ALBERTA ENVIRONMENT'S PERFORMANCE MEASURES AND INDICATORS – Levels 1 & 2

Environmental Indicators
Behavioural Indicators

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Alberta
ENVIRONMENT

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History

Performance measures reporting in Alberta Environment's business plans have changed over the years.

- The 1994-95 to 1996-97 Business Plan included thirteen performance measures.

- The 1995-98 Business Plan identified eight performance measures for reporting, and an additional forty measures for internal monitoring purposes. After public consultation, one performance measure was dropped (Satisfaction of Hunters/Fishermen).

- The 1996-99 Business Plan had seven performance measures. Additional measures were not identified due to a functional review that was proceeding internally. The outcome of this review was redefined Ministry businesses, expected to result in revised internal Ministry performance measures.

  The Business Plan framework was thoroughly reviewed at the same time. The mission, operating principles, core businesses, goals, strategies and performance measures were all rigorously assessed to their meaning, value, and contribution to the government's core business: People, Prosperity and Preservation.

- The 1997-2000 Business Plan reflected the results of the above review. Three former performance measures were dropped (Proportion of Licensees who are Able to Receive the Quantity of Water Desired; Proportion of Spills and Accidental Releases Cleaned Up Annually; Reforestation Rate), and three measures already reported in *Measuring Up* were adopted (Air Quality Index; Surface Water Quality; Timber Sustainability).

- A revised Alberta surface water quality index has been completed, based on a national index being developed through the CCME and an agricultural water quality index being developed for Alberta Agriculture, Food and Rural Development.

- As a result of transferring the Government of Alberta's lead role on climate change from Alberta Energy, two new performance measurements were added to the 1999-00 to 2001-02 Business Plan; 1) *Government Action to Improve Government Energy Productivity* and 2) *Action by Alberta Organizations to Improve Energy Efficiency.*

- In March 2001, Alberta Environment was reorganized and a new department (Alberta Sustainable Resource Development) was created. Several measures were transferred to this department and to Alberta Community Development. There are five measures left: Air Quality Index, Surface Water Quality Index, Reduction of Municipal Solid Waste to Landfills, Pulp Production (BOD), Government Action to Improve Energy Productivity and Action by Alberta Organizations to Improve Energy Efficiency.

Current Performance Measures (2000-01)

Air Quality Index

Related Government Business Plan Goals

Goal 1: Albertans will be healthy.

Goal 17: The high quality of Alberta's environment will be maintained or enhanced.

The Measure

This measure illustrates the Ministry's effectiveness in protecting and maintaining high air quality, by providing an indication of air quality in Alberta throughout the year.

Data

The percentage of days shown in the table below is based on the number of days in a year.

Table 1: Air Quality Index

	Rating			
Year	**Good**	**Fair**	**Poor**	**Very Poor**
1990	354	11	0	0
1991	352	13	0	0
1992	361	5	0	0
1993	359	6	0	0
1994	349	16	0	0
1995	358	7	0	0
1996	360	6	0	0
1997	359	6	0	0
1998	354	11	0	0
1999	357	8	0	0
2000	359	7	0	0

Target

Maintain "good" air quality equal to or better than 97% of the days and with no poor days.

Results

The figure shows that there were no days rated poor or very poor last year. Poor levels typically occur only one or two hours per year.

Methodology

The measure is based on data collected from nine continuous monitoring stations - three stations in both Edmonton and Calgary, and one station in each of Beaverlodge (35 km west-northwest of Grande Prairie, Fort Saskatchewan and Red Deer. Additional stations are currently planned. The

data from these stations is used to calculate the Index of Quality of Air (IQUA) every hour.

The IQUA is calculated based on air quality data contained in the Alberta Ambient Air Data Management System, more commonly known as the Clean Air Strategic Alliance (CASA) data warehouse. This system can be accessed by the general public at http://www.casadata.org

The IQUA is based on outdoor concentrations of five major air pollutants (carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide). The concentration of each pollutant is converted to an IQUA number, and the highest number is the IQUA for that station. IQUA ratings are divided into Good, Fair, Poor and Very Poor categories. These categories are derived using formulas based on air quality guidelines of the Alberta *Environmental Protection and Enhancement Act* and the *National Air Quality Objectives*.

The following table provides a description of the effects anticipated on the environment, vegetation, human health and visibility at various air quality levels.

Table 2: IQUA Ratings

IQUA Rating	Effects
Good	Desirable range: no known harmful effects to soil, water, vegetation, animals, materials, visibility or human health. The long-term goal is for air quality to be in this range all of the time in Canada.
Fair	Acceptable range: adequate protection against harmful effects to soil, water, vegetation, animals, materials, visibility and human health.
Poor	Tolerable range: not all aspects of human health or the environment are adequately protected from possible adverse effects. Long-term control action may be necessary, depending on the frequency, duration and circumstances of the readings.
Very Poor	Intolerable range: In this range, continued high readings could pose a risk to public health.

External Factors

Air quality is influenced by a number of factors including vehicle emissions, weather patterns, and intensity of industrial development.

Comparison with Others

Although a federal-provincial committee developed the IQUA, some jurisdictions tend to customize the index to meet their specific needs. For example, British Columbia has added inhalable particulates (PM_{10}) to the index and Saskatchewan does not monitor dust and smoke and therefore cannot use dust and smoke in their index. The best way to compare air quality across the country is to compare the individual pollutant concentrations that go into calculating the index.

The following tables are a summary of annual average and number of exceedances of the 1-hour guideline (where applicable) for the pollutants that are used in calculating the Alberta version of the IQUA. These pollutants are carbon monoxide, dust and smoke, nitrogen dioxide, ozone and sulphur dioxide.

Table 3: Annual Average Pollutant Concentrations in Canadian Cities

City	Carbon Monoxide (ppm)	Dust and Smoke (COH Units)	Nitrogen Dioxide (ppm)	Ozone (ppm)	Sulphur Dioxide (ppm)	Averaging Period
Halifax	0.7	0.3	0.019	0.022	0.010	1990 to 1998
Montreal	0.5	0.2	0.021	0.016	0.004	1990 to 1998
Ottawa	0.9	0.2	0.020	0.017	0.004	1990 to 1998
Toronto	1.0	0.4	0.026	0.018	0.005	1990 to 1998
Hamilton	1.0	0.4	0.020	0.020	0.008	1990 to 1998
Winnipeg	0.6	0.1	0.015	0.018	0.001	1990 to 1998
Regina	0.7	not monitored	0.014	0.016	0.001	1990 to 1998
Saskatoon	0.5	not monitored	0.013	0.017	0.001	1990 to 1998
Edmonton	*0.8*	*0.2*	*0.023*	*0.019*	*0.003*	*1990 to 1998*
Calgary	*0.9*	*0.2*	*0.025*	*0.018*	*0.004*	*1990 to 1998*
Fort Saskatchewan	*0.5*	*0.1*	*0.013*	*0.024*	*0.002*	*1990 to 1998*
Fort McMurray	*0.4*	*0.1*	*0.009*	*0.021*	*0.003*	*1990 to 1998*
Vancouver	1.0	0.3	0.021	0.012	0.005	1990 to 1998

* Data for Canadian Cities from 1990-1998 are from the National Air Pollution (NAPS) network annual summaries. Data for Alberta stations after 1994 are from Alberta Environment air quality monitoring reports. Dust and smoke data for 1998 is not reported in the NAPS network annual summaries.

