



**STRATHCONA INDUSTRIAL ASSOCIATION
AMBIENT AIR MONITORING NETWORK**

ANNUAL REPORT

2001



March 12, 2002

Alberta Environment
Enforcement and Monitoring Division
11th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta, T5K 2J6

**Reference: Strathcona Industrial Association
Ambient Air Monitoring Network - Annual Report 2001**

Dear Sir:

On behalf of the Strathcona Industrial Association, we are pleased to present the 2001 Annual Report of the Ambient Air Monitoring Network.

The Ambient Air Monitoring Network and its operations are structured to meet the requirements of the Air Monitoring Directive (AMD - 1989). Data from the network is used by Association members to assess current and historical air quality.

This report includes an Executive Summary, highlights of the Ambient Air Monitoring Network Operations and an Assessment of Air Quality during 2001.

Summary information on the Strathcona Industrial Association, including its membership, objectives and details on the monitoring network are also appended to this report.

We trust that this report satisfies your requirements and that the data summary presented herein will be useful to you and your colleagues.

Yours truly,

STRATHCONA INDUSTRIAL ASSOCIATION

Original Signed by

Jim Wilson
President

Enclosure

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	5
INTRODUCTION	7
Strathcona Industrial Association	7
Ambient Air Monitoring Network	8
Network Modifications during 2001	10
RESULTS OF AIR QUALITY MONITORING	11
Overview	11
Continuous Air Quality Monitoring	13
- Hydrogen Sulphide (H ₂ S)	13
- Sulphur Dioxide (SO ₂)	15
- Nitrogen Dioxide (NO ₂)	16
- Total Hydrocarbons (THC)	17
Intermittent Air Quality Monitoring	18
- Total Suspended Particulates (TSP)	18
- Inhalable Particulates (PM ₁₀ and PM _{2.5})	19
Static Air Quality Monitoring	20
Exposure Cylinder Network	20
- Static Total Sulphation	20
- Static Hydrogen Sulphide	22
AMBIENT AIR NETWORK OPERATION	24
Instrument Operational Times	24
Performance Checks	24
Message Board	24

LIST OF TABLES

		Page
TABLE 1	Key Parameters - Continuous Monitoring Data - 2001 Summary	25
TABLE 2	Hydrogen Sulphide (H ₂ S) - 2001 Summary	26
TABLE 3	Sulphur Dioxide (SO ₂) - 2001 Summary	28
TABLE 4	Nitrogen Dioxide (NO ₂) - 2001 Summary	29
TABLE 5	Total Hydrocarbons (THC) - 2001 Summary	30
TABLE 6A	Total Suspended Particulates (TSP) - 2001 Summary	31
TABLE 6B	Inhalable Particulates (PM ₁₀ and PM _{2.5}) - 2001 Summary	32
TABLE 7	Static Total Sulphation - 2001 Summary	33
TABLE 8	Static Hydrogen Sulphide - 2001 Summary	34
TABLE 9	Hydrogen Sulphide (H ₂ S) - 2001 Summary Frequency Distribution of 1-Hour Averages	35
TABLE 10	Sulphur Dioxide (SO ₂) - 2001 Summary Frequency Distribution of 1-Hour Averages	37
TABLE 11	Nitrogen Dioxide (NO ₂) - 2001 Summary Frequency Distribution of 1-Hour Averages	38
TABLE 12	Wind Speed and Wind Direction - 2001 Summary Frequency Distribution of 1-Hour Averages	39
TABLE 13	Static Total Sulphation - 2001 Summary Stations Grouped by Annual Average Concentration Values	41
TABLE 14	Static Hydrogen Sulphide - 2001 Summary Stations Grouped by Annual Average Concentration Values	41
TABLE 15	Alberta Ambient Air Quality Guidelines	42

APPENDICES

	Page
APPENDIX A Strathcona Industrial Association - Historical Development	43
APPENDIX B Ambient Air Monitoring Network Description	48
APPENDIX C Reporting Capabilities	50
APPENDIX D Static Total Sulphation and Static Hydrogen Sulphide Cylinders	52

LIST OF FIGURES

	Page
FIGURE 1 SIA Ambient Air Monitoring Network	9
FIGURE 2 Exposure Cylinders Network Concentration Grouping of Static Total Sulphation Stations	21
FIGURE 3 Exposure Cylinders Network Concentration Grouping of Static Hydrogen Sulphide Stations	23
ABBREVIATIONS	4
UNITS OF MEASUREMENT	4

ABBREVIATIONS

24-hours	- a calendar day
AIC	- Automatic Instrument Check (instrument self-verification process)
AMD	- 'Air Monitoring Directive' issued by Alberta Environment in 1989
CAER	- Community Awareness and Emergency Response program
calm	- 1-hour average wind speed is lower than 1 km/hour
CASA	- Clean Air Strategic Alliance
CDEF	- Continuous Data Exchange Format (for 5-minute and 1-hour data transfer to the CASA Data Warehouse)
H ₂ S	- hydrogen sulphide
Hi-Vol	- high volume sampler
MST	- Mountain Standard Time
NO ₂	- nitrogen dioxide
NO	- nitric oxide
NO _x	- oxides of nitrogen
PM ₁₀ and PM _{2.5}	- inhalable particulates
RTU	- Remote Terminal Unit (collecting data at each station)
SIA	- Strathcona Industrial Association
SO ₂	- sulphur dioxide
THC	- total hydrocarbons
TSP	- Total Suspended Particulates collected by a Hi-Vol sampler
WDIR	- wind direction
WSPD	- wind speed

UNITS OF MEASUREMENT

µg/m ³	- micrograms per cubic meter
average	- arithmetic average $X = \sum n X_i / \sum n$
geometric average	- $X = \text{antilog of } \sum (n \log X_i) / \sum n$
km/hr	- kilometers per hour
mg SO ₃ eq./day/100 cm ²	- milligrams of SO ₃ equivalent per day per 100 square centimeters
ppb	- parts per billion by volume
ppm	- parts per million by volume

EXECUTIVE SUMMARY

The Strathcona Industrial Association (SIA) is a registered non-profit corporation of eleven companies with operating facilities located in east Edmonton and Strathcona County.

The SIA commenced multi-user operation of the Ambient Air Monitoring Network in the early 1980s. The network consists of seven continuous air monitoring stations and twenty-one static monitoring stations. The stations are situated throughout an area of about 12 km x 12 km that consists of large industrial plants surrounded by commercial, light industrial and residential land users. Three of the seven continuous air monitoring stations also contain analyzers which sample air quality on days specified coast-to-coast by Environment Canada.

Results of Ambient Air Monitoring

A) Continuous Monitoring

Parameters measured by the network on a continuous basis include:

- Hydrogen sulphide (H₂S)
- Sulphur dioxide (SO₂)
- Nitrogen oxides (NO, NO_x, NO₂)
- Total hydrocarbons (THC)
- Wind speed and wind direction (WSPD and WDIR).

The concentrations of various parameters recorded by the SIA network are well below the provincial guidelines indicating that the ambient air quality in the region is good. In 2001, two exceedances of the H₂S 1-hour guideline were recorded. The SIA member plants reported stable operations. These situations were likely caused by non-SIA sources.

PARAMETER	NO. OF MONITORING STATIONS	NUMBER OF 1-HOUR EXCEEDANCES				
		2001	2000	1999	1998	1997
Hydrogen Sulphide (H ₂ S)	5	2	2	2	7	8
Sulphur Dioxide (SO ₂)	3	0	0	0	0	0
Nitrogen Dioxide (NO ₂)	2	0	0	0	0	0

The 24-hour and the annual average concentration values for sulphur dioxide and nitrogen dioxide were below the Alberta Ambient Air Quality guideline levels. The hydrogen sulphide 24-hour Alberta Ambient Air Quality guideline level was exceeded once at the Beverly station and once at the Clover Bar station on December 6, 2001. All SIA members reported normal plant operations during this period.

B) Intermittent Monitoring

Total Suspended Particulates (TSP). A high volume (Hi-Vol) particulate sampler was operated at Beverly and Gold Bar stations in 2001. The Hi-Vol unit collected a 24-hour composite sample of TSP at each location on every sixth day. The annual average and the monthly average particulate levels ranged from 25 - 60 % of the Alberta Ambient Air Quality guidelines.

The TSP 24-hour Alberta Ambient Air Quality guideline level was exceeded once at the Beverly station on February 12, 2001. All SIA members reported normal plant operations during this period.

PARAMETER	NO. OF MONITORING STATIONS	NUMBER OF EXCEEDANCES				
		2001	2000	1999	1998	1997
Total Suspended Particulates (TSP)	2 (from Aug. 1, 1998)	1	1	0	2	-
	3 (till Jul. 31, 1998)	-	-	-	7	2

Inhalable Particulates. The inhalable particulates PM₁₀ and PM_{2.5} were monitored at the Sherwood Park station. PM₁₀ and PM_{2.5} were measured in the same six-day frequency as TSP and the instrument was set up to alternate between sampling of PM₁₀ and PM_{2.5}. The measured concentrations of PM₁₀ varied from 5.498 to 34.794 µg/m³ and the PM_{2.5} varied from 2.263 to 23.364 µg/m³. There are no Alberta Ambient Air Quality guideline levels for PM₁₀ and PM_{2.5}.

C) Static Monitoring.

The SIA also operates a separate static monitoring network for total sulphation and hydrogen sulphide that consists of 21 stations. The exposure cylinders are assembled in a grid pattern, which covers approximately the same area as the continuous ambient air monitoring network. Recorded values of both static total sulphation and static hydrogen sulphide ranged between 6 and 39 % of the Alberta Ambient Air Quality guideline limits.

PARAMETER	NO. OF MONITORING STATIONS	NUMBER OF EXCEEDANCES				
		2001	2000	1999	1998	1997
Exposure Cylinder Network	21	0	0	0	0	0

Network Operational Review and Enhancements.

The average operational time of the continuous monitoring system was 99.6 %. There were no major operating problems with the individual analyzers, telecommunication system or with the central computer.

The particulate samplers and the static monitoring stations also operated reliably.

SIA was very active in the CAER (Community Awareness and Emergency Response) program. CAER is a North-American wide initiative adopted by the SIA to enhance relationships between the community and industry. The SIA participated in approximately 10 activities in 2001 ranging from community safety events to CAER fairs. Data from the ambient air monitoring network was on display to the public at the majority of these events.

INTRODUCTION

STRATHCONA INDUSTRIAL ASSOCIATION

The Strathcona Industrial Association (SIA) is a corporation of eleven industrial companies operating in east Edmonton and Strathcona County. The SIA was formed in 1974 to represent members on matters of common concern. The historical development of the SIA and the SIA Ambient Air Monitoring Network is described in Appendix A.

Present membership of the SIA is as follows:

- AT Plastics Inc.
- Alberta Envirofuels Inc.
- Alcan Smelters and Chemicals Ltd
- AltaSteel Ltd.
- Celanese Canada Inc.
- The City of Edmonton Gold Bar Wastewater Treatment Plant
- Enbridge Pipelines Inc.
- EPCOR
- Imperial Oil
- Owens Corning Canada Inc.
- Petro-Canada Products

The Association is incorporated under Alberta's Companies Act as a non-profit corporation. It is managed by a Board of Directors, the Environmental Committee and the CAER Committee. The Board of Directors establishes and implements policy and manages the finances. The Environmental Committee has a mandate to address environmental matters, to oversee the operation of the Ambient Air Monitoring Network, to deal with any technical matters of concern to the member companies and to liaise with the provincial regulatory authority, Alberta Environment.

CAER Committee promotes responsible management of products used by the SIA members and associated health and safety aspects, local emergency response by combining emergency plans of industry with municipal emergency as well as the community awareness of industry activities.

The SIA mission statement is:

“....to work with the Community, City, and the County to ensure a safe and healthy working and living environment”.

Expansions and Modifications of Individual Plants

A list of specific expansions and modifications of individual plants that could affect ambient air quality is not compiled in the 2001 SIA Annual Report as required by the AMD-1989, page 37, paragraph 'f'. The SIA member companies report and discuss their individual expansion activities directly with Alberta Environment or applicable regulatory agency.

AMBIENT AIR MONITORING NETWORK

The locations of monitoring stations in the Ambient Air Monitoring Network are shown in Figure 1. A detailed description of the network is included in Appendix B.

Continuous Monitoring

The following is a list of continuous parameters monitored at the seven monitoring stations:

MONITORING STATION	CONTINUOUSLY MONITORED PARAMETERS					
	SO ₂	H ₂ S	NO _x /NO/NO ₂	THC	WSPD	WDIR
1 Clover Bar		★	★ ★ ★		★	★
2 Sherwood Park	★	★		★	★	★
3 Elmjay	★	★			★	★
4 Gold Bar		★			★	★
5 Beverly	★	★		★	★	★
6 Forest Heights			★ ★ ★		★	★
7 Clareview					★	★

★ Locations of instruments. NO₂ data is auto-calculated from values provided by NO_x and NO analyzers.

Readings are taken every second for each parameter and averaged into 30-second values at each station. The 30-second averages are then transferred into a central computer database. The central computer collects the real-time and historical air monitoring data from all stations, as well as instrument span checks and monthly four-point calibrations of analytical instruments. All authorized users can view the recorded data in graphical images and charts or in user definable LOG reporting formats (Appendix C).

Intermittent Monitoring

Total Suspended Particulates (TSP) were monitored at the Beverly and the Gold Bar residential stations. The Hi-Vol samplers operated every sixth day and ran for a 24-hour period. Four to six filters were collected from each Hi-Vol sampler every month.

Inhalable particulates (PM₁₀ and PM_{2.5}) were monitored at the Sherwood Park residential station. Inhalable particulates were collected on the same days as TSP and the instrument was set up to alternate between sampling of PM₁₀ and PM_{2.5}.

