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**EFFECTS OF ENVIRONMENTAL EXPOSURE ON
U.S. AND CANADIAN FIRMS' RESPONSES TO PROVIDING
RECOMMENDED ENVIRONMENTAL DISCLOSURES**

A Dissertation

by

PAUL A. ASHCROFT

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 1999

Major Subject: Accounting

UMI Number: 9934363

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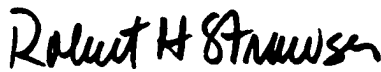
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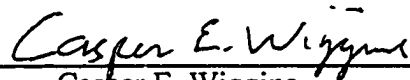
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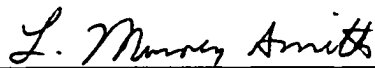
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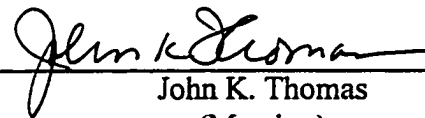
Robert H. Strawser
(Chair of Committee)



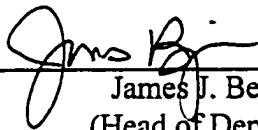
Casper E. Wiggins
(Member)



L. Murphy Smith
(Member)



John K. Thomas
(Member)



James J. Benjamin
(Head of Department)

May 1999

Major Subject: Accounting

ABSTRACT

Effects of Environmental Exposure on U.S. and Canadian Firms' Responses
to Providing Recommended Environmental Disclosures. (May 1999)

Paul A. Ashcroft, B.S., University of Southern Mississippi;

M.B.A., University of South Alabama

Chair of Advisory Committee: Dr. Robert H. Strawser

This study evaluates the content of environmental information in the annual reports of U.S. firms and Canadian firms that have potentially significant environmental risks. Interactive relationships between firms and firm stakeholders are theorized to influence firms' environmental disclosure quality. Firms' environmental exposure is examined in relation to environmental disclosure quality. Variables potentially affecting reported environmental capital costs and environmental operating costs are studied. Additionally, U.S. firms' and Canadian firms' environmental disclosure quality is compared and annual report location of disclosure is evaluated. Environmental disclosure quality is measured against environmental disclosure recommendations by the American Institute of Certified Public Accountants (AICPA) and the Canadian Institute of Chartered Accountants (CICA).

The results of this study indicated that U.S. firms provided higher quality environmental disclosures than did Canadian firms. In general, changes in disclosure

levels over time were not significantly different between U.S. firms and Canadian firms. Also, U.S. firms provided most of their environmental disclosures in the financial statement section and the management discussion and analysis section of the annual report. Canadian firms primarily used the introduction section and the management and discussion and analysis section for reporting environmental information. Regression results revealed that firms' environmental disclosure quality increased as pollution levels increased, and also that there was no significant relationship between the number of firm facilities and firms' environmental disclosure quality. Also, no significant relationship was found between environmental capital expenditures and either the number of polluting facilities or the amount of pollution released. However, both U.S. and Canadian firms reported significantly lower environmental operating expenses as their pollution levels increased.

DEDICATION

I dedicate this dissertation to my father, William H. Ashcroft, who always gave his best in everything he did, and to my mother, Annie G. Ashcroft, who has a very generous spirit. My father's hard work, sincerity, honesty, and kind treatment of others have been great examples for me to follow. My mother's thoughtfulness and generosity have made me a better man than I would be otherwise.

ACKNOWLEDGMENTS

I appreciate the guidance received from my committee members, Robert Strawser, Casper Wiggins, John Thomas, Murphy Smith, and the Graduate Council Representative, John Boies. Each of them has made important contributions through their input and feedback that has significantly improved this research.

Many friends have continually encouraged me to “reach the summit” as I gradually made progress each year towards the completion of my Ph.D. I sincerely appreciate the following people for their friendship and support: Dena Johnson, Collin McCormick, Doug Medlin, Tonya Leake, Jason King, John Savash, Caroline Strand, Tina Upton, Arthur Mann, and Dwight Tomkins. To Rebecca Watts I would like to say thank you for encouraging me by telling me that you are proud of me.

Although they probably are not even aware that I was writing a dissertation, or even what a dissertation is, I want to give special thanks to each of the children who were in the kindergarten class that I taught at the A&M Church of Christ. Each of you added joy and happiness to my life. Thank you for all the fun we had together.

Additionally, I am very thankful to KPMG Peat Marwick for awarding me a doctoral scholarship during the second year of my doctoral program. I appreciate the financial support as well as the confidence KPMG Peat Marwick placed in my research ideas and my perspectives on the education of college students.

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CHAPTER I

INTRODUCTION

Before 1997, no standardized U.S. Generally Accepted Accounting Principles (GAAP) existed that applied to environmental accounting other than *Statement of Financial Accounting Standards (SFAS) number 5* (Financial Accounting Standards Board 1975). The disclosure of environmental information in the annual reports of firms up to 1996 was primarily subject to the discretion of management. A comprehensive analysis of the information provided in firms' annual reports related to environmental costs, policies, strategies, pollution, effects of regulation, and current and future actions to respond to environmental concerns is needed to understand firms' environmental disclosure decisions. Such an analysis would reveal if firms have resolved the major uncertainties regarding how to measure and when to record environmental costs and obligations, and also respond to a recent increased interest in the topic of environmental accounting and a desire for additional research regarding environmental costs and obligations (L. T. Johnson 1993).

Several items indicate the need to study environmental disclosures. Firms deal with tremendous uncertainties in reporting environmental costs, and are also pressured by stakeholders and other components of society to provide environmental disclosures. Prior research has stated that firms' known and potential environmental costs are very

This dissertation follows the format and style of *The Accounting Review*.

significant. Also, the professional business community and accounting standards bodies in the U.S. and Canada have recently shown an increased interest in environmental accounting. Additional reasons to examine environmental disclosures are that information about future environmental liabilities is very useful, and general concern about the environment is considerably high.

A considerable amount of prior accounting research has examined issues related to the study of environmental disclosure. A comprehensive review of relevant research is provided for the areas of voluntary disclosure, environmental disclosure and costs, the usefulness of social and environmental information, and the relationship of environmental disclosure and environmental performance.

This study views the reporting of environmental information by firms in their annual reports as primarily resulting from influences exerted by stakeholders upon the firms. The interpenetrating systems model of Preston and Post (1975) states that various interacting components exist in society which influence but do not control each other. The interpenetrating systems theory states that management actions and social policy-making are interactive and interdependent with each other. Business firms have the capability to both respond to and affect social actions. Thus, stakeholders and other social actors have the potential to cause firms to report desired environmental information.

This study examines the content of environmental information provided by a sample of U.S. firms and Canadian firms that have potentially significant environmental

costs and obligations. The study also evaluates variables that potentially influence disclosure levels, particularly how disclosure quality is influenced by firms' environmental exposure. A list of environmental information items recommended or required to be disclosed is used to capture the content of disclosures provided by the firms. The disclosure list used in this study was developed based on guidelines produced by the American Institute of Certified Public Accountants (AICPA) and the Canadian Institute of Chartered Accountants (CICA). Specifically, these guidelines are the AICPA's *Statement of Position 96-1, Environmental Remediation Liabilities*, which was approved by the Financial Accounting Standards Board (FASB), and these CICA documents: *Handbook Section 3060* (regarding future removal and site restoration costs), *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues*, and *Reporting on Environmental Performance: Summary Report*.

U.S. and Canadian firms included in the study were randomly selected from public firms that reported pollution releases in the 1994 Toxics Release Inventory (U.S.) and the 1994 National Pollutant Release Inventory (Canada). The annual reports of these firms for the years 1994 to 1996 were evaluated for the environmental disclosures provided in accordance with the disclosure list.

The research objectives of this study are to:

1. Evaluate the quality and content of environmental disclosure of the the sample firms in the U.S. and in Canada. The environmental disclosures provided by the firms will be evaluated according to the

AICPA and the CICA guidelines as presented in Appendix A.

2. Determine which, if either, of the two nations' sample firms provide environmental disclosures that adhere more completely to the recommendations and requirements presented by the AICPA and the CICA.
3. Examine potential factors that affect:
 - a. the quality of recommended and required environmental disclosures.
 - b. the amount of environmental costs reported.

The results of this study indicated that U.S. firms provided higher quality environmental disclosures than did Canadian firms. In general, changes in disclosure levels over time were not significantly different between U.S. firms and Canadian firms. Regression results revealed that firms' environmental disclosure quality increased as pollution levels increased, and also that there was no significant relationship between the number of firm facilities and firms' environmental disclosure quality. Also, no significant relationship was found between environmental capital expenditures and either the number of polluting facilities or the amount of pollution released. However, both U.S. and Canadian firms reported significantly lower environmental operating expenses as their pollution levels increased.

The remainder of the study is organized as follows. Chapter II provides the motivation for the study, chapter III presents the literature review, chapter IV proposes a

theory to explain firms' responses in providing environmental disclosures, chapter V describes the analytical methods used and proposes the hypotheses to be tested, and chapter VI discusses the empirical results. Finally, chapter VII summarizes the study and its implications, states the limitations of the study, and suggests additional research.

CHAPTER II

MOTIVATION

Several factors motivate the examination of how firms in the U.S. and Canada have responded to meet their social responsibility in terms of reporting relevant, useful environmental information to investors, creditors, suppliers, and other financial statement users. The following items motivate this study, and are discussed in detail in this chapter:

1. The level of social responsibility present in an individual culture may influence the environmental disclosure behavior of firms. Societal pressure on firms is perceived to be greater in Canada than in the U.S.
2. Firms face a considerable challenge in handling the financial reporting of environmental costs. Additionally, suppliers, customers, investors, and other stakeholders perceive environmental information as valuable. Thus, stakeholders exert pressure on firms to provide detailed environmental information.
3. On an overall basis, firms' known and potential environmental costs are very significant.
4. The professional business community has recently shown an increased interest in environmental accounting.
5. Accounting standards bodies in both the U.S. and Canada have given additional attention to environmental accounting standards and have

made substantial recommendations for increased environmental disclosure.

6. Accounting standards allow firms much freedom in reporting environmental liabilities. Environmental disclosures can assist stakeholders in estimating unrecorded environmental liabilities.
7. Examining the environmental disclosures of firms from two societies (the U.S. and Canada) provides a more comprehensive perspective of how societal pressure affects firms' disclosure behavior than would result from studying only one country's firms.
8. General environmental concern is considerably high in both Canada and the U.S. and had increased in recent years.

Cultural Influences

The culture and political institutions of Canada differ substantially from those of the United States. Specifically, Canada's society is very community- and group-oriented, while the U.S. has a comparatively liberal society that rejects the concept of communitarianism. (Lipset 1993, S330-S331). Since environmental disclosures provide information that society as a whole may find useful (due to the potential effects of pollution such as declines in personal health, and additional taxes and product costs), cultural differences in the United States and Canada could cause differences in disclosure by firms of the two nations. Socialism is a major political force in Canada, but it is not in the United States (Merelman 1991, 28). Therefore, Canadian firms, which may be

more influenced by society and stakeholders than are U.S. firms, respond by providing a higher quality and quantity of environmental disclosure than do U.S. firms. Also, the users of Canadian firms' financial statements may have a greater desire for socially oriented information in annual reports than do the users of U.S. firms' financial statements, due to the more significant overall social focus in Canada as compared to the U.S.

Bandyopadhyay et al. (1994) studied the reported reconciliations between Canadian-GAAP income and U.S.-GAAP income for 96 Canadian firms who are also listed on a major U.S. stock exchange. They report that on average their sample firms' U.S. GAAP earnings as a percentage of the market value of equity are 2.2% lower than Canadian GAAP earnings. Bandyopadhyay et al. (1994) conclude that this result indicates that U.S. GAAP is more conservative than Canadian GAAP. This study evaluates the differences, if any, between U.S. and Canadian firms' handling of environmental disclosures in annual reports; in a sense the study assesses the degree to which firms in each nation are socially responsible (i.e. conservative) regarding the quality of environmental information they report.

Financial Reporting and the Need for Environmental Information

Examining environmental disclosures is important due to the impact that environmental costs have on financial reporting. Price Waterhouse (1992, p. i) clearly states the relevance of accounting for environmental costs by explaining:

Of the many risks and uncertainties that threaten to undermine the

usefulness of financial reporting in the 1990s, few pose as formidable a challenge as environmental costs.

The reporting of environmental performance, cost, and liability information is a major issue in other countries as well as in the U.S. The Canadian Institute of Chartered Accountants (CICA) expresses the demands on firms to report environmental information by stating (1994a, p. xiii):

Organizations are facing increasing pressures to publicly account for their environmental performance. They have to be in a position to respond to requests for more information from various stakeholders on their environmental policy, practices and performance. This demand has prompted many organizations to establish or formalize environmental management systems to ensure that processes, practices and procedures are in place to attain environmental objectives and that information reported to stakeholders is reliable.

Since providing environmental information in annual reports is largely voluntary, reporting practices will vary considerably across firms. In the CICA's view, this variation is necessary to allow firms to discover the most effective reporting methods.

The CICA (1994a, p. xvi) states:

As more organizations voluntarily report on environmental performance, generally accepted reporting practices will emerge. Until then, reporting practices should remain flexible to encourage new and innovative ways to present environmental information.

In explaining the intended use of their publication *Reporting on Environmental Performance*, the CICA (1994a, 3) gives further explanation of the influences on and the

need for environmental reporting:

Increasingly, organizations of every type and size, public and private, profit and non-profit, are being asked for information on how they deal with the environment. Many groups - from suppliers, customers, and regulators to the public at large - want to know what impact organizations are having on the environment and how they are dealing with those impacts. They want reassurance that organizations are operating responsibly towards the environment and, if not, what they are doing to improve their performance in the future.

Organizations, management and their advisors should understand how this increased environmental emphasis on environmental issues affects their business operations. And make no mistake, the effects can be pervasive, from greater or lesser acceptance of products and services, to community support or boycotts to obtaining necessary permits to carry on operations.

Organizations must also understand how this environmental awareness translates into new reporting requirements to a variety of audiences, from regulators to investors and shareholders, to consumer advocates and a variety of other interested groups. As the demand for both mandatory and voluntary reporting continues to increase, organizations will have to learn what questions they need answers to, what information to obtain, and how to evaluate the fairness of the resulting disclosures.

One concern that every publicly traded firm has is that of having adequate access to the capital markets. However, the role of the capital markets in influencing environmental disclosure is not totally known. The CICA (1994a) claims that the capital markets have not effectively handled the negative environmental effects that a firm's operations may have. However, this situation is improving in that "The capital markets are demanding much more disclosure of environmentally related information" (CICA 1994a, 11). The CICA further stresses the importance of firms' understanding and responding to the needs of capital markets participants by saying:

Organizations that raise funds in the capital markets need to understand the screening criteria used by financial institutions, insurance companies, investors and investment analysts and acquire the information necessary to respond to them. Otherwise, an organization may find that it pays a premium in the capital markets. In fact, access to those markets may be completely denied (1994a, 12).

Firms will likely incur substantial costs from providing a significant amount of environmental information in their annual reports. Firms would have to receive adequate benefits from the disclosures in order to provide the environmental information. Perhaps the following statement best summarizes the motivation that firms should have to provide environmental information and the benefits to them for doing so.

Organizations have expanding needs for environmental information to manage performance and profitability. They must be able to satisfy the markets that their environmental practices and performance are neither harmful to their financial profitability nor to the environment. Moreover, to meet accountability expectations and compete effectively, information must be communicated to regulators, customers, capital markets and other interested parties. Reporting information in a useful format and in a timely manner suggests to the recipients that the organization has developed good management practices regarding environmental issues (CICA 1994a, 16).

Various actions taken by several parties to protect the environment may have effects on accounting and the information provided in annual reports. These actions include the passage of laws requiring that firms reduce and/or clean up current and/or past pollution, efforts by the U.S. Environmental Protection Agency (EPA) and Environment Canada to administer and enforce environmental cleanup laws,

promulgation of accounting standards for environmental reporting by bodies such as the AICPA, the FASB, and the CICA, and the tracking of pollution releases of firms.

