



PARKLAND AIRSHED MANAGEMENT ZONE



1999 Annual Report

1999 ANNUAL REPORT

CONTENTS

1.0 Introduction.....	2
2.0 Chairman’s and Program Manager’s Reports.....	3
2.1 Report from the Chair.....	3
2.2 Program Manager’s Report.....	3
2.3 Meet the Program Manager.....	4
3.0 Organization.....	5
4.0 Committee Reports.....	6
4.1 Technical Working Group.....	6
4.2 Issues Response Group.....	7
4.3 Human Health Committee.....	7
4.4 Communications Committee.....	8
4.5 Financial Committee.....	8
5.0 Annual Meetings.....	9
6.0 Air Quality Monitoring Program.....	10
6.1 Passive Monitoring Program.....	11
6.2 Continuous Monitoring Program.....	13
6.3 Data Management System.....	13
7.0 Links to the Clean Air Strategic Alliance.....	14
8.0 Financial Report.....	15
Appendices	
Appendix I: Board of Directors.....	16
Appendix II: Committee Members.....	16
Appendix III: Association Members.....	18
Appendix IV: Landowners.....	18
Appendix V: Acknowledgements.....	19
Glossary.....	19

INTRODUCTION

1999 marked the second full year of operation for the Parkland Airshed Management Zone Association (PAMZ).

The association is a multi-stakeholder, non-profit organization that was established to identify air quality concerns within the zone and implement management solutions suited to those concerns. By following the Clean Air Strategic Alliance (CASA) model of consensus decision making, PAMZ provides a forum for concerned stakeholders to meet, discuss and resolve their concerns in a productive and collaborative manner.

The air quality concerns that have been identified as being high priority issues for the zone are:

- Human Health Effects
- Livestock Effects
- Flaring

Developing strategies to address these issues requires reliable and timely data on source emissions, ambient concentrations, and livestock and human

health. The foundation for this work is a comprehensive ambient air quality monitoring program that began operation in 1999 and will be expanded and enhanced further in 2000. The data collected by the program will play a key role in the understanding of air quality in the zone.

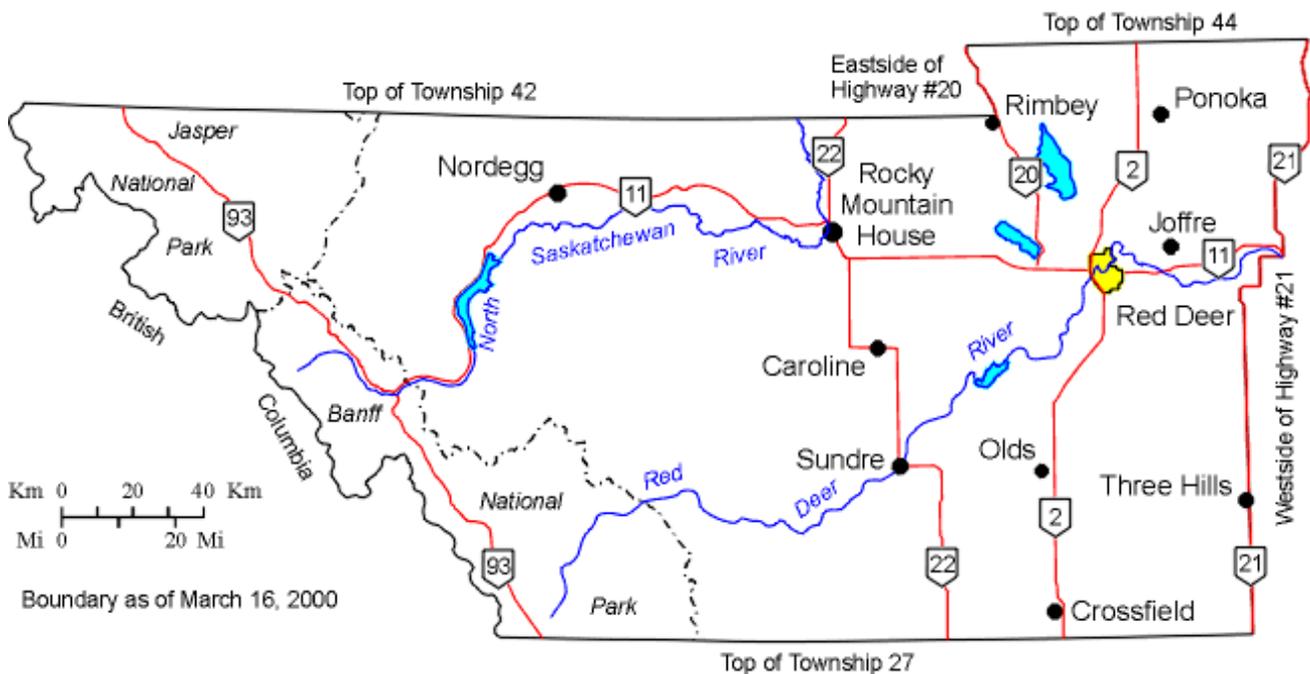
Funding of PAMZ is proportioned fairly amongst its members at levels consistent with their relative impact on the zone's air quality as determined by annual emission inventories. In 1999, PAMZ members' financial and in-kind contributions totaled approximately \$231,000 and over 2500 hours respectively.

1999 was an important and challenging year in the history of the PAMZ. Through the commitment and perseverance of its members, several goals the association had set for itself were achieved while significant progress was made on others. PAMZ is proud to present its accomplishments and progress in this third annual report.

PAMZ Mission Statement

The Parkland Airshed Management Zone will implement a zonal approach to monitoring and managing air quality in the zone.

Parkland Airshed Management Zone



REPORT FROM THE CHAIR

1999 proved to be a challenging year for the Parkland Airshed Management Zone. These challenges were met with enthusiasm and cooperation by a dedicated group of stakeholders from industry, government, NGOs and public.

It has been very encouraging to witness the strong support and patience of industry and local governments that are supporting our program financially through a process which has taken much longer than originally anticipated.

The hiring of Kevin Warren as program manager in March has expedited our program with the deployment of the 28-station passive monitoring network, which became operational at the beginning of December. This data is now being compiled and reported to the public routinely. The full monitoring program is anticipated to be operational during the second quarter of 2000.

The future success of zonal air quality management will require the active participation and support of all stakeholders that will benefit from improvements to air quality in the region. As scientifically credible and quality assured information is gained, the results will be clearly communicated to the public and government.



As this is my final year as Chair of the PAMZ Board I wish to thank all the membership for their contributions and support over the past two years. It has been a pleasure to work with such a dedicated group and I am confident that PAMZ will have great success in the future as a result of all of those involved.

