Priority Setting Workshop
Final Report of the Organizing Committee

Prepared by the
Priority Setting Workshop Organizing Committee
for the
Clean Air Strategic Alliance
Board of Directors

FINAL

March 2010

Acknowledgements

Alberta Environment provided the funding for this workshop, the results of which will be used to guide the process for developing ambient air quality objectives for priority substances.

The Priority Setting Workshop Organizing Committee was responsible for arranging the workshop, and acknowledges the support of all participants who shared their time and expertise.

About CASA

The Clean Air Strategic Alliance (CASA) is a non-profit association composed of stakeholders from three sectors – government, industry and non-government organizations such as health and environmental groups. All CASA groups and teams, including the board of directors, make decisions and recommendations by consensus. These recommendations are likely to be more innovative and longer lasting than those reached through traditional negotiation processes. CASA's vision is 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.

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Ambient air quality objectives are an important part of Alberta's air quality management system. Under section 14 of the *Environmental Protection and Enhancement Act*, Alberta Environment sets ambient air quality objectives for the province. When an objective is written into a facility approval, it becomes a legal requirement for that facility. The objectives are also very useful in airshed management and planning, and for communicating the state of air quality to the public.

With the help of CASA, Alberta Environment has held two previous priority-setting workshops, one in 2000 and one in 2004, to receive stakeholder input into the prioritization of substances for the objective setting process. Each workshop resulted in a priority list of substances that became the focus of Alberta Environment's three-year work plan. The work plans were implemented with the help of a multi-stakeholder advisory committee. The development and review of objectives for three substances in the 2005-2008 work plan (benzene, nitrogen dioxide, sulphur dioxide) is not yet complete and will continue.

In 2009, Alberta Environment again asked CASA to organize a multi-stakeholder workshop to obtain input on a new list of priority substances. CASA established the Priority Setting Workshop 2009 Committee to plan and implement the third workshop and to develop recommendations to Alberta Environment on priority substances for Alberta Environment's Ambient Objective Setting Process.

Prior to the workshop, the committee assembled suggestions for priority substances, including those nominated by Albertans. A package of background information, including the nominated substances, was provided to workshop participants. Consensus was reached on 11 priority substances and on a recommendation regarding odour. The workshop committee also makes a suggestion regarding the process for future priority setting workshops.

Recommendation 1

The Priority Setting Workshop Committee recommends that Alberta Environment develop ambient air quality objectives or review existing objectives for the following 11 priority substances as part of its next three-year work plan:

- Mercury
- Ultrafine PM
- Para-cresol
- Radionuclides
- Acrolein
- Carbonyl sulphide
- Hydrogen sulphide
- Ammonia (ecological effects)
- Arsenic
- Cadmium
- Volatile Organic Compounds (Alberta Environment to choose one or two based on health effects and ozone forming potential)

Recommendation 2

The Priority Setting Workshop Committee recommends that the CASA Board send a letter to the appropriate ministries, including Alberta Environment, Alberta Agriculture and Rural Development, and Alberta Health and Wellness, advising them of the concerns of attendees at the priority setting workshop as well as members of the public with respect to agricultural odours.

Process Suggestion

Feedback received through the workshop evaluation forms was positive. Overall, participants were very satisfied with the way the workshop went and felt that the objectives were accomplished. There was a good mix of very knowledgeable people and those who were relatively new to the process, but were engaged and keen to be involved.

Based on its experience in organizing this, the third, priority setting workshop, the Workshop Committee suggests that organizers of future workshops should ensure:

a) there is a specific process for the afternoon plenary session, and
b) that one process for all breakout groups is established and followed.

1 Introduction

Ambient air quality objectives (AAQOs) are an important part of Alberta's air quality management system. Under section 14 of the *Environmental Protection and Enhancement Act*, Alberta Environment sets AAQOs for the province. When an objective is written into a facility approval, it becomes a legal requirement for that facility. The objectives are also very useful in airshed management and planning, and for communicating the state of air quality to the public.

