Animal Health Project Team
Final Report and Recommendations

Clean Air Strategic Alliance

March 2003

By consensus, the CASA board of directors approved this report and the recommendations within at its March 20, 2003 meeting.

ISBN 1-896250-21-1

Acknowledgements

The Animal Health Project Team gratefully acknowledges the generous financial support of the following:

- Canadian Association of Petroleum Producers.
- CASA Acidifying Emissions Management Implementation Team.
- Alberta Energy and Utilities Board.
- Petro-Canada.
- Small Explorers and Producers Association of Canada.

The Animal Health Project Team also acknowledges the passion and support of the volunteers who generously provided their time and energy to this team. Without the contribution of these volunteers, the Animal Health Project Team would not have been able to fulfill its mandate.

About CASA

The Clean Air Strategic Alliance (CASA) was established in March 1994 as a new way to manage air quality issues in Alberta. CASA is a non-profit association composed of diverse stakeholders from three sectors. Senior representatives from each sector, government, industry, and non-government organizations (such as health and environment groups) are committed to developing and applying a comprehensive air quality management system for the people of Alberta through a collaborative, consensus-based process. All participants in the CASA consensus-based process work towards a shared vision and mission.

CASA Vision

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

CASA Mission

The Clean Air Strategic Alliance is a stakeholder partnership that has been given shared responsibility by its members, including the Alberta Government, for strategic air quality planning, organizing, and coordinating resources, and evaluation of results in Alberta through a collaborative process.

Executive Summary

Formed in late 1999, the Animal Health Project Team's (AHPT) goal was to prevent short and long-term adverse impacts of air contaminants on animal health. The team had the following objectives:

- Identify key concerns regarding the effects of air emissions on animal health.
- Investigate animal health impacts attributable to air contaminants.
- Develop a management response system to manage identified risks.
- Assess air quality guidelines and objectives and make recommendations to ensure animal health is protected.
- Document and summarize scientific and local/traditional knowledge regarding the effects of air emissions on animal health.
- Identify research gaps and make recommendations to fill those gaps.
- Communicate with stakeholders.

The team undertook a number of activities to meet its objectives. Highlights of these activities are:

- The team sponsored a survey that has identified some potential areas for further response.
- One major area of focus was the development of a management response system, the Herd and Environmental Record System (HERS), to address livestock health issues potentially associated with air emissions.
- The team identified a need to help communities undertake their own community monitoring programs and developed a brochure describing the types of programs and assistance available.
- The team made ongoing proactive contributions to the Western Canada Study undertaken by the Western Interprovincial Scientific Studies Association (WISSA).
- The team identified gaps in research and also developed guidelines on how to improve the credibility of research into animal health.

Recommendations

The following recommendations arise from the team's work.

1. **The AHPT recommends that the following two documents be printed and be made available according to the distribution plan (see Appendix F):**
   - **The Herd and Environmental Record System to livestock owners.**
   - **The Community Monitoring Brochure to landowners living in proximity to emission sources.**

2. **The AHPT recommends that the proposed complaints/response line, which is part of the approved Human Health Monitoring System, be expanded to enable documentation of and response to animal health complaints related to air pollution.**

3. **The Animal Health Project Team recommends that the Surface Rights Board develop and implement an awareness campaign so landowners are more aware of the Board's existence, its mandate and its responsibility for compensation regarding animal health issues.**

4. **The AHPT recommends that research be encouraged, supported and funded by the Alberta Government in the following areas:**
   - **Chemistry, toxicity, interaction and cumulative effects of mixtures of pollutants.**
   - **Effects of air pollution on reproduction and immunology.**
   - **Identification of biomarkers.**
   - **Exposure level assessment.**

5. **The AHPT recommends that its recommendations for improving the credibility of research be considered by any organization undertaking major research projects on the effects of air pollution on animal health.**

Next Steps

The next phase of the animal health project involves implementing some of the recommendations and helping other recommendations move forward through other organizations. The team made the following recommendation in this regard.

6. **The AHPT recommends that a Human and Animal Health Implementation Team be established to:**
   - **Review and implement, if still appropriate, the recommendations from the Human Health Project Team (see Appendix G).**
   - **Implement recommendations from the Animal Health Project Team.**
   - **Organize a workshop(s) to disseminate information about HERS to the farming community.**
   - **Receive information about current and future research in the areas of human and animal health.**
   - **Provide input into current and future research.**
   - **Identify emerging issues in the areas of human and animal health, and recommend actions to address those issues.**
   - **Provide information support to other project teams.**
   - **Periodically evaluate, review and make any needed changes to the Herd and Environmental Record System and the Community Monitoring Brochure.**

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1 Introduction

1.1 The Issue of Animal Health

For many years, farmers in Alberta have been expressing concerns about the effects of air emissions on the health of animals. These concerns include respiratory, reproductive, gastrointestinal and, more recently, neurological problems. The concerns expressed relate to both acute and chronic exposure to air emissions. Decreased production, increased illness and higher death rates have all been attributed to air emissions.

In 1986, Alberta Environment and Alberta Agriculture sponsored a workshop on the effects of acid forming emissions on livestock. Although a number of recommendations emerged from that workshop, there was no mechanism in place to implement them. In 1996, the Alberta Environmental Research Centre released a report prepared for the Alberta Cattle Commission entitled *Cattle and the Oil and Gas Industry in Alberta: A Literature Review with Recommendations for Environmental Management.* This document cited many problems and made a number of recommendations relating to air emissions, one of which was addressed by CASA's Flaring Project Team. Various other studies have been done in Alberta and there is extensive experiential information on the effects of air emissions on animal health. A bibliography can be found in Appendix B.

The CASA vision recognizes the importance of animal health and its connection with air quality, by stating that: the air will be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on animals, people and the environment. CASA further noted the significance of this issue by making human and animal health a key focus area in its 1999-2002 business plan. The identified opportunity was to "assess the impact of air contaminants on human and animal health, manage potential health risks and recommend action" with the goal of "preventing adverse short and long term effects due to outdoor and indoor contaminants." The objectives for this key focus area are to:

- Detect human and animal health effects attributable to air contaminants.
- Develop a management response system to manage identified risks.
- Assess air quality guidelines and objectives to ensure human and animal health are protected.

1.2 Formation of the CASA Animal Health Project Team

Alberta's livestock industry has a very strong presence in the part of the province covered by the Parkland Airshed Management Zone (PAMZ), which is based in the Rocky Mountain House-Sundre-Red Deer area. The PAMZ board identified animal health as one of its priority issues and expressed concern about the impacts of air emissions on animal health. But PAMZ felt the issue was broad enough that it should be dealt with at the provincial level and, accordingly, presented a statement of concern to the CASA board in March 1998. In November 1998, the CASA board established the Animal Health Working Group (AHWG).

The AHWG proceeded to develop a work plan, terms of reference and objectives, identified potential members for a project team, and presented its proposal to the CASA board in November 1999, at which time an Animal Health Project Team (AHPT) was approved. Members of the AHPT are listed in Appendix C, and the team's terms of reference can be found in Appendix D.

1.3 Key Areas of Activity

The team focused its work according to the objectives described in the terms of reference. Each of these activities is discussed in its own section of this report:

- Key concerns regarding the effects of air emissions on animal health.
- Investigation of animal health impacts attributable to air contaminants.
- Response system to manage identified risks.
- Assessment of air quality guidelines to ensure animal health is protected.
- Scientific and experiential knowledge regarding the effects of air emissions on animal health.

