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

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Priority Setting Workshop Final Report Of The Organizing Committee

Clean Air Strategic Alliance

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By consensus, the CASA board of directors approved this report at the March 17, 2005 meeting.

This report is available as an Adobe Acrobat™ PDF file on the CASA Web site at http://www.casahome.org.

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 be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals or the environment.

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Compounds, Abbreviations and Acronyms

AAQOWG	Ambient Air Quality Objectives Working Group
B(a)P	Benzo(a)pyrene
BATEA	Best Available Technology Economically Achievable
BTEX	A mixture of benzene, toluene, ethylbenzene and xylene
CASA	Clean Air Strategic Alliance
CS_2	Carbon disulphide
EPT	Electricity Project Team (of CASA)
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides (also oxides of nitrogen)
NPRI	National Pollutant Release Inventory
NRCB	Natural Resources Conservation Board
OSB	Oriented Strand Board
PAH	Polycyclic Aromatic Hydrocarbons
PM	Particulate matter
PMRA	Pest Management Regulatory Agency
PSW	Priority Setting Workshop
SO_2	Sulphur dioxide
TLV	Threshold limit value
VOCs	Volatile organic compounds

Executive Summary

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 held the first priority-setting workshop in October 2000 to receive stakeholder input into the prioritization of substances for the objective setting process. This workshop resulted in a priority list of substances that became the focus of Alberta Environment's three-year work plan. Participants also recommended that a similar process be used to identify future priorities. When objective development and review of the priority substances from 2000 were nearing completion, 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 2004 Committee to plan and implement the second 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. All suggestions were subjected to a filtering process, and workshop participants further refined the lists. Consensus was reached on seven priority substances, as well as on a list of substances that are important but require additional information before a decision can be made on their priority status. The workshop committee also developed suggestions regarding the process for future priority setting workshops.

Recommendations on Priority Substances

Recommendation 1

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

- Nitrogen oxides
- Benzene
- B(a)P (PAH indicator)
- Naphthalene
- Formaldehyde
- Hydrogen fluoride
- Carbonyl sulphide

Recommendation 2

The Priority Setting Workshop Committee recommends that Alberta Environment gather additional information on the following substances, and provide this information as input to the next priority-setting workshop in three to four years:

- Aluminum
- Radionuclides
- Sulphur hexafluoride
- Mercury
- Vinyl acetate
- Selenium
- PAH group
- Cobalt

Recommendation 3

The Priority Setting Workshop Committee recommends that the ambient air quality objectives being developed for carbon disulphide and sulphur dioxide should be completed as quickly as possible.

Non-consensus recommendation

Workshop participants recognized the importance of odours as an air quality issue, but were unable to agree on how they should be addressed. The Priority Setting Workshop Committee is aware that a CASA working group is developing terms of reference for a project team to come up with an air quality strategic plan for confined feeding operations, and that odours may be considered as part of this project. Nevertheless, some workshop participants were of the view that Alberta Environment has responsibilities in this area and asked that the report reflect concern about odours and their management in the province.

Thus the non-consensus recommendation from the workshop is that:

> Alberta Environment should formulate a plan for developing and implementing an odour management framework for the province.

Process Suggestions

Based on its experience in organizing this, the second, priority setting workshop, the Workshop Committee offers two process suggestions for future organizing committees to consider.

1. At the 2004 workshop, participants requested a list of the substances from the 2000 workshop that Alberta Environment had considered but decided that ambient air quality objectives were not required. The committee provided the list at this workshop but it would be helpful to distribute such a list as part of the preparatory materials for future workshops.
2. To streamline the process for the workshop and give participants a more manageable list of substances to start with, the 2004 Workshop Committee used various tools to filter the large initial list of potential priority substances. Assuming that future organizing committees also use a filtering process, the committee suggests that the process and rationale be more thoroughly described in the pre-workshop reading materials. This would give participants a better understanding of how the initial list of substances was assessed.

1. Introduction

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.

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 and co-facilitates the Ambient Air Quality Objectives Working Group, a multi-stakeholder working group that provides ongoing advice on setting air quality management objectives. Alberta presently has ambient air quality objectives for 39 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. Four approaches for objective development have been identified: *creating*, *reviewing*, *adopting*, *and updating*. The approach that is taken depends on two factors: whether an objective exists in Alberta, and whether it is a stakeholder priority or a department need.

- 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.
- An objective is *adopted* when no Alberta objective exists and Alberta Environment needs the objective.
- Objective *updates* take place when an Alberta objective is currently in place and Alberta Environment considers that the objective needs to be revisited.

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 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.

With the help of CASA, Alberta Environment held the first priority-setting workshop in October 2000 to receive stakeholder input into the prioritization of substances for the objective setting process. This workshop resulted in a priority list of substances that became the focus of Alberta Environment's three-year work plan. Participants also recommended that a similar process be used to identify future priorities. When objective development and review of the priority substances from 2000 were nearing completion, Alberta Environment again asked CASA to organize a multi-stakeholder workshop to obtain input on a list of priority substances for the next three-year work plan. 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 ambient objectives and other information is available online at http://www3.gov.ab.ca/env/air/OGS/index.html.

2. Overview of the 2004 Priority-Setting Workshop

In response to Alberta Environment's request, CASA established the Priority Setting Workshop 2004 Committee to plan and implement the second workshop. The committee comprised representatives of government, industry and non-governmental organizations (see Appendix A). Its tasks were to oversee the 2004 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. Workshop participants were encouraged to reach consensus on the short list, but if that was not possible, Alberta Environment staff would use their best judgment in selecting substances for the objective-setting process from the longer list submitted to them.

Prior to the workshop, the committee assembled suggestions for priority substances, including those nominated by Albertans. All suggestions were subjected to a filtering process, which is described in more detail in sections 3 and 4 below. Forty-four participants attended the workshop to provide their input; participants and their affiliations are listed in the workshop proceedings (Appendix B).

3. Identification of Substances

3.1 Compilation of the Initial List of Substances

Compiling a list of substances from which to develop priorities was the starting point for both the 2000 and 2004 workshops. Public input was sought and Alberta Environment prepared a series of background fact sheets that were used for both workshops. These included details on emissions, uses, environmental levels and exposures, environmental fate and behaviour, toxicity, and ambient air quality guidelines from various jurisdictions. The fact sheets were available on the CASA website prior to the workshop.

In preparation for the 2000 workshop, a Scientific Advisory Committee was struck specifically to review more than 128 stakeholder nominations for ambient air quality guidelines. Following this review, the committee presented its recommendations for substances that it considered to be priorities for guideline development, along with the criteria it used to make these assessments.