Following is a discussion of the potentially significant environmental costs firms are facing, practical business interests in environmental accounting issues, and accounting policies in the U.S. and Canada on environmental reporting.

Environmental Costs

Price Waterhouse (1992) states that during the 1980s, capital expenditures by U.S. firms for environmental matters increased tenfold, from 2 percent to 20 percent of all capital spending. Also, still unfunded and perhaps mostly unrecorded are the unpaid costs firms have for past violations of laws, including an estimated \$500 billion for the Superfund Act alone. Overall, the current total known environmental liability is estimated to be between two and five percent of the U.S. gross domestic product (Chadick et al. 1993). As these estimated environmental costs and liabilities are substantial, investors, creditors, and other users of annual reports would desire to have detailed information relevant to a particular firm's environmental situation.

Practical Business Interests in Environmental Accounting

In the past few years, the business community has expressed a greater interest in the topic of environmental accounting, as well as given additional consideration to how adequately firms report their environmental costs, liabilities, and activities. This professional interest in environmental accounting indicates that this study will be of benefit to accounting and business practitioners by providing an evaluation of firms'

disclosure practices.

A question business professionals ask is, “How should firms account for the increasing costs of environmental cleanup?” The following questions, as well as others, must be answered in order to develop even an estimated range of environmental costs to accrue (Dirks 1991a, 90):

1. What remedial action will occur?
2. Will any environmental costs be recovered from other parties such as insurance companies, or other firms involved in the contamination?
3. How long will the remediation process take?
4. Will the planned remediation succeed? What other alternatives are available?

Surma and Vondra (1992) surveyed 125 major U.S. corporations in 1990, and asked the firms when they record hazardous waste liabilities. The percentage of firms in each category was:

Recorded at time facility is disposed of	20
Expensed as cleanup is ongoing	18
When firm makes settlement offer	15
At time of official notification by proper government authority	12
Allocated over useful life of property	8
At completion of the Remedial Investigation and feasibility study (RI/FS)	20
When sign consent to conduct RI/FS	5
Internal company procedure discovers & reports the cleanup responsibility	2

The Price Waterhouse 1994 survey includes both an accounting portion focusing

on financial statement reporting of past environmental problems, and a management portion asking executives how they create policies and programs to prevent environmental problems. Price Waterhouse (1994, p. i) finds that firms accrue environmental costs sooner than in the past and are expanding disclosures. They conclude that this improvement in reporting is likely a result of increasing information available on contaminated sites, and the additional guidance provided by the accounting profession and the Securities and Exchange Commission (SEC).

The interest shown in environmental accounting issues by the business community indicates that firms' environmental disclosures are of considerable importance, and provide much needed information to users of annual reports. The following four sections of this study address the accounting standards for accruing environmental liabilities and providing environmental disclosures in the U.S. and Canada.

Accounting Standards in the United States: FASB and AICPA Requirements

The basic requirements for recording environmental liabilities are provided by the *Statement of Financial Accounting Standards (SFAS) number 5, Accounting for Contingencies* (Financial Accounting Standards Board 1975). Paragraph 8 of SFAS 5 states that contingencies shall be recorded when it is probable that a liability has been incurred or an asset impaired and the amount of loss can be reasonably estimated. When a contingency is not accrued because one or both of the conditions are not met for doing so, SFAS 5 provides the following guidance in paragraph 10:

If no accrual is made for a loss contingency because one or both of the conditions in paragraph 8 are not met, or if an exposure to loss exists in excess of the amount accrued pursuant to the provisions of paragraph 8, disclosure of the contingency shall be made when there is at least a reasonable possibility that a loss or an additional loss may have been incurred.

A firm that has an extensive amount of pollution releases could have significant contingent liabilities related to environmental cleanup that would be reported under SFAS 5.

FASB Interpretation No. 14, Reasonable Estimation of the Amount of a Loss, (Financial Accounting Standards Board 1976) provides additional guidance beyond SFAS 5. Interpretation 14 explains that when the loss is probable and it is possible to estimate only a range of loss, then both requirements of SFAS 5 have been satisfied and a loss accrual shall be made. If an amount within the range is a better estimate of the likely loss than any other amount, that amount shall be recorded. Otherwise, the minimum amount in the range must be recorded. Appendix E summarizes the reporting requirements for contingent liabilities.

In the past few years, FASB's Emerging Issues Task Force (EITF) has dealt with several environmental accounting issues. The conditions under which hazardous waste remediation costs should be capitalized is covered in EITF Issue 90-8, *Capitalization of Costs to Treat Environmental Contamination*. Issue 90-8 states that in general,

environmental contamination treatment costs should be expensed, but can be capitalized if they (1) extend the life, increase the capacity, or improve the safety or efficiency of the property, or (2) reduce or prevent future environmental contamination, or (3) are to prepare the property for sale (Dirks 1991a). EITF Issue 93-5, *Accounting for Environmental Liabilities*, expresses the concept that an environmental liability should be analyzed separately from any recovery claims, and that the loss and the claim can be netted only when recovery is probable (Delaney et al. 1996).

Statement of Position 96-1 (SOP 96-1) - Environmental Remediation Liabilities was issued in 1996 by the Accounting Standards Executive Committee of the American Institute of Certified Public Accountants, and was approved by the FASB. SOP 96-1 is effective for fiscal years beginning after December 15, 1996. The first paragraph of SOP 96-1 explains the authority that an SOP has:

AICPA members should consider the accounting principles in this Statement of Position if a different accounting treatment of a transaction or event is not specified by a pronouncement covered by rule 203 of the AICPA Code of Professional Conduct. In such circumstances, the accounting treatment specified by this Statement of Position should be used, or the member should be prepared to justify a conclusion that another treatment better presents the substance of the transaction in the circumstances.

The summary to SOP 96-1 explains that authoritative guidance is given on specific accounting issues relating to the recognition, measurement, display, and disclosure of environmental remediation liabilities. The summary further states that the SOP provides:

- That environmental remediation liabilities should be accrued when the

- criteria of SFAS 5 are met.
- Benchmarks to assist in the determination of when environmental remediation liabilities should be accrued according to SFAS 5.
 - That an accrual for environmental liabilities should include
 - a. the incremental direct costs of the remediation effort, and
 - b. compensation and benefit costs for employees directly involved in the remediation effort.
 - That the measurement of the liability should include
 - a. the firm's allocable share of the liability for a certain site, and
 - b. the firm's share of the liability that will not be paid by other potentially responsible parties or the government.
 - That the measurement of the liability should be based on
 - a. existing laws and regulations, and the remediation technology expected to be used, and
 - b. the entity's estimates of the costs of all aspects of the remediation effort when they are expected to be performed.
 - That the measurement of the liability may be discounted to the present value if the liability and the amount and timing of cash payments for the liability are fixed or readily determinable.
 - Guidance on the presentation of environmental remediation liabilities in financial statements and on disclosures about environmental-cost-related accounting principles, environmental remediation loss contingencies, and other loss contingency disclosure considerations.

The FASB's and the AICPA's recent increased interest in the area of environmental reporting and disclosure indicates that environmental accounting issues are becoming increasingly important in accounting policy-making. The guidance provided in SOP 96-1 was used in developing the disclosure list used in this study to evaluate firms' environmental disclosures. The details of items chosen from SOP 96-1 for the disclosure list are provided in Appendix D.

Included in SOP 96-1 are several examples of disclosures that firms could provide in their annual reports. Provided below is the sample accounting policies footnote disclosure for environmental remediation-related costs from section 7.13

(information that is italicized and enclosed in brackets is not required):

Environmental Remediation Costs-[Enterprise A accrues for losses associated with environmental remediation obligations when such losses are probable and reasonably estimable. Accruals for estimated losses from environmental remediation obligations generally are recognized no later than completion of the remedial feasibility study. Such accruals are adjusted as further information develops or circumstances change.]
 Costs of future expenditures for environmental remediation obligations are not discounted to their present value. *[Recoveries of environmental remediation costs from other parties are recorded as assets when their receipt is deemed probable.]*

Securities and Exchange Commission (SEC) Environmental Disclosure

Requirements

The SEC has also stated requirements regarding environmental accounting that affect the disclosures firms must make in the 10-K, which is filed annually by publicly traded U.S. firms. Regulation S-K, Item 101(c)(1)(xii) (1982a) requires that appropriate disclosure be made as to the material effects of environmental laws on the capital expenditures, earnings, and competitive position of the firm. This disclosure requirement includes material estimated capital expenditures for environmental control facilities in the current year and the next year, and for “such further periods as the registrant may deem material.” Additionally, Regulation S-K, Item 103(5) (1982b) requires disclosure of pending legal proceedings, including those from environmental laws, that (a) are material to the business or financial condition of the firm, or (b) have a claim of greater than ten percent of the firm's current assets, or (c) in which a government authority is involved and sanctions will exceed \$100,000.

To legally comply with SEC regulations, firms must provide all of the SEC-required information in the 10-K, but only certain specified items in the annual report. SEC Regulation 14A discusses the information that must be reported in the annual reports of firms registered under Section 12 of the 1934 Securities Exchange Act. For example, Rule 14-a3(b)(1) states that the registrant's annual report shall contain audited balance sheets for the two most recent years and audited statements of income and cash flows for the three most recent years. Per Rule 14a-3, the following Regulation S-K items must be provided in the annual report to shareholders: Items 302, 304, 301, 201, management's discussion and analysis required by Item 303, and the information on segments and operations required by paragraphs (b), (c)(1)(i), and d of Item 101 (Coopers & Lybrand 1997, 204-205). Since Regulation 14 does not mention that the information described in Items 101(c)(1)(xii) or Item 103 of Regulation S-K must be reported in annual reports, it is at the discretion of firm management whether to do so or not. Note that *The Coopers & Lybrand Sec Manual* referenced above contains the exact text of Rule 14a-3.

The SEC's position indicates that they consider environmental cost information essential to investors. The SEC requirements for disclosure in the 10K may indirectly influence firms to provide more environmental disclosure in annual reports. Therefore, it is worthwhile to examine annual reports to evaluate the environmental disclosures provided.

The following discussion will now consider influences on environmental

disclosure for Canadian firms.

Canadian Environmental Accounting Standards

The *CICA Handbook* section 3290, effective as of August 1978, covers the treatment of contingencies in Canadian firms' financial statements. Section 3290 states that the appropriate accounting treatment of contingent losses depends on the probability that a future event or events will confirm that an asset had been impaired or a liability incurred at the financial statement date. The CICA provides the following three categories for classifying the probability of the future events occurring:

- (a) likely - there is a high probability that the future event(s) will occur;
- (b) unlikely - there is a slight probability that the future event(s) will occur;
- (c) not determinable - the probability that the future events will occur cannot be determined.

Regarding the accrual of a loss, section 3290 specifies that:

The amount of a contingent loss should be accrued in the financial statements by a charge to income when both of the following conditions are met:

- (a) it is likely that a future event will confirm that an asset had been impaired or a liability incurred at the date of the financial statements; and
- (b) the amount of the loss can be reasonably estimated.

Disclosure of the nature of an accrual and, in some circumstances, the amount accrued may be desirable (*CICA Handbook*, Section 3290.12)

Also, if there is a range of loss estimated, and one amount within that range is a better estimate than any other amount, that amount should be accrued. If no best estimate is possible, then the minimum amount in the range would be accrued. Any potential loss greater than the amount accrued would be presented in a note to the financial statements. The following specific guidelines are given regarding disclosure of contingent losses (*CICA Handbook*, Section 3290.15):

The existence of a contingent loss at the date of the financial statements should be disclosed in notes to the financial statements when:

- (a) the occurrence of the confirming future event is likely but the amount of the loss cannot be reasonably estimated; or
- (b) the occurrence of the confirming future event is likely and an accrual has been made but there exists an exposure to loss in excess of the amount accrued; or
- (c) the occurrence of the confirming future event is not determinable.

The requirements for Canadian firms to disclose contingent losses are essentially the same guidelines provided for U.S. firms in SFAS 5. As shown in the summary of reporting requirements for contingent liabilities in Appendix E, the only difference between the two nations is for footnote disclosures. Canadian firms must disclose in the notes contingent losses which are likely to occur but which they either cannot estimate or for which a potential loss beyond the amount accrued exists, and disclose possible losses for which the probability of the future event occurring cannot be determined (regardless of whether they can estimate the amount of the loss or not). U.S. firms must disclose

potential unrecorded contingent losses where there is a “reasonable possibility” of the loss or additional loss occurring. This difference in mandatory accounting standards for contingent liability reporting is minimal and should therefore have no or minor effects on causing differences in the quality of environmental disclosure for contingent liabilities across firms in each country.

In addition to contingent liabilities, Canadian GAAP does specifically mention future removal and site restoration costs in *CICA Handbook* sections 3060.39-41, which came into effect in December 1990. Following is the exact text of these sections as stated by the CICA. Considerable discretion is provided to firms, as section 3060.39 states that when these costs are “reasonably determinable”, then they “should” be recorded.

- .39 When reasonably determinable, provisions should be made for future removal and site restoration costs, net of expected recoveries, in a rational and systematic manner by charges to income.
- .40 Future removal and site restoration costs include costs, net of expected recoveries, for dismantling and abandoning a property. Provisions are needed to accrue the liability for future removal and site restoration costs, when the likelihood of their incurrence is established as a result of environmental law, contract, or because the enterprise has established a policy to restore a site, and when such costs can be reasonably determined. Provisions are recorded as liabilities and are not classified with accumulated amortization.
- .41 When future removal and site restoration costs cannot be reasonably determined, a contingent liability may exist. (See contingencies, Section 3290.)

Currently, the CICA has provided nonmandatory guidelines and recommendations for environmental reporting. Overall, the CICA recommends that

firms develop a framework for organizing and reporting environmental information. The following statement indicates that the CICA (1994b, 6) desires firms to consider users' needs to be of highest importance:

The key to successful communication is to provide readers with useful information. The same characteristics that make financial information useful to its readers - relevance, reliability, understandability and comparability - also serve to make environmental information useful to its audiences.

Other than the future removal and site restoration costs required to be reported by *CICA Handbook* Section 3060, and contingent liabilities under *Handbook* Section 3290, Canadian accounting guidelines make the reporting of environmental information in annual reports a discretionary choice.

Unrecorded Future Environmental Liabilities

As discussed above, accounting standards in both the U.S. and in Canada are not extensive regarding the recording of environmental liabilities. Thus, firms have considerable freedom to decide whether to accrue environmental liabilities and in determining the amount of any accruals. As a result, firms potentially have significant unrecorded environmental liabilities. Examining firms' environmental disclosure quality helps to assess the extent to which firms have provided information about their future environmental liabilities. While firms may not necessarily disclose the dollar amount of the liability, other information may be reported that is useful to investors and other

stakeholders in developing their own estimates of firms' potential environmental liabilities.

Motivation for Comparing U.S. and Canadian Firms

The prior discussion has largely focused on an increased interest in environmental reporting by various accounting, business, and professional parties to motivate the proposed study. This section presents reasons why it would be beneficial to examine and compare the environmental reporting habits of firms specifically in Canada and the United States.

This study seeks to understand how firms respond to users' needs for environmental information. Firms were chosen from two societies that are politically and economically similar but culturally different in order to examine how societal pressure influences firms' environmental disclosure behavior. This comparative analysis provides a more comprehensive analysis of this issue than would result by examining only one country.

If firms' environmental disclosure actions are influenced by society, then firms in a more socialistic nation (e.g. Canada) would be expected to provide better disclosure than firms in a nation that has a lower level of socialism (e.g. United States). Examining disclosures by U.S. firms and comparing them to those of Canadian firms provides insight into the issue of whether an increase in overall social concern in the U.S. could result in U.S. firms providing higher quality environmental disclosures.