Lloyd Cumming,
Chair

“The future success of zonal air quality management will require the active participation and support of all stakeholders that will benefit from improvements to air quality in the region”

PROGRAM MANAGER’S REPORT

As I write this, it has been one year since I signed my contact with PAMZ to become their program manager. What a year it has been! Working for a non-profit organization provides me with many challenges that ensure I never have a dull moment.

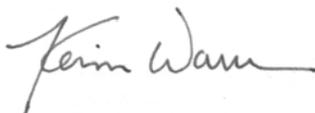
The consensus approach is new to me and while at times it seems to take so much more effort and patience, the results that are achieved truly do justify the extra effort. The decisions and solutions that result are far more innovative than those

reached by more traditional means and far more likely to succeed. There is more commitment to the outcome because the affected stakeholders have generated and designed the solution.

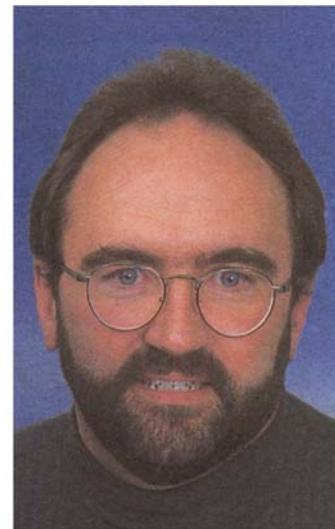
The amazing thing is that through the process, trust and friendship develop amongst those who might otherwise have been adversaries. Making all the friends that I have over the last year has been very satisfying for me.

...the biggest challenge he faces as the PAMZ Program Manager is developing and maintaining a monitoring program that is dynamic and capable of responding to the issues emerging and evolving within the PAMZ.

The PAMZ members I have worked with over the last year are of the highest caliber and their integrity, diversity of knowledge and experience, and commitment to the organization and its goals are indisputable. With their contributions and support, PAMZ will deliver the regional air quality monitoring program that provides the data needed to develop successful air quality management strategies for the zone.



Kevin Warren
Program Manager



MEET THE PROGRAM MANAGER

The Parkland Airshed Management Zone now has a program manager responsible for the design, implementation and operation of its Air Quality Monitoring (AQM) Program. He is Kevin Warren, a Calgary-based consultant, who has nineteen years of experience operating, designing and managing numerous AQM programs both in Western Canada and Internationally.

Kevin has lived in Alberta since 1965, when his Air Force family moved to Canadian Forces Base Cold Lake following postings in Quebec, Europe, Nova Scotia and Ontario. His original career plan saw him pursuing a degree in Forestry at the University of Alberta, but in the late 70s he changed career paths working as a laboratory technologist for Chemical and Geological Laboratories in Edmonton. In 1979 he moved to Edson to work for Hudson's Bay Oil and Gas at its Edson Gas Plant where he again changed career paths assuming responsibility for the monitoring, treating and reporting of all the plant's emissions to the surrounding air, ground and watersheds.

In 1981, Kevin was hired by Western Research in Edmonton to operate, maintain and calibrate AQM Stations and Networks located throughout Northern Alberta. Two years later he transferred to Western's head office in Calgary and in

1985 was assigned to the Acid Deposition Research Program's (ADRP) Biophysical Research Team. The ADRP was one of the earliest multi-stakeholder studies in Alberta undertaken to assess the environmental impact of acid-forming gases in Alberta.

In 1989, Western Research was acquired by the Trimac Group of Companies and reorganized to form Bovar Environmental Services. Kevin was promoted to manage the company's AQM division. In this position, he was responsible for the design and management of several large-scale monitoring networks. The largest and most successful of these programs is a 50 station nation-wide AQM network located in Malaysia. In 1999 Kevin started his own company, Amarok Consulting, specializing in AQM program design and management. "Amarok" is the Inuit word for "wolf".

Besides wolves, Kevin's other passions include hiking, camping, coaching soccer, hockey pools, downhill skiing, and following environmental issues.

Kevin believes the biggest challenge he faces as the PAMZ Program Manager is developing and maintaining a monitoring program that is dynamic and capable of responding to the issues emerging and evolving within the PAMZ.

ORGANIZATION

The Parkland Airshed Management Zone Association is a non-profit organization whose membership is drawn from four stakeholder groups all united in a common purpose, to improve air quality. This goal is consistent with CASA, PAMZ's parent organization. The Parkland Airshed Management Zone Association was incorporated under the societies Act in April 1997, and operates under guidelines put forth by CASA.

The four stakeholder groups represented in the association are the public, industry, government, and non-government organizations (NGOs). The association's activities are managed by a Board of Directors. Each of the four sectors nominates directors and alternates to serve on the board. Individuals from local municipalities, provincial government departments, regional health authorities, the farming and ranching community, environmental organizations, industry and the general public represent their various sectors on the board which has twelve directors at present. The current makeup of the board is:

- Three public members
- Three industry members
- Four government members
- Two NGO members

Committees for promoting the objects or functions of the association are appointed



Executive Committee (Left to Right)
Miles Nystrom, Dr. Martha Kostuch, Kevin Warren, Lloyd Cumming, Brian Goliss



and dissolved by the PAMZ Board. Each committee has a chairperson and reports to the board through that person. Currently there are five PAMZ committees:

- Technical Working Group
- Issues Response Group
- Human Health Committee
- Communications Committee
- Financial Committee

The board may establish project teams to investigate, evaluate, and provide resolutions to specifically defined issues. These teams report to the board directly or through a manager and are composed of persons appointed by the board. Currently there are no project teams in operation.

A program manager, Kevin Warren, has been contracted to manage the PAMZ air quality monitoring program, oversee the implementation and evaluation of zonal air quality management strategies, and perform other tasks as identified in the position's terms of reference. The program manager reports to the board and sits on all of the association's committees.

Operation of the monitoring program has been contracted to a Calgary-based air quality services company, RSLs 2000 Inc., that reports to the program manager. Analysis of the passive samplers employed by the program has been sub-contracted by RSLs 2000 Inc. to an Edmonton-based laboratory, Maxxam Analytics Inc.

The Parkland Airshed Management Zone Association was incorporated under the societies Act in April 1997, and operates under guidelines put forth by CASA.

COMMITTEE REPORTS

TECHNICAL WORKING GROUP (TWG)

... the group's ongoing task will be to assess the data collected by the program and make recommendations of management strategies based on that data to the PAMZ Board.

The Technical Working Group has been in existence since the inception of PAMZ. Its primary task to date, has been the design of the zonal air quality monitoring program. After the program is operational the group's ongoing task will be assessing the data collected by the program and making recommendations of management strategies based on that data to the PAMZ Board. This group works closely with the program manager in overseeing the operation of the program including the relocation of a station(s) to insure that the program is providing the data required by the association's stakeholders to help them gain an understanding of the region's air quality and its effects.