As was the case in 2000, 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 2004 organizing committee prepared and implemented a communications plan to solicit nominations (see Appendix C), and received nominations from 60 individuals through this process (see Table 1).

Table 1: Substances nominated by the public

Substances that were on the initial list

Ammonia	Metals - arsenic, cadmium, chromium
Arsenic	Methyl bromide
Benzene	Nitrogen dioxide
Benzenes and like carcinogens	NO_2 which features in the Carrot Creek reports
Carbon dioxide	NO_3 which features in the Carrot Creek reports
Carbon disulphide	O_3 for its detrimental effects on the natural cycles
Cobalt	Ozone
Dioxins	Particular matter
Dust particles	Polycyclic Aromatic Hydrocarbons - naphthalene, benzo(a)pyrene
Formaldehyde	Selenium
Furans	Sulphur dioxide
Hydrogen sulphide	Sulphur oxides
Lead	Toluene
Mercury	VOCs - Hexane, BTEX compounds

Substances that were not on the initial list

Deoxidizers (chlorine and derivates)	Brominated flame retardants
Carbonyl sulphide	Radionuclides
Nitrogen	

Mixtures

Compressor emissions	Generator emissions
Emissions from housed livestock	Idling vehicle emissions
Emissions from personal water craft, ATV and snowmobiles	

Local concerns

Odours from the Cloverbar landfill site	Wood Burning BBQ's
Particulate from LaFarge cement plant	
Particulate from asphalt plants (O'Hanlon, Park Paving, etc.)	
Wainwright area emissions such as NH4, H2S, and particulate matter are of major concern.	

Indoor Air Quality

Cigarette Smoke	Toner products
Fragrance emissions from perfumes and lotions	

Greenhouse Gas Emissions

Greenhouse Gas Emissions	Perfluorocarbons

Miscellaneous

Any element that has an effect on health	Lack of education
Odours in general	Pheromones
Skunks	Plant fugitive emissions by area - updated annually

The committee reviewed this list and noted that many of the substances also appeared on the list from the 2000 workshop. Specific additional substances were added to this list, which represented the starting point for the 2004 prioritization process (see Table 2). A number of other nominated substances were not specific enough to be considered further in the prioritization process. Among these were substances that are not monitored as part of Alberta Environment's ambient air quality monitoring network, and some are found only in indoor air. Some of them were mixtures, such as emissions from compressor stations, vehicles and livestock, while others reflected very specific local concerns, such as odours from a nearby landfill site or from industrial facilities.

Table 2: Complete initial list of substances compiled for 2004 priority setting workshop

Acetaldehyde
Acetone
Acetylene
Acrolein
Acrylamide
Acrylic acid
Acrylonitrile
Aldrin
Aluminum
Ammonia
Antimony (and compounds)
Arsenic (and compounds)
Barium
Benzene
Benzo(a)pyrene
Beryllium (and compounds)
Bromomethane
1,3-butadien
Butyric acid
BTEX
Cadmium (and compounds)
Carbon dioxide
Carbon disulphide
Carbon monoxide
Carbon tetrachloride
Chlordane
Chlordecone
Chlorine
Chlorine dioxide
Chloroform
Chromium (and compounds)
Cobalt
Copper
Cumene
Decane
Dicamba
1,4-dichlorobenzene
DDE
Dichloromethane
2,4-dichlorophenoxyacetic acid
1,2-dichloropropane
1,3-dichloropropene
Dieldrin
Di (2-ethylhexyl) phthalate
Dioxins (and furans)
Dursban (Chlorpyrifos)
Endrin
Ethane
Ethyl acrylate
Ethyl benzene (VOC)
Ethylene
Ethylene dibromide
Ethylene dichloride
Ethylene oxide
2-ethylhexanol
Ethynyl benzene
Formaldehyde
Glutaraldehyde
Glyphosate
Heptachlor
Heptane
Hexabromobiphenyl
Hexachlorobenzene
Hexane
Hydrazine
Hydrogen
Hydrogen sulfide
Iron
Isocyanates
Isopropyl Alcohol (Isopropanol) (VOC)
Lead (and compounds)
Lindane
Manganese (and compounds)
Mecoprop
Mercaptan
Mercury (and compounds)
Methane
Methyl bromide
Methyl chloride
Methyl chloroform
Methylene chloride
Methylene diphenyl diisocyanate
Mirex
Molybdenum
Napthalene
Nickel (and compounds)
Nitric acid
Nitric oxide
Nitrogen dioxide
Nitrogen oxide
Nonane
Octane
Ozone (ground level)
Fine particulate matter ($PM_{2.5}$)
Coarse particulate matter ($PM_{2.5-10}$)
Pentachlorophenol
Perchloroethylene
Phenol
Polyaromatic hydrocarbons (PAHs)
Polychlorinated biphenyls (PCBs)
Propylene oxide
Quinoline
Selenium (and compounds)
Silica
Silver
Styrene
Sulphur dioxide
Terpenes
1,1,2,2-tetrachloroethane
Tin
Titanium
Toluene

2,4-toluene diisocyanate (TDI)	1,1,2-trichloroethane	Vinylidene chloride
Total reduced sulphur (TRS)	Trichloroethylene (TCE)	Volatile organic compounds (VOCs)
Toxaphene	2,4,6-trichlorophenol	Xylenes
	Vanadium (and compounds)	Zinc
	Vinyl chloride	Zirconium

The list of priority substances from the 2000 workshop was quite long and this was acknowledged as a concern at the time. Nevertheless, Alberta Environment and the Ambient Air Quality Objectives Working Group reported to the 2004 workshop that objectives had been developed, reviewed, or are in development for a number of substances, through the objective setting process that was in place from 2001 to 2004. The committee used this as one criterion in its prioritization process, which reduced the list of substances to be considered at the 2004 workshop. The committee's prioritization process is described more fully in section 4.

4. Prioritization Process for 2004 Workshop

To streamline the process for the workshop and give participants a more manageable list of substances to start with, the Workshop Committee developed a method of filtering the large initial list of potential priority substances described in section 3. This filtering activity was phase one of the prioritization process and is described in detail in Appendix D. During the workshop (phase two of the prioritization process), participants further refined the lists with the goal of developing a final list of 10-15 substances for Alberta Environment's objective-setting process.

4.2 Prioritization Process: Phase One (Filtering)

The committee looked first at substances that were being addressed by other processes, specifically:

- Whether the substance has a current ambient objective or is or has been recently reviewed by Alberta Environment,
- Whether the substance is being or has been reviewed under the Canada Wide Standards process, and
- Whether the Pest Management Regulatory Review certification has been withdrawn for the substance or if it is otherwise prohibited from use in Canada.