Static Monitoring

An Exposure Cylinder Network, consisting of 21 exposure cylinders, is evenly distributed throughout the industrial area and nearby residential communities. The cylinders monitor static total sulphation and static hydrogen sulphide. Each cylinder was replaced once per month. More details on the Exposure Cylinders Network can be found in Appendix D.

NETWORK MODIFICATIONS DURING 2001

The following is a list of modifications and enhancements completed during 2001:

- An older NO_x analyzer at the Forest Heights station was replaced with a new NO_x analyzer on May 5, 2001 (model TECO 42C).
- A new hydrocarbon analyzer was installed at the Beverly station on May 26, 2001 (model TECO 51LT). The new analyzer was unstable and had to be returned to its manufacturer. The original hydrocarbon analyzer was reinstalled on June 2, 2001.
- A faulty grounding of a meteorological tower was discovered at the Forest Heights station in June 2001. In addition, weatherproofing of the wind instrument appeared insufficient and its manufacturer agreed to replace O-ring seals at all sensors during annual certification.
- An older SO₂ analyzer at the Elmjay station was replaced with a new SO₂ analyzer on October 23, 2001 (model TECO 43C).
- A new roof-mounted platform was installed at the Sherwood Park station to provide access to a Partisol instrument and wind sensors for maintenance and repairs.
- Alberta Environment staff audited six SIA stations during 2001. The Clover Bar, Elmjay, Gold Bar, Beverly, Clareview and Forest Heights stations operated in compliance.

The day-to-day management and field investigations related to the SIA ambient air monitoring network were carried out by Eco Tech Consulting Ltd. Eco Tech Consulting is an independent environmental company based in Edmonton.

RESULTS OF AIR QUALITY MONITORING

OVERVIEW

The SIA network measures *ambient air quality*, which refers to the general quality of air in a region. Ambient air quality data is used to monitor trends in air quality, which result from emissions from man-made sources (industry, motor vehicles) and natural biological processes. It does not specifically measure emissions from a single source. Weather conditions also influence the quality of ambient air.

The following table lists exceedances of the Alberta Ambient Air Quality guidelines as recorded by the SIA Ambient Air Monitoring Network during the past five years:

TYPE OF SAMPLING / PARAMETER	NO. OF MONITORING STATIONS	NUMBER OF EXCEEDANCES				
		2001	2000	1999	1998	1997
Continuous:*						
Hydrogen Sulphide (H ₂ S)	5	2	2	2	7	8
Sulphur Dioxide (SO ₂)	3	0	0	0	0	0
Nitrogen Dioxide (NO ₂)	2	0	0	0	0	0
Intermittent:**						
Total Suspended Particulates (TSP)	2 3	1 -	1 -	0 -	2 7	- 2
Static:***						
Static Total Sulphation	21	0	0	0	0	0
Static Hydrogen Sulphide	21	0	0	0	0	0

* Number of exceedances of 1-hour guidelines
 ** Number of exceedances of 24-hour guidelines

*** Number of exceedances of 30-day guidelines

All recorded concentrations for all parameters are well below the Alberta Ambient Air Quality guidelines except for two 1-hour concentrations and two 24-hour concentrations of hydrogen sulphide. Alberta Environment was informed of these situations during the year. This degree of compliance indicates good ambient air quality in the East-Edmonton / Sherwood Park region.

Tables 1 to 15 (pages 25 – 42) included at the end of this section summarize ambient air monitoring data measured at individual stations in 2001 as follows:

Table 1	Key Parameters - Continuous Monitoring Data
Tables 2, 3, 4, 5	Hydrogen Sulphide (H ₂ S), Sulphur Dioxide (SO ₂), Nitrogen Dioxide (NO ₂) and Total Hydrocarbons (THC)
Table 6A	Total Suspended Particulates (TSP)
Table 6B	Inhalable Particulates (PM ₁₀ and PM _{2.5})
Tables 7, 8, 13, 14	Static Total Sulphation and Static Hydrogen Sulphide
Tables 9, 10, 11, 12	Frequency Distributions of a Parameter and Wind Data
Table 15	Alberta Ambient Air Quality Guidelines

A comparison of the 2001 annual averages with the corresponding historical values since 1997 indicates that the overall air quality has remained unchanged in the region. The 2001 average values for all parameters remained extremely low.

TYPE OF SAMPLING / PARAMETER	RANGE OF ANNUAL AVERAGES				
	2001	2000	1999	1998	1997
Continuous: (expressed in ppm)					
Hydrogen Sulphide (H₂S) (5 stations)	0.000 - 0.001	0.000 - 0.001	0.000 - 0.001	0.000 - 0.001	0.001
Sulphur Dioxide (SO₂) (3 stations)	0.002 - 0.004	0.002 - 0.003	0.001 - 0.004	0.003 - 0.004	0.002 - 0.004
Nitrogen Dioxide (NO₂) (2 stations)	0.016 - 0.018	0.017 - 0.021	0.014 - 0.021	0.015 - 0.022	0.016 - 0.026
Total Hydrocarbons (THC) (2 stations)	1.9 - 2.2	2.0 - 2.1	2.0 - 2.1	2.0 - 2.1	1.4 - 2.0
Intermittent: (expressed in µg/m ³)					
Total Suspended Particulates (TSP) (* 2 stations from Aug. 1, 1998) (** 3 stations till July 31, 1998)	34.2 – 41.4*	30.8 – 33.0*	32.5 - 32.9*	35.0* - 37.4**	29.8 - 35.9**
Inhalable Particulates:					
PM₁₀	16.372	16.444	16.458	15.665	-
PM_{2.5}	8.270	10.788	6.867	9.074	-
(1 station)					
Static: (mg SO ₃ eq./day/100 cm ²)					
Static Total Sulphation (21 stations)	0.012 - 0.123	0.009 - 0.128	0.010 - 0.116	0.014 - 0.105	0.035 - 0.127
Static Hydrogen Sulphide (21 stations)	0.004 - 0.012	0.003 - 0.014	0.004 - 0.010	0.002 - 0.009	0.004 - 0.012

Meteorological Information - Wind Speed and Wind Direction

Both wind speed and wind direction are very important factors influencing regional air quality. Even if the wind is blowing from the same direction, diffusion and dispersion of emitted gases and particulates is greatly impacted by variation in wind speed and corresponding air turbulence. Different degrees of turbulence are created by variable mixing conditions due to the vertical gradient of ambient temperatures and terrain roughness unique to each station. Annual frequency distributions of wind speed and wind direction are presented in Table 12.

CONTINUOUS AIR QUALITY MONITORING

HYDROGEN SULPHIDE (H₂S)

Alberta Ambient Air Quality guidelines for hydrogen sulphide are:

- 1-hour average concentration **0.010 ppm**
- 24-hour average concentration **0.003 ppm**
- Annual average concentration Not established

The highest concentrations recorded in 2001 at the individual stations are summarized in the following table. The annual average concentration is also provided.

MONITORING STATION	HIGHEST H ₂ S CONCENTRATIONS RECORDED AT INDIVIDUAL STATIONS			ANNUAL AVERAGE (ppm)
	1-HOUR (ppm)	24-HOURS (ppm)	MONTHLY (ppm)	
Clover Bar	0.018	0.004	0.001	0.001
Sherwood Park	0.012	0.002	0.001	0.001
Elmjay	0.004	0.001	0.001	0.000
Gold Bar	0.007	0.003	0.002	0.001
Beverly	0.010	0.004	0.002	0.001

Hydrogen sulphide levels were extremely low in the region. The annual average concentrations of H₂S show only minute fluctuations during the past several years:

MONITORING STATION	HYDROGEN SULPHIDE (H ₂ S)- ANNUAL AVERAGE CONCENTRATION (ppm)				
	2001	2000	1999	1998	1997
Clover Bar	0.001	0.001	0.001	0.001	0.001
Sherwood Park	0.001	0.000	0.001	0.001	0.001
Elmjay	0.000	0.000	0.000	0.000	0.001
Gold Bar	0.001	0.001	0.001	0.001	0.001
Beverly	0.001	0.001	0.001	0.001	0.001

A frequency distribution of the one-hour averages of hydrogen sulphide is provided in Table 9.

During 2001, there were two occurrences when H₂S concentrations exceeded the 1-hour guideline specified in the Air Monitoring Directive (AMD-1989, Alberta Environment) and in the Alberta Ambient Air Quality guidelines. During these exceedances SIA member companies reported normal operation.

NUMBER OF H ₂ S EXCEEDANCES OF 1-HOUR GUIDELINE	2001	2000	1999	1998	1997
	2	2	2	7	8

Alberta Environment was informed of each occurrence and an Incident File Number was issued. The results of the SIA investigations are described in the following table:

DATE	MONITORING STATION	TIME (MST)	1-HOUR H ₂ S AVERAGES (ppm)	RESULTS OF INVESTIGATION FOR H ₂ S EXCEEDANCES
Aug. 10	Sherwood Park	08:00	0.012	Wind was gentle at about 3 - 5 km/hour from the southwest (200-250° from north). The ambient concentration of H ₂ S was elevated for 35 min. There are no SIA member companies in this direction.
Oct. 6	Clover Bar	22:00	0.018	Wind was very light at 2 - 3 km/hour from the north (355° from north). The ambient concentration of H ₂ S was elevated for about 20 min. All SIA member companies verified their plant operation during this period and did not identify a cause of the elevated H ₂ S emissions.

The 24-hour average concentrations for hydrogen sulphide were below the provincial guideline of 0.003 ppm except one day at the Beverly and the Clover Bar stations. The recorded 24-hour concentration of H₂S reached 0.004 ppm at these two stations on December 6, 2001. All SIA members reported normal plant operations during this period.

The average operational time of the five H₂S instruments was 100.0 % in 2001 (range 99.7 – 100.0 %).

SULPHUR DIOXIDE (SO₂)

Alberta Ambient Air Quality guidelines for sulphur dioxide are:

- 1-hour average concentration **0.170 ppm**
- 24-hour average concentration **0.060 ppm**
- annual average concentration **0.010 ppm**

The highest concentrations of SO₂ recorded in 2001 at individual stations are shown in the following table. The annual average concentration is also provided.

MONITORING STATION	HIGHEST SO ₂ CONCENTRATION RECORDED AT INDIVIDUAL STATIONS			ANNUAL AVERAGE (ppm)
	1-HOUR (ppm)	24-HOURS (ppm)	MONTHLY (ppm)	
Sherwood Park	0.043	0.011	0.003	0.003
Elmjay	0.046	0.009	0.004	0.002
Beverly	0.065	0.016	0.006	0.004

A comparison of the annual average concentration of SO₂ for the three monitoring stations for the past five years is provided below. SO₂ concentration in the regional air shed is stable with only minute fluctuations from year to year.

MONITORING STATION	SULPHUR DIOXIDE (SO ₂)- ANNUAL AVERAGE CONCENTRATION (ppm)				
	2001	2000	1999	1998	1997
Sherwood Park	0.003	0.002	0.002	0.004	0.002
Elmjay	0.002	0.003	0.001	0.003	0.003
Beverly	0.004	0.003	0.004	0.004	0.004

A frequency distribution of the sulphur dioxide 1-hour averages is provided in Table 10. No exceedances have been recorded during the last 5 years.

NUMBER OF SO ₂ EXCEEDANCES OF 1-HOUR GUIDELINE	2001	2000	1999	1998	1997
		0	0	0	0

The combined average operational time of the three SO₂ instruments was 99.7 % in 2001 (range 95.0 – 100.0 %).

NITROGEN DIOXIDE (NO₂)

Alberta Ambient Air Quality guidelines for nitrogen dioxide are:

- 1-hour average concentration **0.210 ppm**
- 24-hour average concentration **0.110 ppm**
- annual average concentration **0.030 ppm**

Nitrogen dioxide concentration in the ambient air is a combination of emissions from several sources. The main contributors are vehicular traffic and residential heating, rather than industrial plants. The highest concentrations recorded in 2001 at the individual stations are summarized below:

MONITORING STATION	HIGHEST NO ₂ CONCENTRATION RECORDED AT INDIVIDUAL STATIONS			ANNUAL AVERAGE (ppm)
	1-HOUR (ppm)	24-HOURS (ppm)	MONTHLY (ppm)	
Clover Bar	0.094	0.057	0.026	0.016
Forest Heights	0.078	0.046	0.030	0.018

The following table compares the annual average concentration at the two monitoring stations.

MONITORING STATION	NITROGEN DIOXIDE (NO ₂)- ANNUAL AVERAGE CONCENTRATION (ppm)				
	2001	2000	1999	1998	1997
Clover Bar	0.016	0.017	0.014	0.015	0.016
Forest Heights	0.018	0.021	0.021	0.022	0.026

A frequency distribution of the nitrogen dioxide 1-hour averages is provided in Table 11. There were no exceedances of the 1-hour provincial guideline limit in 2001.

NUMBER OF NO ₂ EXCEEDANCES OF 1-HOUR GUIDELINE	2001	2000	1999	1998	1997
		0	0	0	0

The 1-hour, 24-hour and the annual average NO₂ concentrations were well below the provincial guideline limits.

The average operational time of the two NO₂ instruments was 99.8 % in 2001 (range 95.9 – 100.0 %).

TOTAL HYDROCARBONS (THC)

Alberta does not have guidelines for ambient air concentrations of total hydrocarbons. However, the background ambient concentration of total hydrocarbons varies between 1.5 to 2.0 ppm in Alberta ('Air Quality Monitoring in Alberta ' as reported on www.casadata.org web page).

'Total hydrocarbons' refer to a broad family of chemicals that contain carbon and hydrogen atoms. Sources include vegetation, natural biological processes, emissions from everyday work (industry, motor vehicles) and leisure activities (fireplaces).