March 1999, marked the culmination of two years of hard work by this multi-stakeholder group, with the final approval of the Air Quality Monitoring Program's Design by the PAMZ Board.

At the end of March a joint application for amendments for some of the companies participating in the Parkland Airshed Management Zone Association was



Technical Working Group (left to right)
Damian Kajnc, Miles Nystrom, Dwight Jenkinson,
Greg Ritz, Kevin Warren, John Retallack, Brian
Goliss, Jim Dixon, Karen McCallion, Paul Walker

Missing From Above: Lloyd Cumming, Jack Davis,
Dennis Reid, John Hawkins, Lynn Huntley, Rod
Sikora, Heather Allan, Jeff Strem, David McCoy

submitted to Alberta Environment. The PAMZ Air Quality Monitoring Program would supersede the co-applicants' existing Compliance Ambient AQM programs. Collapsing of the existing program(s) for a facility would be contingent upon that facility's membership in PAMZ and its support of the PAMZ AQM Program.

The application was deemed to be administratively complete in late May and in early June Public Notification of the Joint Application was posted in eleven local newspapers. Only two statements of concern were filed and one of these concerns was subsequently withdrawn after the party had learned more details of the proposed AQM Program in discussions with PAMZ representatives. The remaining concern was addressed by the TWG in July.

In September, the PAMZ TWG was kept busy addressing several questions raised by a technical review of the application conducted by Alberta Environment throughout the summer months.

In reviewing the PAMZ application, Alberta Environment found that it had no formal technical guidelines in place for assessing the PAMZ air quality monitoring program. A technical review of a similar application by one of the other existing airsheds had been conducted in 1996, but had not resulted in the establishment of formal guidelines for future airsheds' air quality monitoring programs. Substantial additional time and effort was required for Alberta Environment to establish guidelines specifically to assess the program designed by PAMZ.

By December 1999, these guidelines were in place and included such considerations as facilities' AENV and EUB complaint records, ambient and source air quality

(Continued from page 6)

guideline exceedences, average ambient air quality levels, local concerns, future throughput, plant upgrades and improvements, etc. all throughout the previous five-year period (1995-1999). At the year's end the application was still

undergoing review by Alberta Environment. The review is scheduled for completion during the first quarter of 2000 with amendments of successful facilities' approvals to follow shortly thereafter.

ISSUES RESPONSE GOUP (IRG)

Work continued on the three top priority issues identified by PAMZ: human health, animal health and flaring. A Human Health Committee has been established and the Terms of Reference were approved by the PAMZ Board. The CASA Board approved PAMZ's statement of concern and established an Animal Health Project Team. Two members of PAMZ are active

participants on CASA's Animal Health Project Team. The Animal Health Project Team held a workshop on the effects of air pollution on animal health near Sundre in November. Continued progress has been made on reducing flaring both province-wide and within this zone. The Issues Response Group also developed guidelines for locating the portable AQM trailer.

HUMAN HEALTH COMMITTEE (HHC)

The Parkland Airshed Management Zone's Human Health Committee (HHC) was established in January 1999 in response to a need of addressing one of the three key priorities for the people living within the PAMZ. Formal terms of reference were accepted by the Board in November 1999, and include two important purposes that direct the Committee's work. First, the PAMZ HHC acts as a forum to explore and address issues affecting human health that may be associated with air pollution. To this end, the HHC is comprised of



Human Health Committee (Left to Right)
Sheila Lockrem, Wayne Johnston, Ila Johnston,
Damian Kajnc, Sherry Scheunert, Dr. Abimbola Abi-
ola, Margaret Coutts, Greg Ritz, Kevin Warren, Dar-
rell Myroniuk, Dr. Rudy Zimmer

Missing From Above: Dr. Martha Kostuch

representatives from a wide variety of interests including health, environment, academics, industry, agriculture and the general public. Members of the HHC continue to increase their understanding about health issues and regulatory matters affecting air quality through thoughtful presentations by member sectors and invited guests. The second purpose of the HHC is to assess the feasibility of implementing a human health - air quality monitoring system in a manner similar to that recommended by the Clean Air Strategic Alliance's Human Health Project Team in 1999. This initiative is a long-range strategy that will require the goodwill and teamwork of many sectors to ensure the creation of such an ongoing monitoring function as a potential tool to help reduce the impact of air pollution on human health. Currently, the HHC is planning for a comprehensive community consultation process to ensure that the general public has appropriate input into the development of priorities around human health issues in the PAMZ. The outcome of the proposed survey, workshops and public information forums in the coming 1-2 years will be an initial work plan for the HHC to help address some of the health issues important to the people living in the zone.

This initiative is a long-range strategy that will require the goodwill and teamwork of many sectors to ensure the creation of such an ongoing monitoring function as a potential tool to help reduce the impact of air pollution on human health.

COMMUNICATIONS COMMITTEE (CC)



Communications Committee (left to right): Lloyd Cumming, Bill Post, Bev Phillips, Kevin Warren, Alice Murray

Missing From Above: Ila Johnston

1999 was a busy and rewarding year for the PAMZ communications committee. Membership drives aimed both at municipalities and industries operating within the zone were very successful. Membership was tripled. Forty-six companies from various industry sectors including mining, manufacturing, oil & gas, petrochemical, and transportation have become funding members.

Presentations about the organization and its proposed air quality monitoring program were given to fifteen municipalities located fully or partially within the zone's boundaries. Six municipalities have recognized their business's and residents' impacts on the airshed and also elected to become funding members.

Various presentations about the association were also given to students, companies, professional organizations, industrial associations, and to the Clean Air Strategic Alliance's Board of Directors.

Besides securing members, these presentations first sought to create an awareness of the work of the PAMZ and that of its member companies and organizations, and second to raise the awareness in all its audiences of some of the principles of environmental protection including personal environmental responsibility and pollution prevention.



Presentation to Elementary School by the PAMZ Program Manager

*...raise the awareness
in all its audiences of
some of the principles of
environmental protection
including personal
environmental
responsibility and
pollution prevention.*

FINANCIAL COMMITTEE (FC)

The financial committee was very active both early and late in the year updating the zone's funding formulas as the emission surveys were updated so that the funding apportionments for 1999 and 2000 were kept proportional to stakeholders' emissions to the airshed.

In 1999, PAMZ made the leap from roughly a \$40,000/year organization to a \$250,000/year organization. The systems

that had been put in place by the financial committee in previous years were able to handle this large change. The committee has been especially successful in managing the association's cash flow while at the same time maximizing the interest accrued on its funds. The challenge in the coming year will be to continue this trend through the periods when large amounts of capital are needed to establish the monitoring network.

SECOND ANNUAL MEETING

The Second Annual General Meeting of the Parkland Airshed Management Zone Association was held on June 10, 1999 at the Lacombe Golf and Country Club located near Lacombe, Alberta.