Table 4: Average Number of Exceedences per Station per Year in Canadian Cities

City	Carbon Monoxide	Dust and Smoke	Nitrogen Dioxide	Ozone	Sulphur Dioxide	Averaging Period
Halifax	0.00	no 1-hour guideline	0.00	1.44	0.94	1990 to 1998
Montreal	0.04	no 1-hour guideline	0.09	5.99	0.12	1990 to 1998
Ottawa	0.00	no 1-hour guideline	0.00	2.88	0.00	1990 to 1998
Toronto	0.60	no 1-hour guideline	0.02	21.86	0.19	1990 to 1998
Hamilton	1.67	no 1-hour guideline	0.00	19.54	0.83	1990 to 1998
Winnipeg	0.00	no 1-hour guideline	0.00	0.06	0.00	1990 to 1998
Regina	0.00	not monitored	0.00	0.11	1.00	1990 to 1998
Saskatoon	0.00	not monitored	0.00	0.00	0.00	1990 to 1998
Edmonton	*1.15*	*no 1-hour guideline*	*0.00*	*0.59*	*0.11*	*1990 to 1998*
Calgary	*2.56*	*no 1-hour guideline*	*0.04*	*0.22*	*0.00*	*1990 to 1998*
Fort Saskatchewan	*0.00*	*no 1-hour guideline*	*0.00*	*4.00*	*0.00*	*1990 to 1998*
Fort McMurray	*0.00*	*no 1-hour guideline*	*0.00*	*1.11*	*0.00*	*1990 to 1998*
Vancouver	0.03	no 1-hour guideline	0.00	0.54	0.06	1990 to 1998

*Data for Canadian cities from 1990-1998 are from the National Air Pollution Surveillance (NAPS) network annual summaries. Data for Alberta stations after 1994 are from Alberta Environment air quality monitoring reports.

Frequently Asked Questions

1. What parameters most frequently contribute to hourly exceedences? What are the health effects of these parameters?

Poor air quality will occur primarily in the fall/winter and in the summer season. During the fall/winter period, the combination of strong temperature inversions and light winds will often create a layer of cold, stagnant air near the ground. Also, vehicles tend to idle longer and fuel consumption for heating buildings increases during cold spells. Combustion products emitted mostly by automobiles are trapped in this layer of cold, stagnant air. In Edmonton these conditions usually occur with the approach of a warm front. In Calgary, strong temperature

inversions are common before the arrival of Chinook winds. The parameter primarily responsible for fall/winter Poor air quality is dust and smoke. However, carbon monoxide and nitrogen dioxide levels are also elevated.

Poor air quality can also occur in the heat of the summer. Under hot, calm weather conditions, photochemical smog can be formed through a complicated set of chemical reactions involving oxides of nitrogen and volatile hydrocarbons in the presence of sunlight. Photochemical smog has a noticeable light brown colour, and can reduce visibility and trigger respiratory response. Ground-level ozone is a component of major concern in photochemical smog.

2. What determines the location of air quality monitoring stations?

In the past, air quality monitoring urban stations operated by the department (Edmonton and Calgary) were located in cooperation with the National Air Pollution Surveillance network. Air monitoring stations in small urban locations such as Fort Saskatchewan were selected based on requests from local municipalities and the proximity of industrial sources to the communities. The specific site requirements for the stations are detailed in the Alberta Environment Air Monitoring Directive. The specific location of the monitoring stations is also based on several other criteria including proximity to pollution sources, availability of amenities such as power and access, long-term collection of data, and forecasted development of the surrounding area. The specific location of the station is often made through consultation with the local municipality.

3. What else is done to monitor air quality in the province?

In addition to the government monitoring network, industries in Alberta are required to monitor ambient air pollution concentrations in the vicinity of their facilities by their respective air emission approvals. In 1999, industries in Alberta operated about 191 continuous, 87 intermittent and 1265 static* monitoring stations. Monitoring stations operated by industry are intentionally situated at locations where maximum ambient air pollutant concentrations are predicted to occur.

In recent years, the zone approach to air quality monitoring has been applied to some areas of the province. This zone approach was developed, in consultation with the Clean Air Strategic Alliance, to address air quality issues and concerns common to a specific geographical area of the province. In 2000, there were three airshed zones that conducted air quality monitoring in Alberta. These were the West Central Airshed Zone (located in the Drayton Valley-Edson-Hinton area), the Wood Buffalo Environmental Zone (located in the Fort McMurray-Fort McKay-Fort Chipewyan area) and the Parkland Airshed Management Zone (located in the Rocky Mountain House-Red Deer-Sundre area). These zones are co-ordinated by representatives of industry, government, environmental associations, local municipalities and the general public. A total of 15 continuous air quality monitoring stations were operated by these three zones in 2000.

Special air quality monitoring surveys are also conducted by Alberta Environment to: (1) obtain province-wide air quality data; (2) explore potential sites for Alberta's permanent monitoring network; (3) identify any potential problem areas; and (4) respond to air quality concerns from the community. Many of these air quality surveys are initiated on the basis of public concern or on the request of municipal officials. Most special air quality surveys involve collecting air quality data using the Mobile Air Monitoring Laboratory (MAML). In 2000, Alberta Environment conducted 10 mobile air quality monitoring surveys within the province.

* Static monitoring stations are stations that collect air quality data as a one-month integrated concentration, giving only one number per month. Continuous monitoring stations provide data every hour.

4. Are Alberta's air quality standards changing?

Alberta has stringent standards for both stack emissions and ambient air quality. As technology and science evolve, these standards will continue to be adjusted. Alberta recently strengthened its standards for new coal-fired power plants, a marked improvement over current federal standards. Alberta Environment is committed to a consultation process for new standards for existing and new facilities. The Government of Alberta demonstrated its commitment to reducing greenhouse gas emissions by participating in the foundation of Climate Change Central, a partnership with environmental groups, industry and education groups to find made-in-Alberta solutions to address climate change.

5. How are the standards enforced?

Apart from regular monitoring, Alberta Environment conducts unannounced spot checks and audits to ensure industry is operating within the air quality guidelines and standards set in place. Infractions could lead to penalties under the Environmental Protection and Enhancement Act.

6. What are the long terms trends regarding air quality?

- ✓ Carbon monoxide levels have decreased by more than 60 per cent in downtown Edmonton and Calgary over the past two decades.
- ✓ Nitrogen dioxide levels have decreased by more than 30 per cent in downtown Edmonton and Calgary over the same time period.
- ✓ Particulate levels have decreased from 40 to 50 per cent in Edmonton and Calgary since 1986.
- ✓ Benzene levels have decreased by 30 to 50 per cent in Edmonton and Calgary over the last decade.

Surface Water Quality Index

Related Government Business Plan Goals

Goal 1: Albertans will be healthy.

Goal 7: Alberta will have a prosperous economy.

Goal 10: Alberta's value-added industries will lead economic growth.

Goal 17: The high quality of Alberta's environment will be maintained or enhanced.