In addition, the team provided input to the Western Interprovincial Scientific Studies Association (WISSA) [1], particularly their *Western Canada Study on Animal and Human Health Effects Associated with Exposure to Emissions from Oil and Natural Gas Field Facilities*. Data collection for the study occurred throughout 2001 and 2002, with data analysis and peer review planned for 2003. A final report is anticipated in 2004.

[1] WISSA is a not-for-profit company, federally incorporated under the *Canada Corporations Act* as of February 2, 2001. WISSA undertakes research to examine the potential environmental impacts of emissions on the environment and animal and human health. Management of WISSA is provided by a Board of Directors composed of officials from the governments of Alberta, British Columbia, Manitoba and Saskatchewan.

2. Key Concerns Regarding the Effects of Air Emissions on Animal Health

Stakeholder input from members of the team was one way that the key concerns about the effects of air emissions on animal health were captured and documented. The team also undertook to create a survey to capture the concerns of others in the province. The survey was distributed, non-randomly, in May 2000 to nearly 1,600 individuals in government, industry, and non-government organizations and to members of the public. Those asked to complete the survey were members of CASA, the Small Explorers and Producers Association of Canada, Wild Rose Agricultural Producers and the National Farmers Union.

There were 154 respondents to the survey, with 30 individuals indicating that they had experienced problems with air quality affecting animal health. These 30 respondents were referred to as "The 30 Subset."

DISTRIBUTION OF THE AHPT SURVEY

Clean Air Strategic Alliance	315
Small Explorers and Producers Association of Canada	425
Wild Rose Agricultural Producers	600
National Farmers Union	250
Total Surveys Distributed	**1,590**

2.1 Survey Analysis

The question-by-question analysis of the survey that follows focused on both the total number of responses and on The 30 Subset.

The accuracy of the results is limited by the inconsistency of the respondents' methods in ranking. For example, in question 2 the respondents were instructed to rank a list of emission sources. They were to rank the source they saw as most significant as 1, the second most significant as 2 and so on; and to rank as many as they wished. However, some respondents ranked one source as 1, another source as 2, up until perhaps 5 or perhaps until all on the list were ranked. Other respondents marked three different sources as 1, one source as 2, and four sources as 3. And yet other respondents simply checked off a number of sources. In this case, the recorder entered all checked sources as 1. For example, if five were checked, they were all recorded as 1.

2.2 Survey Results

Question 1 *How would you rate the air quality in your region?*	Good/Very Good	Average	Poor/Very Poor	Don't Know/No Answer
TOTAL RESPONDENTS	65%	24%	11%	10%
30 SUBSET	13%	50%	30%	7%

Question 2 *What emission sources, if any, do you see affecting the current air quality in your region?*	Road dust	Vehicles	Oil & gas processing plants	Well test flaring	Sour gas release	Spills & leaks (oil & gas)
TOTAL RESPONDENTS	10%	9%	8%			
30 SUBSET	6%	6%	10%	10%	8%	6%

Question 3 *Have you experienced any problems regarding air quality impacts on animal health?*	Yes	No	Don't Know/No Answer
TOTAL RESPONDENTS	19%	56%	25%
NB: the 19 % constitute the 30 Subset			

Question 4 *What are the effects that you are aware of regarding air quality impacts on animal health?*	Irritated Eyes	Fertility Problems – Female	Abortions	Decreased Productivity
30 SUBSET	8%	7%	7%	7%

Question 5 *In your experience, which of the conditions below have contributed to air pollution impacts on animal health?*	Nearness to emission source	Combined emissions	Type of pollutant	Severity of emission	Wind direction
30 SUBSET	16%	12%	12%	12%	12%

Respondents were also given the opportunity to provide additional comments regarding emissions sources, health effects, and conditions. They were also asked to suggest action(s) the project team should consider taking.

2.3 Summary of Written Comments

- Address issues associated with intensive livestock operations (from manure handling, to conditions, etc).
- Improve air quality monitoring (more parameters, high-tech, continuous, ppb).
- Conduct comprehensive chemical analysis of flare gas as well as emissions from other industrial facilities.
- Take into consideration/assess animal husbandry practices.
- Continue with existing studies/conduct credible scientific studies - epidemiology, exposure, toxicology.
- Improve air quality by reducing and/or eliminating emissions.

- Conduct research into effects of fertilizers, pesticides, herbicides (consider alternates to spraying, etc.).
- Improve monitoring and inspection of facilities and enforcement of standards/regulations
- Continue to have input into the Western Canada Cattle Study; monitor the study closely to ensure correct question is being asked.
- Establish a system of better record keeping for herds.

Information on how to obtain the survey, survey report and other documents from the AHPT can be found in Appendix E.

3. Investigation of Animal Health Impacts Attributable to Air Contaminants

In its early days, the AHPT brainstormed a list of actions that could be taken to help detect animal health effects. Over the course of a number of meetings, the team reviewed the action items on the list and determined if and how each item would be addressed. In some cases, the team heard presentations on a specific topic in order to educate themselves. In other cases, more research work was done by individual team members or a sub-group was formed. Some of the action items were clearly not in the mandate of the team or even CASA; others were already being addressed through other processes. The team's final recommendations are closely linked to these action items as well as the needs identified in the survey results.

The possible action items are listed below, followed by specific activities and decisions relating to many of the items on the list.

3.1 List of Possible Actions to Investigate Animal Health Impacts

Monitoring

- Hire an animal health investigator.
- Follow-up to soil acidification monitoring.
- Carry out routine collection of information from herd owners adjacent to well testing to detect effects.
- Collect more air quality data.
- Monitor air quality in pastures.
- Establish community self-monitoring programs (example: Environment Law Centre's project on community monitoring in Hinton).
- Obtain more data on end of flare (speciation).
- Look for information on animal health effects in areas where air quality is poor.
- Conduct lung post-mortems.
- Follow-up on Fort McMurray personal exposure monitoring study.
- Follow-up on existing air quality monitoring (zones – West Central, PAMZ).
- Conduct food quality monitoring.
- Conduct exposure monitoring.

Epidemiological

- Conduct exposure monitoring.
- Carry-out routine collection of information from herd owners adjacent to well testing to detect effects.
- Systematically collect observational evidence.
- Look for information on animal health effects in areas where air quality is poor.
- Follow-up on Fort McMurray personal exposure monitoring study.
- Conduct food quality monitoring.

Research

- Research on monitoring methodology.
- Conduct exposure monitoring.
- Examine dose-response data under controlled conditions to detect what else can cause effects.

- Obtain more data on end of flare (speciation).
- Increase understanding of risk aspects.
- Find out why there is discrepancy in herds adjacent to each other.
- Understand more about synergistic and cumulative effects of mixtures (not individual compounds).
- Identify biomarkers.
- Conduct lung post-mortems.
- Follow-up on Fort McMurray personal exposure monitoring study.
- Conduct food quality monitoring.

Pathways/Fate
- Obtain more information on exposure pathways.

Risk Assessment
- Conduct exposure monitoring.
- Carryout routine collection of information from herd owners adjacent to well testing to detect effects.
- Examine dose-response data under controlled conditions to detect what else can cause effects.
- Obtain more information on exposure pathways.
- Increase understanding of risk aspects.
- Understand more about synergistic and cumulative effects of mixtures (not individual compounds).
- Develop performance measurements, performance requirements, for animal health and air quality (similar to AIQA).
- Review recommendations from international and national scientific workshops.