Air quality objectives are generally established for 1-hour, 24-hour, and annual averaging periods. Alberta Environment considers scientific, social, technological, economic and other factors when objectives are set. It also manages a multi-stakeholder working group that provides ongoing advice on setting air quality management objectives. Alberta presently has AAQOs for 51 substances.[1]

Typically, the list of substances for which objectives are needed or for which existing objectives should be reviewed is examined on a regular basis. These priority substances then become the focus of Alberta Environment's work plan on objective development. One of the following approaches is used for the recommended substances:

- Objective *creation* is undertaken when no Alberta objective exists and the substance is a stakeholder priority.
- Objective *review* occurs when an Alberta objective is already in place and the objective is a stakeholder priority.

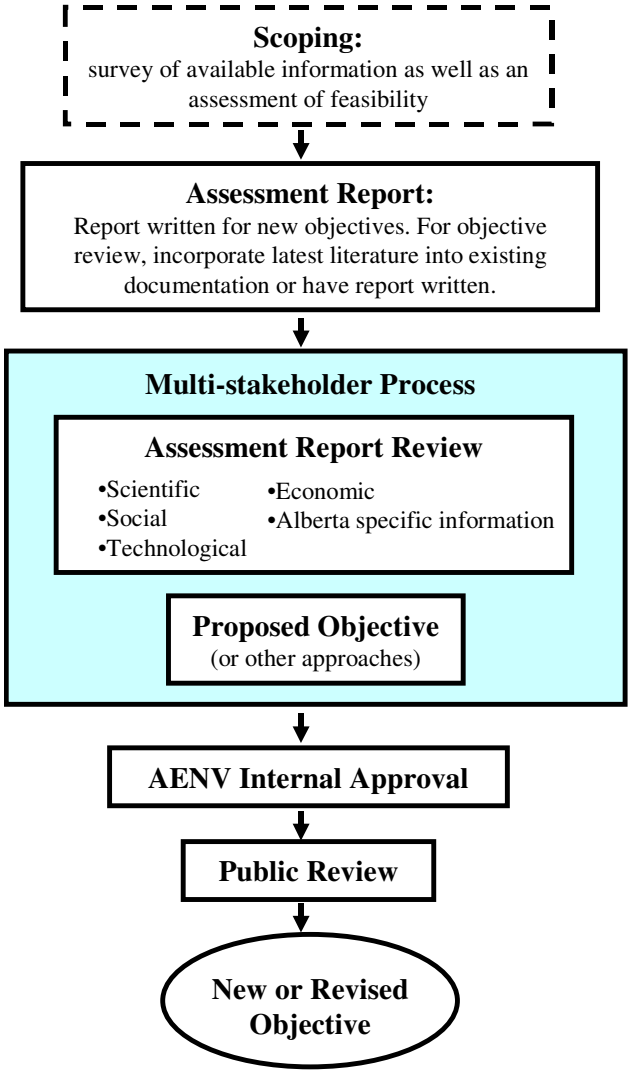
The task of deciding which substances should be part of the objective-setting process is an important one. In response to a recommendation from two previous CASA teams (the Multi-Stakeholder Group for Particulate Matter and Ozone and the Sulphur Dioxide Management Project Team), Alberta Environment decided to involve stakeholders in the process of identifying the priority substances for which objectives should be set or existing objectives reviewed. The overall process for developing new objectives or reviewing existing ones is shown in Figure 1.

With the help of CASA, Alberta Environment has held two previous priority-setting workshops, one in 2000 and one in 2004, to receive stakeholder input into the prioritization of substances for the objective setting process. Each workshop resulted in a priority list of substances that became the focus of Alberta Environment's three-year work plan. In 2009, Alberta Environment again asked CASA to organize a multi-stakeholder workshop to obtain input on a new list of priority substances for the next three-year work plan.[2] CASA is a neutral third party with no stake in the workshop outcome, and has extensive experience helping groups collaborate and reach consensus.

[1] A complete list of substances is available online at http://environment.alberta.ca/1066.html.

[2] It should be noted that objectives for three priority substances from the 2004 workshop are still under review: nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and benzene.

Figure 1. Steps in the Development of Ambient Air Quality Objectives After Prioritization of Substances



Creation of a new air quality objective may begin with a scoping phase. Different approaches to developing a new AAQO may be explored for the compound or group of compounds under review.