The Sherwood Park and Beverly stations are equipped with total hydrocarbon analyzers. The highest readings recorded in 2001 for different averaging periods were:

MONITORING STATION	HIGHEST TOTAL HYDROCARBONS CONCENTRATION RECORDED AT INDIVIDUAL STATIONS			ANNUAL AVERAGE (ppm)
	1-HOUR (ppm)	24-HOURS (ppm)	MONTHLY (ppm)	
Sherwood Park	8.8	3.2	2.6	2.2
Beverly	11.5	3.5	2.2	1.9

The following table compares the historical annual average concentration of total hydrocarbons at the two monitoring stations:

MONITORING STATION	TOTAL HYDROCARBONS - ANNUAL AVERAGE CONCENTRATION (ppm)				
	2001	2000	1999	1998	1997
Sherwood Park	2.2	2.1	2.1	2.1	2.0
Beverly	1.9	2.0	2.0	2.0	1.4

In general, total hydrocarbons levels were in the normal ambient background range and only minor fluctuations were registered. Detailed data of total hydrocarbons is listed in Table 5.

The average operating time of the two instruments monitoring total hydrocarbons was 98.9 % in 2001 (range 76.1 - 100.0 %).

INTERMITTENT AIR QUALITY MONITORING

A) TOTAL SUSPENDED PARTICULATES (TSP)

Alberta Ambient Air Quality guidelines for total suspended particulates are:

- 24-hour total loading **100 mg/m³**
- annual geometric average loading **60 mg/m³**

Suspended particulates are very fine particles, which range from about 0.001 to 500 microns in diameter. The particles may originate from soil, road and agricultural dust, smoke, forest fires, vehicular emissions and industrial sources.

Total suspended particulates (TSP) were measured by high volume (Hi-Vol) samplers following a six-day cycle. The sampling days were synchronized in all provinces by Environment Canada. On a sampling day, a pump at each station was automatically turned on and air was drawn through a very fine filter for the next 24 hours. The filters were submitted for weight analyses.

The Sherwood Park and Beverly stations are equipped with TSP analyzers. The highest daily loadings, monthly loadings and geometric annual averages recorded during 2001 at the individual stations are summarized in the following table:

MONITORING STATION	HIGHEST RECORDED TOTAL SUSPENDED PARTICULATES LOADING AT INDIVIDUAL STATIONS		ANNUAL GEOMETRIC AVERAGE (µg/m ³)
	24-HOURS (µg/m ³)	MONTHLY AVERAGE (µg/m ³)	
Gold Bar	93.2	58.7	34.2
Beverly	107.1	61.0	41.4

The Sherwood Park station was converted from TSP monitoring to inhalable particulates monitoring at the end of July 1998. The following table compares the historical annual average concentration at the monitoring stations:

MONITORING STATION	TOTAL SUSPENDED PARTICULATES ANNUAL AVERAGE LOADING (µg/m ³)				
	2001	2000	1999	1998	1997
Sherwood Park*	-	-	-	35.0*	29.8
Gold Bar	34.2	30.8	32.9	36.8	31.9
Beverly	41.4	33.0	32.5	37.4	35.9

* Until July 31, 1998

One exceedance of the 24-hour provincial guideline level was recorded at the Beverly station on February 12, 2001. On the same day the concentration of TSP at the Gold Bar station was also elevated. The wind varied from 1 to 18 km/hr and was shifting from the southwest to the northwest and back to the southwest. The SIA member companies did not report any unusual operating conditions.

NUMBER OF EXCEEDANCES OF 24-HOUR GUIDELINE	2001	2000	1999	1998	1997
	1	1	0	9	2

During 2001, a total of 122 valid samples were collected at the two locations. The geometric annual averages of total suspended particulates were low in the region. Detailed information for total suspended particulates is provided in Table 6A.

B) INHALABLE PARTICULATES (PM₁₀ and PM_{2.5})

Inhalable particulates are very fine particles that may potentially affect human health. PM₁₀ particles have a diameter of less than 10 micrometers and are suspended in the air for an indefinite period of time. Particles with diameters between 2.5 and 10 micrometers are generally removed from inspired air in the nose and throat. Particles that have a diameter of less than 2.5 micrometers (PM_{2.5}) can penetrate into the lungs. The particles may originate from soil, road and agricultural dust, smoke, forest fires, vehicular emissions and industrial sources. Currently, there are no Alberta Ambient Air Quality guidelines for inhalable particulates.

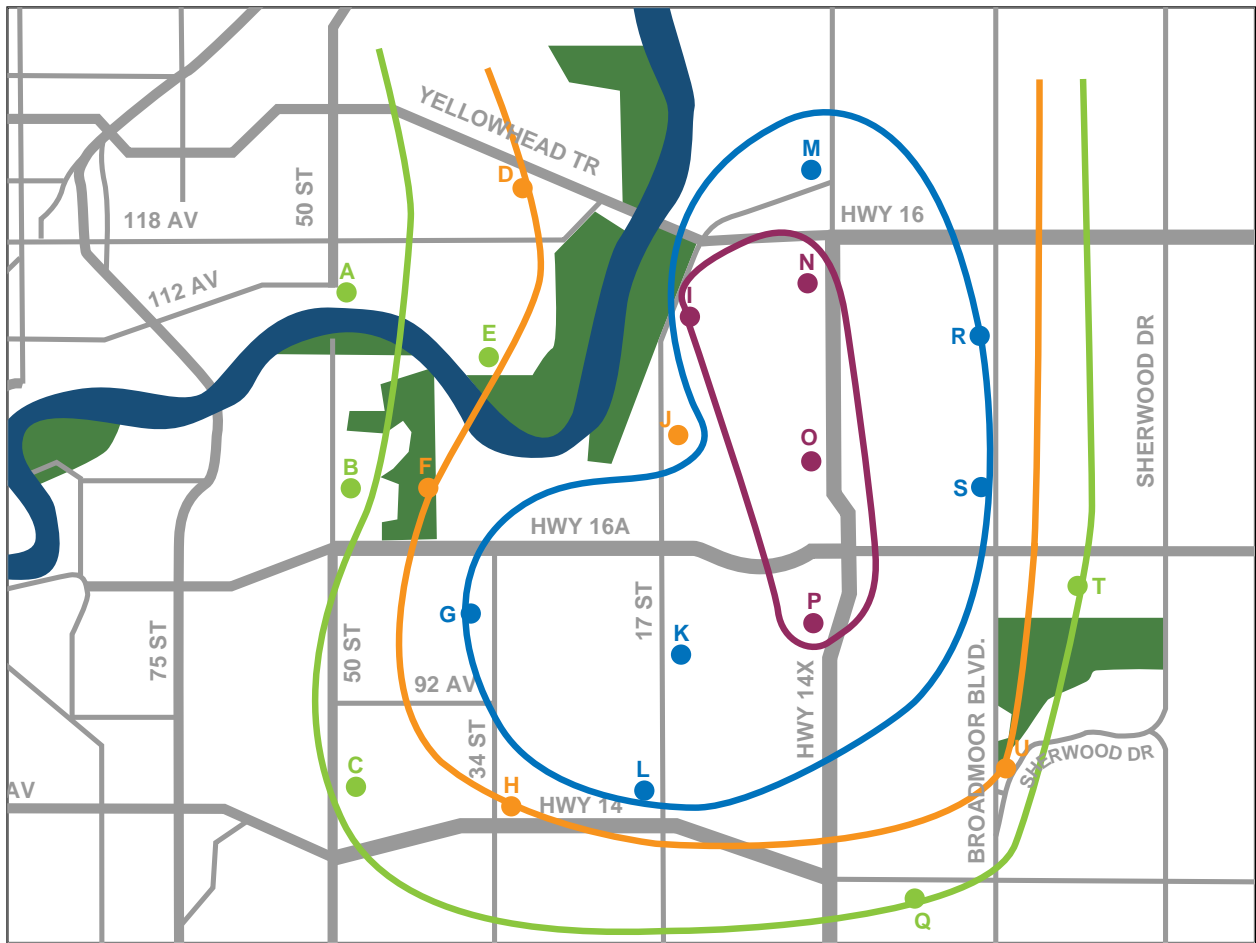
The measurement of inhalable particulates at the Sherwood Park station was initiated on August 1, 1998. PM₁₀ and PM_{2.5} samples were collected for duration of 24-hours every sixth day. The sampler was set up to alternate between sampling of PM₁₀ and PM_{2.5}.

In 2001, the highest 24-hour loading, the highest monthly average and the arithmetic annual average at the Sherwood Park station are provided in the following table:

MONITORING STATION	HIGHEST RECORDED INHALABLE PARTICULATE CONCENTRATIONS		ANNUAL AVERAGE (µg/m ³)
	24-HOURS (µg/m ³)	MONTHLY AVERAGE (µg/m ³)	
Sherwood Park: PM ₁₀ PM _{2.5}	34.794 23.364	27.164 16.509	16.372 8.270

In total, there were 31 valid samples of the PM₁₀ and 30 valid samples of the PM_{2.5} recorded at the Sherwood Park station during 2001. Detailed data for the inhalable particulates is listed in Table 6B and comparison with the previous years is provided in the following table:

MONITORING STATION	INHALABLE PARTICULATES - ANNUAL AVERAGE LOADING (µg/m ³)				
	2001	2000	1999	1998	1997
Sherwood Park: PM ₁₀ PM _{2.5}	16.372 8.270	16.444 10.788	16.458 6.867	15.665 9.074	- -



CONCENTRATION GROUPINGS (ranges expressed in mg SO₃ eq./day/100 cm²):



FIGURE 2 EXPOSURE CYLINDERS NETWORK
CONCENTRATION GROUPINGS OF TOTAL SULPHATION STATIONS

STATIC HYDROGEN SULPHIDE

Alberta Environment's guideline for static monitoring of hydrogen sulphide is:

- static hydrogen sulphide **0.100 mg SO₃ equivalent /day/100 cm²**
calculated from a 1-month accumulated loading

The range of annual loadings and the highest recorded loadings across all 21 monitoring stations, are listed in the following table:

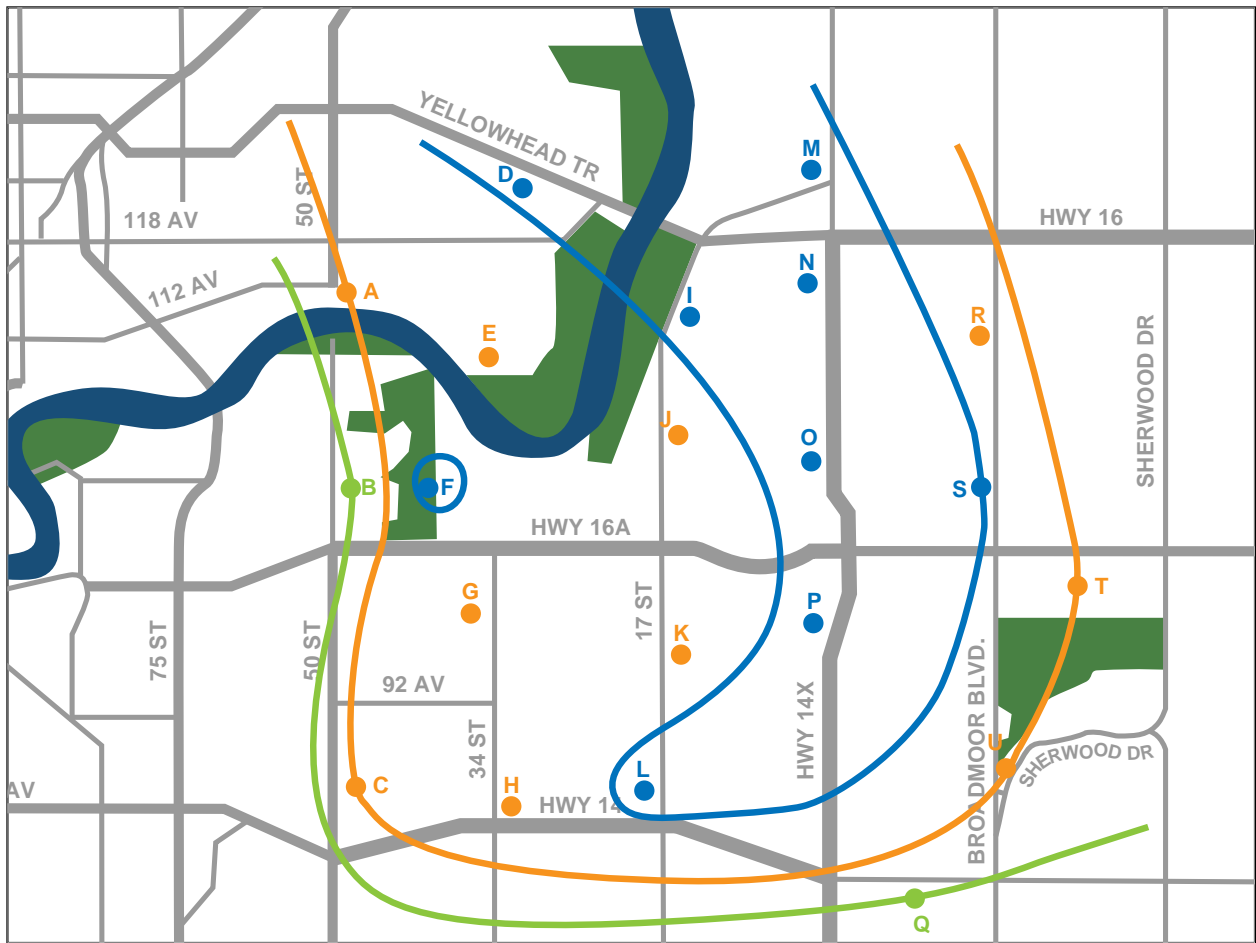
LOADING	STATIC HYDROGEN SULPHIDE (mg SO ₃ eq./day/100 cm ²)				
	2001	2000	1999	1998	1997
Range of Annual Averages	0.004 – 0.012	0.003 – 0.014	0.004 - 0.010	0.002 - 0.009	0.004 - 0.012
Highest Recorded Value	0.030	0.031	0.031	0.022	0.045

The recorded loadings at each station and the corresponding annual averages are shown in Table 8. The highest recorded loading was only 30 % of the provincial guideline and the average daily loadings were very low in both the industrial and residential areas covered by the Exposure Cylinder Network.