Education/ Communication
- Hire an animal health investigator.
- Encourage differential veterinary diagnosis.
- Systematically collect observational evidence.
- Establish community self-monitoring programs (example: Environmental Law Centre's pilot project on community monitoring in Hinton).
- Encourage farmers to keep herd health records.
- Increase understanding of risk aspects.
- Follow-up on Fort McMurray personal exposure monitoring study.
- Develop investigative tools to respond to specific incidents.
- Establish a central data repository.
- Review recommendations from international and national scientific workshops.

3.2 Activities Undertaken Related to the List

Presentations and Interactions with Other Organizations

The team spent considerable effort educating members about monitoring technology, parameters, regulations and current programs. Presenters provided information on why monitoring is done, what is monitored, how the results are used, how monitoring is conducted in the field, as well as related technical and research issues.

The team heard presentations from representatives of Mount Royal College, the Parkland Airshed

Management Zone (PAMZ), Alberta Environment and the Alberta Research Council as well as from the Alberta Energy and Utilities Board (EUB), Alberta Health and Wellness and the Environmental Law Centre (ELC).

The team learned the pros and cons of passive monitoring systems and the details of a "made in Alberta" passive sampling system that was developed for SO_2, NO_2, O_3 and H_2S. The least expensive of all the options, passive monitoring systems do not require power and may be set out for longer periods of time, at more locations and in remote areas. Continuous air quality monitors monitor ambient concentrations. They can provide near instantaneous measurement and comparison of a number of pollutants. The team also learned that integrated monitoring involves collecting samples with a reactive tube, filter or air collection system over a known exposure time. Integrated monitoring is less expensive than continuous monitoring. Portable monitoring systems are becoming increasingly available on the market. They are expensive and require technical training, but they have a number of advantages, such as the ability to operate in remote locations and the ability to analyse numerous different compounds.

The ELC and PAMZ spoke about their respective monitoring programs as models that might be pursued by communities. The aim of the ELC's program is to empower local residents by encouraging partnerships with industry and regulators and building public knowledge and skills. The program was piloted in Hinton and Fort Saskatchewan. The PAMZ program involves stationary continuous monitoring, stationary passive monitoring and a portable monitoring trailer.

The AHPT also heard about the EUB's plan to implement the recommendations of the Provincial Advisory Committee on Public Safety and Sour Gas.

Good data from monitoring will help both researchers as well as the local communities. The following gaps were identified:

- Improve the ambient air monitoring system to answer exposure related questions.
- Monitor at specific sites (farms).
- Use portable monitors where needed.
- Need a specific program or question before addressing who, where, when, how much.
- Ambient monitoring program(s) should be reviewed to ensure effects of air pollution on animal health are addressed.
- Airshed zones should be encouraged to consider effect of air pollution on animal health when designing monitoring programs.
- Good quality assurance / quality control is needed.

The appointment of a provincial animal health investigator will help educate farmers about issues related to animal health. The AHPT reviewed the 1995 protocol for such a position and learned that a new protocol was under development by the five concerned agencies. The team provided input on the draft protocol and changes were made as a result. This protocol was finalized in 2002.

The AHPT discovered that there are very few epidemiological studies or research related to air quality and human health or animal health. Most evidence is anecdotal.

Members saw a video presentation on a new combustion technology that may be an alternative to

flaring. The technology destroys 150 of the chemicals found in flares, but not Nitrogen Oxides (NOx). Unfortunately, the technology is only applicable to well test flaring, and not to the remaining 70% of other flaring situations. Furthermore, the technology would not displace the use of waste solution gas for electricity generation. It was noted that flaring has been reduced by 30% in the Sundre-Caroline area and that some people living close to wells with reduced flaring believe that their health and the health of their animals has improved.

The team heard a presentation by an Alberta Health and Wellness representative on the results of the Alberta Oil Sands Community Assessment and Health Effects Assessment Program. The study provided a useful baseline to develop studies in other regions as well as follow-up studies in the area. The team listened to a presentation on work conducted by Alberta Pork regarding intensive livestock operations (ILOs) where the major air quality issues are odour and human health impacts. The team learned that Alberta Agriculture, Food and Rural Development has prepared an inventory of emissions from agricultural sources, including tillage, feedlots, over-wintering and wind erosion. The members also heard that researchers at Texas A & M have conducted a literature review of human health effects associated with airborne emissions from ILOs. So far, pork producers have not identified any concerns about emission impacts on animals and are not aware of any problems with operations near oil and gas facilities. In fact, the major issue for pork producers is the impact of their operations on the surrounding area. The pork industry is reviewing possible next steps and would be interested in a mechanism that would bring together the learnings from different organizations.

The team learned that the Alberta Research Council is developing a proposal for a study to detect residue in tissues of animals exposed to crude oil in laboratories. The study will examine rats and move to larger animals. It was noted that Phase 2 of the WISSA study will look at meat residues, however, this work will depend on the outcome of Phase 1.

The team also heard a presentation from Alberta Health and Wellness that summarized a review of microbial air quality, a hydrogen sulphide (H_2S) study and polycyclic aromatic hydrocarbon (PAH) study.

The team heard presentations on food security, linking environmental degradation, food quality and human health. There is a growing emergence of environmental quality as part of food history and food contamination with chemical compounds is emerging as an issue.

Herd Records

It became apparent to the team that, at this time, farmers have no way to know if emissions are affecting the health of their livestock or if the problems are caused by other sources. There is no baseline information, nor documentation of environmental incidents. The team felt it was critical to address the following gaps:

- Develop a protocol for herd records capturing regional management differences.
- Need information on health characteristics (normal pregnancy rates, expected disease rates, etc.).
- Farmers should be encouraged to use the protocol and keep good records.
- Need information on confounding factors (i.e., nutrition, crowding, fertilizing pastures, role of micro-nutrients).

Much of the team's focus was on developing this protocol, which was ultimately named the Herd and Environmental Record System or HERS. The HERS framework is intended to provide livestock producers with a means of managing the potential risks associated with environmental (air, water, soil, feed) contamination and their impact on animal health and the economic performance of the herd or flock. The focus of HERS is to encourage and guide producers in documenting all relevant factors in situations where livestock are potentially affected by environmental conditions.

HERS is not intended to replace the existing record-keeping systems of producers, but rather to supplement existing systems and ensure sufficient documentation to properly assess poor performance. Using HERS encourages both proactive procedures for recording baseline information on livestock performance as well as procedures for documenting incidences of environmental contamination.

Part of the intent of developing HERS was to gather herd-by-herd information. However, livestock owners would have to be willing to share information about their herds.

The HERS program is intended to be a management tool that will guide livestock producers in documenting all relevant factors in both normal environmental conditions and in abnormal environmental conditions. The HERS program was produced in two versions. Information about how to obtain copies of the HERS can be found in Appendix E.

Community Monitoring

While this work was taking place, the Community Monitoring sub-group studied ways that communities could set up their own monitoring programs, including training individuals to collect air samples that would be sent to commercial labs for analysis. In the end, the sub-group recommended that a brochure be developed and made available describing the various types of monitoring programs. Information about how to obtain copies of the Community Monitoring Brochure can be found in Appendix E.

Both the HERS initiative and the Community Monitoring Brochure form a substantial portion of the work undertaken by the AHPT. There is now a need to distribute these documents to the communities.