The Measure

This measure illustrates the Ministry's effectiveness in ensuring high quality surface water.

The Alberta Surface Water Quality Index is based on three aspects of water quality that relate to water quality objectives*:

- **Scope** - the number of water quality variables that do not meet objectives in at least one sample during the time period under consideration, relative to the total number of variables measured.
- **Frequency** - the number of individual measurements that do not meet objectives, relative to the total number of measurements made in all samples for the time period of interest.
- **Amplitude** – the amounts, by which measurements, which do not meet the objectives, depart from those objectives.

These results are used to evaluate the quality of river water up- and downstream of major centres in terms of overall quality and with respect to four groups of variables: metals, nutrients, bacteria, and pesticides. River water quality is reported because the effects of human activities are generally more evident in rivers than in lakes.

Index values are not reported for use-specific categories, but suitability for various uses can be commented on in the accompanying text.

Data

Table 5: Alberta Surface Water Quality Index (Measuring Up)

Symbol	Category	Description *Guidelines are…*
★	96-100	Almost always met (**Excellent**)
✓	81-95	Occasionally not met, but usually by small amounts (**Good**)
❍	66-80	Sometimes not met by moderate amounts (**Fair**)
●	46-65	Often not met, sometimes by large amounts (**Marginal**)
✖	0-45	Almost always not met by large amounts (**Poor**)

SITE	1996-97	1997-98	1998-99	1999-00	COMMENTS
Bow River Upstream of Calgary Downstream of Calgary	★96 ❍76	★100 ✓87	★97 ✓82	★97 ✓84	Water quality is better upstream of Calgary than downstream. Upgraded municipal wastewater treatment, including full disinfection (1997), has resulted in improved conditions downstream.
North Saskatchewan River Upstream of Edmonton Downstream of Edmonton	✓91 ❍66	★97 ❍71	✓93 ❍80	✓86 ✓81	Conditions downstream of Edmonton have improved due to upgraded wastewater treatment (1998), which has reduced the number of bacteria.
Oldman River Upstream of Lethbridge Downstream of Lethbridge	❍78 ✓83	✓83 ✓84	✓89 ❍80	★97 ✓86	Conditions are improving downstream of Lethbridge due to upgraded wastewater treatment (1999). The quality of the upstream site varies from year to year due to the influence of city storm runoff. Recent dry conditions have caused less runoff resulting in less movement of contaminants from the land to the river.
Red Deer River Upstream of Red Deer Downstream of Red Deer	❍76 ✓84	n/a n/a	✓83 ✓81	✓87 ❍75	Water quality is better upstream of Red Deer than downstream for all four variable groups (metals, nutrients, bacteria, and pesticides).
Smoky/Peace River At Watino At Fort Vermilion	✓84 ✓86	✓83 ✓89	✓91 ✓94	✓90 ✓86	Conditions remain good at both sites, but nutrients occasionally do not meet guidelines. In addition, a number of pesticides were detected in the Peace River at Fort Vermilion this year.
Athabasca River At Athabasca At Old Fort	✓91 ✓90	✓92 ✓90	✓90 ✓95	✓91 ✓91	Conditions remain good at both sites. However, nutrient and metal concentrations occasionally exceeded guidelines at both sites.

Source: Alberta Environment

n/a - Overall scores are not provided because no pesticide data are available.

*Guidelines vs. Objectives: In this context, a "guideline" refers to a value recommended by an official body (CCME, Province, *etc.*) to support and maintain a designated water use. An "objective" is considered to be a value used in the index formula as a reference against which measured concentrations are compared. An objective may be a guideline or it may be some other user-defined value.

Target

The target is to bring river water quality downstream of developed areas in line with upstream water quality conditions while maintaining overall river quality.

Results

The table shows that the quality of river water at the 12 sites ranges from excellent to fair. Water quality tends to be poorer downstream of areas of urban, industrial or agricultural development. The index values vary naturally from site to site and from year to year, often related to changes in flow volume. However, improvements in conditions downstream from both Edmonton and Calgary can be linked to upgraded wastewater treatment in these two cities. Any activity that significantly changes water quantity or affects inputs from either point (discrete) or non-point (diffuse) sources should be reflected by the index.

Methodology

Monthly water quality samples are collected at two locations for each of the province's six major river systems. An index value is calculated for each of four variable groups for data collected between April and March, representing both a fiscal and a “water” year:

- **Metals** (up to 22 variables measured quarterly);
- **Nutrients** (6 variables measured monthly, including oxygen and pH);
- **Bacteria** (2 variables measured monthly); and
- **Pesticides** (up to 17 variables measured quarterly).

Index values for the four variable groups are then averaged to produce an overall index value that can be tracked over time.

Variables in the first three groups are compared to the guidelines listed *in Surface Water Quality Guidelines for Use in Alberta*. Where a number of guidelines exist for one variable, the guideline for the most sensitive use (recreation, agriculture or the protection of aquatic life) is chosen. Drinking water guidelines are not considered, since surface water should not be used for drinking without first being treated.

Variables in the fourth group (pesticides) are evaluated based on whether or not they can be detected in a water sample. This conservative approach was adopted because some pesticides do not yet have official guidelines, and unlike metals, nutrients and bacteria, do not occur naturally in the environment.

External Factors

River flow volume, temperature, the degree of development along rivers, non-point sources of runoff (such as agricultural fields), and point sources of effluent which discharge into rivers all influence surface water quality. Significant improvements have been made to water quality below major developments as a result of improved point source control. Continued improvements are expected as municipal wastewater treatment facilities and infrastructures are upgraded. These improvements will take time and a significant infrastructure investment on the part of municipalities.

Comparisons with Others

Water quality varies naturally from region to region due to differing soil types, geology, and climatic conditions. The frequency of monitoring, the variables of concern, and water quality objectives chosen also differ from province to province, making comparisons difficult. However, it is possible

to compare jurisdictions based on the impact of wastewater on the aquatic environment. Alberta's municipal sewage treatment standards and infrastructure are highly regarded. In the 1999 National Sewage Report Card published by the Sierra Legal Defence Fund, the cities of Calgary and Edmonton received the highest ratings in Canada (rated A and B+, respectively) for their sewage treatment methods and discharges.

Frequently Asked Questions

1. What variables most commonly do not meet guidelines in surface water? What are the health effects of these variables?

The variables that most commonly do not meet guidelines are fecal coliform bacteria, phosphorus and nitrogen. Fecal coliform bacteria may indicate potential health risks to swimmers, and may affect the suitability of water for crop irrigation and livestock watering. Phosphorus is an important nutrient for plant growth, but in large quantities can be responsible for the unsightly growth of nuisance algae and rooted aquatic plants. Total nitrogen, which includes ammonia, can also cause algal growth, but in large quantities can be toxic to aquatic life, and unsuitable for livestock and plant watering. These guidelines are met more frequently upstream of developed areas than downstream.

Compliance with the total phosphorus guideline varies from year to year at all sites. The most noticeable change in phosphorus compliance is seen in the Bow River downstream of Calgary. In 1982, Calgary's wastewater treatment plants began reducing phosphorus in their effluent. As a result, this guideline is currently exceeded far less frequently below Calgary than it had been in the past. Upgrades to wastewater treatment facilities in the cities of Edmonton and Lethbridge have begun to decrease the amounts of total phosphorus downstream of these cities as well.

Yearly compliance with the total nitrogen guideline also varies naturally, but is generally lower downstream of major centres. The total nitrogen guideline is almost always met in the North Saskatchewan and Bow Rivers, upstream from Edmonton and Calgary. Recent and planned upgrades to the wastewater treatment facilities in a number of Alberta cities will help improve compliance at downstream sites.

Numbers of fecal coliform bacteria almost always meet guidelines at sites upstream of the cities of Edmonton and Calgary. Downstream of these cities, the guideline value is often exceeded. Calgary, Edmonton, and Lethbridge have recently begun to disinfect their wastewater with ultra-violet light. It is anticipated that compliance with the fecal coliform guideline will improve, as this technique is fine-tuned.

Some of the test results not meeting the appropriate guidelines may represent the effect of natural factors on water quality. For example, during spring runoff, levels of nutrients and metals may exceed the guideline values even in undisturbed areas, simply because they are present in the soil that is washed into the river.

2. Which of the rivers identified in this measure have shown the most improvement or degradation? Why?

The surface water quality index has been calculated for data from April 1995 through March 2000. At most sites, the index values reveal no significant overall improvement or degradation over this time period. Most year-to-year differences are likely due to natural variation. However, the addition of ultra-violet disinfection at Calgary's Fish Creek wastewater treatment plant in 1997 is reflected in the improved index values for 1997-98 and 1998-99 in the Bow River downstream of Calgary. A similar upgrade to Edmonton's Gold Bar wastewater treatment facility

in 1998 is reflected in the 1998-99 and 1999-00 results.

The site that appears to show the most improvement is the Oldman River upstream from Lethbridge. In 1995-96, this site was ranked as Marginal; in 1999-00 it was ranked as Excellent. Because city storm drains influence this site, its quality varies with the amount of runoff entering the river from the drains. Recent dry conditions have caused less runoff, resulting in less movement of contaminants from the land to the river. In a wet year, conditions may again become fair or marginal.

3. Why does this performance measure not show historical data before 1995?

The new Surface Water Quality Index (first presented in 2000) should be better able to capture changes in water quality than its predecessor; however, long-term trends in overall index values will be difficult to calculate until a few more years of data are collected. This is because the sampling program has only recently been standardized at all sites. In particular, pesticides were not collected prior to 1995.

Trends over a longer period can be illustrated in individual water quality variables. For example, phosphorus removal at the City of Calgary's wastewater treatment plants in the early 1980s has lead to decreased concentrations of this nutrient being detected in the Bow River downstream of Calgary. Analysis of statistical trends for water quality variables measured at all the long-term river network stations is ongoing. These sorts of analyses provide a more in-depth picture of the complex state of water quality in Alberta rivers.

4. Some sites are reported as having "Excellent" water quality. Is it safe to drink this or any other surface water?

The Index refers to the condition of natural (untreated) surface water. Surface water should *never* be consumed without first being treated. Even so-called pristine water can contain pathogens (microorganisms such as G*iardia, Cryptosporidium* etc.) that cause illness in humans. The source of these organisms is faeces from domestic and wild animals as well as from human sewage. Freezing will not kill these organisms. Any raw surface water can be contaminated. All surface water must have chemically assisted filtration and disinfection as a minimum treatment in Alberta municipal waterworks systems.

5. How does the current index differ from the Surface Water Quality Index presented in 1996 through 1999? Why is it better?

Table 6: Comparison of Index numbers between old and new

	Old ('96-99)	New ('00)	Comment
Sites Reported	12	12+	The index is calculated for the same 12 river sampling locations as previously, plus a number of others that are monitored as part of the province's Long-term River Network (LTRN).
Variables Used	Up to 20	Up to 48	The index uses a wider range of water quality variables than it did previously. New variables include pesticides, ammonia, nitrate, *E. coli*, and a number of metals.

Guidelines/ Objectives Used	Alberta Ambient Surface Water Quality Interim Guidelines (1993)	Surface Water Quality Guidelines for Use in Alberta (1999) * (→)	The water quality variables measured at each site are compared to guidelines. The new index uses a broader and more up to date set of guidelines/ objectives than did its predecessor. * (pesticides are compared to analytical detection limits, since many lack guidelines)
Calculation Method	Percent Compliance	Complex formula incorporating three factors	The old index was based simply on the number of tests meeting guidelines as a percentage of the total number of tests. The new index uses this information (Frequency), along with the number of variables not meeting guidelines (Scope) and the amount by which the guidelines are not met (Amplitude). This method is discussed in Wright *et al*. (1999) and Neary *et al*. (2001).
Numeric Results	0-100, where 100 is best	0 – 100 where 100 is best	Although each index delivers results within the same numeric range, these results are not directly comparable.
Classes	4 – Good Fair Poor Unacceptable	5 – Excellent Good Fair, Marginal Poor	The number and names of the class reflect the terminology tentatively chosen by the CCME. The class names may change, but the number will likely remain at 5.
"Sub-index" Groupings	3 categories based on water use	4 categories based on variable groups	The previous index presented 3 index values for each site in terms of suitability for use by aquatic life, agriculture, and recreational users. While this presentation is attractive, it can be somewhat misleading. The new index will present sub-index values for **metals**, **nutrients**, **bacteria**, and **pesticides** as well as an overall average. References to water use can be made in the accompanying text.
Reporting Period	Calendar Year	Fiscal Year	Because of the lengthy process of sample collection, testing, data entry, and verification, the index can never be "up to date". A fiscal year presentation allows us to be more current (i.e. 1998-99 data in 2000). The fiscal year also approximates a "water year" (starting in spring).
Presentation of Trends	Presented for individual variables	Presented for overall value or for each variable group	Both indices are subject to natural year-to-year variation. Over the long-term, the new index is more robust to these fluctuations and better able to depict trends. Changes to the sampling program from year to year can also make trends difficult to interpret. The LTRN sampling program was standardized in 1999; index values can be calculated on data from previous years that has been sub-sampled to resemble

			the current program. An overall index value cannot be calculated for data prior to 1995, since pesticides were not part of the program at that time.
Presentation Style	Table – quality categories represented by different shades or symbols	Table – categories represented by symbols or Map – categories represented by colours	Like the former index, the new index is presented in tabular format for Measuring Up. Supplemental data are presented as bar graphs. Categories for the full list of 22 sites will be presented as coloured shapes on a provincial map.

6. **How does the Alberta Surface Water Quality Index differ from other WQ Indices used in the province (e.g. Alberta Agricultural Water Quality Index, Oldman River Basin Water Quality Index)? Can numbers calculated for various water quality indices be compared?**

A water quality index is simply a method for combining complex water quality data into a single number or narrative statement. Alberta made a significant contribution to the development of a Canadian Water Quality Index (CWQI) through its participation in a national technical sub-committee under the direction of the Canadian Council of Ministers of the Environment (CCME). Although the CWQI has yet to see official use, the concept has already been applied in Alberta for a number of different purposes. These applications all use the same mathematical formula (calculation of slope, frequency, and amplitude) but differ in the variables and objectives they use, the format they are presented in, and their specific purpose.

The Alberta Surface Water Quality Index (ASWQI) is a department- and government-wide performance measure that is used to indicate the relative quality of sites in major provincial rivers. The index formula has also been adapted for use specifically in the Oldman River and its tributaries as a reporting tool for the Oldman River Basin Water Quality Initiative. The Oldman Index uses fewer variables than the province-wide measure (no metals are included), and consists of a "general" index and a separate "pesticide" index. Index values calculated for the ASWQI will therefore not necessarily match those calculated at the same site using the Oldman method. However, each method should deliver a relatively consistent description of water quality at that site. For example, in 1998-99, the Oldman River at Highway 3 was given an overall index value of 89 (Good) using the ASWQI method, and a general index value of 87 (category 3 out of 10 where 1 is best – green symbol on map) using the Oldman method.

Alberta Agriculture, Food, and Rural Development are also using the CWQI formula to develop an index concept for small streams in agricultural watersheds. The AFRD (AESA) method uses a different set of variables and objectives and a different classification scheme than either the Alberta or Oldman index. Again, numbers will not be directly comparable with the results of these indices. Care should be taken so that the presentation of each of these indices is different enough to discourage direct comparisons. Also, enough information should be provided to the public to allow them to distinguish between the various applications of the index formula and to avoid confusion.

Reduction of Municipal Solid Waste to Landfills

Related Government Business Plan Goals

Goal 1: Albertans will be healthy.

Goal 17: The high quality of Alberta's environment will be maintained or enhanced.

The Measure

This measure charts the Ministry's efforts to work with Albertans to encourage less waste.

The Ministry's role has been to provide technical and financial assistance to municipalities for waste management and recycling infrastructure, as well as training, education and general awareness about waste management options and opportunities

Data

Table 7: Reduction of Municipal Solid Waste to Landfills

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Tonnes per Capita	0.99	1.01	0.91	0.89	0.80	0.74	0.76	0.82	0.79	0.75	0.74

Target

The waste reduction for Alberta is to reduce municipal solid waste disposal to landfills to 0.5 tonnes per capita by 2010.

Results

The above table shows a steady reduction in waste to landfills until 1995. In 1996, increasing economic activity, construction, and demolition projects resulted in increased amounts of materials being sent to landfills. A downward trend in the amount of municipal solid waste to landfills resumed in 1998 and 1999.

Methodology

The method used to calculate the annual waste reduction statistic was developed by the Canadian Council of Ministers of the Environment (CCME). The method is based on the use of measured amounts of material sent for disposal at landfills with weigh scales. Waste statistics are calculated for both urban and rural areas and a composite statistic for the Province is calculated using population estimates provided by Alberta Municipal Affairs.

External Factors

External factors critical to success of waste reduction programs includes the ability of the department to provide services that meet the needs of the waste management industry, to gain continued public and private sector commitment to environmental stewardship, and the introduction of progressive waste management practices and systems.

Comparison with Others

According to the CCME National Solid Waste Inventory (January 14, 1997), jurisdictions across Canada have had mixed success in meeting their 50% waste reduction targets. Several jurisdictions, including Alberta, did well over the first few years as the more-easily-implemented reduction measures took effect. Further reductions have become more difficult and other factors, such as increasing economic activity, have limited progress towards the 50% reduction target.

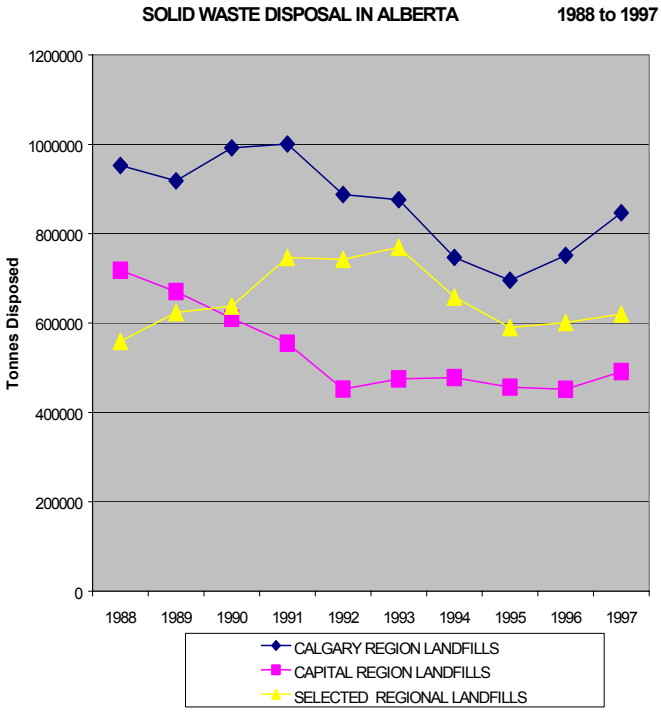
Table 8: Solid Waste Inventory Comparisons between Canadian Jurisdictions

Jurisdiction	Per Capita Disposal		Per capita % reduction (1988-94)
	1988	1994	
British Columbia	1.04	0.74	29
Alberta	1.03	0.81	22
Saskatchewan	1.13	0.79	30
Manitoba	1.00	0.79	21
Ontario	0.92	0.64	30
Quebec	0.84	0.71	15
New Brunswick	0.83	0.80	3
Nova Scotia	0.68	0.80	-18
Prince Edward Island	0.74	0.62	17
Newfoundland	0.95	0.67	29
Yukon Territory	0.65	0.76	-17
Northwest Territories	0.65	0.89	-37
Canada	0.92	0.71	23

Frequently Asked Questions

1. Why was there an increase in waste going to landfills in 1997?

In 1996 and 1997, increases in waste generation were reported in all sectors, including residential, commercial, construction and demolition.



2. If not for the increases in waste disposal for 1997, what would the waste reduction numbers have looked like?

Had waste reduction in Alberta continued at levels experienced between 1991 and 1995, the reduction for 1997 would have been about 41%.

3. What steps need to be taken to meet the 50% waste reduction target in Alberta?

It was evident in the last few months of 1998 that the continued upturn in disposal of wastes to landfill would render the 50% reduction target impossible to attain the year 2000. Alberta Environment will have to focus efforts more closely on high volume, high priority waste materials in order to achieve longer-term waste reduction benefits. A revised performance measure was subsequently adopted to reflect this

Pulp Production Versus the Amount of Substance (Biochemical Oxygen Demand) Discharged

Related Government Business Plan Goals

Goal 1: Albertans will be healthy.

Goal 7: Alberta will have a prosperous economy.

Goal 10: Alberta's value-added industries will lead economic growth.

Goal 17: The high quality of Alberta's environment will be maintained or enhanced.

The Measure

This measure is one indicator of Alberta Environment's performance in protecting aquatic ecosystems.

Oxygen is required in the biochemical breakdown of organic matter in pulp mill wastewater. This breakdown may decrease the amount of oxygen available to aquatic organisms. An excess amount of these substances could cause a shortage of oxygen available to keep aquatic ecosystems healthy. To help control the amount of substance released to aquatic ecosystems, pulp mills are issued approvals, which restrict the amount of biochemical oxygen demand (BOD) that can be released into river water.
Alberta's average maximum allowable BOD is based on criteria for both water quality and best available demonstrated

Data

Table 9: Pulp Production versus Amount of Discharge

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
BOD (kg/tonne)	2.22	1.67	1.22	0.99	0.85	0.9	0.83	0.80	0.82	0.77
Pulp Production (tonnes/day)	3952	4419	5271	6005	6195	6146	6213	6361	6681	6838

Target

BOD discharged for 2002 does not exceed 1.0 kilograms/Air Dried Tonne of Pulp.

Results

Historical data confirm the amount of BOD released per tonne of pulp has dropped substantially over the past 10 years. The current regulated standard for BOD levels is 3 kg per air-dried tonne of pulp. The performance measure shows that industry is well below the standard.

Methodology

Data is derived from the discharge-monitoring component of the department's Environmental Management System (EMS). The seven pulp mills submit monthly monitoring data that is entered into Alberta Environment's EMS system.

The BOD and pulp production data for the seven pulp mills is extracted from EMS. The average pulp production per day and average kg BOD released per day is calculated for each of the seven pulp mills for a given year. The average for all seven mills is added to provide the total average pulp produced per day for all mills (A). The total average kg BOD released per day for all mills are also added together (B). This number (B) is then divided by the total average pulp produced per day (A) to arrive at the average kg BOD released per tonne of pulp produced.

External Factors

A number of factors may influence the breakdown of BOD in aquatic ecosystems. For example, cold winter temperatures slow down natural biological processes such as the breakdown of organic matter. In addition, pulp production may vary creating variations in the amount of BOD in the effluent discharged.

Comparison to Others

The federal government has its own *Pulp and Paper Effluent Regulations* established under the *Fisheries Act*. The provinces are allowed to set standards that are more stringent than the federal requirements but cannot exceed the federal limits. A comparison of the parameters is shown in the table below. Alberta, as well as other provinces, has set limits for more parameters than the federal government to enhance protection of the environment. In addition, Alberta has set limits for other parameters where water quality concerns (based on the *Surface Water Quality Guidelines for use in Alberta)* are applicable.
Delete this table and replace with more up to date comparison from OECD report. Note Alberta upper limit on BOD is now at 3.0 kg/tonne, and TSS is at 5.0 kg/tonne since the 1998 renewal of Daishowa-Marubeni International Ltd.'s approval with lower limits.

Table 10: Effluent Limits Comparison (Monthly Average Discharges kg/tonne)

Parameter	BOD_5	Total Suspended Solids	AOX (organic halides)
Alberta	1.5 to 5.5	2.5 to 9.5	0.55 to 1.5
Canada	7.5	11.25	No limit
Ontario	3.35 to 5.0	5.02 to 7.87	1.5
British Columbia	5.0 to 7.5	11.25	1.5

Source: HA SIMONS Pulp Mill Effluent Benchmarking Study 1996

Frequently Asked Questions

1. How is the BOD standard of 3 kg/tonne of pulp set?

The standard of 3 kg/tonne reported in the annual report is based on a calculated average using the specific standard for each mill. The BOD standard of 3 kg/tonne of pulp is calculated from the monthly average allowable discharge, not the daily maximum allowable discharges. On the Athabasca and Wapiti Rivers, water quality considerations were the main factors in setting the BOD limits for the pulp mills. On the Peace River, where water quality and depletion of oxygen were less of an issue because of the high rivers flow rate, the limits were based on

technological considerations. The department specifies limits to mass loading quantities (kg/day) in approvals. Therefore, even if a mill increases production, discharges of pollutants are capped at a maximum loading. The table below shows the BOD limit as a loading in kg/day (as it appears in current approvals) and as the calculated production basis in kg/tonne (using design production rates).

Table 11: BOD Limits

Pulp Mill	2001 BOD Limit (kg/day)	2001 BOD Limit (kg/tonne)
Alberta Newsprint Company	2100	3.0
Alberta Pacific Forest Industries Inc.	2250	1.5
Daishowa Marubeni International Ltd.	4050	3.0
Millar Western Pulp	2040	3.0
Slave Lake Pulp Corporation	1050	2.1
Weldwood of Canada Ltd.	3300	3.0
Weyerhaeuser Canada Ltd.	2460	3.0

2. What does the department do to ensure that all those discharging into rivers maintain this standard?

Every pulp mill in Alberta submits a monthly wastewater discharge quality report to Alberta Environment. Staff reviews this data and enters it into a database to evaluate compliance with the set limits. Any exceedences of the BOD limits are referred to Enforcement and Monitoring for investigation. Pulp mills are also legally obligated through their approvals to report any exceedences of limits directly to the AENV. Periodically, the staff takes samples of the mill's effluent to ensure the limits in approvals are being met.

3. If the industry standard is 3 kg/tonne, why is this standard not used as the target for this performance measure?

Industry's performance is already well below the 3 kg/tonne standard. To encourage industries to "meet this target" would imply that industries should release more BOD into the environment. Instead, we are encouraging industries to continue to reduce their loading.

4. Has any approval holder ever exceeded this standard during the reported period?

The discharge limits have evolved over time as new technology allowed the pulp mills to reduce the quantities of pollutants released into the receiving environment. In 1990, the average BOD discharge was 3.17 kg/tonne. The numbers reported annually for the BOD performance measure also represent an average that includes all seven mills. Individual mills may have exceeded this value although better performing mills brought down the average value. Since 1991, the annual average discharge for all seven mills has not exceeded 3 kg/tonne.

5. Given that flow levels and winter temperatures can affect the ability of rivers to assimilate discharges, what checks are in place to ensure that winter discharges don't damage river ecosystems?

Where water quality and dissolved oxygen levels in the river are prime considerations in setting pulp mill BOD limits, low flows and winter temperatures are already taken into account. Water quality models used the critical low flow time periods to calculate allowable inputs from pulp mills, also considering all the other inputs into the river system from municipal or other industrial sources.

The limits that were set for the mills ensure that dissolved oxygen in the rivers should not fall

below 5.0 mg/L at any given time (the dissolved oxygen standard when the limits were developed based on water quality models). The Northern River Basins Study recommended a minimum dissolved oxygen level of 6.5 mg/L, which has been adopted in the *Surface Water Quality Guidelines for use in Alberta* as a weekly average value. Renewed pulp mill approvals incorporate this standard as a minimum level that must be maintained in the rivers.

The current BOD limits have historically proven to be sufficient to protect water quality. With sufficient levels of dissolved oxygen present in the river, ecosystems will be protected. Pulp mills have also been required to conduct winter benthic surveys downstream of their mills to compare the invertebrate population health to locations upstream of the mills. These surveys have shown no evidence of excessive dissolved oxygen depletion effects downstream of the mills.

As an additional check on the health of river ecosystems, the department conducts water quality surveys on major river systems where industrial or municipal discharges could have an effect. For example, winter water quality, including dissolved oxygen, is measured during the critical months on the Athabasca River, which receives discharge from five Alberta mills.

6. What action does the Department take when exceedences occur?

As with all violations of approval conditions, if an exceedence does occur, then Enforcement and Monitoring would begin an investigation. Depending on the results of the investigation, Alberta Justice could take legal action against the company.

7. If the provincial standard for BOD from pulp effluent is 3 kg/tonne, and industries are averaging 0.77 kg/tonne, why can't we lower the provincial standard to 1 kg/tonne?

The provincial standard is now 3 kg/tonne for most mills. Alberta Pacific and Slave Lake Pulp Corp have more stringent standards of 1.5 and 2.1 kg/tonne, respectively.

The 0.77 kg/tonne number (2000) is an AVERAGE of seven mills. Some mills perform better than others because of the age of the mills, the process they use and the type of treatment systems they use do. The annual average for the best mill was 0.1 kg/tonne and for the worst it was 2.0 kg/tonne. The 3 kg/tonne limit provides protection of the aquatic environment, based both on water quality models and on actual in stream measurements.

The department has completed the operating approval renewals for all the pulp mills and will not begin the next cycle of renewals until 2003. We follow the *Industrial Release Limits Policy* in setting standards. This recommends choosing the more stringent of the water quality based limits or the technology based limits. Three kg/tonne is the same for both water quality and technology based limits for this industry. In 2003, we will again consider technology improvements, water quality protection, and past performance of the mills to determine if a new standard should be set.

8. What modifications/improvements are planned for this measure?

If new standards are adopted based on Best Available Technology, the performance measure standard will be updated to reflect the improvements and to set new goals for the pulp industry.

Government of Alberta Greenhouse Gas Emission Profile

Related Government Business Plan Goals

Goal 7: Alberta will have a prosperous economy.

Goal 16: Alberta's renewable natural resources will be sustained.

Goal 17: The high quality of Alberta's environment will be maintained or enhanced.

The Measure

Actions to reduce GHG emissions stem from three core focus areas for the Alberta government. These areas include government owned buildings, waste by Government of Alberta employees and vehicles.

Greenhouse gas emissions are calculated by multiplying annual energy usage (cubic meters of natural gas, litres of gasoline, etc. that is tracked by Alberta infrastructure) by an emissions factor. With the exception of electricity and waste, emissions are based on Environment Canada data published through the National Voluntary Challenge and Registry Program (VCR Inc.).

All greenhouse gas emissions reported for this measure will be based on the best available data.

Data

Table 12: Alberta Government Baseline, Targets, and Actual Figures for Greenhouse Gas Emissions.[1]

Kilotonnes of CO_2 Equivalent

	1996	1997	1998	1999	2000	2001
Baseline	545	539	540	540	540	540
Target	531	513	502	491	479	427
Actual	502	475	457	444	433	

**In 2001, Alberta government emissions from 1990 to 1999 were re-calculated to reflect recent updates to emissions factors, reflecting better science, and improved methodologies. These changes increase the absolute levels for each year, however their relative position (including percentage reductions overall and relative to annual targets remain the same). The 2000 figures, and those in the revised Action Plan, are based on the new emissions factors and methodologies.*

Target

The new target is to reduce GHG emissions is 26 per cent below 1990 levels by the year 2005. In 1990, emissions were 549 kilotonnes of CO2 equivalent.

Results

The Alberta government continues to reduce its overall emissions and has consistently exceeded its annual targets. In fiscal year 2000-2001 emissions of CO_2 equivalent were 433 kilotonnes (or 22 per cent) below 1990 levels. These reductions exceed our 2000-2001 target by 46 kilotonnes. The Alberta Government has submitted a new Action Plan under the VCR Inc. for continued efficiency actions to be achieved between 2000-2005. In addition to the Alberta government's new targets and measures in the new plan, the Alberta government will be participating in the VCR Inc.

1 Table 1 shows the target emission reductions, adjusted in the 1997-98 progress report to account for a spreadsheet error.

Champions in Action initiative. This initiative will place additional rigour on climate change reporting.

Methodology

GHG emissions are calculated by multiplying annual energy usage (cubic metres of natural gas, litres of gasoline, etc. that are tracked by Alberta Infrastructure) by an emissions factor. With the exception of electricity and waste, emissions are based on Environment Canada data published through the National Voluntary Challenge and Registry (VCR Inc.) program.

Frequently Asked Questions

1. How is this target established?

The Alberta Government greenhouse gas emission reduction target was set in 1996 by an interdepartmental team consisting of government departments with lead responsibility for the management of the government's buildings, vehicles and solid waste. Departments developed an emissions baseline to account for expected changes in government operations. For example, the baseline recognized the reduction in the size of the Alberta government in the mid-1990s. The emission reduction target was based on emission reductions that could be achieved through the government's building energy management program, changes in the government's vehicle fleet and other planned initiatives.

2. How do Alberta Government actions compare to other Canadian governments (federal or provincial)?

The Alberta government has been a leader in taking voluntary action to reduce its own emissions of greenhouse gases. Alberta was the first government to submit an action plan to the Voluntary Challenge and Registry office (VCR Inc.). The province was also the first government to have its Action Plan recognized as a "Gold Level" reporter – the highest standard for reporting under the VCR. The Alberta Government's actions to reduce greenhouse gas emissions have also been recognized through VCR Inc.'s National Leadership Awards. Alberta's action plan is the only provincial or federal government Action Plan to be recognized – on three separate occasions, including the 2001 Leadership Awards.

3. What are the Government of Alberta's post-2000 targets for greenhouse gas emissions from its own operations?

The Alberta Government has established a target to reduce greenhouse gas emissions from its operations by 26% below 1990 levels. This new target was outlined in the Government's October 2001 submission to VCR Inc. This target will be pursued in collaboration between Alberta Infrastructure, Alberta Transportation, Alberta Environment and other government organizations.

4. What is the background on this measure?

The Alberta government was one of the leading proponents of the national Voluntary Challenge and Registry initiative – outlined in 1995 as a major element of Canada's National Action Program on Climate Change. To demonstrate leadership and set an example for others, in 1995 the Alberta government voluntary committed to reduce emissions from its own operations was outlined in its submission to the Voluntary Challenge and Registry. Our first VCR Action Plan was submitted in the fall of 1995. Government

leadership in improving energy productivity was subsequently recognized as a key element of Alberta's climate change strategy – released by Premier Klein in October 1998. In February 2002, Environment Minister Lorne Taylor outlined a renewed Alberta climate change strategy, which again included a strong focus on government leadership.

Measuring Government action to Improve Energy Productivity aims to promote activities that improve the energy efficiency of Alberta government operations through energy audits of government buildings, appliances and vehicles and energy productivity targets for departments.

5. What is the rationale for this Index?

Over the last couple of years there has been a growing concern about climate change as a result of rising greenhouse gas (GHG) emissions. As part of a government management team lead by Alberta Infrastructure, Alberta Environment and Alberta Transportation have been working on measuring the government contribution to encouraging reductions in GHG emissions. Alberta Environment has measured the amount of emissions released by government for the last three years.

Alberta Organizations Energy Productivity Improvements

Related Government Business Plan Goals

Goal 7: Alberta will have a prosperous economy.

Goal 9: Alberta businesses will be increasingly innovative.

Goal 17: The high quality of Alberta's environment will be maintained or enhanced.

The Measure

The measure uses annual data obtained from the National Voluntary Challenge and Registry (VCR Inc.) to determine how many action plans have been filed by Alberta organizations throughout a given year.

Data

Organizations that are operating in Alberta who do not have headquarters based here are not listed as Albertan organizations.

The cumulative number of action plans has been increasing since 1995 (Figure 16). The number of action plans in 2000 was 161.

Table 13: Cumulative Number of Submitted Action Plans from Alberta Companies to VCR

Year	1995	1996	1997	1998	1999	2000
Number of Action Plans	55	83	103	132	161	161

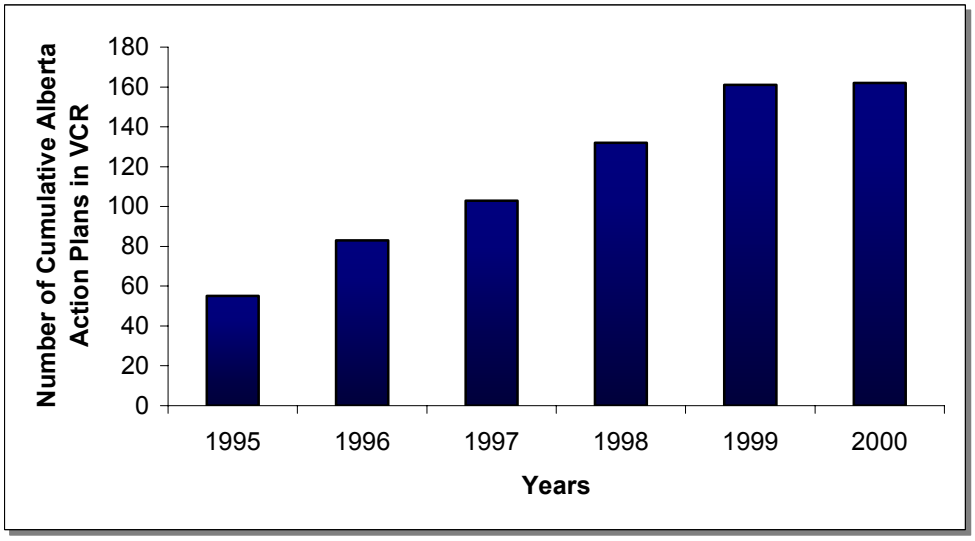


Figure 1: Graph of Cumulative Number of Submitted Action Plans from Alberta Companies to VCR

Target

Continued increase in the number of registered plans.

Methodology

Data is obtained from VCR Inc., a non-profit partnership between industry and governments across Canada. Its mandate is to provide the means for promoting, assessing and recognizing the effectiveness of the voluntary approach in addressing climate change.

Only organizations that have head offices located in Alberta are included in this data.

Supplemental Information

In 1999 VCR Inc. introduced the Champion reporting system. The intent is to recognize organizations that report more rigorously. Based on the Olympic medal system reports 'earn' a logo that provides more profile to their submissions. Alberta has the most Champion-level reporters of any jurisdiction involved with VCR Inc.

Table 14: Percentage of Albertan Organizations in each Champion-level of reporting as of 2000.

Level of Reporting	Percentage that are Albertan Organizations
Gold	39%
Silver	35%
Bronze	35%

Frequently Asked Questions

1. **What is VCR Inc?**

   The Voluntary Challenge Registry Inc. is a not-for-profit organization that promotes the voluntary approach of reducing greenhouse gas emissions. The Challenge Registry is a place for companies document their progress and to be recognized for voluntary actions taken to reduce greenhouse gas emissions.

2. **Why use VCR Inc. data?**

   VCR Inc. has a database on the Internet that allows the public view the progress of Canadian organizations. By promoting VCR Inc, through the use of their data, it raises the awareness of companies actively engaged in greenhouse gas emission reductions. The database also allows other organizations can learn from other "leaders" within their sector and pursue best practices.

3. **What is the Alberta Government doing about Climate Change?**

   The Alberta Government is registered with VCR Inc. and has submitted its own Action Plan. As a Gold level reporter we have reduced greenhouse gas emissions associated with government operations by 22% below 1990 levels as of 2000/2001.

4. **What further background is there on this measure?**

Energy consumption and the use of materials and natural resources drive emissions, yet these activities also drive the global economy. The challenge is to achieve economic prosperity while reducing both energy use and material flows across the global economy.

Alberta has benefited from the world's reliance on fossil fuels, developing and exporting the bulk of its coal, oil and natural gas to other parts of North America and the world.

Recently, the burden that industrialization places on global resources has received as much attention as its benefits. The challenge faced by Alberta is to ensure that economic growth is sustained while reducing the carbon intensity of Alberta's energy products and reducing the overall energy demand across the province.

Industry, academia and environmental organizations, often working collaboratively with government, have responded effectively to climate change issues through local, regional, provincial, national and international perspectives.

Many Alberta companies are leading the country in innovative ways of reducing or mitigating greenhouse gas emissions. A growing number of companies are considering future constraints on greenhouse gas emissions when planning operations and making investment decisions.

5. What is the rationale for this Index?

A key element of Alberta's climate change strategy is action by all Alberta organizations to improve their energy productivity. The measure illustrates the Ministry's effectiveness in obtaining voluntary action by Alberta organizations to reduce greenhouse gas (GHG) emissions.

6. Why are not more organizations taking voluntary action?

The VCR Inc. Registry does not include all of the organizations that are taking action in Alberta. It is focused on those organizations that have outlined detailed action plans for greenhouse gas emission reductions that meet the reporting requirements of VCR Inc. One of the reasons why Alberta not seen an increase in companies reporting to VCR Inc. is recent merger trends within various sectors of the economy. For example, over the past several years, the petroleum sector has seen a relatively large number of mergers and acquisitions. As well, many organizations are taking voluntary action that may not be recognized. The Alberta government is partnering with Climate Change Central to increase the level of engagement in the climate change issue through public education and outreach and innovative pilot programs.

7. What are the minimum standards of reporting for VCR Inc.?

The minimum criteria to gain entry into VCR Inc. is the basic Action Plan which must include:

- Senior management support,
- Commitment to regular reporting and
- A base year calculation.

8. What are the requirements of the different levels of Champion-level reporting?

There are 42 different elements on the Champion Reporting Checklist. Each of these elements has been allocated different point values. There are possible 100 points available from all the elements. A Gold level reporter needs 90 points, Silver level 70 and Bronze level 50.

Along with the point values there are certain required elements that must be included for each level.

Required elements for Gold level:

- Provide a signed statement of endorsement from senior management
- Commit to regular reporting
- Provide quantification that can be used in target setting
- Commit to target setting
- Provide a list of key activities/projects
- Provide a tonnage inventory of all emissions
- Provide results are achieved in comparison with targets
- Provide results achieved are below 1990 levels of CO_2e or energy intensity per unit of output
- Provide results are achieved which are verifiable
- Provide an explanation of the climate change issue to employees
- Communicate the company response to climate change
- Identify opportunities for individual action

Requirements for Silver and Bronze level

- Provide a signed statement of endorsement from senior management
- Commit to regular reporting
- Provide quantification that can be used in target setting
- Commit to target setting
- Provide a list of key activities/projects
- Provide a tonnage inventory of all emissions