Also, since Canada and the U.S. are linked economically (i.e., are close trading

partners), disclosure practices by firms in each nation may influence the firms in the other nation to change the content of their disclosures. For example, if Canadian chemical firms begin providing very detailed environmental disclosures, chemical firms in the U.S. may respond by providing an increased quality and/or quantity of environmental disclosure. This potential effect is due to competition between firms in the two nations. Environmental information is becoming increasingly important to business decisions, as vendors and suppliers seek to align themselves with environmentally responsible firms (Allen 1994). Thus, firms have an incentive to provide at least as much environmental disclosure as their competitors and perhaps more.

Discussed next are particular reasons supporting the choice of Canada and the U.S. as the nations whose firms are included in the study.

Motivation for Examining Canadian Firms

Several sources indicate that public concern in Canada about the environment is quite high. For example, Decima Research in Toronto reports that 8 out of 10 Canadians are very concerned about the environment. And there seems to be good reason for concern, as the World Wildlife Fund states that Canada is losing 240 acres of wilderness each hour to development, logging, mining, and other industries. This loss of habitat threatens 255 animal and plant species with extinction. Another example is that in 1994, environmental activists were seeking a ban on the discharge of chlorine compounds into the Great Lakes, due to cancer and other health problems they are linked to causing (Nichols 1994).

Bakvis and Nevitte (1992, 146) discuss how environmentalism in Canada has increased over time. The authors present results of a Gallup poll asking the open-ended question “What do you think is the most important problem facing this country today?” “Environmental concerns” was the answer of 3% of the respondents in February 1987, 17% in July 1989, and 14% in March 1990. In national elections starting with 1974, the following question was asked of voters: “What is the most important issue to you personally in this election?” In 1979, a meager 0.2% of voters responding said that the environment was the most vital issue. However, by 1988, 6% of voters said the environment was most important.

Environmental organizations in Canada have also had a considerable impact on the public’s concern for the environment. Many environmental groups in Canada seek to exert political pressure to obtain favorable environmental policies, and also try to influence the social movement (Wilson 1992). Wilson goes on to explain more completely (1992, 109) that “Many groups, that is, practice a kind of dual politics, mixing the pressure group’s pragmatism with the social movement’s commitment to the goals of societal transformation and its sensitivity to the dangers of co-optation.” In addition, all environmental groups in Canada are involved in direct lobbying to affect public policy. Most of these groups are also working hard to influence societal thinking about environmental issues (Wilson 1992, 109-110).

These facts indicate that there are significant influences in Canada supporting increased environmental awareness and action, as well as a considerable interest in the

environment by the Canadian society as a whole. Examining Canadian firms' environmental disclosure quality is useful since it will reveal how firms in a socially oriented nation have responded to an increase in environmental awareness in society as a whole.

Motivation for Examining U.S. Firms

Several items indicate that the U.S. public has become more concerned about the environment over time. The Roper Organization polled U.S. residents to respond to the question of whether environmental protection laws and regulations have gone too far, have not gone far enough, or have created the right balance. From 1972 to 1990, the percentage answering "not far enough" increased from 34 to 54 percent, "too far" fell from 13 to 11 percent, and "right balance" decreased from 32 to 26 percent. This greater desire for environmental regulation is particularly indicative of an increased concern for the environment, considering that during this time period the U.S. public was generally opposed to increased governmental regulation (Kempton et al. 1995).

In another poll, Cambridge Reports asked citizens to decide whether the statement, "We must sacrifice economic growth in order to preserve and protect the environment" or the opposite statement (i.e. sacrifice the environment to have economic growth) was most accurate. From 1976 to 1990, those selecting to sacrifice economic growth increased from 38 to 64 percent, while those deciding to sacrifice the environment decreased from 21 to 15 percent. Those responding "I do not know" dropped from 41 to 21 percent (Kempton et al. 1995).

With this increase in environmental awareness in the U.S., we may expect U.S. firms to be more informative regarding their environmental actions. Thus, it is useful to examine the content of U.S. firms' environmental disclosures.

Summary of Motivation

This chapter has presented specific reasons why it is important to examine environmental disclosure quality. Motivating factors discussed were the level of social responsibility in a culture, uncertainties in reporting environmental costs, the desire by stakeholders for environmental information, potentially significant environmental costs, substantial interest by the business community and accounting standards bodies in environmental accounting, unrecorded future environmental liabilities, and a considerable level of concern about the environment in both Canada and the U.S.

Chapter III discusses previous research regarding disclosure and environmental accounting as well as the contribution of this study beyond prior research.

CHAPTER III

REVIEW OF RELEVANT LITERATURE

Prior accounting research has examined issues that relate to the current study. This chapter reviews prior research that is most relevant to this study. The applicable research reviewed is in the areas of voluntary disclosure, environmental disclosure and costs, the usefulness of social and environmental information, and the relationship of environmental disclosure and environmental performance.

Voluntary Disclosure

Lang and Lundholm (1993) state that prior research on voluntary disclosure has proposed a positive relation between disclosure and firm performance. The overall prediction of this prior research is that when disclosure costs exist, firms above a certain performance level will disclose, and firms not meeting the necessary performance level will not. Lang and Lundholm (1993) examine how the following variables affect financial analysts' ratings of corporate disclosures: returns, analyst forecast errors, firm size, returns variability, the correlation between annual returns and earnings, and the extent to which the firm is active in issuing securities.

The dependent variables used in a regression model by Lang and Lundholm (1993) were analysts' ratings of corporate disclosures as taken from the *Reports of the Financial Analysts Federation Corporate Information Committee*. These reports evaluate the completeness of firms' disclosures across three dimensions: annual published information, quarterly and other published information, and investor relations

and related aspects. The disclosure ratings used for the dependent variables were for each of the following categories: the annual report, other publications, investor relations, and the total overall rating.

Lang and Lundholm's (1993) findings revealed that as the size of the firm (as measured by market value) increased, an increase occurred in the disclosure ratings for each of the four categories, at the .01 level of statistical significance. Other variables indicating a significant, positive relation with each category of disclosure rating were the annual stock market return, and the presence of a debt or equity registration statement. The correlation between annual stock returns and annual earnings had a significant negative relation with each of the disclosure ratings categories. With the exception of the standard deviation of market-adjusted stock returns indicating a positive relation with only the ratings for the investor relations category, the other variables were not significant.

As Lang and Lundholm's (1993) results indicate that both firm size and firm performance have an impact on the quality of disclosure that firms provide in annual reports, this study incorporates variables to assess how those factors affect environmental disclosure. Total assets and total sales will be used as separate measures of firm size, and return on equity to measure firm performance.

Barth et al. (1995) consider only firms that have Superfund sites in examining disclosures about environmental liabilities related to cleaning up those sites. Barth et al. (1995) use both annual reports and 10-K's to evaluate environmental liability

disclosures. An index containing thirteen items regarding potentially responsible party (PRP) status on Superfund sites (whether or not the firm has been identified as a “potentially responsible party” to clean up the site), remediation cost estimates, accrual of liabilities, and insurance recovery was used to measure disclosures. Of particular relevance to this study, Barth et al. (1995) state that 20.7% of their firm-year observations disclosed an estimate of or gave a qualitative statement about total remediation costs, and 33.5% of the firms reported that they had accrued some amount for their environmental liabilities.

Two propositions made by Barth et al. (1995) are that more disclosure will result as the average age of Superfund sites on which the company is a PRP increases, and as the percentage of a company’s sites for which a Record of Decision (ROD) has been filed increases. The reason given for these propositions is that management has more complete information about the environmental liabilities as sites age and as sites progress through the Environmental Protection Agency’s (EPA) regulatory process, and thus will provide more disclosures.

Regression results reported by Barth et al. (1995) indicated that the average age of Superfund sites and percentage of sites that a ROD has been filed for both have a significant negative relation with their overall disclosure index and an index item that measures if the company stated they were a PRP on one or more Superfund sites. These results were opposite from those expected, and indicate that as Superfund sites age and as more RODs are filed for a firm, the public is likely to be more aware of a firm’s

environmental situation. Thus, stakeholders may have a lower demand for information in the annual report regarding the costs and liabilities involved, the cleanup process, litigation, and other significant items. Firms may also feel less inclined to incur the costs necessary to provide additional disclosures, since much information is available from these other sources. That is, as the public is more informed about a firm's environmental situation from sources other than the annual report, they may not pressure the company to provide increased environmental disclosure in the annual report. Public pressure is likely required for firms to provide additional disclosures, considering that environmental disclosures are largely voluntary. This study uses the number of facilities for which a firm reports pollution information as a proxy for the amount of information that the public has regarding a firm's environmental situation. As a firm has more facilities, its activities are more likely to be reported by the media. The public becomes more informed and may have less of a need for additional environmental information in the annual report.

In summary, Lang and Lundholm (1993) used analysts' ratings of corporate disclosures to examine the relationship between disclosures and firm performance. Barth et al. (1995) studied only U.S. firms with Superfund sites to examine disclosures about environmental liabilities for cleaning up those sites. This study extends Lang and Lundholm (1993) by examining the relationship between environmental disclosure quality and performance, and also by using a direct measure of disclosure quality (see Appendix A) rather than relying on analysts' ratings of disclosure. This study improves

on Barth et al. (1995) by studying firms with a broader range of exposure to environmental risk than examining only firms with Superfund sites (Superfund sites are the most hazardous and risky sites in the U.S.), by examining both U.S. and Canadian firms, and by evaluating all aspects of firms' environmental disclosure and not only environmental liability disclosure.

Environmental Disclosure and Costs

Gamble et al. (1995) rated the content of environmental disclosures in the annual reports and 10Ks of firms in the oil and gas, chemical, petroleum refining, steel works, motor vehicles, and hazardous waste industries for the years 1986 to 1991. Comparisons were conducted to test for differences in disclosure quality between years, and for differences in disclosure quality between industries. Gamble et al. (1995) found a significant increase in disclosure quality over time, with 1989 having the highest quality level. The industries of petroleum refining and hazardous waste management had the highest quality environmental disclosures among the sampled industries.

Niskala and Pretes (1995) evaluated the content of environmental disclosures by Finnish corporations in terms of the information provided in the three categories of qualitative, quantitative, and financial. In comparing disclosures made in 1992 to 1987, they found a significant increase in the percentage of firms reporting capital expenditure information, and a significant increase in the amount of qualitative information provided. No significant increase in the amount of quantitative disclosure was observed.

Barth and McNichols (1994) examined factors that may explain the estimated

costs involved in remediating Superfund sites. For each one of the 640 sites in their sample, they obtained the estimated cost of cleaning up the site from the EPA Records or Decision. They performed separate regressions using estimated capital costs, estimated operating and monitoring costs, and estimated total present worth of costs as the dependent variables. The hazard score assessed for a site by the EPA was significant and positively related to each of the three cost estimates. The presence of groundwater pollution had a significant positive relation to the operating and monitoring cost estimate, and to the present worth cost estimate. The total yards of contaminated soil was positively related to the present worth cost estimate. Also, a group variable capturing the 16 different types of Superfund sites as listed by the EPA, and a group variable capturing the type of remediation technology suggested by the EPA to be used at the site were both significantly related to each type of cost estimate.

In summary, Gamble et al. (1995) examined environmental disclosures in U.S. annual reports and 10Ks for the period 1986 to 1991, Niskala and Pretes (1995) evaluated the environmental disclosures reported by Finnish firms in 1992 and 1987 for the categories of qualitative, quantitative, and financial, and Barth and McNichols (1994) examined variables potentially influencing the estimated costs of remediating Superfund sites. This study improves on each of these prior studies by examining firms in the U.S. and Canada rather than sampling firms in only one country. A more recent period (1994 to 1996) is used than that of Gamble et al. (1995). The time period studied is also continuous, an improvement over the five year separation in time employed by Niskala

and Pretes (1995). Contributions beyond Barth and McNichols (1994) are that this study examines variables that potentially influence environmental disclosure quality, environmental capital costs, and environmental operating expenses.

The Usefulness of Social and Environmental Information

Several studies on the usefulness of environmental information have been conducted. Williams (1980) analyzed managers perceptions of the usefulness and importance of social and environmental information. Belkaoui (1980) evaluated if the incremental content of socio-economic accounting information (specifically this information was abatement costs of pollution) added to conventional accounting information would have any effect on an external user's investment decision. Ingram (1978) studied the impact of social responsibility disclosures on security returns in order to assess the usefulness of the disclosures. Estes (1976) proposed a social reporting accounting system with various objectives and guidelines. While not totally conclusive, overall these studies indicated that environmental information has some relevance.

This study improves prior research in this area by providing a direct measure of how firms view the value of environmental disclosure. This is accomplished by capturing environmental disclosure quality based on firms' actual disclosure actions.

The Relationship of Environmental Disclosure and Environmental Performance

Other studies have compared the quality of environmental disclosures to the environmental performance of the firm. In examining firms' annual reports, Ingram and Frazier (1980, 616) classified environmental disclosures under the four dimensions of

evidence, time, specificity, and theme. Ingram and Frazier (1980) scored the content of firms' environmental disclosures by counting the number of sentences contained in the annual report for each topic. Each sentence was read and then a check was placed "adjacent to the appropriate category in each dimension" (p. 617). Each sentence was classified four times, according to each of the four dimensions used to categorize the sentence. The authors compared firms stated accomplishments and objectives (i.e. disclosure quality) to the Council on Economic Priorities indices on firms' environmental performance. The only meaningful result was overall, poorer environmental performers made slightly more disclosures than better performers.

Wiseman (1982) used an indexing procedure based on the type and topic of information provided in firms' environmental disclosures. Wiseman's (1982) index measured the quality of environmental disclosures by using a scoring method such that each topic discussed by the firm is rated on a 0 to 3 scale, depending on how specific the information that is provided. A topic received a score of 3 if it was disclosed in monetary or quantitative terms; a score of 2 if company specific information was provided, but not in quantitative terms; a score of 1 if the item was discussed only in general terms; and a score of 0 if the topic on the disclosure list was not present in the firm's annual report. Wiseman (1982) also compared disclosure quality (as measured by her scoring index) to environmental performance as measured by the Council on Economic Priorities, and found no significant relationship between disclosure quality and environmental performance.

In summary, both Ingram and Frazier (1980) and Wiseman (1982) evaluate firms' disclosure quality and compare it to firms' environmental performance as measured by the Council on Economic Priorities. To measure environmental disclosure quality, Ingram and Frazier (1980) counted sentences while Wiseman (1982) scored each disclosure from 0 to 3 depending on the specificity of the information reported. The current study significantly improves on the research by Ingram and Frazier (1980) and by Wiseman (1982) in several ways. First, it captures environmental disclosure quality more accurately and in greater detail by the use of the comprehensive disclosure checklist given in Appendix A. Second, it is the first environmental accounting study to use the recommendations and requirements for environmental reporting published by the AICPA and the CICA to capture the content of firms' environmental disclosures. Third, it uses a direct measure of firms' environmental performance (the amount of pollution releases), rather than relying on the less objective ratings by the Council on Economic Priorities. Fourth, disclosures by all sample firms are evaluated over a period of three years (1994 to 1996). Ingram and Frazier (1980) examined the environmental disclosures of firms in each of four industries in only one of the years from 1971 to 1974. Wiseman (1982) evaluated environmental disclosures made by the steel industry in 1972 and 1976, the oil industry in 1974, and the pulp and paper industry in 1972. See chapter V for details on the research methods and statistical procedures in this study.