Recommendation #1:

The AHPT recommends that the following two documents be printed and be made available according to the distribution plan:

- **The Herd and Environmental Record System to livestock owners.**
- **The Community Monitoring Brochure to landowners living in proximity to emission sources.**

A copy of the distribution plan can be found in Appendix G.

4. Response System to Manage Identified Risks

The AHPT also brainstormed a list of actions to develop a management response system that would manage identified risks. Again, the team worked through the items on this list over the course of a number of meetings. The possible action items are listed below, followed by specific activities and decisions relating to some of the items on the list.

Below is the list of action items, followed by the activities and decisions related to many of the items on the list.

4.1 List of Possible Actions to Develop a Management Response System

Communication/Education

- Secure broad acceptance of the animal investigator protocol.
- Educate the petroleum industry on normal acceptable losses in a healthy herd.
- Increase awareness of what industry is already doing.

Research/Monitoring/Data Gathering

- Determine threshold limits.
- Determine how to set acceptable limits.
- Establish an animal health monitoring system.
- Measure the effect of emission reductions on improvements in animal health.
- Involve students in monitoring and collecting air quality data.

Regulatory/Enforcement

- Require external confirmation of results.
- Increase inspection of equipment.

Emission Reduction/Pollution Prevention

- Reduce emissions.
- Develop and implement emission reduction strategies at the provincial, regional and local levels.
- Eliminate grandfathering of facilities.

Responding to Concerns/Identified Risks

- Use dispute resolution.
- Act when patterns are observed.
- Establish compensation panel or board to deal with damage to livestock.
- Treat all landowners fairly.
- Secure broad use of the animal investigator process.

Economic

- Increase Alberta Environmental Protection (AEP) and EUB's resources to monitor and respond.
- Provide incentives for industry to reduce emissions.
- Provide disincentives for industries that don't reduce emissions.
- Encourage government incentives for alternate energy.

Other

- Establish indices of performance.
- Integrate with current and proposed management systems (e.g., flaring).
- Develop an emergency response system for animals.

4.2 Activities Undertaken Related to the List

The team learned that there are now requirements in EUB Guides 56 and 60 for industry to provide better notification and communicate with landowners and residents adjacent to flares. The AHPT communicated to the EUB and the CAPP Emergency Response Plan committees that this recommendation should also apply to animal health issues.

The team discussed whether threshold limits could be determined through the use of biomarkers to learn more about what level of exposure causes an effect.

The team learned that the EUB conducts formal investigations of incidents and the results are available to the public. The EUB also provides summaries of its audits. Inspections are covered by the EUB under its Inspection, Complaints & Enforcement Program. Following a presentation to the AHPT from Albert Health and Wellness, the AHPT concluded that further work needed to be done to gather information related to Animal Health complaints.

Recommendation #2:

> **The AHPT recommends that the proposed complaints/response line, which is part of the approved Human Health Monitoring System, be expanded to enable documentation of and response to animal health complaints related to air pollution.**

The team learned that several CASA project teams are dealing with emissions reduction and pollution prevention. Solution gas flaring has been reduced by 38 percent at the end of 2000 and further improvement was experienced in 2001 (53%). The Flaring/Venting Team made recommendations addressing all areas of upstream flaring and venting.

The AHPT also discussed the EUB review of grandfathering of sour gas plants, with some concern expressed about the narrow scope. However, the narrow scope allowed the EUB to focus and complete its work in a shorter time frame. This review has now been completed and a schedule has been established to degrandfather all sour gas plants in Alberta.

The AHPT learned about the EUB's new "appropriate dispute resolution process", and distributed draft guidelines for public review. The team wanted to improve the use of dispute resolution at the operational stage of oil and gas developments as well as encourage the tools use at the project application stage. The program has now been implemented.

Information was also provided by CAPP on its stewardship program, initiated in 1999, to demonstrate the oil and gas industry's commitment to continuous improvement, enhance its credibility with stakeholders and exhibit a high level of adherence to industry standards. A condition of membership in CAPP, the program requires companies to improve their operations in an environmentally, economically and socially responsible manner in a stepped approach.

The team also heard a presentation from the Surface Rights Board addressing compensation issues

related to animal health impacts. In addition to the prohibitive cost of filing a complaint, members of the team expressed concern about the burden of proof required to demonstrate when an air quality issue has caused damage and the cost of filing a claim is prohibitive. The issue of creating evidence was partly addressed through the development of HERS. However, it was believed that many landowners are unaware of the process available to address complaints. Thus,

Recommendation #3:

> **The AHPT recommends that the Surface Rights Board develop and implement an awareness campaign so landowners are more aware of the Board's existence, their mandate and their responsibility for compensation regarding animal health issues**.

5. Air Quality Guidelines

Although ambient air quality has a direct impact on the health of livestock, the AHPT was aware that Alberta Environment is working on developing guidelines for substances with the assistance of a stakeholder-working group called the Ambient Air Quality Guidelines Working Group (AAQGWG). The AHPT decided not to duplicate the work of the AAQGWG. The AAQGWG's work is based on the Alberta Ambient Air Quality Guidelines Work Plan, available at http://www3.gov.ab.ca/env/info/infocentre/publisting.cfm.

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6. Scientific and Local/Traditional Knowledge Regarding the Effects of Air Emissions on Animal Health

6.1 Animal Health Workshop

Near the beginning of its mandate, the project team conducted an Animal Health Workshop to help members learn more abut the issues and relationships between air quality and animal health. This two-day workshop was held in Sundre in November 1999 to enable AHPT members to:

- Become informed about the current state of scientific, technical, traditional, and community knowledge as it relates to air quality and animal health.
- Reach a shared basic understanding of the status, strengths and shortcomings of the current knowledge base.

Speakers included scientists, government officials, academics, practising veterinarians and livestock producers. The group heard a variety of presentations ranging from discussions on animal health from the perspective of veterinarians as well as farmers. There were also presentations on air quality issues and the potential impact on animal health. At the end of the informational workshop, presenters were asked to summarize the key recommendations and actions they would suggest to the Animal Health Project Team. The team reviewed these comments and subsequently identified some gaps that may need to be pursued. With respect to the knowledge already available, the team brainstormed that:

- We need more monitoring.
- There is broad concern among the farm population about this issue.
- There are a lot of pregnancy complications and unthriftiness.
- We know some of the cause and effect issues, and some things we can do to reduce emissions, especially flaring.
- We have substantial observational evidence of effects of air pollution on animal health.
- Animal symptoms from environmental exposure are different from infections and viruses.
- We need more science to prove or disprove a correlation between air emissions and animal health effects.
- There are some improvements that can be realized around flaring.

The following information gaps were identified:

- Information on the toxicology of mixtures and compounds is very limited.
- There are no exposure measurements of cattle/no exposure based studies.
- We lack adequate information about monitoring.
- We lack information on effects and receptors.
- We do not know the effects on livestock from crowding, fertilizing pastures and nutrient depletion.
- We do not know all the confounding factors.

These gaps were then distilled into four main categories:

1. Research on mixtures rather than single substances
2. Monitoring
3. Livestock Management and Record Keeping
4. Exposure

The AHPT addressed Gap 2 through the development of a community monitoring brochure while Gap 3 was addressed through the development of the HERS framework. Gaps 1 and 4 pertain to the need for more scientific research and are addressed through the AHPT's recommendation 4.