The contributions of outgoing board members Luke Stang of Alberta Environment, John Torneby of Alberta Environment, Linda Burrell of the County of Mountainview, Jack Peck of the County of Mountainview, Lois Cramer of Nova Chemicals Corp., and Bob Farion of the Alberta Energy & Utilities Board was recognized and celebrated.

A summary of the Parkland Airshed Management Zone Association's activities and accomplishments over the 1998 year was presented by the chairman. The past year had predominantly been a year of building the foundation for developing and implementing a system for air quality monitoring and management within the zone. Some of the year's highlights were:

- An emissions inventory and study, initiated in 1997 was developed further. The inventory identifies emission sources in the zone and was developed to provide the basis for funding in the zone and to track any changes to which air quality can be compared in the long term.
- A funding formula based on the results

of the emissions inventory for financing the operation of the zone was established, whereby stakeholder financial support is based on their share of emissions.

- A business plan to document the business of the association and to serve as a discussion document with current and potential stakeholders was developed.
- A human health committee was established in response to the identification of human health as the highest priority of the zone's stakeholders.
- The TWG had a busy year continuing work on the design of the zonal air quality monitoring program that could fulfill the data needs of the various PAMZ stakeholder groups and committees to improve their understanding of the region's air quality and its effects.
- A program manager position and that position's terms of reference were approved.

A presentation about the air quality monitoring program was given by the program manager with questions and discussion on its design and the plans for its implementation.

The meeting concluded with a question and answer session from the public.

A human health committee was established in response to the identification of human health as the highest priority of the zone's stakeholders.

THIRD ANNUAL MEETING

The Third Annual General Meeting of the Parkland Airshed Management Zone Association will be held on **Thursday, June 15, 2000 at 7:00 PM**. The meeting will be held at the Royal Canadian Legion Branch No. 36's Meeting Hall located at **5019-50 Street** in the Town of **Rimbey, Alberta (403-843-2464)**.

All interested members of the public are invited and encouraged to attend. At this meeting, a summary of PAMZ's activities and accomplishments for 1999 will be presented, the PAMZ Air Quality Monitoring Program will be discussed, and the executive committee and board membership will be confirmed.

AIR QUALITY MONITORING PROGRAM

The PAMZ Regional Air Quality Monitoring (AQM) Program is the consensus of two year's of work by the PAMZ Board and Technical Working Group.

In designing the AQM Program, PAMZ reviewed other zonal monitoring programs both within and outside of Alberta and adopted elements of those programs it felt could best serve the PAMZ stakeholders' needs. The parameters that were chosen to be monitored are consistent with those being monitored within the Alberta Ambient Air Quality Monitoring System's (AAAQMS) network and at sites within Alberta's other two existing Air Quality Management Zones: West Central Airshed Society (WCAS) and Wood Buffalo Environmental Association (WBEA).

The primary intent of the PAMZ Regional AQM Program is the provision of high quality data required in the development and evaluation of strategies to address zonal air quality.

The program's design has four major attributes:

- It will provide data to address the current and future air quality concerns/issues of the zone's various stakeholders.
- This data will contribute to the body of information required by the scientific community and other users outside of the PAMZ to provide a better understanding of certain pollutants

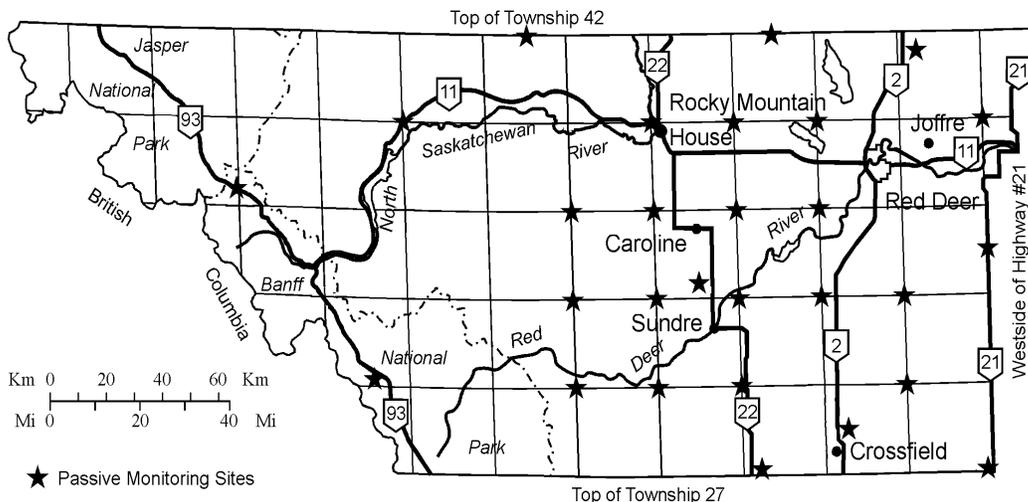
including their sources, behaviors and effects.

- It will be dynamic and evolutionary in nature and, therefore, capable of responding to changing or emerging concerns, issues, technologies, and developments in other management zones/programs.
- It can be effectively funded by the zone's stakeholders while allowing the PAMZ to research, develop and implement other programs and activities.

The primary intent of the PAMZ Regional AQM Program is the provision of high quality data required in the development and evaluation of strategies to address zonal air quality issues.

The program has two major components:

- A twenty-eight station passive monitoring network for sampling NO₂, O₃ and SO₂ that began operation in December 1999.
- A three station continuous monitoring network for monitoring a number of parameters from a wide range of natural, industrial, non-industrial and mobile emission sources, and scheduled for startup in 2000.



PAMZ Passive Monitoring Network - Station Locations (Boundaries and locations as of December 1, 1999)

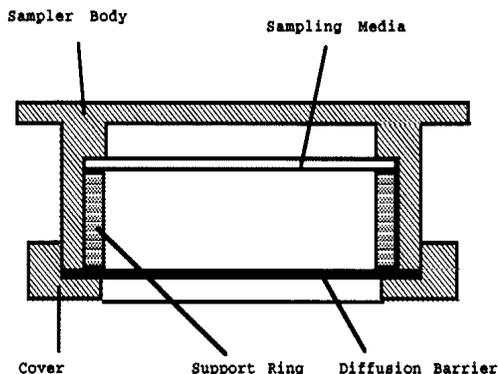
PASSIVE MONITORING PROGRAM

The PAMZ AQM Program uses passive monitors as a cost-effective method of collecting air quality data over a large region (42,000 sq. km.). The resulting database will be suitable for the identification of long term air quality trends, a typical approach in making regional-scale air quality assessments.

Passive samplers rely on the principles of permeation and diffusion to physically uptake the pollutant gas being sampled. This method is an alternative to active sampling or continuous monitoring where an air sample is drawn or forced mechanically into or through a collection device or past a detector.