Summary of Literature Review

Prior accounting research has examined issues regarding voluntary disclosure, environmental disclosure, environmental costs, the usefulness of environmental information, and the relationship between environmental disclosure and environmental performance. Lang and Lundholm (1993) studied how various firm variables affect financial analysts' ratings of corporate disclosures. Barth et al. (1995) examined disclosures for environmental liabilities related to Superfund sites. Gamble et al. (1995) evaluated the content of environmental disclosures in U.S. firms' annual reports and 10Ks for the period of 1986 to 1991. Niskala and Pretes (1995) studied environmental disclosures provided by Finnish corporations in 1992 and 1987. Barth and McNichols (1994) tested the relationship of various items with the estimated costs of remediating Superfund sites. Williams (1980), Belkaoui (1980), Ingram (1978), and Estes (1976) each examined various issues related to the usefulness of social and environmental information. In general, the current study extends prior disclosure and environmental accounting research by measuring environmental disclosure quality more objectively and completely, by examining potential influences on environmental disclosure quality and on reported environmental costs, and by using a more direct measure of firms' environmental performance.

Chapter IV presents a comprehensive theory regarding influences on firms' environmental disclosure actions.

CHAPTER IV

THEORETICAL DEVELOPMENT

This chapter presents a theory to explain firms' environmental disclosure behavior. Discussed in this chapter are the desire by stakeholders for environmental information, societal influences on business to provide environmental information, and interpenetration between firms and other social components.

Theoretical Background

Some influence has been exerted on firms to report environmental costs, liabilities, and other environmental results to the investors, suppliers, employees, and other stakeholders of the firm. This influence is viewed in this study as primarily the result of two sources: the desire by the public and the firm's stakeholders for better quality information concerning the environmental activities of companies, and the recommendations by the AICPA and the CICA for firms to improve their environmental reporting.

While it is clear that accounting requirements mandated by standard-setting boards have great impact on the information provided by firms to stakeholders, it is far less plausible that firms would be willing to absorb the costs necessary to provide additional environmental information merely because of recommendations for environmental reporting by the AICPA and the CICA. It is very reasonable that firms would provide increased environmental disclosure in annual reports because the general public and the stakeholders of the firm desired it and the firm would obtain benefits from

the stakeholders and society in general when they did improve the quality of their reported environmental information. Increased disclosure could also be caused by governmental influence. Government could create regulations and laws requiring additional environmental disclosure, rather than waiting for firms to voluntarily provide information.

The accounting standard-setting bodies create accounting standards, which firms must follow with certain choices allowed. Firms report the required information while choosing among allowable methods, and report additional information as they desire to (i.e. information not required to be reported). The users of financial statements and accounting reports benefit from the information provided, and thus have an incentive to influence firms to provide information that is not required to be reported. The view that society directly influences environmental disclosure is especially logical, since firms' reporting of environmental information in annual reports is largely voluntary rather than required. Firms would not voluntarily incur the costs to provide additional disclosure without pressure from some influential body outside the firm. This study views the stakeholders of the firm and society in general as the primary source of that pressure. This section presents a comprehensive theory to explain the interaction between society and firms in the reporting of environmental information. The theory provides support for how society (i.e., the public) influences firms to voluntarily provide useful information about environmental costs, liabilities, programs, and other environmental activities of the firm.

Interaction Between Business and Other Social Components

Many different, interacting components exist to create a functional, productive society. Some of the major components are values, norms of behavior, individuals producing goods and services, government, educational institutions, and organizations operating both for profit and not-for-profit. A theoretical framework is provided in this section to explain how and why firms interact with other institutional components within society (i.e., the public) to provide environmental disclosures.

In proposing that private managerial activity and social policy-making are interactive and interdependent with each other, Preston and Post (1975, 3-4) present what they describe as “two fundamental questions”:

1. What is the appropriate scope of private managerial responsibility within society; how far is the individual managerial unit supposed to go in anticipating and attempting to deal with social needs and problems?
2. Within the defined scope, what are the criteria of appraisal and evaluation; how do corporate managers, their critics, and the general public distinguish good from bad performance, success from failure?

The authors go on to state that since private business firms are large and important organizational bodies in our society, they should be expected to be actively involved and participating in, as well as responding to, the process of social decision making.

Business firms are viewed as subsystems within a larger society, with the entire society being a large and complex macro-system that contains many components and

subsystems within it. Preston and Post (1975, 16) introduce the concept of interpenetrating systems by proclaiming, “Systems are said to be interpenetrating when more than one distinct system, neither totally contained by nor containing the other, is involved in a single event or process.”

Interpenetrating Systems Model

Firms seeking a profit must cooperate with other institutional groups (e.g. government and consumer groups) within society or else risk possible business failure. Preston and Post (1975) have developed several models of how management and society interact with each other. One model they propose is called the “interpenetrating systems model”. In developing a foundation for their interpenetrating systems model, Preston and Post (1975) explain that the managerial unit in a firm is, to a certain extent, a distinct element in the economy, rather than some functioning part within a larger controlled system. Also, interactions between business and other institutional components or groups in society involve exchange, power and exploitation, as well as a connection between business and these components that reflect common interests and cooperation (pp. 24-25). With this model, Preston and Post (1975) assume that the entire society exists as a macro-system, but that individual business organizations form a sub-system of their own, which neither completely control nor are controlled by the social and political environment. In other words, the views and actions of social and political systems may influence the decisions and actions taken by business, and business has the same potential to affect these system groups. Using “society” as a referent to “other

institutional components”, Preston and Post explain this relationship as follows (1975, 26-27):

We require a model that permits society to influence and constrain - but not necessarily dominate or control - an area of activity formerly reserved to the firm exclusively. Similarly, attempts by individual organizations to affect the course of public policy - whether by bribery or persuasion - may be described as an expansion of managerial activity into the decision system of society at large. In neither example does one system necessarily come to control the other completely, even with respect to the specific matter involved and certainly not in all matters. Nor can the relationship between the systems be described in the simple terms of input-output or exchange. On the contrary, the concept of interpenetration seems to be, if less precise, the more accurate general form of the relationship between micro-organizational management and its social environment.

An interpenetrating systems model opens up the possibility - which has in fact become a necessity of considering the potential differences, conflicts, and compatibilities among the goals of micro-organizations and those of society at large. In both the market contract and exploitation models it is assumed that organizations are responsive to their own individual goals and that these goals are balanced (favorably or unfavorably) with those of other system components through the exchange process. In the fully developed technostructure model there can be no goal disharmony; the goals of the managerial class and those of industrial society as a whole have, through the process of adoption and adaptation, become the same. By contrast, the interpenetrating systems model can accommodate both the separateness and possible conflict of managerial and societal goals on one hand and the process of managerial/societal goal adjustment on the other. Society may take into account and seek to influence the goals of the managerial units; and they, in turn, may take into account and seek to influence those of society at large. Neither are the two systems completely separate and independent nor does either control the other; their relationship is better described in terms of interpenetration. As Virgil B. Day, vice-president of General Electric has remarked: “The social and economic responsibilities of the corporation have been so broadened and interwoven in the public’s expectations ... that it no longer makes sense, if indeed, it ever did, to talk as if they could be separated.”

The interpenetrating systems model (theory) is proposed as a comprehensive explanation as to why firms would respond to other institution's (e.g., social and political) demands for environmental information and provide environmental disclosures in their annual reports beyond what is required by accounting standards, but stop short of providing totally complete environmental disclosures. Government and consumer groups influence managers of firms, but do not have sufficient power over them to impel management to provide complete environmental information. In the words of Preston and Post (1975, 28), the model of interpenetrating systems "assumes neither complete integration nor complete separation between micro-managerial units and their larger host environment. This model permits the analysis of both conflict and harmony, and of structural adaptation of the two systems to each other over time."

The interpenetrating systems model does not propose that there is some kind of "market contract" between the firm and other institutional components of society such that the public rewards the firm in a financially beneficial manner for the performance of certain functions. Rather, the interpenetrating systems model views social and political response to managerial actions as having many sources and forms of approval and disapproval. This process of interaction between other components of society and business involves three stages (Preston and Post 1975, 45-47):

1. The firm recognizes its relevant publics. A public, which is simply a group of people with a common interest, becomes relevant to a firm when its main interest affects, or is affected by, the firm's activities.

2. Management acknowledges that it has some measure of responsibility to evaluate how its activities and decisions impact on its relevant publics. Management will of course consider the positive impacts that its actions and decisions have. However, the socialization process is fully complete only when the firm identifies the negative impacts of its activities, and these negative impacts are considered in managerial decision making.
3. The firm develops its own positive position with respect to some or all of its relevant publics. The goals and desires of the many publics are seen no longer as restraints on otherwise desirable decisions or actions by the firm. Preston and Post (1975) further explain:

By contrast, the goals of the “publics” become incorporated into the goals of the organization itself, serving to define its overall objectives and norms. Adoption of such positive stance involves, in essence, an organizational decision to become further socialized, to interact with the relevant publics in the identification of common purposes and the solution of common problems. The third stage also brings into sharp prominence the need to delineate a boundary for managerial responsibility encompassing something less than the full range of activities and concerns of society itself.

If government and consumer groups (non-governmental organizations as well) interact with firm management to influence their actions and decisions, this would have to be indicated by some response by business. As business and its constituent firms move through the socialization process above, management will begin to change its behavior, or at a minimum, its stated position. Preston and Post (1975) identify three major categories of responses that business firms make to the socialization process: 1.

corporate philanthropy, 2. stylistic and process responses, and 3. citizenship and coalitions.

Philanthropy is likely a normal response by business management to the realization that their firms exist within a larger society and that other components of society have needs that are not completely met through market exchange.

Once business firms consider their impact on one or more publics in its decision making, changes usually occur in the managerial process i.e. the way tasks and actions are carried out. Process responses are ones of substance, where something essentially new is being implemented, such as creating a committee composed of diverse employees in the organization to study an issue relevant to the firm. A stylistic response is where only a formal change occurs, and not one of substance, such as informing the public of an employee committee that already existed, rather than creating a new committee in response to specific political and/or social requests.

Corporate citizenship implies an expansion of firm goals such that a commitment to broad responsibilities in the political and social environment are made. Corporate citizenship activities indicate the beginning of the last stage of the socialization process. Firm responses may be limited to only the local community or may provide a citizenship role to society as a whole. Preston and Post (1975, 50-51) state the following:

Corporate citizenship involves at least two distinct elements not necessarily involved in either philanthropy or in the stylistic-process response to socialization. The first of these elements is explicit acceptance of organizational goals beyond the scope of market exchange transactions; the second is recognition of the need for coalitions among interested parties for the purpose of accomplishing mutually desired

goals.

The addition of citizenship goals to the usual organizational objectives may be termed the “profit-plus” philosophy. The essential idea is that the survival-growth-profitability goals of the firm are expanded to include a citizenship element as well. The new element does not supplant the old, nor are both fully integrated into a new comprehensive framework. Nevertheless, there may well be some sacrifice of short-run advantage, including profit, in order to attain the “plus,” the social objective that has been explicitly included among the goals of the firm.

In terms of environmental accounting and reporting, using the concepts of corporate citizenship and “profit-plus” philosophy described above, firms reporting of environmental information beyond that required by accounting standards would be evidence of the adoption of organizational goals beyond those required by market exchange transactions. The additional costs incurred by firms in reporting non-mandated environmental information would represent the sacrifice of profit in order to gain the “plus” of being viewed by society as a responsible corporate citizen.

Regarding controls used by firms to meet their social and political responsibilities and the evaluation of firms’ social performances, Preston and Post (1975, 131) state that the literature on social involvement has been criticized for largely omitting coverage of systematic organizational controls and appraisal criteria. Preston and Post (1975) very accurately state the role and importance of accounting in the evaluation and reporting of firms’ social performance by stating:

The problem has two dimensions: One is that internal control and accounting mechanisms must be applied to new areas of managerial performance if that performance is actually to be monitored, evaluated, and rewarded. The other is that some means must be found for external reporting and evaluation of the organization as a whole with respect to

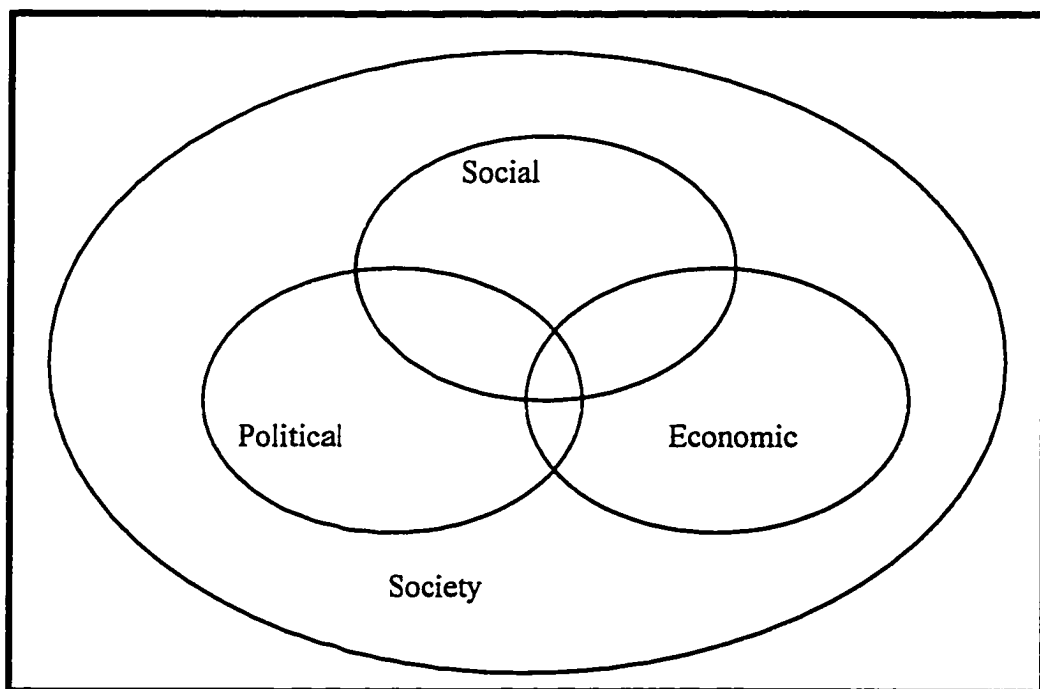
social performance.

Business firms have a tremendous challenge in developing accounting systems that will adequately collect and report accurate environmental cost and activity information. Management of these firms must create new reporting systems by deciding what areas of environmental performance and activity will be measured, how these areas and activity will be measured, and how to report the collected information to internal parties as well as to those outside the firm. Significant cost and effort would likely be incurred by most firms in creating a new environmental and social involvement reporting system. Firms' reporting of environmental accounting and activity information that is not required to be reported by accounting standards indicates that the demand for the information reported was sufficient enough to warrant the cost and effort incurred in developing the new system.

For most business firms, the groups probably providing the primary demand for additional environmental information are each firm's stakeholders or "relevant publics" as referred to by Preston and Post (1975), consumers and the public in general, the government, and special interest groups. That is, the interpenetrating systems model, as presented by Preston and Post (1975), is proposed as an explanation for business firms' reporting of environmental information beyond that required by accounting standards, and also why firms would not report complete information: that political and social institutions influence business to report environmental information, and business responds by reporting some additional environmental information. Business does not

perceive however, a need or reason to disclose all environmental information available to it. In other words, business, government, and social components interactively influence one another, but lack sufficient power to totally control each other. A general model of society and the relationships and influences between these components is presented below in figure 1.

FIGURE 1
A Basic Model of the Major Components of Society



In the basic model of society depicted above, each group has certain actors that

carry out the social processes of that group. In this study only the primary actor for each group is considered to explain how the economic component is influenced to provide environmental disclosure. The primary actors for each component of society are: consumer groups in the social arena, government in the political arena, and business firms in the economic arena.

Miles (1987) also views business as being actively involved in understanding and positively responding to the society in which the firm operates. Miles (1987) proposes to develop a general framework that will allow corporate executives to effectively understand and manage the corporate social environment by which they are surrounded. Miles (1987) argues that such a framework is needed due to the tremendous recent increase in the influence of social and political issues on business policies and practices. Miles further explains that the framework should motivate organizational diagnosis and movement toward the improvement of business firms' social performance, and should identify factors that affect their social performance. He also opines (pp. 1-2):

That executive leaders recognize the importance of helping their corporations cope with an increasingly sensitive social environment is well documented. Recent studies of government regulation in America have justified their concern. For example, although economic regulation of business has continued to grow during the last twenty years, this traditional form of government regulation has been eclipsed in both rate of growth and intensity of resources by the new "social" regulation. Other studies reported during the last few years have documented the increasing burden that these rising social expectations have placed on executive leaders of the nation's largest corporations. Many chief executive officers now spend more time on external affairs than on any other activities. Most have allocated significant resources to the development of elaborate corporate staff functions to help them understand and manage the corporate social

environment.

