Report of the Data Issues Group

Prepared for
the CASA Board of Directors

presented to the Board
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Chemicals and Acronyms

Chemicals

H_2S = Hydrogen sulphide
O_3 = Ozone
PAHs = Polycyclic Aromatic Hydrocarbons
PM = Particulate Matter
$PM_{2.5}$ = Particulates smaller or equal to 2.5 microns in diameter
PM_{10} = Particulates smaller or equal to 10 microns in diameter
SO_2 = Sulphur dioxide
VOCs = Volatile Organic Compounds

Acronyms

Provincial

AAFRD = Alberta Agriculture, Food and Rural Development
AENV = Alberta Environment
AHW = Alberta Health and Wellness
ATRANS = Alberta Transportation
EUB = Alberta Energy and Utilities Board
OSC = Operations Steering Committee (AENV)
EPAs = Environmental Performance Agreements
SOE = State of the Environment

Federal

EC = Environment Canada
HC = Health Canada
NRCan = Natural Resources Canada
PNR = Prairie and Northern Canada Region (EC)
NPRI = National Pollutant Release Inventory
EPWG = Emissions and Projection Working Group
WGAQOG = Working Group on Air Quality Objectives and Guidelines
VCR = Voluntary Challenge and Registry program

Other

CAC = Criteria Air Contaminant
CASA = Clean Air Strategic Alliance
QA/QC = Quality Assurance / Quality Control

1. Executive Summary

To achieve CASA's vision of clean air in Alberta, decision makers need good quality data. The data must be adequate in quantity and quality to ensure decision makers are able to properly assess the state of the environment and to take appropriate actions to correct, maintain, or continuously improve the health of Alberta's environment. Adequate data for source emissions, ambient concentrations and ecosystem and human health effects is essential for ensuring that decisions support progress toward the vision of clean air.

A number of CASA teams, working on various issues, have identified data gaps in the past and have made recommendations for filling those gaps. In March 2000, the CASA Workshop on Data Issues was convened to address data/information issues. As a result of this Workshop, the CASA Data Issues Group was formed in 2001. The Group was to compile and review recommendations from the CASA Workshop on Data Issues, from CASA project teams, and from previous forums on air quality and health issues.

For simplicity, the Group defined "from previous forums on air quality and health issues" to mean any presentation made to the CASA Board that included recommendations on data issues from the inception of CASA to the end of the year 2000.

The word data was defined to mean facts, figures and values obtained by systematically making observations, measurements and estimations of a thing or an event.

The Group started with a list of 200 recommendations and pared these down to 97 by dropping duplications and adopting narrower definitions of air quality (i.e. excluding climate change) and data issues (e.g. excluding recommendations related to commitment to improving data, establishing zones, etc.). The implementation status of the 97 recommendations was then assessed as "done", "in progress" or "not started". The "in progress" and "not started" recommendations were divided into 8 categories and the recommendations in each category were sorted into a number of subject areas. The recommendations under each subject area were rephrased into a number of specific action steps that could be prioritized and implemented.

To ensure that the prioritization of actions is done in an objective manner, 6 criteria were developed. Extensive input from CASA teams was obtained in developing the criteria. The first criterion simply screens out actions that it was thought could not be implemented. The second criterion divides the actions into two groups, those resulting from a consensus process, and those arising from a process where consensus was not sought (called individual actions). The actions in both groups were then prioritized by applying criteria III to VI. Recognizing the inexactness of the prioritization process, it was concluded that a qualitative priority system, i.e. high, medium, low was the appropriate measure for the overall priority of each action.

A consequence of Criterion II is that two lists of prioritized actions were developed (shown in Tables 1 and 2). This separation seemed appropriate because CASA attaches greater importance to "consensus" recommendations. However, the Data Issues Group believes that action to complete both "consensus" and "individual" actions is merited.

Most of the actions are "in progress" meaning that some work is already underway on that action. Noteworthy as well is the fact that some "individual" actions have been given a high priority.

Most recommendations don't specify the implementer(s). Once the actions were prioritized, the most appropriate agency(ies) to lead implementation were identified. Group members contacted these agencies to discuss the implementation status of the prioritized actions. An implementation update, as derived from these agencies, is given in Tables 3 and 4 for the "in progress" actions.

As a consequence of the work of the Group, and the results obtained, the Group wishes to make a number of recommendations to various organizations. These recommendations are listed below.

1.1 Recommendations

To All CASA Teams

Recommendation #1: ***The Data Issues Group recommends that CASA teams, when making recommendations on data issues to the CASA Board, word their recommendations so that they present a clearly defined problem and have specific actions, goals, or objectives.***

Recommendation #2: ***The Data Issues Group recommends that CASA teams, when making recommendations to the CASA Board, suggest the organizations which are to implement their recommendations and also suggest the timelines for implementation.***

To Implementers

Please note that the actions listed in these recommendations are described in Tables 1 and 2 (pages 19 to 24) in the results section.

Recommendation #3(a): ***The Data Issues Group recommends that Alberta Environment, in partnership with the other named lead agencies, take the lead in ensuring progress with respect to actions 1-1, 6-7, 2-4, 6-2, 1-2, 1-4, 1-7, 4-3, 5-10, 6-8, 1-6, 2-1, 2-2, 1-10, 8-5 and 7-1, 2-6, 5-9, 6-9, 5-4, 2-7, 8-9, 5-8. Alberta Environment should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Environment should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(b): ***The Data Issues Group recommends that Environment Canada, in partnership with the other named lead agencies, help to ensure progress with respect to actions 1-1, 6-18, 6-2, 1-2, 1-7, 1-6, 6-5, 1-10, 7-2, 8-5 and 7-1. Environment Canada should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Environment Canada should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(c): ***The Data Issues Group recommends that Alberta Health and Wellness, in partnership with the other named lead agencies, take the lead in ensuring progress with respect to actions 6-3, 6-7, 4-1, 6-2, 8-1, 3-1, 5-10, 6-8, 6-5, 8-3 and 6-10, 2-5, 4-4, 6-9, 6-6. Alberta Health and Wellness should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Health and Wellness should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(d): ***The Data Issues Group recommends that the Alberta Energy and Utilities Board, in partnership with the other named lead agencies, take the lead, where appropriate, in ensuring progress with respect to actions 1-11, 6-7, 4-3 and 3-3, 5-2, 6-9.The Energy and Utilities Board should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, the Energy and Utilities Board should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(e): ***The Data Issues Group recommends that the Operations Steering Committee, in partnership with the named lead agencies, develop a plan to ensure progress with respect to actions 2-4, 2-1, 2-2 and 5-1, 5-4, 8-9. The Operations Steering Committee (OSC) should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, the OSC should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(f): ***The Data Issues Group recommends that Alberta Transportation, in partnership with the other named lead agencies, consider taking the lead in ensuring progress with respect to actions 1-4, 1-5. Alberta Transportation should give their most immediate attention to the higher priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Transportation should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(g): ***The Data Issues Group recommends that Health Canada, in partnership with the named lead agencies, help to ensure progress with respect to actions 6-3, 6-2, 8-3 and 6-10, 4-4, 6-6. Health Canada should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Health Canada should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(h): ***The Data Issues Group recommends that Alberta Agriculture, Food and Rural Development, in partnership with the other named lead agencies, consider taking the lead to ensure progress with respect to actions 4-1 and 6-12, 6-13, 6-9, 6-15, 6-14. Alberta Agriculture, Food and Rural Development should give their most immediate attention to the higher priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Agriculture, Food and Rural Development should put in place a process to monitor, and regularly report to the board, the status of the actions.***

To Specific CASA Teams

Recommendation #3(i): The Data Issues Group recommends that the CASA Human Health Project Team consider developing a recommendation related to action 5-6.

Recommendation #3(j): The Data Issues Group recommends that the CASA Animal Health Project Team consider developing a recommendation related to action 5-7.

2. Introduction

To achieve CASA's vision of clean air

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

decision makers need good quality data. Adequate data on source emissions, ambient concentrations, and ecosystem and human health effects are all essential to ensure that decisions support making, measuring, and assessing progress toward the vision. The data must be adequate in quantity and quality to ensure decision makers are able to properly assess the state of the environment and to take appropriate action to correct, maintain, and continuously improve, the health of Alberta's environment.

A number of CASA teams, working on various issues, have identified data gaps and have made recommendations for filling these gaps. For instance, the need for reliable and readily available source emission, ambient monitoring and ecological data was identified in CASA's Project Integration and Information Workshop held in 1996. In 1997, the SO_2 Management Project Team recommended the establishment of a comprehensive source and emission data capture and reporting system, an SO_2 emission forecasting system, and a mechanism for ongoing information sharing among stakeholders. The Vehicle Emissions Working Group, the Human Health Project Team, and the Ecological Effects Monitoring Implementation Design Team all identified serious data gaps in 1998. As well, data gaps, credible measuring and reporting were identified as key issues at the November 1998 CASA Board "Desired Future" Workshop.

At its June 1999 meeting, the CASA Board approved the Strategic Planning Team's recommendation that "*The Secretariat takes the lead in organizing a workshop to address data/information issues".* The Workshop, which was held on March 13 and 14, 2000, outcomes are contained in a report titled "W*orkshop on Data Issues: Summary Report".* Workshop participants brought forward more than 50 recommendations. No consensus was sought but there was clear support for several overarching recommendations that participants viewed as fundamental to improving both data management and the decisions that are based on the data. The overarching recommendations were:

1. The most critical need identified in this workshop was for commitment, resources and leadership, particularly on the part of the provincial government, to establish and maintain a better system to collect, manage, distribute and interpret data in a scientifically sound and timely manner. Therefore, a small group of senior CASA stakeholders should develop a strategy for securing commitment from key decision makers in government and industry to provide the resources and leadership to establish and maintain this system.

2. A multi-stakeholder group, coordinated by CASA, should compile and review recommendations from this workshop, from CASA project teams, and from previous forums on air quality and health issues. The status of these recommendations should be assessed, with the aim of developing an implementation plan to improve the collection of air quality and health data.

The report and recommendations were endorsed by the Board and have been implemented by two groups: a group of senior CASA stakeholders to tackle the first overarching recommendation and a multi-stakeholder group to work on the second overarching recommendation. The group of senior CASA stakeholders, i.e. the Board Committee on CASA Funding, met with Doug Tupper of Alberta Environment who declared himself committed to expanding monitoring at Alberta Environment and to carry CASA's views to his Minister. This commitment motivated a number of members from each of the 3 sectors to come forward when the Secretariat polled stakeholders for members of a CASA Data Issues Group. A list of the members of the Data Issues Group is in Appendix 1.

2.1 Terms of Reference

The goal of the Data Issues Group was to develop an implementation plan that will lead to progress with respect to resolving outstanding data issues. The key tasks of the group were:

- Compile and review recommendations on data issues from CASA teams, CASA forums, and the CASA Workshop on Data Issues;
- Assess the status of implementation of each of these recommendations;
- Develop criteria for prioritizing the recommendations;
- Prioritize the recommendations;
- Develop an implementation strategy and plan that will lead to progress with respect to resolving outstanding data issues;
- Report to, and obtain input, from CASA teams;
- Report to, and obtain input, from the CASA Board.

To identify the specific problem that the Group was to resolve, "recommendations on data issues from CASA teams, CASA forums, and the CASA Workshop on Data Issues" were defined as recommendations on data issues from any presentations made to the CASA Board from its inception to the end of the year 2000.

The Data Issues Group's terms of reference are in Appendix 2.

2.2 Definition of Data

The *Background Document on Existing Data Sets and Issues (February, 2000)*, prepared by Dr. Harby Sandhu, for the CASA Workshop on Data Issues, gives the following definition of data:

> *The word data means facts, figures and values obtained by making observations, measurements and estimations of a thing or an event, systematically.*

The words *data* and *information* are used interchangeably in some published literature, but other publications make the distinction that *observations* and *measurements* when collected systematically become *data*. Data when organized and related to questions or scientific hypotheses, produce *information*.

3. Gathering and Sorting the Data

In preparation for the group's work, Secretariat staff prepared a list of 200 recommendations on data issues that was derived by reviewing CASA Board meeting briefing books and excerpting any recommendations that appeared to relate to data issues.
The Data Issues Group reviewed the 200 recommendations and dropped duplications and recommendations that, in their view, were not related to data issues. (Duplications arose because some teams appear before the board more than once.) The recommendations the group worked with are in Appendix 3; the ones the group dropped are in Appendix 4.

It should be noted that the recommendations were tagged with respect to whether they resulted from a consensus process or not. "Consensus" recommendations are recommendations that were agreed to by a CASA team or other multi-stakeholder group; "individual" recommendations are, perhaps, recommendations made at a workshop where consensus was not sought or recommendations made during a presentation to the board for which no consensus had been sought.

The status of implementation of each of the recommendations in Appendix 3 was then assessed to be "complete", "in progress" or "not started". Those that were assessed to be complete were not considered further. The remaining recommendations were divided into 8 categories: emissions; ambient; exposure; effects; records management; research; modelling; and "broad". "Broad" was a catch all category for recommendations that were important but did not fit into any of the other 7 categories.