The advantages of the passive samplers used by PAMZ are their simple design, low cost and ease of use. No power is required to operate them, making them suitable for remote use; the only major restriction in locating samplers is the ability to access the sampler. The samplers have been lab and field validated under extreme weather conditions. Up to three samplers are installed facing downwards in a dome-shaped rain shelter. The downward-facing design of the rain shelter minimizes particulate and condensation interference.

The sampler itself consists of a polycarbonate shell, support ring and barrier. A Teflon film is used as the diffusion barrier, with analyte-specific coated filter media as the collection matrix.



Passive Air Sampling System

The PAMZ Passive Monitoring Network currently consists of twenty-eight stations and was commissioned in December 1999. The parameters included in the passive network are currently SO₂, NO₂ and O₃. VOC passive monitors may be added in the future should this technology advance sufficiently. The passive monitoring stations are located throughout the zone on a 3 X 3 township grid system though there is a bias to the more developed eastern part of the zone, due in part to the limited accessibility of the zone's western regions. Because this database will also be compared to the stationary and portable continuous monitoring results, two (eventually three) passive monitoring station sites are co-located with continuous monitoring locations.

Passive monitoring is conducted on a monthly interval year-round. Due to the large geographic area covered by the network it takes a dedicated technician three days at the start of every month to change out the samplers. After collection, the exposed samplers are sent for analysis to the laboratory located in Edmonton. Unexposed samplers (blanks) are also sent to the lab for analysis so that the results can be blank-corrected. For the first six months of the program, samples are being collected in triplicate. The sampling will switch to a duplicate mode pending a review of the results of the triplicate sampling after the initial six months.

The resulting database will be suitable for the identification of long term air quality trends, a typical approach in making regional-scale air quality assessments.



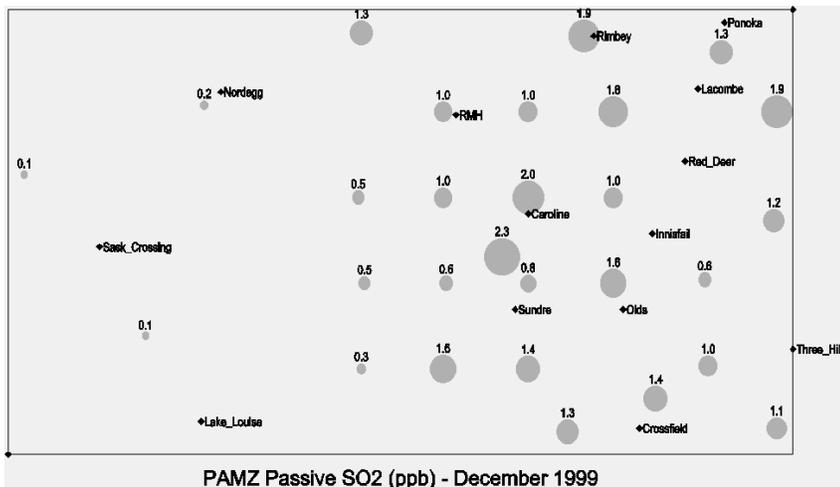
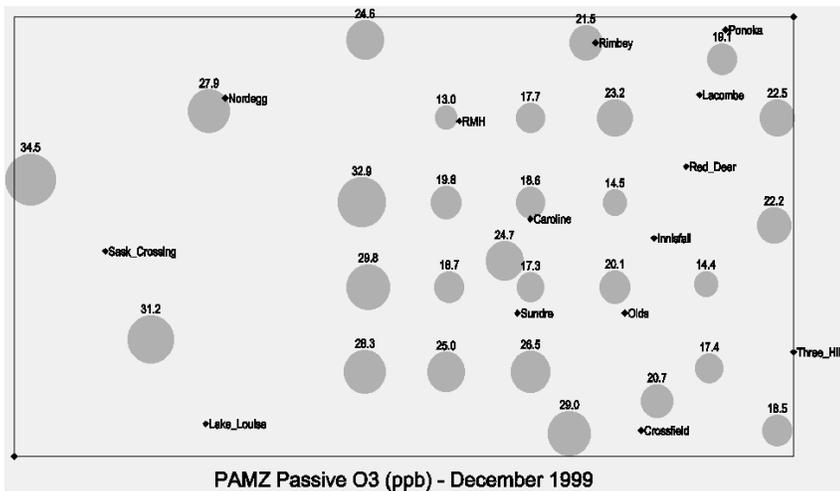
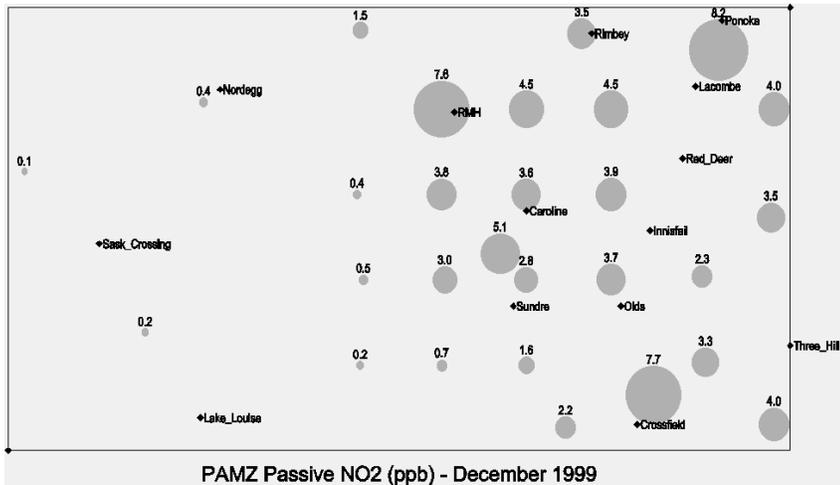
Fallen Timber Monitoring Station

Once the samplers have been received at the laboratory the filter media contained in them is removed, reacted, and analyzed using methods and instrumentation designed specifically for this purpose.

A formula that accounts for the impact of meteorological conditions on the samplers' sampling rate is used to determine the average concentration of the pollutant gas being monitored. Three meteorological parameters are required for this calculation: ambient temperature, wind speed, and relative humidity. This data is collected at seven stations located within the zone and operated by Environment Canada.

Average monthly concentrations are calculated for each site from an average of the samples collected and analyzed. After review and acceptance by the PAMZ Program Manager the passive data is supplied to the CASA Data Warehouse where it can be accessed freely. Additionally, hard copy and digital formats of the data and post maps of the results will be available upon request, from the PAMZ Program Manager. Eventually the passive monitoring data and post maps will be accessible directly through the PAMZ Website.