6.2 Learnings from the Animal Health Workshop

- A presentation on *The Cow and the Oil Patch* noted that cattle numbers tend to be higher in areas with intense oil and gas activity. A study on the voluntary ingestion of crude oil by cattle found that cattle will explore and ingest crude oil by licking or drinking and that effect seen in the field suggest that cattle are sensitive to diethylene glycol.

- A presentation on how substances are monitored and controlled in Alberta noted that Alberta's Air Quality Guidelines include six guidelines for criteria substances and 25 guidelines for air toxics. There are also five other guidelines. Ambient air quality is monitored by government, industry and by regional air quality monitoring networks.

- A presentation on *Research on Air Pollution and Animal Health* noted that some work has already been done on the connections between air pollution and animal health, including five research studies, a review and four field studies. Current research includes studies on air pollution and cold temperature interaction and flare composition.

- A presentation on air chemistry noted that there are a number of important questions that need to be answered. What are the major sources? How much is being emitted? What are the components of the emissions? And where are they going and what impact are they having? The report discussed the need for new technology to reduce flaring of sour gas.

- Another presentation focused on pollutant sources and Alberta's air pollution management system. The lack of knowledge of the combined effects of low-level pollutants was raised as a serious concern. The limitations of monitors and plume dispersion models were also discussed.

- The *Meteorological and Aerodynamic Influences on Plume Dispersion* were also discussed, noting all the factors that can affect dispersion such as stack parameters, wind speed, atmospheric stability, terrain, and building dimensions.

- A presentation on *Air Quality Issues And Animal Health* outlined the risk assessment principles that have traditionally been applied to human health issues. It was noted that genetics and husbandry also play a role.

- A presentation on veterinary toxicology outlined the routes of exposure: oral, inhalation, ocular and dermal, with the latter routes difficult to calculate doses. Other factors affecting dose response include age, gender, pregnancy, and the presence of multiple chemicals that may cause synergistic reactions.

- A presentation on epidemiology discussed the seven main ways to gather information: personal observation and anecdotal evidence, uncontrolled field studies, controlled

laboratory studies, observational field studies, controlled field trials, use of sentinel animals, and human occupational health data.

- A presentation on reproduction in cattle focused on performance expectations and problems. The presentation reviewed reproductive characteristics including a 24-hour fertility window. Male and female physiology was discussed as well as cow-calf statistics for various parts of the province.

- Farmers who farm near Sundre provided their own personal perspective on the impact of a series of nearby flaring incidents. Testing indicated high amounts of benzene, toluene and xylene. Another farmer who farms near St. Albert noted abnormal sexual behaviour in animals on the farm, including wild animals. Birthing also involved a higher than average number of abnormalities, both with the calves and their mothers. Another farmer near Pincher Creek noted that human health effects began to occur in the late 1950s soon after the first sour gas well was drilled. This farmer had documented events since that time in detail, noting they had lost a viable herd and spring water, as well as the potential resale value of their property as a result of the local plant's activities. Another farmer near Drayton Valley described the birthing problems he had for a week following a flaring incident in 1994, which had not occurred before and did not occur later.

- During *A Veterinarians' Perspective* presentation, the team learned that during the time of significant flaring north of Alix there were human health and animal health problems. In a second presentation from *A Veterinarians' Perspective*, the team learned there are acute and chronic effects and impacts from air pollution, including reproductive, immuno-suppression and respiratory effects, as well as increased nutritional deficiencies and neurological problems.

With these learnings and despite the WISSA study described below, the team came to understand that not enough research information is available. There is insufficient research to provide definitive links between emissions and animal health. Thus,

Recommendation #4:

The AHPT recommends that research be encouraged, supported and funded by the Alberta Government in the following areas:

- **Chemistry, toxicity, interaction and cumulative effects of mixtures of pollutants;**
- **Effects of air pollution on reproduction and immunology;**
- **Identification of biomarkers; and**
- **Exposure level assessment.**

6.3 WISSA

The AHPT became informed on the *Western Canada Study on Animal and Human Health Effects Associated with Exposure to Emissions from Oil and Natural Gas Field Facilities* being sponsored by WISSA. The study involves a number of components relating to action items raised by the group:

1. A field study to characterize air quality downwind from flares.
2. A human health exposure and risk assessment study to be conducted by Alberta Health and Wellness.

3. A study of health effects in beef cattle associated with chronic exposures to flaring.
4. A study of health effects in birds.
5. A lab study of reproductive toxicology of flare emissions.
6. A lab study to identify potential bio-indicators of flare emissions in beef cattle.

The AHPT was asked to provide comments on the draft framework. In addition to the comments, the team also recommended some measures to enhance the credibility of the study. The team was also informed that the study would include ongoing, intermittent and episodic monitoring. In the end, action items 2, 5 and 6 were deferred to the second phase, dependent on outcome of first phase.

6.4 Improving Research Credibility

The team noted that increasing issues about credibility were making the undertaking of research studies more challenging and harming research outcomes. With its significant experience in this area, the team created suggestions for improving the credibility of research undertakings. Thus,

Recommendation #5:

The AHPT recommends that its Recommendations for Improving the Credibility of Research be considered by any organization undertaking major research projects on the effects of air pollution on animal health.

Recommendations for Improving the Credibility of Research:

1. **Ask the right question**
   - Provide an up front concise definition of what is expected.
2. **Assemble the right team**
   - Multi-stakeholder
   - Scientific - ensure enough researchers to cover the work.
   - Political commitment and adequate resources.
3. **Review and reconfirm the question**
4. **Establish the structure**
   - Multi-disciplinary research and investigative team.
   - Appropriate advisory and review boards.
   - Peer review of all component including design and results.
   - Periodic public reporting in appropriate language.
   - Funding sources and mechanism for managing funds.
   - Ensure independence of research.
5. **Ensure results belong to everyone**
6. **Ensure the results answer the question**
7. **Follow-up: implement**

Act on findings/follow recommendations

7. Communication with Stakeholders

Two-way communications was an important part of the AHPT's process. Members were encouraged to communicate with their stakeholders on an ongoing basis.

A survey was undertaken to determine the concerns of livestock owners. Following approval of this final report by the CASA Board, a notice will be sent out to the survey respondents who had indicated that they wanted to be kept informed to let them know how they can obtain a copy of the final report, the HERS Program and the Community Monitoring Brochure.

Both the HERS program and the monitoring brochure were developed for communities and livestock owners living near emission sources. The AHPT has developed a distribution plan for the HERS program and the Community Monitoring Brochure.

The Animal Health Workshop proceedings were distributed to all the workshop participants, AHPT members, and the PAMZ Board. They were also posted on the CASA web site and hard copies were made available for those without electronic access.

At key points, media releases were developed and sent to targeted media representatives such as *Western Producer*, resulting in positive coverage. News releases were sent out when the AHPT was formed, following the workshop and with the release of the final report.

8. Future of the Animal Health Project Team

The AHPT has gathered substantial information, identified gaps and created some positive tools, such as the HERS framework and the Community Monitoring Brochure. These tools now need to be distributed and monitored. In addition, the team made a number of recommendations on how animal health issues should be addressed. It is clear that ongoing work is needed to implement these recommendations.

Human and animal health has been identified as a key focus area for CASA in its current business plan. Recommendations of the CASA coordination workshop, held two years ago, support the establishment of a joint human and animal health team. The following human health issue was identified at the workshop:

> There is a significant need for more information and data on human health, including health status information exposure data and monitoring data. One of the considerations identified under this issue was that human health issues are a significant factor in the work of other CASA project teams.