Some of the recommendations in each category were very specific and others were very general. Sometimes, a very specific recommendation could be fitted into a more general one. To capture and deal with such overlap, the recommendations in each category were sorted according to a number of subject areas. The recommendations under each subject area were rephrased into a number of specific action steps that could be prioritized and implemented. The subject areas, action steps, as well as information from the original recommendations on which the action steps were based, were entered into a matrix. Such a matrix was constructed for each category of recommendations (see Appendix 5). The matrices were designed to ensure there was an audit trail back to the original recommendations so as not to lose the original recommendation in the rephrasing process. The goal of this reorganizing and rephrasing was to come up with a list of action steps that is manageable.

The matrices were reviewed by the group to ensure that the defined action steps fully captured the apparent intent of each of the original recommendations on which the action steps were based, to ensure a reasonable level of continuity between matrices, and to ensure there were no redundancies.

4. Criteria for Prioritizing Actions

To ensure that the prioritization of actions is done in an objective manner, criteria were developed for the prioritization process. A list of 28 possible criteria was considered by the group. In the end the group came to 6 final criteria by combining and dropping criteria from the original 28. Note that the Data Issues Group agreed that cost was an implementation issue, not a prioritization issue, and therefore determined that cost should not be a criterion for prioritizing actions.

A description of each of these criteria was prepared and the descriptions were forwarded to active CASA teams to review. A letter was sent to all co-chairs of active CASA teams, with the description of the 6 criteria enclosed, requesting individual comments/ suggestions to be forwarded to the group. As well group representatives attended a number of CASA team meetings in May and June to present the criteria and to receive input. Through these two mechanisms a substantial number of responses were received. These resulted in some revisions to the criteria.

Note that the first criterion simply screens out actions that were too vague to implement, that did not seem feasible to implement, that did not fit with CASA's mandate, or that did not relate to specific action steps that could be carried out.. The second criterion simply divides the actions into two groups. Criteria III to VI are then applied to prioritize the actions in each of the two groups. A list of parked actions is in Appendix 6.

4.1 Final criteria

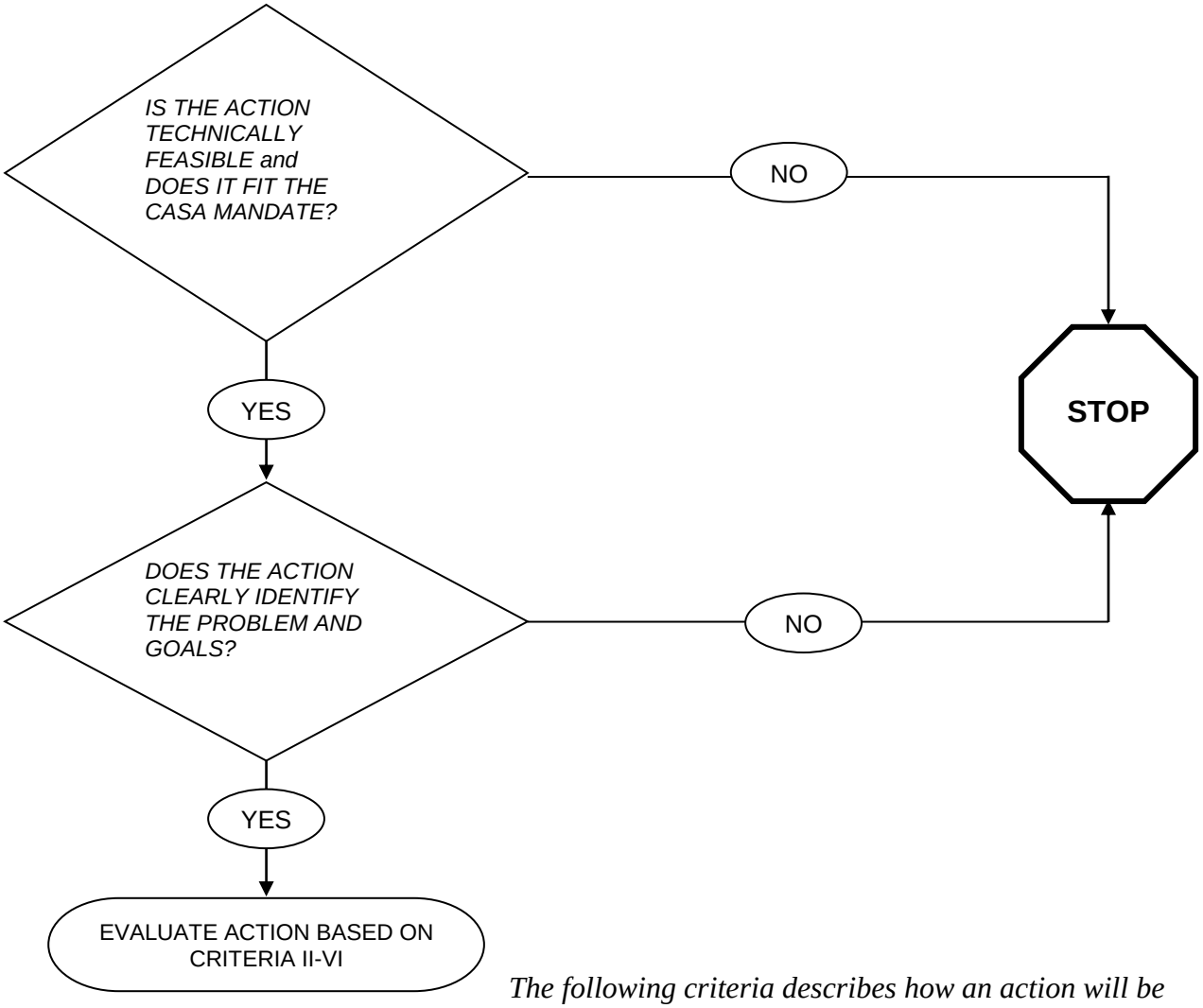
Criteria for Prioritizing Actions/Recommendations

Criterion I: Actionable

Four separate elements comprise this criterion:

1. The action must present a clearly defined problem.
2. The action must fall within the mandate of CASA and its member organizations.
3. The action must have specific actions, goals or objectives.
4. The action must be technically feasible in the foreseeable future.

An action must meet this criterion in order to be further evaluated. If the action is determined not to be technically feasible, or within the mandate of CASA and its member organizations, the action will be parked. An action that fulfills this element must then also address a definable problem, and permit specific actions, goals or objectives before proceeding to be evaluated based on Criteria II – VI.

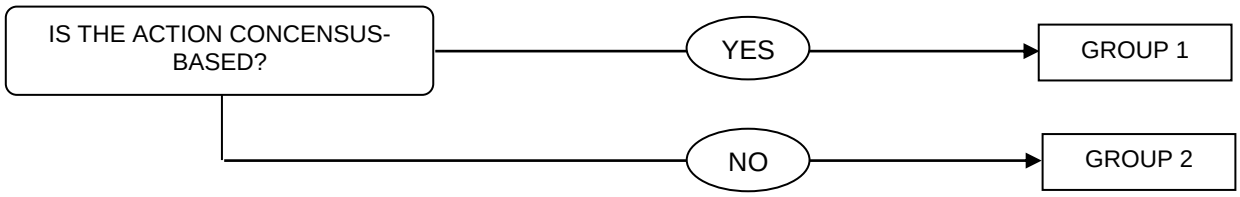


The following criteria describes how an action will be evaluated or ranked once it has been determined that Criterion I has been met.

NOTE: The Data Issues Group recognizes that these criteria are simplistic and, therefore, may not be easily applied to some actions/recommendations. Should a criterion be difficult to apply to a given action, any deviations from the criterion will be explained in the ranking documentation.

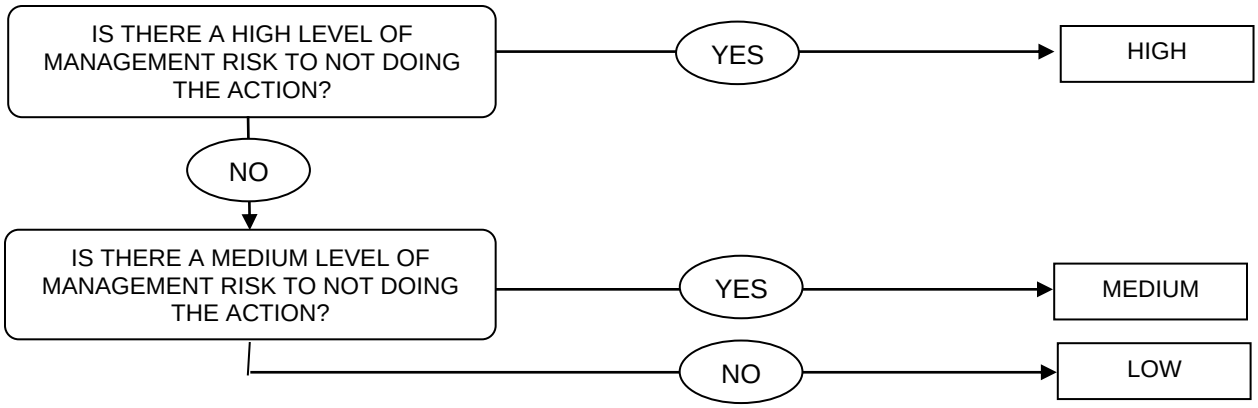
Criterion II: Consensus-Based Actions

If the action is consensus-based it will be placed in Group 1 (consensus), and if not it will be placed in Group 2 (individual).



Criterion III: Risk Management

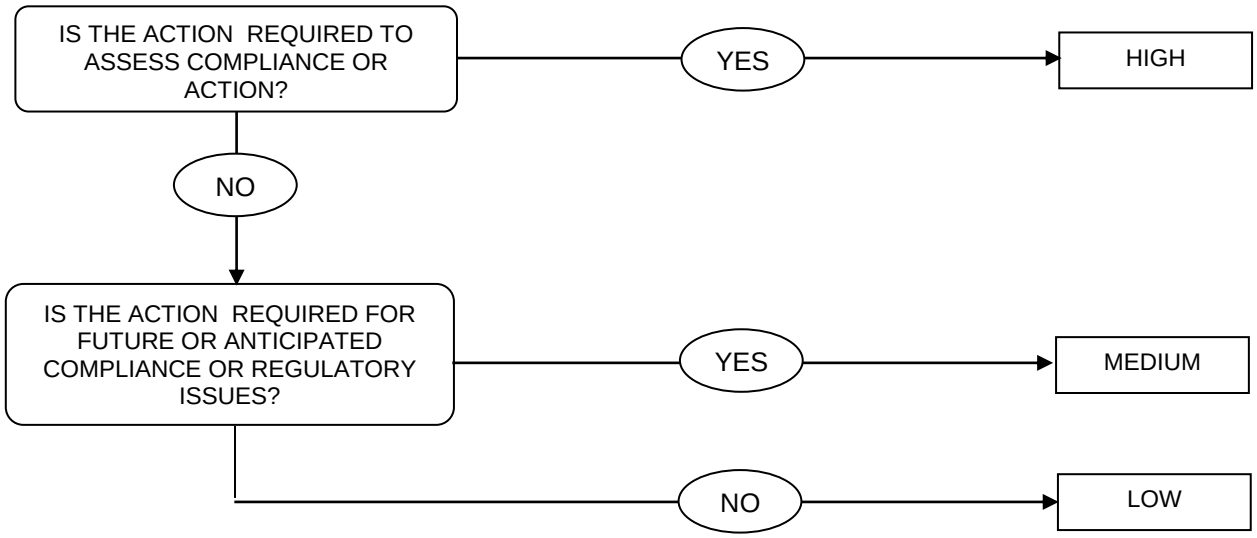
Risk management[1] is an integral component of good management and decision-making. Each action is ranked based on the management risk of not implementing or acting on the action. Risks of not acting include public perception risks (such as lack of transparency or public access to information), scientific risks (such as insufficient data on which to assess issues), and decision-making risks (such as insufficient scientific evidence on which to base decisions or actions). (Note: this criteria does not directly evaluate the environmental or health risk of the issue associated with the action.)



[1] *Risk Management* is a systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues.

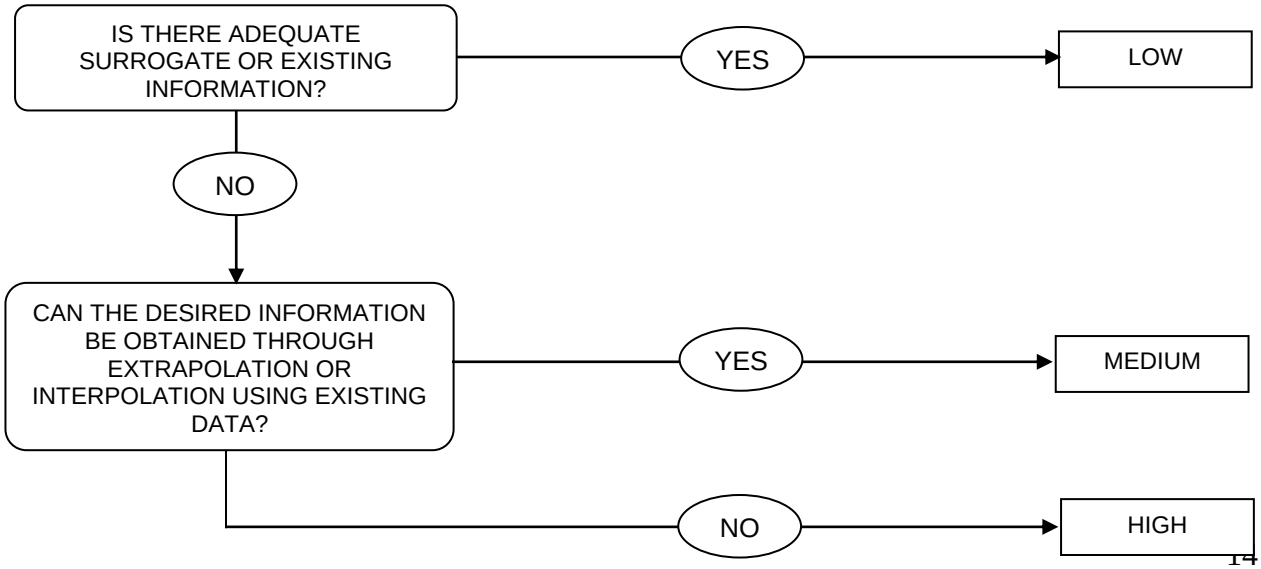
Criterion IV: Regulatory Relevance

Sufficient data is necessary to determine where you are in relation to the relevant standard, guideline, or objective, and also where you are with respect to the various trigger levels. A high ranking with respect to regulatory relevance denotes that the action step is required to calculate your risk of exceeding a trigger level or standard. A low ranking would be given if there is enough information to make a reasonable assessment of the risk, or where there is adequate surrogate information (i.e. emissions inventory data which can be used to model ambient data).