Similar to Preston and Post, Miles' (1987) perception is that the governmental and social components of society exert substantial influence over business (management of firms), and that business management actively responds to their political and social environment acting upon them. From this theoretical perspective, management would be actively involved in understanding the needs of financial statement users for environmental information and respond by providing the requested information to the extent they considered reasonable.

In his discussion of law and legal order in the context of the economy and social norms, Weber (1968, 311) expresses that an important distinction exists between legal and sociological influences. Weber states that it is necessary to consider what actually happens to cause a group to follow or to not follow certain norms. Weber (1968, 312) explains that law expresses what ought to be, while the social perspective describes how things actually are. He states that most people follow laws "not out of obedience regarded as a legal obligation, but either because the environment approves of the conduct and disapproves of its opposite, or merely as a result of unreflective habituation to a regularity of life that has engraved itself as a custom" (p. 312). In other words, Weber is saying that social pressures and expectations have a much greater effect on behavior and actions than do laws or prescribed requirements. If Weber's perspective is correct, it would indicate that stakeholders and society are able to influence firms to provide sufficient environmental disclosures in annual reports. Accounting "laws" (i.e.,

mandated accounting standards) require almost no environmental disclosure in either Canadian or U.S. annual reports. Evidence of firms providing more than a minimal amount of environmental information in annual reports would support Weber's perspective.

Stakeholders and society would have to possess a significant amount of power in order to cause firms to provide voluntary disclosures. According to Weber, power is the probability of an individual or a group of obtaining their desire(s) in a communal action even against the opposition of others who are involved in the action (Gerth and Mills 1946, 180). Weber stresses that power is often created by social honor or prestige, and that the legal order is not normally the primary source of power (Gerth and Mills 1946, 180).

Firms responding to pressure for additional environmental information by providing increased environmental disclosures in annual reports would be considered social action in Weber's view. Weber states that action includes all human behavior in which the acting party attaches a subjective meaning to the behavior (Weber 1947, 88). This action may be either aggressive or passive, as well as focused either outward or inward. Weber explains that an action is social when the acting party considers the behavior of others and is affected by that behavior (Weber 1947, 88).

Summary of Theory

The reporting of environmental information by firms in their annual reports is presented in this chapter as primarily resulting from influences exerted by stakeholders upon the firms. The interpenetrating systems model of Preston and Post (1975) is proposed to explain how social components outside firms can affect firms' environmental disclosure behavior. The perspective of the interpenetrating systems model is that various interacting components exist in society which influence but do not control each other. Specifically, the theory states that management actions and social policy-making are interactive and interdependent with each other. Business firms have the capability to both respond to and affect social actions. Further, the relationship between firms and other societal groups involves exchange, power and exploitation, as well as cooperation. Thus, stakeholders and other social actors have the potential to cause firms to report desired environmental information.

Chapter V discusses the sample selection procedures, the hypotheses proposed, and the other research methods employed in this study.

CHAPTER V

RESEARCH METHOD

This chapter discusses the research method employed. Included in this chapter are the criteria used to select the sample firms, the methods used in obtaining annual reports, descriptive statistics for the U.S. and the Canadian sample firms, and a correlation analysis of firms' environmental disclosure quality with selected firm variables. Also described are firms' environmental exposure, the pollution databases used to obtain firms' pollution levels, the research design employed, the validity of the disclosure index, and the research hypotheses and expected results.

Sample

One of the main purposes of this research is to examine the issue of how business has responded to apparent pressure from the social and political components of society for increased environmental information. Corporate firms are used in this study as the actor representing business, since corporations collectively exert a tremendous amount of economic influence in both the U.S. and Canada. A primary issue to be examined by this research is how the amount of firms' environmental exposure, as measured by the quantity of pollution releases reported by each firm, affects the quality of environmental disclosure provided in the annual reports of those firms.

The first selection criteria for each nation's sample is that the firm's pollution releases must be publicly available. U.S. sample firms must be included in the 1994 Toxic Release Inventory (TRI) database produced by the United States EPA. Canadian

sample firms must be included in the 1994 National Pollutant Release Inventory (NPRI) database produced by Environment Canada. This simply means that each corporate firm was required to and did report the amount of pollution releases of certain toxic items in 1994. The second criteria for each nation's sample is that the firm's shares are publicly traded on a stock exchange in their home country. Other criteria for sample selection are that the firm must have a two-digit SIC Code classification between 20 and 39 (since U.S. firms within only these classifications must report pollution releases), and the firm's annual report year ends on December 31. The December 31 year-end for the annual report provides for the best possible evaluation of the relationship between pollution releases and environmental disclosures, as both Canadian and U.S. firms must report pollution releases on a January 1 to December 31 basis. Table 1 provides details of the number of firms contained in the pollution databases, the number of publicly traded firms, and the number of firms in the final population available for sample selection.

In order to best examine the relationship between the level of disclosure quality and the quantity of pollution releases, it was necessary to select firms that have varying levels of pollution. The initial selection of the sample firms in each nation was therefore done on a random basis. This selection was accomplished by using the "RAND" function in the Microsoft Excel spreadsheet package to create a uniform distribution of random numbers for each country's population of qualified corporations. The RAND function provided an evenly distributed random number greater than or equal to 0 and

TABLE 1
Population of Firms

Canada

Number of entities in 1994 National Pollutant Release Inventory (NPRI)	3,115
Less: observations not identified as business firms ¹	<u>2,472</u>
Number of business firms in 1994 NPRI	643
Less: firms not publicly traded	272
Less: firms with a year-end other than December 31	107
Less: firms with an SIC Code other than 20 to 39	<u>81</u>
Firms available for sample selection ²	183
Less: firms not chosen for sample	<u>133</u>
Number of firms included in sample	<u><u>50</u></u>

United States

Number of firms in 1994 Toxics Release Inventory database ³	75,533
Less: firms not identified as publicly traded	<u>70,577</u>
All publicly traded firms	4,956
Less: firms with a year-end other than December 31	<u>1,998</u>
Firms available for sample selection ⁴	2,958
Less: firms not chosen for sample	<u>2,908</u>
Number of firms included in sample	<u><u>50</u></u>

¹ The NPRI database does not identify which entities are business firms. Separate files were obtained from Environment Canada that list only companies. A total of 643 companies were in these separate files.

² These are firms publicly traded on a Canadian stock exchange with an SIC Code from 20 to 39. Firm name, address, and public status were collected from either *Survey of Industrials 1994*, *Survey of Mines and Energy Resources 1990*, or *Report on Business Canada Company Handbook 1997*.

³ Only firms with an SIC Code from 20 to 39 are required to report pollution releases in the United States.

⁴ Firms in the Global Researcher SEC database with December 31 year-ends and an SIC Code from 20 to 39. Global Researcher SEC includes only firms that report to the Securities and Exchange Commission.

less than 1 for every firm in both populations.

Table 1 indicates that 183 Canadian firms and 2,958 U.S. firms were available for selection in the study. A random number was assigned to each of these available firms, separately by country. Assigning random numbers to each country's population of firms separately was necessary to provide each firm in each country's population of corporations an equal chance of being selected for the sample.

For each country's sample, the company names were ranked from the highest to the lowest random number. Canadian firms were selected first, beginning with the highest ranked firm and continuing until 50 firms were chosen. The U.S. firms were then chosen in order based on the highest random number assigned, and also matched to the Canadian firms by the first two digits of the Standard Industrial Classification (SIC) Code. Matching by SIC Code provides that the U.S. sample will have the same number of firms in each industry as the Canadian sample does. This improves the reliability of the statistical tests by making the potential effect of differences in disclosure quality across industries as equivalent as possible for each sample.

Annual reports for each firm were obtained in two ways. The first method was by mailing a letter requesting annual reports for the years 1994, 1995, and 1996 to each of the first 50 Canadian firms and the first 50 U.S. firms selected for the study as explained above. Second requests were mailed for all annual reports not received. The Disclosure Select CD-ROM database was searched to obtain any annual reports not received by mail. Disclosure Select contains certain years of annual reports for the

10,000 largest firms worldwide. Most of the sample firms' reports were not available on Disclosure Select.

Panel A of table 2 contains the firms selected for the sample, and for which annual reports were obtained for each of the years 1994, 1995, and 1996. Canadian and U.S. firms were matched by two-digit SIC Code, and then within SIC Codes by 1994 sales revenue. Matching the sample firms provides for a matched pair test of mean disclosure levels across countries, which is discussed later in this chapter.

Panel B of table 2 presents the SIC Code descriptions, and the number and percentage of firms in each nation's sample for each two-digit SIC Code. Paper and related products firms comprise 34.0% of the sample, the largest of any group. There are also a substantial number of chemical firms and primary metal firms, with each representing 20.0% of the total sample.

Table 3 reports descriptive statistics of overall characteristics and per share items for the sample firms. The mean figures for average assets, average liabilities, average equity, and return on equity are fairly similar for each country's sample, where the U.S. firms have slightly higher means for each of these items with the exception of average equity. However, U.S. firms' average sales of \$2,370,000,000 is 44.51% higher than mean Canadian firm sales of \$1,640,000,000 and U.S. average net income of \$123,000,000 is 33.19% greater than Canadian average net income of \$92,348,000. On a per share basis, the U.S. firms have a considerably larger amount of average assets, average liabilities, average equity, sales, and earnings. All amounts for Canadian firms

TABLE 2
Sample Firms - Matched Within SIC Code by Amount of 1994 Revenue^A

Panel A: Firms Selected for Sample

<i>Firm Name</i>	<i>Canada</i>		<i>United States</i>	
	<i>SIC Code</i>	<i>1994 Revenue</i>	<i>SIC Code</i>	<i>1994 Revenue</i>
Domco International	2295	204,204	Russell Corporation	2253 1,152,633
Wallcoverings	2671	36,074	Badger Paper Mills	2621 92,648
Dover Industries	2631	86,724	Mosinee Paper	2621 305,570
Perkins Papers	2676	81,207	American Biltrite	2671 404,473
AT Plastics	2673	139,363	Pope & Talbot Inc.	2611 524,409
Winpak Limited	2671	184,151	Caraustar Industries	2655 544,628
Harmac Pacific	2611	122,879	Chesapeake Corp.	2621 1,233,700
Crestbrook Forest Industries	2611	220,336	Rayonier Inc.	2611 1,260,492
Doman Industries	2611	554,581	Consolidated Papers	2672 1,579,061
Weldwood	2611	777,432	Potlatch Corp.	2631 1,605,206
West Fraser Timber	2611	935,438	Bowater Inc.	2621 2,001,141
Canfor Corp.	2611	1,026,533	Temple Inland Inc.	2631 2,794,000
Repap Enterprises	2671	1,268,995	Willamette Industries	2621 3,873,575
Cascades Inc.	2631	1,260,406	Jefferson Smurfit	2653 4,093,000
Noranda Forest	2611	1,318,332	Boise Cascade Corp.	2621 5,074,230
Domtar Inc.	2611	1,564,110	Champion International	2621 6,972,038
Avenor Inc.	2621	1,385,636	Stone Container	2631 7,351,200
George Weston Ltd.	2611	9,498,625	Weyerhaeuser Co.	2621 11,788,000
Paperboard Industries	2752	529,446	Gibson Greetings Inc.	2751 540,145
Donohue Inc.	2711	589,880	John H Harland Co.	2761 561,617
Quebecor	2754	2,904,406	Banta Corp.	2754 1,022,650
SICO Inc.	2851	118,794	Specialty Chemical Resources Inc.	2842 43,419
Celenese Canada	2869	459,081	LSB Industries Inc.	2873 267,391
CCL Inc.	2851	681,769	Bio Rad Labs Inc.	2835 396,618
Agrium Inc.	2819	783,507	Stepan Co.	2843 528,218
Canadian Occidental Petroleum	2812	741,626	Wellman Inc.	2824 1,109,398
Methanex Corp.	2869	1,487,892	Albemarle Corp.	2819 1,244,222

TABLE 2 (Continued)

<u>Canada</u>			<u>United States</u>		
<i>Firm Name</i>	<i>SIC Code</i>	<i>1994 Revenue</i>	<i>Firm Name</i>	<i>SIC Code</i>	<i>1994 Revenue</i>
DuPont Canada	2851	1,224,686	Avon Products Inc.	2844	4,492,100
Westcoast Energy	2842	2,175,581	Lyondell Petrochemical	2821	4,936,000
Nova Corporation	2813	2,720,572	Union Carbide Corp.	2821	5,888,000
Imperial Oil Ltd.	2813	6,509,941	Pfizer Inc.	2834	10,021,400
Suncor Inc.	2911	1,193,550	Tesoro Petroleum	2911	970,172
Petro Canada	2992	3,346,655	Diamond Shamrock	2911	2,936,800
Shell Canada	2999	3,677,594	Tosco Corp.	2911	7,284,051
Intertape Polymer	3081	126,253	Carlisle Companies	3081	822,534
Consumers Packaging	3211	307,417	For Better Living	3272	81,517
St. Lawrence Cement	3241	420,549	Southdown Inc.	3241	596,100
Slater Steel	3312	361,323	Driver Harris Co.	3357	35,343
Algoma Steel	3312	798,562	Imco Recycling Inc.	3341	141,167
Co-Steel Inc.	3312	920,789	Synalloy Corp.	3312	147,298
Ivaco Inc.	3324	1,036,098	RMI Titanium Co.	3356	171,166
Falconbridge	3339	1,432,125	Armco Inc.	3312	1,559,900
Dofasco Inc.	3312	1,652,287	Maxxam Inc.	3354	2,237,800
Stelco	3312	2,041,160	Nucor Corp.	3312	3,462,046
Inco Ltd.	3331	1,770,770	Inland Steel Industries Inc.	3312	4,781,500
Noranda Inc.	3339	4,845,745	Bethlehem Steel	3312	4,867,500
Alcan Aluminum	3334	8,216,000	Reynolds Metals Co.	3334	7,213,000
GSW Inc.	3433	178,672	Valmont Industries	3441	544,642
Cinram Limited	3695	105,763	Genlyte Group Inc.	3646	445,660
Camco Inc.	3631	343,622	Antec Corp.	3663	658,237

TABLE 2 (Continued)

Panel B: Number of Sample Firms in each SIC Code.

<u>Two-digit SIC Code</u>	<u>Description</u>	<u>Number of firms in each nation's sample</u>	<u>Percentage of total sample</u>
22	Textile Mill Products	1	2.0
26	Paper and Allied Products	17	34.0
27	Printing, Publishing, and Allied Industries	3	6.0
28	Chemicals and Allied Products	10	20.0
29	Petroleum Refining and Related Industries	3	6.0
30	Rubber and Miscellaneous Plastic Products	1	2.0
32	Stone, Clay, Glass, and Concrete Products	2	4.0
33	Primary Metal Industries	10	20.0
34	Fabricated Metal Products, except machinery and transportation equipment	1	2.0
36	Electronic and Other Electrical Equipment, except computer equipment	<u>2</u>	<u>4.0</u>
	Total	<u><u>50</u></u>	<u><u>100.0</u></u>

[^] Revenue for all firms is stated in thousands of U.S. dollars. Canadian firms' revenue was converted to U.S. dollars using either the firm's average conversion rate indicated in the annual report, or the average rate of all Canadian firms that reported the U.S. currency exchange rate experienced during the year.