The results of total sulphation monitoring in 2001 can be summarized as follows:

- The highest recorded loading was 30 % of the guideline.
- The loadings were below 25 % of the guideline 98.4 % of the time.
- High traffic areas with nearby industrial activities recorded marginally elevated static hydrogen sulphide.

The isopleths for different concentration groupings are shown in Figure 3 and listed in Table 14.



CONCENTRATION GROUPINGS (ranges expressed in mg SO₃ eq./day/100 cm²):



FIGURE 3 EXPOSURE CYLINDERS NETWORK
CONCENTRATION GROUPINGS OF HYDROGEN SULPHIDE STATIONS

AMBIENT AIR NETWORK OPERATION

INSTRUMENT OPERATIONAL TIMES

The Air Monitoring Directive (AMD-1989) stipulates that operational time of each instrument must be at least 90% every month. To qualify a given time interval as a valid operational period, all components of the system, including the instrument, telephone line and the central computer, must be operating satisfactorily. The time required to perform manual monthly calibrations and Automatic Instrument Checks (AIC) is considered a valid operational time.

During 2001, the minimum monthly operational time of all analyzers was 95.9 % except for one instrument. In May 2001, the total hydrocarbons (THC) analyzer at the Beverly station was out for repairs and installation of new parts and its operational time was reduced to 76.1 %.

The average yearly operational time of all analyzers was 99.7 %. The wind speed and direction sensors had yearly average operational time 99.4 %.

PERFORMANCE CHECKS

The quality of the data generated by the SIA Ambient Air Monitoring Network is verified by Automatic Instrument Checks (AIC) and manual multi-point instrument calibrations.

AIC is carried out on a 47-hour cycle throughout the year and manual calibrations are performed once a month on all analyzers. Both the AIC and multi-point instrument calibration reports are stored in the central computer and are available for viewing upon request. Another check on proper instrument operation is the automatic 'flagging' of suspected data by the computer.

System alarms are generated for unauthorized door entry, temperature deviations in a station (high and low limits are monitored) or computer malfunctions. Individual alarms are investigated and follow-up actions initiated by the network manager.

The Hi-Vol samplers used for monitoring of total suspended particulates are calibrated every three months. The Partisol 2000[®] air sampler flow is calibrated every four months with a specialized flow meter.

MESSAGE BOARD

The 'Message Board' is used to document deviations detected by the network manager and to inform SIA members and Alberta Environment staff. The Message Board is used in the following manner:

- The network manager checks reasons for a significant deviation, enters the description into the 'Message Board' system and appends it to a given parameter or a station for a specific date, time and time mode (5-min, 1-hour or 24-hours).
- The text is linked to a particular occurrence and can be viewed by all authorized network users. The messages can be viewed by selecting LOG 6.
- The network manager provides a detailed explanation of an environmental deviation or a serious operational problem of the network (e.g. why the operational time of an instrument was below 90 %).

TABLE 1 KEY PARAMETERS - CONTINUOUS MONITORING DATA - 2001 SUMMARY

PARAMETER	MONITORING STATION	ANNUAL AVERAGE (ppm)	MAXIMUM VALUES				OPERATIONAL TIME (%)	EXCEEDANCES	
			24-HOURS (ppm)	DATE	1-HOUR (ppm)	DATE		24-HOURS	1-HOUR
HYDROGEN SULPHIDE (H ₂ S)	CLOVER BAR	0.001	0.004	Dec. 6	0.018	Oct. 6	99.9	1	1
	SHERWOOD PARK	0.001	0.002	Dec. 5	0.012	Aug. 10	100.0	0	1
	ELMJAY	0.000	0.001	Jan. 11	0.004	Aug. 27	100.0	0	0
	GOLD BAR	0.001	0.003	Nov. 22	0.007	Nov. 22	100.0	0	0
	BEVERLY	0.001	0.004	Dec. 6	0.010	Mar. 30	99.9	1	0
	OVERALL		0.001				100.0	2	2
SULPHUR DIOXIDE (SO ₂)	SHERWOOD PARK	0.003	0.011	May 20	0.043	Sep.7	99.3	0	0
	ELMJAY	0.002	0.009	Feb. 15	0.046	May 16	100.0	0	0
	BEVERLY	0.004	0.016	Jan. 23	0.065	Mar. 15	99.9	0	0
	OVERALL	0.003					99.7	0	0
NITROGEN DIOXIDE (NO ₂)	CLOVER BAR	0.016	0.057	Dec. 6	0.094	Jan. 8	99.6	0	0
	FOREST HEIGHTS	0.018	0.046	Jan. 11	0.078	Jan. 9	99.9	0	0
	OVERALL	0.017					99.8	0	0
TOTAL HYDROCARBONS (THC)	SHERWOOD PARK	2.2	3.2	Dec. 26	8.8	Jun. 8	99.8	-	-
	BEVERLY	1.9	3.5	Dec. 6	11.5	Feb. 2	97.9	-	-
	OVERALL	2.1					98.9	-	-

TABLE 2 HYDROGEN SULPHIDE (H₂S) - 2001 SUMMARY

MONITORING STATION	MONTH	MONTHLY AVERAGE (ppm)	MAXIMUM VALUES				OPERATIONAL TIME (%)	1-HOUR EXCEEDANCES
			24-HOURS (ppm)	DATE	1-HOUR (ppm)	DATE		
CLOVER BAR	JANUARY	0.001	0.002	8	0.006	8	99.9	0
	FEBRUARY	0.000	0.001	20	0.004	20	100.0	0
	MARCH	0.000	0.001	8	0.002	2	99.9	0
	APRIL	0.001	0.001	13	0.007	13	99.9	0
	MAY	0.001	0.001	10	0.007	10	99.9	0
	JUNE	0.000	0.001	14	0.003	17	100.0	0
	JULY	0.001	0.001	8	0.005	12	100.0	0
	AUGUST	0.001	0.001	29	0.004	28	99.9	0
	SEPTEMBER	0.001	0.001	4	0.004	30	99.9	0
	OCTOBER	0.000	0.002	6	0.018	6	100.0	1
	NOVEMBER	0.001	0.002	12	0.004	12	100.0	0
	DECEMBER	0.001	0.004	6	0.006	6	99.9	0
	AVERAGE	0.001					99.9	
MAXIMUM	0.001	0.004		0.018			1	
SHERWOOD PARK	JANUARY	0.000	0.001	11	0.002	12	100.0	0
	FEBRUARY	0.000	0.001	26	0.002	26	100.0	0
	MARCH	0.000	0.001	8	0.001	8	99.9	0
	APRIL	0.000	0.001	13	0.002	13	99.9	0
	MAY	0.000	0.001	10	0.002	10	100.0	0
	JUNE	0.000	0.000	23	0.001	28	100.0	0
	JULY	0.000	0.001	8	0.002	12	99.9	0
	AUGUST	0.001	0.001	10	0.012	10	99.9	1
	SEPTEMBER	0.001	0.001	18	0.002	18	99.9	0
	OCTOBER	0.001	0.001	6	0.004	6	100.0	0
	NOVEMBER	0.001	0.001	20	0.003	20	100.0	0
	DECEMBER	0.001	0.002	5	0.003	5	100.0	0
	AVERAGE	0.001					100.0	
MAXIMUM	0.001	0.002		0.012			1	
ELMJAY	JANUARY	0.000	0.001	11	0.003	12	100.0	0
	FEBRUARY	0.000	0.000	26	0.002	26	100.0	0
	MARCH	0.000	0.001	8	0.003	8	99.8	0
	APRIL	0.000	0.000	13	0.002	13	99.9	0
	MAY	0.000	0.001	24	0.002	14	99.9	0
	JUNE	0.000	0.000	14	0.001	13	100.0	0
	JULY	0.000	0.000	8	0.002	8	100.0	0
	AUGUST	0.000	0.000	22	0.004	27	99.9	0
	SEPTEMBER	0.000	0.001	18	0.003	16	100.0	0
	OCTOBER	0.000	0.000	25	0.002	30	99.9	0
	NOVEMBER	0.000	0.001	20	0.002	22	100.0	0
	DECEMBER	0.001	0.001	5	0.003	14	100.0	0
	AVERAGE	0.000					100.0	
MAXIMUM	0.001	0.001		0.004			0	

Cont'd

TABLE 2 (Cont'd) HYDROGEN SULPHIDE (H₂S) - 2001 SUMMARY

MONITORING STATION	MONTH	MONTHLY AVERAGE (ppm)	MAXIMUM VALUE				OPERATIONAL TIME (%)	1-HOUR EXCEEDANCES
			24-HOURS (ppm)	DATE	1-HOUR (ppm)	DATE		
GOLD BAR	JANUARY	0.000	0.002	11	0.004	9	99.9	0
	FEBRUARY	0.001	0.001	17	0.003	12	99.9	0
	MARCH	0.000	0.001	6	0.002	6	99.9	0
	APRIL	0.000	0.000	13	0.003	13	99.8	0
	MAY	0.000	0.000	24	0.004	14	100.0	0
	JUNE	0.000	0.000	6	0.003	6	100.0	0
	JULY	0.000	0.001	9	0.004	12	100.0	0
	AUGUST	0.000	0.002	27	0.005	27	100.0	0
	SEPTEMBER	0.001	0.001	17	0.003	27	100.0	0
	OCTOBER	0.001	0.002	30	0.004	30	100.0	0
	NOVEMBER	0.001	0.003	22	0.007	22	100.0	0
	DECEMBER	0.002	0.003	5	0.005	5	100.0	0
	AVERAGE	0.001					100.0	
	MAXIMUM	0.002	0.003		0.007			0
BEVERLY	JANUARY	0.001	0.003	10	0.009	10	100.0	0
	FEBRUARY	0.000	0.001	2	0.004	2	100.0	0
	MARCH	0.001	0.002	30	0.010	30	99.8	0
	APRIL	0.001	0.002	28	0.007	21	99.7	0
	MAY	0.000	0.001	11	0.006	9	99.9	0
	JUNE	0.000	0.001	6	0.002	25	99.9	0
	JULY	0.000	0.001	27	0.004	9	99.8	0
	AUGUST	0.001	0.002	15	0.008	27	100.0	0
	SEPTEMBER	0.001	0.002	18	0.005	17	99.9	0
	OCTOBER	0.001	0.002	25	0.005	15	100.0	0
	NOVEMBER	0.001	0.003	12	0.010	16	100.0	0
	DECEMBER	0.002	0.004	6	0.008	13	100.0	0
	AVERAGE	0.001					99.9	
	MAXIMUM	0.002	0.004		0.010			0

TABLE 3 SULPHUR DIOXIDE (SO₂) - 2001 SUMMARY

MONITORING STATION	MONTH	MONTHLY AVERAGE (ppm)	MAXIMUM VALUES				OPERATIONAL TIME (%)	EXCEEDANCES	
			24-HOURS (ppm)	DATE	1-HOUR (ppm)	DATE		24-HOURS	1-HOUR
SHERWOOD PARK	JANUARY	0.003	0.006	6	0.025	25	100.0	0	0
	FEBRUARY	0.003	0.006	5	0.026	12	100.0	0	0
	MARCH	0.003	0.010	9	0.039	9	99.9	0	0
	APRIL	0.002	0.009	10	0.034	10	99.9	0	0
	MAY	0.003	0.011	20	0.039	16	100.0	0	0
	JUNE	0.002	0.005	12	0.018	12	100.0	0	0
	JULY	0.002	0.005	30	0.026	30	99.9	0	0
	AUGUST	0.003	0.006	4	0.029	8	96.4	0	0
	SEPTEMBER	0.003	0.008	7	0.043	7	99.9	0	0
	OCTOBER	0.003	0.007	11	0.024	31	95.0	0	0
	NOVEMBER	0.002	0.009	17	0.041	17	100.0	0	0
	DECEMBER	0.003	0.005	2	0.020	2	100.0	0	0
	AVERAGE	0.003					99.3		
	MAXIMUM	0.003	0.011		0.043			0	0
ELMJAY	JANUARY	0.003	0.007	14	0.041	17	100.0	0	0
	FEBRUARY	0.003	0.009	15	0.038	15	100.0	0	0
	MARCH	0.002	0.006	9	0.034	9	99.8	0	0
	APRIL	0.002	0.006	19	0.025	19	99.9	0	0
	MAY	0.004	0.009	16	0.046	16	99.9	0	0
	JUNE	0.001	0.003	21	0.014	29	100.0	0	0
	JULY	0.001	0.006	31	0.019	31	100.0	0	0
	AUGUST	0.001	0.005	8	0.020	8	99.9	0	0
	SEPTEMBER	0.002	0.005	7	0.037	27	100.0	0	0
	OCTOBER	0.003	0.007	7	0.027	7	99.9	0	0
	NOVEMBER	0.001	0.003	20	0.014	17	100.0	0	0
	DECEMBER	0.002	0.004	5	0.017	15	100.0	0	0
	AVERAGE	0.002					100.0		
	MAXIMUM	0.004	0.009		0.046			0	0
BEVERLY	JANUARY	0.006	0.016	23	0.055	23	100.0	0	0
	FEBRUARY	0.005	0.010	13	0.032	13	100.0	0	0
	MARCH	0.004	0.010	31	0.065	15	99.8	0	0
	APRIL	0.004	0.013	21	0.052	21	99.6	0	0
	MAY	0.002	0.005	12	0.043	16	99.9	0	0
	JUNE	0.002	0.004	30	0.021	30	99.9	0	0
	JULY	0.003	0.008	4	0.036	1	99.8	0	0
	AUGUST	0.003	0.006	21	0.022	21	100.0	0	0
	SEPTEMBER	0.003	0.012	23	0.038	23	99.9	0	0
	OCTOBER	0.003	0.007	26	0.037	26	100.0	0	0
	NOVEMBER	0.004	0.009	13	0.022	15	100.0	0	0
	DECEMBER	0.006	0.011	24	0.030	18	100.0	0	0
	AVERAGE	0.004					99.9		
	MAXIMUM	0.006	0.016		0.065			0	0