The results of these three filtering processes are shown in Table 3.

Table 3: Substances that are being addressed by other processes

Substances with objectives currently in effect that were not reviewed through the 2001 Alberta Environment Objective Setting Process

Acetaldehyde	Formaldehyde
Benzene	Lead (and compounds)
Carbon monoxide	Methylene diphenyl diisocyanate
Chlorine	Nitrogen dioxide
Chlorine dioxide	Phenol
Chromium (and compounds)	Styrene
Coarse particulate matter	Vinyl chloride
Ethylene oxide	Volatile organic compounds (VOCs)

Table 3 continued on next page

Substances with objectives developed, reviewed, or in development through the 2001 Alberta Environment Objective Setting Process

2-ethylhexanol	Isopropyl alcohol (Isopropanol)
Acetone	Manganese (and compounds)
Acrylonitrile	Nickel (and compounds)
Ammonia	Ozone (ground level)
Arsenic (and compounds)	Pentachlorophenol
Carbon disulphide	PM2.5
Cumene	Propylene oxide
Ethyl benzene	Sulphur dioxide
Ethylene	Toluene
Hexane	Total reduced sulphur (TRS)
Hydrogen sulphide	Xylenes

Substances under elimination via the Stockholm Convention on Persistent Organic Pollutants (entered into force 17 May 2004); the Prohibition of Certain Toxic Substances Regulations, 2003; and/or no longer registered for use in Canada under the Pest Control Products Act

Aldrin	Hexabromobiphenyl
Chlordane	Hexachlorobenzene
Chlordecone	Mirex
Dieldrin	Polychlorinated biphenyls (PCBs)
Endrin	Toxaphene
Heptachlor	

Substances undergoing the Canada Wide Standard Process

Dioxins (and furans)	Mercury (and compounds)

Substances that have been virtually eliminated

Bromomethane	Carbon tetrachloride
1,3-butadiene	Dichloromethane

Following these three concurrent filtering processes, the committee used a relative risk ranking process for some of the remaining substances, as described in Appendix C. If a threshold limit value (TLV) and data on ambient concentration were available for a substance, its risk index could be calculated. Based on this data, some substances were then ranked, see Table 4.

Table 4: Substances ranked by the ambient concentration-TLV method

Substance	TLV (mg/m3)	Ambient Mean (ug/m3)	Risk Index
Cobalt	0.02	0.0010	49.150
Aluminum	10.00	0.28	28.218
Copper	1.00	0.025	25.152
Cadmium	0.01	0.00021	21.331
Barium	0.50	0.0091	18.143
Naphthalene	52.43	0.59	11.283
Methyl chloride	103.25	1.15	11.175
Ethane	1230.27	9.43352	7.668
1,1,2,2-tetrachloroethane	6.87	0.050	7.311
1,3-dichloropropene	4.54	0.015	3.405
Titanium	10.00	0.034	3.403
Vinylidene chloride	19.83	0.057	2.860
Perchloroethylene	169.53	0.46	2.709
Chloroform	48.83	0.13	2.705
Ethylene dichloride	40.47	0.10	2.551
1,4-dichlorobenzene	60.13	0.10	1.737
Silver	0.10	0.00015	1.491
Selenium (and compounds)	0.20	0.00022	1.104
Antimony (and compounds)	0.50	0.00050	0.993
Trichloroethylene (TCE)	268.71	0.22	0.824
1,1,2-trichloroethane	54.56	0.038	0.699
Heptane	1639.26	1.1	0.659
Nonane	1049.16	0.42	0.400
Octane	1401.47	0.44	0.314
Tin	2.00	0.00060	0.299
Zirconium	5.00	0.0013	0.265
Methyl chloroform	1909.90	0.30	0.158
1,2-dichloropropane	346.60	0.035	0.101
Molybdenum	10.00	0.00088	0.088
Nitric oxide	30.69	0.00059	0.019

Notes:
1. For aluminum, the TLV for metal dust was used.
2. For titanium, the TLV for titanium dioxide was used
3. For molybdenum, the TLV for metal and insoluble compounds was used.

This left nearly 75 substances unranked for various reasons. These are shown in Table 5.

Table 5: Unranked remaining substances

Acetylene	Dursban (Chlorpyrifos)	Nitric acid
Acrolein	Ethane	Nitric oxide
Acrylamide	Ethyl acrylate	Nitrogen oxide
Acrylic acid	Ethylene dibromide	Nonane
Aluminum	Ethylene dichloride	Octane
Antimony (and compounds)	Ethynyl benzene	Perchloroethylene
Barium	Glutaraldehyde	Polyaromatic hydrocarbons (PAHs)
Benzo(a)pyrene	Glyphosate	Quinoline
Beryllium (and compounds)	Heptane	Selenium (and compounds)
Butyric acid	Hydrazine	Silica
BTEX	Hydrogen	Silver
Cadmium (and compounds)	Iron	Terpenes
Carbon dioxide	Isocyanates	1,1,2,2-tetrachloroethane
Chloroform	Lindane	Tin
Cobalt	Mecoprop	Titanium
Copper	Mercaptan	2,4-toluene diisocyanate (TDI)
Decane	Methane	1,1,2-trichloroethane
Dicamba	Methyl bromide	Trichloroethylene (TCE)
1,4-dichlorobenzene	Methyl chloride	2,4,6-trichlorophenol
Dichlorodiphenyldichloroethylene (DDE)	Methyl chloroform	Vanadium (and compounds)
2,4-dichlorophenoxyacetic acid	Methylene chloride	Vinylidene chloride
1,2-dichloropropane	Molybdenum	Zinc
1,3-dichloropropene	Naphthalene	Zirconium
Di (2-ethylhexyl) phthalate		

4.3 Prioritization Process: Phase Two (the Workshop)

The Priority Setting Workshop represented phase two of the prioritization process. Participants were provided with the results and rankings of the committee's filtering prior to the workshop and the process was reviewed in the first plenary session. Participants then worked in three facilitated breakout groups to develop a list of substances for further discussion by everyone. Each breakout group was given the list of substances arising from the 2000 priority-setting workshop for which objectives have been or are being developed. They also requested the list of substances for which Alberta Environment and the Ambient Air Quality Objectives Working Group decided not to develop objectives. With this background information, each breakout group prepared a list of priority substances for discussion by all workshop participants. Despite the prioritization work that was done by the committee prior to the workshop, participants could still propose any substance for consideration by the workshop. (See Appendix C, the Workshop Proceedings, for these lists and the rationale for the various substances on them.)