Criterion V: Surrogate or Existing Information

If adequate existing or surrogate information exists, the action will be ranked low. If no surrogate or existing information exists but the information can be estimated through interpolation or extrapolation, the action will be ranked medium. If no surrogate or existing information exists and the information cannot be estimated through interpolation or extrapolation, the action will be ranked high.

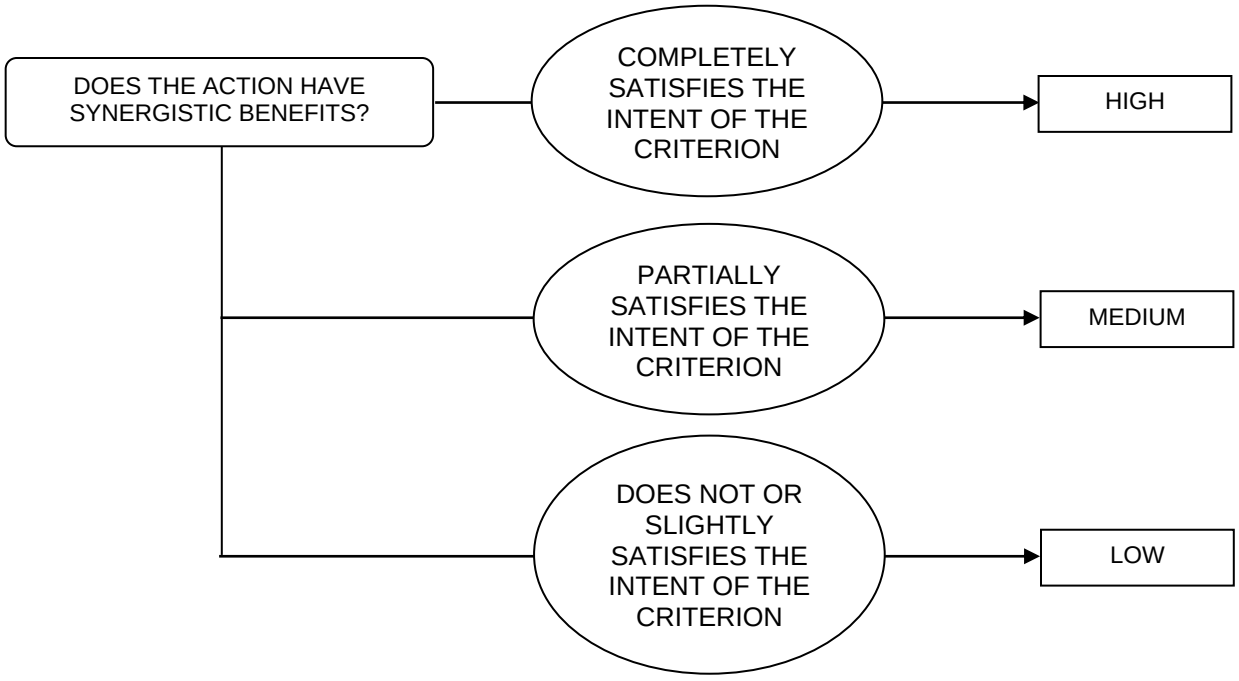


<u>Criterion VI</u>: Synergistic Benefits

This criterion is comprised of three elements:

1. The action is a prerequisite for another recommendation.
2. The action satisfies multiple CASA team objectives.
3. The action will produce data which can later serve as surrogate information.

An action that satisfies all three elements will be ranked high with respect to this criterion. An action that satisfies two of the three elements will be ranked medium, and if the action satisfies one or none of these elements, it will be ranked low.



4.2 Prioritizing the actions

The 6 criteria were applied to each action listed in the matrices. After passing through criteria I and II, an action was assessed as of high, medium, or low priority according to each criterion (criterion III to VI inclusive). The assessment of the priorities was accomplished through group consensus. The priorities for the 4 different criteria were combined by assigning 3 points to each high, 2 points to each medium and 1 point to each low rating. The points for each action were added up to produce a total point score for each action. The actions were then ordered according to total point score with the highest scoring actions at the top of the list.

Recognizing the inexactness of the prioritization process, it was concluded that a qualitative priority system, i.e. high, medium, low, was the appropriate tool to use. Additional refinement to the prioritization protocol appeared difficult to justify and of questionable value for the effort required.

5. Reviewing the Implementation Status

When the original recommendations were first reviewed, it was recognized that an implementation plan might already be in place for many of them. Information on the implementation status was collected in the following ways:

- Alberta Environment provided a matrix that represented its response to the recommendations from the CASA Data Issues Workshop.
- Other group members supplied information about work being done by their organization that was relevant to the recommendations.
- As well, CASA project managers reviewed the recommendations and supplied information on implementation status.
- In some cases, implementers' representatives were consulted.
- In other cases implementers' web sites were examined.

On the basis of this information, recommendations were classified as: not started; in progress; or complete. Appendix 3 gives the implementation status of each recommendation. Recommendations classified as "done" were dropped from the list of recommendations to be prioritized. Information from recommendations classified as "in progress" or "not started" entered into the matrices. Actions listed in the matrices were classified as "in progress" or "not started" according to the implementation status of the recommendation(s) from which they were derived. Actions classified as "in progress" or "not started" were prioritized.

5.1 Potential Implementers

Most recommendations don't specify the implementer(s). Once the actions were prioritized, the most appropriate agency(ies) to lead implementation were identified. Group members contacted these agencies to discuss the implementation status of the prioritized actions. An implementation update, as derived from these agencies, is given in Tables 3 and 4 for the "in progress" actions.

6. Results

A consequence of Criterion II is that two lists of prioritized actions were developed, one for actions stemming from "consensus" recommendations and another for actions stemming from "individual" recommendations. This separation seemed appropriate because CASA attaches greater importance to "consensus" recommendations. However, the Data Issues Group believes that action to complete both "consensus" and "individual" actions is merited.

The prioritized consensus actions, and their priority in terms of high, medium, low, are given in Table 1. Note that the matrix reference number given for each action consists of two parts. The first number refers to the matrix number from which the action was taken and the second number is derived by sequentially numbering the actions listed in that matrix. Thus matrix reference number 1 – 1 refers to the first action listed in matrix 1 (emissions). This numbering system was

used so as to make it possible to refer back to the matrix in which an action is derived. From the matrix, it is possible to refer back to the original recommendation(s) from which the action was derived. Within each priority class (i.e. high, medium, low) in Table 1 (and as well in Tables 2, 3, 4) actions are listed in order of matrix number, and are not necessarily in order of relative priority to each other. The same information is given for individual actions, that is, actions that arose from recommendations that were not derived through a consensus process, in Table 2.

Note that most of the actions are "in progress", meaning that some work is already under way on that action. Only 1 "not started" action is listed in Table 1 and 5 in Table 2.
Noteworthy as well is the fact that some "individual" actions have also been given a high priority.

The lead agencies for implementation are also given in Tables 1 and 2. An implementation update for "in progress" actions is given in Tables 3 and 4. Group members have a limited ability to identify what has been done and what still needs to be done. The implementing agencies may have more ability to identify the gaps between what has been done and what still needs to be done.

6.1 Recommendations

The Data Issues Group makes the following recommendations:

To All CASA Teams

Recommendation #1: ***The Data Issues Group recommends that CASA teams, when making recommendations on data issues to the CASA Board, word their recommendations so that they present a clearly defined problem and have specific actions, goals, or objectives.***

Recommendation #2: ***The Data Issues Group recommends that CASA teams, when making recommendations to the CASA Board, suggest the organizations which are to implement their recommendations and also suggest the timelines for implementation.***

To Implementers

Note the actions mentioned in the following recommendations are described in Tables 1 and 2 (pages 19 to 24).

Recommendation #3(a): ***The Data Issues Group recommends that Alberta Environment, in partnership with the other named lead agencies, take the lead in ensuring progress with respect to actions 1-1, 6-7, 2-4, 6-2, 1-2, 1-4, 1-7, 4-3, 5-10, 6-8, 1-6, 2-1, 2-2, 1-10, 8-5 and 7-1, 2-6, 5-9, 6-9, 5-4, 2-7, 8-9, 5-8. Alberta Environment should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Environment should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(b): ***The Data Issues Group recommends that Environment Canada, in partnership with the other named lead agencies, help to ensure progress with respect to actions 1-1, 6-18, 6-2, 1-2, 1-7, 1-6, 6-5, 1-10, 7-2, 8-5 and 7-1. Environment Canada should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Environment Canada should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(c): ***The Data Issues Group recommends that Alberta Health and Wellness, in partnership with the other named lead agencies, take the lead, where appropriate, to ensure progress with respect to actions 6-3, 6-7, 4-1, 6-2, 8-1, 3-1, 5-10, 6-8, 6-5, 8-3 and 6-10, 2-5, 4-4, 6-9, 6-6. Alberta Health and Wellness should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Health and Wellness should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(d): ***The Data Issues Group recommends that the Alberta Energy and Utilities Board, in partnership with the other named lead agencies, take the lead in ensuring progress with respect to actions 1-11, 6-7, 4-3 and 3-3, 5-2, 6-9.The Energy and Utilities Board should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, the Energy and Utilities Board should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(e): ***The Data Issues Group recommends that the Operations Steering Committee, in partnership with the named lead agencies, develop a plan to ensure progress with respect to actions 2-4, 2-1, 2-2 and 5-1, 5-4, 8-9. The Operations Steering Committee (OSC) should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, the OSC should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(f): ***The Data Issues Group recommends that Alberta Transportation, in partnership with the other named lead agencies, consider taking the lead in ensuring progress with respect to actions 1-4, 6-8, 1-5 .Alberta Transportation should give their most immediate attention to the higher priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Transportation should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(g): ***The Data Issues Group recommends that Health Canada, in partnership with the named lead agencies, help to ensure progress with respect to actions 6-3, 6-2, 8-3 and 6-10, 4-4, 6-6. Health Canada should give their most immediate attention to the high priority consensus actions, but progress to complete the other actions is merited. As well, Health Canada should put in place a process to monitor, and regularly report to the board, the status of the actions.***

Recommendation #3(h): The Data Issues Group recommends that Alberta Agriculture, Food and Rural Development, in partnership with the other named lead agencies, consider taking the lead to ensure progress with respect to actions 4-1 and 6-12, 6-13, 6-9, 6-15, 6-14. Alberta Agriculture, Food and Rural Development should give their most immediate attention to the higher priority consensus actions, but progress to complete the other actions is merited. As well, Alberta Agriculture, Food and Rural Development should put in place a process to monitor, and to regularly report to the board, the status of the actions.

To Specific CASA Teams

Recommendation #3(i): The Data Issues Group recommends that the CASA Human Health Project Team consider developing a recommendation related to action 5-6.

Recommendation #3(j): The Data Issues Group recommends that the CASA Animal Health Project Team consider developing a recommendation related to action 5-7.