The post maps presented on the left, summarize the results of the passive sampling conducted in December 1999. The diameter of each circle is proportional to the monthly average concentration of that pollutant observed at a station. The boundaries of the map roughly coincide with those of PAMZ; some of the zone's major population centers are indicated. More monthly data will be required before a thorough assessment of the results can be undertaken by the TWG.



CONTINUOUS MONITORING PROGRAM

The PAMZ continuous monitoring program will be monitoring more types of emissions from a wider range of sources than those historically monitored in the zone. These include all the criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), particulate matter 10 microns and smaller (PM₁₀) and particulate matter 2.5 microns and smaller (PM_{2.5}), as well as hydrogen sulfide (H₂S), total reduced sulphur compounds (TRS), and methane, non-methane and total hydrocarbons (CH₄, NMHC, THC). The locations proposed for two of the continuous monitoring stations (Caroline and Red Deer) are those that modeling has determined to have high deposition levels of SO₂ or NO₂.

The PAMZ continuous program was not operational in 1999. The monitoring



Caroline Continuous AQM Station

station located in Red Deer will become operational early in 2000. It will initially be operated by Alberta Environment with plans to turn its operation over to PAMZ in the near future. The Caroline Station is scheduled to begin operation in the second quarter of 2000. A unique feature of the PAMZ continuous monitoring program is its portable monitoring station which will be relocated to various sites within the zone and will be sited primarily to respond to issues identified by the zone's residents and prioritized by the PAMZ Issues Response Group. The portable monitoring station is scheduled to begin operation during the third quarter of 2000.

The analyzers used in the program are capable of detecting low level concentrations of pollutants that may be associated with chronic human and livestock health disorders as well as the higher levels associated with the health concerns resulting from acute exposures. There will be an intensive Quality Assurance/Quality Control (QA/QC) program associated with the monitoring and the data management that will make it possible to detect subtle changes and trends in data to allow for the assessment of the impacts of various emission-producing operations within the zone. Various meteorological parameters will also be continuously monitored to gain a better understanding of possible sources and behaviors of the different pollutants.

The PAMZ continuous monitoring program will be monitoring more types of emissions from a wider range of sources than those historically monitored in the zone.

DATA MANAGEMENT SYSTEM

PAMZ will maintain four data sets:

- Emissions Inventory
- Passive Monitoring Data
- Continuous Monitoring
- Intermittent Sampling

All of these data sets are required by PAMZ for the development and evaluation of strategies to address zonal air quality issues. It is essential therefore that they are complete and scientifically credible and also that the processes employed to collect them are timely and efficient.

Rigorous QA/QC procedures are integral components of the collection, analysis and archiving processes employed by the PAMZ AQM Program.

Data is supplied to the CASA Data Warehouse (www.casadata.org) where it can be accessed freely. Additionally, hard copy and digital formats of the data are available upon request, from the PAMZ Program Manager. Eventually the data will be accessible directly through the PAMZ Website (www.pamz.org).



CASA Vision

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

LINKS TO THE CLEAN AIR STRATEGIC ALLIANCE (CASA)



Christine Macken of CASA accepting Lloyd Cumming's thanks on behalf of PAMZ for all her hard work and support.

The Parkland Airshed Management Zone Association was established under the umbrella of the Clean Air Strategic Alliance (CASA), adopting the CASA principles of consensus-based multi-stakeholder representation and following its Zone Air Quality Management. The association is an independent entity that provides progress updates to the Alliance, shares some common members and directors, and whose members contribute significantly to the following CASA working groups and project teams:

- Acidifying Emissions Management Implementation Team (AEMIT)
- Ambient Air Quality Monitoring Operations Steering Committee
- Climate Change Project Team
- Flaring
- Human Health
- Pollution Prevention
- Animal Health Working Group
- Multi-Stakeholder Group (MSG) for Particulate Matter and Ozone.

Through the early years of PAMZ's existence CASA has provided a substantial amount of support and resources to PAMZ that have helped it to build the strong sustainable foundation required for it to develop and implement its zonal monitoring and management plans.

The Parkland Airshed Management Zone actively shares information with the other existing regional airshed management zones and new ones as they establish their management plans and develop their monitoring programs. The West Central Airshed Society (WCAS), shares a significant portion of PAMZ's northern boundary and was established in January 1995, the first air quality management zone to be formed in Alberta. This zone encompasses about 35,000 square kilometers stretching east from the Alberta/British Columbia border to Highways 20 and 759 as far north as the top of Township 54. The high priority issues identified by this zone's stakeholders are:

- Human Health
- Odours
- Data Management

The Wood Buffalo Zone, operated by the Wood Buffalo Environmental Association, has implemented a monitoring network in the Regional Municipality of Wood Buffalo. It covers an area of 68,500 square kilometers stretching south from the Alberta/Northwest Territories border to south of Fort McMurray and includes the regions two major population centers, Fort Chipewyan and Fort McMurray. In 1998 the WBEA won the Financial Post's Award for Business Partnership for its community-driven environmental activities and monitoring program. The high priority issues for this zone are:

- Soil Acidification
- Crops and Forests
- Human Health

Human health issues have been identified by CASA and all the airshed management zones as a high priority issue. Through its air quality monitoring program, data management system and the work of its Human Health Committee, the Parkland Airshed Management Zone expects to strengthen its links with other organizations through the sharing of the data and information that it collects.

FINANCIAL REPORT

Parkland Airshed Management Zone Financial Report* for the Year Ended December 31, 1999

	1999	1998
Revenue:		
Membership Fees	\$ 231,030	\$ 40,139
Interest	3,514	393
	<u>234,544</u>	<u>40,532</u>
Expenses:		
Consultant fees	53,087	8,352
Advertising and Promotion	6,930	3,910
Office	5,435	4,485
Travel	2,021	159
Meetings	1,551	782
Professional Fees	875	1,050
Equipment Rental	695	-
Insurance	331	-
Bank Charges	91	43
Amortization	4,920	-
	<u>75,936</u>	<u>18,781</u>
Excess of Revenues over Expenses	<u>\$ 158,608</u>	<u>\$ 21,751</u>
Items Not Involving Cash:		
Amortization	4,920	-
	163,528	21,751
Net Change in Non-Cash Working Capital	<u>(3,571)</u>	<u>12,628</u>
	159,957	34,379
Investing Activities:		
Purchase of Capital Assets	<u>(49,195)</u>	<u>-</u>
Increase in Cash	110,762	34,379
Cash, Beginning of Year	<u>36,261</u>	<u>1,882</u>
Cash, End of Year	\$147,023	\$36,261

* A copy of the audited financial report is available from the treasurer upon request.