The following recommendation came out of the coordination workshop:

> *The CASA Board should review the status of the Human Health Project team and consider how the needs of stakeholders can be met.*

Another related issue identified at the workshop was that participants wanted a close relationship to be developed between the AHPT and the HHPT because the exposure issues are similar. The following recommendation was made to address this issue:

> *The CASA Board, when reviewing the status of the Human Health Project Team should consider the relationship between the Human Health Project Team and the Animal Health Project Team.*

Alberta Health and Wellness has also indicated its support for the establishment of an implementation team on human and animal health.

Recommendation #6:

The AHPT recommends that a Human and Animal Health Implementation Team be established to:

- **Review and implement, if still appropriate, the recommendations from the Human Health Project Team (see Appendix G).**
- **Implement recommendations from the Animal Health Project Team.**
- **Organize a workshop(s) to disseminate information about the HERS system to the farming community.**
- **Receive information about current and future research in the areas of human and animal health.**
- **Provide input into current and future research.**
- **Identify emerging issues in the areas of Human and Animal Health, and**

recommend actions to address those issues.

- **Provide information support to other project teams.**
- **Periodically evaluate, review and make any needed changes to the Herd and Environmental Record System and the Community Monitoring Brochure**.

The recommendations from the Human Health Project Team can be found in Appendix G.

9. Conclusions

The Animal Health Project Team met its goals and objectives as defined in the terms of reference. The team made significant inroads in identifying and addressing the complex issues related to animal health in the province. Clearly, there is a need to expand and improve the quality of research in this area, as stated in the team's recommendations.

The development of the Community Monitoring Brochure and HERS were significant achievements. Both of these are positive tools that will assist landowners and livestock owners in assessing the effects of air emissions in their areas.

The team has recommended the establishment of a new combined Human and Animal Health Implementation Team that will be able to further this work to meet the CASA vision of air that is odourless, tasteless, looks clear and has no measurable short or long-term adverse effects on people, animals or the environment.

Appendix A: Acronyms and Abbreviations

AAAQMS	Alberta Ambient Air Quality Monitoring System
AENV	Alberta Environment
AEP	Alberta Environmental Protection (now known as Alberta Environment)
AEUB (EUB)	Alberta Energy and Utilities Board
AHPT	Animal Health Project Team
AHWG	Animal Health Working Group
AQM	Air Quality Monitoring
CAPP	Canadian Association of Petroleum Producers
CASA	Clean Air Strategic Alliance
CFO	Confined Feedlot Operation
CPPI	Canadian Petroleum Products Institute
ELC	Environmental Law Centre
H2S	Hydrogen Sulphide
ILO	Intensive Livestock Operations
HERS	Herd and Environmental Response System
HHPT	Human Health Project Team
H_2S	Hydrogen Sulphide
NGO	Non Government Organization
NOx	Nitrogen Oxides
PAH	Polycyclic Aromatic Hydrocarbon
PAMZ	Parkland Airshed Management Zone
QA/QC	Quality Assurance / Quality Control
SEPAC	Small Explorers and Producers Association of Canada
SO_2	Sulphur Dioxide
WISSA	Western Interprovincial Scientific Studies Association

Appendix B: Bibliography of Background Documents

Air Toxics Management Program in Alberta. Alberta Environmental Protection. April 1998.

Bovine Tissue Slides and Investigation Data for Histopathology Report on Contract 95-0303. S&K Veterinary Pathology Consulting Services, Stillwater & Edmond, Oklahoma, 1995.

Cattle and the Oil and Gas Industry in Alberta: A Literature Review With Recommendations for Environmental Management. Alberta Environmental Centre, 1996.

Effects of Acid Forming Emissions in Livestock. Proceedings of an International Workshop, November 18/19, 1986. Alberta Environment Council 92-P2.

Effects of Air Emissions from Sour Gas Plants on the Health and Productivity on Beef and Dairy Herds in Alberta, Canada. Executive Summary, Morgan Scott. July, 1998.

Evaluation of the impact of a natural gas leak from pipeline on productivity of beef cattle. C.L Waldner, C.S. Ribble, and E.D. Janzen. Journal of Veterinary Medicine Today, Vol. 212, No. 1, January 1, 1998.

Examining the Association Between the Petroleum Industry and Beef Herd Productivity. Dr. Cheryl Waldner, Western College of Veterinary Medicine, Saskatoon, Saskatchewan, 1999. (Thesis Abstract).

Presentation by AEUB on Upstream Petroleum Industry Flaring. September 14, 1999.
Toxicology of Oil Field Pollutants in Cattle: A Review. R. W. Coppock, M.S. Mostrom, A.A. Khan and S.S. Semalulu, December, 1995.

Upstream Petroleum Industry Flaring Guide. Alberta Energy and Utilities Board, June, 1999.

Upstream Petroleum Industry Flaring Requirements. Alberta Energy and Utilities Board. July 29, 1999. (Interim Directive).

Use of Livestock as Monitors of Environmental Health Following a Petroleum Pipeline Break. M.S. Mostrom, C.A.J. Campbell, and R.W. Coppock, Environmental Toxicology Research, Alberta Environmental Centre, Vegreville, Canada.

Western Canada Study on Animal and Human Health Effects Associated with Exposure to Flaring: Literature Review and Intensive Livestock Emissions Inventory for Alberta, Chetner, et al., prepared for Intensive Livestock Operations Working Group.

Presentations: *Ambient Monitoring 101 - An Introduction*, Dennis Leask, Mount Royal College, *Air Quality Monitoring 202*, Kevin Warren, PAMZ, and *Air Quality Monitoring 30*3 - *Recent Trends*, Mel Strosher, Alberta Research Council.

Presentation: *Alberta Oil Sands Community Assessment and Health Effects Assessment Program*, Alberta Health & Wellness

Presentation: *Alberta Environmental Farm Plan*. Karen Yakimishyn, AEFP.

Presentation: *Alternatives to Flaring - New Combustion Technologies*. Questor Inc.

Presentation: *Appropriate Dispute Resolution*. Bill Remmer, EEUB.

Presentation: AOPA and CFOs. Cindy Chiasson, ELC.

Presentation: *CAPP Stewardship Program*. John Squarek, CAPP.

Presentation: *Cowchip$ Program: A decision-making tool for commercial Cow Calf Managers*, by Dr John Basarab, Alberta Agriculture Food & Rural Development, Lacombe.

Presentation: *Energy Utilities Board Enforcement System*. Karen Veitch, EUB.

Presentation: *Food Safety*. Robert Coppock, Alberta Research Counsel.

Presentation*: Intensive Livestock Operations & Air Quality Issues*, Alberta Pork Producers

Presentation: *Monitoring Technology*. Kevin Warren, PAMZ and Bob Myrick, AENV.

Presentation: *Recommendations from the Provincial Advisory Committee on Public Safety & Sour Gas*: EUB Implementation Plan

Presentation: *Recommendations for a Human Health Monitoring Framework*, Alberta Health & Wellness

Presentation: *Surface Rights Board and Compensation*. Stan Schumacher, Surface Rights Board.