6.2 Prioritized Actions

Table 1: Prioritized Consensus Actions

Matrix Reference #	Action	Imple-mentation Status	Priority	Lead Agencies For Implementation
1 - 1	Establish database for SO_2 atmospheric, source, and emission data	In progress	High	AENV, EC
1 – 2	Ensure development of improved emissions inventories	In progress	High	AENV, EC
1 – 11	Ensure emissions from solution gas flaring and venting are properly reported	In progress	High	EUB
2 – 4	Design future monitoring programs to address the insufficient number of monitoring sites, the need for more appropriate measurement of parameters and receptors, and improved data quality	In progress	High	OSC, AENV
4 – 1	Improve collection of human and animal health data relating to solution gas flaring	In progress	High	AHW, AAFRD
6 – 2	Investigate relationships between PM and O_3 emissions, ambient air, human exposure, and human health	In progress	High	AHW, AENV, HC, EC
6 – 3	Develop a research program to address gaps in the H_2S health effects database	In progress	High	AHW, HC
6 –7	Measure personal exposure to compounds of concern emitted by flares	In progress	High	EUB, AENV, AHW
6 – 18	Conduct further research on source apportionment	In progress	High	AENV, EC

Table 1: Prioritized Consensus Actions (cont'd)				
Matrix Reference #	**Action**	**Imple-mentation Status**	**Priority**	**LeadAgencies For Implementation**
8 – 1	Approve and implement the human health monitoring framework (tool for detecting trends and associations between air quality and health-related variables)	In progress	High	AHW
1 – 4	Gather data on vehicle emissions	In progress	Medium	AENV, ATRANS
1 – 5	Gather data on vehicle emissions equipment tampering	Not started	Medium	ATRANS
1 – 6	Gather data on toxic emissions from electricity sector	In progress	Medium	AENV, EC
1 – 7	Research uncertainties in emissions inventories, including PM and O_3 precursors, biogenic emissions, and open source emissions	In progress	Medium	AENV, EC
2 – 1	Expand ambient monitoring to include measurements of ozone in agricultural areas and near/distant from urban centres	In progress	Medium	AENV, OSC, EC
2 – 2	Expand ambient monitoring to include PM_{10}, $PM_{2.5}$, and O_3, and their precursors, from more areas of the province, including more rural and background locations	In progress	Medium	AENV, OSC, EC
3 – 1	Collect personal exposure data on PM and O_3	In progress	Medium	AHW
4 – 3	Conduct basic research to determine the contribution of the electricity sector's emissions to health and ecological effects associated with smog	In progress	Medium	EUB, AENV
5 – 10	Regularly report pollution trends, together with correlated health effects	In progress	Medium	AENV, AHW
6 – 5	Support epidemiological studies on health effects of air pollution	In progress	Medium	AHW, HC
6 – 8	Link vehicle emissions to ambient data, human exposure and health effects	In progress	Medium	AENV, AHW
1 – 10	Develop methodologies for estimating emission inventories	In progress	Low	AENV, EC
7 – 2	Evaluate the use of regional photochemical models in future rollback analysis	In progress	Low	EC
8 – 3	Identify and gather concerns and knowledge (scientific and traditional/local) on health effects of air contaminants and identify gaps in knowledge	In progress	Low	AHW, HC
8 – 5	Develop mechanisms to benchmark, measure, and report pollution prevention/continuous improvement activities	In progress	Low	AENV, EC

Table 2: Prioritized Individual Actions					
Matrix Reference #	**Action**	**Implementation Status**	**Priority**	**Lead Agencies For Implementation**	**CASA Data Workshop**
6 – 10	Study health effects of low level exposure to PM emissions (<2.5ug/m^3)	In progress	High	AHW, HC	Yes
6 – 12	Study the reproductive, immunological, and other health impacts on cattle of low-level exposure to a variety of contaminants	In progress	High	AAFRD	No
6 – 13	Research to understand risk to cattle from flaring emissions and whether current ambient standards protect cattle	In progress	High	AAFRD	No
7 – 1	Improve the regional, provincial and national forecasting systems for source emissions	In progress	High	AENV, EC	Yes
2 – 5	Expand indoor air quality monitoring	In progress	Medium	AHW	Yes
2 – 6	Undertake a review of the current monitoring response capabilities for events involving significant sour gas releases and ensure that adequate capability exists	Not started	Medium	EUB, AENV	No
3 – 3	Establish a high-level exposure registry to track individuals exposed to substantial levels of sour gas	Not started	Medium	EUB	No
4 – 4	Develop comprehensive health effects information (qualitative and quantitative) relating to sour gas	In progress	Medium	AHW, HC	No
5 – 1	Establish a central electronic data repository, transfer and clearinghouse system to house air quality data including source emissions, emission forecast information, ambient concentrations, and effects	In progress	Medium	OSC	Yes
5 – 2	Establish a database on sour gas (current and historical data on well, pipeline and facility leaks, ruptures, flares, venting)	In progress	Medium	EUB	No
5 – 4	Include data on industrial compliance, ambient monitoring, and airsheds in the CASA data warehouse	In progress	Medium	OSC, AENV	Yes

Table 2: Prioritized Individual Actions (cont'd)					
Matrix Reference #	**Action**	**Implementation Status**	**Priority**	**Lead Agencies For Implementation**	**CASA Data Workshop**
5 – 6	Develop a protocol for incorporating experiential (anecdotal) data into a formally recognized knowledge system	In progress	Medium	CASA Human Health Team	Yes
5 – 7	Develop a reporting protocol for agricultural producers to keep good herd and air quality event records	In progress	Medium	Animal Health Team	Yes
5 – 9	Prepare and distribute a regular report on the status of Alberta's air quality	In progress	Medium	AENV	No
6 – 6	Use personal exposure monitoring and internal dose biomarker research to improve understanding of exposure events and hazard sources and their effects on human health	Not started	Medium	AHW, HC	Yes
6 – 9	Link upstream oil and gas emissions (including flaring and venting) to ambient data, environmental receptors, and human health effects	In progress	Medium	EUB, AENV, AHW, AAFRD	Yes
2 – 7	Establish a group to look at QA/QC of zonal monitoring data	Not started	Low	AENV	Yes
5 – 8	Provide annotated links from CASA data warehouse to other data and information sources	In progress	Low	AENV	Yes
6 – 14	Study the effect of cold climate on animal exposure to gaseous pollutants	In progress	Low	AAFRD	No
6 – 15	Determine the degree of exposure, threshold dose and toxicological response in cattle to the compounds emitted by flares and evaluate whether short-term, high level exposure to these chemicals constitutes a risk to cattle health	In progress	Low	AAFRD	No
8 – 9	Coordinate review and standardization of air quality data collection and management (including protocols, criteria, guidelines and metadata)	Not started	Low	OSC, AENV	Yes

6.3 Implementation Status Update

It was agreed that documenting the information the group collected on what was being done by whom for the actions classified as "in progress" was important. Group members representing the lead agencies, identified in Tables 1 and 2, supplied the implementation updates given in Tables 3 and 4.

Table 3: Implementation Update For "In Progress" Consensus Actions			
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies For Implementation**
1 - 1	Establish database for SO_2 atmospheric, source, and emission data	The CASA Data Warehouse includes ambient SO_2 data collected by the provincial government and airshed zones (over 20 SO_2 stations). AENV is developing a process to electronically capture ambient and emissions SO_2 data. EC is adding SO_2 (and other criteria air contaminants) to the NPRI database beginning in the 2002 reporting year. This should improve the quality of SO_2 emissions data and improve public access to that data. The 2000 CAC inventory (which includes SO_2) will be finalized by EC (in co-operation with the provinces) in 2003.	AENV, EC
1 – 2	Ensure development of improved emissions inventories	Within PNR, EC has recently completed several emissions related projects including: spatial allocation of emissions in AB, SK, MB and adjoining US provinces; quality control of point sources in the 1995 CAC inventory. Nationally, the inclusion of new substances for NPRI reporting, and the lowering of reporting thresholds for some substances should improve the inventories for those substances. AENV and EC are participating in the Emissions and Projection Working Group (EPWG), which is to develop nationally consistent standardized methodologies, processes and procedures for the timely and accurate preparation of emission inventories and projections criteria air contaminants (CACs).	AENV, EC

Table 3: Implementation Update For "In Progress" Consensus Actions…..(cont'd)			
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies For Implementation**
1 – 11	Ensure emissions from solution gas flaring and venting are properly reported	This information (volume data) is reported in EUB reports ST-60B for the years 1999, 2000 and 2001. Data quality is improving. The EUB does not require reporting of related SO_2 emissions.	EUB
2 – 4	Design future monitoring programs to address the insufficient number of monitoring sites, the need for more appropriate measurement of parameters and receptors, and improved data quality	The CASA Ambient Air Quality Monitoring Project Team developed a strategic ambient monitoring plan in 1995. The CASA Operations Steering Committee is looking into updating this plan with input from Alberta Environment, airshed zones and other CASA project teams.	OSC, AENV
4 – 1	Improve collection of human and animal health data relating to solution gas flaring		AHW, AAFRD

Table 3: Implementation Update For "In Progress" Consensus Actions…..(cont'd)			
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies For Implementation**
6 – 2	Investigate relationships between PM and O_3 emissions, ambient air, human exposure, and human health	AHW has successfully led three community exposure and health effects assessments to date. The assessments in Fort McMurray and Grande Prairie have resulted in detailed reports being made publicly available. The third assessment in Fort Saskatchewan is scheduled to present a detailed report in early Spring 2003. A fourth exposure assessment is in the planning stages for the Lake Wabamun area. Health Canada has an active research program investigating the relationships between PM and O_3 and human health, including studies of toxicological interactions; physical, biochemical, and clinical effects; and effects on healthy and asthmatic subjects. EC has an active research program on PM and O_3 issues. This includes measurement of PM, ozone and precursors at a number of sites across Canada, modelling studies that attempt to understand the causes of pollution episodes and source apportionment of PM.	AHW, AENV, HC, EC
6 – 3	Develop a research program to address gaps in the H_2S health effects database	AHW is pursuing this recommendation with other research partners. As part of the multi-jurisdictional Working Group on Air Quality Objectives and Guidelines (WGAQOG), Health Canada was involved in drafting a document on sulphur compounds. The risk assessment component of this work identified research needs.	AHW, HC

Table 3: Implementation Update For "In Progress" Consensus Actions…..(cont'd)			
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies For Implementation**
6 –7	Measure personal exposure to compounds of concern emitted by flares	The AENV Air Research Users Group conducted a study to determine ambient concentrations of pollutants downwind of flares. The pollutants monitored included VOCs and PAHs. Contaminant specific personal exposure prototypes are being investigated by AHW. The EUB Public Safety & Sour Gas initiative includes a recommendation dealing with H_2S monitoring that is being addressed by AHW.	EUB, AENV, AHW
6 – 18	Conduct further research on source apportionment	In co-operation with industry, the AENV Air Research Users Group conducted source apportionment studies for several industrial sectors. EC is working on source apportionment of PM both regionally and nationally. Speciated PM measurements were taken at Elk Island NP in support of source apportionment work.	AENV, EC
8 – 1	Approve and implement the human health monitoring framework (tool for detecting trends and associations between air quality and health-related variables)		AHW
1 – 4	Gather data on vehicle emissions		AENV, ATRANS
1 – 6	Gather data on toxic emissions from electricity sector	EC maintains NPRI that includes emissions from the electricity sector. There is currently a program in partnership between EC, NRCan, provinces and utilities to gather more data on mercury emissions from the electricity sector.	AENV, EC

Table 3: Implementation Update For "In Progress" Consensus Actions…..(cont'd)			
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies For Implementation**
1 – 7	Research uncertainties in emissions inventories, including PM and O_3 precursors, biogenic emissions, and open source emissions	EC has ongoing research efforts in this area mostly conducted by the Pollution Data Branch.	AENV, EC
2 – 1	Expand ambient monitoring to include measurements of ozone in agricultural areas and near/distant from urban centres	Ozone is measured in seven agricultural areas by the provincial network and airshed zones. Limited ambient monitoring has been conducted upwind and downwind of urban centres. The CASA Operations Steering Committee will address this issue.	AENV, OSC, EC
2 – 2	Expand ambient monitoring to include PM_{10}, $PM_{2.5}$, and O_3, and their precursors, from more areas of the province, including more rural and background locations	$PM_{2.5}$ and O_3 monitoring has been added at several locations in rural and background areas of the province over the past several years. The CASA Operations Steering Committee will address this issue.	AENV, OSC, EC
3 – 1	Collect personal exposure data on PM and O_3	AHW ensures that this data collection is an integral part of each community exposure and health effects assessment conducted in the Province.	AHW
4 – 3	Conduct basic research to determine the contribution of the electricity sector's emissions to health and ecological effects associated with smog	Progress is being made through the CASA Electricity Team. Emissions that contribute to smog are reported annually to AENV. A community exposure and health effects assessment for the Wabamun area, where a significant proportion of these emissions occur, has recently been initiated.	EUB, AENV
5 – 10	Regularly report pollution trends, together with correlated health effects	Long-term trends in ambient air pollution levels are available for provincial and airshed monitoring stations through the CASA Data Warehouse. A SOE report on air quality was completed by AENV for 1998.	AENV, AHW
6 – 5	Support epidemiological studies on health effects of air pollution	HC has an active epidemiological research program examining air pollution and human health.	AHW, HC

Table 3: Implementation Update For "In Progress" Consensus Actions…..(cont'd)			
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies For Implementation**
6 – 8	Link vehicle emissions to ambient data, human exposure and health effects		AENV, AHW
1 – 10	Develop methodologies for estimating emission inventories	There is ongoing work to refine emission inventories.	AENV, EC
7 – 2	Evaluate the use of regional photochemical models in future rollback analysis	EC is currently doing photochemical modelling in support of the PM/O_3 team. Some of these model runs will include "reduced emission" scenarios, which is essentially rollback analysis.	EC
8 – 3	Identify and gather concerns and knowledge (scientific and traditional/local) on health effects of air contaminants and identify gaps in knowledge	The Safe Environments Programme at Health Canada investigates links between air quality and health. Research concentrates on assessment of the hazards to human health resulting from exposure to airborne pollutants.	AHW, HC
8 – 5	Develop mechanisms to benchmark, measure, and report pollution prevention/continuous improvement activities	Alberta Environment has developed a pollution prevention section. This new section will be looking at this issue. Some mechanisms that EC uses are VCR, NPRI, and voluntary environmental performance agreements (EPAs) with industry.	AENV, EC