TABLE 3
Descriptive Statistics for All Years Combined, 1994 to 1996

<u>Item</u>	<u>Canadian Firms</u>		<u>U.S. Firms</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
<i>Panel A: Overall Characteristics, in Thousands of U.S. dollars (except average common shares outstanding and return on equity)</i>				
AVAS	1,930,000	2,396,000	2,290,000	2,996,000
AVLB	1,070,000	1,338,000	1,570,000	2,060,000
AVEQ	860,000	1,028,000	720,000	1,099,000
SALES	1,640,000	2,081,000	2,370,000	2,756,000
NINC	92,348	117,213	123,000	271,087
AVCOM	77,631,422	85,744,209	52,408,590	82,082,956
RETEQ	14.24	16.29	15.70	27.65

Sample Size 150 150

Panel B: Per Share Amounts

AVASPS	23.65	15.78	47.71	61.14
AVLBPS	13.66	11.22	33.38	58.82
AVEQPS	9.99	5.34	14.33	10.86
SALESPS	24.74	28.08	51.21	43.59
EPS	1.10	1.10	1.57	2.31

Sample Size 150 150

Panel C: Definition of Firm Items

- AVAS = average assets, calculated as (total assets at beginning of year + total assets at end of year)/2.
- AVLB = average liabilities, calculated as (total liabilities at beginning of year + total liabilities at end of year)/2.
- AVEQ = average equity, calculated as (total equity at beginning of year + total equity at end of year)/2.
- SALES = total of all operating revenue items on the income statement.
- NINC = net income shown on the income statement.

TABLE 3 (Continued)

AVCOM	=	average number of common shares outstanding. If reported by the firm, this is the weighted average number of shares outstanding during the year. If not reported, it is calculated as [(number of shares outstanding at beginning of year + number of shares outstanding at end of year)/2].
RETEQ	=	return on average equity, calculated as (NINC/AVEQ).
AVASPS	=	average assets per share, calculated as (AVAS/AVCOM).
AVLBPS	=	average liabilities per share, calculated as (AVLB/AVCOM).
AVEQPS	=	average equity per share, calculated as (AVEQ/AVCOM).
SALES	=	total operating revenue per share, calculated as (SALES/AVCOM).
EPS	=	net earnings per share indicated in the firm's annual report.

were converted to U.S. dollars using the procedure explained in footnote A of table 2.

Table 4 provides a pairwise correlation analysis of firms' environmental disclosure scores and other selected variables. The other variables included are average assets, average liabilities, average equity, return on equity, sales, net income, and pollution releases. Of greatest interest in this study is the relationship between firms' environmental disclosure levels and firm characteristics such as environmental performance, size, and financial performance. The positive and significant correlation between pollution releases and disclosure scores indicates that firms provide more environmental information in their annual reports as they release additional pollution. A positive, significant correlation also exists between disclosure scores and each of the variables of average assets, average liabilities, average equity, sales, and net income. These correlations indicate that as firms increase in size, they provide additional

TABLE 4
Correlation of Firm Variables[^]

	DISC	AVAS	AVLB	AVEQ	RETEQ	SALES	NINC	POLL
DISC	--	.303 (.000)	.325 (.000)	.227 (.000)	.015 (.802)	.274 (.000)	.129 (.026)	.360 (.000)
AVAS	.414 (.000)	--	.962 (.000)	.914 (.000)	-.003 (.963)	.876 (.000)	.672 (.000)	.606 (.000)
AVLB	.424 (.000)	.985 (.000)	--	.779 (.000)	.018 (.752)	.864 (.000)	.588 (.000)	.632 (.000)
AVEQ	.311 (.000)	.854 (.000)	.779 (.000)	--	-.034 (.558)	.771 (.000)	.719 (.000)	.500 (.000)
RETEQ	.051 (.375)	.018 (.750)	.025 (.663)	-.050 (.392)	--	.102 (.077)	.318 (.000)	.031 (.659)
SALES	.380 (.000)	.962 (.000)	.953 (.000)	.812 (.000)	.089 (.125)	--	.623 (.000)	.533 (.000)
NINC	.283 (.000)	.709 (.000)	.665 (.000)	.704 (.000)	.529 (.000)	.731 (.000)	--	.431 (.000)
POLL	.453 (.000)	.625 (.000)	.600 (.000)	.583 (.000)	.045 (.525)	.584 (.000)	.511 (.000)	--

Definition of Variables

DISC = total environmental disclosure score based on the checklist in Appendix A.

POLL = total tons of untreated pollution releases by the firm in the current year.

AVAS, AVLB, AVEQ, RETEQ, SALES, and NINC are defined in Table 2.

[^] Numbers above the diagonal represent Pearson correlations while those below the diagonal represent Spearman rank correlations. Numbers in parentheses represent p-values, two-tailed tests.

environmental disclosures. Financial performance appears to have no association with environmental disclosure levels, as the correlation between return on equity and disclosure scores is not significant.

Environmental Exposure

The sample selection procedures are designed to identify U.S. and Canadian business firms that are likely to have some amount, and potentially significant amounts of environmental costs and/or liabilities. The amount of pollution releases reported by a firm to the appropriate governmental agency is used as a proxy for a firm's environmental performance, or in other words, the amount of environmental exposure that a firm has. Prior studies have examined the effect of firms' environmental performance on environmental disclosure. However, this study provides a unique contribution in that it is the first to measure environmental performance by the amount of pollution released. This measure provides an advantage over prior studies, since the quantity of pollution released is a direct, verifiable, objective measure of environmental performance. Firms with poorer environmental performance (i.e., greater environmental exposure) would generally be expected to disclose more environmental information than would firms with minor amounts of environmental problems. A firm must have some amount of environmental costs, activities, obligations, or potential liabilities before it can provide any environmental disclosure. Selecting only firms with reported pollution releases for this study ensures that both the U.S. and the Canadian sample firms are likely to provide at least a minimal amount of environmental disclosure.

Pollution Databases

The EPA's Toxics Release Inventory (TRI) and Environment Canada's National Pollutant Release Inventory (NPRI) were used to select the U.S. and Canadian corporate samples respectively, and to obtain pollution and facility data on the sample firms. A brief discussion of the background of the TRI and the NPRI and their contents is provided below.

The main purpose of the U.S. Emergency Planning and Community Right to Know Act (EPCRA) of 1986 was to inform citizens about hazardous chemicals released in their local communities. EPCRA requires manufacturers to report releases of over 300 chemicals considered by the EPA to be toxic to the environment.

Through EPCRA, Congress required that a Toxics Release Inventory (TRI) be publicly available. The TRI includes the amount of toxic chemicals that manufacturing facilities release into the air, water, and land, and the amount of toxic chemicals that facilities recycled or used for energy recovery on-site. Other data in the TRI are the quantity of toxic chemicals transported to another facility, and the method the reporting facility uses to treat chemical wastes. Only facilities that perform manufacturing operations in the industry groups noted in the U.S. Government Standard Industrial Classification (SIC) Codes 20 through 39 must report to the EPA regarding its use of toxic chemicals. (United States Environmental Protection Agency 1996, 1-2 to 1-4).

The Canadian National Pollutant Release Inventory (NPRI) was created by the authority of the Canadian Environmental Protection Act (CEPA) to obtain information

on the release of substances into the environment. The NPRI reports in tons the amount of 178 specified substances released by facilities each year to the air, water, and land. (Environment Canada, 1995).

Research Design

The content of environmental information provided in the annual reports of each sample firm was evaluated according to the disclosure list contained in Appendix A. This list is based on recommendations and standards for environmental reporting issued by the AICPA and the CICA. Appendices B and C provide the detailed CICA guidelines from which the CICA items in Appendix A were developed. Appendix D presents the selected portions of the AICPA's Statement of Position 96-1 that form the basis of the AICPA items in Appendix A. This study offers a potentially significant contribution to the accounting literature by examining environmental disclosures in light of the guidance provided by authoritative accounting bodies, which no previously existing research has done.

The analysis of the quality of the sample firms' environmental disclosures was done for each of the following individual items or grouped items as a unit:

1. The corporation's annual report overall.
2. Each of the following categories of the annual report, specifying the location of the disclosures:
 - a. Introduction, President's letter, and discussion of the lines of business.

- b. Management's discussion and analysis.
 - c. Audited financial statements, footnotes, and auditor's report.
 - d. Other sections.
3. Adherence of disclosures to the AICPA guidelines only.
 4. Adherence of disclosures to the CICA guidelines only.

The disclosure list in Appendix A was used to capture and quantify the quality level of the environmental disclosures provided in each item or section in the four classifications above. For the annual report, a separate quantification of the disclosures provided was prepared for each section noted above in item 2. The number of items provided according to the list in Appendix A was collected and separately totaled for the annual report section that contains the introduction, president's letter, and information on the nature of the corporation's business, for the section containing management's discussion and analysis, and so forth. This analysis is beneficial, since disclosures provided in the financial statements and footnotes are the only ones that are audited and thus are more meaningful and reliable to financial statement users. Discovering where firms disclose environmental information in their annual reports provides additional insight into the quality of the information provided (audited vs. unaudited) and also extends prior environmental accounting research which has not considered the location of disclosures in the annual report. Although not evaluated by this research, annual report users may place more emphasis and importance on disclosures found in certain sections of the annual report rather than equal emphasis on the disclosures in each section. The

categories described above to classify the sections of the annual report are based on those used by the U.S. and Canadian sample firms in this study.

Additionally, the environmental disclosures of both the U.S. sample corporations and the Canadian sample corporations were evaluated separately according to the U.S. recommendations for reporting (i.e. AICPA guidelines), and the Canadian recommendations for reporting (i.e. CICA guidelines). This analysis was performed in order to understand how corporations have specifically adhered to the guidelines presented by each country's standard setting body and whether the AICPA or the CICA has had a greater influence on environmental reporting practices overall and in each country.

The list of items in Appendix A is based on the guidelines provided in the following documents: *CICA Handbook* Section 3060 on Site Remediation Costs (CICA 1995a), *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues* (CICA 1993), *Statement of Position 96-1: Environmental Remediation Liabilities* (American Institute of Certified Public Accountants, Accounting Standards Executive Committee 1996), and *Reporting on Environmental Performance: Summary Report* (CICA 1994). As indicated in Appendix A, the topical areas of environmental disclosures considered are environmental liabilities, environmental expenses, environmental assets, accounting policies, environmental management, environmental performance, product information, and regulatory requirements. These categories are provided simply as descriptive headings for the types of environmental information

required or recommended to be disclosed, i.e. they are not from any of the CICA or AICPA documents.

Coding of Annual Report Disclosures

Only hard copies of corporate annual reports were used in this study. Each sample firm's annual reports for 1994, 1995, and 1996 were read and the environmental information contained therein was classified as follows. Disclosures that completely provided the information of an item on the disclosure list in Appendix A were noted for that corporation. Each item from the disclosure list that a corporation provided was scored a "1", while each item not provided was scored a "0". The number of items disclosed by each corporation was then totaled for each category of the disclosure list (disclosures for environmental expenses, for example), and for the entire disclosure list.

A firm's disclosure concerning a specific item noted on the list in Appendix A was coded a "1" for that corporation only if the information provided met all the requirements described. For example, a corporation may disclose its current year environmental capital expenditures but not describe what type of assets were purchased. Such a disclosure would be coded a "0" for the disclosure list, since the corporation does not explain the nature of the capital expenditures. Note in the disclosure list in Appendix A, under disclosures for environmental assets, the first item states a need for "disclosure of the nature and amount of current environmental expenditures on capital assets." Only disclosures that met all of the information requirements of an item on the disclosure list were counted in totaling each firm's disclosure score. Disclosures providing less than

the requested information, as well as those concerning items not described in the disclosure list in Appendix A were not scored or included in any analysis in this research.

Assessment of Validity of the Disclosure Index

Disclosure indices are very useful in conducting accounting research. However, the use of a disclosure index requires subjective judgments by the researcher codifying the disclosures of firms. As a result, the validity of the disclosure measure obtained should be assessed.

Cronbach's coefficient alpha tests the reliability of indices consisting of dichotomously-scored items. Cronbach's coefficient alpha evaluates the internal consistency of repeated measurements by examining the extent to which correlation among the measurements is increased by random error. In this study, the repeated measurements are the categories of the disclosure index. A general rule is that a Cronbach's alpha of 0.8 or greater indicates that the correlation among categories is increased very little by random measurement error (Carmines and Zellner 1979). However, no standard test of significance exists for Cronbach's coefficient alpha.

Computed with standardized data, Cronbach's coefficient alpha for the eight categories of the disclosure index is 0.69. These eight categories are given in Appendix A (environmental liabilities, environmental expenses, environmental assets, and so forth). This result suggests that slight random measurement error may reduce the power of the empirical tests provided later.

Hypotheses for Environmental Disclosure Quality Differences Across Countries

As stated previously in this study, Canada is generally considered to be a more socially concerned nation than is the United States. Canadian firms may respond to a greater extent to a given amount of social pressure than would U.S. firms to the same amount of pressure. Canadian citizens and stakeholders may also be more active in pressuring corporations to provide socially beneficial actions than are U.S. citizens and stakeholders. As a result, Canadian firms would respond to societal and stakeholder pressure for social information by providing a greater amount of detailed environmental information in annual reports than do U.S. firms. Also, for the years 1994 to 1996, through *CICA Handbook* sections 3060.39-41 regarding future removal and site restoration costs, Canadian accounting standards require more direct environmental information than do U.S. standards. Note that the FASB-approved SOP 96-1 goes into effect for fiscal years ending after December 15, 1996. Over time, society's understanding of and interest in environmental problems and possible solutions has increased. As Canada is considered to be a more socially oriented nation than is the U.S., the increase in concern for the environment each year is expected to be greater in Canada than in the U.S. These reasons lead to the following hypotheses, which are stated in the alternative form.

Hypothesis 1: The quality of environmental information provided by Canadian corporations in their annual reports will be greater than the quality of environmental information provided by U.S. corporations in

their annual reports, in each of the years 1994, 1995, and 1996, and for the period of 1994 to 1996.

Hypothesis 2: The increase in the quality of environmental disclosures provided in annual reports will be greater for Canadian corporations than it is for U.S. corporations for each of the time periods of 1994 to 1995, 1995 to 1996, and 1994 to 1996.

Tests of Disclosure by Report Location and by Standards Body

In addition to tests of hypotheses 1 and 2, the content of corporations' annual report disclosures in each nation were compared by report location. This was done to discover if disclosure quality differences exist in each of the following sections of the annual report: introduction, president's letter, and discussion of the lines of business (INTRO); management's discussion and analysis (MD&A); the audited financial statements, footnotes, and auditor's report (FINST); and other sections (OTHER). This analysis reveals which sections of the annual report corporations in each nation tend to primarily use to provide environmental disclosures. Comparisons of disclosure scores for these four report locations are made over the entire 1994 to 1996 period for all firms, for Canadian firms only, and for U.S. firms only. Also, a test was done to evaluate if Canadian firms and U.S. firms provide a significantly different level of environmental disclosure in each report location. No theory exists in the accounting literature regarding the expected behavior of firms in choosing certain report locations to provide voluntary disclosures. Also, no prior research has been done regarding the report location of

environmental disclosures. Thus, no hypotheses are proposed for any of the tests regarding disclosure location.

Also, separate disclosure quality measures were computed based on the policies of each individual standards body. Environmental disclosure quality provided by the U.S. sample corporations measured separately by the AICPA guidelines and by the CICA guidelines were compared to the Canadian sample corporations' disclosure levels, also separately measured by the AICPA and the CICA guidelines. This comparison would indicate if significant differences exist in the amount of response to the AICPA guidelines and the CICA guidelines across countries. As the AICPA and CICA guidelines primarily present recommendations for disclosure rather than requirements, no hypothesis is proposed regarding either nation's response to AICPA or CICA guidelines.