TABLE 4 NITROGEN DIOXIDE (NO₂) - 2001 SUMMARY

MONITORING STATION	MONTH	MONTHLY AVERAGE (ppm)	MAXIMUM VALUE				OPERATIONAL TIME (%)	EXCEEDANCES	
			24-HOURS (ppm)	DATE	1-HOUR (ppm)	DATE		24-HOURS	1-HOUR
CLOVER BAR	JANUARY	0.024	0.040	8	0.094	8	99.9	0	0
	FEBRUARY	0.020	0.029	2	0.075	20	100.0	0	0
	MARCH	0.016	0.026	6	0.057	30	95.9	0	0
	APRIL	0.013	0.023	13	0.043	27	99.9	0	0
	MAY	0.012	0.026	10	0.046	22	99.9	0	0
	JUNE	0.010	0.018	7	0.037	21	100.0	0	0
	JULY	0.009	0.017	31	0.031	26	100.0	0	0
	AUGUST	0.013	0.026	27	0.046	27	99.8	0	0
	SEPTEMBER	0.013	0.029	25	0.071	25	99.9	0	0
	OCTOBER	0.017	0.033	25	0.067	9	100.0	0	0
	NOVEMBER	0.019	0.029	12	0.055	12	100.0	0	0
	DECEMBER	0.026	0.057	6	0.077	6	99.9	0	0
	AVERAGE	0.016					99.6		
	MAXIMUM	0.026	0.057		0.094			0	0
FOREST HEIGHTS	JANUARY	0.030	0.046	11	0.078	9	100.0	0	0
	FEBRUARY	0.024	0.037	2	0.055	19	100.0	0	0
	MARCH	0.018	0.034	6	0.058	6	99.7	0	0
	APRIL	0.014	0.022	1	0.052	11	99.9	0	0
	MAY	0.012	0.026	11	0.055	11	99.2	0	0
	JUNE	0.012	0.020	21	0.055	21	100.0	0	0
	JULY	0.010	0.019	8	0.043	1	99.9	0	0
	AUGUST	0.013	0.028	22	0.049	27	100.0	0	0
	SEPTEMBER	0.015	0.028	25	0.053	15	100.0	0	0
	OCTOBER	0.017	0.029	25	0.045	15	100.0	0	0
	NOVEMBER	0.020	0.033	13	0.048	13	100.0	0	0
	DECEMBER	0.029	0.046	26	0.058	19	100.0	0	0
	AVERAGE	0.018					99.9		
	MAXIMUM	0.030	0.046		0.078			0	0

TABLE 5 TOTAL HYDROCARBONS (THC) - 2001 SUMMARY

MONITORING STATION	MONTH	MONTHLY AVERAGE (ppm)	MAXIMUM VALUES				OPERATIONAL TIME (%)
			24-HOURS (ppm)	DATE	1-HOUR (ppm)	DATE	
SHERWOOD PARK	JANUARY	2.2	2.6	12	4.2	12	100.0
	FEBRUARY	2.0	2.3	26	6.0	4	100.0
	MARCH	2.0	2.2	21	2.8	8	99.9
	APRIL	1.9	2.2	13	3.1	30	99.3
	MAY	2.2	2.4	10	3.5	12	100.0
	JUNE	2.3	2.9	8	8.8	8	100.0
	JULY	2.2	2.5	31	3.1	31	99.9
	AUGUST	2.2	2.5	22	3.9	22	99.1
	SEPTEMBER	2.2	2.6	18	3.4	18	99.9
	OCTOBER	2.3	2.6	25	3.5	31	100.0
	NOVEMBER	2.4	3.0	21	3.8	21	100.0
	DECEMBER	2.6	3.2	26	4.3	5	100.0
	AVERAGE	2.2					99.8
	MAXIMUM	2.6	3.2		8.8		
BEVERLY	JANUARY	2.2	3.2	11	8.0	8	100.0
	FEBRUARY	2.0	3.0	2	11.5	2	100.0
	MARCH	1.9	2.4	7	3.3	6	99.8
	APRIL	1.8	2.3	28	4.3	28	99.7
	MAY	1.7	2.1	12	3.1	12	76.1
	JUNE	1.9	2.1	6	3.2	14	99.9
	JULY	1.7	1.9	27	3.0	9	99.3
	AUGUST	1.8	2.2	27	4.2	27	100.0
	SEPTEMBER	1.8	2.2	25	3.3	26	99.9
	OCTOBER	1.7	2.4	30	5.5	30	100.0
	NOVEMBER	2.0	2.7	20	5.0	19	100.0
	DECEMBER	2.2	3.5	6	5.9	6	100.0
	AVERAGE	1.9					97.9
	MAXIMUM	2.2	3.5		11.5		

TABLE 6A TOTAL SUSPENDED PARTICULATES (TSP) - 2001 SUMMARY

MONITORING STATION	TOTAL SUSPENDED PARTICULATES (ug/m ³)												MAX. VALUE	GEOMETRIC AVERAGE
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
GOLD BAR														
FIRST SAMPLE	25.1	27.4	37.3	30.2	44.1	39.4	27.1	28.4	41.0	16.7	35.2	49.8	49.8	
SECOND SAMPLE	38.4	57.8	38.5	27.0	57.1	18.9	44.7	63.7	18.9	71.0	46.0	20.9	71.0	
THIRD SAMPLE	19.3	24.9	37.7	55.9	58.2	21.1	23.1	93.2	37.0	79.0	75.1	22.2	93.2	
FOURTH SAMPLE	31.0	12.5	17.9	36.7	34.8	18.7	9.1	59.4	31.2	23.9	63.5	61.1	63.5	
FIFTH SAMPLE	32.5	-	39.6	55.2	48.5	25.8	19.4	48.9	55.8	21.8	27.0	33.5	55.8	
SIXTH SAMPLE	28.7	-	-	-	36.4	-	-	-	-	-	-	-	36.4	
MONTHLY AVERAGE	29.2	30.7	34.2	41.0	46.5	24.8	24.7	58.7	36.8	42.5	49.4	37.5		34.2
BEVERLY														
FIRST SAMPLE	28.0	45.9	57.1	42.2	60.9	49.9	35.6	34.5	48.2	20.5	32.7	52.3	60.9	
SECOND SAMPLE	52.6	107.1	55.2	28.4	75.6	25.6	48.4	64.2	25.1	67.4	56.4	19.4	107.1	
THIRD SAMPLE	24.6	75.9	58.2	47.7	70.3	32.9	26.3	83.1	39.4	71.0	62.1	25.0	83.1	
FOURTH SAMPLE	40.7	15.0	20.3	52.7	44.7	22.2	32.4	69.0	29.8	15.8	68.1	60.5	69.0	
FIFTH SAMPLE	46.1	-	50.6	76.7	65.6	33.2	30.8	48.2	58.2	27.5	16.7	37.1	76.7	
SIXTH SAMPLE	37.5	-	-	-	32.7	-	-	-	-	-	-	-	37.5	
MONTHLY AVERAGE	38.3	61.0	48.3	49.5	58.3	32.8	34.7	59.8	40.1	40.4	47.2	38.9		41.4
EXCEEDANCES / MO.	0	1	0	0	0	0	0	0	0	0	0	0		
STATIONS' AVERAGE														
FIRST SAMPLE	26.6	36.7	47.2	36.2	52.5	44.7	31.4	31.5	44.6	18.6	34.0	51.1	52.5	
SECOND SAMPLE	45.5	82.5	46.9	27.7	66.4	22.3	46.6	64.0	22.0	69.2	51.2	20.2	82.5	
THIRD SAMPLE	22.0	50.4	48.0	51.8	64.3	27.0	24.7	88.2	38.2	75.0	68.6	23.6	93.2	
FOURTH SAMPLE	35.9	13.8	19.1	44.7	39.8	20.5	20.8	64.2	30.5	19.9	65.8	60.8	65.8	
FIFTH SAMPLE	39.3	-	45.1	66.0	57.1	29.5	25.1	48.6	57.0	24.7	21.9	35.3	66.0	
SIXTH SAMPLE	33.1	-	-	-	34.6	-	-	-	-	-	-	-	34.6	
AREA AVERAGE	33.7	45.8	41.2	45.3	52.4	28.8	29.7	59.3	38.5	41.5	48.3	38.2		38.2

NOTE: 1. Units: ug/m³

2. Alberta Air Quality Guideline level: 100 ug/m³

3. Samples are taken every six days for a 24 hour period

TABLE 6B INHALABLE PARTICULATES (PM₁₀ AND PM_{2.5}) - 2001 SUMMARY

MONITORING STATION	PM ₁₀ INHALABLE PARTICULATES (ug/m ³)												MAX. VALUE	ANNUAL AVERAGE
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
SHERWOOD PARK														
FIRST SAMPLE	12.648	14.801	16.785	-	19.314	12.551	-	10.579	-	5.498	-	34.794	34.794	
SECOND SAMPLE	-	-	-	10.788	-	-	12.413	-	8.928	-	23.436	-	23.436	
THIRD SAMPLE	12.506	15.742	11.079	-	24.870	10.815	-	28.769	-	26.505	-	9.079	28.769	
FOURTH SAMPLE	-	-	-	23.589	-	-	8.372	-	8.011	-	30.891	-	30.891	
FIFTH SAMPLE	19.577	-	12.578	-	24.882	9.205	-	21.257	-	5.900	-	24.741	24.882	
SIXTH SAMPLE	-	-	-	-	-	-	-	-	-	-	-	-		
MONTHLY AVERAGE	14.910	15.272	13.481	17.189	23.022	10.857	10.393	20.202	8.470	12.634	27.164	22.871		16.372

MONITORING STATION	PM _{2.5} INHALABLE PARTICULATES (ug/m ³)												MAX. VALUE	ANNUAL AVERAGE
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
SHERWOOD PARK														
FIRST SAMPLE	-	-	-	7.052	-	-	4.457	-	3.360	-	3.652	-	7.052	
SECOND SAMPLE	5.012	21.090	15.383	-	7.428	5.651	-	23.133	-	4.374	-	6.775	23.133	
THIRD SAMPLE	-	-	-	9.555	-	-	2.263	-	5.054	-	2.777	-	9.555	
FOURTH SAMPLE	18.713	4.499	5.803	-	4.220	4.180	-	9.885	-	5.393	-	23.364	23.364	
FIFTH SAMPLE	-	-	-	5.290	-	-	4.929	-	5.276	-	5.442	-	5.442	
SIXTH SAMPLE	4.151	-	-	-	4.804	-	-	-	-	-	-	-	4.804	
MONTHLY AVERAGE	9.292	12.795	10.593	7.299	5.484	4.916	3.883	16.509	4.563	4.884	3.957	15.070		8.270

TABLE 7 STATIC TOTAL SULPHATION - 2001 SUMMARY

EXPOSURE CYLINDER NETWORK (21 MONITORING STATIONS)

MONITORING STATION	STATIC TOTAL SULPHATION LOADINGS (mg SO ₃ eq./day/100 cm ²)												MAXIMUM VALUE	ANNUAL AVERAGE
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
A	0.042	0.015	0.044	0.058	0.010	0.045	0.009	0.020	0.055	0.042	0.045	0.046	0.058	0.036
B	0.015	0.012	0.008	0.011	0.011	0.010	0.008	0.006	0.018	0.005	0.009	0.030	0.030	0.012
C	0.058	0.069	0.055	0.011	0.046	0.055	0.047	0.040	0.066	0.050	0.053	0.055	0.069	0.050
D	0.102	0.088	0.088	0.010	0.066	0.055	0.009	0.060	0.068	0.058	0.089	0.093	0.102	0.066
E	0.068	0.012	0.014	0.009	0.009	0.001	0.011	0.022	0.066	0.037	0.064	0.073	0.073	0.032
F	0.086	0.062	0.045	0.108	0.009	0.001	0.078	0.045	0.073	0.050	0.088	0.078	0.108	0.060
G	0.064	0.120	0.110	0.093	0.095	0.097	0.098	0.104	0.095	0.107	0.096	0.101	0.120	0.098
H	0.090	0.101	0.073	0.013	0.012	0.061	0.089	0.070	0.019	0.055	0.063	0.075	0.101	0.060
I	0.077	0.135	0.150	0.117	0.151	0.113	0.095	0.154	0.113	0.119	0.125	0.121	0.154	0.123
J	0.081	0.046	0.075	0.068	0.078	0.049	0.078	0.065	0.072	0.076	0.078	0.086	0.086	0.071
K	0.079	0.090	0.105	0.082	0.115	0.059	0.068	0.066	0.095	0.114	0.078	0.099	0.115	0.088
L	0.116	0.120	0.095	0.099	0.078	0.075	0.084	0.079	0.076	0.101	0.074	0.086	0.120	0.090
M	0.143	0.118	0.079	0.080	0.073	0.058	0.055	0.089	0.089	0.069	0.088	0.101	0.143	0.087
N	0.188	0.139	0.128	0.107	0.095	0.066	0.072	0.094	0.120	0.097	0.117	0.121	0.188	0.112
O	0.139	0.115	0.129	0.145	0.155	0.097	0.072	0.127	0.132	LA	0.106	0.115	0.155	0.121
P	0.060	0.137	0.153	0.108	0.195	0.093	0.089	0.110	0.103	0.017	0.119	0.129	0.195	0.109
Q	0.081	0.035	0.051	0.011	0.017	0.001	0.012	0.042	0.015	0.057	0.044	0.045	0.081	0.037
R	0.130	0.120	0.112	0.008	0.085	0.080	0.073	0.086	0.085	0.090	0.088	0.099	0.130	0.088
S	0.146	0.110	0.124	0.008	0.151	0.061	0.062	0.087	0.108	0.099	0.094	0.098	0.151	0.096
T	0.065	0.013	0.060	0.005	0.073	0.027	0.012	0.053	0.055	0.069	0.058	0.070	0.073	0.047
U	0.074	0.069	0.074	0.007	0.050	0.040	0.015	0.056	0.059	0.074	0.049	0.078	0.078	0.054