Producers Guide: Western Canada Beef Productivity Study

Appendix C Animal Health Project Team Members

Cecil Anderson	Pembina Agriculture Protection Association (West Central)
Paul Belanger	Green Foundation
Bill Bocock	Rose Ridge Citizens
Jenny Bocock	Women of Unifarm
Harry Brook	Alberta Agriculture Food & Rural Development (Recommended Practices Sub-Group)
Ralph Christian	Alberta Agriculture Food & Rural Development
Robert Coppock	Alberta Research Council
Matthew Dance	Clean Air Strategic Alliance
Long Fu	Alberta Environment
Judy Huntley	Bert Riggall Environmental Foundation
Hanna Janzen	ExxonMobil Canada
Dwight Jenkinson	Mobil Oil Canada
Kim Johnson	Shell Canada Limited
Ila Johnston	Parkland Airshed Management Zone
Wayne Johnston	Farmer
Gray Jones	Western Canada Wilderness Committee
Joe Kendall	Alberta Agriculture Food & Rural Development
Rob Kennedy	Energy and Utilities Board
Murray Kerik	Alberta Cattle Commission
Dennis Kohlman	Petro-Canada Resources
Martha Kostuch (co-chair)	Bert Riggall Environmental Foundation Prairie Acid Rain Coalition
Cornelia Kreplin	Alberta Agriculture Food & Rural Development
Christine Macken	CASA
Kevin McLeod	Alberta Health
Bob Patrick	National Farmers Union
Henry Pirker	South Peace Environmental Association
David Pryce	Canadian Association of Petroleum Producers
Ansar Qureshi	Alberta Health and Wellness
Gary Sargent	Alberta Cattle Commission
Mike Sawyer	Citizens Oil & Gas Council
Chris Severson-Baker	Pembina Institute
John Squarek	Small Explorers and Producers Association of Canada Canadian Association of Petroleum Producers (After April 2002)
Dennis Stokes	Alberta Environment
Tim Taylor (co-chair)	PetroCanada/CAPP
Amy Van Der Kooi	Mobil Oil
Karen Veitch	Alberta Energy and Utilities Board
Cliff Whitelock	Pembina Agricultural Protection Association

Appendix D Animal Health Project Team Terms of Reference

Membership

- Agricultural Industry.
- Industry.
- Government.
- Environmental Organizations.
- Zones.

Goal

To prevent short and long-term adverse impacts of air contaminants on animal health

Objectives

- Identify key concerns regarding the effects of air emissions on animal health.
- Investigate animal health impacts attributable to air contaminants.
- Develop a management response system to manage identified risks.
- Assess air quality guidelines and objectives and make recommendations to ensure that animal health is protected.
- Document and summarize scientific and local/traditional knowledge regarding the effects of air emissions on animal health.
- Identify research gaps and make recommendations to fill the gaps.
- Communicate with stakeholders.

Tasks

1. Identify and gather existing information – concerns, scientific, and local / traditional knowledge.
2. Evaluate information.
3. Identify and prioritize gaps.
4. Identify tasks/actions to fill priority gaps
5. Develop recommendations for actions that can be taken to manage identified risks.
6. Determine what steps are needed to investigate animal health effects.
7. Determine what steps are needed to assess air quality guidelines and objectives to ensure animal health is protected.
8. Communicate with stakeholders on an ongoing basis.

Appendix E Animal Health Project Team Reports and Documents

All AHPT Reports and Documents can be found either at:
http://www.casahome.org/casa_library/ or by contacting CASA.

1. Herd and Environmental Record System.
2. Community Monitoring Brochure.
3. Workshop Proceedings.
4. Air Quality Impacts Final Report (Survey and Survey Results).

Appendix F Implementation Plan for the Herd and Environmental Record System and Community Monitoring Brochure

Copyright and Availability of Information

- HERS will not be copyrighted, in order to facilitate distribution on a "word of mouth" basis among producers, who could photocopy the document and pass it on.
- Post on the CASA website (downloadable file in PDF format; Word/Excel versions available by request for those who wish to use an electronic document).
- Kaniteo Information Services to retain a copy of the final version to distribute to other customers as appropriate.

Distribution Hubs

- Farm Credit.
- Natural Resources Conservation board.
- Farmers' Advocate.
- AAMD&C.
- Auction Marts.
- Trade Fairs.
- 4-H groups.
- Agricultural departments at Olds College, Universities in Calgary and Edmonton, other local colleges.
- District Agricultural offices.
- Cattle Commission (include advertisement or article in publication).
- Other farm groups: farming co-ops, equipment distributors, UFA, etc.
- Stakeholder facilities (Bert Riggall Environmental Association, South Peace Environmental Association, etc.).
- Veterinary offices.
- Feed stores.
- Alberta Veterinary Medical Association, #750 Weber Centre, 5555 Calgary Trail N.W., Edmonton, Alberta, T6H 5P9, Toll free: 1-800-404-2862.
- Place an ad, public service announcement, or article in key magazines or newspapers, (i.e. Western Producer, Farmer's Advocate, Albert Report, etc.) directing people to where they can pick up HERS; and have HERS available at these newspaper offices.
- EUB representative, Karen Veitch, will forward the electronic copies of the HERS document to all EUB Field Centres and provide information to field staff on the purpose of this system. Field staff will provide this information to farmers when appropriate.
- People who participate in existing programs, such as the Dairy and Beef Herd Improvement programs.
- Tie-in to Alberta Environmental Farm Plan (1-866-844-AEFP).
- Land Man Association

Second stage distribution:

Consider sponsoring a workshop (presented by the consultant), to present this tool to key groups (see distribution hubs above). These groups can then go on to farm the tool out to their memberships, and to the public. This workshop should be co-ordinate and planned by the new CASA AHPT, if it is given a mandate to continue. This workshop could be presented in conjunction with an existing meeting, such as the Alberta Cattle Commission Annual Meeting, a SPOG neighbor's day, an Alberta Environmental Farm Plan workshop, Farm Shows, etc.

Other Ideas

- Initiating HERS with hard copies and gradually moving towards a provincial computerised system is the logical way to go
    - This may later allow for province-wide data manipulation and trending
- CASA should implement HERS as it is received from Kaniteo (i.e. after the initial pilot test has been completed, without spending any more time doing further evaluation). However, this tool is a work in progress, and as such its suitability should be reviewed on an ongoing basis, for example every few years, by the body that retains the ownership and responsibility for the document.

Numbers

- Electronic and hard copies will be sent to key groups (see Distribution Hubs)
- Both the lite and the full version of HERS will be sent out
- We will need a letter and a package of both HERS document to be sent out. Budget for 1000 copies

Recommended Use

- For producers to document on a routine basis environmental and herd health histories, so that a baseline is established and any changes can be tracked and assessed
- On the extreme end of the spectrum, this tool could be used by producers and industry in case of dispute
- The package should contain a feedback sheet that allows users to provide comments and suggestions about the format and content. Some key questions would be where did you find this tool, would you be interested (eventually) in sharing your data for academic/research use, what did you think of the format/content. This feedback will provide CASA with a continuous improvement opportunity, but it will require ongoing support and maintenance.

Appendix G Human Health Project Team Recommendations

The Human Health Project Team made the following recommendations to the CASA Board of Directors on November 25th, 1998:

Recommendation 1
The HHPT recommends that the CASA Board reaffirm its approval of the proposed framework for a Human Health Monitoring System (first given in February 1997);

Recommendation 2
The HHPT recommends that the CASA Board endorse the formation of a multi-stakeholder subgroup of the HHPT, under the joint leadership of Alberta Health and Wellness and Alberta Environmental Protection (now AENV), to develop specific recommendations, timelines, and work plan to implement the proposed Framework for a Human Health Monitoring System;

Recommendation 3
The HHPT recommends that the CASA Board incorporate a review of the implemented human health monitoring system into CASA's periodic strategic planning activities;

Recommendation 4
The HHPT recommends that the CASA Board endorse the proposed timelines to complete Appendices K (Evaluation Report) and L (Subgroup Report on Implementation) to this report before the June board meeting and to submit them for approval at that time.