Table 4: Implementation Update for "In Progress" Individual Actions				
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies for Implementation**	**CASA Data Work-shop**
6 – 10	Study health effects of low level exposure to PM emissions (<2.5ug/m^3)	AHW ensures that $PM_{2.5}$ concentrations are measured as an integral component of all community exposure and health effects assessments. Health Canada has an active research program on PM, including studies of cardio-respiratory effects of concentrated fine particles on healthy and asthmatic subjects.	AHW, HC	Yes
6 – 12	Study the reproductive, immunological, and other health impacts on cattle of low-level exposure to a variety of contaminants		AAFRD	No
6 – 13	Research to understand risk to cattle from flaring emissions and whether current ambient standards protect cattle		AAFRD	No
7 – 1	Improve the regional, provincial and national forecasting systems for source emissions	EC, in co-operation with the provinces, is continually trying to improve forecasts for emissions through such measures as updating emission factors and using updated economic and population forecasts to drive emission forecasts. A recent example in Alberta is the Cheminfo emissions forecast that was funded by EC through the CASA PM/O_3 team.	EC, AENV	Yes
2 – 5	Expand indoor air quality monitoring	Indoor air quality measurements are an integral component of each community exposure and health effects assessment that involves AHW.	AHW	Yes

Table 4: Implementation Update for "In Progress" Individual Actions……(cont'd)				
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies for Implementation**	**CASA Data Work-shop**
4 – 4	Develop comprehensive health effects information (qualitative and quantitative) relating to sour gas	Extensive reviews of the scientific literature are currently being undertaken by AHW on the health effects associated with acute exposure to H_2S and SO_2. Once completed the review will focus on the health effects associated with chronic exposure to low levels of both compounds. As part of the multi-jurisdictional Working Group on Air Quality Objectives and Guidelines (WGAQOG), Health Canada was involved in drafting comprehensive health effects information on sulphur compounds.	AHW, HC	No
5 – 1	Establish a central electronic data repository, transfer and clearinghouse system to house air quality data including source emissions, emission forecast information, ambient concentrations, and effects	The CASA Data Warehouse is a central repository for ambient air quality data collected by the provincial and airshed zone networks. Source emission and emission forecast information is not included in this system.	OSC, AENV	Yes
5 – 2	Establish a database on sour gas (current and historical data on well, pipeline and facility leaks, ruptures, flares, venting)	This is being addressed via the EUB's Public Safety and Sour Gas initiative. Current status is noted in the EUB's Public Safety and Sour Gas Annual Progress Report (pg 69)	EUB	No
5 – 4	Include data on industrial compliance, ambient monitoring, and airsheds in the CASA data warehouse	Work is in progress to develop a method to electronically capture ambient compliance data. Ambient airshed data is included in the CASA Data Warehouse.	OSC, AENV	Yes

Table 4: Implementation Update for "In Progress" Individual Actions……(cont'd)				
Matrix Reference #	**Action**	**Implementation Update**	**Lead Agencies for Implementation**	**CASA Data Work-shop**
5 – 6	Develop a protocol for incorporating experiential (anecdotal) data into a formally recognized knowledge system		CASA Human Health Project Team	Yes
5 – 7	Develop a reporting protocol for agricultural producers to keep good herd and air quality event records		Animal Health Team	Yes
5 – 9	Prepare and distribute a regular report on the status of Alberta's air quality	The last AENV SOE report for air quality was for 1998.	AENV	No
6 – 9	Link upstream oil and gas emissions (including flaring and venting) to ambient data, environmental receptors, and human health effects	Ft. McMurray Study, Western Canada Animal Health Study Current status on some of the items is also noted in the EUB,s Public Safety and Sour Gas Annual Progress Report.	EUB, AENV, AHW, AAFRD	Yes
5 – 8	Provide annotated links from CASA data warehouse to other data and information sources	At the present time, links to related web sites are listed on the CASA Data Warehouse web site.	AENV	Yes
6 – 14	Study the effect of cold climate on animal exposure to gaseous pollutants		AAFRD	No
6 – 15	Determine the degree of exposure, threshold dose and toxicological response in cattle to the compounds emitted by flares and evaluate whether short-term, high level exposure to these chemicals constitutes a risk to cattle health		AAFRD	No

Appendix 1

List of Data Issues Group Members

Name	Organization
Terry Lee Degenhardt	Wildrose Agricultural Producers
Marianne English, Project Manager	Clean Air Strategic Alliance
Markus Kellerhals	Environment Canada
Barb Kinnie	Sierra Club of Canada, Chinook Group
Alexander MacKenzie	Alberta health and Welfare
Paije McGrath	TransAlta Corporation
Russ Miyagawa	Toxics Watch Society of Alberta
Bob Myrick	Alberta Environment
Bob Scotten	West Central Air Society (WCAS)
Stacey Smythe, Co-Chair	Health Canada
Darcy Walberg, Co-Chair	Agrium

Appendix 2

Terms of Reference

Purpose: (a) To compile and review recommendations on data issues from CASA teams, CASA forums, and the CASA Workshop on Data Issues.
(b) To assess the status of these recommendations.
(c) To develop an implementation plan that will lead to progress with respect to resolving outstanding data issues.

Goal: To develop an implementation plan that will lead to progress with respect to resolving outstanding data issues.

***Key Task Areas*:**
1. Compile and review recommendations on data issues from CASA teams, CASA forums, and the CASA Workshop Data Issues.
2. Assess the status of implementation of each of these recommendations.
3. Develop criteria for prioritizing.
4. Prioritize the recommendations.
5. Develop an implementation strategy and plan that will lead to progress with respect to resolving outstanding data issues.
6. Identify the implementers, and the supporting rationale for implementation in the implementation plan.
7. Report to, and obtain input from, CASA teams.
8. Report to, and obtain input from, the CASA Board.

Timelines: It is anticipated that the Working Group will deliver its final report and recommendations in September 2002.

The Working Group expects to meet monthly until its tasks are completed.

Context: The formation of the Data Issues Working Group resulted from a process that began in November 1998 with CASA's Desired Future in 2020Workshop. As a result of that workshop, the CASA Board approved a recommendation (in June 1999):

The Secretariat take the lead in organizing a workshop to address data/information issues.

A workshop on data issues was held in March 2000. This workshop resulted in more than 50 recommendations being developed, including two overarching recommendations one of which stated:

A multi-stakeholder group, coordinated by CASA, should compile and review recommendations from this workshop, from CASA project teams, and from previous forums on air quality and

health issues. The status of these recommendations should be assessed, with the aim of developing an implementation plan to improve the collection of air quality and health data.

The CASA Board adopted the overarching recommendations and mandated the establishment of the Data Issues Working Group in response to the above recommendation. The Working Group will take into consideration the following:

1. CASA requires data for its teams and so there needs to be a link between the Working Group and CASA teams.
2. The Working Group members each represent their sector and so must communicate with their sector on Working Group activities.
3. Any implementation plan that the Working Group develops needs to identify concrete actions that can actually be accomplished.

Reporting to the CASA Board of Directors:

1. The Board decision (of June 2000) clearly laid out the tasks of the Working Group and so it is not necessary to obtain further direction from the Board at this time.
2. The Group will seek Board approval of priorities before proceeding to develop an implementation plan.
3. The Group may present one or two status reports to the Board.
4. The Group will report to the Board once its tasks are completed.

Appendix 3

List of Recommendations Included in Prioritization Process

Board Meeting	Team	Matrix #	Status	Recommendations
November 1994	D3 Stake-holder Group	4, 6	In progress	**2.** Basic research is required to determine the contribution of the electrical sector's emissions to the health and ecological effects associated with smog.
		1	In progress	**3.** Research is required to determine what and how much toxic emissions are associated with the electric sector.
November 1995	Ambient Air Quality Project Team	5	In progress	**4.** The most commonly expressed concerns relating to this subject, and the issues, to be addressed in the design of the future monitoring programs, included: ▪ Access to information ▪ Insufficient number of sampling sites ▪ Consistent high level of data quality ▪ More appropriate parameters, receptors, and indicators need to be measured.
November 1996	Item 3.1 : Public Information and Report on Air Quality	5	In progress	**5.** CASA to assemble, analyze, and disseminate information regarding the status of the province's air quality in a credible and timely fashion. The report should include: a full range of air quality indices (ghg, acid deposition, ground level ozone, toxics); provincial aggregate and regional info; historical trends; projections; comparisons with other jurisdictions; areas of improvement; successes; areas of risk/problem spots.
	SO_2 Management	1	In progress	**6.** AEP and AEUB establish a comprehensive, reliable and integrated SO_2 atmospheric source and emission data capture and reporting system. The system should use an acceptable electronic data information exchange standard that is compatible and can be integrated with collected ambient monitoring data.
			Done	**7.** AEUB and AEP establish an SO_2 emissions forecasting system that provides emissions forecasts on an ongoing and timely basis.
			Done	**8.** CASA institute mechanisms, such as Internet, symposium/workshops, etc. for ongoing information sharing among stakeholders.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
March 1997	Human Health Resource Team	8	In progress	**9.** Approve the human health monitoring framework which is a tool to gather information on the health of people for the purpose of detecting trends and associations between air quality and health related variables. The process consists of an ongoing systematic collection, analysis, and interpretation of selected data on health outcomes, air quality parameters, and population exposure.
		8	In progress but linked to #9	**10.** The monitoring system has to include public health symptoms as well as ambient data and other factors such as weather; the monitoring system should be broad-based and province-wide.
		6	In progress	**11.** Appropriate health indicators should be identified to allow more focused investigations of causal relationships.
		5	In progress	**12.** A communication component to encourage regular public reporting of trends in pollutant levels, together with results of correlated health effects is needed.
		6	In progress	**13.** Better support and data for epidemiological studies on health effects of air pollutants is needed.
		8	In progress	**14.** The system requires bodies of knowledge, such as: the known health effects of air emissions; temperature; wind direction; humidity; seasonal variations for allergies; information about relevant event occurrences particular to specific areas; etc.
December 1997	Flaring Project Team	1	In progress	**26.** The EUB clarifies and revises reporting requirements as practical to ensure the volumes and the composition of all materials directed to the atmosphere from solution gas flaring and venting are appropriately reported.
		6	In progress	**27.** The EUB, Alberta Environmental Protection, Alberta Health and Alberta Agriculture, Food and Rural Development establish processes and linkages to relate data on oil and gas wells, and solution gas flaring and venting with data on pollutants, environmental receptors and human and animal health.
		4	In progress	**28.** Alberta Health improves collection of human health data respecting the impacts of solution gas flaring.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
December 1997	Flaring Project Team	4	In progress	**29.** Alberta Agriculture, Food and Rural Development improve the collection of animal health data respecting the impacts of solution gas flaring.
December 1997	Flaring Project Team		Done	**30.** CAPP compile data on the type, distribution and performance of existing process equipment associated with emission sources and assess the net benefits of revised requirements/ processes.
			Done	**31.** Alberta Environmental Protection assesses the feasibility of developing methods and a protocol to monitor ambient concentrations of compounds of concern emitted by solution gas flares and, if feasible, implement ambient monitoring for these compounds.
		6	In progress	**33.** Alberta Health develop methods and implement a program for measuring personal exposure to compounds of concern emitted by flares.
	Ecological Effects Monitoring Project Team		Done	**36.** Ambient air quality monitoring of ozone should be expanded to include measurement of ozone levels in northern Alberta.
		2	In progress	**37.** Ambient air quality monitoring for ozone should expanded to include measurement of ozone levels in agricultural areas both near and distant from urban centres.
			Done	**38.** An acid deposition effects monitoring program should be established in each of two forest types (pine and aspen).
		6	In progress	**43.** A research program be developed and funded to address the knowledge gaps relating to the health effects data-base for H_2S.
December 1997	Vehicle Emissions Working Group	1	Not started	**44.** Information is lacking on the extent and seriousness of tampering in this province. CASA should ask Alberta Transportation and Utilities to consider inspecting for systems that have been tampered with as part of the inspection process for vehicles coming into Alberta from other jurisdictions for sale or permanent registration.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
December 1997	Vehicle Emissions Working Group	6	In progress	**45.** Serious data gaps limit our ability to understand and respond to the relationship between air quality and human health. Specifically, there are concerns about the adequacy of ambient air monitoring data as an indicator of human exposure. Efforts should be made to fill data gaps in two main areas: 1) developing an emissions inventory and 2) assessing how this inventory relates to human health.
		1, 6	In progress	**46.** Alberta Environmental Protection should undertake an emissions inventory by getting data on emissions from vehicles, percentage of overall emissions from vehicles, and linkage of emissions and human exposure with ambient air quality.
	Statement of Concern on Animal Health	6	In progress	**47.** Additional research is needed to understand the risk to cattle of volatile emissions from flaring and whether current ambient standards protect cattle.
		4	In progress	**48.** An Alberta livestock-monitoring database should be constructed.
		6	In progress	**49.** The degree of exposure, threshold dose and toxicological response in cattle to the compounds emitted by flares.
		6	In progress	**51.** Studies to evaluate whether short-term, high-level exposure to these chemicals constitutes a risk to cattle health.
		6	In progress	**52.** Studies need to be done on low-level exposure to a variety of contaminants and the potential impacts on cattle, with special attention to the reproductive and immunological systems.
		6	In progress	**53.** Studies need to be done on the effects of cold climate on exposure to gaseous pollutants.
March 1999	Animal Health Working Group	8	In progress	**55.** Identify and gather existing information – concerns, scientific and local/traditional knowledge on health effects attributable to air contaminants.
		8	In progress	**56.** Identify gaps.
November 1999	Pollution Prevention/ Continuous Improvement	8	Complete?	**60.** Develop mechanisms to benchmark, measure, and report pollution prevention activities.
		1	In progress	**61.** Ensure development of improved emissions inventories

