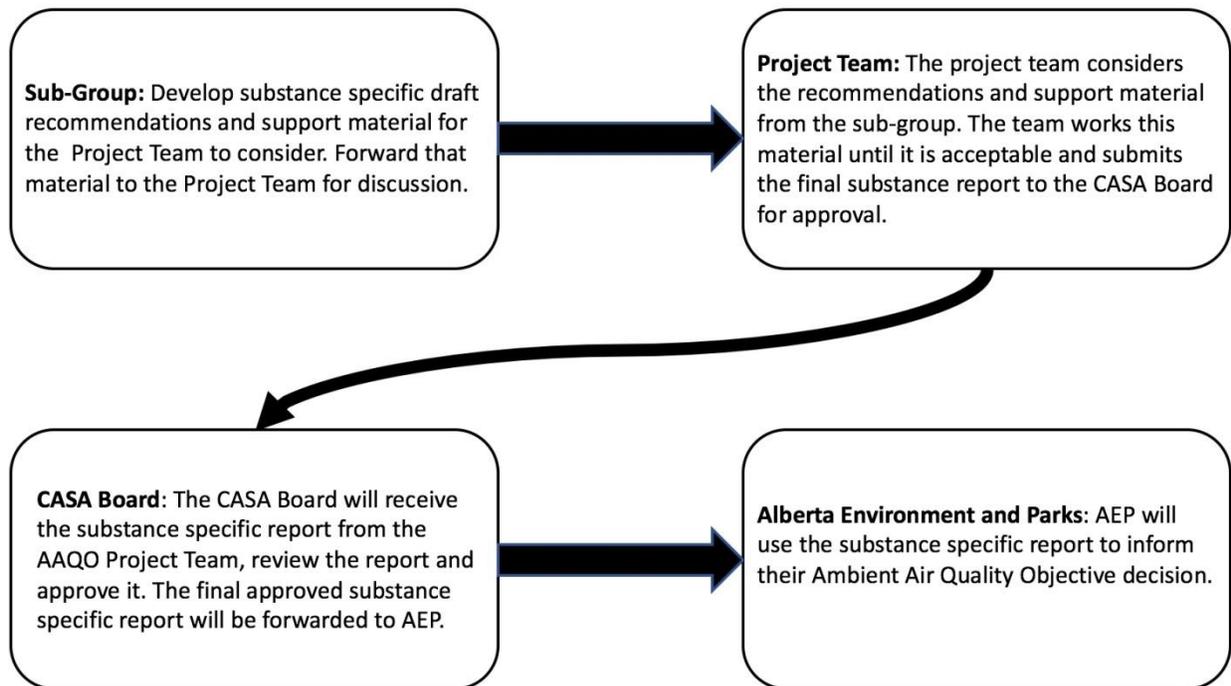
information and feedback can be solicited. It is each team member’s responsibility to bring their constituency along and ensure that they can demonstrate to other team members that they are endeavoring to do this.

Team members also need be aware and accept that differences of opinion and perspective are natural and expected and that the tension between differing perspectives can be used positively to help generate solutions. In addition, all team members need to actively participate and display a commitment and responsibility for the well-being of the team and the success of the process, including keeping the team on task and on track.

The expectations of AAQO Team Members are consistent with those roles and responsibilities described in *CASA’s Managing Collaborative Processes Guide*.

## Reporting Structure

Figure 1 represents the reporting structure of the AAQO Project Team. Further process details can be found in *CASA’s Comprehensive Air Quality Management System (CAMS)* document.



**Figure 1:** AAQO Project Team Reporting Structure

## Project Quorum

The AAQO process will require quorum for all substantive decisions involving recommendations but not on process decisions. In lieu of the team, the co-chairs are empowered to make process decisions between meetings. The team will meet 4 times per year with the expectation that the substantive work will occur at the sub-groups. Additional meetings can be called under exceptional circumstances, by co-chairs.

Quorum is defined as:

Organization	Number of stakeholders to achieve quorum
Alberta Airshed Council	1
Alberta Environment and Parks	1
Alberta Health	1
Alberta Health Services	1
Environmental Non-Governmental Organizations	1
Industry	1

## Stakeholder Engagement Plan

Key stakeholders will be engaged on an as-needed basis to address the specific concerns that their industry might have with the development of objectives. The following categories of stakeholders may also be involved:

**Project Team:** Stakeholders who are required at the table to reach consensus agreement.

**Corresponding Members:** Stakeholders who receive all correspondence but are not required at the table to reach consensus agreement.

**Sub-groups or Technical Experts:** Stakeholders who have a specific interest or expertise and can be engaged in a more focused way at a sub-group level.

## Project Schedule

The work of the AAQO Project Team is sequential and will follow the schedule as outline in Figure 2.

2017			2018			2019				2020			
June	Sept	Dec	March	June	Sept	Dec	March	June	Sept	Dec	March	Sept	Dec
PM <sub>2.5</sub>													
	O <sub>3</sub>												
			NO <sub>2</sub>										
							SO <sub>2</sub>						
H <sub>2</sub> STRS													
										Final Report			

Figure 2: AAQO Project Schedule

## Projected Resources and Costs

Given the current level of knowledge within the AAQO Project Team and with CASA's report writing support, it is anticipated that no additional external resources will be required for this project. It is the intent to use sub-groups to conduct the detailed background work associated with developing recommendation for each of the parameters being reviewed.

If Team Members determine that additional expertise is required (consultants, modelling of parameters, etc.), they are required to: (1) develop a detailed Terms of Reference for the work, and (2) fundraise. Given

the current level of knowledge within the AAQO Project Team and with CASA's report writing support, it is anticipated that no additional resources will be required. It is the intent to use sub-groups to conduct the detailed background work associated with developing recommendation for each of the parameters being reviewed.





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