NOTES:

1. Units: SO₃ eq. mg/day/100 cm²

LA - laboratory accident

2. Alberta Air Quality Guideline Level: 0.500 maximum

3. The 21 station network was in operation from January to December 2001.

TABLE 8 STATIC HYDROGEN SULPHIDE - 2001 SUMMARY

EXPOSURE CYLINDER NETWORK (21 MONITORING STATIONS)

MONITORING STATION	STATIC HYDROGEN SULPHIDE LOADINGS (mg SO ₃ eq./day/100 cm ²)												MAXIMUM VALUE	ANNUAL AVERAGE
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
A	0.011	0.004	0.013	0.003	0.001	<0.001	0.008	0.004	0.005	0.011	0.008	0.004	0.013	0.0065
B	0.008	0.002	0.001	0.004	0.002	<0.001	0.005	0.004	0.004	0.005	0.005	0.003	0.008	0.0039
C	0.010	0.009	0.007	0.005	<0.001	0.002	0.005	0.007	0.001	0.008	0.003	0.007	0.010	0.0058
D	0.027	0.020	0.016	0.008	<0.001	0.004	0.001	0.012	0.009	0.008	0.013	0.012	0.027	0.0118
E	0.019	0.004	0.010	0.003	0.004	0.001	0.001	0.001	0.002	0.008	0.012	0.012	0.019	0.0064
F	0.018	0.011	0.010	0.026	<0.001	0.001	0.010	0.006	0.003	0.006	0.012	0.012	0.026	0.0105
G	0.014	0.012	0.010	0.008	<0.001	0.002	0.002	0.009	0.005	0.008	0.005	0.012	0.014	0.0079
H	0.017	0.007	0.008	0.003	<0.001	0.002	<0.001	0.006	0.005	0.009	0.005	0.006	0.017	0.0068
I	0.022	0.014	0.019	0.010	0.001	0.005	0.003	0.007	0.011	0.018	0.006	0.016	0.022	0.0110
J	0.020	0.013	0.011	0.008	0.004	0.003	0.008	0.004	0.005	0.008	0.005	0.015	0.020	0.0087
K	0.019	0.006	0.019	0.009	0.004	0.005	0.006	0.010	0.001	0.011	0.005	0.015	0.019	0.0092
L	0.025	0.017	0.008	0.016	<0.001	0.004	<0.001	0.010	0.002	0.005	0.006	0.013	0.025	0.0106
M	0.027	0.018	0.003	0.006	<0.001	<0.001	<0.001	0.005	0.005	0.009	0.016	0.016	0.027	0.0117
N	0.022	0.016	0.012	0.004	0.003	0.006	0.012	0.013	0.005	0.011	0.013	0.021	0.022	0.0115
O	0.030	0.014	0.013	0.009	0.004	0.004	<0.001	0.009	0.007	0.009	0.013	0.021	0.030	0.0121
P	0.025	0.015	0.017	0.012	0.008	0.003	0.002	0.006	0.005	0.021	0.009	0.018	0.025	0.0118
Q	0.010	0.002	0.007	0.004	<0.001	0.001	<0.001	0.001	0.004	0.007	0.006	0.006	0.010	0.0048
R	0.017	0.012	0.018	0.006	0.004	0.003	0.004	0.001	0.005	0.011	0.008	0.010	0.018	0.0083
S	0.026	0.015	0.020	0.006	0.001	<0.001	0.009	0.013	0.005	0.017	0.008	0.009	0.026	0.0117
T	0.015	0.004	0.004	0.005	0.002	0.003	<0.001	0.009	0.002	0.011	0.006	0.007	0.015	0.0062
U	0.019	0.010	0.002	0.007	<0.001	0.004	0.003	0.001	0.005	0.011	0.008	0.010	0.019	0.0073

NOTES:

1. Units:SO₃ eq. mg/day/100 cm²
2. Alberta Air Quality Guideline Level: 0.100 maximum
3. The 21 station network was in operation from January to December 2001.

TABLE 9 HYDROGEN SULPHIDE (H₂S) - 2001 SUMMARY

FREQUENCY DISTRIBUTION OF 1-HOUR AVERAGES

MONITORING STATION	MONTH	NUMBER OF READINGS	% READINGS IN CONCENTRATION RANGE (ppm)			
			0.000<=0.003	0.003<=0.010	0.010<=0.050	0.050<=MAX
CLOVER BAR	JANUARY	720	99.2	0.8	0.0	0.0
	FEBRUARY	654	99.8	0.2	0.0	0.0
	MARCH	726	100.0	0.0	0.0	0.0
	APRIL	702	99.1	0.9	0.0	0.0
	MAY	722	99.7	0.3	0.0	0.0
	JUNE	702	99.9	0.1	0.0	0.0
	JULY	725	99.4	0.6	0.0	0.0
	AUGUST	721	99.7	0.3	0.0	0.0
	SEPTEMBER	699	99.7	0.3	0.0	0.0
	OCTOBER	725	99.3	0.6	0.1	0.0
	NOVEMBER	703	99.6	0.4	0.0	0.0
	DECEMBER	723	97.4	2.6	0.0	0.0
	TOTAL HOURS	8,522				
AVERAGE		99.4	0.6	0.0	0.0	
SHERWOOD PARK	JANUARY	722	100.0	0.0	0.0	0.0
	FEBRUARY	654	100.0	0.0	0.0	0.0
	MARCH	724	100.0	0.0	0.0	0.0
	APRIL	702	100.0	0.0	0.0	0.0
	MAY	719	100.0	0.0	0.0	0.0
	JUNE	703	100.0	0.0	0.0	0.0
	JULY	725	100.0	0.0	0.0	0.0
	AUGUST	723	99.7	0.1	0.1	0.0
	SEPTEMBER	702	100.0	0.0	0.0	0.0
	OCTOBER	723	99.9	0.1	0.0	0.0
	NOVEMBER	702	100.0	0.0	0.0	0.0
	DECEMBER	725	99.9	0.1	0.0	0.0
	TOTAL HOURS	8,524				
AVERAGE		100.0	0.0	0.0	0.0	
ELMJAY	JANUARY	725	99.9	0.1	0.0	0.0
	FEBRUARY	653	100.0	0.0	0.0	0.0
	MARCH	724	99.7	0.3	0.0	0.0
	APRIL	702	100.0	0.0	0.0	0.0
	MAY	722	100.0	0.0	0.0	0.0
	JUNE	703	100.0	0.0	0.0	0.0
	JULY	722	100.0	0.0	0.0	0.0
	AUGUST	720	99.9	0.1	0.0	0.0
	SEPTEMBER	702	99.9	0.1	0.0	0.0
	OCTOBER	718	100.0	0.0	0.0	0.0
	NOVEMBER	699	100.0	0.0	0.0	0.0
	DECEMBER	726	100.0	0.0	0.0	0.0
	TOTAL HOURS	8,516				
AVERAGE		99.9	0.1	0.0	0.0	

NOTE: 0.0 indicates that there were no readings in the specified concentration range

Cont'd

TABLE 9 (Cont'd) HYDROGEN SULPHIDE (H₂S) - 2001 SUMMARY

FREQUENCY DISTRIBUTION OF 1-HOUR AVERAGES

MONITORING STATION	MONTH	NUMBER OF READINGS	% READINGS IN CONCENTRATION RANGE (ppm)			
			0.000<=0.003	0.003<=0.010	0.010<=0.050	0.050<=MAX
GOLD BAR	JANUARY	726	99.3	0.7	0.0	0.0
	FEBRUARY	653	99.8	0.2	0.0	0.0
	MARCH	724	100.0	0.0	0.0	0.0
	APRIL	701	100.0	0.0	0.0	0.0
	MAY	721	99.9	0.1	0.0	0.0
	JUNE	702	100.0	0.0	0.0	0.0
	JULY	718	99.7	0.3	0.0	0.0
	AUGUST	725	99.0	1.0	0.0	0.0
	SEPTEMBER	700	99.9	0.1	0.0	0.0
	OCTOBER	724	99.2	0.8	0.0	0.0
	NOVEMBER	701	96.3	3.7	0.0	0.0
	DECEMBER	725	95.4	4.6	0.0	0.0
	TOTAL HOURS	8,520				
	AVERAGE		99.0	1.0	0.0	0.0
BEVERLY	JANUARY	724	94.3	5.7	0.0	0.0
	FEBRUARY	654	99.4	0.6	0.0	0.0
	MARCH	724	97.8	2.2	0.0	0.0
	APRIL	698	97.9	2.1	0.0	0.0
	MAY	718	99.2	0.8	0.0	0.0
	JUNE	702	100.0	0.0	0.0	0.0
	JULY	722	99.9	0.1	0.0	0.0
	AUGUST	725	96.7	3.3	0.0	0.0
	SEPTEMBER	698	97.4	2.6	0.0	0.0
	OCTOBER	725	97.4	2.6	0.0	0.0
	NOVEMBER	701	88.6	11.4	0.0	0.0
	DECEMBER	726	86.5	13.5	0.0	0.0
	TOTAL HOURS	8,517				
	AVERAGE		96.3	3.7	0.0	0.0

NOTE: 0.0 indicates that there were no readings in the specified concentration range

TABLE 10 SULPHUR DIOXIDE (SO₂) - 2001 SUMMARY

FREQUENCY DISTRIBUTION OF 1-HOUR AVERAGES

MONITORING STATION	MONTH	NUMBER OF READINGS	% READINGS IN CONCENTRATION RANGE (ppm)					
			0.00-0.02	0.02-0.06	0.06-0.11	0.11-0.17	0.17-0.34	0.34-MAX
SHERWOOD PARK	JANUARY	722	99.7	0.3	0.0	0.0	0.0	0.0
	FEBRUARY	654	99.1	0.9	0.0	0.0	0.0	0.0
	MARCH	722	98.9	1.1	0.0	0.0	0.0	0.0
	APRIL	702	98.4	1.6	0.0	0.0	0.0	0.0
	MAY	719	98.9	1.1	0.0	0.0	0.0	0.0
	JUNE	703	100.0	0.0	0.0	0.0	0.0	0.0
	JULY	725	99.7	0.3	0.0	0.0	0.0	0.0
	AUGUST	694	99.7	0.3	0.0	0.0	0.0	0.0
	SEPTEMBER	701	99.3	0.7	0.0	0.0	0.0	0.0
	OCTOBER	684	99.1	0.9	0.0	0.0	0.0	0.0
	NOVEMBER	702	99.4	0.6	0.0	0.0	0.0	0.0
	DECEMBER	724	100.0	0.0	0.0	0.0	0.0	0.0
	TOTAL HOURS	8,452						
AVERAGE		99.3	0.7	0.0	0.0	0.0	0.0	
ELMJAY	JANUARY	725	99.7	0.3	0.0	0.0	0.0	0.0
	FEBRUARY	653	98.6	1.4	0.0	0.0	0.0	0.0
	MARCH	724	99.9	0.1	0.0	0.0	0.0	0.0
	APRIL	702	99.9	0.1	0.0	0.0	0.0	0.0
	MAY	722	99.0	1.0	0.0	0.0	0.0	0.0
	JUNE	703	100.0	0.0	0.0	0.0	0.0	0.0
	JULY	722	100.0	0.0	0.0	0.0	0.0	0.0
	AUGUST	720	99.9	0.1	0.0	0.0	0.0	0.0
	SEPTEMBER	701	99.4	0.6	0.0	0.0	0.0	0.0
	OCTOBER	716	99.4	0.6	0.0	0.0	0.0	0.0
	NOVEMBER	699	100.0	0.0	0.0	0.0	0.0	0.0
	DECEMBER	726	100.0	0.0	0.0	0.0	0.0	0.0
	TOTAL HOURS	8,513						
AVERAGE		99.6	0.4	0.0	0.0	0.0	0.0	
BEVERLY	JANUARY	724	98.6	1.4	0.0	0.0	0.0	0.0
	FEBRUARY	654	98.9	1.1	0.0	0.0	0.0	0.0
	MARCH	724	99.6	0.3	0.1	0.0	0.0	0.0
	APRIL	696	99.1	0.9	0.0	0.0	0.0	0.0
	MAY	719	99.9	0.1	0.0	0.0	0.0	0.0
	JUNE	702	99.7	0.3	0.0	0.0	0.0	0.0
	JULY	722	99.6	0.4	0.0	0.0	0.0	0.0
	AUGUST	721	99.7	0.3	0.0	0.0	0.0	0.0
	SEPTEMBER	698	98.9	1.1	0.0	0.0	0.0	0.0
	OCTOBER	725	99.4	0.6	0.0	0.0	0.0	0.0
	NOVEMBER	700	99.9	0.1	0.0	0.0	0.0	0.0
	DECEMBER	726	99.2	0.8	0.0	0.0	0.0	0.0
	TOTAL HOURS	8,511						
AVERAGE		99.4	0.6	0.0	0.0	0.0	0.0	