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
March 2001	Presentation by EUB on Public Safety and Sour Gas	4	In progress	**64.** The EUB work with Alberta Health and Wellness, regional health authorities, Alberta Environment, Alberta Human Resources, industry and other stakeholders to ensure that comprehensive health effects information (qualitative and quantitative) is developed as soon as practical due to its urgency.
		3	Not started	**66.** The EUB work with Alberta Health and Wellness and Alberta Human Resources to establish a high-level exposure registry to track individuals who have been knocked down or had other substantial exposure to sour gas.
		5	In progress	**67.** The EUB review and organize its existing large quantity of sour gas data on well, pipeline and facility leaks, ruptures, flares and venting to provide a historical database that is accurate and complete, and, in conjunction with other stakeholders, urgently develop and maintain new databases that deal specifically with sour gas, and make such databases available to the industry and the public.
		2	Not started	**73.** The EUB undertake a review of the current monitoring response capabilities for events involving significant sour gas release and ensure that adequate capability exists.
		2	Done	**75.** The EUB enhance its capability to conduct monitoring as part of its complaint response and compliance programs.
March 2001	Human Health Project Team	8	See Recommend-ation 10	**78.** The components of the comprehensive human health and air quality monitoring system are: ▪ Symptoms and public health complaints ▪ Known human health effects of air contaminants ▪ Information about relevant event occurrences ▪ Ambient air quality monitoring data ▪ Human health effects monitoring data.
November 1999	MSG PM and O_3	1	In progress	**80.** Additional work be done on methodologies related to estimating emissions inventories.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
November 1999	MSG for PM and O_3	1	In progress	**81.** The uncertainties in the emissions inventories be researched further. The uncertainties for which further research is needed include: ▪ emissions of PM and of ozone precursors ▪ biogenic emissions; and ▪ emissions from open sources.
		6	In progress	**82.** Conducting further research on source apportionment take the lead in: ▪ source profiles are accurate, reliable, comprehensive and appropriate for Alberta emitters; ▪ data are gathered on additional ambient species and the way in which they fluctuate over time; and ▪ models most appropriate to the Alberta situation are used and that expertise is available to correctly interpret the results.
		2	In progress	**85.** Monitoring be expanded so that data on PM_{10}, $PM_{2.5}$, and O_3, and their precursors, is collected from more areas of the province.
		2	In progress	**86.** Particulate monitoring focus on PM_{10}, and $PM_{2.5}$ fractions of ambient air particulate matter rather than on Total Suspended Particulates alone.
		2	In progress	**87.** Ambient air quality monitoring be expanded to include more rural and background locations.
		7	In progress	**89.** Evaluate the use of regional photochemical models in future analysis.
		6	In progress	**92.** Further investigation be undertaken to determine how emissions of particulate matter and ozone correlate with ambient air quality and how ambient air quality is linked to human exposure.
		3	In progress	**93.** Personal exposure monitoring efforts be encouraged and supported to produce credible, scientifically defensible data for improved evidence-based decision-making.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
November 1999	MSG for PM and O_3	6	In progress	**94.** Further investigation be undertaken to determine how emissions of particulate matter and ozone correlate with ambient air quality and how ambient air quality is linked with effects on human health and the environment
		3	In progress	**96.** Personal exposure monitoring become part of a long-term air monitoring strategy in Canada.
November 1999	MSG for PM and O_3		Done	**98.** Research be undertaken to validate the association between human health effects and ambient concentrations of PM_{10} and $PM_{2.5}$.
			Done	**99.** Environment Canada be approached to provide any available information on the ecological benefits of reduced levels of particulate matter or ozone pollution.
		5	In progress	**102.** Establishing and maintaining a database that contains key process information about Alberta source sectors that emit particulate matter and PM and ozone precursors.
February 1996	Preparing for Climate Variability and Change on the Canadian Prairies		Done	**119.** Improved climate and weather predictions at the regional scale with particular emphasis on severe weather and the magnitude and frequency of drought.
			Done	**125.** Changes in frequency and severity of extreme weather events.
			Done	**126.** Upper and lower bounds of future prairie climate based on the IPC scenarios.
November 1996	Alliance Project Integration and Information Workshop		Done	**141.** The need for reliable and readily available ambient monitoring data was identified by participants. Some suggested that this data needs to be easily accessible to all those wanting it, including the general public.
		5	In progress	**142.** Some suggested that reliable source emission data should also be readily available (including forecasts).
		5	In progress	**143.** A central repository is required for all ambient and ecological data and possibly for source data.
		5	In progress	**144.** Greater coordination and common format standards and protocols need to be used for collection, storage, and transmission of data.
		5	Not started	**145.** Need to know who will use or need the data, who will "own" and manage it, and how it will fit with other data being used in air quality decision making.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
March 2000	CASA Workshop on Data Issues	6	Not started	**155.** The CASA Board should recommend that the Government of Alberta, the Alberta Heritage Foundation and the Alberta Research Council balance research activities toward personal ambient exposure monitoring and internal dose biomarker research to improve our understanding of exposure events and how they relate to health effects and hazard sources.
March 2000	CASA Workshop on Data Issues	3	In progress	**156.** Collect indoor and outdoor exposure data for urban areas, urban/industrial areas, rural areas, and rural/affected areas
		6	In progress	**157.** Collect health effects exposure data for exposure to low levels of particulate matter (below 25 mug/m^3). This should be referred to the new project team that is being established on PM and O_3.
		3	In progress	**158.** Developed an exposure-monitoring program.
		6	In progress	**159.** Link exposure monitoring with emissions information, ambient monitoring and effects data.
		2	In progress	**160.** Expand indoor air monitoring.
		8	Not started	**161.** Request that Alberta Health and Wellness and Alberta Food, Agriculture and Rural Development provide clear direction to data-gatherers about what the departments need to track long-term human, animal or ecological health.
		5, 8	In progress	**162.** Develop protocols for recording experiential data.
		8	Not started	**163.** CASA should ask the Government of Alberta to coordinate a review of the way air quality data is currently collected and managed.
		5	Not started	**164.** CASA should recommend a lead agency to establish a protocol to incorporate observational information into the formally recognized knowledge system
		1	In progress	**166.** Fill gaps in source inventories, specifically for non-regulated sources.
		1	In progress	**167.** Improve Alberta-specific emission factors.
		7	Done	**168.** Establish Alberta-specific models to estimate and forecast criteria air contaminants and air toxics from vehicles.
		1	Not started	**169.** Establish a provincial emission testing system for in-use vehicle emissions in Alberta.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
March 2000	CASA Workshop on Data Issues	8	In progress	**172.** Develop standard methods to collect data (protocols, criteria and guidelines) and review periodically.
		5	In progress	**173.** Establish a reporting protocol for farmers to keep records, and encourage farmers to keep records.
		8	In progress	**174.** Gather data on confounding factors.
		6	In progress	**176.** Do more research on effects to determine what kind of data needs to be gathered.
March 2000	CASA Workshop on Data Issues	7	In progress	**177.** Improve the regional, provincial and national forecasting systems for source emissions by increasing the parameters covered. We need political will, money and people to make this happen.
		2	In progress	**178.** Improve the use of existing air monitoring by: ▪ tapping into other sources (e.g. literature reviews) to find out who is doing what, ▪ linking to other organizations who are already doing the work, and ▪ monitoring more parameters.
		5	In progress	**179.** All data should be collected and accessible in electronic format.
		5	In progress	**180.** The CASA data warehouse should be expanded to include industrial compliance data and airshed data.
		5	In progress	**181.** Annotated links should be provided from the CASA data warehouse to other data and information sources; this will require website upgrades.
		2	Not started	**182.** CASA should establish an official group to address QA/QC of zonal and monitoring data.
			Done	**183.** CASA should establish an electronic data transfer and clearinghouse.
		5	In progress	**184.** Enhance the present CASA website to point stakeholders to areas where they can find information that is important to them.
		5	In progress	**185.** Put data into an electronic format so it is easily accessible.
		5	Not started	**186.** Identify the audience and the needs, to determine what data is needed and how to present it.
		8	In progress	**187.** Improve metadata.
		5	In progress	**188.** Data should be made available at different levels of detail.

List of Recommendations Included in Prioritization Process ……(cont'd)

Board Meeting	Team	Matrix #	Status	Recommendations
		5	In progress	**189.** Establish a central electronic data directory or repository with links to other sources.
		8	Not started	**191.** Construct a good reference matrix of: who is doing what, who has the resources to address the gaps and needs identified by this workshop, what are the responsibilities and who will be affected.

Appendix 4

List of Recommendations Not Included in Prioritization Process

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
November 1994	D3 Stakeholder Group	**1**. Basic problem-solving research is necessary to enable the effective use of mechanisms and tools in managing air quality.	not actionable
March 1997	SO2 Management Team	**15**. AEP and AEUB establish a comprehensive, reliable and integrated SO2 atmospheric source and emission data capture and reporting system. The system should use an acceptable electronic data information exchange standard that is compatible and can be integrated with collected ambient monitoring data.	duplicate of 6
		16. AEUB and AEP establish an SO2 emission forecasting system that provides emission forecasts on an ongoing and timely basis.	duplicate of 7
		17. CASA institute mechanisms, such as Internet, symposium/workshops, etc., for ongoing information sharing among stakeholders.	duplicate of 8
June 1997	Improving Board Performance Committee	**18.** The Board should set aside sufficient time at its meeting to analyze and assess existing air quality data and to establish realistic and appropriate goals/targets for air quality in the province over the next 10 – 15 years.	not a data issue
	Proposal for a Human Health Air Quality Research Organization for Alberta	**19**. Prioritize research through a multi-stakeholder process.	not a data issue
		20. Promote research projects and expertise.	not actionable
		21. Facilitate better coordination/collaboration and some efficiencies through a network of interested scientists.	not actionable
		22. Allocate and administer funds for human health/air quality research projects.	not a data issue
		23. Ensure quality of research.	not actionable
June 1997	Proposal for a Human Health Air Quality Research Organization for Alberta	**24**. In addition, this organization may become a resource for a number of existing organizations and the public as a source of accurate and credible information on human health/air quality issues.	not actionable

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
December 1997	Strategic Planning Initiative/Committee	**25.** The goal is to achieve improvement in air quality management; one objective is to improve air quality through data collection/ integration of information. This requires systematic collection of data and information, such as: • Base line air quality • Data from Ambient and zonal ambient monitoring systems • Data from health and other effects-based scientific studies/programs, including data on air quality complaints in Alberta.	not actionable
	Flaring Project Team	**32**. Alberta Environmental Protection assesses the feasibility and form of ambient guidelines for compounds emitted by solution gas flaring.	not actionable
		34. Alberta Environmental Protection leads discussions with other research bodies regarding research to fill gaps in our understanding of the effects of solution gas flaring on human health and animal health and vegetation.	not actionable
		35. CASA communicates with interested members of the public the policy management framework recommended in this report and provides an opportunity for the public to comment on future recommendations regarding regulatory values and timelines.	not actionable
June 1998	Strategic Planning Committee	**40**. CASA's fourth core business area is measuring, evaluating and reporting on air quality and the performance of the air quality management system.	not actionable
		41. Key performance measures should include, amongst others, ambient air quality indicators, ecological effects indicators, and human health effects indicators.	not actionable
June 1998	Air Toxics Project Team	**42**. Alberta Health and AEP should re-evaluate the Air Quality Objective for H2S from both a human/animal health and from an environmental viewpoint.	not a data issue
	Statement of Concern on Animal Health	**50**. A workshop should be held to identify the research priorities of the livestock producers, the oil and gas industry, CASA, and the regulators.	not actionable
		54. Development of a risk protocol for doing hazard and risk assessment in cattle.	not actionable

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
March 1999	Ecological Effects Implementation Team	**57**. CASA sponsor an information-sharing workshop on ecological monitoring, of one to two days in length, possibly late in 1999 or early in 2000.	not actionable
June 1999	Strategic Planning Team	**58**. The second gap identified as a result of the Desired Future Workshop was the lack of comprehensive, integrated data.	not actionable
		59. The Secretariat take the lead in organizing a workshop to address data/information issues (measuring, collection, integration, reporting, projections, etc.)	done
November 1999	Multi Stakeholder Group for PM & Ozone	**79.** The regional emissions inventories provided by Environment Canada be used only as an initial estimate. If these regional estimates are to be used in future progress or regulatory reporting, then further refinements are recommended.	not actionable
		83. Collaborating with other jurisdictions to improve the methodologies for source apportionment modelling, data collection, study design and interpretation of results	not actionable
		84. The MSG further recommends that the Group evaluate the forthcoming report on source apportionment and determine whether additional recommendations are needed in this area.	not a data issue
		88. That Environment Canada adopts a more transparent approach that will enable stakeholders to review their rollback analysis process.	not a data issue
		90. That Environment Canada play a leadership role and work with others (such as provincial agencies and scientific organizations) to conduct further research on regional airshed and photochemical models.	not actionable
November 1999	Multi Stakeholder Group for PM & Ozone	**91.** That Environment Canada ensures that any future analyses include an assessment of uncertainty so that limitations can be accounted for.	not actionable