Hypotheses for Variables Potentially Affecting Environmental Disclosure Quality

Another objective of this research is to examine variables that likely affect the quality of firms' environmental reporting. The following OLS regression model was employed to evaluate items possibly affecting the reported disclosures. The model was run separately for 1994 and 1995¹.

$$DISC = \beta_0 + \beta_1 POLL + \beta_2 NUMFAC + \beta_3 COUNTRY + \beta_4 RETEQ + \beta_5 SIZE + e \quad (1A)$$

where:

DISC is disclosure quality as measured by the total environmental

¹ All regression models employing pollution releases do not include 1996 as neither the TRI nor the NPRI databases are available for 1996 as of July 23, 1998.

	disclosure score based on the disclosure checklist in Appendix A.
<i>POLL</i>	is the total tons of untreated pollution releases by the firm in the current year.
<i>NUMFAC</i>	is the number of facilities for which the firm reported pollution releases.
<i>COUNTRY</i>	is a variable identifying the location of the firm's headquarters. For firms located in Canada and the U.S., the <i>COUNTRY</i> variable has the values of 1 and 0, respectively.
<i>RETEQ</i>	is return on average equity. See table 3 for calculation.
<i>SIZE</i>	is the size of the firm, which is measured in separate runs of the model by the firm's average assets, and by the firm's total operating revenues (i.e. sales). See table 3 for the calculation of average assets.

POLL and *NUMFAC* were collected from the TRI database for U.S. firms and the NPRI database for Canadian firms. Hypotheses for *POLL*, *NUMFAC*, and *COUNTRY* follow below.

RETEQ and *SIZE* are employed in the model to control for variation in environmental disclosure levels that may occur regardless of the quantity of firms' pollution releases or the number of polluting facilities. *RETEQ* is used to control for operating performance. As a firm has a higher return on equity, it may provide more extensive environmental information since it is more able to withstand any "bad news" effects. In this study, it is expected that as *RETEQ* increases, firms provide additional environmental disclosures. *SIZE* is measured in two ways, with model 1A run separately for each measure. Total assets is one measure employed for firm size, as firms with larger amounts of assets have more resources to provide more complete disclosures.

Also, larger firms tend to receive more scrutiny from the public and the government, and this pressure may cause them to provide more disclosures. Barth et al. (1995) found a significant positive relationship between size (measured as the market value of equity) and firms' environmental disclosure. Total sales will also be used to measure *SIZE*, as Patten (1991) shows that revenues have a positive significant relationship with firms providing a high level of social disclosures. In this study, a positive relationship is expected between *SIZE* and firms' environmental disclosure scores. No formal hypotheses are presented for the regression results for *RETEQ* and *SIZE*, since these are control variables and not the primary variables of interest in this study.

As the quantity of a firm's pollution releases increases, it is potentially exposing itself to additional environmental costs and liabilities. Thus, a firm with additional pollution releases should have more environmental information available from which to choose to provide in its annual report. Social and political stakeholders are also likely to be generally aware of which businesses are releasing the larger quantities of pollution, due to information provided by the media, government, and other public sources. As a firm's pollution increases, political and social stakeholders will increasingly demand environmental information regarding the firm, and will exert greater levels of influence on the firm's management to provide environmental disclosures in the annual report. These stakeholders realize that environmental risks and costs are generally higher and thus they have a greater need for detailed environmental information regarding the firm. With increased pollution levels, firms are expected by stakeholders to provide an

increased quality of environmental disclosure in response to greater stakeholder demand.

As the number of facilities a firm has increases, the amount and quality of environmental information available to the public from sources other than firms' annual reports (such as the media) should be greater. This is simply because as firms have more geographical locations the public has an increased awareness of firms' activities and an increased need for news and other current information about the firm.

The number of corporate facilities for which pollution data are reported is used as a proxy for the amount of environmental information available regarding firms from sources other than the annual report. Barth et al. (1995) used the variables "average age of Superfund sites" and "percentage of sites for which an EPA Record of Decision (ROD) has been filed" as measures of the publicly available environmental information for a firm. Barth et al. (1995) found that the average age of Superfund sites and the percentage of sites that a ROD has been filed for each have a significant negative relationship with their overall environmental disclosure index and an index item that measures if the company stated it was a PRP on one or more Superfund sites. Their results indicated that firms provided less disclosure as more public information was available. This study uses the number of firm facilities as a proxy for the amount of public environmental information available outside a firm's annual report. As the number of firm facilities increases, it is expected that environmental information available from the media and other public sources increases. Thus, society and stakeholders become more knowledgeable of firms' environmental risks and exert less

pressure on firms to provide additional environmental disclosures in the annual report. In other words, the public becomes more informed and has less of a need for additional environmental information in the annual report. With the decrease in societal pressure, firms provide a lower quality of environmental disclosure. In this study, firms that have more facilities (i.e. as more environmental information is available to the public) are expected to provide less environmental disclosure in their annual reports.

Since Canada is a more socialistic nation than is the U.S., societal pressure on corporations to provide environmental disclosure is likely to be greater in Canada than in the U.S. Additionally, Canadian corporations may respond to a greater extent in providing environmental disclosures than do U.S. firms due to the greater social focus in Canada.

The following hypotheses are proposed regarding environmental disclosure quality, and are stated in the alternative form. These hypotheses are tested by using regression model 1A, as well as models 1B and 1C which follow below.

Hypothesis 3: As the quantity of corporations' reported pollution releases increases, there will be an increase in environmental disclosure quality.

Hypothesis 4: As the number of facilities that corporations have that report pollution releases increases, there will be a decrease in disclosure quality.

Hypothesis 5: Canadian corporations provide a greater level of disclosure

quality than do U.S. corporations. Thus, it is expected that the *COUNTRY* variable is positive and significantly related to disclosure quality.

The above variables of *POLL* and *RETEQ* are similar to ones used by M. Johnson (1995). The data for the *RETEQ* and *SIZE* variables were obtained from each corporation's annual report.

The total environmental disclosure score is based on guidelines created in the U.S. by the AICPA and in Canada by the CICA. It is possible that firms responded differently to the guidelines produced by the AICPA than they did to the guidelines produced by the CICA. Therefore, it is useful to examine in a multivariate model how the independent variables discussed above may have affected the disclosures provided according to the policies of each standard-setting body. The following OLS regression models were employed to assess how the independent variables influence disclosure quality measured according to both the U.S. guidelines (AICPA) and the Canadian guidelines (CICA):

$$DISAICPA = \alpha_0 + \alpha_1 POLL + \alpha_2 NUMFAC + \alpha_3 COUNTRY + \alpha_4 RETEQ + \alpha_5 SIZE + e \quad (1B)$$

where:

DISAICPA is the environmental disclosure score for items meeting the disclosure guidelines prepared by the American Institute of Certified Public Accountants.

POLL, *NUMFAC*, *RETEQ*, and *SIZE* are the same as for model 1A.

COUNTRY is coded 1 for a U.S. corporation and 0 for a Canadian corporation.

Coding U.S. firms with a value of 1 for *COUNTRY* in model 1B is necessary to test hypothesis 6 below.

$$DISCICA = \chi_0 + \chi_1 POLL + \chi_2 NUMFAC + \chi_3 COUNTRY + \chi_4 RETEQ + \chi_5 SIZE + e \quad (1C)$$

where:

DISCICA is the environmental disclosure score for items meeting the disclosure guidelines prepared by the Canadian Institute of Chartered Accountants.

For models 1B and 1C, *POLL*, *NUMFAC*, *COUNTRY*, *RETEQ*, and *SIZE* are defined the same as they were for model 1A. *POLL*, *NUMFAC*, and *COUNTRY* are the primary variables of interest, with hypotheses for these variables following. *RETEQ* and *SIZE* are employed as control variables, for the same reasons as in model 1A.

In model 1C, *COUNTRY* is 1 for a Canadian corporation, and 0 for a U.S. corporation. Coding the *COUNTRY* variable in this way allows for the testing of hypothesis 6 below.

Models 1B and 1C assess how the disclosures provided according to U.S. recommendations and Canadian recommendations, respectively, have been influenced by firms' public exposure, environmental exposure, country of location, financial performance, and size. For each model, it is expected that disclosure quality will increase with additional pollution releases and will decrease as a corporation has more facilities (Hypotheses 3 and 4 are repeated here). However, disclosure quality is expected to be greater for corporations whose country issued the recommended/required guidelines. This provides for hypothesis 6, given in the alternative form.

Hypothesis 6: Corporations in both the U.S. and Canada will provide a higher

quality of environmental disclosure for items recommended or required by the standard setting body in their home country than do the corporations in the other nation. That is, it is expected that the *COUNTRY* variable will be positive and significant in both models 1B and 1C.

Table 5 provides a summary of the expected coefficients for models 1A, 1B, and 1C. These models test hypotheses 3, 4, 5, and 6.

TABLE 5
Summary of Expected Regression Results for Regression Models 1A, 1B, and 1C

<u>Independent Variables</u>	<u>Dependent Variable and Predicted Signs of Coefficients</u>		
	<u>Model 1A</u> DISC	<u>Model 1B</u> DISAICPA	<u>Model 1C</u> DISCICA
POLL	+	+	+
NUMFAC	-	-	-
COUNTRY *	+	+	+
RETEQ	+	+	+
SIZE	+	+	+

* The Country variable is coded as follows:

<u>Model</u>	<u>Canadian firm =</u>	<u>U.S. firm =</u>
1A	1	0
1B	0	1
1C	1	0

Hypotheses for Environmental Capital Expenditures and Operating Expenses

Disclosures that provide the amount of environmental costs incurred are among the most informative and useful disclosures to the stakeholders of a firm. Because environmental cost information is of much value, the following two types of costs were noted and totaled from the annual reports for each corporation that reported them for each of the years 1994 and 1995: environmental capital expenditures, and environmental operating costs (such as remediation, cleanup, and general expenses). These cost disclosures provide an understanding of the amount of environmental capital and operating costs that the sample U.S. and Canadian corporations are incurring. Also, the following two OLS regression models were tested for each of the two nations separately to examine variables that potentially affect the amount of disclosed environmental costs:

$$ENVCAP = \phi_0 + \phi_1 POLL + \phi_2 NUMFAC + \phi_3 RETEQ + \phi_4 SIZE + e \quad (2)$$

where:

ENVCAP is the total current year environmental capital expenditures in U.S. dollars.

$$ENVEXP = \gamma_0 + \gamma_1 POLL + \gamma_2 NUMFAC + \gamma_3 RETEQ + \gamma_4 SIZE + e \quad (3)$$

where:

ENVEXP is the total current year environmental operating expenses in U.S. dollars.

In models 2 and 3, *POLL*, *NUMFAC*, *RETEQ*, and *SIZE* are the same as they were defined in model 1A. *NUMFAC* and *POLL* are the variables the variables of primary interest in models 2 and 3, with hypotheses following for these variables. *RETEQ* controls for the expectation that firms with better operating performance will spend more

on environmental capital and operating costs. *SIZE* controls for the expectation that larger firms will spend greater amounts on environmental capital and operating costs than will small firms. Since they are control variables, no formal hypotheses are given for *RETEQ* or for *SIZE*.

ENVCAP and *ENVEXP* were collected from the sample firms' annual reports. Firms that did not report a specific amount for *ENVCAP* or *ENVEXP* are excluded from the analysis of models 2 and 3. The following hypotheses are proposed regarding the affect of the number of facilities on the amount of environmental costs, and are stated in the alternative form.

Hypothesis 7: As corporations have a greater *NUMFAC*, the amount of *ENVCAP* disclosed in annual reports increases.

Hypothesis 8: As corporations have a greater *NUMFAC*, the amount of *ENVEXP* disclosed in annual reports increases.

These results are expected because with more facilities, firms require more pollution prevention equipment and would have more sites to clean up. As a firm has more separate facility locations, the environmental capital and remediation costs should be greater. In other words, there are expected to be variable capital and operating costs associated with each additional facility that a firm has.

Firms with higher pollution levels likely have more significant environmental problems than do firms that release lower amounts of pollution. Increased environmental exposure through the release of greater quantities of pollution is likely to

lead to higher amounts of environmental costs. With additional pollution produced, capital expenditures undertaken in the current year should be greater as more equipment would likely be purchased in an effort to reduce the amount of future pollution releases to a level suitable to society and/or to meet legal requirements. Also, with an increase in pollution, cleanup efforts would likely be more extensive and thus remediation costs and other environmental operating expenses should be higher. Thus, the following hypotheses are proposed, and are stated in the alternative form.

Hypothesis 9: As the amount of *POLL* increases, the amount of *ENVCAP* disclosed in annual reports increases.

Hypothesis 10: As the amount of *POLL* increases, the amount of *ENVEXP* disclosed in annual reports increases.

The expected results for regression models 2 and 3 given in Table 6. Models 2 and 3 test hypotheses 7, 8, 9, and 10.

TABLE 6
Summary of Expected Regression Results for Models 2 and 3

*Dependent Variable and
Predicted Signs of Coefficients*

<u>Independent Variables</u>	<u>Model 2</u> ENVCAP	<u>Model 3</u> ENVEXP
POLL	+	+
NUMFAC	+	+
RETEQ	+	+
SIZE	+	+

Note: Models 2 and 3 are run separately for U.S. firms and Canadian firms.

Summary of Research Method

Sample corporate firms in this study only include firms that must report pollution releases to either the EPA (U.S. firms) or to Environment Canada (Canadian firms). The environmental disclosure quality of the sample firms' annual reports for 1994, 1995, and 1996 was measured in accordance with the disclosure list in Appendix A. A correlation analysis revealed that firms' environmental disclosure quality is positively and significantly associated with firms' pollution releases, average assets, average liabilities, average equity, sales, and net income.

An overview of the EPA's Toxic Release Inventory and Environment Canada's National Pollutant Release Inventory was provided. The particular methods used to assess and examine firms' environmental disclosures were discussed. The hypotheses proposed expect that Canadian firms provided higher environmental disclosure quality than did U.S. firms, environmental disclosure quality increases as pollution levels increase, environmental disclosure quality decreases as the number of firm facilities increases, firms responded to a greater extent to the environmental disclosure guidelines in their home country, and environmental capital expenditures and environmental operating expenses are each positively related to both the number of firm facilities and to the level of pollution releases.

CHAPTER VI

EMPIRICAL RESULTS

The quality of environmental information provided by each sample corporation in each of the years 1994, 1995, and 1996 was measured by summing the number of disclosed information items found in the disclosure list in Appendix A. Firms' environmental disclosure quality was then analyzed and evaluated in accordance with the research methods discussed in chapter V. This chapter presents the results of the tests performed for each hypothesis and analysis given in chapter V.

Hypotheses for Environmental Disclosure Quality Differences Across Countries

Hypothesis 1

Hypothesis 1 proposed that Canadian firms would provide a greater quality of environmental disclosure than did U.S. firms. Hypothesis 1 was tested by using the Wilcoxon rank sum test to evaluate the difference between Canadian and U.S. disclosure levels for the separate years of 1994, 1995, and 1996, and for the period of 1994 to 1996. The Wilcoxon test is a non-parametric procedure, and is appropriately used in this study due to the ordinal data created from totaling the items on the disclosure list. The Wilcoxon is the non-parametric equivalent to the t test of means.

Firms' overall disclosure scores, as well as disclosure scores for each of the following subject areas were compared across countries: environmental liabilities, environmental expenses, environmental assets, accounting policies, environmental management, environmental performance, product information, and regulatory

requirements. Typical alpha levels of .05 indicating extreme significance and .10 indicating marginal significance are used in testing disclosure quality differences. In testing disclosure differences, Canadian and U.S. firms were matched based on SIC Code and sales revenue. Table 2, given earlier, provides the specific firms matched together.

Table 7 provides the overall results of the test comparing Canadian firms' and U.S. firms' environmental disclosure quality scores. Overall disclosure scores in 1994 are not significantly different across countries. For each of the years 1995 and 1996, U.S. firms' disclosure scores are significantly higher than the Canadian firms' disclosure scores, at less than the .09 level. In each year, the mean overall disclosure score was slightly above 7.0 for Canadian firms and approximately 9.0 for U.S. firms. For the period 1994 to 1996, U.S. firms' mean disclosure level of 9.05 is greater than the Canadian firms' mean disclosure level of 7.22, at a .009 level of significance. These results indicate that hypothesis 1 cannot be accepted.