Based on well-informed and active discussion at the workshop, final lists were proposed and these appear in section 5 as part of the committee's recommendations.

5. Recommendations

Based on the results of the Priority-Setting Workshop and its experience in organizing this workshop, the Priority Setting Workshop Committee is making recommendations in two main categories:

a. Recommendations on priority substances
b. Suggestions regarding the process for future priority setting workshops

5.1 Recommendations on Priority Substances

Workshop participants reached consensus on a list of seven priority substances, as well as on a list of substances that are important but require additional information before a decision can be made on their priority status. The Workshop Committee thus makes the following recommendations based on stakeholder input at the 2004 Priority Setting Workshop.

Recommendation 1

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

- Nitrogen oxides
- Benzene
- B(a)P (PAH indicator)
- Naphthalene
- Formaldehyde
- Hydrogen fluoride
- Carbonyl sulphide

Recommendation 2

The Priority Setting Workshop Committee recommends that Alberta Environment gather additional information on the following substances, and provide this information as input to the next priority-setting workshop in three to four years:

- Aluminum
- Radionuclides
- Sulphur hexafluoride
- Mercury
- Vinyl acetate
- Selenium
- PAH group
- Cobalt

Recommendation 3

Two other substances for which ambient air quality objectives are being developed were affirmed by workshop participants as important emissions. Thus, the Priority Setting Workshop Committee recommends that the ambient air quality objectives being developed for carbon disulphide and sulphur dioxide should be completed as quickly as possible.

Non-consensus recommendation

Workshop participants recognized the importance of odours as an air quality issue, but were unable to agree on how they should be addressed. The Priority Setting Workshop Committee is aware that a CASA working group is developing terms of reference for a project team to come up with an air quality strategic plan for confined feeding operations, and that odours may be considered as part of this project. Nevertheless, some workshop participants were of the view that Alberta Environment has responsibilities in this area and asked that the report on priority substances reflect concern about odours and their management in the province.

Thus the non-consensus recommendation from the workshop is that:

> Alberta Environment should formulate a plan for developing and implementing an odour management framework for the province.

5.2 Process Suggestions for Future Priority Setting Workshops

Based on its experience in organizing this, the second, priority setting workshop, the Workshop Committee offers two process suggestions for future organizing committees to consider.

At the 2004 workshop, participants requested a list of the substances from the 2000 workshop that Alberta Environment had considered but decided that ambient air quality objectives were not required. The committee provided the list at this workshop but it would be helpful to distribute such a list as part of the preparatory materials for future workshops.

To streamline the process for the workshop and give participants a more manageable list of substances to start with, the 2004 Workshop Committee used various tools to filter the large initial list of potential priority substances. Assuming that future organizing committees also use a filtering process, the committee suggests that the process and rationale be more thoroughly described in the pre-workshop reading materials. This would give participants a better understanding of how the initial list of substances was assessed.

6. Next Steps

This priority setting workshop was the first step in this round of development or review of ambient air quality objects for Alberta. The seven priority substances identified in Recommendation 1 will go to Alberta Environment for development of a three year work plan that will be carried out with the assistance of a multi-stakeholder working group.

The eight substances that are identified in Recommendation 2 will also go to Alberta Environment to gather information on the substances and prepare a fact sheet or update existing fact sheets. This information will be provided to the next Priority Setting Workshop Organizing Committee.

In conclusion, this was the second priority setting workshop held to provide input to Alberta Environment. Reflecting comments from workshop participants and its own experience, the Workshop Organizing Committee strongly believes this process has value and is very much worth continuing.

Appendix A: Priority-Setting Workshop Organizing Committee

Laura Blair	Alberta Environment
Matthew Dance	CASA Secretariat
Long Fu	Alberta Environment
Wendy Lyka	NOVA Chemicals
Russ Miyagawa	Toxics Watch Society
Michael Queenan	Residents for Accountability in Power Industry Development

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 Web site and on request to the CASA office.

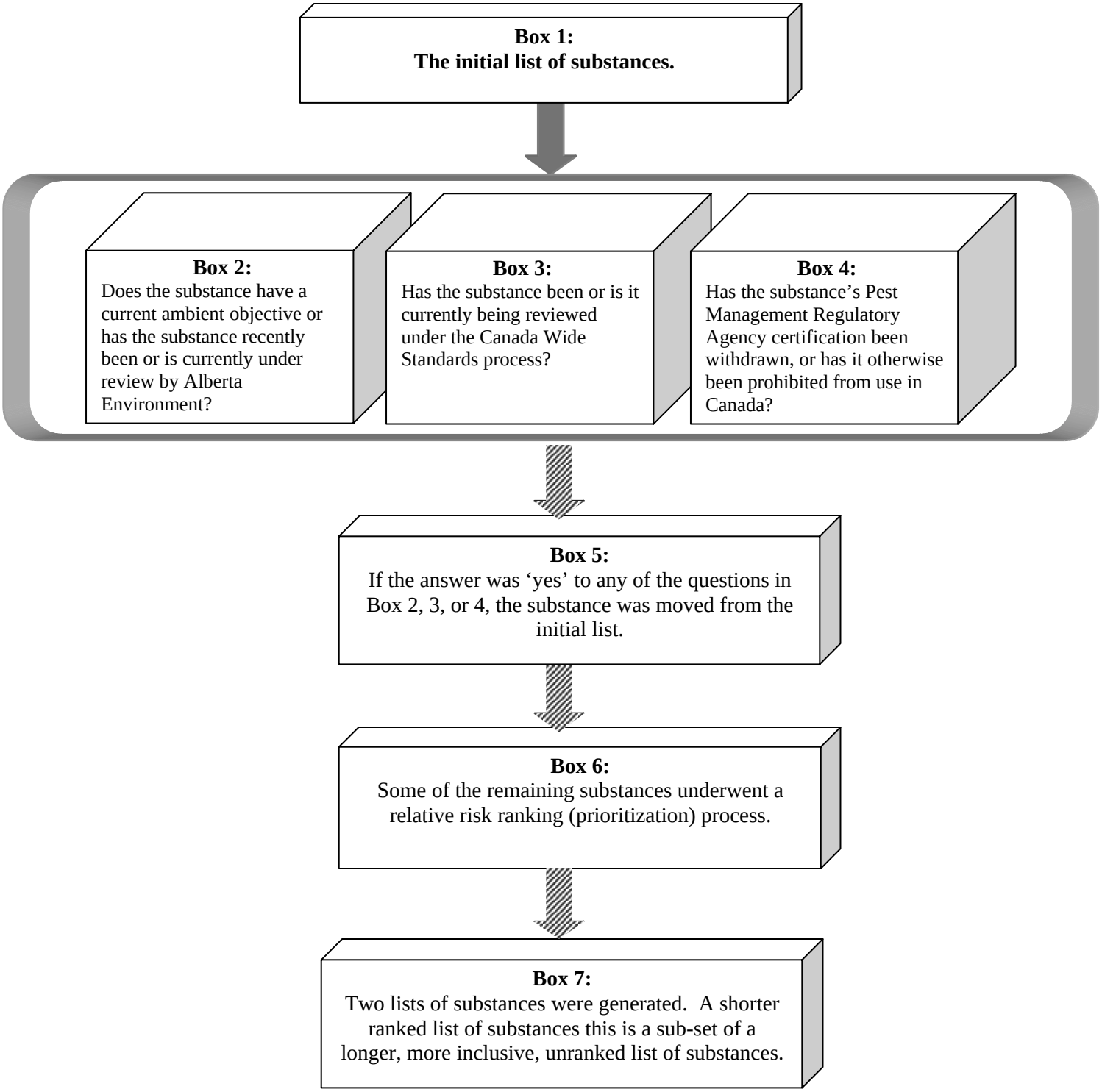
Articles were placed in CASA's online Clean Air Bulletin, on the CASA home page, and in other stakeholder publications and Web sites. E-mail notices were sent to individual CASA stakeholders and to individuals who had participated in the 2003 public consultations of CASA's Electricity Project Team.