NOTE: 0.0 indicates that there were no readings in the specified concentration range

TABLE 11 NITROGEN DIOXIDE (NO₂) - 2001 SUMMARY

FREQUENCY DISTRIBUTION OF 1-HOUR AVERAGES

MONITORING STATION	MONTH	NUMBER OF READINGS	% READINGS IN CONCENTRATION RANGE (ppm)			
			0.000<=0.050	0.050<=0.110	0.110<=0.210	0.210<=MAX
CLOVER BAR	JANUARY	724	98.3	1.7	0.0	0.0
	FEBRUARY	650	99.7	0.3	0.0	0.0
	MARCH	694	99.9	0.1	0.0	0.0
	APRIL	698	100.0	0.0	0.0	0.0
	MAY	721	100.0	0.0	0.0	0.0
	JUNE	700	100.0	0.0	0.0	0.0
	JULY	724	100.0	0.0	0.0	0.0
	AUGUST	719	100.0	0.0	0.0	0.0
	SEPTEMBER	695	99.6	0.4	0.0	0.0
	OCTOBER	723	99.9	0.1	0.0	0.0
	NOVEMBER	696	99.9	0.1	0.0	0.0
	DECEMBER	720	96.4	3.6	0.0	0.0
	TOTAL HOURS	8,464				
	AVERAGE		99.5	0.5	0.0	0.0
FOREST HEIGHTS	JANUARY	722	98.1	1.9	0.0	0.0
	FEBRUARY	651	99.4	0.6	0.1	0.0
	MARCH	723	99.4	0.6	0.0	0.0
	APRIL	699	99.9	0.1	0.0	0.0
	MAY	714	99.3	0.7	0.0	0.0
	JUNE	698	99.9	0.1	0.0	0.0
	JULY	697	100.0	0.0	0.0	0.0
	AUGUST	722	100.0	0.0	0.0	0.0
	SEPTEMBER	693	99.9	0.1	0.0	0.0
	OCTOBER	723	100.0	0.0	0.0	0.0
	NOVEMBER	701	100.0	0.0	0.0	0.0
	DECEMBER	723	98.8	1.2	0.0	0.0
	TOTAL HOURS	8,466				
	AVERAGE		99.6	0.4	0.0	0.0

NOTE: 0.0 indicates that there were no readings in the specified concentration range

TABLE 12 WIND SPEED AND WIND DIRECTION - 2001 SUMMARY
 FREQUENCY DISTRIBUTION OF 1-HOUR AVERAGES

MONITORING STATION	DIRECTION	% WIND SPEED RANGE (km/hr)						TOTAL (%)
		1-5	6-11	12-19	20-28	29-38	39+	
CLOVER BAR	N	1.05	1.33	0.33	0.01	0.00	0.00	2.72
	NE	3.34	3.27	0.98	0.02	0.00	0.00	7.61
	E	3.08	4.15	2.57	0.46	0.01	0.00	10.27
	SE	4.40	6.68	5.37	1.62	0.16	0.00	18.23
	S	8.18	14.12	2.83	0.16	0.00	0.00	25.29
	SW	3.03	6.82	2.17	0.14	0.00	0.00	12.16
	W	1.52	6.07	7.17	2.15	0.16	0.00	17.07
	NW	0.89	1.93	2.74	0.73	0.11	0.00	6.41
	TOTAL %	25.49	44.36	24.16	5.29	0.45	0.00	99.76
						CALM =	0.24%	
SHERWOOD PARK	N	0.76	0.42	0.00	0.00	0.00	0.00	1.18
	NE	2.74	2.10	0.14	0.00	0.00	0.00	4.97
	E	6.58	7.06	1.44	0.08	0.00	0.00	15.16
	SE	8.02	12.51	3.61	0.28	0.00	0.00	24.42
	S	10.47	8.26	0.43	0.00	0.00	0.00	19.16
	SW	8.08	2.53	0.31	0.00	0.00	0.00	10.92
	W	5.14	9.41	4.57	0.64	0.03	0.00	19.79
	NW	1.06	1.15	0.83	0.08	0.01	0.00	3.13
	TOTAL %	42.84	43.43	11.33	1.08	0.05	0.00	98.73
						CALM =	1.27%	
ELMJAY	N	0.45	1.29	1.36	0.06	0.00	0.00	3.15
	NE	1.67	4.35	1.47	0.18	0.00	0.00	7.67
	E	3.33	10.12	3.52	0.37	0.00	0.00	17.34
	SE	3.85	19.62	4.11	0.01	0.00	0.00	27.59
	S	2.40	8.73	1.21	0.03	0.00	0.00	12.37
	SW	1.37	4.91	3.77	1.08	0.25	0.00	11.39
	W	0.54	4.10	6.57	3.31	1.20	0.16	15.87
	NW	0.25	0.91	2.67	0.69	0.09	0.00	4.61
	TOTAL %	13.85	54.03	24.68	5.73	1.54	0.16	100.00
						CALM =	0.00%	
GOLD BAR	N	1.59	1.29	0.05	0.00	0.00	0.00	2.92
	NE	2.97	3.28	0.26	0.00	0.00	0.00	6.51
	E	2.96	4.15	0.61	0.00	0.00	0.00	7.71
	SE	5.60	6.28	1.48	0.03	0.00	0.00	13.39
	S	22.46	4.36	0.22	0.00	0.00	0.00	27.04
	SW	8.55	4.45	0.39	0.00	0.00	0.00	13.39
	W	5.25	11.64	4.82	0.54	0.00	0.00	22.25
	NW	1.39	2.01	1.50	0.16	0.00	0.00	5.06
	TOTAL %	50.77	37.46	9.32	0.73	0.00	0.00	98.28
						CALM =	1.72%	

Cont'd

TABLE 12 (Cont'd) WIND SPEED AND WIND DIRECTION - 2001 SUMMARY
 FREQUENCY DISTRIBUTION OF 1-HOUR AVERAGES

MONITORING STATION	DIRECTION	% WIND SPEED RANGE (km/hr)						TOTAL (%)
		1-5	6-11	12-19	20-28	29-38	39+	
BEVERLY	N	1.52	0.71	0.01	0.00	0.00	0.00	2.24
	NE	4.03	4.30	0.70	0.00	0.00	0.00	9.03
	E	4.04	3.58	0.27	0.02	0.00	0.00	7.92
	SE	4.79	6.49	1.21	0.02	0.00	0.00	12.51
	S	14.32	9.84	0.23	0.00	0.00	0.00	24.38
	SW	13.54	7.01	0.46	0.00	0.00	0.00	21.01
	W	4.63	9.97	4.49	0.48	0.00	0.00	19.57
	NW	1.17	0.87	0.23	0.00	0.00	0.00	2.26
	TOTAL %	48.03	42.76	7.60	0.53	0.00	0.00	98.91
						CALM =	1.09%	
FOREST HEIGHTS	N	1.66	0.67	0.00	0.00	0.00	0.00	2.33
	NE	3.62	2.61	0.09	0.00	0.00	0.00	6.32
	E	4.87	3.98	0.87	0.08	0.00	0.00	9.81
	SE	9.14	6.85	1.31	0.06	0.00	0.00	17.35
	S	24.18	5.00	0.25	0.01	0.00	0.00	29.44
	SW	7.52	3.41	0.53	0.00	0.00	0.00	11.46
	W	5.56	9.73	3.11	0.09	0.00	0.00	18.50
	NW	1.51	1.49	0.40	0.04	0.00	0.00	3.44
	TOTAL %	58.06	33.73	6.57	0.29	0.00	0.00	98.66
						CALM =	1.34%	
CLAREVIEW	N	2.58	1.12	0.11	0.00	0.00	0.00	3.81
	NE	5.09	4.32	1.02	0.00	0.00	0.00	10.43
	E	4.33	4.49	1.12	0.03	0.00	0.00	9.97
	SE	2.91	4.47	1.94	0.26	0.00	0.00	9.58
	S	6.68	5.79	0.82	0.01	0.00	0.00	13.31
	SW	9.61	13.48	1.87	0.07	0.00	0.00	25.03
	W	3.51	8.49	8.05	2.07	0.13	0.00	22.24
	NW	1.84	2.07	1.14	0.19	0.02	0.00	5.27
	TOTAL %	36.55	44.21	16.08	2.64	0.15	0.00	99.63
						CALM =	0.37%	

TABLE 13 STATIC TOTAL SULPHATION - 2001 SUMMARY
Stations Grouped by Annual Average Concentration Values

LOADINGS (mg SO ₃ eq./day/100 cm ²) (Concentration Grouping)	MONITORING STATIONS				
	2001	2000	1999	1998	1997
< 0.050	A,B,C, E,Q,T (6 stations)	A,B,E,Q,T (5 stations)	A,B,C,E,F H,Q,T,U (9 stations)	A,B,E,J Q,T,U (7 stations)	A,B,E,Q,T (5 stations)
0.051 to 0.075	D,F,H,J,U (5 stations)	C,D,F,H,J,K M,N,U (9 stations)	D,J,K L,M,N,R (7 stations)	C,D,H,K L,M,N,R,S (9 stations)	C,H,J,M,R,U (6 stations)
0.076 to 0.100	G,K,L,M,R,S (6 stations)	G,L,O,R,S (5 stations)	G,O,S (3 stations)	F,G,O (3 stations)	D,F,I,K,L,N (6 stations)
0.101 to 0.150	I,N,O,P (4 stations)	I,P (2 stations)	I,P (2 stations)	I,P (2 stations)	G,O,P,S (4 stations)
> 0.150	-	-	-	-	-

TABLE 14 STATIC HYDROGEN SULPHIDE - 2001 SUMMARY
Stations Grouped by Annual Average Concentration Values

LOADINGS (mg SO ₃ eq./day/100 cm ²) (Concentration Grouping)	MONITORING STATIONS				
	2001	2000	1999	1998	1997
< 0.0050	B,Q (2 stations)	B (1 station)	B,H,Q (3 stations)	B,C,E,H P,Q,R,T,U (9 stations)	Q (1 station)
0.0051 to 0.0100	A,C,E,G H,J,K,R,T,U (10 stations)	A,C,E,F,G H,J,K,L Q,R,S,T,U (14 stations)	A,C,D,E,F,G,I J,K,L,M,N,O P,R,S,T,U (18 stations)	A,D,F,G,I,J K,L,M,N,O,S (12 stations)	A,B,C,E,G,H,I J,L,M,N,O,R S,T,U (16 stations)
0.0101 to 0.0150	D,F,I,L M,N,O,P,S (9 stations)	D,I,M,N,O,P (6 stations)	-	-	D,F,K,P (4 stations)
0.0151 to 0.0250	-	-	-	-	-
> 0.0250	-	-	-	-	-

TABLE 15 ALBERTA AIR QUALITY GUIDELINES - Parameters measured by SIA
Guidelines Consolidated by Alberta Environment (February 2000)

PARAMETER	AVERAGING PERIOD	MAXIMUM PERMISSIBLE CONCENTRATION		MONITORING TYPE
<u>Ambient Monitoring:</u>				
Sulphur Dioxide (SO ₂)	one hour	450 µg/m ³	0.172 ppm	continuous
	24-hours	150 µg/m ³	0.057 ppm	
	annual average	30 µg/m ³	0.011 ppm	
Hydrogen Sulphide (H ₂ S)	one hour	14 µg/m ³	0.010 ppm	continuous
	24-hours	4 µg/m ³	0.003 ppm	
Nitrogen Dioxide (NO ₂)	one hour	400 µg/m ³	0.212 ppm	continuous
	24-hours	200 µg/m ³	0.106 ppm	
	annual average	60 µg/m ³	0.032 ppm	
Total Hydrocarbons (THC)	no guideline	-	-	continuous
<u>Intermittent Monitoring:</u>				
Total Suspended Particulates (TSP)	24-hours	100 µg/m ³	-	for 24-hour period every 6 th day
	annual geometric average	60 µg/m ³	-	
Inhalable Particulates (PM _{2.5} and PM ₁₀)	24-hours	-	-	for 24-hour period every 6 th day
<u>Static Monitoring:</u>				
Static Total Sulphation	one day	0.500 mg SO ₃ equivalent /day/100 cm ²		1-month accumulated loading
Static Hydrogen Sulphide	one day	0.100 mg SO ₃ equivalent /day/100 cm ²		1-month accumulated loading

APPENDIX A

STRATHCONA INDUSTRIAL ASSOCIATION HISTORICAL DEVELOPMENT

STRATHCONA INDUSTRIAL ASSOCIATION

HISTORICAL DEVELOPMENT

- 1975
- In the mid seventies, government, industry and the public expressed concern that the airshed capacity in the Edmonton area may be potentially exceeded by future developments. Comprehensive air quality data was needed.
 - Following discussions with Alberta Environment and other industrial groups in Canada, the SIA made a commitment to develop and operate an air monitoring network with the following objectives:
 - consolidate air quality data and determine trends in air quality for specified parameters,
 - provide data for future environmental impact assessment studies,
 - maintain and improve relations with public and government,
 - eliminate redundant air monitoring by individual companies.
- 1979
- The SIA network was commissioned in 1979. At that time the network had no compliance function and each SIA member was required to carry out its own ambient air monitoring to meet government requirements. Thus, the compliance monitoring by individual plants was in addition to monitoring done by the newly established SIA network.
- 1981
- After two years of operation, a joint Alberta Environment/SIA Task Force was set up to achieve integration of existing industry ambient air monitoring into the SIA network and eliminate duplication.
- 1982
- The joint Task Force presented formal recommendations to the SIA and to Alberta Environment in May 1982. The recommended modifications to the SIA network were accepted and operation of the ambient air compliance network commenced on July 1, 1982. Alberta Environment stipulated that the network must operate in accordance with the 'Air Monitoring Directive'.
- 1983
- Alberta Environment was given access to real-time and historical air quality data from the network. This milestone was reached in January 1983 and the SIA became the first multi-industry compliance network in North America.
- 1984
- Joint industry/government discussions were initiated to determine how ambient air exceedances should be reported since many stakeholders had real time access to the data. The discussions culminated in an agreement to develop a 'Message Board' where all significant deviations would be recorded and archived with the air quality data.
- 1985
- The Message Board was implemented and used to report and explain exceedances detected by the SIA Air Monitoring Network. SIA members and Alberta Environment staff have access to the Message Board.