BOARD OF DIRECTORS

	<u>Member</u>	<u>Alternate</u>
Government	David Lloyd Alberta Environment	Dene Berry Alberta Environment
	Jeff Strem Alberta Energy & Utilities Board	Jim Benum Alberta Energy & Utilities Board
	Greg Ritz David Thompson Health Region	Darren Barber David Thompson Health Region
	Sheila Lockrem Mountainview County	Vacant
Non-Gov. Organizations	Dr. Martha Kostuch Prairie Acid Rain Coalition	Lenore Harris Red Deer River Naturalists
	Doug Jones Albertans for a Clean Environment	Rose Balcom Albertans for a Clean Environment
Public	Lloyd Cumming Burnstick Lake	Bill Post Olds
	Reg Watson Eagle Hill	Ila Johnston Sundre
	Damien Kajnc Red Deer	Alison Bakken Sundre
Industry	Brian Goliss Shell Canada Ltd.	Dan Dumaine Limeco Products Ltd.
	Miles Nystrom Husky Oil Operations Ltd.	John Hawkins Amoco Canada Petroleum Co. Ltd.
	Ed Szymanek N.A.L. Resources	Jim Dixon Nova Chemicals Corp.

COMMITTEE MEMBERS

Executive Committee

Chairman	Lloyd Cumming	Public
1st Vice-Chair	Brian Goliss	Industry
2nd Vice-Chair	Vacant	Government
Treasurer	Miles Nystrom	Industry
Secretary	Dr. Martha Kostuch	NGO
Program Manager	Kevin Warren	Program Manager

Issues Response Group

Dr. Martha Kostuch	Prairie Acid Rain Coalition	NGO	(Chair)
David McCoy	Husky Oil Operations	Industry	
John Hawkins	Amoco Canada Petroleum	Industry	
Wayne Johnston	Sundre	Public	
Ila Johnston	Sundre	Public	
Karen McCallion	Alberta Environment	Government	
Jeff Strem	Alberta Energy & Utilities Board	Government	
Kevin Warren	Amarok Consulting	Program Manager	

Human Health Committee

Dr. Rudy Zimmer	David Thompson Health Region	Government	(Chair)
Sheila Lockrem	County of Mountainview	Government	
Greg Ritz	David Thompson Health Region	Government	
Dr. Martha Kostuch	Prairie Acid Rain Coalition	NGO	
Sherry Scheunert	Red Deer River Naturalists	NGO	
Margaret Coutts	Red Deer River Naturalists	NGO	
Ila Johnston	Sundre	Public	
Wayne Johnston	Sundre	Public	
Damian Kajnc	Red Deer	Public	
Dr. Abimbola Abiola	Olds College	Public	
Darrell Myroniuk	PetroCanada	Industry	
Kevin Warren	Amarok Consulting	Program Manager	

Communications Committee

Lloyd Cumming	Burnstick Lake	Public	(Chair)
Ila Johnston	Sundre	Public	
Bill Post	Olds	Public	
Beverly Phillips	Gulf Midstream	Industry	
Alice Murray	Shell Canada Ltd.	Industry	
Kevin Warren	Amarok Consulting	Program Manager	

Financial Committee

Miles Nystrom	Husky Oil Operations	Industry	(Chair)
Rod Sikora	Gulf Midstream	Industry	
Kevin Warren	Amarok Consulting	Program Manager	

Technical Working Group

Brian Goliss	Shell Canada Ltd.	Industry	(Chair)
Bob Farion	Alberta Energy & Utilities Board	Government	
Damian Kajnc	Red Deer	Public	
David McCoy	Husky Oil Operations	Industry	
Dennis Reid	Husky Oil Operations	Industry	
Dwight Jenkinson	Mobil Oil Canada	Industry	
Ed Szymanek	NAL Resources	Industry	
Greg Ritz	David Thompson Health Region	Government	
Heather Allan	Amoco Canada Petroleum	Industry	
Jack Davis	Calgary	Public	
Jeff Strem	Alberta Energy & Utilities Board	Government	
Jim Dixon	Nova Chemicals Corp.	Industry	
John Hawkins	Amoco Canada Petroleum	Industry	
John Retallack	TransCanada Midstream	Industry	
Karen McCallion	Alberta Environment	Government	
Lloyd Cumming	Burnstick Lake	Public	
Lynn Huntley	Amoco Canada Petroleum	Industry	
Miles Nystrom	Husky Oil Operations	Industry	
Rod Sikora	Gulf Midstream	Industry	
Kevin Warren	Amarok Consulting	Program Manager	

FUNDING MEMBERS

Industry

Agrium	Amoco Canada Petroleum	Anderson Exploration
ARC Resources	Ballateer Resources Ltd.	Beau Canada Exploration Ltd.
Border Paving Ltd.	Canadian 88 Energy Corp.	Courage Energy Inc.
Cypress Energy Inc.	Elk Point Resources Inc.	Encal Energy Ltd.
Fletcher Challenge Energy Inc.	Grey Wolf Exploration	Gulf Canada Resources Ltd.
Gulf Midstream	Husky Oil Operations Ltd.	Imperial Oil Resources Ltd.
Johns Mannville	Limeco Products Ltd.	Magin Energy Inc.
Merit Energy Ltd.	Mobil Oil Canada	NAL Resources
Newport Petroleum Corp.	Northrock Resources Ltd.	Northstar Energy Corp.
Nova Chemicals Corp.	Numac Energy Inc.	Parkland Refining
Penn West Petroleum Ltd.	Petro-Canada	Poco Petroleum Ltd.
Pogo Canada	Shell Canada Ltd.	Star Oil & Gas Ltd.
Suncor	Talisman Energy Inc.	TransCanada Midstream
Tri Link Resources Ltd.	Triumph Energy Corp.	Ulster Petroleum Ltd.
Union Carbide Canada Inc.	Western Facilities Management	

Municipalities

Lacombe County	M.D. of Clearwater	Mountain View County
Town of Eckville	Town of Rocky Mtn House	Town of Sundre

LANDOWNERS

The Parkland Airshed Management Zone expresses their appreciation to everyone who has contributed in the implementation of the air quality monitoring program. In particular, we would like to note the invaluable assistance of the cooperating landowners who have allowed PAMZ to locate passive monitoring stations on their property and are providing year-round access to these sites.