Articles were submitted to Alberta weekly newspapers, and advertisements were purchased in all weekly papers as well as three major Alberta dailies: *The Edmonton Journal, Calgary Herald* and *Red Deer Advocate*. CASA communications staff also pitched the story to Alberta's seven daily papers.

Messages and advertisements were sent by July 30, 2004 with a nomination deadline of September 1, 2004, giving people 33 days in which to submit their nominations for consideration at the October workshop.

Appendix C: Filter Process

To provide a more manageable list of substances to the PSW 2004, the PSW Committee developed a filter process to identify substances that have been, or are currently being addressed through other processes that are relevant to Alberta. The diagram below represents the filter process, and is followed by a more detailed explanation.



Explanation of the Filter Process

Box 1

"The initial list of substances."

The initial list of substances was generated by the Science Advisory Committee during the 2000 Priority Setting Workshop process. The nominations for substances from the 2000 and 2004 processes are also included in this list.

The questions in Boxes 2, 3, 4, and 5 were applied concurrently to the initial and nominated list of substances to identify substances that were being addressed by other processes.

Box 2

"Does the substance have a current ambient objective or has the substance recently been or is currently under review by Alberta Environment?"

The purpose of this filter was to identify those substances for which:

- an ambient objective has been developed,
- the substance is currently under review, or
- an objective is currently being developed for the substance under Alberta Environment's 2001 Objective Setting Work Plan.

The priority list of substances developed at the 2000 Priority Setting Workshop fed into Alberta Environment's 2001 Objective Setting Work Plan.

Volatile organic compounds (VOCs) were examined by Alberta Environment's multi-stakeholder Objective Setting Working Group during the last three-year work plan. It was found that for four of the VOCs examined:

- Two have no known local sources and the ambient levels are close to global background (bromomethane and carbon tetrachloride)
- One has an ambient trend that is going down with little or no difference between urban and rural levels (dichloromethane)
- And, that the ambient trend of 1,3-butadiene is downward and consistent among the cities but ambient levels will continue to be monitored.

Box 3

"Has the substance been or is it currently being reviewed under the Canada Wide Standards process?"

Substances were identified if there currently is a Canada Wide Standard (CWS) or if the Canadian Council of the Ministers of the Environment (CCME) is currently working on a CWS (mercury, and dioxins and furans). More information on the CWS process is available at: http://www.ccme.ca/initiatives/standards.html.

Box 4

"Has the substance's Pest Management Regulatory Agency (PMRA) certification been withdrawn, or has it otherwise been prohibited from use in Canada?"

Several of the compounds on the initial list were substances that have been banned for use in Canada. Some were pesticides that the PMRA has withdrawn their certification for use. Other substances have been prohibited (use, sale, manufacture, or import) under the Prohibition of Certain Toxic Substances Regulations, 2003.

Box 5

"If the answer was 'yes' to the questions in Box 2, 3, or 4, the substance was moved from the initial list."

Table 2 in this report contains a list of the substances that were identified as a result of Box 2, 3, or 4.

Box 6

"Some of the remaining substances underwent a relative risk ranking (prioritization) process."

The ranked list of substances and the remaining unranked list appear in Tables 4 and 5 respectively in the main body of this report.

Substances were ranked using risk contributions based on the *TLV TWA* (Threshold Limit Values – Time Weighted Average) from *2004 TLVs® and BEIs® Based on the Documentations of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices by the ACGIH* (American Conference of Governmental Industrial Hygienists).

> "Threshold limit values (TLVs) refer to airborne concentrations of chemical substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects. TLVs are developed to protect workers who are normal healthy adults."

The calculation used to determine the risk is:

$$RI = \frac{\text{Ambient Concentration } (\mu g/m^3)}{\text{TLV / TWA } (mg/m^3)} \times 1000$$

Where: RI = Risk Index
TLV/TWA = Threshold Limit Value / Time Weighted Average

The ambient concentration was taken from the National Air Pollution Surveillance (NAPS) Network. The data used spanned 2000 to 2002. Each year was averaged at a given site, the average of the years was found, then these numbers were averaged to give one representative number. The three sites are Edmonton Central, Edmonton East, and Calgary Central for the VOC list. For the metals in the list, only Edmonton Central provided three years of data, so only its values were used.

In order to be able to calculate a risk index, two pieces of information are required; a TLV and an ambient concentration. The following substances were missing at least one piece of information:

Beryllium	Glutaraldehyde
Butyric acid	Glyphosate
Decane	Hydrazine
Dicamba	Lindane
Dichlorodiphenyldichloroethylene (DDE)	Mecoprop
2,4-Dichlorophenoxyacetic acid	Mercaptan
Dursban (chlorpyrifos)	Methane
Ethyl acrylate	Quinoline
Ethylene dibromide	2,4,6-Trichlorophenol
Ethynyl benzene	

The following are classes or combinations of substances that do not have a TLV or an ambient concentration; thus ranking is not possible for these substances:

BTEX	Polychlorinated biphenyls (PCBs)
Isocyanates	Silica
Polycyclic aromatic hydrocarbons (PAHs)	Terpenes

The following are listed in 2004 TLVs® and BEIs® as "simple asphyxiants." The substances themselves carry no inherent toxicity, rather the concern is that they will displace oxygen, and that oxygen deprivation is the principal concern:

Acetylene	Hydrogen

The substances in the next list are identified as carcinogenic, and as such require a different ranking method than the Relative Risk Index:

Benzo(a)pyrene	Quinoline
Hydrazine	Ethyl acrylate

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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 be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals or the environment.