- 1986 • A joint Alberta Environment / SIA Task Force was set up to explore ways to optimize the operation of the Air Monitoring Network. The Task Force examined the technical needs, user needs and the benefits of the Network.
- 1987 • Recommendations of the joint Task Force were implemented in 1986-87:
 - Continuous monitoring of H₂S would be maintained at five stations and continuous monitoring of SO₂ at three stations. The redundant instruments were removed (one H₂S, two SO₂ and four NO_x instruments).
 - Total Suspended Particulates monitoring was maintained at three stations.
 - The Exposure Cylinder Network was reduced from 29 to 21 stations and reorganized into a regular grid-pattern.
- 1989 • In May 1989, the central computer was upgraded to increase system reliability and storage capacity for historical data.
- 1992 • The Association reviewed future network operation and discussed an upgrade to modern software and hardware. A concept of consolidating computer system monitoring and environmental surveillance services was also considered.
- 1994 • The major network upgrade was implemented in the summer of 1994. The benefits were:
 - 24-hour coverage complemented by field investigation during deviations.
 - 24-hour access to real time and historical data by all SIA members (on-line access to 16 years of historical data and graphical screens).
 - Switch to regular telephone voice lines to gather data from stations.
 - Consolidation of environmental and security monitoring, reporting, computer maintenance and network administration.
- 1995 • Edmonton Power Generation Inc. joined the SIA and nitrogen oxides monitoring was added to the Clover Bar station (January 1995) and to the Forest Heights station (June 1995).
 - Communication was established with the 17th Street monitoring station (operated by Alberta Environment). The station is located in close proximity to the SIA stations and the instantaneous, 5 min, 1-hour and 24-hour average concentration data are plotted in the same format as the SIA data and can be viewed by SIA members or any authorized user.
- 1996 • New RTUs were installed. The new RTU unit can store data for several days. A new network communication protocol was installed which permits the RTU to download all historical data to the central computer after telephone communication is restored.
- 1997 • Graphical screens were simplified in order to improve comprehension by the general public.
 - Strathcona County Emergency Services staff was granted access to the SIA system.

- 1998
- All RTUs were enhanced and each station can operate independently (without real time connection to the central computer) and perform a monthly calibration as well as automatic instrument span checks during communication failures. The central computer hardware was upgraded by 64 M RAM memory and by adding a 3rd hard drive.
 - On October 28, 1998, the Clover Bar monitoring station was relocated to the Strathcona County maintenance yard. This relocation was requested by the property owners and was approved by Alberta Environment.
 - The Partisol Model 2000[®] Air Sampler replaced the Hi-Vol sampler at Sherwood Park station. Reporting of PM₁₀ and PM_{2.5} levels started in August 1998.
 - On November 9, 1998, the Forest Heights station was officially transferred from Edmonton Power Generation to the SIA. The station is now maintained and calibrated by SIA staff.
 - Monitoring data from the Sherwood Park station were provided to the CASA (Clean Air Strategic Alliance) Data Warehouse. A new protocol permitting a monthly data file transfer was implemented on January 6, 1998.
- 1999
- A new SO₂ analyzer was installed at the Sherwood Park station on February 20, 1999 (model TECO 43C).
 - An older NO_x analyzer at the Forest Heights station was replaced with a spare SIA analyzer and the first computerized calibration was performed on February 26, 1999.
 - The City of Edmonton Gold Bar Wastewater Treatment Plant joined the SIA in August 1999.
 - The “Year 2000” testing and historical data verification was conducted on a new server loaded with new operating software on March 2, 1999 (AlphaServer 800/5, Open VMS 7.2 and Telenium 4.0). The permanent switch to the “Year 2000” compliant system was executed on August 16, 1999.
 - A new EcoWeb Internet access was introduced on August 16, 1999. Using the Microsoft Explorer browser, the authorized user is able to view data in graphical format (concentration trends), in text table format (historical data), verify current alarms or alerts, review QA/QC tasks and use data transfer protocols to download historical 5-min, 1-hour or daily data to other applications.
 - A new meteorological instrument was installed at the Forest Heights station in September 1999 (Blue Sky Instruments, Model 805 Wind System).
- 2000
- Y2K rollover into the new millennium was smooth. All network components operated reliably. No issues were encountered during the leap year date of February 2000.
 - A new NO_x analyzer was installed at the Clover Bar station in March 2000 (model TECO 42C).
 - Meteorological towers were replaced at the Sherwood Park, Beverly and Clareview stations during 2000.

- 2000
- Uninterruptible Power Source units were replaced at all stations during 2000.
 - Modifications of the Forest Heights station air intake manifold were completed and approved by Alberta Environment in July 2000.
 - Trailers of the Clover Bar, Beverly and Clareview stations were repaired.
 - Alberta Environment staff audited six SIA stations. The Clover Bar, Elmjay, Gold Bar, Beverly, Clareview and Forest Heights stations operated in compliance.
- 2001
- A new NO_x analyzer was installed at the Forest Heights station in May 2001 (model TECO 42C).
 - A new SO₂ analyzer was installed at the Elmjay station in October 2001 (model TECO 43C).
 - A new roof-mounted platform was installed at the Sherwood Park station.
 - Alberta Environment staff audited six SIA stations. The Clover Bar, Elmjay, Gold Bar, Beverly, Clareview and Forest Heights stations operated in compliance.

APPENDIX B

AMBIENT AIR MONITORING NETWORK DESCRIPTION

AMBIENT AIR MONITORING NETWORK DESCRIPTION

The SIA Ambient Air Monitoring Network consists of seven permanent stations located in east Edmonton / Sherwood Park region (Figure 1, page 9). The requirements for monitoring were determined between Alberta Environment and the Strathcona Industrial Association utilizing a joint Alberta Environment/SIA Task Force, which was set up in 1982.

Thirty parameters are continuously measured at the seven SIA monitoring stations (16 environmental and 14 meteorological parameters). In addition, two high volume samplers operated every sixth day and four to six samples of total suspended particulates (TSP) were collected per station per month. The inhalable particulates (PM₁₀ and PM_{2.5}) were monitored at the Sherwood Park station. The levels of the PM₁₀ and PM_{2.5} are measured using the same six-day frequency as TSP and the instrument is set up to alternate between sampling of PM₁₀ and PM_{2.5}. The following table lists parameters monitored at the individual stations:

MONITORING STATION	MONITORED PARAMETERS									
	SO ₂	H ₂ S	NO _x /NO/NO ₂			THC	WSPD	WDIR	TSP	PM 2.5/10
1 Clover Bar	-	★	★	★	★	-	★	★	-	-
2 Sherwood Park	★	★	-	-	-	★	★	★	-	★
3 Elmjay	★	★	-	-	-	-	★	★	-	-
4 Gold Bar	-	★	-	-	-	-	★	★	★	-
5 Beverly	★	★	-	-	-	★	★	★	★	-
6 Forest Heights	-	-	★	★	★	-	★	★	-	-
7 Clareview	-	-	-	-	-	-	★	★	-	-

★ Locations of instruments. NO₂ data is auto-calculated from values provided by NO_x and NO analyzers.

Readings of the continuous parameters at the stations are taken every second. The central computer scans each station every thirty seconds using a modem. For all practical purposes, the 30-second value is called 'real time' data. The five-minute averages and one-hour averages are updated using the 30-second values. The 24-hour average values are updated hourly using the one-hour values. The 5-minute, 1-hour and 24-hour values are stored in the memory indefinitely.

EcoSys™ - Environmental Information Management System is an extension of a robust software application developed by MegaSys Computer Technologies of Calgary. EcoSys™ is a multi-user and multi-tasking system and offers real time data acquisition, access to historical data and handles a variety of alarms and alerts. The computer can page the network manager (or other telephone numbers) when specified limits are approached. EcoSys™ responds to real-time, 5-minute, 1-hour or 24-hour concentration alarms (all defined as sliding averages). Digital alarms are related to the surveillance of equipment, facility and instruments and include alarms for high or low temperature, telecommunication failure, unauthorized door entry and power failures. The network operation can be supervised remotely and appropriate action can be initiated including a field investigation in the case of an environmental alarm.

The network manager monitors operation of the network around the clock (24-hour coverage is retained) and deviation reports and regular operating reviews are submitted to the SIA members and Alberta Environment on as needed bases.

APPENDIX C

REPORTING CAPABILITIES

REPORTING CAPABILITIES

Once an authorized SIA user is logged in the SIA central computer, the Option Selection menu is displayed. The menu offers selection of one or several of the following parameters:

<u>Monitoring Stations</u>	<u>Parameters</u>	<u>Time Modes</u>
CB - Clover Bar	SO ₂	CURRENT (30 sec)
SP - Sherwood Park	H ₂ S	5-MINUTE
EJ - Elmjay	THC	1-HOUR
GB - Gold Bar	NO / NO ₂ / NO _x	24-HOUR
BV - Beverly	WSPD	
FH - Forest Heights	WDIR	
CL - Clareview		

The list of selectable trends and tables illustrates flexibility of the reporting system. A detailed "User Manual" is available from the network manager.

Log Number	Log Description
1	Summary Exceedance Report
2	Detailed Exceedance Report
3	Current Value Report
4	Spreadsheet Report for PC (coma delimited format)
5	Status Report (all modes) - current, 5min, hourly, daily
6	Messages and Comments List
7	Daily Log Report
8	Monthly Log Report
9	Monthly Summary Report
10	Automatic Instrument Check Detailed Report
11	Automatic Instrument Check Summary Report
12	Monthly Calibration Report
13	Current Alarm Log Report
14	Current Service Log Report
15	AIC Schedules and Duration's Detailed Report
16	RTU Communication Report
17	Alarm/Alert Limits Report
18	Annual Frequency Distribution Report (SO ₂)
19	Annual Frequency Distribution Report (H ₂ S)
20	Annual Frequency Distribution Report (meteorological)
21	CASA - CDEF Data File selection (1-hour data)
22	CASA - CDEF Data File selection (5 minute data)

A user can access the Ambient Air Monitoring Network data from any computer configured with a valid Internet access or connecting to the central computer directly by a modem.

The user can retrieve information in text or table formats. Intuitive parameter and graph selection options permit fast data capture. The EcoWeb Internet access is available since August 1999 and all graphs are auto-updated every 30 seconds.

APPENDIX D

STATIC TOTAL SULPHATION AND STATIC HYDROGEN SULPHIDE CYLINDERS

STATIC TOTAL SULPHATION AND STATIC HYDROGEN SULPHIDE CYLINDERS

The exposure cylinders measure the amount of sulphur compounds present in the atmosphere (principally sulphur dioxide (SO₂) and hydrogen sulphide (H₂S)). Each cylinder consists of two bands:

A. Static Total Sulphation Cylinder (brown band)

As ambient air passes through the exposure cylinder, the sulphur compounds coming in contact with the band are oxidized to sulphate (SO₄). At the end of the sampling period, the cylinders are returned to a laboratory and analyzed for sulphate (SO₄). The amount of sulphate detected is proportional to the total amount of sulphur compounds deposited on the band and the amount of sulphate is determined by wet chemistry methods. The total sulphation is reported in milligrams of SO₃ equivalent per day per 100 cm² (mg SO₃ eq./day /100 cm²) and is calculated from a 1-month accumulated loading.

B. Static Hydrogen Sulphide Cylinder (white band)

The white band performs the same function as the brown band, however, the white band reacts to hydrogen sulphide (H₂S) only. The static hydrogen sulphide exposure cylinders are wrapped with strips of filter paper soaked in zinc acetate, which converts the H₂S in the atmosphere to zinc sulphide. The static hydrogen sulphide is reported in milligrams of SO₃ equivalent per day per 100 cm² (mg SO₃ eq./day /100 cm²) and is calculated from a 1-month accumulated loading. The static hydrogen sulphide values must be less than or equal to the total sulphation values.

Test Results

Monthly replacement of the exposure cylinders and the subsequent analyses are subcontracted to a certified laboratory in Edmonton. Laboratory results are submitted to the SIA network manager and included in the regular SIA monthly reports.

Guideline Limits

Alberta Environment's guideline limits are 0.5 mg SO₃ eq./day/100 cm² for the static total sulphation and 0.1 mg SO₃ eq./day/100 cm² for the static hydrogen sulphide. Any value above these limits should be regarded as an exceedance and reasons for the occurrence should be discussed.

General

The static monitoring results represent an average loading of sulphur compounds or H₂S over the period of exposure (usually 30 days), rather than the concentration over a shorter time. Neither value can be converted to measure SO₂ or H₂S in terms of parts per million in the ambient air. These methods are suitable for gaining an appreciation of sulphur compounds loadings over a comparatively large area at relatively low cost. The static exposure cylinder monitoring results provide an indication of:

- The "hot" spots (if any) in the area.
- An indication of whether the total sulphation is increasing or decreasing.