Mr. & Mrs. Brian Brietsche - Grainger	Mr. & Mrs. Henry Schmiemann - Caroline
Mr. Buckner - Sundre	Shieling Mountain Lodge - Nordegg
Mr. & Mrs. Hodgkinson - Elnora	Mr. Peter Smith - Leslieville
Mr. Eskild Jacobsen - Olds	Mr. Teynor - Bergen
Ms. Gail Kinsey - Sylvan Lake	Mr. & Mrs. Simon Swier - Morningside
Mr. & Mrs. Glen Kneiper - Stauffer	Mr. & Mrs. Roy Westfall - Crossfield
Mr. Page - Sunnyslope	

ACKNOWLEDGEMENTS

Special thanks to the following people who made significant contributions of their time and spirit and have been a valuable resource for PAMZ in its formative years:

Bob Farion, Alberta Energy & Utilities Board	John Torneby, Alberta Environment
Luke Stang, Alberta Environment	Terry Fink, Ocelot Energy Inc.
Lois Cramer, Nova Chemicals Corp.	Christine Macken, CASA
Christa Cruthers, CASA	Roy Swenson, CASA

Special thanks are also due to the contractors who operate the passive air quality monitoring network and perform the analysis of the passive samples. Their expertise and dedication made for a trouble-free commissioning of the network in early December.

Air Quality Monitoring Contractor

RSLS 2000 Inc.	Garth Stanley	Will Breckenridge	Kelly Baragar
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Laboratory Analysis

Maxxam Analytics Inc.	Dr. Hongmao Tang	Bernie Brassard
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Thanks also to the following organizations and individuals who provide PAMZ with Passive Monitoring Site Locations within Banff National Park and Meteorological Data collected from Atmospheric Environment Services' Stations located within the zone's boundaries:

Parks Canada	Perry Jacobsen	Dave Hunter	
Environment Canada	Dave Fox	Patrick Kyle	Markus Kellerhals

GLOSSARY

Acid Deposition: A comprehensive term for the various ways acidic compounds precipitate from the atmosphere and deposit onto surfaces. It can include: 1) wet deposition by means of acid rain, fog, and snow; and 2) dry deposition of acidic particles (aerosols).

Acid Rain: Rain which is especially acidic (pH <5.2). Principal components of acid rain typically include nitric and sulfuric acid. These may be formed by the combination of nitrogen and sulfur oxides with water vapor in the atmosphere.

Acute Exposure: One or a series of short-term exposures generally lasting less than 24 hours.

Acute Health Effect: A health effect that occurs over a relatively short period of time (e.g., minutes or hours). The term is used to describe brief exposures and effects which appear promptly after exposure.

Ammonia (NH₃): A pungent colorless gaseous compound of nitrogen and hydrogen that is very soluble in water and can easily be condensed into a liquid by cold and pressure. Ammonia reacts with NO_x to form ammonium nitrate – a major PM_{2.5} component in the Western Canada.

Aromatic: A type of hydrocarbon, such as benzene or toluene. Some aromatics are toxic.

Carbon Dioxide (CO₂): A colorless, odorless gas that occurs naturally in the Earth's atmosphere. Significant quantities are also emitted into the air by fossil fuel combustion.

Carbon Monoxide (CO): A colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. Over 80% of the CO emitted in urban areas is contributed by motor vehicles. CO is a criteria air pollutant.

Chronic Exposure: Long-term exposure, usually lasting one year to a lifetime.

Chronic Health Effect: A health effect that occurs over a relatively long period of time (e.g., months or years).

Criteria Air Pollutant: An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set or is under development. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM₁₀ and PM_{2.5}.

Emission Inventory: An estimate of the amount of pollutants emitted into the atmosphere from major mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or a year.

Global Warming: An increase in the temperature of the Earth's troposphere. Global warming has occurred in the past as a result of natural influences, but the term is most often used to refer to the warming predicted by computer models to occur as a result of increased emissions of greenhouse gases.

Greenhouse Effect: The warming effect of the Earth's atmosphere. Light energy from the sun which passes through the Earth's atmosphere is absorbed by the Earth's surface and re-radiated into the atmosphere as heat energy. The heat energy is then trapped by the atmosphere, creating a situation similar to that which occurs in a car with its windows rolled up. A number of scientists believe that the emission of CO₂ and other gases into the atmosphere may increase the greenhouse effect and contribute to global warming.

Greenhouse Gases: Atmospheric gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapor that slow the passage of re-radiated heat through the Earth's atmosphere.

Hydrocarbons: Compounds containing various combinations of hydrogen and carbon atoms. They may be emitted into the air by natural sources (e.g., trees) and as a result of fossil and vegetative fuel combustion, fuel volatilization, and solvent use. Hydrocarbons are a major contributor to smog.

Hydrogen Sulfide (H₂S): A colorless, flammable, poisonous compound having a characteristic rotten-egg odor. About one third of the gas produced in Alberta contains H₂S.

Mobile Sources: Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes.

Natural Sources: Non-manmade emission sources, including biological and geological sources, wildfires, and windblown dust.

Nitric Oxide (NO): Precursor of ozone, NO₂, and nitrate; nitric oxide is usually emitted from combustion processes. Nitric oxide is converted to nitrogen dioxide (NO₂) in the atmosphere, and then becomes involved in the photochemical processes and/or particulate formation.

Nitrogen Oxides (Oxides of Nitrogen, NO_x): A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO₂), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO₂ is a criteria air pollutant, and may result in numerous adverse health effects.

Non-Industrial Source: Any of a large number of sources – such as mobile, area-wide, indirect, and natural sources – which emit substances into the atmosphere.

Non-Methane Hydrocarbon (NMHC): The sum of all hydrocarbon air pollutants except methane. NMHCs are significant precursors to ozone formation.

Ozone (O₃): A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy and ozone precursors, such as hydrocarbons and oxides of nitrogen. Ozone exists in the upper atmosphere ozone layer (stratospheric ozone) as well as at the Earth's surface in the troposphere (ozone). Ozone in the troposphere causes numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

Ozone Depletion: The reduction in the stratospheric ozone layer. Stratospheric ozone shields the Earth from ultraviolet radiation. The breakdown of certain chlorine and/or bromine-containing compounds that catalytically destroy ozone molecules in the stratosphere can cause a reduction in the ozone layer.

Ozone Layer: A layer of ozone in the lower portion of the stratosphere – 12 to 15 miles above the Earth's surface – which helps to filter out harmful ultraviolet rays from the sun. It may be contrasted with the ozone component of photochemical smog near the Earth's surface which is harmful.

Ozone Precursors: Chemicals such as non-methane hydrocarbons and oxides of nitrogen, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, a major component of smog.

Photochemical Reaction: A term referring to chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.

Particulate Matter (PM): Any material, except pure water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse, wind-blown dust particles to fine particle combustion products.

PM_{2.5}: Includes tiny particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.

PM₁₀ (Particulate Matter): A criteria air pollutant consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs where they may be deposited and result in adverse health effects. PM₁₀ also causes visibility reduction.

Sulfur Dioxide (SO₂): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants, which may use coal or oil high in sulfur content, can be major sources of SO₂. SO₂ and other sulfur oxides contribute to the problem of acid deposition. SO₂ is a criteria air pollutant.

Volatile Organic Compounds (VOCs): Carbon-containing compounds that evaporate into the air (with a few exceptions). VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints.