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Environment Accounts and Statistics Division

Environmental Protection Expenditures in the Business Sector, 1996 and 1997 (revised)

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Environmental Protection Expenditures in the Business Sector, 1996 and 1997 (Revised)

Statistics Canada

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Symbols

The following standard symbols are used in Statistics Canada publications:

.. figures not available

... figures not appropriate or not applicable

- nil or zero

-- amount too small to be expressed

x confidential to meet secrecy requirements of the *Statistics Act*

Preface

This publication presents revised estimates from the *Survey of Environmental Protection Expenditures* for 1996 and 1997. The survey covers capital and operating expenditures made in 1996 and 1997 by businesses in order to anticipate or to respond to an environmental regulation, environmental convention or voluntary agreement.

Environmental regulations, current and anticipated, play a major role in the evolution of industry spending on environmental protection. For the past decade, governments in Canada have imposed various environmental regulations regarding the prevention or reduction of air emissions, effluents, solid waste, as well as the protection of wildlife and habitat. However, industry spending on environmental protection may also be affected by environmental conventions and voluntary agreements between governments and industry representatives. These are increasingly important and include specific actions on pollution prevention or abatement.

The *Survey of Environmental Protection Expenditures* tries to fill gaps in the data regarding the cost to industry of environmental protection and the demand for associated environmental products and services.

Acknowledgements

This report was prepared by the Environment Accounts and Statistics Division under the direction of Claude Simard, Director and Alice Born, Chief, Environmental Protection Accounts and Surveys. Data collection for this survey was conducted by the Operations and Integration Division under the supervision of Colette Brassard, Maureen Publow and Paul Pignat.

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1 Highlights

Total expenditures on environmental protection by the industries included in the *Survey of Environmental Protection Expenditures* [1] totalled $4.7 billion dollars in 1997[2], down slightly from $4.9 billion in 1996. Operating expenditures made up 61% of the total in 1996 and 63% in 1997.

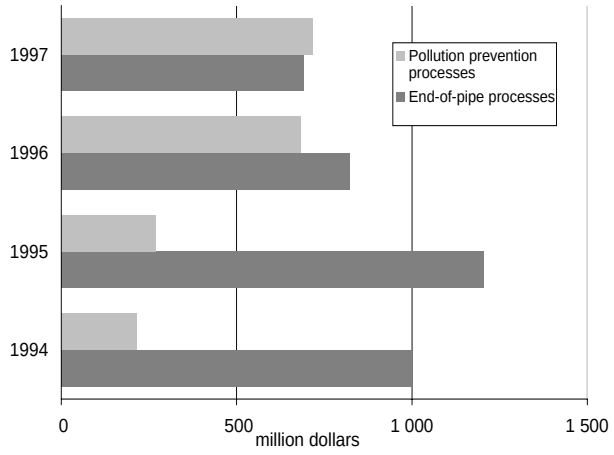
While operating expenditures remained at the same level in 1997 ($3.0 billion in 1996 and 1997), capital expenditures declined from $1.9 billion in 1996 to $1.7 billion in 1997 (Tables A.1 and A.2). The decline was due to a 16% decrease in capital investment spending on end-of-pipe processes for pollution abatement and control (PAC)–those designed to abate undesirable substances resulting from normal production. In comparison, investment spending in pollution prevention (e.g. integrated process changes), grew just over 5% and for the first time exceeded investment spending in PAC end-of-pipe processes (Tables A.5 and A.6). Since 1994, the first year of the survey, businesses have steadily reduced their capital expenditures on end-of-pipe technologies while increasing their capital investment in cleaner integrated process changes (Figure 1.1).

For the fourth consecutive year, the Pulp and Paper industry had the largest capital investment in environmental protection ($331.5 million in 1997). In this industry, environmental investment spending was characterized by large amounts allocated to end-of-pipe processes ($180.0 million) and pollution prevention (integrated process changes) ($136.8 million) (Table A.6).

However, total capital expenditures on environmental protection in Pulp and Paper declined by almost 50% compared with 1996. Industry sources suggest that the focus among pulp and paper companies has shifted from large investment expenditures on environmental protection during the late 1980s and early 1990s, to improved production processes and quality of product. Also, the Pulp and Paper industry was subject to strict environmental regulations for effluents and air emissions in the early 1990s. Compliance to federal and provincial regulations on effluents were scheduled by the end of 1995, explaining the large decrease in 1996 and 1997.

1. Logging, mining, crude petroleum and natural gas, manufacturing, pipeline transport and gas distribution systems. Not covered were agriculture, construction, transportation, distributive trade and services.
2. Figures shown in this report for 1997 are revised estimates. Therefore they are different from the preliminary data released in November 1999 (see Statistics Canada, 1999, *The Daily,* Thursday, November 25). Figures for 1996 are revisions from estimates published in Statistics Canada, 1999, *Environmental Protection Expenditures in the Business Sector, 1996, Preliminary Data,* Catalogue No. 16F0006PPE/PIE, February.

Figure 1.1
Investment Spending on PAC End-of-pipe Processes versus Investment on Pollution Prevention Processes, 1994-1997



Note:
Before 1997, the investment category "pollution prevention" was titled "PAC integrated processes".
Source:
Statistics Canada, Environment Accounts and Statistics Division.

The Primary Metals industry reported the second largest amount of capital investment in environmental protection ($290.4 million), a 16% increase over 1996. Investment in integrated process changes decreased by almost $19 million, but this drop was more than offset by the $46 million increase in end-of-pipe capital investment spending. Primary metals facilities have reported increases in recycling and reclamation, improvements in process efficiency and investment in other pollution control equipment.[3]

Business operating expenditures on environmental protection stayed virtually the same from 1996 to 1997 at $3.0 billion (Tables A.23 and A.24). Operating expenditures on PAC end-of-pipe processes, excluding the "other" manufacturing category, represented 48% of total operating expenditures in 1997[4] (Tables A.25 and A.26). By comparison, operating expenditures for pollution prevention accounted for almost 16% of total operating expenditures on environmental protection (excluding "other" manufacturing). The Pulp and Paper and Primary Metals industries reported the highest operating expenditures for environmental protection ($478.3 million and $485.4 million respectively).

On a provincial basis, capital expenditures on environmental protection declined by $118.7 million dollars in

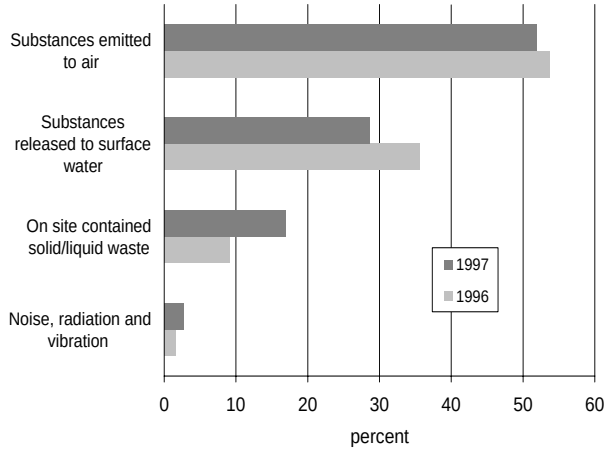
3. Commission for Environmental Cooperation, 2000, *Taking Stock, North American Pollutant Releases and Transfers, 1997,* Montreal.
4. In 1997, operating expenditures on PAC end-of-pipe processes include the purchase of waste management and sewerage services. Before 1997, data on these purchased services were collected separately from data on end-of-pipe processes.

Quebec between 1996 and 1997, while they increased by $130.8 million in Ontario (Tables A.7 and A.8). Most of the decline in Quebec was due to smaller capital investment spending in pollution prevention (investment in pollution prevention increased in Ontario). End-of-pipe PAC operating expenditures increased slightly in both provinces during the same period. Environmental protection expenditures in Alberta and British Columbia fell due to decreases in investment spending for PAC end-of-pipe processes in Alberta and for pollution prevention in British Columbia (Tables A.9 and A.10).

Capital investment spending by environmental medium

Figure 1.2 illustrates the shift between 1996 and 1997 from capital investment spending to minimize substances released to surface waters (and to a lesser extent substances emitted to air) to capital spending on PAC processes to reduce or abate on-site solid and liquid waste (affecting soil and groundwater). This shift in investment spending occurred in both end-of-pipe processes and integrated process changes.

Figure 1.2
Investment Spending on Pollution Abatement and Control by Environmental Medium, 1996-1997



Note:
In 1996, the category "on site contained solid/liquid waste" was titled "soil and groundwater".
Source:
Statistics Canada, Environment Accounts and Statistics Division.

1.1 Survey objectives

The *Survey of Environmental Protection Expenditures* is a source of important information to fill data gaps regarding the cost to industry of environmental protection and the demand for associated environmental products and services. It is part of a major project to develop a national statistics database on the "environment industry". The database provides information allowing the identification and measurement of the supply of goods, services and technologies that are produced by the environment industry and the demand for such products. Information on the demand for environmental goods and services also includes environment-related research and development expenditures as well as government expenditures on environmental protection.

A new upcoming report, *Use of Environmental Technologies and Practices by Canadian Business, 1997*[1], will present additional information from the survey including a profile of environmental processes and technologies used by businesses. The report will also provide information on environmental practices adopted by industry as well as an in-depth analysis of pollution prevention practices in current use (see Section 2 for more detail).

1.2 Definitions

The business sector is involved in a variety of practices aimed directly or indirectly at protecting the environment from the effects of its production activity. These activities have generally been brought about by environmental regulations and, more recently, by voluntary programs and conventions. One method of assessing the effectiveness of these activities is to measure expenditures made on environmental protection (Text Boxes 1.1 and 1.2).

1. Statistics Canada, Catalogue No. 16F0024XIE, fall 2000.

Text Box 1.1

Environmental Protection Expenditures

Environmental protection expenditures are defined as all capital (or investment) and repair expenditures and operating (or current) expenditures incurred in order to comply with or to anticipate environmental regulations, conventions[1] or voluntary agreements that apply to Canada.

The difficulty is to measure multiple-purpose expenditures, that is, expenditures that are made in order to reduce costs but that, at the same time, reduce energy consumption or waste generation. This is a particular problem with business expenditures. For this reason, the 1997 survey expanded the criterion of environmental protection to include any expenditure that ensures or anticipates compliance to environmental regulation or official voluntary agreement.[2] Environmental protection expenditures are classified as follows:

- **Pollution abatement and control (PAC) expenditures**: expenditures for solid waste management; for wastewater management; for environmental monitoring (e.g., air quality); and for equipment and construction used to prevent or reduce pollution;
- **Other environmental protection expenditures**: expenditures for site reclamation and decommissioning; for environmental assessments and audits; and for protection and restoration of wildlife and habitat.

Expenditures on environmental research and development are excluded, in principle, from the data on business expenditures. The data are collected through another Statistics Canada survey, the *Research and Development in Canadian Industry Survey*.

1. Environmental conventions include any formal multiparty commitment to meet specific targets relating to habitat protection and waste and pollution abatement, such as the Canada–U.S. Air Quality Agreement, the National Packaging Protocol, and the Responsible Care Program adopted by the Canadian Chemical Producers' Association.
2. Any voluntary agreement implemented by an establishment or the participation in any voluntary environmental program such as ARET (Accelerated Reduction/Elimination of Toxics).

Text Box 1.2

Classification of Business Environmental Protection Expenditures

Business operating, capital and repair expenditures on environmental protection are broken down according to the following categories:[1]

Environmental monitoring: expenditures for purchase of equipment, supplies, labour and services required to monitor pollutant emissions that would affect air, water or soil quality;

Environmental assessments and audits: expenditures made to review current operations' compliance with regulations and to evaluate the environmental impact of proposed projects;

Site reclamation and decommissioning: expenditures for clean-up of environmental damage and for closing a site;

Wildlife and habitat protection: expenditures made to protect wildlife and habitat from the effects of economic activity and to restore stocks that have been adversely affected by such activity;

Treatment and control of pollution (end-of-pipe processes): expenditures related to funding of separately identifiable processes whose sole purpose is to abate or control undesirable substances emitted during normal production activities, without any incidence on the production process itself; expenditures on waste and sewage management and treatment.[2]

Pollution prevention (PAC integrated processes): expenditures made to develop a new or significantly modified production process in order to prevent or reduce the generation of pollutants and waste; expenditures on leak and spill prevention; expenditures on energy and water conservation; expenditures on recirculation, recovery, reuse and recycling of materials and substances.[3]

Environmental fees, fines and licences; and

Other environmental protection: expenditures for administration of environmental projects, for training, and for other initiatives not elsewhere specified.

1. Each category includes salaries and wages of the business own-account employees for environmental projects as well as purchases of environmental services from a private contractor or from government.
2. In 1996, the purchase of waste management and sewerage services was reported separately. In 1997, purchase of waste management and sewerage services was included as part of end-of-pipe expenditures.
3. . Before 1997, expenditures on pollution prevention were titled expenditures on PAC integrated processes.

2 Survey Methodology

2.1 Objective

The *Survey of Environmental Protection Expenditure Survey* (SEPE) provides a measure of the cost imposed on industry in order to comply with or to anticipate compliance with environmental regulations and conventions. The increasing use of voluntary measures in Canada to prevent and control pollution resulted in the addition of "environmental voluntary agreements" as one of the key criteria for reporting environmental protection expenditures to the 1997 survey. The 1997 survey also collected new information related to environmental practices and technologies used by industry for the purpose of preventing or abating pollution.

The SEPE has been conducted on an annual basis since 1994. This section will describe the methodology of both the 1996 and 1997 cycles. Differences in methodology between the two survey cycles are highlighted and discussed.

2.2 Coverage and data collection

The 1996 and 1997 SEPE did not cover the entire economy (i.e., agriculture, construction, distributive trades, services industries and the government sector were not surveyed). Rather, the survey targeted a number of industries where environmental protection spending was likely to constitute a relatively large proportion of total expenditures.

The data reported in this study are based upon a survey of 2,459 establishments in 1997 and 2,426 establishments in 1996 in primary industries (resource extraction industries) and manufacturing industries, electric power and gas distribution industries and pipeline transport industry. In order to be selected in the survey, the establishment had to have more than 49 employees.

Estimates of 1997 environmental protection expenditures were revised after the November, 1999 release.[1] Therefore, 1997 figures presented in this report are the most recent estimates.

1. Statistics Canada, *The Daily*, November 25, 1999.

2.2.1 Survey frame

A list of establishments to be surveyed was produced using the frame from Statistics Canada's *Annual Survey of Manufactures*, the Business Register and other frames of establishments or companies active in the following industries: Crude Petroleum and Natural Gas, Pipeline Transport, Coal, Electric Power Systems and Gas Distribution Systems. A list of metal and non-metal mining establishments was produced, based on Natural Resource Canada's *Census of Mines*.

2.2.2 Sample selection

Target industries

A number of industries were targeted for increased survey coverage (14 in 1996 and 15 in 1997) based on 2-digit and 3-digit Standard Industrial Classification (SIC) industries (Text Box 2.1). Target industries were selected on the likelihood that they faced or anticipated high levels of environmental expenditures. The selection was based upon previous survey results and additional information obtained

Text Box 2.1

List of Selected Targeted Industries

- Logging (SIC 041)
- Mining (SICs 061, 062, 063)
- Crude Petroleum and Natural Gas (SIC 071)
- Food (SICs 101-109) and Tobacco Products (SICs 121-122)
- Beverage (SICs 111-114)
- Pulp and Paper (SIC 271)
- Primary Metals (two digit SIC 29)
- Transportation Equipment (SICs 321-329)
- Wood (SICs 251, 252, 254 and 259) - 1997 only
- Non-Metallic Mineral Products (two digit SIC 35)
- Refined Petroleum and coal products (two digit SIC 36)
- Chemical and Chemical Products (two digit SIC 37)
- Electric Power Systems (SIC 491)
- Pipeline Transport (SIC 461)
- Gas Distribution Systems (SIC 492)

from annual reports of companies and Statistics Canada's annual *Capital and Repair Expenditure Survey.*[1]

For most of these target industries, all establishments with more than 49 employees were surveyed. A sample of establishments (with more than 49 employees) in other, non-target manufacturing industries was taken. In general, target industries were identified as those reporting more than $1000 of environmental expenditures per employee in 1995 (same criterion used in 1997 based on the 1996 survey results). Establishments with more than 49 employees in the *target* industries (non-manufacturing and targeted manufacturing industries) were provided with a long questionnaire.

The following target industries were included in the census (take-all) portion of the survey: Logging; Mining; Crude Petroleum and Natural Gas Beverage; Tobacco Products; Pulp and Paper; Primary Metals; Refined Petroleum and Coal Products; Electric Power Systems; Pipeline Transport; and Gas Distribution Systems.

Manufacturing sample

The manufacturing sample was made of a take-all strata and a take-some strata. All establishments with more than 49 employees in the following target manufacturing industries were selected and received a long questionnaire: Beverage, Tobacco Products, Pulp and Paper, Primary Metals and Refined Petroleum and Coal Products.

A stratified sample (including some take-all and take-some strata) was taken for the following target manufacturing industries: Food, Wood[2], Non-Metallic Mineral Products, Transportation Equipment, and Chemical and Chemical Products. These industries were sampled at the 3-digit SIC level because of their low environmental expenditure per employee ratio and their large number of small and medium-sized establishments. However, these five manufacturing industries remained target industries because the environmental expenditure to employee ratio was higher than $1000 at the 2-digit SIC level. Consequently, establishments in these industries received a long form.

The non-targeted manufacturing industries were sampled at the 3-digit SIC level and grouped into an "other manufacturing" category. Establishments (with more than 49 employees) in these industries received a short questionnaire.

The take-some strata were selected by ranking establishments within each 3-digit SIC by employment. If there were 50 or more establishments in the 3-digit SICs, the top 15% establishments, ranked by employment, were selected. If there were between 15 and 49 establishments, the top 20% ranked by employment were selected. Where the total number of establishments fell below 15, all establishments were selected. In some provinces and territories, in order to obtain minimum coverage, the employment thresholds had to be reduced. The sample selected the largest establishments in order to minimise response burden. Analysis has shown that there is no bias introduced by surveying the largest establishments because of the absence of a correlation between the environmental expenditure to employment ratio and employment size.

The fact that establishments with the largest number of employees were targeted ensured a satisfactory employment representation. For example, the 1997 sample covered 74.4% of total employment in the target industries.[3]

Non-manufacturing survey

All establishments with more than 49 employees in Logging, Mining, Crude Petroleum and Natural Gas, Electric Power Systems, Gas Distribution Systems and Pipeline Transport were selected.

2.2.3 Environment protection expenditure questionnaire

The survey questionnaire was originally designed in consultation with key public and private sector groups and looking at experience from other countries who have conducted similar surveys. The scope of the survey was to include all expenditures that are required to meet environmental regulation, convention or voluntary agreement[4] (see the questionnaire for further explanation). The mail out of the 1996 survey took place in November 1997 while the 1997 mail out took place in November 1998. To minimise response burden, establishments in non-target manufacturing industries received a shorter version of the questionnaire.

In the short version of both 1996 and 1997 questionnaires, the expenditure breakdown requested included capital (and repair) expenditures and operating expenditures for pollution abatement and control; capital and operating expenditures for other environmental protection activities; and purchase of waste and sewerage management services, and other environmental services. The 1996 short questionnaire had a question on the amount of environ-

1. That survey provided information on industries that had relatively high capital expenditures on assets associated with pollution abatement and control (PAC). In the past, information from surveys in other countries was also used to help determine target industries.
2. In 1996, the Wood industry was sampled as part of other manufacturing industries category but in 1997 it became a target industry. Wooden Box and Pallet industry (SIC 256) and Coffin and Casket industry (SIC 258) were excluded from the sample.
3. Total employment of establishments with 49 or more employees.
4. Environmental voluntary agreements were added as a specific criterion (in addition to the convention criterion) for the 1997 SEPE.

mental services purchased from a private contractor or a government. This question was modified in 1997 to collect more detailed purchased service information related to environment-related construction and engineering services and other environmental services.[1]

The 1996 long questionnaire - provided to establishments in target industries - asked respondents to report the amount of operating and capital expenditures on purchased services from a private contractor or government. As was the case for the short form, this question was modified on the 1997 long form to collect more detailed purchased service information related to environment-related construction and engineering services and other environmental services.[2]

In the 1997 long questionnaire, the expenditure question on treatment and control of pollution (end-of-pipe processes, Question 6) was modified to include the purchase of waste and sewerage services (instead of treating this item separately from end-of-pipe expenditures, as was the case before 1997). The question on expenditures associated with integrated process changes was reformulated in 1997 in order to clarify its meaning in order to reflect the Federal Government's increasing focus on pollution prevention.

Both short forms and long forms included a section asking respondents to identify the principal pollution prevention and abatement methods used. The 1997 long questionnaire focused on pollution prevention methods.

Another new feature of the 1997 long questionnaire was to provide a list of over 100 environmental processes and technologies that the respondent could choose from by checking the appropriate technologies (Question 12). This question replaced previous ones asking respondents to describe their main end-of-pipe processes and integrated process changes. The 1997 long questionnaire also included, for the first time, a question related to other environmental practices adopted by establishments (Question 13). Examples include environmental management systems, ISO 14000 certification, participation in any environmental voluntary agreements or programs (e.g. Accelerated Reduction/Elimination of Toxics Program-ARET), etc. Information collected from Questions 12 and 13 will be used to produce additional analytical reports.[3]

1. In the 1997 short form, the purchase of waste and sewerage services was included in the PAC expenditure question instead of being treated only separately (as was the case for previous years).
2. Estimates of purchase of environmental services still have to be completed so there is no data on these purchases provided in this publication.
3. Please see Statistics Canada, *Use of Environmental Technologies and Processes by Canadian Businesses, 1997*, Catalogue No. 16F0024XIE, available in the fall of 2000 at www.statcan.ca.

2.3 Response and data quality

Data collection took place during the first quarter of 1998 (1996 reference year) and 1999 (1997 reference year). Survey questionnaires were mailed to specific establishments identified in the frame and the responses were returned by mail. The surveys were addressed to a contact person who was either responsible for, or had knowledge of, the environmental operations of the company. In the case of some multi-establishment firms, the survey was mailed to the head office which either forwarded the questionnaire to the appropriate establishment or provided a combined report for all targeted establishments.

Follow-ups via fax and/or telephone were carried out after the due date to remind respondents to return their surveys.

Questionnaires were edited in two steps. First, validity edits were applied to ensure that responses to particular questions fell within a limited range of possible values. Second, consistency edits were then applied. Cases where responses in one section of the questionnaire were inconsistent with those given in other sections were identified and edited. These edits were done on an ongoing basis throughout the data collection phase.

Additional follow-ups were carried out to collect missing data and to resolve inconsistencies.

Response rates

Tables 2.1 and 2.2 show the response rates obtained from the 1996 and 1997 surveys for each industry, according to both number of reporting establishments and employment, as a percentage of total number of survey establishments in scope.

For the 1996 reference year, there were 1,762 reports received for 2,426 surveyed establishments. The response rate for the 1996 survey was 73%, based on the number of reporting establishments, and 82% based on employment covered. This represented an improvement to the 1995 survey.

For the 1997 reference year, there were 1,881 reports received for 2,459 surveyed establishments. The response rate obtained by the 1997 survey was 76%, based on the number of reporting establishments, and 85% based on employment covered. This represented an improvement over 1996.

Verification, imputation and estimation

After data capture was complete, further validation of the data was performed in order to ensure that totals were

correct and to verify that there were no outliers. The latter validation was performed by comparing figures with those from previous year.

Imputation for non-response was performed in four stages. First, all possible related information was assembled (e.g. information from the *Capital and Repairs Expenditure Survey*, Business Register, *Pulp and Paper Canada* and from company annual reports) and some companies were re-contacted to help provide further indicators that would allocate expenditures by province where this information was missing. Second, when possible, last year's operating expenditure data were used to impute for 1996 and 1997 operating expenditure data by applying the appropriate industry growth factor associated with the establishments that did respond during both years. This was only applied to records that were a non-response in the current cycle but responded the previous cycle[1].

Third, total environmental protection expenditures were estimated on a per-employee basis. Unlike the 1995 SEPE, the 1996 and 1997 surveys did not use a linear regression to determine the estimator relating employment and environmental protection expenditures. Instead, the mean of environmental expenditures per employee by industry (2-digit SIC for "other manufacturing" records) and province or region[2] was used to estimate for non-responding establishments. If there were not enough donors at the industry and province/region level, then imputation was based on the mean of the environmental expenditure per employee ratio for a more aggregated group of donors: 1) industry and Canada; 2) pooled (similar) industries and province/region; 3) pooled industry and Canada; or 4) total for Canada.

Finally, the missing components of environmental protection expenditures were estimated as a proportion of total expenditures using donors from the same industry.

Tables 2.3 and table 2.4 show the proportion of imputed value over the total value of environmental protection expenditures (value for complete and partial responses + imputed value for non-response), by expenditure category and by industry.

Estimation was done for establishments that had 49 or more employees but were not surveyed in the "other manufacturing" industries category and in certain target manufacturing industries using the mean of the environmental protection expenditures to employment ratio. A similar approach to the imputation approach was used for estimation. No estimation or imputation was done for questions 6b, 7c, 12 or 13.

1. Regression analysis has shown that using the previous year's operating expenditures is a reasonable predictor of future operating expenditures.
2. The mean of environmental protection expenditures by region was used when there were not enough donors at the provincial level.

The improvement in response rates shown in tables 2.1 and 2.2 from 1996 to 1997 is reflected in the general improvement in imputation rates.

Sampling and non-sampling errors

There are two general categories of error in surveys. The first one arises from the fact that a sample or subset of the target population is used to represent the population. This is referred to as sampling error and its size is quantifiable. The other category is referred to as non-sampling error and is not as easily quantified because of its nature. Non-sampling error refers to all the other kinds of error that arise in surveys - incomplete or inaccurate lists of the general population, respondent misinterpretation of questions, provision of erroneous information, failure or refusal to respond, information processing errors, and so on.

Typically the sampling error is measured by the coefficient of variation, that is the standard deviation or expected variability of the estimate as a percentage of the estimate. In the case of the *Survey of Environmental Protection Expenditures*, the sample portion was not taken randomly. Rather, a minimal sample number was calculated, and the establishments with the largest number of employees were sampled. This methodology was used in order to survey the largest proportion of employment in each target industry while keeping response burden to a minimum. Given the nature of the sampling process, no coefficient of variation by industry was produced.

Every attempt was made to eliminate the non-sampling errors from the results of both surveys. Establishments brought into the survey for the first time were researched and it was verified that the contact information was accurate. The returned questionnaires were verified and validated before data capture. The data were edited and tabulated automatically. Extensive follow-up was carried out for incomplete responses and for non-response. Instructions and definitions were further refined.

The 1996 and 1997 surveys represent the 3rd and 4th time the annual survey has been conducted. Many of the establishments have received the questionnaire in the past and have therefore become more familiar with the concepts and definitions of the survey and are, as a result, more able to provide the information with better accuracy. In some cases, establishments have modified their accounting practices in order to provide, as accurately as possible, the information required by the survey.

The most common difficulty reported by respondents was the inability of their record-keeping systems to isolate the environmental protection component of their many expenditures. Expenditures made either for capital investment or for current operations often provide a combination of benefits such as increased efficiency and reduced waste. In these circumstances, it is difficult to determine what proportion of

the expenditure to credit towards environmental protection, with the consequences that respondents may over-estimate or under-estimate that proportion. Another example of such bias is the inclusion of health protection expenditures in the reported environmental protection expenditures, because of the respondent's inability to distinguish both sets of costs separately.

Future survey cycles should take into account spending on various projects that have environmental benefits, whatever the direct purpose (for instance energy saving or input minimisation). They will try to reflect the changing nature of business activities toward pollution prevention and sustainable production.

Table 2.1
Response Rates by Industry and by Province and Territory, 1996

	According to number of reporting units			According to employment		
Industry	Responses	Total[1]	Response as a percentage of total[1]	Number of employees	**Total[1]**	Response as a percentage of total[1]
Logging	111	158	70	12 820	**17 291**	74
Mining	112	141	79	41 888	**48 980**	86
Crude Petroleum and Natural Gas	43	67	64	13 640	**19 335**	71
Food and Tobacco Products	152	200	76	52 441	**65 218**	80
Beverage	60	77	78	12 984	**15 936**	81
Pulp and Paper	112	151	74	51 357	**63 206**	81
Primary Metals	150	185	81	69 732	**76 873**	91
Transportation Equipment	80	110	73	110 704	**125 926**	88
Non-Metallic Mineral Products	88	132	67	13 390	**17 833**	75
Refined Petroleum and Coal Products	31	37	84	6 533	**7 647**	85
Chemical Products	217	294	74	39 507	**48 533**	81
Other manufacturing	549	806	68	214 790	**288 564**	74
Pipeline Transport and Gas Distribution Systems[2]	31	35	89	21 993	**22 639**	97
Electric Power Systems	26	33	79	71 920	**73 840**	97
Total	**1 762**	**2 426**	**73**	**733 699**	**891 821**	**82**
Province/Territory	Responses	Total[1]	Response as a percentage of total[1]	Number of employees	**Total[1]**	Response as a percentage of total[1]
Newfoundland	19	21	90	5 547	**6 245**	89
Prince Edward Island	3	5	60	471	**1 144**	41
Nova Scotia	38	52	73	15 769	**19 040**	83
New Brunswick	35	57	61	14 629	**19 049**	77
Quebec	426	614	69	184 707	**230 943**	80
Ontario	768	1 028	75	354 249	**420 909**	84
Manitoba	56	77	73	24 861	**30 949**	80
Saskatchewan	50	61	82	15 283	**16 586**	92
Alberta	175	246	71	56 212	**71 806**	78
British Columbia	184	254	72	59 882	**72 891**	82
Yukon Territory and Northwest Territories[3]	8	11	73	2 089	**2 259**	92
Canada	**1 762**	**2 426**	**73**	**733 699**	**891 821**	**82**

Notes:
1. The total excludes out of scope establishments, mergers, closed and/or sold establishments, etc.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
3. Includes Nunavut.

Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table 2.2
Response Rates by Industry and by Province and Territory, 1997

	According to number of reporting units			According to employment		
Industry	Responses	Total[1]	Response as a percentage of total[1]	Number of employees	**Total[1]**	Response as a percentage of total[1]
Logging	125	168	74	14 498	**18 456**	79
Mining	116	151	77	38 927	**47 190**	82
Crude Petroleum and Natural Gas	50	66	76	16 886	**22 116**	76
Food and Tobacco Products	119	154	77	52 424	**63 026**	83
Beverage	49	78	63	11 063	**15 334**	72
Wood	102	139	73	24 780	**34 397**	72
Pulp and Paper	127	151	84	55 932	**61 812**	90
Primary Metals	172	213	81	73 936	**81 720**	90
Transportation Equipment	106	126	84	132 167	**141 134**	94
Non-Metallic Mineral Products	80	111	72	12 418	**16 504**	75
Refined Petroleum and Coal Products	33	37	89	6 694	**7 322**	91
Chemical Products	232	284	82	42 000	**48 664**	86
Other manufacturing	514	716	72	210 931	**265 226**	80
Pipeline Transport and Gas Distribution Systems[2]	32	36	89	20 724	**21 670**	96
Electric Power Systems	24	29	83	66 891	**68 240**	98
Total	**1 881**	**2 459**	**76**	**780 271**	**912 811**	**85**
Province/Territory	Responses	Total[1]	Response as a percentage of total[1]	Number of employees	**Total[1]**	Response as a percentage of total[1]
Newfoundland	23	26	88	7 890	**8 105**	97
Prince Edward Island	7	9	78	1 504	**1 709**	88
Nova Scotia	40	56	71	15 440	**19 125**	81
New Brunswick	39	56	70	14 622	**18 667**	78
Quebec	450	638	71	198 158	**238 445**	83
Ontario	814	1 021	80	379 897	**429 932**	88
Manitoba	67	85	79	30 101	**35 218**	85
Saskatchewan	53	58	91	15 167	**16 344**	93
Alberta	190	242	79	58 591	**72 145**	81
British Columbia	186	254	73	56 714	**70 425**	81
Yukon Territory and Northwest Territories[3]	12	14	86	2 187	**2 696**	81
Canada	**1 881**	**2 459**	**76**	**780 271**	**912 811**	**85**

Notes:
1. The total excludes out of scope establishments, mergers, closed and/or sold establishments, etc.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
3. Includes Nunavut.

Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table 2.3
Imputation for Non Response as a Share of Total Environmental Protection Expenditures, 1996

Industry	Imputed value as a percentage of total value (including the imputation value)
Logging	27.8
Mining	13.9
Crude Petroleum and Natural Gas	25.9
Food and Tobacco Products	20.2
Beverage	21.1
Pulp and Paper	24.3
Primary Metals	9.1
Transportation Equipment	13.7
Non-Metallic Mineral Products	25.1
Refined Petroleum and Coal Products	6.4
Chemical Products	17.3
Other manufacturing	28.3
Pipeline Transport and Gas Distribution Systems[1]	2.3
Electric Power	2.0
Total	**16.9**

Expenditure category excluding other manufacturing industries	Imputed value as a percentage of total value (including the imputation value)
Environmental monitoring - Operating	15.7
Environmental monitoring - Capital	16.8
Environmental monitoring - Total	15.9
Environmental assessments and audits - Operating	13.4
Environmental assessments and audits - Capital	8.4
Environmental assessments and audits - Total	11.7
Site reclamation and decommissioning - Operating	16.8
Site reclamation and decommissioning - Capital	22.3
Site reclamation and decommissioning - Total	18.6
Protection and restoration of wildlife and habitat - Operating	21.6
Protection and restoration of wildlife and habitat - Capital	9.6
Protection and restoration of wildlife and habitat - Total	19.4
Purchase of waste and sewerage collection and disposal services - Operating	13.9
Treatment and control of pollution (end-of-pipe processes) - Operating	12.3
Treatment and control of pollution (end-of-pipe processes) - Capital	23.7
Treatment and control of pollution (end-of-pipe processes) - Total	17.9
Pollution prevention (integrated processes) - Operating	8.1
Pollution prevention (integrated processes) - Capital	17.8
Pollution prevention (integrated processes) - Total	15.0
Environmental charges - Operating	11.1
Other environmental protection expenditures - Operating	13.2
Total expenditures on environmental protection - Operating	**13.5**
Total expenditures on environmental protection - Capital	**20.5**
Total expenditures on environmental protection - Total	**16.4**
Other manufacturing	
Pollution abatement and control expenditures - Operating	26.3
Pollution abatement and control expenditures - Capital	24.0
Pollution abatement and control expenditures - Total	25.1
Other environmental protection expenditures - Operating	36.9
Other environmental protection expenditures - Capital	29.9
Other environmental protection expenditures - Total	36.0
Total expenditures on environmental protection - Operating	**29.8**
Total expenditures on environmental protection - Capital	**24.6**
Total expenditures on environmental protection - Total	**28.3**

Note:
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table 2.4
Imputation for Non Response as a Share of Total Environmental Protection Expenditures, 1997

Industry	Imputed value as a percentage of total value (including the imputation value)
Logging	19.5
Mining	17.9
Crude Petroleum and Natural Gas	20.3
Food and Tobacco Products	15.3
Beverage	27.3
Wood	25.2
Pulp and Paper	13.7
Primary Metals	9.8
Transportation Equipment	6.9
Non-Metallic Mineral Products	24.8
Refined Petroleum and Coal Products	5.8
Chemical Products	10.1
Other manufacturing	21.9
Pipeline Transport and Gas Distribution Systems[1]	3.3
Electric Power Systems	2.3
Total	**12.4**

Expenditure category excluding other manufacturing industries	Imputed value as a percentage of total value (including the imputation value)
Environmental monitoring - Operating	11.8
Environmental monitoring - Capital	12.1
Environmental monitoring - Total	11.9
Environmental assessments and audits - Operating	11.8
Environmental assessments and audits - Capital	9.8
Environmental assessments and audits - Total	11.0
Site reclamation and decommissioning - Operating	14.4
Site reclamation and decommissioning - Capital	15.8
Site reclamation and decommissioning - Total	14.8
Protection and restoration of wildlife and habitat - Operating	13.3
Protection and restoration of wildlife and habitat - Capital	6.0
Protection and restoration of wildlife and habitat - Total	11.9
Treatment and control of pollution (end-of-pipe processes) - Operating	10.9
Treatment and control of pollution (end-of-pipe processes) - Capital	15.6
Treatment and control of pollution (end-of-pipe processes) - Total	12.5
Pollution prevention (integrated processes) - Operating	10.0
Pollution prevention (integrated processes) - Capital	10.3
Pollution prevention (integrated processes) - Total	10.2
Environmental charges - Operating	14.7
Other environmental protection expenditures - Operating	12.5
Total expenditures on environmental protection - Operating	**11.6**
Total expenditures on environmental protection - Capital	**12.9**
Total expenditures on environmental protection - Total	**12.1**
Other manufacturing	
Pollution abatement and control expenditures - Operating	23.2
Pollution abatement and control expenditures - Capital	18.3
Pollution abatement and control expenditures - Total	21.9
Other environmental protection expenditures - Operating	21.9
Other environmental protection expenditures - Capital	20.3
Other environmental protection expenditures - Total	21.7
Total expenditures on environmental protection - Operating	**23.0**
Total expenditures on environmental protection - Capital	**18.4**
Total expenditures on environmental protection - Total	**21.9**

Note:
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Annex A: Statistical Tables

Table A.1

Distribution of Expenditures on Environmental Protection by Industry, 1996

Industry	Capital expenditures		Operating expenditures	
	million dollars	percent	million dollars	percent
Logging	15.4	9.7	142.5	90.3
Mining	77.5	22.2	271.3	77.8
Crude Petroleum and Natural Gas	270.6	51.4	256.0	48.6
Food and Tobacco Products	68.8	40.6	100.7	59.4
Beverage	8.0	28.0	20.6	72.0
Pulp and Paper	650.8	60.2	429.8	39.8
Primary Metals	250.0	34.0	485.8	66.0
Transportation Equipment	61.4	32.8	125.8	67.2
Non-Metallic Mineral Products	43.5	58.0	31.5	42.0
Refined Petroleum and Coal Products	97.7	31.5	212.5	68.5
Chemical Products	93.9	30.2	216.5	69.8
Other manufacturing	135.0	27.4	357.7	72.6
Pipeline Transport and Gas Distribution Systems[1]	45.6	56.1	35.7	43.9
Electric Power	97.6	24.7	297.6	75.3
Total	**1 915.8**	**39.1**	**2 983.8**	**60.9**

Notes:
Figures may not add up to totals due to rounding.
1. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.2

Distribution of Expenditures on Environmental Protection by Industry, 1997

Industry	Capital expenditures		Operating expenditures	
	million dollars	percent	million dollars	percent
Logging	7.6	7.4	96.1	92.6
Mining	80.4	22.8	271.6	77.2
Crude Petroleum and Natural Gas	183.0	42.4	248.8	57.6
Food and Tobacco Products	73.8	38.9	115.8	61.1
Beverage	6.5	22.6	22.2	77.4
Wood	77.4	51.9	71.7	48.1
Pulp and Paper	331.5	40.9	478.3	59.1
Primary Metals	290.4	37.4	485.4	62.6
Transportation Equipment	121.2	46.5	139.5	53.5
Non-Metallic Mineral Products	32.1	45.1	39.1	54.9
Refined Petroleum and Coal Products	124.8	34.7	235.3	65.3
Chemical Products	152.5	40.2	226.9	59.8
Other manufacturing	82.9	22.2	291.2	77.8
Pipeline Transport and Gas Distribution Systems[1]	70.6	66.9	34.8	33.1
Electric Power Systems	113.9	32.2	240.3	67.8
Total	**1 748.6**	**36.8**	**2 997.1**	**63.2**

Notes:
Figures may not add up to totals due to rounding.
1. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.3
Capital Expenditures on Environmental Protection by Industry, 1996

Industry	Pollution abatement and control expenditures[2]	Other environmental protection expenditures[3]	**Total**	Share of total
	million dollars			percent
Logging	11.7	3.7	**15.4**	0.8
Mining	64.5	13.1	**77.5**	4.0
Crude Petroleum and Natural Gas	183.6	87.0	**270.6**	14.1
Food and Tobacco Products	68.2	0.6	**68.8**	3.6
Beverage	7.1	0.8	**8.0**	0.4
Pulp and Paper	633.3	17.4	**650.8**	34.0
Primary Metals	247.6	2.4	**250.1**	13.1
Transportation Equipment	57.1	4.2	**61.4**	3.2
Non-Metallic Mineral Products	41.9	1.6	**43.5**	2.3
Refined Petroleum and Coal Products	89.6	8.1	**97.7**	5.1
Chemical Products	86.9	7.0	**93.9**	4.9
Other manufacturing	118.8	16.2	**135.0**	7.0
Pipeline Transport and Gas Distribution Systems[1]	33.1	12.5	**45.6**	2.4
Electric Power Systems	51.9	45.7	**97.6**	5.1
Total	**1 695.3**	**220.5**	**1 915.8**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
2. Capital expenditures on pollution abatement and control (PAC) include capital expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring.
3. Other capital expenditures on environmental protection include capital expenditures on environmental assessments and audits, site reclamation and decommissioning, and wildlife protection and habitat.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.4
Capital Expenditures on Environmental Protection by Industry, 1997

Industry	Pollution abatement and control expenditures[2]	Other environmental protection expenditures[3]	**Total**	Share of total
	million dollars			percent
Logging	5.5	2.1	**7.6**	0.4
Mining	66.7	13.7	**80.4**	4.6
Crude Petroleum and Natural Gas	107.6	75.4	**183.0**	10.5
Food and Tobacco Products	x	x	**73.8**	4.2
Beverage	5.6	0.9	**6.5**	0.4
Wood	74.3	3.1	**77.4**	4.4
Pulp and Paper	323.0	8.5	**331.5**	19.0
Primary Metals	x	x	**290.4**	16.6
Transportation Equipment	x	x	**121.2**	6.9
Non-Metallic Mineral Products	29.5	2.6	**32.1**	1.8
Refined Petroleum and Coal Products	104.6	20.2	**124.8**	7.1
Chemical Products	137.0	15.5	**152.5**	8.7
Other manufacturing	78.6	4.3	**82.9**	4.7
Pipeline Transport and Gas Distribution Systems[1]	58.0	12.6	**70.6**	4.0
Electric Power Systems	x	x	**113.9**	6.5
Total	**1 545.8**	**202.8**	**1 748.6**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
2. Capital expenditures on pollution abatement and control (PAC) include capital expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring.
3. Other capital expenditures on environmental protection include capital expenditures on environmental assessments and audits, site reclamation and decommissioning, and wildlife protection and habitat.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.5

Capital Expenditures on Environmental Protection by Industry and by Type of Activity, 1996

Industry	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	PAC[1] end-of-pipe processes	PAC[1] integrated processes	**Total**	Share of total
	million dollars							percent
Logging	0.4	0.3	1.4	1.9	10.1	1.3	**15.4**	0.8
Mining	1.7	1.5	11.1	0.4	49.2	13.6	**77.5**	4.0
Crude Petroleum and Natural Gas	6.7	3.8	79.5	3.7	158.4	18.5	**270.6**	14.1
Food and Tobacco Products	1.7	x	0.1	x	37.4	29.1	**68.8**	3.6
Beverage	2.1	0.2	0.7	-	3.5	1.6	**8.0**	0.4
Pulp and Paper	16.9	2.4	13.7	1.4	297.4	319.0	**650.8**	34.0
Primary Metals	5.3	x	0.7	x	61.8	180.5	**250.0**	13.1
Transportation Equipment	0.8	0.2	3.3	0.7	25.3	31.0	**61.4**	3.2
Non-Metallic Mineral Products	2.0	x	1.3	x	33.6	6.3	**43.5**	2.3
Refined Petroleum and Coal Products	3.1	3.6	4.5	-	42.1	44.4	**97.7**	5.1
Chemical Products	24.6	0.4	6.5	0.1	45.1	17.2	**93.9**	4.9
Other manufacturing	..	..	..	..	..	..	**135.0**	7.0
Pipeline Transport and Gas Distribution Systems[2]	0.8	2.8	7.4	2.3	20.6	11.6	**45.6**	2.4
Electric Power Systems	7.0	22.4	6.4	16.9	37.0	7.9	**97.6**	5.1
Total excluding other manufacturing	**73.3**	**40.1**	**136.5**	**27.6**	**821.4**	**681.8**	**1 780.7**	**93.0**
Total	**..**	**..**	**..**	**..**	**..**	**..**	**1 915.8**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. PAC: Pollution abatement and control.
2. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.6

Capital Expenditures on Environmental Protection by Industry and by Type of Activity, 1997

Industry	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	PAC[1] end-of-pipe processes	PAC[1] integrated processes	**Total**	Share of total
	million dollars							percent
Logging	--	0.6	0.8	0.8	0.9	4.6	**7.6**	0.4
Mining	2.3	5.2	7.7	0.8	31.0	33.4	**80.4**	4.6
Crude Petroleum and Natural Gas	7.7	8.7	63.4	3.2	59.2	40.7	**183.0**	10.5
Food and Tobacco Products	x	0.1	x	x	39.5	31.5	**73.8**	4.2
Beverage	0.8	0.1	0.8	-	3.4	1.4	**6.5**	0.4
Wood	3.4	1.0	x	x	49.3	21.6	**77.4**	4.4
Pulp and Paper	6.2	1.9	3.5	3.0	180.0	136.8	**331.5**	19.0
Primary Metals	18.5	0.4	x	x	107.7	161.9	**290.4**	16.6
Transportation Equipment	0.8	0.2	x	x	24.8	93.2	**121.2**	6.9
Non-Metallic Mineral Products	0.3	0.7	1.9	-	19.8	9.4	**32.1**	1.8
Refined Petroleum and Coal Products	2.8	3.1	13.4	3.8	38.7	63.2	**124.8**	7.1
Chemical Products	7.4	5.3	9.4	0.8	64.5	65.0	**152.5**	8.7
Other manufacturing	..	..	..	..	..	..	**82.9**	4.7
Pipeline Transport and Gas Distribution Systems[2]	0.6	6.2	5.0	1.3	14.1	43.3	**70.6**	4.0
Electric Power Systems	x	18.9	x	17.5	57.4	9.8	**113.9**	6.5
Total excluding other manufacturing	**60.9**	**52.3**	**113.8**	**32.3**	**690.3**	**716.0**	**1 665.7**	**95.3**
Total	**..**	**..**	**..**	**..**	**..**	**..**	**1 748.6**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. PAC: Pollution abatement and control.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.7
Capital Expenditures on Environmental Protection by Province and Territory, 1996

Province/Territory	Pollution abatement and control expenditures[1]	Other environmental protection expenditures[2]	**Total**	Share of total
	million dollars			percent
Newfoundland	41.5	0.8	**42.3**	2.2
Prince Edward Island	x	x	**2.4**	0.1
Nova Scotia	x	x	**33.1**	1.7
New Brunswick	80.6	4.3	**84.9**	4.4
Quebec	x	x	**496.4**	25.9
Ontario	445.0	29.1	**474.1**	24.7
Manitoba	22.8	3.1	**26.0**	1.4
Saskatchewan	39.8	21.3	**61.1**	3.2
Alberta	270.5	85.0	**355.5**	18.6
British Columbia	318.5	16.7	**335.2**	17.5
Yukon and Northwest Territories[3]	x	x	**4.7**	0.2
Canada	**1 695.3**	**220.5**	**1 915.8**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Capital expenditures on pollution abatement and control (PAC) include capital expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring.
2. Other capital expenditures on environmental protection include capital expenditures on environmental assessments and audits, site reclamation and decommissioning, and wildlife protection and habitat.
3. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.8
Capital Expenditures on Environmental Protection by Province and Territory, 1997

Province/Territory	Pollution abatement and control expenditures[1]	Other environmental protection expenditures[2]	**Total**	Share of total
	million dollars			percent
Newfoundland	x	x	**16.1**	0.9
Prince Edward Island	1.2	-	**1.2**	0.1
Nova Scotia	16.1	2.3	**18.4**	1.1
New Brunswick	39.6	7.4	**47.0**	2.7
Quebec	335.2	42.5	**377.7**	21.6
Ontario	576.4	28.5	**604.9**	34.6
Manitoba	28.8	5.9	**34.7**	2.0
Saskatchewan	62.9	5.7	**68.6**	3.9
Alberta	212.0	90.7	**302.8**	17.3
British Columbia	254.0	18.1	**272.1**	15.6
Yukon and Northwest Territories[3]	x	x	**5.2**	0.3
Canada	**1 545.8**	**202.8**	**1 748.6**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Capital expenditures on pollution abatement and control (PAC) include capital expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring.
2. Other capital expenditures on environmental protection include capital expenditures on environmental assessments and audits, site reclamation and decommissioning, and wildlife protection and habitat.
3. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.9

Capital Expenditures on Environmental Protection by Type of Activity and by Province and Territory, 1996

Province/Territory	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	PAC end-of-pipe processes	PAC integrated processes	**Total**	Share of total
	million dollars							percent
Newfoundland	0.3	x	x	x	38.4	2.7	**42.2**	2.4
Prince Edward Island	x	x	x	x	x	x	**2.4**	0.1
Nova Scotia	x	0.2	2.5	x	23.0	4.8	**31.7**	1.8
New Brunswick	1.5	1.2	x	x	66.2	9.9	**81.5**	4.6
Quebec	x	17.3	23.2	x	148.1	238.7	**461.2**	25.9
Ontario	18.6	9.2	11.2	1.8	240.3	133.4	**414.4**	23.3
Manitoba	1.5	1.6	1.2	0.1	13.6	4.9	**22.9**	1.3
Saskatchewan	1.6	0.8	20.1	0.2	18.5	18.5	**59.8**	3.4
Alberta	20.5	7.2	68.8	8.1	199.5	43.0	**347.2**	19.5
British Columbia	4.6	2.2	6.1	4.5	70.3	225.1	**312.9**	17.6
Yukon and Northwest Territories[1]	x	x	0.5	0.1	x	x	**4.7**	0.3
Canada[2]	**73.3**	**40.1**	**136.5**	**27.6**	**821.4**	**681.8**	**1 780.7**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Includes Nunavut.
2. Excludes the "other manufacturing" industries category.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.10

Capital Expenditures on Environmental Protection by Type of Activity and by Province and Territory, 1997

Province/Territory	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	PAC end-of-pipe processes	PAC integrated processes	**Total**	Share of total
	million dollars							percent
Newfoundland	x	x	0.1	0.8	1.7	13.0	**16.0**	1.0
Prince Edward Island	x	x	--	x	x	0.6	**1.2**	0.1
Nova Scotia	0.4	0.2	1.7	0.3	7.8	6.3	**16.7**	1.0
New Brunswick	0.7	1.6	3.1	2.7	25.7	12.6	**46.3**	2.8
Quebec	20.8	18.0	x	x	160.6	130.5	**353.7**	21.2
Ontario	17.5	4.5	18.7	2.4	261.8	254.1	**559.1**	33.6
Manitoba	0.9	3.1	x	x	8.5	17.6	**32.8**	2.0
Saskatchewan	0.8	3.5	1.9	0.3	37.3	24.3	**68.0**	4.1
Alberta	13.5	16.2	69.5	4.8	102.1	91.7	**297.8**	17.9
British Columbia	5.9	4.7	8.8	4.5	82.7	162.4	**269.0**	16.1
Yukon and Northwest Territories[1]	x	x	0.3	x	x	2.8	**5.2**	0.3
Canada[2]	**60.9**	**52.3**	**113.8**	**32.3**	**690.3**	**716.0**	**1 665.7**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Includes Nunavut.
2. Excludes the "other manufacturing" industries category.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.11

Distribution of Capital Expenditures for Pollution Abatement and Control by Medium and by Industry, 1996

Industry	Air	Surface water	Soil and groundwater	Noise, radiation and vibration	**Total**
			percent		
Logging	13.5	10.1	76.4	-	**100**
Mining	16.0	62.9	20.8	0.4	**100**
Crude Petroleum and Natural Gas	91.0	2.1	6.5	0.4	**100**
Food and Tobacco Products	20.3	55.1	24.2	0.5	**100**
Beverages	31.2	52.0	16.1	0.8	**100**
Pulp and Paper	46.8	49.6	3.6	--	**100**
Primary Metals	66.2	27.7	5.5	0.6	**100**
Transportation Equipment	63.1	17.8	17.7	1.3	**100**
Non-Metallic Mineral Products	97.2	1.6	1.2	0.1	**100**
Refined Petroleum and Coal Products	43.8	24.6	31.7	-	**100**
Chemical Products	54.3	32.5	10.4	2.8	**100**
Other manufacturing	54.2	24.7	18.0	3.1	**100**
Pipeline Transport and Gas Distribution Systems[1]	59.5	6.6	26.5	7.3	**100**
Electric Power Systems	27.1	28.5	19.2	25.3	**100**
Total	**53.7**	**35.6**	**9.1**	**1.6**	**100**

Notes:
Figures may not add up to totals due to rounding.
The table includes reported capital expenditure shares only.
For all industries except the "other manufacturing industries" group, this table includes capital expenditures on end-of-pipe processes and integrated processes.
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.12

Distribution of Capital Expenditures for Pollution Abatement and Control by Medium and by Industry, 1997

Industry	Air	Surface water	On-site contained solid and liquid waste[1]	Noise, radiation and vibration	**Total**
			percent		
Logging	7.1	23.2	69.4	0.2	**100**
Mining	33.1	41.1	25.6	0.2	**100**
Crude Petroleum and Natural Gas	51.1	19.2	25.1	4.7	**100**
Food and Tobacco Products	23.7	40.9	26.5	8.9	**100**
Beverage	8.0	15.8	73.4	2.8	**100**
Wood	70.6	5.4	23.9	0.2	**100**
Pulp and Paper	51.0	32.5	16.2	0.2	**100**
Primary Metals	61.0	27.9	10.4	0.7	**100**
Transportation Equipment	63.1	12.4	24.2	0.2	**100**
Non-Metallic Mineral Products	72.3	8.8	18.8	--	**100**
Refined Petroleum and Coal Products	60.6	22.9	15.6	1.0	**100**
Chemical Products	36.3	46.0	16.2	1.6	**100**
Other manufacturing	58.4	24.9	15.2	1.5	**100**
Pipeline Transport and Gas Distribution Systems[2]	60.4	29.1	6.8	3.7	**100**
Electric Power Systems	34.6	23.2	19.2	23.1	**100**
Total	**51.9**	**28.6**	**16.9**	**2.7**	**100**

Notes:
Figures may not add up to totals due to rounding.
The table includes reported capital expenditure shares only.
For all industries except the "other manufacturing industries" group, this table includes capital expenditures on end-of-pipe processes and integrated processes.
1. In 1997 the "Soil and groundwater" category was changed to "On-site contained solid and liquid waste" to clarify coverage for that category. Therefore, comparisons with 1996 estimates should be made with caution.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.13

Distribution of Capital Expenditures for Pollution Abatement and Control by Medium and by Province and Territory, 1996

Province/Territory	Air	Surface water	Soil and groundwater	Noise, radiation and vibration	**Total**
			percent		
Newfoundland	x	x	x	x	**100**
Prince Edward Island	x	x	x	x	**100**
Nova Scotia	2.6	91.3	6.1	--	**100**
New Brunswick	42.7	47.5	9.7	-	**100**
Quebec	63.6	26.4	8.7	1.3	**100**
Ontario	54.6	29.7	11.8	3.9	**100**
Manitoba	26.0	66.7	6.0	1.3	**100**
Saskatchewan	32.4	52.3	14.4	0.8	**100**
Alberta	79.9	6.8	11.4	1.9	**100**
British Columbia	42.8	50.8	6.4	0.1	**100**
Yukon and Northwest Territories[1]	7.2	86.4	6.3	0.1	**100**
Canada	**53.7**	**35.6**	**9.1**	**1.6**	**100**

Notes:
Figures may not add up to totals due to rounding.
The table includes reported capital expenditure shares only.
This table includes capital expenditures on end-of-pipe processes and integrated processes for the most part.
1. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.14

Distribution of Capital Expenditures for Pollution Abatement and Control by Medium and by Province and Territory, 1997

Province/Territory	Air	Surface water	On-site contained solid and liquid waste[1]	Noise, radiation and vibration	**Total**
			percent		
Newfoundland	70.7	17.3	9.9	2.1	**100**
Prince Edward Island	x	x	x	x	**100**
Nova Scotia	28.8	27.2	43.6	0.4	**100**
New Brunswick	57.2	31.9	10.9	-	**100**
Quebec	58.5	16.4	23.7	1.4	**100**
Ontario	54.2	26.9	14.2	4.8	**100**
Manitoba	27.0	55.4	15.0	2.5	**100**
Saskatchewan	67.4	12.2	19.0	1.4	**100**
Alberta	54.3	21.3	21.7	2.7	**100**
British Columbia	35.1	52.9	11.5	0.5	**100**
Yukon and Northwest Territories[2]	x	x	x	x	**100**
Canada	**51.9**	**28.6**	**16.9**	**2.7**	**100**

Notes:
Figures may not add up to totals due to rounding.
The table includes reported capital expenditure shares only.
This table includes expenditures on end-of-pipe processes and integrated processes for the most part.
1. In 1997 the "Soil and groundwater" category was changed to "On-site contained solid and liquid waste" to clarify coverage for that category. Therefore, comparisons with 1996 estimates should be made with caution.
2. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.15

Distribution of Capital Expenditures on End-of-Pipe Processes (for Pollution Abatement and Control) by Medium and by Industry, 1996

Industry	Air	Surface water	Soil and groundwater	Noise, radiation and vibration	**Total**
			percent		
Logging	9.2	9.8	81.0	-	**100**
Mining	8.5	70.3	20.7	0.5	**100**
Crude Petroleum and Natural Gas	90.8	2.1	6.8	0.4	**100**
Food and Tobacco Products	27.7	60.2	11.8	0.3	**100**
Beverage	15.9	60.1	23.3	0.7	**100**
Pulp and Paper	49.5	45.2	5.3	0.1	**100**
Primary Metals	59.4	31.4	6.9	2.3	**100**
Transportation Equipment	45.1	17.2	35.0	2.7	**100**
Non-Metallic Mineral Products	98.9	0.6	0.3	0.1	**100**
Refined Petroleum and Coal Products	26.4	31.3	42.2	-	**100**
Chemical Products	55.9	29.1	11.2	3.8	**100**
Pipeline Transport and Gas Distribution Systems[1]	37.7	10.3	40.6	11.4	**100**
Electric Power Systems	27.8	28.6	18.3	25.3	**100**
Total	**52.3**	**33.0**	**12.1**	**2.6**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on end-of-pipe processes are not available for the rest of the manufacturing sector.
The table is based on reported capital expenditure shares only.
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.16

Distribution of Capital Expenditures on End-of-Pipe Processes (for Pollution Abatement and Control) by Medium and by Industry, 1997

Industry	Air	Surface water	On-site contained solid and liquid waste[1]	Noise, radiation and vibration	**Total**
			percent		
Logging	24.2	10.6	64.2	1.1	**100**
Mining	10.8	51.9	37.3	-	**100**
Crude Petroleum and Natural Gas	55.6	14.7	24.1	5.6	**100**
Food and Tobacco Products	13.3	61.7	24.6	0.5	**100**
Beverage	2.6	19.4	74.4	3.6	**100**
Wood	91.3	4.6	3.9	0.1	**100**
Pulp and Paper	71.7	14.1	14.1	0.1	**100**
Primary Metals	50.4	30.5	18.5	0.7	**100**
Transportation Equipment	50.3	43.1	6.3	0.2	**100**
Non-Metallic Mineral Products	87.5	3.0	9.5	-	**100**
Refined Petroleum and Coal Products	39.9	40.3	19.1	0.7	**100**
Chemical Products	35.6	53.2	10.2	0.9	**100**
Pipeline Transport and Gas Distribution Systems[2]	64.7	4.9	15.6	14.9	**100**
Electric Power Systems	33.8	21.2	19.7	25.4	**100**
Total	**51.5**	**26.7**	**17.7**	**4.2**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on end-of-pipe processes are not available for the rest of the manufacturing sector.
The table is based on reported capital expenditure shares only.
1. In 1997 the "Soil and groundwater" category was changed to "On-site contained solid and liquid waste" to clarify coverage for that category. Therefore, comparisons with 1996 estimates should be made with caution.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.17

Distribution of Capital Expenditures on End-of-Pipe Processes (for Pollution Abatement and Control) by Medium and by Province and Territory, 1996

Province/Territory	Air	Surface water	Soil and groundwater	Noise, radiation and vibration	**Total**
			percent		
Newfoundland	x	x	x	x	**100**
Prince Edward Island	x	x	x	x	**100**
Nova Scotia	2.1	91.7	6.2	--	**100**
New Brunswick	44.3	47.7	8.0	-	**100**
Quebec	54.6	31.1	12.8	1.5	**100**
Ontario	49.3	33.5	11.8	5.4	**100**
Manitoba	24.1	69.2	5.0	1.7	**100**
Saskatchewan	49.9	19.3	29.0	1.7	**100**
Alberta	80.9	4.5	12.4	2.1	**100**
British Columbia	52.7	27.4	19.6	0.3	**100**
Yukon and Northwest Territories[1]	4.1	92.7	3.2	0.1	**100**
Canada	**52.3**	**33.0**	**12.1**	**2.6**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on end-of-pipe processes are not available for all manufacturing industries.
The table is based on reported capital expenditure shares only.
1. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.18

Distribution of Capital Expenditures on End-of-Pipe Processes (for Pollution Abatement and Control) by Medium and by Province and Territory, 1997

Province/Territory	Air	Surface water	On-site contained solid and liquid waste[1]	Noise, radiation and vibration	**Total**
			percent		
Newfoundland	x	x	x	x	**100**
Prince Edward Island	x	x	x	x	**100**
Nova Scotia	8.0	37.5	53.9	0.6	**100**
New Brunswick	72.4	18.9	8.7	-	**100**
Quebec	46.0	23.2	30.0	0.7	**100**
Ontario	43.3	38.4	10.8	7.6	**100**
Manitoba	76.1	8.6	3.5	11.8	**100**
Saskatchewan	77.7	5.5	14.5	2.3	**100**
Alberta	63.8	11.2	21.7	3.3	**100**
British Columbia	57.6	21.7	20.1	0.6	**100**
Yukon and Northwest Territories[2]	34.4	50.9	14.2	0.5	**100**
Canada	**51.5**	**26.7**	**17.7**	**4.2**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on end-of-pipe processes are not available for all manufacturing industries.
The table is based on reported capital expenditure shares only.
1. In 1997 the "Soil and groundwater" category was changed to "On-site contained solid and liquid waste" to clarify coverage for that category. Therefore, comparisons with 1996 estimates should be made with caution.
2. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.19

Distribution of Capital Expenditures on Integrated Processes (for Pollution Abatement and Control) by Medium and by Industry, 1996

Industry	Air	Surface water	Soil and groundwater	Noise, radiation and vibration	**Total**
			percent		
Logging	47.3	12.6	40.0	-	**100**
Mining	42.5	36.6	20.9	-	**100**
Crude Petroleum and Natural Gas	93.4	2.6	3.7	0.2	**100**
Food and Tobacco Products	10.6	48.4	40.2	0.7	**100**
Beverages	65.3	33.8	-	0.9	**100**
Pulp and Paper	44.5	53.4	2.1	-	**100**
Primary Metals	68.5	26.4	5.1	-	**100**
Transportation Equipment	78.0	18.3	3.6	0.2	**100**
Non-Metallic Mineral Products	87.8	6.5	5.8	-	**100**
Refined Petroleum and Coal Products	76.1	11.9	12.0	-	**100**
Chemical Products	49.7	42.1	8.2	-	**100**
Pipeline Transport and Gas Distribution Systems[1]	98.8	-	1.2	-	**100**
Electric Power Systems	23.5	27.8	23.4	25.3	**100**
Total	**55.2**	**39.3**	**5.0**	**0.4**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on integrated processes are not available for all manufacturing industries.
The table is based on reported capital expenditure shares only.
1. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.20

Distribution of Capital Expenditures on Integrated Processes (for Pollution Abatement and Control) by Medium and by Industry, 1997

Industry	Air	Surface water	On-site contained solid and liquid waste[1]	Noise, radiation and vibration	**Total**
			percent		
Logging	3.9	25.7	70.4	0.1	**100**
Mining	54.4	30.8	14.4	0.5	**100**
Crude Petroleum and Natural Gas	43.8	26.4	26.5	3.2	**100**
Food and Tobacco Products	36.6	14.9	29.0	19.5	**100**
Beverage	21.0	7.1	71.1	0.8	**100**
Wood	39.1	6.4	54.2	0.3	**100**
Pulp and Paper	28.4	52.8	18.5	0.3	**100**
Primary Metals	68.2	26.1	4.9	0.8	**100**
Transportation Equipment	66.6	4.2	29.0	0.2	**100**
Non-Metallic Mineral Products	41.4	20.7	37.8	0.1	**100**
Refined Petroleum and Coal Products	77.1	8.9	12.9	1.2	**100**
Chemical Products	36.9	38.6	22.3	2.2	**100**
Pipeline Transport and Gas Distribution Systems[2]	59.0	36.9	4.0	0.1	**100**
Electric Power Systems	39.2	35.1	16.3	9.4	**100**
Total	**51.8**	**30.6**	**16.3**	**1.3**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on integrated processes are not available for the rest of the manufacturing sector.
The table is based on reported capital expenditure shares only.
1. In 1997 the "Soil and groundwater" category was changed to "On-site contained solid and liquid waste" to clarify coverage for that category. Therefore, comparisons with 1996 estimates should be made with caution.
2. Includes the following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.21

Distribution of Capital Expenditures on Integrated Processes (for Pollution Abatement and Control) by Medium and by Province and Territory, 1996

Province/Territory	Air	Surface water	Soil and groundwater	Noise, radiation and vibration	**Total**
			percent		
Newfoundland	x	x	x	x	**100**
Prince Edward Island	x	x	x	x	**100**
Nova Scotia	22.8	77.2	-	-	**100**
New Brunswick	15.6	67.5	16.9	-	**100**
Quebec	69.9	24.3	4.8	1.0	**100**
Ontario	66.5	20.1	13.3	0.2	**100**
Manitoba	x	x	x	x	**100**
Saskatchewan	18.3	79.1	2.6	-	**100**
Alberta	73.6	22.7	3.5	0.1	**100**
British Columbia	40.1	57.1	2.8	-	**100**
Yukon and Northwest Territories[1]	x	x	x	x	**100**
Canada	**55.2**	**39.3**	**5.0**	**0.4**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on integrated processes are not available for all manufacturing industries.
The table is based on reported capital expenditure shares only.
1. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.22

Distribution of Capital Expenditures on Integrated Processes (for Pollution Abatement and Control) by Medium and by Province and Territory, 1997

Province/Territory	Air	Surface water	On-site contained solid and liquid waste[1]	Noise, radiation and vibration	**Total**
			percent		
Newfoundland	74.0	13.6	10.2	2.2	**100**
Prince Edward Island	x	x	x	x	**100**
Nova Scotia	67.1	13.0	19.9	-	**100**
New Brunswick	19.3	64.2	16.4	-	**100**
Quebec	69.7	9.4	19.0	1.9	**100**
Ontario	67.8	12.5	18.0	1.7	**100**
Manitoba	11.6	70.5	17.9	-	**100**
Saskatchewan	51.1	22.9	26.0	--	**100**
Alberta	43.0	33.2	21.7	2.1	**100**
British Columbia	27.1	64.0	8.5	0.5	**100**
Yukon and Northwest Territories[2]	x	x	x	x	**100**
Canada	**51.8**	**30.6**	**16.3**	**1.3**	**100**

Notes:
Figures may not add up to totals due to rounding.
Estimates of capital expenditures on integrated processes are not available for all manufacturing industries.
The table is based on reported capital expenditure shares only.
1. In 1997 the "Soil and groundwater" category was changed to "On-site contained solid and liquid waste" to clarify coverage for that category. Therefore, comparisons with 1996 estimates should be made with caution.
2. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.23
Operating Expenditures on Environmental Protection by Industry, 1996

Industry	Pollution abatement and control expenditures[1]	Waste management and sewerage services	Other environmental protection expenditures[2]	**Total**	Share of total
	million dollars				percent
Logging	8.8	8.2	125.5	**142.5**	4.8
Mining	155.1	6.6	109.6	**271.3**	9.1
Crude Petroleum and Natural Gas	66.8	53.3	135.9	**256.0**	8.6
Food and Tobacco Products	35.6	46.7	18.4	**100.7**	3.4
Beverages	3.2	11.9	5.4	**20.6**	0.7
Pulp and Paper	322.9	37.8	69.1	**429.8**	14.4
Primary Metals	297.7	108.9	79.2	**485.8**	16.3
Transportation Equipment	40.9	67.6	17.3	**125.8**	4.2
Non-Metallic Mineral Products	11.4	7.5	12.6	**31.5**	1.1
Refined Petroleum and Coal Products	139.7	40.0	32.8	**212.5**	7.1
Chemical Products	x	44.7	x	**216.5**	7.3
Other manufacturing	115.9	133.3	108.6	**357.7**	12.0
Pipeline Transport and Gas Distribution Systems[3]	10.5	2.4	22.8	**35.7**	1.2
Electric Power Systems	x	18.8	x	**297.6**	10.0
Total	**1 474.9**	**587.7**	**921.2**	**2 983.8**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Operating expenditures on pollution abatement and control include operating expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring. Purchase of waste and sewerage management services is shown separately.
2. Other operating expenditures on environmental protection include operating expenditures on environmental assessments and audits, site reclamation and decommissioning, wildlife protection and habitat, fees, fines and licences, and "other" environmental activities.
3. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.24
Operating Expenditures on Environmental Protection by Industry, 1997

Industry	Pollution abatement and control expenditure[1]	Other environmental protection expenditures[2]	**Total**	Share of total
	million dollars			percent
Logging	11.2	85.0	**96.1**	3.2
Mining	181.8	89.8	**271.6**	9.1
Crude Petroleum and Natural Gas	93.7	155.1	**248.8**	8.3
Food and Tobacco Products	x	x	**115.8**	3.9
Beverage	15.3	6.9	**22.2**	0.7
Wood	43.8	28.0	**71.7**	2.4
Pulp and Paper	399.4	78.9	**478.3**	16.0
Primary Metals	423.4	61.9	**485.4**	16.2
Transportation Equipment	120.2	19.3	**139.5**	4.7
Non-Metallic Mineral Products	24.9	14.2	**39.1**	1.3
Refined Petroleum and Coal Products	184.5	50.8	**235.3**	7.9
Chemical Products	170.7	56.2	**226.9**	7.6
Other manufacturing	233.2	58.1	**291.2**	9.7
Pipeline Transport and Gas Distribution Systems[3]	17.8	17.1	**34.8**	1.2
Electric Power Systems	x	x	**240.3**	8.0
Total	**2 154.3**	**842.8**	**2 997.1**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Operating expenditures on pollution abatement and control include operating expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring. Purchase of waste and sewerage management services is shown separately.
2. Other operating expenditures on environmental protection include operating expenditures on environmental assessments and audits, site reclamation and decommissioning, wildlife protection and habitat, fees, fines and licences, and "other" environmental activities.
3. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.25
Operating Expenditures on Environmental Protection by Industry and by Type of Activity, 1996

Industry	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	Waste management and sewerage services	PAC end-of-pipe processes	PAC integrated processes	Fees, fines and licences	Other	**Total**	Share of total
	million dollars										percent
Logging	3.5	8.5	24.8	84.3	8.2	5.2	0.1	6.0	1.8	**142.5**	4.8
Mining	29.5	7.4	68.6	5.6	6.6	110.6	14.9	5.3	22.8	**271.3**	9.1
Crude Petroleum and Natural Gas	18.2	5.1	85.2	7.6	53.3	44.9	3.6	3.8	34.3	**256.0**	8.6
Food and Tobacco Products	9.3	2.7	4.9	1.5	46.7	23.2	3.1	4.8	4.6	**100.7**	3.4
Beverage	1.1	0.4	0.4	-	11.9	2.0	0.1	2.4	2.3	**20.6**	0.7
Pulp and Paper	92.1	12.6	7.6	18.0	37.8	199.0	31.8	9.6	21.3	**429.8**	14.4
Primary Metals	33.2	5.3	40.7	6.9	108.9	184.5	80.0	6.8	19.6	**485.8**	16.3
Transportation Equipment	5.2	2.1	4.7	0.1	67.6	31.9	3.7	0.8	9.7	**125.8**	4.2
Non-Metallic Mineral Products	4.2	1.5	5.3	0.1	7.5	6.8	0.3	2.5	3.3	**31.5**	1.1
Refined Petroleum and Coal Products	22.7	2.6	5.1	x	40.0	74.8	42.1	x	22.2	**212.5**	7.1
Chemical Products	37.5	9.1	38.3	x	44.7	57.6	x	x	15.4	**216.5**	7.3
Other manufacturing	..	..	..	..	133.3	..	..	..	..	**357.7**	12.0
Pipeline Transport and Gas Distribution Systems[1]	1.4	2.6	5.7	x	2.4	9.0	-	x	12.6	**35.7**	1.2
Electric Power Systems	8.8	22.5	13.4	x	18.8	77.0	x	42.0	23.5	**297.6**	10.0
Total excluding other manufacturing	**266.8**	**82.3**	**304.6**	**142.7**	**454.4**	**826.5**	**265.8**	**89.7**	**193.3**	**2 626.0**	**88.0**
Total	**..**	**..**	**..**	**..**	**587.7**	**..**	**..**	**..**	**..**	**2 983.8**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.26
Operating Expenditures on Environmental Protection by Industry and by Type of Activity, 1997

Industry	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	PAC end-of-pipe processes, waste management and sewerage services[1]	PAC integrated processes	Fees, fines and licences	Other	**Total**	Share of total
	million dollars									percent
Logging	1.6	3.1	10.5	68.8	7.9	1.7	0.5	2.0	**96.1**	3.2
Mining	20.4	7.5	54.9	3.2	122.4	39.0	4.1	20.0	**271.6**	9.1
Crude Petroleum and Natural Gas	17.4	13.4	107.4	1.6	61.1	15.2	6.8	26.0	**248.8**	8.3
Food and Tobacco Products	8.3	x	x	0.6	70.6	x	9.7	3.4	**115.8**	3.9
Beverage	0.6	0.5	1.4	-	13.4	1.3	2.8	2.2	**22.2**	0.7
Wood	5.9	2.2	5.9	10.4	28.9	8.9	6.6	2.8	**71.7**	2.4
Pulp and Paper	52.6	11.9	6.4	25.4	251.1	95.7	9.2	26.1	**478.3**	16.0
Primary Metals	44.0	5.6	28.5	6.0	319.0	60.5	4.9	16.9	**485.4**	16.2
Transportation Equipment	6.5	2.7	2.8	3.8	101.7	12.0	1.4	8.7	**139.5**	4.7
Non-Metallic Mineral Products	1.8	3.2	6.2	-	17.6	5.5	1.4	3.4	**39.1**	1.3
Refined Petroleum and Coal Products	7.3	3.8	32.8	0.5	111.2	66.0	0.2	13.5	**235.3**	7.9
Chemical Products	31.9	7.0	30.6	1.3	104.7	34.1	2.2	15.1	**226.9**	7.6
Other manufacturing	..	..	..	..	..	..	..	..	**291.2**	9.7
Pipeline Transport and Gas Distribution Systems[2]	1.4	2.6	5.0	0.3	13.4	2.9	0.9	8.3	**34.8**	1.2
Electric Power Systems	6.4	x	x	25.6	70.2	x	30.2	28.7	**240.3**	8.0
Total excluding other manufacturing	**206.1**	**81.0**	**298.2**	**147.4**	**1 293.2**	**421.8**	**80.9**	**177.2**	**2 705.9**	**90.3**
Total	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**2 997.1**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Purchase of waste management services and sewerage services is included with operating expenditures for PAC end-of-pipe processes.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.27
Operating Expenditures on Environmental Protection by Province and Territory, 1996

Province/Territory	Pollution abatement and control expenditures[1]	Waste management and sewerage services	Other environmental protection expenditures[2]	Total	Share of total
	million dollars				percent
Newfoundland	x	2.4	x	**15.7**	0.5
Prince Edward Island	0.7	0.7	0.6	**2.0**	0.1
Nova Scotia	x	10.4	x	**44.6**	1.5
New Brunswick	49.2	10.4	21.3	**80.9**	2.7
Quebec	335.7	146.5	152.1	**634.4**	21.3
Ontario	626.9	262.6	256.9	**1 146.4**	38.4
Manitoba	25.8	11.0	22.7	**59.5**	2.0
Saskatchewan	66.5	21.0	42.5	**129.9**	4.4
Alberta	169.0	77.8	207.8	**454.6**	15.2
British Columbia	163.1	44.0	198.5	**405.6**	13.6
Yukon and Northwest Territories[3]	x	0.9	x	**10.2**	0.3
Canada	**1 474.9**	**587.7**	**921.2**	**2 983.8**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Operating expenditures on pollution abatement and control include operating expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring. Purchase of waste and sewerage management services is shown separately.
2. Other operating expenditures on environmental protection include operating expenditures on environmental assessments and audits, site reclamation and decommissioning, wildlife protection and habitat, fees, fines and licences, and "other" environmental activities.
3. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.28
Operating Expenditures on Environmental Protection by Province and Territory, 1997

Province/Territory	Pollution abatement and control expenditures[1]	Other environmental protection expenditures[2]	Total	Share of total
	million dollars			percent
Newfoundland	16.3	3.3	**19.6**	0.7
Prince Edward Island	2.2	0.3	**2.5**	0.1
Nova Scotia	39.8	14.1	**54.0**	1.8
New Brunswick	56.9	16.3	**73.1**	2.4
Quebec	448.1	136.3	**584.4**	19.5
Ontario	936.2	234.9	**1 171.1**	39.1
Manitoba	61.3	22.2	**83.5**	2.8
Saskatchewan	82.1	37.6	**119.6**	4.0
Alberta	260.7	214.5	**475.1**	15.9
British Columbia	243.5	157.9	**401.3**	13.4
Yukon and Northwest Territories[3]	7.4	5.5	**12.9**	0.4
Canada	**2 154.3**	**842.8**	**2 997.1**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Operating expenditures on pollution abatement and control include operating expenditures on PAC end-of-pipe processes, PAC integrated processes and environmental monitoring. Purchase of waste and sewerage management services is shown separately.
2. Other operating expenditures on environmental protection include operating expenditures on environmental assessments and audits, site reclamation and decommissioning, wildlife protection and habitat, fees, fines and licences, and "other" environmental activities.
3. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.29

Operating Expenditures on Environmental Protection by Type of Activity and by Province and Territory, 1996

Province/Territory	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	Waste management and sewerage services	PAC end-of-pipe processes	PAC integrated processes	Fees, fines and licences	Other	**Total**	Share of total
	million dollars										percent
Newfoundland	1.8	0.4	0.9	x	2.3	5.5	x	1.0	1.4	**15.3**	0.6
Prince Edward Island	0.1	0.1	0.2	x	0.6	0.5	--	x	0.1	**1.8**	0.1
Nova Scotia	3.6	0.7	1.3	x	8.4	15.1	x	1.1	4.0	**39.8**	1.5
New Brunswick	10.2	1.9	4.3	7.2	8.6	35.5	1.7	1.1	4.1	**74.7**	2.8
Quebec	87.2	13.7	43.5	16.7	112.7	164.3	54.5	26.1	28.3	**546.9**	20.8
Ontario	79.1	32.4	83.6	22.1	194.9	347.1	143.9	20.2	61.1	**984.3**	37.5
Manitoba	5.2	1.4	6.0	1.4	6.5	15.6	2.5	4.3	7.6	**50.6**	1.9
Saskatchewan	10.3	8.1	10.3	1.2	19.5	48.6	6.6	12.9	9.1	**126.5**	4.8
Alberta	41.0	13.9	106.8	17.5	70.6	101.7	20.6	8.0	55.5	**435.6**	16.6
British Columbia	27.4	9.4	46.1	72.9	29.4	88.4	30.6	14.6	21.3	**340.1**	13.0
Yukon and Northwest Territories[1]	0.8	0.2	1.7	x	0.9	4.2	x	x	0.9	**10.2**	0.4
Canada[2]	**266.8**	**82.3**	**304.6**	**142.7**	**454.4**	**826.5**	**265.8**	**89.7**	**193.3**	**2 626.0**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Includes Nunavut.
2. Excludes the "other manufacturing" industries category.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.30

Operating Expenditures on Environmental Protection by Type of Activity and by Province and Territory, 1997

Province/Territory	Environmental monitoring	Environmental assessments and audits	Reclamation and decommissioning	Wildlife and habitat protection	PAC end-of-pipe processes, waste management and sewerage services[1]	PAC integrated processes	Fees, fines and licences	Other	**Total**	Share of total
	million dollars									percent
Newfoundland	1.4	0.3	0.6	0.9	7.6	6.8	0.2	1.1	**19.0**	0.7
Prince Edward Island	0.1	--	0.1	--	1.9	0.2	0.1	0.1	**2.4**	0.1
Nova Scotia	3.2	1.4	5.8	0.9	25.2	7.6	1.2	4.0	**49.4**	1.8
New Brunswick	6.2	1.2	4.0	5.4	35.8	12.8	1.4	3.8	**70.5**	2.6
Quebec	50.6	11.8	35.1	26.7	252.8	87.7	17.7	33.9	**516.4**	19.1
Ontario	56.6	26.4	69.7	30.0	579.2	162.8	18.4	57.0	**1 000.1**	37.0
Manitoba	5.8	1.5	5.4	2.9	26.6	23.5	7.0	4.1	**76.9**	2.8
Saskatchewan	8.8	4.4	12.3	1.1	55.4	16.1	12.4	6.8	**117.3**	4.3
Alberta	38.8	20.3	131.0	8.1	163.4	45.6	9.8	41.7	**458.7**	17.0
British Columbia	33.3	12.8	32.6	71.3	140.0	57.7	12.6	22.1	**382.4**	14.1
Yukon and Northwest Territories[2]	1.2	0.9	1.6	0.1	5.2	1.0	0.2	2.6	**12.8**	0.5
Canada[3]	**206.1**	**81.0**	**298.2**	**147.4**	**1 293.2**	**421.8**	**80.9**	**177.2**	**2 705.9**	**100.0**

Notes:
Figures may not add up to totals due to rounding.
1. Purchase of waste management services and sewerage services is included with operating expenditures on PAC end-of-pipe processes .
2. Includes Nunavut.
3. Excludes the "other manufacturing" industries category.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.31
Frequency of Methods Used to Reduce Waste and Pollutants by Industry, 1996

	1996 waste and pollutant reductions							
Industry	End product modification	End-of-pipe installation	Integrated production process change	Improved control of operations	Recycling	Energy efficiency	Material or solvent substitution	Other
	percent of total number declared							
Logging	4.2	33.3	4.2	62.5	45.8	25.0	16.7	-
Mining	4.5	39.4	22.7	48.5	57.6	42.4	27.3	21.2
Crude Petroleum and Natural Gas	3.4	58.6	41.4	79.3	65.5	75.9	41.4	-
Food and Tobacco Products	11.7	39.0	24.7	51.9	59.7	42.9	28.6	6.5
Beverage	12.5	40.0	42.5	37.5	82.5	42.5	15.0	5.0
Pulp and Paper	5.1	55.7	40.5	50.6	46.8	36.7	26.6	12.7
Primary Metals	5.1	48.1	36.7	49.4	69.6	38.0	39.2	6.3
Transportation Equipment	17.6	39.2	43.1	51.0	80.4	56.9	56.9	5.9
Non-Metallic Mineral Products	9.1	45.5	30.3	42.4	72.7	39.4	39.4	9.1
Refined Petroleum and Coal Products	12.5	43.8	12.5	75.0	50.0	43.8	18.8	12.5
Chemical Products	20.0	32.2	35.7	62.2	70.8	29.6	43.5	17.4
Other manufacturing	12.7	19.2	28.5	38.5	71.9	38.1	39.6	4.2
Pipeline Transport and Gas Distribution Systems[1]	3.6	53.6	7.1	75.0	67.9	71.4	42.9	3.6
Electric Power Systems	11.8	29.4	23.5	47.1	76.5	82.4	58.8	5.9
Total	**10.9**	**35.9**	**30.6**	**49.2**	**66.2**	**41.7**	**36.5**	**8.4**

Notes:
This table includes data reported only.
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.32
Frequency of Pollution Prevention Methods[1] by Industry, 1997

	1997 pollution prevention							
Industry	Product design of reformulation	Substitution or modification of production process	Recirculation. recovery, reuse or recycling	Energy conservation	Material or solvent substitution	Prevention of leaks and spills	Other	Proportion of respondents who reported
	percent of total number declared							percent
Logging	8.6	2.9	34.3	5.7	14.3	80.0	5.7	29.7
Mining	3.8	22.5	58.8	53.8	23.8	50.0	2.5	72.7
Crude Petroleum and Natural Gas	34.3	40.0	74.3	65.7	48.6	94.3	5.7	79.5
Food and Tobacco Products	13.7	30.1	67.1	58.9	30.1	63.0	5.5	61.3
Beverage	25.0	17.9	57.1	32.1	21.4	50.0	14.3	57.1
Wood	16.3	20.9	58.1	34.9	34.9	60.5	9.3	44.8
Pulp and Paper	8.3	27.1	71.9	40.6	31.3	58.3	11.5	78.7
Primary Metals	11.0	43.0	70.0	54.0	37.0	51.0	2.0	60.6
Transportation Equipment	18.5	32.1	64.2	55.6	55.6	56.8	4.9	78.6
Non-Metallic Mineral Products	11.5	25.0	75.0	32.7	30.8	38.5	7.7	65.0
Refined Petroleum and Coal Products	38.9	44.4	72.2	61.1	50.0	77.8	-	78.3
Chemical Products	26.8	22.8	61.1	38.9	35.6	68.5	5.4	68.3
Other manufacturing	11.7	17.9	63.0	32.7	40.8	30.1	17.6	76.9
Pipeline Transport and Gas Distribution Systems[2]	16.7	11.1	50.0	72.2	44.4	77.8	11.1	81.8
Electric Power Systems	6.7	20.0	53.3	73.3	53.3	93.3	13.3	65.2
Total	**14.7**	**24.2**	**63.6**	**42.1**	**37.0**	**51.2**	**9.9**	**67.4**

Notes:
This table includes data reported only.
1. This table is different from the 1996 table in that it focuses on pollution prevention (as defined by the Federal Government). Therefore, the «end-of-pipe installation» category is not included here and some categories have been renamed in order to better reflect the Federal Government's definition of pollution prevention.
2. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.33

Reduction of Future Waste and Pollutant Emissions: Frequency of Methods Used by Industry as Reported in 1996

	Future[2] waste and pollutant reductions							
Industry	End product modification	End-of-pipe process	Integrated production process change	Improved control of operations	Recycling	Energy efficiency	Material or solvent substitution	Other
	percent of total number declared							
Logging	3.7	25.9	29.6	48.1	63.0	37.0	25.9	14.8
Mining	5.4	39.2	35.1	59.5	51.4	48.6	32.4	18.9
Crude Petroleum and Natural Gas	10.0	56.7	56.7	90.0	66.7	96.7	50.0	3.3
Food and Tobacco Products	18.1	52.1	31.9	56.4	51.1	58.5	26.6	7.4
Beverage	13.3	55.6	48.9	75.6	84.4	84.4	17.8	4.4
Pulp and Paper	11.8	52.9	56.5	50.6	55.3	45.9	36.5	5.9
Primary Metals	6.3	51.6	46.3	57.9	69.5	53.7	43.2	8.4
Transportation Equipment	25.8	37.1	35.5	50.0	74.2	64.5	67.7	17.7
Non-Metallic Mineral Products	8.9	37.8	42.2	55.6	68.9	46.7	37.8	8.9
Refined Petroleum and Coal Products	36.8	52.6	36.8	78.9	73.7	68.4	26.3	15.8
Chemical Products	25.0	42.9	45.7	69.3	66.4	39.3	54.3	15.0
Other manufacturing	15.1	18.0	37.0	46.1	64.4	46.8	48.6	6.7
Pipeline Transport and Gas Distribution Systems[1]	18.5	59.3	11.1	74.1	66.7	85.2	63.0	18.5
Electric Power Systems	11.8	23.5	11.8	52.9	70.6	76.5	64.7	11.8
Total	**15.2**	**38.5**	**39.9**	**57.2**	**64.3**	**53.3**	**43.8**	**10.2**

Notes:
This table includes data reported only.
1. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
2. Future pollutant and waste reductions planned in the next two years.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.34

Frequency of Future Pollution Prevention Methods[1] Used by Industry as Reported in 1997

	Future[2] pollution prevention							
Industry	Product design of reformulation	Substitution or modification of production process	Recirculation, recovery, reuse or recycling	Energy conservation	Material or solvent substitution	Prevention of leaks and spills	Other	Proportion of respondents who reported
	percent of total number declared							percent
Logging	9.4	12.5	34.4	9.4	15.6	68.8	9.4	27.1
Mining	4.7	29.7	59.4	56.3	23.4	53.1	3.1	58.2
Crude Petroleum and Natural Gas	37.1	54.3	80.0	74.3	37.1	91.4	5.7	79.5
Food and Tobacco Products	16.0	34.6	69.1	65.4	25.9	60.5	6.2	68.1
Beverage	9.7	16.1	58.1	67.7	19.4	45.2	3.2	63.3
Wood	14.0	18.6	67.4	23.3	39.5	55.8	7.0	44.8
Pulp and Paper	14.1	33.7	79.3	59.8	32.6	65.2	8.7	75.4
Primary Metals	15.5	45.4	74.2	53.6	39.2	53.6	3.1	58.8
Transportation Equipment	30.3	47.4	73.7	68.4	65.8	63.2	10.5	73.8
Non-Metallic Mineral Products	10.4	25.0	81.3	47.9	33.3	50.0	6.3	60.0
Refined Petroleum and Coal Products	53.3	66.7	80.0	66.7	53.3	93.3	-	65.2
Chemical Products	34.2	29.6	65.8	42.1	41.4	61.8	3.9	69.7
Other manufacturing	17.1	27.6	62.7	47.2	46.6	39.8	6.8	63.1
Pipeline Transport and Gas Distribution Systems[3]	17.6	23.5	64.7	70.6	41.2	82.4	5.9	77.3
Electric Power Systems	13.3	20.0	46.7	66.7	53.3	86.7	13.3	65.2
Total	**19.4**	**31.9**	**67.1**	**51.7**	**39.9**	**55.5**	**6.2**	**62.2**

Notes:
This table includes data reported only.
1. This table is different from the 1996 table in that it focuses on pollution prevention (as defined by the Federal Government). Therefore, the «end-of-pipe installation» category is not included here and some categories have been renamed in order to better reflect the Federal Government's definition of pollution prevention.
2. Future pollution prevention planned in the next two years.
3. Includes the two following industries: Pipeline Transport and Gas Distribution Systems.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.35
Frequency of Methods Used to Reduce Waste and Pollutants in 1996 by Province and Territory

	1996 waste and pollutant reductions							
Province/Territory	End product modification	End-of-pipe installation	Integrated production process change	Improved control of operations	Recycling	Energy efficiency	Material or solvent substitution	Other
	percent of total number declared							
Newfoundland	-	40.0	10.0	-	30.0	40.0	50.0	40.0
Prince Edward Island	x	x	x	x	x	x	x	x
Nova Scotia	4.3	34.8	13.0	47.8	60.9	30.4	8.7	-
New Brunswick	4.2	54.2	25.0	37.5	50.0	37.5	33.3	4.2
Quebec	10.6	36.4	35.5	45.2	61.8	35.5	31.3	6.9
Ontario	14.1	32.3	32.1	49.2	73.2	43.7	42.9	9.1
Manitoba	9.4	28.1	28.1	50.0	62.5	43.8	37.5	-
Saskatchewan	8.8	52.9	35.3	58.8	58.8	50.0	32.4	14.7
Alberta	6.2	38.1	24.7	60.8	69.1	53.6	38.1	9.3
British Columbia	7.7	39.7	26.9	51.3	55.1	33.3	25.6	7.7
Yukon and Northwest Territories[1]	x	x	x	x	x	x	x	x
Canada	**10.9**	**35.9**	**30.6**	**49.2**	**66.2**	**41.7**	**36.5**	**8.4**

Notes:
This table includes data reported only.
1. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.36
Frequency of Pollution Prevention Methods[1] in 1997 by Province and Territory

	1997 pollution prevention							
Province/Territory	Product design of reformulation	Substitution or modification of production process	Recirculation, recovery, reuse or recycling	Energy conservation	Material or solvent substitution	Prevention of leaks and spills	Other	Proportion of respondents who reported
	percent of total number declared							percent
Newfoundland	11.8	29.4	52.9	29.4	23.5	70.6	5.9	77.3
Prince Edward Island	25.0	-	100.0	25.0	50.0	75.0	-	57.1
Nova Scotia	4.5	18.2	72.7	36.4	31.8	59.1	18.2	59.5
New Brunswick	8.3	37.5	58.3	62.5	58.3	66.7	4.2	64.9
Quebec	10.7	25.9	64.1	39.6	34.4	44.4	10.4	62.6
Ontario	17.4	23.2	63.2	43.3	42.2	47.6	11.2	70.1
Manitoba	14.0	28.0	74.0	28.0	38.0	34.0	16.0	76.9
Saskatchewan	19.4	41.7	63.9	66.7	25.0	72.2	8.3	73.5
Alberta	17.2	23.0	62.3	45.1	28.7	70.5	7.4	70.1
British Columbia	11.7	17.1	60.4	36.0	28.8	56.8	3.6	61.0
Yukon and Northwest Territories[2]	-	28.6	71.4	42.9	28.6	42.9	-	70.0
Canada	**14.7**	**24.2**	**63.6**	**42.1**	**37.0**	**51.2**	**9.9**	**67.4**

Notes:
This table includes data reported only.
1. This table is different from the 1996 table in that it focuses on pollution prevention (as defined by the Federal Government). Therefore, the «end-of-pipe installation» category is not included here and some categories have been renamed in order to better reflect the Federal Government's definition of pollution prevention.
2. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.37

Reduction of Future Waste and Pollutant Emissions: Frequency of Methods Used by Province and Territory as Reported in 1996

	Future[1] waste and pollutant reductions							
Province/Territory	End product modification	End-of-pipe installation	Integrated production process change	Improved control of operations	Recycling	Energy efficiency	Material or solvent substitution	Other
	percent of total number declared							
Newfoundland	-	11.1	-	33.3	55.6	77.8	55.6	55.6
Prince Edward Island	x	x	x	x	x	x	x	x
Nova Scotia	15.8	36.8	10.5	57.9	57.9	42.1	42.1	5.3
New Brunswick	13.6	40.9	36.4	54.5	72.7	63.6	45.5	-
Quebec	14.7	37.1	50.9	48.3	62.9	42.2	39.2	8.2
Ontario	15.7	35.8	37.7	58.5	66.5	53.0	47.9	9.3
Manitoba	20.0	30.0	27.5	50.0	65.0	67.5	52.5	7.5
Saskatchewan	8.1	56.8	48.6	64.9	70.3	51.4	27.0	18.9
Alberta	18.3	47.5	39.2	73.3	63.3	72.5	48.3	10.0
British Columbia	12.5	43.2	39.8	54.5	53.4	50.0	30.7	15.9
Yukon and Northwest Territories[2]	x	x	x	x	x	x	x	x
Canada	**15.2**	**38.5**	**39.9**	**57.2**	**64.3**	**53.3**	**43.8**	**10.2**

Notes:
This table includes data reported only.
1. Future pollutant and waste reductions planned in the next two years.
2. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Table A.38

Frequency of Future Pollution Prevention Methods[1] Used by Province and Territory as Reported in 1997

	Future[2] pollution prevention							
Province/Territory	Product design of reformulation	Substitution or modification of production process	Recirculation, recovery, reuse or recycling	Energy conservation	Material or solvent substitution	Prevention of leaks and spills	Other	Proportion of respondents who reported
	percent of total number declared							percent
Newfoundland	27.8	27.8	61.1	38.9	27.8	55.6	5.6	81.8
Prince Edward Island	25.0	-	100.0	25.0	50.0	75.0	-	57.1
Nova Scotia	28.6	47.6	76.2	52.4	47.6	52.4	4.8	56.8
New Brunswick	13.0	26.1	69.6	60.9	47.8	60.9	-	62.2
Quebec	11.6	31.5	72.2	52.3	36.5	53.1	7.5	55.9
Ontario	23.0	33.1	64.8	50.7	45.5	51.6	6.8	65.6
Manitoba	19.5	39.0	82.9	58.5	53.7	46.3	2.4	63.1
Saskatchewan	17.9	48.7	61.5	71.8	30.8	64.1	10.3	79.6
Alberta	23.1	28.9	66.1	57.0	32.2	71.9	5.0	69.5
British Columbia	13.3	21.1	60.0	38.9	25.6	62.2	3.3	49.5
Yukon and Northwest Territories[3]	-	-	80.0	40.0	-	40.0	-	50.0
Canada	**19.4**	**31.9**	**67.1**	**51.7**	**39.9**	**55.5**	**6.2**	**62.2**

Notes:
This table includes data reported only.
1. This table is different from the 1996 table in that it focuses on pollution prevention (as defined by the Federal Government). Therefore, the “end-of-pipe installation” category is not included here and some categories have been renamed in order to better reflect the Federal Government’s definition of pollution prevention.
2. Future pollution prevention planned in the next two years.
3. Includes Nunavut.
Source:
Statistics Canada, Environment Accounts and Statistics Division.

Annex B: Questionnaires

National Accounts and Environment Division

Survey of Environmental Protection Expenditures, 1996

Confidential when completed

Collected under the authority of the Statistics Act, Revised Statutes of Canada, 1985, Chapter S19.

Français au verso

Correct as required

Establishment name

Operating name

C / O

Address

City

Province Postal code

SURVEY OBJECTIVE

This survey measures the cost imposed on industry by environmental protection in Canada through Canadian regulations and conventions.

The results of this survey will be combined with government and household expenditures to form a complete account of the costs of environmental protection for Canadians.

CONFIDENTIALITY

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INFORMATION

Important: please read the definitions and instructions provided at the end of the questionnaire before answering.

If you require assistance in completing this questionnaire or if you have any questions or comments regarding this survey, please contact:

Operations and Integration Division
Statistics Canada
Ottawa, Canada, K1A 0T6
E-mail address: enviro.oid.exp@statcan.ca

Telephone (toll-free): **1-800-255-7726**
Fax: **1-613-951-0709**

The questionnaire is available in an electronic spreadsheet format. Please contact the Operations and Integration Division if you prefer to use this reporting option.

In all correspondence concerning this questionnaire, please quote the identification number that appears on the address label.

Please return this questionnaire within 30 days of receipt.

If you are unable to do so, kindly inform the Operations and Integration Division of the expected completion date.

1. Reporting year.

Report must cover your most recent financial year ending between **April 1, 1996** and **March 31, 1997**.

	Day	Month	Year		Day	Month	Year
From	010	020	030	**to**	040	050	060

For Statistics Canada use only

Rec. D	M	Y	Ed. D	M	Y	Kyd. D	M	Y	Bat.	Coll.	FSC

Please report expenditures in thousands of Canadian dollars

2. Environmental monitoring. *If response is none, please write "0" in corresponding box.*

Include

- all costs related to equipment, supplies, labour and purchased services that are used in response to or in anticipation of regulation or conventions requiring the monitoring of pollutants emitted by this establishment.

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
100	+	110	=	120

3. Environmental assessment and audits. *If response is none, please write "0" in corresponding box.*

Include

- expenditures for reviews of current operations for compliance with regulations (audits);
- expenditures to evaluate the environmental impact of proposed programs or projects (assessments);
- associated legal and consulting costs.

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
130	+	140	=	150

4. Site reclamation and decommissioning. *If response is none, please write "0" in corresponding box.*

Exclude

- any fine or compensation for environmental damage (this is to be reported in Question 13);
- any provision for future environmental liability.

a) Expenditures on site remediation made during 1996 for any active site belonging to your establishment

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
161	+	171	=	181

4. Site reclamation and decommissioning. *If response is none, please write "0" in corresponding box. - Continued*

b) Expenditures on site decommissioning made during 1996 following the closing down of a site (even if closing occurred before 1996)

Operating expenditures $ 000		Capital expenditures $ 000		Total expenditures $ 000
162	+	172	=	182

c) Are you aware of any other inactive sites belonging to your company, for which decommissioning expenditures may have been made in 1996

1 ◯ Yes 2 ◯ No ▶ *Go to question 5*

▼

If yes, please indicate the contact person(s) below: *(Please use the comments section if necessary)*

Name of contact / Name of site	Telephone No.	Fax No.

5. Protection and restoration of wildlife and habitat. *If response is none, please write "0" in corresponding box.*

Include

- expenditures made in compliance with regulations or conventions to protect wildlife and habitat from the effects of this establishment's operations or to restore stocks that have been adversely affected by such operations.

Exclude

- expenditures for site reclamation and decommissioning which are already reported in Question 4;
- expenditures for aesthetic purposes.

Operating expenditures $ 000		Capital expenditures $ 000		Total expenditures $ 000
190	+	200	=	210

6. Purchase of waste and sewerage collection and disposal services. *If response is none, please write "0" in corresponding box.*

Include

- all expenditures related to the use of a waste collection and disposal service provided by a private contractor or a federal, provincial or local government body;
- all expenditures related to the use of a sewerage service provided by a federal, provincial or local government body.

Exclude

- any expenditures for waste management activities done by your establishment's employees (to be included in Question 7);
- any expenditure already included in Questions 2 to 5.

$ 000

240

End-of-Pipe Pollution Abatement and Control (PAC) Expenditures

7. End-of-Pipe PAC expenditures.

End-of-pipe PAC construction and equipment are not an integral part of production. Their sole purpose is to abate or to control undesirable substances emitted during normal production activities.

If response is none, please write "0" in corresponding box.

Include

- any capital or operating expenditure for equipment or facilities which are separately identifiable and which have been installed exclusively to prevent or to reduce emissions of pollutants;
- any expenditure related to waste collection and treatment done by your establishment's employees.

Exclude

- any expenditure already included in Questions 2 to 6;
- any waste recycling expenditure if that activity is integrated into a production process (Question 9).

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
250	+	260	=	270

8. Did you report capital expenditures in Question 7?

1 ◯ Yes 2 ◯ No ▶ *Go to Question 10*

▼

What percentage of this amount was spent on preventing or abating each of the following?

Substances emitted to air		Substances released to surface waters		Substances released to soil or groundwater		Noise or radiation		
%		%		%		%		
280	+	290	+	300	+	310	=	**100%**

9. Please provide a brief description of your main end-of-pipe PAC projects.

Refer to page 8 for examples.

Expenditures on PAC integrated processes

10. Expenditures on PAC integrated processes. *If response is none, please write "0" in corresponding box.*

Include

- all expenditures for new or significantly modified production processes that are mainly required by environmental regulations or conventions in order to prevent or to reduce emissions of pollutants and the amount of waste generated. Examples are process modifications to allow for material substitution, use of improved catalysts, and reuse of waste or water in the production system.

Exclude

- expenditures already reported in Questions 2 through 7.

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
500	+	510	=	520

11. Did you report capital expenditures in Question 10?

1 ◯ Yes 2 ◯ No ▶ *Go to Question 13*

▼

What percentage of this amount was spent on abating or controlling each of the following?

Substances emitted to air		Substances released to surface waters		Substances released to soil or groundwater		Noise or radiation		
%		%		%		%		
530	+	540	+	550	+	560	=	**100%**

12. Please provide a brief description of your main process-integrated PAC projects.
Refer to page 8 for examples.

13. Environmental charges. *If response is none, please write "0" in corresponding box.*

Include

- permits, fees, levies, special assessments;
- other charges paid to regulating bodies in order to allow operations to take place at this establishment;
- any fines, penalties, or damage awards paid to government agencies or to individuals.

$ 000

760

14. Other environmental protection expenditures.

If response is none, please write "0" in corresponding box.

Include

- the costs of administration for an environmental affairs division;
- training and information programs;
- any other additional expenditures that are required to comply with environmental regulations or conventions.

Exclude

- research and development expenditures.

$ 000

770

15. Total expenditures on environmental protection

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
801	+	802	=	803

16. From the total environmental protection expenditures reported in Question 15, what was the amount of environmental services purchased from a private contractor or a government?

Include

- all expenditures associated with the use of a waste collection and treatment service or a sewerage service provided by a private contractor or a federal, provincial/territorial or local government and included in Question 6;
- any other purchase of environmental services provided by a private contractor or a federal, provincial/territorial or local government (e.g. purchase of environmental monitoring services; purchase of environmental assessment and audit services; purchase of construction and engineering services associated with the installation or maintenance of PAC infrastructure or equipment).

Exclude

- any expenditure for environmental services provided by the employees of your establishment or of your company

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
804	+	805	=	806

Reduction of waste and pollution

17. If you have reduced your waste and pollution emissions in 1996 or if you are planning to reduce them in the next 2 years, please indicate how these reductions were/will be achieved, by checking the appropriate box. Please include any projects regardless of whether they are required by regulation or convention.

PAC method	1996 emissions reductions	Future emissions reductions
End-product modification	810 ☐	815 ☐
End-of-pipe installation	820 ☐	825 ☐
Integrated production process change	830 ☐	835 ☐
Improved control of operations	840 ☐	845 ☐
Recycling	850 ☐	855 ☐
Energy efficiency	860 ☐	865 ☐
Material substitution, solvent reduction, elimination or substitution	870 ☐	875 ☐
Other	880 ☐	885 ☐

Certification

I certify that, to the best of my knowledge, the information provided in this questionnaire is correct and complete.

900	Signature X	Date (D / M / Y)	910	Title	
905	Name of person completing this questionnaire (Type or print)		915	Telephone No.	920 Fax No.
925	E-mail address				

Comments *(Add a page if needed)*

Thank you for your cooperation

SELECTED ENVIRONMENTAL TECHNOLOGIES - Reference: Capital Projects, Questions 9 and 12.

Air and Water Treatment Systems

Absorption and adsorption systems
Activated sludge systems
Aeration systems
Aerobic lagoon and pond systems
Air filtration equipment
Air stripping
Anaerobic contact systems
Bed filtration systems
Biological polishing
Catalytic oxydation and reduction systems
CFC control equipment
Chemical oxidation and reduction systems
Chlorination
Coagulation, flocculation and flotation
Combustion and incineration systems
Electrostatic precipitators and separators
Flare systems
Flue gas desulphurization
Gravity settling systems
Inertial separator
Ion exchanger
Membrane filtration
Neutralization systems
Nitrification and denitrification
Noise and odour control
Oil/water separation
Ozonation
Precipitation chambers
Primary clarification
Screening and degritting
Steam stripping
Tall stack systems
Thermal oxidation systems
Ultravoilet photolysis systems
Vapour condenser
Ventilation systems
Wet oxidation systems
Wet scrubbing systems

Land Management

Aeration/vapour extraction systems
Bioremediation methods
Injection grouting technology
Landfarming methods
Pozzalanic treatment methods
Pump and treat technologies
Remediation using soil washing
Solvent extraction technology
Thermal desorption technology

Site Decommissioning

Asbestos remediation technologies
Lead clean up methods
PCB decontamination methods
Plant decommissioning
Site clean up methods
Underground storage tanks handling

Resource Management

Acid mine drainage control
Composting technology
Ecological landscaping methods
Geophysical methods
Geotechnical methods
Renaturalization methods
Site restoration methods

Energy Conservation

Clean fuel systems
Cogeneration
Energy efficiency conversions
Fuel substitution
Waste-to-energy systems

DEFINITIONS AND CONCEPTS

Environmental protection expenditures are defined in this survey as all operating expenses and capital expenditures that are incurred in order to comply with environmental regulations or conventions which apply to Canada. They consist of expenditures for pollution abatement and control and expenditures for restoring wildlife and habitat, along with associated expenditures for environmental monitoring, environmental assessments and audits, and reclamation and decommissioning of sites. Expenditures to improve employee health, workplace safety and site beautification are excluded.

Environmental conventions refer to any formal, multi-party commitment by an industry or an industry association for instance, to meet specific targets in terms of habitat protection, waste reduction, or the elimination or reduction of specific materials that are considered to be harmful or toxic to the natural environment in Canada. Examples are the National Packaging Protocol reduction of packaging by 50 percent by the year 2000; the Montreal Protocole (elimination of CFCs by 1998); the Canada-U.S. Air Quality Agreement; the "Responsible Care" program from the Canadian Chemical Producers Association.

Environmental regulations refer to any current Canadian federal, provincial, or municipal law that is intended to protect or to restore the environment. Expenditures related to anticipated Canadian federal, provincial or municipal law may be included as long as its provisions are known. Expenditures to conform to foreign regulations are excluded.

Pollution abatement and control (PAC) expenditures include all outlays for the primary purpose of preventing, abating or controlling the release of pollutants and generation of waste resulting from the operations of this establishment. Expenditures to produce PAC equipment for sale are excluded, as are expenditures for research and development, since the latter are reported in Statistics Canada's Survey on Research and Development in Canadian Industry.

HOW TO REPORT

Please report expenditures in **thousands of Canadian dollars.** If, for certain categories, no expenditures have been incurred, please write "0" in the corresponding box.

Where precise data are not available, your best estimate is acceptable. If additional information is available in an annual report or an environmental performance report, **please include a copy** when you return the questionnaire.

TO REPORT CAPITAL EXPENDITURES

Report expenditures made during the 1996 fiscal year.

Include all outlays for machinery and equipment as well as for the construction of non-residential facilities (contractors or own employees). For construction, include all costs associated with demolition, planning and design (such as engineering and construction fees), any materials supplied to construction contractors for installation and any costs associated with the purchase of land that are neither amortized nor depreciated.

Exclude any provisions for future environmental liability.

TO REPORT OPERATING EXPENSES

Include all cash expenses, rather than accruals, incurred during your 1996 fiscal year for labour, fuel and electricity, materials and supplies, and purchased services.

FOR LOGGING ACTIVITIES

Use Question 5 to report additional expenditures for logging caused by environmental regulation or convention. **Include** the extra cost of any practice that would not otherwise be followed in the absence of environmental regulation or convention. **Exclude** the foregone revenues resulting from regulations that reduce the allowable harvest.

FOR MINING ACTIVITIES

Use Question 6 or 7 to report any expenditures that are related to the handling and treatment of mine tailings and that are required by environmental regulation. Even if some of these activities are now considered to be "standard practice", **include** related expenditures if they are required by regulation. Use Question 14 to report imputed interest on funds held in trust against future environmental liabilities. Report only actual expenditures.

FOR PETROLEUM OPERATIONS

Please report separately, if possible, environmental protection expenditures associated with different petroleum operations: exploration, refining, chemical products, pipeline transportation.

Environment Statistics Program

Survey of Environmental Protection Expenditures, 1997

Confidential when completed

Collected under the authority of the Statistics Act, Revised Statutes of Canada, 1985, Chapter S19.

Si vous préférez ce questionnaire en français, veuillez cocher ☐

Correct as required

Establishment name

Operating name

C / O

Address

City

Province/Territory Postal code

SURVEY OBJECTIVE

This survey provides a measure of the cost imposed on industry by environmental protection in Canada through Canadian environmental regulations, conventions and voluntary agreements. The survey also aims at identifying practices and technologies used in Canadian industry for the purpose of preventing or abating pollution.

The results of this survey will be combined with government and household expenditures to form a complete account of the costs of environmental protection for Canadians.

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1. Reporting year

Report must cover your financial year ending between **April 1, 1997** and **March 31, 1998**.

	Day	Month	Year		Day	Month	Year
From	010	020	030	**to**	040	050	060

For Statistics Canada use only

Rec. D	M	Y	Ed. D	M	Y	Kyd. D	M	Y	Bat.	Coll.	FSC

4-2300-2.1: 1998-07-24 STC / NAD - 475-04244

Statistics Canada Statistique Canada

Canada

Please report expenditures in thousands of Canadian dollars

2. Environmental monitoring *If response is none, please write "0" in corresponding box.*

Include

- All costs related to equipment, supplies, labour and purchased services required for monitoring pollutants emitted by this establishment. Expenditures associated with participation to the National Pollutant Release Inventory (NPRI) are to be included.

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
100	+	110	=	120

3. Environmental assessment and audits *If response is none, please write "0" in corresponding box.*

Include

- Expenditures for reviews of current operations for compliance with regulations (audits)
- Expenditures to evaluate the environmental impact of proposed programs or projects (assessments)
- Associated legal and consulting costs

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
130	+	140	=	150

4. Site reclamation and decommissioning *If response is none, please write "0" in corresponding box.*

a) Expenditures on site remediation made during the fiscal year 1997 for any active site belonging to your establishment

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
161	+	171	=	181

b) Expenditures on site decommissioning made during the fiscal year 1997 following the closing down of a site (even if closing occurred before 1997)

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
162	+	172	=	182

A list of processes/technologies associated with site reclamation and decommissioning is provided in Question 12c.

Exclude

- Any fine or compensation for environmental damage (this is to be reported in Question 8)
- Any provision for future environmental liability

5. Protection and restoration of wildlife and habitat *If response is none, please write "0" in corresponding box.*

Include

- All expenditures made to protect wildlife and habitat from the effects of this establishment's operations or to restore stocks that have been adversely affected by such operations

Exclude

- Expenditures for site reclamation and decommissioning which are already reported in Question 4
- Expenditures for aesthetic purposes

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
190	+	200	=	210

6. Treatment and control of pollution (end-of-pipe processes)

Treatment and control of pollution are performed using end-of-pipe equipment or installation. These end-of-pipe processes are not an integral part of production; their sole purpose is to abate or to control undesirable substances resulting from normal production.

a) Pollution treatment and control expenditures *If response is none, please write "0" in corresponding box.*

Include

- Any capital or operating expenditure for equipment or facilities which are separately identifiable and which have been installed exclusively to reduce or eliminate pollutants resulting from production
- Any expenditure related to waste collection, removal and treatment done by your establishment's or company's employees
- Any purchase of waste and sewerage management services

Exclude

- Any expenditure specific to workers' health and safety
- Any expenditure for on-site recycling (Question 7)

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
250	+	260	=	270

b) Did you report capital expenditures in Question 6a?

1 ◯ Yes 2 ◯ No ▶ *Go to Question 7*

What percentage of this amount was spent on reducing or abating each of the following?

Substances emitted to air		Substances released to surface waters		On site contained solid/ liquid waste		Noise, vibration or radiation		
%		%		%		%		
280	+	290	+	300	+	310	=	**100%**

A list of environmental processes/technologies is provided in Question 12.

7. Pollution prevention

Pollution prevention is the use of processes, practices, materials, products or energy that avoid or minimise the creation of pollutants and waste, and reduce overall risk to human health or the environment.

Pollution Prevention - A Federal Strategy for Action, Government of Canada (1995)

This question tries to identify expenditures and methods used for the purpose of preventing or minimising pollution and waste, or promoting resource conservation.

a) Expenditures on pollution prevention *If response is none, please write "0" in corresponding box.*

Include

- All operating and capital expenditures for equipment or facilities integrated to a production process that avoid or minimise the production of pollutants and waste
- All operating and capital expenditures for equipment or facilities related to leak and spill prevention. They may include expenditures on the following: spill containments, dyke extensions, accessories (valves, pumps); emission detection equipment, etc.
- All operating and capital expenditures for equipment or facilities used for conserving energy or water
- All operating and capital expenditures for equipment or facilities associated with recirculation, recovery, reuse and recycling of materials or substances

Exclude

- Any expenditure already included in Questions 2 to 6
- Any expenditure specific to worker's health and safety

Operating expenditures $ 000		Capital expenditures $ 000		Total expenditures $ 000
500	+	510	=	520

b) Did you report capital expenditures in Question 7a?

1 ◯ Yes 2 ◯ No ▶ *Go to Question 8*

▼

What percentage of this amount was spent on preventing or minimising each of the following?

Substances emitted to air %		Substances released to surface waters %		On site contained solid/ liquid waste %		Noise, vibration or radiation %		
530	+	540	+	550	+	560	=	**100%**

7. Pollution prevention - Continued

c) Pollution prevention methods

If you have prevented, or reduced waste or pollutants or conserved resources in fiscal year 1997, or if you are planning to do so in the next 2 years, please indicate how it was/will be achieved by checking the appropriate boxes. Please include any project, regardless of whether they are required by environmental regulation or convention.

Methods of pollution prevention	1997	1998-1999
Product design or reformulation	810 ☐	815 ☐
Substitution or modification of production process (integrated process)	830 ☐	835 ☐
Recirculation, recovery, on site recycling or reuse of materials or substances [1]	850 ☐	855 ☐
Energy conservation	860 ☐	865 ☐
Material substitution, reduction or elimination, or solvent substitution	870 ☐	875 ☐
Prevention of leaks and spills	880 ☐	885 ☐
Other	890 ☐	895 ☐

_____

_____

_____

1 Recirculation, recovery, reuse or recycling: recirculation, reuse, recovery or recycling of water, materials or substances generated during production, excluding materials transferred or recycled off site.
Examples: vapour recovery, recovery of sludge, water recirculation, reuse of water for refrigeration condenser operation.

A list of environmental processes/technologies is included in Question 12.

8. Environmental charges *If response is none, please write "0" in corresponding box.*

Include

- Permits, fees, levies, special assessment and related fees
- Other charges paid to regulating bodies in order to allow operations to take place at this establishment
- Any fines, penalties, or damage awards paid to government agencies or to individuals

$ 000

760 ☐

9. Other environmental protection expenditures *If response is none, please write "0" in corresponding box.*

Include

- The costs of administration for an environmental affairs division
- Training and information programs
- Any other additional expenditures that are required to comply with environmental regulations or conventions

Exclude

- Research and development expenditures

$ 000

770 ☐

10. Total expenditures on environmental protection *If response is none, please write "0" in corresponding box.*

This question is the total of all preceding categories.
It should also include all data for which breakdowns were not available.

Operating expenditures		Capital expenditures		Total expenditures
$ 000		$ 000		$ 000
801	+	802	=	803

11. Purchase of environmental services *If response is none, please write "0" in corresponding box.*

From the total environmental protection expenditures reported in Question 10, what was the amount of environmental services purchased from a private contractor or a government?

a) Waste management services or sewerage services — $ 000 — 240

Include

- All expenditures related to the use of a waste collection, disposal or treatment service, or an off-site recycling service provided by a private contractor or a federal, provincial or local government body
- All expenditures related to the use of a sewerage service provided by a federal, provincial or local government body

Exclude

- Any expenditures for waste management activities done by your establishment's or company's employees (Question 6)
- Any expenditure for recycling on site (Question 7)

b) Environment-related construction and engineering services — $ 000 — 805

c) Other environmental services — $ 000 — 804

Examples:

- purchase of environmental assessment and audit services
- purchase of services for site reclamation or decommissioning
- purchase of services associated with wildlife and habitat protection and restauration

d) Total purchase of environmental services — $ 000 — 806

Include

- sum of cells 240, 805 and 804

Exclude

- any expenditure for environmental services provided by the employees of your establishment or your company

12. Environmental processes

Indicate how you have prevented or abated pollution resulting from normal production by checking the appropriate boxes.

a) Treatment of gas, liquid waste and noise, vibrations and radiations

Please indicate, by checking boxes, if they are pollution abatement processes (treatment and control) or pollution prevention processes as defined in Questions 6 and 7.

Treatment of gas

	Prevention	Abatement	Cannot specify prevention or abatement
Physical treatment			
Gravity deposition			
Precipitation chamber	1000 ☐	1001 ☐	1002 ☐
Dust collector system	1003 ☐	1004 ☐	1005 ☐
Inertial separator			
Cyclone	1006 ☐	1007 ☐	1008 ☐
Vortex	1009 ☐	1010 ☐	1011 ☐
Centrifugal precipitator	1012 ☐	1013 ☐	1014 ☐
Impingement eliminator	1015 ☐	1016 ☐	1017 ☐
Electrostatic precipitator	1018 ☐	1019 ☐	1020 ☐
Filtration			
Bag house	1021 ☐	1022 ☐	1023 ☐
Activated carbon filter	1024 ☐	1025 ☐	1026 ☐
Membrane filter	1027 ☐	1028 ☐	1029 ☐
Adsorption			
Activated carbon adsorption	1030 ☐	1031 ☐	1032 ☐
Other media	1033 ☐	1034 ☐	1035 ☐
Other	1036 ☐	1037 ☐	1038 ☐
Biological treatment			
Biological filtration	1039 ☐	1040 ☐	1041 ☐
Activated sludge	1042 ☐	1043 ☐	1044 ☐
Phytoremediation	1045 ☐	1046 ☐	1047 ☐
Other	1048 ☐	1049 ☐	1050 ☐
Chemical treatment			
Scrubbing			
Wet scrubbing system	1051 ☐	1052 ☐	1053 ☐
Air scrubbing	1054 ☐	1055 ☐	1056 ☐
Desulfurisation	1057 ☐	1058 ☐	1059 ☐
Catalytic reduction	1060 ☐	1061 ☐	1062 ☐
Chemical oxidation	1063 ☐	1064 ☐	1065 ☐
Ozonation	1066 ☐	1067 ☐	1068 ☐
Other	1069 ☐	1070 ☐	1071 ☐
Thermal treatment			
Flare system	1072 ☐	1073 ☐	1074 ☐
Vapour condenser	1075 ☐	1076 ☐	1077 ☐
Dryer	1078 ☐	1079 ☐	1080 ☐

12. Environmental processes - Continued

Treatment of gas - Concluded

Thermal treatment - Continued	Prevention	Abatement	Cannot specify prevention or abatement
Incineration			
Thermal recuperative incineration	1081 ☐	1082 ☐	1083 ☐
Catalytic incineration	1084 ☐	1085 ☐	1086 ☐
Thermal regenerative incineration	1087 ☐	1088 ☐	1089 ☐
Fluidised bed	1090 ☐	1091 ☐	1092 ☐
Oxidation			
Thermal oxidation	1093 ☐	1094 ☐	1095 ☐
Catalytic oxidation	1096 ☐	1097 ☐	1098 ☐
Cooling tower	1099 ☐	1100 ☐	1101 ☐
Other	1102 ☐	1103 ☐	1104 ☐

Treatment of liquid waste

Physical treatment

Screening	1105 ☐	1106 ☐	1107 ☐
Degritting	1108 ☐	1109 ☐	1110 ☐
Primary clarification (sedimentation, gravity settling chamber)	1111 ☐	1112 ☐	1113 ☐
Precipitator	1114 ☐	1115 ☐	1116 ☐
Centrifugal precipitator	1117 ☐	1118 ☐	1119 ☐
Oil/water separation			
Gravity	1120 ☐	1121 ☐	1122 ☐
Oilphylic pads	1123 ☐	1124 ☐	1125 ☐
Coalescing separators	1126 ☐	1127 ☐	1128 ☐
Adsorption system			
Activated carbon adsorption	1129 ☐	1130 ☐	1131 ☐
Polymer	1132 ☐	1133 ☐	1134 ☐
Other media	1135 ☐	1136 ☐	1137 ☐
Contact system			
Air stripping	1138 ☐	1139 ☐	1140 ☐
Steam stripping	1141 ☐	1142 ☐	1143 ☐
Flotation	1144 ☐	1145 ☐	1146 ☐
Filtration			
Bed filtration system (e.g. sand filter)	1147 ☐	1148 ☐	1149 ☐
Pressure (press filter, filter leaf)	1150 ☐	1151 ☐	1152 ☐
Vacuum (rotary, drum, centrifugal)	1153 ☐	1154 ☐	1155 ☐
Membrane (dialysis, reverse osmosis, ultrafiltration, electrodialysis, piezodialysis, pervaporation)	1156 ☐	1157 ☐	1158 ☐
Gravity (belt)	1159 ☐	1160 ☐	1161 ☐
Equalisation pond	1162 ☐	1163 ☐	1164 ☐
UV disinfection	1165 ☐	1166 ☐	1167 ☐
Other	1168 ☐	1169 ☐	1170 ☐

12. Environmental processes - Continued

Treatment of liquid waste - Continued

Chemical treatment	Prevention	Abatement	Cannot specify prevention or abatement
Oxidation			
Wet oxidation system	1171 ☐	1172 ☐	1173 ☐
Chemical oxidation	1174 ☐	1175 ☐	1176 ☐
Electrochemical oxidation	1177 ☐	1178 ☐	1179 ☐
Disinfection			
Chlorination	1180 ☐	1181 ☐	1182 ☐
Ozonation	1183 ☐	1184 ☐	1185 ☐
Reduction system			
Dephosphating	1186 ☐	1187 ☐	1188 ☐
Denitrification	1189 ☐	1190 ☐	1191 ☐
Dechlorination	1192 ☐	1193 ☐	1194 ☐
Neutralisation	1195 ☐	1196 ☐	1197 ☐
Ion exchange	1198 ☐	1199 ☐	1200 ☐
Flocculation	1201 ☐	1202 ☐	1203 ☐
Coagulation	1204 ☐	1205 ☐	1206 ☐
Demineralisation	1207 ☐	1208 ☐	1209 ☐
Nitrification	1210 ☐	1211 ☐	1212 ☐
Other	1213 ☐	1214 ☐	1215 ☐
Thermal treatment			
Incineration	1216 ☐	1217 ☐	1218 ☐
Drying	1219 ☐	1220 ☐	1221 ☐
Evaporation	1222 ☐	1223 ☐	1224 ☐
Distillation	1225 ☐	1226 ☐	1227 ☐
Fluidised bed	1228 ☐	1229 ☐	1230 ☐
Thermal oxidation	1231 ☐	1232 ☐	1233 ☐
Other	1234 ☐	1235 ☐	1236 ☐
Biological treatment			
Aerobic treatment			
Activated sludge dewatering	1237 ☐	1238 ☐	1239 ☐
Biological polishing or biofiltration	1240 ☐	1241 ☐	1242 ☐
Aeration pond	1243 ☐	1244 ☐	1245 ☐
Aerobic lagoon	1246 ☐	1247 ☐	1248 ☐
Aeration system	1249 ☐	1250 ☐	1251 ☐
Other	1252 ☐	1253 ☐	1254 ☐
Anaerobic treatment			
Septic tank	1255 ☐	1256 ☐	1257 ☐
Anaerobic digester reactor	1258 ☐	1259 ☐	1260 ☐
Other	1261 ☐	1262 ☐	1263 ☐

12. Environmental processes - Continued

Treatment of liquid waste - Continued

Biological treatment – Continued

	Prevention	Abatement	Cannot specify prevention or abatement
Biosystem			
Biological reactor	1264 ☐	1265 ☐	1266 ☐
Multiplate reactor	1267 ☐	1268 ☐	1269 ☐
Other	1270 ☐	1271 ☐	1272 ☐

Treatment of noise, vibration or radiation

Noise/vibration suppression equipment			
Accoustic barriers	1273 ☐	1274 ☐	1275 ☐
Mufflers	1276 ☐	1277 ☐	1278 ☐
Other	1279 ☐	1280 ☐	1281 ☐

b) Energy – Please indicate your energy conservation processes by checking the appropriate boxes.

Cogeneration	1282 ☐
Energy efficiency	1283 ☐
Fuel substitution	1284 ☐
Waste-to-energy system	1285 ☐
Clean fuel system	1286 ☐
Renewable energy source	1287 ☐
Solar	1288 ☐
Wind power	1289 ☐
Geothermal	1290 ☐
Biomass	1291 ☐
Other	1292 ☐

c) Treatment of soils – Please indicate how site reclamation and decommissioning, and waste management were done by checking the appropriate boxes.

Site reclamation and decommissioning (reference: Question 4)

Underground storage tanks handling	1293 ☐
Excavation	1294 ☐
Solvent extraction system	1295 ☐
Vapour extraction systems	1296 ☐
Geomembrane	1297 ☐
Injection grouting technology	1298 ☐
Soil washing	1299 ☐
Reduction	1300 ☐
Other	1301 ☐

Biological treatment

Biological degradation by aeration or bioventilation	1302 ☐
Bioslurping	1303 ☐
Bioremediation	1304 ☐

12. c) Treatment of soils – Continued

Site reclamation and decommissioning – Continued

Biological treatment - Continued

Renaturalisation . . . . . 1305 ☐
Phytoremediation . . . . . 1306 ☐
Other . . . . . 1307 ☐

Thermal treatment

Thermal desorption technology . . . . . 1308 ☐
Thermal oxidation system . . . . . 1309 ☐
Incineration . . . . . 1310 ☐
Other . . . . . 1311 ☐

Waste Management

Container . . . . . 1312 ☐
Dehydration . . . . . 1313 ☐
Packaging . . . . . 1314 ☐
Modification or preparation of landfill or waste treatment sites . . . . . 1315 ☐
Pozzolanic treatment method . . . . . 1316 ☐
Compacting . . . . . 1317 ☐
Shredding . . . . . 1318 ☐
Grinding . . . . . 1319 ☐
Crushing . . . . . 1320 ☐
Screening . . . . . 1321 ☐
Degritting . . . . . 1322 ☐
Other . . . . . 1323 ☐

Thermal treatment

Fluidised bed incineration . . . . . 1324 ☐
Pyrolysis . . . . . 1325 ☐
Incineration . . . . . 1326 ☐
Other . . . . . 1327 ☐

Biological treatment

Biopiles . . . . . 1328 ☐
Composting technology . . . . . 1329 ☐
Landfarming method . . . . . 1330 ☐
Other . . . . . 1331 ☐

13. Environmental practices

This question concerns other activities, services or practices adopted by this establishment to avoid or minimise pollution or to conserve resources.

		Yes	No
a) Does this establishment use an environmental management system? If yes, could you briefly describe?	951	☐	☐
b) Is this establishment ISO 14000 certified or does it have an equivalent certification? If yes, please describe.	953	☐	☐
c) Is this establishment implementing any environmental voluntary agreement, or is participating in any voluntary environmental program such as ARET (Accelerated Reduction/Elimination of Toxics)? If yes, please list programs, accords or agreements.	955	☐	☐
d) Does this establishment have a "green" procurement policy?	957	☐	☐
e) Are any of the goods produced by this establishment certified by an environmental Program, for example "Eco-Logo" operated by Terrachoice Inc.? If yes, please describe.	959	☐	☐
f) Does this establishment report information to the National Pollutant Release Inventory (NPRI)?	961	☐	☐
g) Does this establishment publish an annual report on its environmental performance or sustainable development?	963	☐	☐
h) Does this establishment use life cycle analysis for decision-making?	965	☐	☐
i) Other	967	☐	☐

Comments *(Add a page if needed)*

Thank you for your cooperation

Certification

I certify that, to the best of my knowledge, the information provided in this questionnaire is correct and complete.

900	Signature X	Date (D / M / Y)	910	Title	
905	Name of person completing this questionnaire (Type or print)		915	Telephone No.	920 Fax No.
925	E-mail address				

Definitions and Concepts

Environmental protection expenditures are defined in this survey as all operating expenses and capital expenditures that are incurred in order to comply with environmental regulations, conventions or voluntary agreements which apply to Canada. They consist of expenditures for pollution abatement and control and expenditures for restoring wildlife and habitat, expenditures for environmental monitoring, environmental assessments and audits, and expenditures for reclamation and decommissioning of sites. Expenditures to improve employee health, workplace safety and site beautification are excluded.

Expenditures to produce pollution abatement and control equipment for sale are also excluded as they would appear twice in the expenditure data produced by Statistics Canada. Expenditures for environment-related research and development are also excluded since they are reported in Statistics Canada's Survey on Research and Development in Canadian Industry.

Environmental conventions or voluntary agreements refer to any formal, multi-party commitment by an industry or an industry association for instance, to meet specific targets in terms of habitat protection, waste reduction, or the elimination or reduction of specific materials that are considered to be harmful or toxic to the natural environment in Canada. Examples include the following: the National Packaging Protocol (reduction of packaging by 50 percent by the year 2000); the Montreal Protocol (elimination of CFCs by 1998); the Canada-U.S. Air Quality Agreement; the "Responsible Care" program from the Canadian Chemical Producers Association; the Accelerated Reduction / Elimination of Toxics (ARET) Program; the Voluntary Challenge and Registry (VCR) Program on climate change; etc.

Environmental regulations refer to any current Canadian federal, provincial, or municipal law that is intended to protect or to restore the environment. Expenditures related to anticipated Canadian federal, provincial or municipal law may be included as long as its provisions are known. Expenditures to conform to foreign regulations are excluded.

How To Report

Please report expenditures in **thousands of Canadian dollars.** If, for certain categories, no expenditures have been incurred, please write "0" in the corresponding box.

Where precise data are not available, your best estimate is acceptable. If additional information is available in an annual report or an environmental performance report, **please include a copy** when you return the questionnaire.

TO REPORT CAPITAL EXPENDITURES

Report expenditures made during the 1997 fiscal year.

Include all relevant outlays for machinery and equipment and their installation, as well as for the construction of non-residential facilities (contractors or own employees). For construction, include all costs associated with demolition, planning and design (such as engineering and construction fees), any materials supplied to construction contractors for installation and any costs associated with the purchase of land that are neither amortised nor depreciated.

Exclude any provisions for future environmental liability.

TO REPORT OPERATING EXPENSES

Include all cash expenses, rather than accruals, incurred during your 1997 fiscal year for labour, fuel and electricity, materials and supplies, and purchased services.

FOR LOGGING ACTIVITIES

Use Question 5 to report additional expenditures for logging caused by environmental regulation or convention. **Include** the extra cost of any practice that would not otherwise be followed in the absence of environmental regulation or convention. **Exclude** the foregone revenues resulting from regulations that reduce the allowable harvest.

FOR MINING ACTIVITIES

Use Questions 6 or 11a to report any expenditures that are related to the handling and treatment of mine tailings and that are required by environmental regulation. Even if some of these activities are now considered to be "standard practice", include related expenditures if they are required by regulation. Use Question 9 to report imputed interest on funds held in trust against future environmental liabilities. Report only actual expenditures.

FOR PETROLEUM OPERATIONS

Please report separately, if possible, environmental protection expenditures associated with different petroleum operations: exploration, refining, chemical products, pipeline transportation.