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Contents

Compounds, Abbreviations and Acronyms

AAQOWG	Ambient Air Quality Objectives Working Group
B(a)P	Benzo(a)pyrene
BATEA	Best Available Technology Economically Achievable
BTEX	A mixture of benzene, toluene, ethylbenzene and xylene
CASA	Clean Air Strategic Alliance
CS_2	Carbon disulphide
EPT	Electricity Project Team (of CASA)
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides (also oxides of nitrogen)
NPRI	National Pollutant Release Inventory
NRCB	Natural Resources Conservation Board
OSB	Oriented Strand Board
PAH	Polycyclic Aromatic Hydrocarbons
PM	Particulate matter
PSW	Priority Setting Workshop
SO_2	Sulphur dioxide
TLV	Threshold limit value
VOCs	Volatile organic compounds

1 Introduction

Matthew Dance, CASA project manager for the Priority Setting Workshop (PSW) Organizing Committee, convened the workshop (see Appendix A for a list of participants). He noted that CASA is holding this workshop as a means of providing input to Alberta Environment on priority substances for which ambient air quality objectives should be set. Long Fu and Wendy Lyka from the organizing committee presented additional background on the priority setting process and the work done by the committee in preparation for the workshop. Matthew also presented information about CASA and the consensus process, and reviewed the agenda for the day. He noted that the product of the workshop will be submitted to Alberta Environment and that a final report, including the workshop outcomes, will be prepared for the CASA board.

1.1 Background

Alberta Environment is mandated under section 14 of the *Environmental Protection and Enhancement Act* to set ambient air quality objectives. These objectives are an important component of the air quality management system in Alberta for several reasons. 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.

Alberta Environment considers scientific, social, technological, economic and other factors when objectives are set. The department manages and co-facilitates a multi-stakeholder working group[1] that provides ongoing advice on setting air quality management objectives. The first priority setting workshop was held in 2000, and was organized by CASA. The priorities from that workshop were incorporated into a three-year work plan for the department, which is now nearing completion. Long Fu presented a list of substances for which objectives had been developed or reviewed or were in development as a result of the previous objective-setting process. Work remains to be done on four substances (three sulphur compounds and ammonia). The priority substances identified from the 2004 workshop will be incorporated into a new three-year work plan for Alberta Environment.

1.2 Workshop Goal and Filter Process

The goal for the 2004 workshop was to provide a short list of 10-15 substances to Alberta Environment's objective-setting process. It was desirable to produce a consensus short list for Alberta Environment but if that was not possible, department staff would use their best judgment in selecting substances from the longer list submitted to them.

The PSW organizing committee developed a filter process to give workshop participants more information and tools to help prioritize the substances. A number of filters were developed with the goal of identifying those substances for which ambient objectives are in the process of being created, or substances that have undergone a process to create an ambient objective. Additional information was provided to participants in the background package distributed prior to the workshop.

[1] The Ambient Air Quality Objectives Working Group.

1.3 Questions and Discussion

In response to several questions from participants, the following additional information was provided for clarification.

- In the breakout groups, participants will still have the opportunity to add substances that did not make it onto the ranked list for one reason or another. This will include substances nominated by the public and those for which ambient objectives already exist, since this is the only process by which Alberta Environment receives input on which substances should be reviewed. The ranked list is a tool to be used in refining the priority list of substances.
- Factors such as technology, economics, and others will be fully considered later in the objective-setting process and lack of information on these factors should not prevent them being considered as a priority for further work.
- The public was invited, through newspaper ads and Internet postings, to submit their priority substances for consideration. Approximately 60 individuals made submissions, and this was considered a good response.
- It was noted that there are some errors in the threshold numbers for benzene.
- The Ambient Air Quality Objectives Working Group (AAQOWG), formed after the last workshop to work with Alberta Environment, gathered more information on health, environmental and other factors. Where required, subgroups were formed for each compound and group of compounds to look at the analyses, trends and other available information. The AAQOWG made recommendations to Alberta Environment in each case. They decided, for example, that some VOCs (volatile organic compounds) and heavy metals warranted having an objective, while others did not. In some cases, such as mercury, the AAQOWG thought there were better ways to address the substances than through the use of ambient objectives. Workshop participants agreed it would be useful to know which compounds the AAQOWG reviewed and then decided not to recommend that an ambient objective be developed. (Note: A list of these substances was provided for each breakout group.)
- The Threshold Limit Values (TLV) are occupational health and safety based numbers, designed to protect workers who are normal healthy adults.

2 Identification of Priority Substances

Participants worked in three facilitated breakout groups to develop a list of substances for further discussion in the plenary session. Each breakout group was given the list of substances arising from the 2000 priority setting workshop, for which objectives have been or are being developed, as well as the list for which it was decided not to develop objectives. These lists are shown in Appendix B.

With this background information, each breakout group prepared a list of priority substances for discussion by all workshop participants (see Table 1). The substances are not listed in any particular order in the table. The longer lists considered by each group, along with any rationale for why the substances in Table 1 should be considered priorities, are provided in Appendix C.

Table 1: Priority Substances Identified by Breakout Groups

Group 1	Group 2	Group 3
Benzene	NOx	NOx (NO_2 and NO)
Benzo(a)pyrene (B(a)P)	PAH indicators	Benzene
Formaldehyde	Benzene	Naphthalene
NO_2	Mercury	Odour compounds
Cobalt	PAH group	Sulphur hexafluoride
Carbonyl sulphide	Vinyl acetate	Hydrogen fluoride (24-hr)
Naphthalene	Carbon disulphide	Formaldehyde
Aluminum	Cobalt	
Carbon disulphide	Sulphur dioxide	
Radionuclides	Selenium	

2.1 Priority List of Substances

After reviewing and discussing the three lists, participants agreed by consensus in the plenary session to put forward the following list of priority substances for which ambient air quality objectives should be developed or for which existing objectives should be reviewed:

- Nitrogen oxides
- Benzene
- B(a)P (PAH indicator)
- Naphthalene
- Formaldehyde
- Hydrogen fluoride
- Carbonyl sulphide

Participants readily agreed that the first four substances should be on the priority list (nitrogen oxides, benzene, benzo(a)pyrene, and naphthalene), then entered into discussion about the final three substances. Participants agreed to add formaldehyde, hydrogen fluoride and carbonyl sulphide to the priority list for the following reasons:

- Formaldehyde was on a previous list considered by the advisory group to Alberta Environment and was dropped because the reference concentration at the time was generally above the ambient levels being experienced. However, Health Canada has re-evaluated the reference concentration and it has been increased dramatically. As well, oriented strand board

facilities in Alberta are a source of this compound. For these reasons, it was agreed to include formaldehyde on the priority list.

- A 24-hour objective is needed for hydrogen fluoride to supplement existing standards.
- New research data is now available on carbonyl sulphide and it is also on the National Pollutant Release Inventory (NPRI) list. It is one of the partially oxidized components of combustion and is an important reduced sulphur compound.

2.2 Substances that Require Additional Consideration

Workshop participants engaged in considerable further discussion about the fate of the remaining substances that were brought forward by the three breakout groups (Table 1). It was agreed by consensus that the following substances, listed in no particular order, require additional attention. Specifically, additional information should be gathered on these substances, and this information should be provided as input to the next priority setting workshop in three to four years. The group discussed each substance, and further elaboration is provided below.

Substances for which additional information is required:

- Aluminum
- Radionuclides
- Sulphur hexafluoride
- Mercury
- Vinyl acetate
- Selenium
- PAH group
- Cobalt

All participants readily agreed that aluminum and radionuclides require further attention.

Sulphur hexafluoride is one of the six main greenhouse gases covered by the Kyoto Protocol; although emitted in much smaller quantities than carbon dioxide, on a molecular basis, its potential as a global warming agent is 29,000 times greater than carbon dioxide. SF_6 is found in electrical switches and a few other small sources. Its ambient levels are low, but it is an important substance.

Mercury – Participants noted that the management framework developed by CASA's Electricity Project Team (EPT) is expected to deal with most of the point source mercury emissions in Alberta, achieving a reduction of 50-80% by 2009. Work is also underway to develop a BATEA (Best Available Technology Economically Achievable) standard for mercury, which will not be less stringent than current commitments. Mercury in food, soil and water is regarded as a more serious problem than mercury in the air; there is also the issue of transboundary emissions, with significant amounts of mercury coming into Alberta from international sources. Some participants noted that Alberta Environment is addressing regional deposition. If there is an ambient objective, it will be necessary to monitor the substance, and some concern was expressed about whether this would add to activities that are already underway. Particular concerns were expressed by residents who live near coal-fired power plants, the main source of mercury in Alberta. When there are weather inversions and fog, higher levels of ambient mercury are experienced in these areas, and further work needs to be done to assess this risk. Workshop participants agreed to recommend more work on mercury, noting that much more information should be available in a few years as the EPT's recommendations are implemented.

Vinyl acetate was identified by Strathcona Industrial Association members as a substance that warrants additional work.

Selenium – It was noted that ambient air is not a good way to measure selenium. If selenium were measured at any concentrations in ambient air, the levels would be of concern. It is probably more important to measure what is in the soil and water and measure selenium emissions at source. Nevertheless, it would be useful to gather further information on this substance.

PAH group – Participants noted that naphthalene, which is on the priority list, is not a good PAH indicator, but B(a)P could be used as a surrogate indicator. Some concern was expressed that leaving the PAH group on a list for further consideration would take a great deal of time and effort. It was nevertheless agreed to put the PAH group on the list of substances for further work.

Cobalt is known to be deficient in the soil, but there is not yet enough information on ambient levels to determine its significance as a priority substance.

2.3 Other Substances

2.3.1 Sulphur dioxide and carbon disulphide

Two other substances appeared on the lists from the breakout groups: sulphur dioxide (SO_2) and carbon disulphide (CS_2).

An ambient objective is being developed for SO_2 so action to deal with this substance is in progress.

It was agreed by consensus that CS_2 is a substance of concern and participants want to ensure that it is addressed. An objective is expected to be issued in a relatively short time and efforts should be made to ensure that work on this objective is completed.

2.3.2 Odours

"Odours" appeared on one breakout group's list. Odours differ from other substances in that they comprise many compounds. If people smell an objectionable odour, some process would be triggered, but the process now varies depending on what the source is and if it is an ambient odour. How odour complaints are addressed is an important question and an ambient air quality objective may or may not be part of the way this problem is addressed. From a health concern, ammonia and hydrogen sulphide are the odour compounds we know most about and these are addressed through ambient objectives.

The working group on objective development has discussed at length how to deal with odours from intensive livestock operations. One option is to develop an odour management framework, but there is no consensus as to whether a framework should include an odour objective. The Intensive Livestock Working Group and Alberta Agriculture, Food and Rural Development will be bringing a statement of opportunity to the CASA board in November 2004 regarding air quality issues associated with confined feeding operations, and there is some uncertainty about how the various processes will fit together. The NRCB also responds to odour concerns.

One problem with odours is that they tend to be repeat occurrences of reduced exposure for short durations. These events are very disturbing to people's lives, but it is difficult to deal with exposures of 1-3 minutes that simply don't get covered by a one-hour guideline. This issue is complex and divisive, it won't go away and it is not unique to Alberta.

Participants acknowledged that odour is a bigger issue than this workshop can address. There was general agreement that an odour management framework is needed, but there was no agreement about whether such a framework should include an ambient objective. It was agreed that a non-consensus recommendation should come out of the workshop, advising that odour is an important issue, and that Alberta Environment should formulate a plan for developing and implementing an odour management framework for the province.

3 Conclusions and Recommendations

3.1 Consensus Recommendations

Workshop participants agreed by consensus to recommend that:

1. Ambient air quality objectives should be developed, or existing objectives reviewed, for the following seven priority substances:
    - Nitrogen oxides
    - Benzene
    - B(a)P (PAH indicator)
    - Naphthalene
    - Formaldehyde
    - Hydrogen fluoride
    - Carbonyl sulphide

2. Additional information on the following substances should be compiled as background and input to the next priority setting workshop in three to four years:
    - Aluminum
    - Radionuclides
    - Sulphur hexafluoride
    - Mercury
    - Vinyl acetate
    - Selenium
    - PAH group
    - Cobalt

3. The ambient air quality objectives being developed for carbon disulphide and sulphur dioxide should be completed as quickly as possible.

3.2 Non-consensus Recommendation

Workshop participants recognized the importance of odours as an air quality issue, but were unable to agree on how they should be addressed.

Thus the non-consensus recommendation from the workshop is that:

> Alberta Environment should formulate a plan for developing and implementing an odour management framework for the province.

Appendix A: Workshop Participants

Ron Axelson	Alberta Cattle Feeders' Association
Randall Barrett	Alberta Environment, Northern Region
Laura Blair*	Alberta Environment
Bill Bocock	Rose Ridge Citizens
Karina Bodo	Alberta Health and Wellness
Jim Bolton	TransAlta
Claude Chamberland	Shell Canada
Matthew Dance*	CASA Secretariat
Jim Dixon	NOVA Chemicals
John Drinkwater	BP
Kim Eastlick	Alberta Energy and Utilities Board
Long Fu*	Alberta Environment
Geoff Granville	Shell Canada
David Gue	Grasslands Naturalist Society and Palliser Airshed
Karen Haugen-Kozyra	Alberta Agriculture, Food and Rural Development
Ahmed Idriss	CASA Secretariat
Brent Korobanik	Strathcona Industrial Association
Martha Kostuch	Prairie Acid Rain Coalition
Ingrid Liepa	CASA Secretariat
Bernice Lloyd	CASA Secretariat
Wendy Lyka*	NOVA Chemicals
Alex Mackenzie	Alberta Health and Wellness
Kevin McCullum	Strathcona Industrial Association
Russ Miyagawa*	Toxics Watch Society
Myra Moore	Fort Air Partnership
Penny Mosmann	Health Canada
Bob Myrick	Alberta Environment, Monitoring & Evaluation
David Onuczko	Northeast Capital Industrial Association
Crystal Parrell	Alberta Environment, Monitoring & Evaluation
Ian Peace	Residents for Accountability in Power Industry Development
George Pfaff	Petro-Canada
Rick Phaneuf	Alberta Environment
Steve Probert	Capital Health
Michael Queenan*	Residents for Accountability in Power Industry Development
Sheldon Roth	University of Calgary
Kim Sanderson	Recorder
Bob Scotten	West Central Airshed Society and Palliser Airshed Society
Kristopher Siriunas	Alberta Energy and Utilities Board
Dennis Stefani	Calgary Health Region
Marilyn Thomas	United Church Women
Jocelyn Thrasher-Haug	Strathcona Industrial Association
Joan Tingley	ATCO Power
Kevin Warren	Parkland Airshed Management Zone and Peace Airshed Society
Brenda Woo	Health Canada
Ruth Yanor	Mewassin Community Action Council

* indicates member of Priority Setting Workshop Organizing Committee

Appendix B: Substances Identified at the 2000 Priority Setting Workshop for which Objectives Have Been or Are Being Developed

Following is the list of substances identified in the 2000 Priority Setting Workshop, for which objectives have been or are being developed:

- Heavy metals
  - Arsenic
  - Manganese
  - Nickel
- VOCs
  - Isopropyl alcohol
  - Hexane
  - Ethyl benzene
  - Toluene
  - Xylenes
- Reduced Sulphur Compounds
  - Hydrogen sulphide (H_2S)
  - Carbon disulphide (CS_2)
  - Mercaptans
  - Total reduced sulphur (TRS)
- SO_2
- Ammonia
- Particulate matter (PM)
- Ozone
- Six air toxics: acetone, acrylonitrile, cumene, ethylene, pentachlorophenol, propylene oxide

Following is the list of substances identified in the 2000 priority setting workshop, for which the Ambient Air Quality Objectives Working Group decided not to develop objectives:

- Heavy metals
  - Mercury
  - Copper
  - Cadmium
  - Vanadium
  - Molybdenum
  - Chromium
- VOCs
  - 1-3 butadiene
  - Formaldehyde
  - Dichloromethane
  - Carbon tetrachloride
  - Bromomethane

Appendix C: Substances Considered by Breakout Groups, and Rationale for Priorities

Breakout Group 1

High priority substances:

- Benzene – There is a guideline but it's from Texas and was developed in 1999, and should be looked at again from an Alberta perspective
- Benzo(a)pyrene – a good surrogate for all PAHs
- Formaldehyde – There is a guideline from Texas. This substance was identified in the last exercise but dropped. It is toxic and there is a growing number of OSB plants emitting it in Alberta.
- NO_2 – A guideline developed in 1975 relates to odour, so it should be looked at again.

Medium priority substances:

- Cobalt – Cobalt is emitted from coal-fired power plants and could become an issue if more coal plants are developed; also high Threshold Limit Value
- Carbonyl sulphide – This substance was on the public list, but didn't make it onto any lists after that, and there is nothing in the fact sheets.

Low priority substances:

- Naphthalene – a PAH, which is highly toxic and high levels are observed.
- Aluminum – concerns are similar to cobalt
- Carbon disulphide – guideline is being developed, but should be kept on the list
- Radionuclides – were on the public list but more information is needed.

Substances that were considered but did not make it onto the priority list:

- $PM_{2.5}$ – Being addressed through a Canada Wide Standard, which will be adopted as an ambient guideline
- PM_{10} – Most sources are natural
- PERC – local sources
- Hydrogen fluoride
- Biological odours – A statement of opportunity is coming to CASA regarding confined feeding operations and air quality, so odours can be addressed through that process
- Total reduced sulphur compounds – being addressed

Breakout Group 2

Priority substances:

- NO_X – because of its role as an acidifying emission
- PAH indicators – can measure specific indicators, but some concern re whole group
- Benzene – Concern is related to long-term exposure, especially in the context of mixtures.
- Mercury – A number of different processes are underway to address mercury, but we need an overall plan.
- PAH group
- Vinyl acetate
- Carbon disulphide
- Cobalt
- SO_2
- Selenium

Substances that were discussed but did not make it on to the final priority list:

- $PM_{2.5}$ – being addressed in other forums

Processes are required to address other substances of concern:

- Mixtures, such as PAHs, BTEX, VOCs
- Odours
- Chronic exposures (total exposures and all pathways

Breakout Group 3

Priority substances:

- NOx (NO_2 and NO)
- Benzene
- Naphthalene – a prototype PAH
- Sulphur hexafluoride – very toxic and corrosive
- Hydrogen fluoride – need a 24-hour objective
- Formaldehyde
- Odour compounds – The group did not have consensus as to whether odour should be on the priority list, but it is a different concept because odours comprise a number of different compounds. Ammonia and H_2S are the key compounds and they are already being worked on. There was no agreement on whether sources are controlled through an odour management framework or whether there is an ambient air quality objective.