Appendix H Human Health Monitoring System

This document outlines the framework for a generic human health monitoring system for Alberta. It has been developed, and is supported by, the members of the CASA Human Health Resource Group, which includes representatives from industry, government, health and environment NGOs, and other stakeholders.

The proposed monitoring system cannot answer all questions about health effects and air quality. Instead, the system is a tool that can be used 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 on-going systematic collection, analysis, and interpretation of selected data on health outcomes, air quality parameters, and population exposure. Despite its apparent simplicity, this is not an easy process to develop, as can be confirmed by the lack of available models on which to base a system.

GOALS

The goals of the proposed system are:

- To ensure the availability of timely, high quality data while respecting issues of privacy and confidentiality.
- To ensure that information about human health relative to air quality is made available to the public and to decision-makers.
- To encourage studies and pilot projects on human health, especially lung health, and to correlate results with ambient air quality data and other relevant data.

OBJECTIVE

To facilitate the development of a province-wide system, including methods and techniques, for measuring and assessing human health effects in relation to air quality.

THE MONITORING SYSTEM

The table below depicts the capability of the system to integrate, on an ongoing basis, ambient air quality and human health effects data. The system can also respond to community driven health concerns, and can investigate concerns of a local, regional or zonal nature through the use of specialized studies and specialized data collection. The system has the following components:

1. Ongoing Monitoring

Central to the proposed human health system is the collection of ambient air monitoring data, which would be correlated with data on health effects (symptoms) at the population level. This component serves as a first level of assessment of human exposure to air contaminants on a provincial basis. This component serves to:

a) Provide better linkages between the existing ambient air quality and health effects data,
b) Provide a province-wide framework (technical and organizational) for carrying out detailed exposure and health effects monitoring and, if necessary, special studies,
c) Contribute to the assessment of long-term trends of air pollution and associated population health status.

2. Public Health Concerns

This component is initiated when a number of health concerns received from a region or community warrant a comprehensive investigation. These concerns may be identified by members of the public, or may emerge from activities occurring in other components of the human health monitoring system. This component will:

a) Provide a fast, cost-effective, mechanism to respond to public concerns,
b) Facilitate identification of emerging hot spots or areas of concerns, and
c) Facilitate validation of community concerns.

3. Special Monitoring

This component is triggered as a result of concerns that cannot be resolved through either of the above components (1 or 2), and involves the use of periodic exposure and health effects surveys for different pollutants. For example, these studies could attempt to assess human exposure in specific regions or the exposure of selected population groups (e.g. children, highly sensitive or highly exposed people) to specific pollutants. Two generally accepted methods for this type of monitoring are:

- Collection of individual exposure data through the use of personal exposure monitors:
- Collection of special ambient data.

At this level, data on personal exposure is compared with special ambient data to provide further evidence of linkages between ambient emissions and a possible health effect. This component will:

- Provide detailed exposure and health effects data for air contaminants considered to be of priority by the communities participating in the study;
- Promote the research and development of personal exposure assessment methodologies;
- Provide better support and data for epidemiological studies on health effects of air pollution;
- Provide the rational, if necessary, for health or regulatory decisions.

CONCLUSION

The proposed monitoring system provides a comprehensive model for stakeholder involvement, ongoing monitoring, continual assessment, and response to public concerns, with each component having steps of increasing technical complexity, and each step relying on problem identification before initiation.

Appendix I Human Health Monitoring Framework

The implementation of the system described is based on several assumptions:

- Implementation can only be achieved in stages over time; it is not an activity that can be accomplished provincially in one sweeping initiative.
- General geographic areas of the province that are likely to provide the best prospects for early success include: Fort Saskatchewan, Grande Prairie, Caroline, Edmonton and Calgary.
- It requires the development of computer software.
- It requires the cooperation of all stakeholders in terms of data acquisition and access.

1. Human Health Symptoms

Implementation Options**:** Create a 1-800# telephone system.

The 1-800 phone-in line and its computer support should be located within the Poison Control Centre, Foothills Hospital, Calgary, Alberta. It is the ideal and obvious place to locate the ongoing activity because of its; ability to maintain a singular method of recording telephone input, existing expertise, track record of providing toxicological support to the regional health authorities, and communication links with Alberta Health.

2. Public Health Complaints

Implementation Options: Establish the 1-800 phone-in line.

The 1-800 system would support the collection of a standard set of data that is then shared on a timely basis with the regional health authority involved (i.e. where the complainant is located) and Alberta Health. Complainants would need only remember one telephone number, receive some immediate assistance and be advised of any future communications activity in response to their complaint (i.e. do they wish to have their complaint investigated and do their expectations of the system include further discussion with investigators).

3. Human Health Effects of Air Emissions

Implementation Options. This already takes place as normal business in Alberta Health. No new activity is required.

4. Extraordinary Emissions Events

Implementation Options. A coordinated system that will require the cooperation and voluntary participation of Alberta Environmental Protection, Alberta Energy, the Alberta Energy and Utilities Board, all of the regional health authorities and industry. Existing information/notification protocols may need to be enhanced and maintained.

5. Human Health Monitoring

Implementation Options. Part of this already takes place in Alberta Health on a project basis. Human Health Monitoring also requires an enhanced ambient air monitoring network in the province.

6. Ambient Air Monitoring

Implementation Options:
An enhanced ambient air monitoring design *(currently there are five critical areas within the province that perhaps provide the best opportunities for success. These five areas include: Fort Saskatchewan, Grande Prairie, Caroline, Edmonton and Calgary. The implementation committee believes that the interest in these air sheds may provide our best chance for early success).* CASA Human Health Project Team Co-Chairs will engage the Ambient Air Quality Monitoring: Operations Steering Committee to refine and enhance this backbone system. CASA partners will promote the framework. The multi-stakeholder management committee will encourage regional activity.

7. Ongoing Activity

Implementation Options.
Alberta Health has to establish the ongoing activity. It will require the cooperation of Alberta Environmental Protection and the Regional Health Authorities.

8. Issues/Actions Identification

Implementation Options. Alberta Health is the central option for the analysis. A scientific advisory committee will be needed to provide scientific oversight on this and subsequent steps.

9. Investigation

Implementation Options. Alberta Health is the central option supported by a scientific advisory committee.

10. Further Problem Identification

Implementation Options. Alberta Health is the central option supported by a scientific advisory committee.

11. Special Monitoring

Implementation Options. Alberta Health is the only proposed option with all special monitoring supported by a scientific advisory committee as is currently the case.

12. Communications Strategy

Implementation Option: To be drafted as a responsibility of the Multi-Stakholder Management committee described in 13.

13. Multi-Stakeholder Management

Implementation Option: Alberta Health in partnership with CASA establishes a multi-stakeholder management group that functions as an Operations Steering Committee. It is chaired by Alberta Health, meets quarterly and will:

- Provide strategic planning and/or direction.
- Influence and prioritise effort.
- Establish and maintain effective communication.
- Provide an audit/evaluation function respecting the frameworks activities.

14. Feedback

Implementation Options. Feedback is part of the system and requires a centralized operation, e.g. coordinated by Alberta Health and Wellness.

Revised Comprehensive Human Health Monitoring System