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
		95. Existing data and knowledge about these issues be considered and applied as new technology is used to develop the data set (i.e., personal exposure) that will produce credible, scientifically defensible data for improved evidence-based decision making.	not actionable
		97. Alberta Environment track the work presently underway at the US Environmental Protection Agency, continuing the assessment of particulate matter.	not actionable
		100. Alberta Environment investigates and review the "Quality-Adjusted Life Years" approach to benefit assessment for consideration in policy decisions.	not a data issue
		101. The MSG further recommends that the Group evaluate the forthcoming report of the Royal Society's Expert Review Panel and determine if additional recommendations are needed.	for MSG
		103. That Alberta Environment take the lead in identifying control technologies that are compatible with Alberta source sector processes.	not actionable
		104. That Alberta Environment take the lead in identifying capital and operating and maintenance costs for compatible control technologies.	not actionable
		105. That Alberta Environment takes the lead in establishing a process to periodically review and update this information.	not actionable
		106. That Alberta Environment take the lead in engaging Alberta source sectors and other stakeholders throughout the development of these cost estimates.	not actionable
		107. The MSG further recommends that the Group evaluate the forthcoming report on control technologies and costs for Alberta and determine whether additional recommendations are needed in this area.	not actionable
		108. Alberta Environment take the lead and involve stakeholders in developing a provincial strategy to reduce emissions of particulate matter and precursors to PM and ozone.	not a data issue
November 1999	Multi Stakeholder Group for PM & Ozone	**109.** The Alberta Government actively encourage and support the formation of airshed management zones in Alberta. In doing this, Alberta Environment should play a facilitative, supportive and monitoring role to ensure that existing zonal experience is effectively shared.	not a data issue

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
		110. Airshed management zones set up a process, including consultation with stakeholders, to develop, file and participate in the implementation of action plans to achieve the Canada-Wide Standards for Particulate Matter and Ozone.	not a data issue
		111. Alberta Environment promote the use and formation of airshed management zones for other provinces within the national process.	not a data issue
		112. Alberta Environment be established as the organization ultimately accountable for compliance with the Canada-Wide Standards across the province.	not a data issue
		113. Alberta Environment, in consultation with stakeholders, continue to identify and evaluate administrative options (that is, non "command and control" options) for reducing emissions of particulate matter and ozone.	not a data issue
		114. Opportunities for educating the public about PM and ozone should be identified, further investigated and evaluated.	not a data issue
		115. More effort be given to researching the possibility of combining PM and ozone education with other air quality topics that are more likely to be in the public eye (such as greenhouse gases).	not a data issue
		116. The forecasts for population, transportation and energy demand be considered by Alberta Environment and by stakeholders when developing jurisdictional action plans to implement the Canada-Wide Standards for Particulate Matter and Ozone.	not a data issue
		117. Alberta Environment and stakeholders collaborate on researching new estimates for future growth and forecasts in Alberta.	not actionable
		118. Alberta Environment, with the assistance of the MSG, develop implementation plans for the PM and Ozone Canada-Wide Standards.	not a data issue
March 2000	Enhanced Performance Subgroup of Pollution Prevention/ Continuous Improvement Team	**62.** AEP, the EUB and the SO2 Management Implementation Team should review the nature and success of enhanced performance initiatives to investigate the pros and cons of broader programs for emissions off-sets or credit tracking.	not a data issue

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
June 2000	Acidifying Emissions Management Implementation Team and Animal Health Project Team (re Science Symposium)	**63.** There's general agreement on the need for a science symposium which might cover some of the following Topics: · Relationship between air quality and human health effects · Advancements in public policy processes in relation to air quality and environmental management · Acidifying emissions · Health effects of vehicle emissions · Ozone formation and vehicle emissions · Meeting the Canada-wide Standards for PM and Ozone · Impact of climate change measures on CACs · Animal health effects · Effects on ecosystems at levels below ambient guidelines · New scientific developments in relation to PM and Ozone · Multi-party management of emissions	done
March 2001	Presentation by EUB on Public Safety and Sour Gas	**65**. The EUB, Alberta Health and Wellness, Alberta Environment, regional health authorities, industry, and other interested parties including Alberta universities, jointly establish an independent Scientific Review and Advisory Committee to provide recommendations on required research programs related to sour gas and health.	not a data issue
		68. The EUB, in cooperation with stakeholders, develop a framework and methodology for standardizing dispersion modelling and probabilistic risk assessment that will provide clarity to the industry and the public	not a data issue
		69. The EUB require that users of sour gas hazard and probabilistic risk assessment techniques clearly state their methods and assumptions.	not a data issue
		70. The EUB be responsible for reviewing and updating its standard models and methods regularly.	not a data issue
		71. The EUB ensure that appropriate expertise in special subject areas, such as health and probabilistic risk assessment, is available in the form of staff, consultants, EUB Board members and acting Board members to participate in decisions and to ensure that these subject areas are appropriately dealt with in decision reports.	not a data issue
		72. The EUB should initiate a review of the implications of setbacks on the ability to develop property	not a data issue

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table A: Recommendations on Data Issues from CASA Teams

Board Meeting	Team	Recommendations	Reasons*
March 2001	Presentation by EUB continued	**74**. The EUB, with the assistance of industry and researchers, promote and support the development of exposure monitors that can be used to measure personal exposure of the public to sour gas-related substances in a practical manner.	not actionable
		76. Formation of an information office located within the EUB and supported by a stakeholder committee, to provide accurate, reputable, neutral information related to sour gas development and to be a key contact for referring the public to sources of additional relevant, reputable information.	not a data issue
		77. The EUB initiate a study involving industry, government, the public, and municipal representatives to determine the nature of local benefits, such as reduced property taxes and local business opportunities, to communities impacted by sour gas development.	not a data issue

* The Group adopted a somewhat narrow definition of a "data issues recommendation". First, a recommendation had to be aimed at obtaining a specified set of air quality data. If it was not, it was considered to be "not actionable". If the type of data desired was specified but the recommendation dealt with how to get it, then the recommendation was deemed to be "not a data issue". If the recommendation was related to a data issue but not an air quality data issue, then the recommendation was deemed to be "not an air quality issue". (The Group did not consider climate change to be an air quality issue.)

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table B: Recommendations on Data Issues from CASA Forums

Forum		Recommendations	
Name	**Date**		**Reason***
Preparing for Climate Variability and Change on the Canadian Prairies	held February 1996, presented to the Board June 1996	**120**. Improved dissemination of information and education of the community with respect to the use of this information and its application to risk management.	not actionable
		121. Education and information are required with respect to crop varieties.	not an air quality issue
		122. Other crop varieties need to be evaluated for use in a changing climate.	not an air quality issue
		123. Understand the role of pest and disease in the ecosystem as a key element for both a variable and changing climate.	not an air quality issue
		124. Potential for changes in the functioning of ecological processes and changes in disturbances (e.g. fire, erosion)	not actionable
		127. Sectoral level effects and the resulting cumulative effects on energy demand.	not actionable
		128. Develop specific societal and commercial adaptive changes to mitigate effects	not an air quality issue
		129. Improved regional scale climate scenarios capable of linking with a variety of water quantity and quality models.	not an air quality issue
		130. Integrated assessment of the effects of change on water due to climate change and land use change.	not an air quality issue
		131. Cumulative effects on ecosystem dynamics, including specific resources at risk, is an important information gap.	not an air quality issue
		132. More predictive models to assess climate change effects on growth and yield, insects and forest fires are needed.	not an air quality issue
		133. Increased cooperation, coordination and information transfer is required.	not actionable
		134. The assessment of regeneration is a high priority.	not an air quality issue
		135. More information on current and expected impacts of climate, in particular for long-term investment decisions and single resource communities is needed.	not an air quality issue
Acidifying Emissions Symposium	November 1996	**136**. The CASA Board establish a strategy for communicating the air quality-related research needs which support management priorities to the research community in Alberta.	not a data issue
		137. The CASA Board use symposia and workshops as a means of facilitating communication between scientists and managers.	not actionable

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table B: Recommendations on Data Issues from CASA Forums

Forum		Recommendations	
Name	**Date**		**Reason***
Alliance Project Integration and Information Workshop	Secretariat Initiative November 1996	**138**. Need to ensure that critical emissions are not being neglected in light of new information.	not actionable
		139. Groups need to consider the implications and synergies of managing emissions outside of their mandate (e.g. H_2S, GHG, etc.) in an integrated manner.	not a data issue
		140. Health effects of vehicle emissions and the effects of air quality on animal health are other areas that need to be considered.	not actionable
Desired Future Workshop	Strategic Planning Team November 1998	**146**. Develop necessary information to fill gaps and provide knowledge for making the right decisions, including relative risks.	not actionable
		147. Need research on synergistic effects.	not actionable
		148. Knowledge limits CASA's progress.	not actionable
CASA Workshop on Data Issues	held March 2000, presented to Board June 2000	**149**. Secure long-term and organizational commitment to ensure resources and support are available	not a data issue
		150. CASA should prepare a position paper that outlines for the Government of Alberta the importance of good coordination among departments and agencies to deal with air quality issues and their impacts, and get the Government's endorsement to proceed and commitment to support.	not a data issue
		151. Get commitment and support from senior levels of government and industry for resources to resolve data issues.	not a data issue
		152. Make politicians and other decision makers aware of the data needs and the resources needed, and get them to make a commitment to secure those resources.	not a data issue
		153. Work with Health Canada and Environment Canada on an environmental health strategy.	not a data issue
		154. Alberta Health and Wellness and Alberta Environment should develop a long-term plan to address human health issues related to exposure and indoor air quality.	not a data issue
		165. Explore partnerships with organizations and various levels of government outside Alberta to help meet monitoring needs and assess effects.	not a data issue
		170. Develop methods for the most effective ways to generate data	not actionable
		171. Design the data management system based on what we know now. Perhaps we need to update our monitoring and data collection systems	not actionable
		175. Establish a volunteer network to gather data (outside the farmers).	not actionable

List of Recommendations Not Included in Prioritization Process……..(cont'd)

Table B: Recommendations on Data Issues from CASA Forums

Forum		Recommendations	
Name	**Date**		**Reason***
CASA Workshop on Data Issues	held March 2000, presented to Board June 2000	**190**. CASA should allocate resources and develop a team to work on a mission statement that will help incorporate the conceptual needs that were stated earlier. This team should develop objectives and go through the process of developing a mini strategic plan.	not a data issue
		192. Review existing recommendations that have to do with data issues that CASA has endorsed	done
		193. CASA should ensure its recommendations are taken to Cabinet and are properly discussed there.	not a data issue
		194. Test the original mandate of CASA to see if transportation and agriculture departments [?] should be included, given evolving concerns.	not a data issue
		195. Redo the CASA conceptual diagram to link activities and vision via data to illustrate links with human health and ecological effects.	not a data issue
		196. Establish a group to compile existing and new recommendations and develop an action plan to move them forward.	done
		197. Establish a multi-stakeholder group to develop an action plan to implement the data recommendations from CASA project teams and working groups and from this workshop. The action plan would include what, who and when, and would identify resources needed and a plan to obtain the resources. CASA would be the obvious body to house this group.	done
Zones		**198** The CASA Board should recommend that the Minister of Environment allow zones to fully collapse their ambient air monitoring and apply CASA's Ambient Air Quality Monitoring System.	not a data issue
		199 CASA and the provincial government should encourage and facilitate the establishment of zones throughout Alberta.	not a data issue
		200 CASA and the government should provide political, policy and resource support to existing zones.	not a data issue

Appendix 5

Matrix of Action Steps

MATRIX #1 – Emissions

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref #	Current Status		Comment
			Who	How			Who	What	
Comprehensive and reliable source and emissions inventory database	1 –1	Establish database for SO_2 atmospheric, source, and emission data	AENV and AEUB	use electronic data collection	SO_2 Management Group	6	AENV AEUB, EC	Electronic data transfer project NPRI database	6 – C in progress
	1 –2	Ensure development of improved emissions inventories				61	as above	as above	61 - C
	1 – 4	Gather data on vehicle emissions	AENV and Alberta Transportation	Establish a provincial emission testing system for in-use vehicles	CASA Data Issues Workshop; Vehicle Emissions Working Group	169 46			169 – I 46 – C not started

MATRIX #1 – Emissions…..(cont')

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref #	Current Status		Comment
			Who	How			Who	What	
Comprehensive and reliable source and emissions inventory database	1 – 5	Gather data on vehicle emissions equipment tampering	Alberta Transportation	Establish an inspection system for vehicle emissions equipment tampering	Vehicle Emissions Working Group	44	AI		44 – C not started', refused by AI
	1 – 6	Gather data on toxic emissions from electric sector			D3 Stakeholder Group	3	AENV AEUB EC	*Electronic data transfer project* NPRI database MERS	3 –C in progress
	1 – 7	Research uncertainties in emissions inventories, including PM and O_3 precursors, biogenic emissions, and open source emissions			MSG for PM and O_3	81			81 – C
	1 - 10	Develop methodologies for estimating emission inventories		Improve AB specific emission factors	MSG for PM and O_3; CASA Data Issues Workshop	80 167	CASA PM/O_3 Working Group AENV	Cheminfo report AENV factors	80 – C; 167 – I complete
	1 - 11	Ensure emissions from solution gas flaring and venting are properly reported	EUB	Review reporting requirements	Flaring Project Team	26	AEUB		26 – C

Compre-hensive and reliable source and emissions inventory database

MATRIX #2 – Ambient

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Expansion and Improvement of Monitoring	2 – 1	Expand ambient monitoring to include measurements of ozone in agricultural areas and near/distant from urban centres			Ecological Effects Monitoring Project Team	37	AENV Air Management Zones	Ambient monitoring plans	37 – C in progress, part of CI activities
	2 – 2	Expand ambient monitoring to include PM_{10}, $PM_{2.5}$, and O_3, and their precursors, from more areas of the province, including more rural and background locations			MSG	85, 87	AENV, Airsheds	Ambient monitoring plans	85 – C 87 – C in progress, part of CI activities

MATRIX #2 – Ambient……..(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Expansion and Improvement of Monitoring	2 - 4	Design future monitoring programs to address the insufficient number of monitoring sites, the need for more appropriate measurement of parameters and receptors, and improved data quality		Tap into other sources to find out who is doing what; Link to other organizations who are already doing the work; Monitor more parameters and indicators; Increase number of sampling sites.	Ambient Air Quality Monitoring Project Team; CASA Data Issues Workshop	4 178	AENV Air-sheds	Ambient monitoring plans	4 – C 178 – I in progress, part of CI activities
	2 - 5	Expand indoor air quality monitoring		For urban areas, urban/industrial, rural, and rural/affected areas.	CASA Data Issues Workshop	156, 158, 160	AHW	Component part of all CEHEAP's	156 – I 158 – I 160 – I in progress
Sour Gas/ Flaring and Complaint Response	2 - 6	Undertake a review of the current monitoring response capabilities for events involving significant sour gas releases and ensure that adequate capability exists.	EUB		Presentation by EUB on Public Safety and Sour Gas	73	AEUB		73 - I not started
Airshed Zones	2 - 7	Establish a group to look at QA/QC of zonal monitoring data	CASA		CASA Data Issues Workshop	182	AENV Air-sheds	Air monitoring directive	182 – I in progress and ongoing

MATRIX #3 – Exposure

Subject	Matrix Ref#	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Personal Exposure Monitoring	3 – 1	Collect personal exposure data on PM and O_3	AH&W, AENV, HC, EC, CASA Air Shed Zones		MSG on PM and O_3	93, 96	AHW	Component of all CEHEAP's; Consultation with zones ongoing	93 – C 96 – C in progress and ongoing
Exposure Monitoring	3 - 3	Establish a high-level exposure registry to track individuals exposed to substantial levels of sour gas	EUB with AH&W and Alberta Human Resources	include individuals knocked-down by sour gas exposure	presentation by EUB on Public Safety and Sour Gas	66	AHW	under consideration for 2002	66 – I not started

MATRIX #4 – Effects

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Solution Gas Flaring	4 – 1	Improve collection of human and animal health data relating to solution gas flaring	AH&W; AAFRD	implement	Flaring Project Team	28 29	AHW AAFRD	on hold	28 – C 29 – C not started
	4 - 2	Construct livestock monitoring database			Statement of Concern on Animal Health	48		WISSA	48 – I
Smog	4 - 3	Conduct basic research to determine the contribution of the electric sector's emissions to Health and ecological effects associated with smog			D3 Stakeholder Group	2		MERS	2 – C in progress
Sour Gas	4 - 4	Develop comprehensive health effects information (qualitative and quantitative) relating to sour gas	AEUB, AH&W, regional health authorities, AENV, Alberta Human Resources, industry, stakeholders		EUB presentation on public safety and sour gas	64	AH&W	Consultant hired by AHW; the consultant's work is being managed by a multidisciplinary advisory committee	64 – I in progress

MATRIX #5 – Records Management

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comment
			Who	How			Who	What	
Central Data Repository	5 - 1	Establish a central electronic data repository to house air quality data including source emissions, emission forecast information, ambient concentrations, and effects		There is a need for source emission data and emission forecast information. A central data repository needs to be established for this purpose. The data need to be collected and accessible in electronic format available to all those wanting it. Greater coordination, common formats and protocols are needed. Consider who will need or use the data, who will "own" and manage it, and fit with other data used in air quality decision making; Make data available at different levels of detail.	Ambient Air Quality Monitoring Project Team; Alliance Project Integration and Information Workshop; CASA Data Issues Workshop	4 142 143 144 145 179 185 186 188 189	AENV, CASA	ChemInfo	4 - C 142 - I 143 - I 144 – I 145 - I 179 – I 185 – I 186 – I 188 - I 189 – I in progress and ongoing
	5 - 2	Establish a data base on sour gas (current and historical data on well, pipeline and facility leaks, ruptures, flares, venting)	AEUB	Data available to industry and public	Presentation by EUB on public safety and sour gas	67	AEUB		67 – I in progress

MATRIX #5 – Records Management…….(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comment
			Who	How			Who	What	
	5 - 3	Establish and maintain database on sectors that emit PM and PM and O_3 precursors (including key process information)			MSG on PM and O_3	102	CASA PM/O_3 MSG AENV	ChemInfo	102 – C in progress and ongoing
	5 – 4	Include data on industrial compliance, ambient monitoring and airsheds in CASA Data Warehouse			CASA Data Issues Workshop	180			180 – I
Central Data Repository	5 - 6	Develop a protocol for incorporating experiential/ anecdotal data into a formally recognized knowledge system	CASA to recommend a lead agency		CASA Data Issues Forum	162, 164			162 – I 164 – I

MATRIX #5 – Records Management…….(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comment
			Who	How			Who	What	
Collection, storage, format, and transmission of data Links between data sources	5 - 7	Develop a reporting protocol for agricultural producers to keep good herd records related to air quality events		Producers need to keep good herd records	CASA Data Issues Workshop	173			173 – I
	5 - 8	Provide annotated links from CASA DATA Warehouse to other data and information sources		Requires web site upgrades	CASA Data Issues Workshop	181, 184, 189	CASA AENV		181 – I 184 – I 189 - I
Reporting	5 - 9	Prepare and distribute a regular report on the status of Alberta's air quality	CASA	include toxics, trends, projections, regional information	Public Information and Report on Air Quality	5	CASA AENV	CASA data warehouse State of Environment Committee status and projection report	5 – I in progress and ongoing
	5 - 10	Regularly report pollution trends together with correlated health effects	CASA	to encourage and facilitate	Human Health Resource Team	12			12 - C

MATRIX #6 – Research

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Human Health Effects Studies	6 – 1	Identify appropriate health indicators for investigation of causal relationships			Human Health Resource Team March 1997	11			11 – C
	6 - 2	Investigate relationships between PM and O_3 emissions, ambient air, human exposure, and human health			MSG for PM and O_3; CASA Data Issues Workshop; D3 Stakeholder Group	92 94 157 2	CASA, AENV, EC	PM/O_3, MSG	92 – C 94 – C 157 – I 2 – C in progress and ongoing
	6 - 3	Develop a research program to address gaps in the H_2S health effects database.			Air Toxics Project Team, June 1998	43	AENV		43 – C in progress and ongoing

MATRIX #6 – Research……..(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Human Health Effects Studies	6 - 4	Research health effects to identify data gaps and needs			CASA Data Issues Workshop	176			176 – I
	6 - 5	Gather better data for epidemiological studies on health effects.			Human Health Resource Team	13			13 - C
	6 - 6	Use personal exposure monitoring and internal dose biomarker research to improve understanding of exposure events and hazard sources and their effects on human health	Gov't of Alberta, Alberta Heritage Foundation for Medical Research, and Alberta Research Council	To do research	CASA Data Issues Workshop	155			155 - I
Human Health Effects Studies	6 - 7	Measure personal exposure to compounds of concern emitted by flares	AH&W	To develop methods and implement program	Flaring Project Team	33	AHW	Postponed	33 – C
	6 – 8	Link vehicle emissions to ambient data, to human exposure and to health effects)		Assess how emissions from solution gas flaring and venting relate to health	Vehicle Emissions Working Group	159			159 - I

MATRIX #6 – Research……..(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
	6 – 9	Link upstream oil and gas emissions (including flaring and venting) to: ambient data, environmental receptors, and human and animal health effects	EUB, AENV, AHW, AAFRD, and industry	Assess how emissions from solution gas flaring and venting relate to health	Flaring/ Venting Project Team	27, 45, 46			27 – C 45 – C 46 – C
	6 – 10	Study health effects of low level exposure (< 2.5ug/m^3) to PM emissions	MSG on PM and O_3		CASA Data Issues Worksh op	157	AHW	Being done as a component of CEHEAP	157 – I
Animal Health Effects Studies	6 – 12	Study the reproductive, immunological, and other health impacts on cattle of low-level exposure to a variety of contaminants			Stateme nt of Concern on Animal Health	52			52 – I
	6 – 13	Link source emissions to ambient data and ambient data to health effects			Stateme nt of Concern on Animal Health	47			47 – I
Animal Health Effects Studies	6 – 14	Study the effect of cold climate on animal exposure to gaseous pollutants			Stateme nt of Concern on Animal Health	53			53 – I

MATRIX #6 – Research……..(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
	6 - 15	Determine the degree of exposure, threshold dose and toxicological response in cattle to the compounds emitted by flares and evaluate whether short-term, high level exposure to these chemicals constitutes a risk to cattle health			Statement of Concern on Animal Health	49, 51			49 – I 51 - I
Source Apportionment	6 - 18	Conduct further research on source apportionment	AENV	ensure that source profiles are accurate and appropriate; data are gathered on additional ambient species; appropriate models are used; and expertise is available to interpret the results	MSG on PM and O_3	82			82 – C

MATRIX #7 – Modelling

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Emissions Forecasting	7 – 1	Improve the regional, provincial and national forecasting systems for source emissions		By increasing the parameters covered	CASA Data Issues Workshop	177	CASA PM/O_3, MSG	ChemInfo	177 – I in progress and ongoing
Roll-back Analysis	7 - 2	Evaluate the use of regional photochemical models in future rollback analysis	EC		MSG for PM and O_3	89	EC	is implementing photochemical models in AB but not specifically for this purpose	89 - C

MATRIX #8 – Broad

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Human Health	8 - 1	Approve and implement the human health monitoring framework (tool for detecting trends and associations between air quality and health-related variables)		The process consists of ongoing, systematic collection, analysis, and interpretation of selected data on health outcomes, air quality parameters, and population exposure; Need to include: symptoms and public health complaints; known human health effects of air contaminants; ambient air quality monitoring data; human health effects monitoring data; meteorological data; information on seasonal variability of allergies; information on population exposure; information on relevant event occurrences	Human Health Resource Team; Human Health Project Team	9, 10, 14, 78			9 – C 10 – C 14 – C 78 – C

MATRIX #8 – Broad…….(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
Human Health	8 - 2	Gather data on confounding factors			CASA Data Issues Workshop	174	AHW		174 – I in progress and ongoing
Animal Health	8 - 3	Identify and gather concerns and knowledge (scientific and traditional/local) on health effects of air contaminants and identify gaps in knowledge.			Animal Health Working Group	55, 56		WISSA	55 – C 56 - C
	8 - 4	Gather data on confounding factors			CASA Data Issues Workshop	174			174 - I
Pollution Prevention	8 - 5	Develop mechanisms to benchmark, measure, and report pollution prevention/ continuous improvement activities			Pollution Prevention/ Continuous Improvement	60	EC	NPRI, VCR, ARET, Responsible Care (Chem. Industry)	60 - C
General	8 - 6	Provide clear direction to data-gatherers about what data is needed to track long-term human, animal, or ecological health	AHW, AAFRD		CASA Data Issues Workshop	161	AHW, AAFRD		161 – I not started
	8 - 7	Develop protocols for recording experiential data		Improve metadata	CASA Data Issues Workshop	162, 187			162 – I 187 – I not started

MATRIX #8 – Broad…….(cont'd)

Subject	Matrix Ref #	Action Steps	Implementation		Source	Ref. #	Current Status		Comments
			Who	How			Who	What	
	8 - 8	Develop standard methods to collect data (protocols, criteria and guidelines) and review periodically		protocols, criteria and guidelines with metadata and reviewed periodically	CASA Data Issues Workshop	172, 187			172 – I 187 – I not started
	8 - 9	Coordinate review of air quality data collection and management	Gov't of Alberta		CASA Data Issues Workshop	163	AENV		163 – I not started
	8 - 10	Construct a reference matrix		Include who is doing what, who has the resources to address gaps and needs, who has responsibility, and who is affected	CASA Data Issues Workshop	191			191 – I not started

Appendix 6

Parked Actions

Matrix Reference #	Parked Action
1 – 9	Gather data on source emissions from non-regulated sources.
4 - 2	Construct livestock monitoring database (see matrix reference # 5 – 7).
6 - 1	Identify appropriate health indicators for investigation of causal relationships.
6 - 4	Research health effects to identify gaps and needs.
8 - 2	Gather data on confounding factors for human health.
8 - 4	Gather data on confounding factors on animal health.
8 - 6	Provide clear direction to data-gatherers about what data is needed to track long-term human, animal, or ecological health.