2 Overview of the 2009 Priority-Setting Workshop

In response to Alberta Environment's request, CASA established the Priority Setting Workshop 2009 Committee to plan and implement the third workshop. The committee was composed of representatives from government, industry and non-governmental organizations (see Appendix A). Its tasks were to oversee the 2009 Priority Setting Workshop, report back on the process, and make recommendations to Alberta Environment.

The goal of the workshop was to develop, with the help of knowledgeable stakeholders, a short list of 10-15 substances for Alberta Environment's Ambient Objective Setting Process. Prior to the workshop, the committee assembled material related to priority substances, including those substances nominated by Albertans.

Forty-two people from industry, government and non-government organizations attended the workshop to provide their input; participants and their affiliations are listed in Appendix A of the workshop proceedings. CASA and Alberta Environment made a particular effort to engage representatives of Aboriginal communities, both to obtain their views and insights and to increase their familiarity with the CASA consensus process. Their input reflected a holistic perspective, specifically that air pollutants and air emission sources can affect land, water and wildlife and we need to consider the effect of exposure to all air pollutants, not just individual contaminants.

3 Identification of Priority Substances

3.1 Background

Consistent with the previous two workshops, a list of substances was compiled to use as a starting point in determining priorities. Alberta Environment prepared a series of background fact sheets with additional information. As was done previously, Albertans were invited to nominate air pollutants that were of concern to them and for which they thought ambient air quality objectives should be developed or reviewed. The 2009 organizing committee prepared and implemented a communications plan to solicit nominations (see Appendix B), and received nominations from 31 individuals through this process (see Table 1).

Prior to the workshop, an information package was prepared and made available to invited stakeholders with the intent that the material would be reviewed and used at the workshop to develop the eventual list of priority substances. The package included:

- Information on releases of substances to the air in Alberta obtained from the 2007 National Pollutant Release Inventory,
- Substances from the 2004 Priority Setting Workshop,
- Information on substances nominated by the public for consideration at this workshop, and
- Chemical fact sheets, which were provided on the CASA website prior to the workshop and as hard copy to each breakout group at the workshop.

Substances from the above lists were ranked for their relative impact in four categories: human health criteria, eutrophication, acidification and smog, using characterization factors from the Tool for the Reduction and Assessment of Chemical and Other Environmental Factors (TRACI), where factors

were available. TRACI characterization factors were obtained from the US EPA. These rankings are shown in Tables 2-5.

Table 1. Substances Nominated by the Public

SUBSTANCES

Hydrogen sulphide
Mercury from coal-fired power plants
Acrolein
Sulphur oxides
Nitrogen oxides

MIXTURES

Automobile exhaust
Smoke from firepits
Sour gas
Emissions from flares
Emissions from oil and gas industry
Emissions from coal-fired energy generation
Materials used in outdoor furnaces
Total carcinogens (common endpoint)

AGRICULTURE

Odours from confined feeding operations
Crop sprays

INDOOR AIR QUALITY

Chemicals in laundry products (e.g. fabric softeners)
Air fresheners
Perfumes of all kinds in all products
Dryer sheets (smell from dryer vents)

LOCAL CONCERNS

Lethbridge human sewage treatment lagoon
Yeast/mouldy bread odours in north Lethbridge
Dust from gravel roads and construction sites

GREENHOUSE GAS EMISSIONS

CO_2
Methane

MISCELLANEOUS

Particles from tires (e.g., that affect the soil)
Chem trails

Table 2. Substances Ranked with Respect to Potential Impact on Human Health

	Chemical	CAS Number	HH Criteria Relative Impact
1	Sulphur dioxide	7446-09-5	1.18E+07
2	PM10 - Particulate Matter $\leq$ 10 Microns	NA - M09	3.46E+06
3	PM2.5 - Particulate Matter $\leq$ 2.5 Microns	NA - M10	3.07E+06
4	PM - Total Particulate Matter	NA - M08	2.86E+06
5	Oxides of nitrogen (expressed as NO_2)	11104-93-1	2.10E+06

Table 3 Substances Ranked with Respect to Potential Impact on Acidification

	Chemical	CAS Number	Acidification Relative Impact
1	Sulphur dioxide	7446-09-5	4.31E+10
2	Oxides of nitrogen (expressed as NO_2)	11104-93-1	3.81E+10
3	Ammonia (Total)	NA - 16	1.95E+09

Table 4 Substances Ranked with Respect to Potential Impact on Eutrophication

	Chemical	CAS Number	Eutrophication Relative Impact
1	Oxides of nitrogen (expressed as NO_2)	11104-93-1	4.21E+07
2	Ammonia (Total)	NA - 16	2.43E+06

Table 5 Substances Ranked with Respect to Potential Impact on Smog Formation

	Chemical	CAS Number	Smog Relative Impact
1	Oxides of nitrogen (expressed as NO_2)	11104-93-1	1.18E+09
2	Volatile Organic Compounds (VOCs)	NA - M16	2.08E+08
3	Carbon monoxide	630-08-0	7.75E+06
4	Ethylene	74-85-1	4.46E+06
5	Formaldehyde	50-00-0	2.10E+06
6	n-Hexane	110-54-3	1.59E+06
7	Propylene	115-07-1	1.39E+06
8	Toluene	108-88-3	1.36E+06
9	Methanol	67-56-1	1.23E+06
10	Acetaldehyde	75-07-0	1.11E+06
11	1,2,4-Trimethylbenzene	95-63-6	5.41E+05
12	Ethylene glycol	107-21-1	3.90E+05
13	Cyclohexane	110-82-7	3.48E+05
14	Ethylbenzene	100-41-4	2.80E+05
15	Styrene	100-42-5	2.50E+05
16	n-Butyl alcohol	71-36-3	1.71E+05
17	2-Butoxyethanol	111-76-2	1.54E+05
18	Acrolein	107-02-8	1.52E+05
19	Benzene	71-43-2	1.24E+05
20	i-Butyl alcohol	78-83-1	8.52E+04
21	1,3-Butadiene	106-99-0	7.42E+04
22	Phenol (and its salts)	108-95-2	2.29E+04
23	Cumene	98-82-8	1.51E+04
24	Naphthalene	91-20-3	1.17E+04
25	Isopropyl alcohol	67-63-0	5.90E+03
26	Dichloromethane	75-09-2	3.58E+02
27	Ethylene oxide	75-21-8	7.41E+01
28	Tetrachloroethylene	127-18-4	2.31E+01

	Chemical	CAS Number	Smog Relative Impact
29	Methyl tert-butyl ether	1634-04-4	1.75E+01
30	Isoprene	78-79-5	1.25E+01
31	Formic acid	64-18-6	1.77

3.2 Workshop Prioritization Process

Participants worked in three facilitated breakout groups to develop a list of substances for further discussion in the plenary session. As a starting point, participants were encouraged to use the information in the package distributed prior to the workshop. Experts familiar with the range of substances on the various lists circulated among the three breakout groups to answer any questions and provide additional insights as requested.

With reference to the information package, participants in their breakout groups nominated substances to be considered. The group discussed the nominated substances and why they should or should not be considered as candidates for the development of objectives. Each breakout group then prioritized its list to decide which substances should be presented for further consideration by all participants. The substance lists that were presented to the plenary session are show below in Table 1. The full lists considered by each group, along with further explanation and rationale, are shown in Appendix C of the workshop proceedings.

Table 6 Priority Substances Identified by Breakout Groups

Group 1	Group 2	Group 3
Ammonia (environmental effects)	Mercury	Para-cresol
Mercury (environmental effects)	Radionuclides	Acrolein
Ultrafine particulate matter	Ultrafine particulate matter	Total reduced sulphur
Ozone (vegetation impacts)	Cadmium	Particulate matter
Para-cresol	Glyphosate	Carbonyl sulphide
Arsenic	Cobalt	Mercury
Acrolein	Lead	Radionuclides
Hydrogen sulphide	Para-cresol	
Acetaldehyde	Hydrogen sulphide	
Thiophenes		
Carbonyl sulphide		
Silica		

Based on well-informed and active discussion, workshop participants agreed by consensus to a final list of 11 priority substances; this list appears in section 4 as part of the committee's recommendations. Workshop participants provided additional context for work on ammonia, mercury and mixtures:

- Participants noted that ammonia was reviewed in 2004 and there is a one hour limit based on odour. One participant advised that recent work from Europe suggests that ammonia can have significant ecological effects at levels much lower than the limit set for odour. The direction from the workshop is that the work done in 2004 should be reviewed and an additional limit should be established that is based on ecological effects.
- Mercury was on lists from previous priority setting workshops. The Canadian Council of Ministers of the Environment (CCME) has a Canada Wide Standard (CWS) for mercury

and is focusing on controlling emissions. Ambient levels are relatively low so an AQO may not be particularly useful. However, concerns about mercury remain high, especially with respect to bioaccumulation, and it would be good to have a meaningful AQO that is measurable and could be associated with deposition. If that is not possible, then emissions controls are really the only option.

- Concerns were noted about the potential health effects of mixtures. Mixtures are complex and difficult to address, requiring considerable time and resources. Alberta Environment should be encouraged to look at mixtures and their effect on air quality as opportunities arise.

4 Recommendations and Suggestions

Recommendation 1: Priority Substances

Based on stakeholder input at the 2009 Priority Setting Workshop, the Priority Setting Workshop Committee recommends that:

> Alberta Environment develop ambient air quality objectives or review existing objectives for the following 11 priority substances as part of its next three-year work plan:
>
> - Mercury
> - Ultrafine PM
> - Para-cresol
> - Radionuclides
> - Acrolein
> - Carbonyl sulphide
> - Hydrogen sulphide
> - Ammonia (ecological effects)
> - Arsenic
> - Cadmium
> - Volatile Organic Compounds (Alberta Environment to choose one or two based on health effects and ozone forming potential)

The Committee also brings to the attention of the CASA board six additional substances that were identified by the three breakout groups but did not receive a priority ranking by all workshop participants. These six substances are:

- Acetaldehyde
- Cobalt
- Glyphosate
- Lead
- Thiophenes
- Total reduced sulphur

Recommendation 2: Odours

A significant number of nominations from the public involved odours, most of which related to agricultural operations. Workshop participants agreed that the odour issue is important but that odour represents a mixture for which an AAQO is unlikely to be developed because odour does not meet the necessary criteria for an AAQO. Thus, it is not within the scope of this workshop and will be handled outside the priority-setting process. However, because of its importance and potential to affect air quality, the Priority Setting Workshop Committee recommends that:

The CASA Board send a letter to the appropriate ministries, including Alberta Environment, Alberta Agriculture and Rural Development, and Alberta Health and Wellness, advising them of the concerns of attendees at the priority setting workshop as well as members of the public with respect to agricultural odours.

Process Suggestion

Feedback received through the workshop evaluation forms was positive. Overall, participants were very satisfied with the way the workshop went and felt that the objectives were accomplished. There was a good mix of very knowledgeable people and those who were relatively new to the process, but were engaged and keen to be involved.

Based on its experience in organizing this, the third, priority setting workshop, the Workshop Committee suggests that organizers of future workshops should ensure:

a) there is a specific process for the afternoon plenary session, and
b) that one process for all breakout groups is established and followed.

Appendix A: Priority-Setting Workshop Organizing Committee

Laura Blair	Alberta Environment
Linda Jabs	CASA Secretariat
Natasha Rowden	CNRL
Ruth Yanor	Meewasin Community Council

Appendix B: Communications Activities

The goal of the Priority Setting Workshop was to provide a short list of priority substances for which Alberta Environment would develop ambient air quality objectives. As part of the process of developing this list, Albertans were asked to nominate air pollutants that were of concern to them and for which they thought objectives were needed.

To help CASA stakeholders and interested Albertans nominate substances, the Workshop Committee prepared a nomination form along with advertisements and promotional messages to solicit nominations. The ads and promotional messages described how to nominate a substance, and the nomination form was made available on the CASA website and on request to the CASA office.

Articles were placed in CASA's online Clean Air Bulletin, on the CASA home page, and in other stakeholder publications and websites. E-mail notices were sent to individual CASA stakeholders.

Articles were submitted to Alberta weekly newspapers, and advertisements were purchased in all weekly papers as well as the major Alberta daily papers.

Messages and advertisements were placed in July with a nomination deadline of September 25, 2009.