However, examining the comparisons of disclosure scores by subject area in table 7 indicates some interesting results. In each year and for the 1994 to 1996 period, the Canadian firms' environmental disclosure quality for the subjects of environmental management and environmental performance were significantly higher than was the disclosure quality by the U.S. firms for these subjects. Except for environmental performance for 1995 being significant at the .047 level, each difference was significant at the .020 level or lower. Also for each year and for the entire period, U.S. firms

TABLE 7
Wilcoxon Test of Differences in Environmental Disclosure Scores

<u>Disclosure Topic</u>	<u>Canadian Firms</u>		<u>U.S. Firms</u>		<u>Signif. of Diff. in Means</u>	<u>Signif. higher nation</u>
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>		
<i>Panel A: 1994 Disclosure Levels</i>						
Overall Disclosure	7.12	5.36	8.90	6.59	.116	
Disclosure by subject:						
Env. Liabilities	.60	.78	2.84	2.59	.000 ^a	U.S.
Env. Expenses	.34	.69	1.02	1.13	.000 ^a	U.S.
Env. Assets	.60	.78	0.54	0.73	.373	
Accounting Policies	.62	.90	0.64	1.19	.244	
Env. Management	2.92	2.29	1.82	1.98	.004 ^a	Canada
Env. Performance	.96	1.22	0.50	1.04	.007 ^a	Canada
Product Information	.16	.37	0.16	0.42	.408	
Regulatory Requirements	.92	1.05	1.38	1.41	.074 ^c	U.S.
Sample size for each topic	50		50			
<i>Panel B: 1995 Disclosure Levels</i>						
Overall Disclosure	7.20	5.52	9.04	6.32	.068 ^c	U.S.
Disclosure by subject:						
Env. Liabilities	.68	.96	2.96	2.68	.000 ^a	U.S.
Env. Expenses	.40	.78	1.00	1.16	.002 ^a	U.S.
Env. Assets	.60	.76	.58	.76	.436	
Accounting Policies	.58	.86	.66	1.12	.438	
Env. Management	3.10	2.43	1.72	1.81	.002 ^a	Canada
Env. Performance	1.04	1.52	.50	.86	.047 ^b	Canada
Product Information	.14	.40	.16	.37	.299	
Regulatory Requirements	.66	.87	1.46	1.43	.002 ^a	U.S.
Sample size for each topic	50		50			

TABLE 7 (Continued)

<i>Disclosure Topic</i>	<i>Canadian Firms</i>		<i>U.S. Firms</i>		<i>Signif. of Diff. in Means</i>	<i>Signif. higher nation</i>
	<i>Mean</i>	<i>Std. Dev.</i>	<i>Mean</i>	<i>Std. Dev.</i>		
<i>Panel C: 1996 Disclosure Levels</i>						
Overall Disclosure	7.34	5.79	9.22	6.73	.086 ^c	U.S.
Disclosure by subject:						
Env. Liabilities	.80	1.07	2.88	2.56	.000 ^a	U.S.
Env. Expenses	.52	.86	1.12	1.29	.006 ^a	U.S.
Env. Assets	.44	.76	.58	.78	.120	
Accounting Policies	.62	.92	.90	1.23	.195	
Env. Management	3.30	2.67	1.68	1.85	.002 ^a	Canada
Env. Performance	.92	1.29	.42	.70	.020 ^b	Canada
Product Information	.16	.37	.16	.37	.500	
Regulatory Requirements	.58	.86	1.48	1.46	.005 ^a	U.S.
Sample size for each topic	50		50			
<i>Panel D: Disclosure Levels for the entire 1994 to 1996 period</i>						
Overall Disclosure	7.22	5.52	9.05	6.51	.009 ^a	U.S.
Disclosure by subject:						
Env. Liabilities	.69	.94	2.89	2.60	.000 ^a	U.S.
Env. Expenses	.42	.78	1.05	1.19	.000 ^a	U.S.
Env. Assets	.55	.77	.57	.75	.358	
Accounting Policies	.61	.89	.73	1.18	.485	
Env. Management	3.11	2.46	1.74	1.87	.000 ^a	Canada
Env. Performance	.97	1.35	.47	.87	.000 ^a	Canada
Product Information	.15	.38	.16	.39	.435	
Regulatory Requirements	.72	.93	1.44	1.43	.000 ^a	U.S.
Sample size for each topic	150		150			

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

^c indicates significance at less than the .10 level (one-tailed test).

provided higher quality disclosures in the subjects of environmental liabilities and environmental expenses than did Canadian firms, significant at the .006 level or lower. U.S. firms' disclosures for regulatory requirements were significantly greater in 1995, 1996, and for the 1994 to 1996 period, at the .005 level or lower. U.S. firms' regulatory requirements disclosure scores were marginally significantly higher in 1994, at the .074 level of significance. Disclosure quality was not significantly different across countries for the subjects of environmental assets, accounting policies, and product information. The greater quality of disclosure of environmental management and environmental performance [environmental liabilities and environmental expenses] information by Canadian firms [U.S. firms] than U.S. firms [Canadian firms] may indicate that Canadian firms [U.S. firms] are more attuned to the social implications [financial implications] of their environmental activities than are U.S. firms [Canadian firms].

Hypothesis 2

Hypothesis 2 proposes that the increase in environmental disclosure quality over time will be greater for Canadian firms than it is for U.S. firms. Hypothesis 2 was examined by using both the absolute change in disclosure each year for each corporation (for example, number of items disclosed in 1995 less the number of items disclosed in 1994), and the percentage change in disclosure each year for each corporation (for example, the change in the number of items disclosed from 1994 to 1995 divided by the number of disclosed items in 1994).

The results of testing changes in disclosure levels across countries is presented in

table 8. Changes in disclosure are compared for the periods of 1994 to 1995, 1995 to 1996, and 1994 to 1996. For each time period, the first panel gives the amount of change in disclosure followed in the second panel by the percentage change in disclosure. Both changes in overall disclosure level, and changes in disclosure by subject area are examined.

The Wilcoxon statistics shown in table 8 reveal that only for the subject of environmental liabilities in the period 1995 to 1996 did the Canadian firms' disclosure quality increase more than that of the U.S. firms. This result held for both the amount of change and the percentage change, at less than the .10 level of significance. For all other subject categories of disclosure and for overall disclosure, the Canadian firms' disclosure quality did not increase significantly more than did the disclosure quality of the U.S. firms. This was the case for each of the time periods examined. These results indicate that hypothesis 2 cannot be accepted. Consequently, it must be concluded that Canadian firms' environmental disclosure quality has not increased more than has the disclosure quality of U.S. firms.

For the subject of regulatory requirements, U.S. firms' disclosure quality increased significantly more (at less than the .01 level) than that of the Canadian firms did from 1994 to 1995 and from 1994 to 1996 for both the amount of change and the percentage change. The percentage increase was also greater for regulatory requirements for U.S. firms in 1995 to 1996, significant at the .035 level. These findings indicate that U.S. firms may have faced a more substantial increase in environmental legal and

TABLE 8
Wilcoxon Test of Changes in Disclosure Levels: Canada vs. U.S.

<u>Disclosure Topic</u>	<u>Canadian Firms</u>			<u>U.S. Firms</u>			<u>Signif. of Diff. in Means</u>	<u>Signif. higher nation</u>
	<u>Mean</u>	<u>Std. Dev.</u>	<u>n</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>n</u>		
<i>Panel A: Amount of Change in Disclosure, 1994 to 1995</i>								
Overall Disclosure	.08	2.57	50	.14	2.55	50	.380	
Disclosure by subject:								
Env. Liabilities	.08	.49	50	.12	1.10	50	.455	
Env. Expenses	.06	.42	50	-.02	.43	50	.212	
Env. Assets	.00	.67	50	.04	.53	50	.471	
Accounting Policies	-.04	.20	50	.02	.32	50	.131	
Env. Management	.18	1.60	50	-.10	1.15	50	.337	
Env. Performance	.08	1.14	50	.00	.88	50	.483	
Product Information	-.02	.38	50	.00	.49	50	.317	
Regulatory Requirements	-.26	.63	50	.08	.44	50	.002 ^a	U.S.
<i>Panel B: Percentage Change in Disclosure, 1994 to 1995</i>								
Overall Disclosure	.02	.44	45	.15	.76	45	.426	
Disclosure by subject:								
Env. Liabilities	.05	.51	22	.10	.56	37	.471	
Env. Expenses	-.14	.50	11	.00	.31	28	.284	
Env. Assets	-.21	.58	21	-.10	.42	20	.178	
Accounting Policies	-.07	.23	20	.00	.17	15	.382	
Env. Management	.17	.77	41	-.08	.53	34	.151	
Env. Performance	-.04	1.09	26	-.15	.54	14	.391	
Product Information	-.38	.74	8	-.57	.53	7	.324	
Regulatory Requirements	-.37	.42	27	.03	.25	30	.000 ^a	U.S.

TABLE 8 (Continued)

<u>Disclosure Topic</u>	<u>Canadian Firms</u>			<u>U.S. Firms</u>			<u>Signif. of Diff. in Means</u>	<u>Signif. higher nation</u>
	<u>Mean</u>	<u>Std. Dev.</u>	<u>n</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>n</u>		
<i>Panel C: Amount of Change in Disclosure, 1995 to 1996</i>								
Overall Disclosure	.14	3.02	50	.18	3.09	50	.270	
Disclosure by subject:								
Env. Liabilities	.12	.52	50	-.08	1.03	50	.074 ^c	Canada
Env. Expenses	.12	.52	50	.12	.59	50	.354	
Env. Assets	-.16	.68	50	.00	.49	50	.094 ^c	U.S.
Accounting Policies	.04	.45	50	.24	.72	50	.016 ^b	U.S.
Env. Management	.20	2.24	50	-.04	1.31	50	.230	
Env. Performance	.31	1.23	50	-.08	.53	50	.365	
Product Information	.02	.43	50	.00	.40	50	.404	
Regulatory Requirements	-.08	.49	50	.02	.65	50	.201	
<i>Panel D: Percentage Change in Disclosure, 1995 to 1996</i>								
Overall Disclosure	.09	.77	46	.10	.75	44	.311	
Disclosure by subject:								
Env. Liabilities	.20	.63	22	.05	.60	38	.098 ^c	Canada
Env. Expenses	.01	.73	13	.11	.44	27	.203	
Env. Assets	-.32	.70	22	-.09	.60	21	.093 ^c	U.S.
Accounting Policies	-.05	.23	19	.18	.40	17	.083 ^c	U.S.
Env. Management	.31	1.23	40	-.10	.43	34	.107	
Env. Performance	-.31	.47	21	-.24	.36	15	.323	
Product Information	-.58	.49	6	-.50	.53	8	.387	
Regulatory Requirements	-.21	.52	23	.09	.63	33	.035 ^b	U.S.

TABLE 8 (Continued)

<u>Disclosure Topic</u>	<u>Canadian Firms</u>			<u>U.S. Firms</u>			<u>Signif. of Diff. in Means</u>	<u>Signif. higher nation</u>
	<u>Mean</u>	<u>Std. Dev.</u>	<u>n</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>n</u>		
<i>Panel E: Amount of Change in Disclosure, 1994 to 1996</i>								
Overall Disclosure	.22	3.25	50	.32	3.51	50	.301	
Disclosure by subject:								
Env. Liabilities	.20	.70	50	.04	1.50	50	.120	
Env. Expenses	.18	.56	50	.10	.54	50	.153	
Env. Assets	-.16	.77	50	.04	.70	50	.115	
Accounting Policies	.00	.35	50	.26	.83	50	.009 ^a	U.S.
Env. Management	.38	2.10	50	-.14	1.34	50	.254	
Env. Performance	-.04	1.14	50	-.08	.85	50	.381	
Product Information	.00	.35	50	.00	.45	50	.398	
Regulatory Requirements	-.34	.69	50	.10	.74	50	.001 ^a	U.S.

Panel F: Percentage Change in Disclosure, 1994 to 1996

Overall Disclosure	.10	.85	45	.20	.92	45	.201	
Disclosure by subject:								
Env. Liabilities	.19	.75	22	.10	.72	37	.190	
Env. Expenses	.05	.82	11	.14	.47	28	.290	
Env. Assets	-.45	.67	21	-.15	.65	20	.051 ^c	U.S.
Accounting Policies	.03	.52	20	.22	.50	15	.159	
Env. Management	.30	1.28	41	.01	.85	34	.195	
Env. Performance	-.24	.84	26	-.28	.53	14	.364	
Product Information	-.38	.52	8	-.43	.53	7	.419	
Regulatory Requirements	-.49	.42	27	.17	.67	30	.000 ^a	U.S.

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

^c indicates significance at less than the .10 level (one-tailed test).

regulatory requirements than did the Canadian firms and simply had a larger increase in the need to disclose regulatory items than did the Canadian firms. U.S. firms also had a significantly larger increase in disclosures for environmental accounting policies. This increase occurred from 1995 to 1996, with significance levels of .016 and .083 for the amount of change and percentage change, respectively. This increase also occurred in the 1994 to 1996 period, for the amount of change in disclosure only, at the .009 level of significance. The observed change in disclosure behavior may be due to increased interest in the last few years by the FASB and the AICPA in developing environmental accounting policies. Additionally, U.S. firms had greater changes in disclosure level for environmental assets than did Canadian firms, in 1995 to 1996 for both the amount of change and percentage change, and for the percentage change in 1994 to 1996. All changes in environmental asset disclosure were marginally significant at less than the .10 level.

Tests of Disclosure by Report Location and by Standards Body

As discussed in chapter V on the research methods used, the total environmental disclosure score for each firm was further classified into four separate scores by the location of the disclosure in the annual report. Disclosures of each item on the list in Appendix A were scored as a 1 in total, so that the overall disclosure score for the entire report would equal the sum of the scores for each report location. Any disclosure of the same item in more than one report location was handled by dividing 1 by the number of locations used and assigning the result to each location.

Testing of potential differences in disclosure scores across report locations was done using analysis of variance (ANOVA). Each ANOVA was performed using the SPSS 8.0 statistical software package. SPSS 8.0 performed post hoc multiple comparison tests of whether significant differences existed across the disclosure scores for each report location. These multiple comparison tests were prepared in SPSS using a significance level of .0125, which is simply the significance level of .05 selected for this test divided by the number of report locations being tested. Reducing the significance level in this manner is necessary in a multiple comparisons test in order to maintain statistical validity of the results. SPSS performs the test at the reduced significance levels, but reports the results in the printout based on the significance level originally specified (.05 here). For example, if using an overall significance of .05 that is reduced to .0125 for each of 4 groups and SPSS calculated a true significance of .011, the results would report a significance of .044. This simply means that the significance levels reported are to be compared to standard significance levels (such as .01, .05, .10) but the actual statistical procedure in SPSS was correctly performed by allocating the significance level equally across all groups tested.

Table 9 provides the ANOVA results for whether firms provide a significantly greater amount of environmental disclosure in one or more report locations than in a different report location or locations. This analysis was done for all years combined. Panel A presents the ANOVA results for all firms, Panel B reports the ANOVA results for Canadian firms, and Panel C gives the ANOVA results for U.S. firms.

TABLE 9
Analysis of Variance of Disclosures by Annual Report Location

Dependent Variable: Disclosure Score for each of the four annual report locations of Introduction (INTRO), Management's Discussion and Analysis (MD&A), Financial Statements and Footnotes (FINST), and Other Locations (OTHER).

Panel A: All Firms, 1994 to 1996
ANOVA Table

<i>Effect</i>	<i>df</i>	<i>Sum of Squares</i>	<i>F-Ratio</i>	<i>p-Value</i>
Between Report Locations	3	1,431.05	61.10	.000
Within Report Locations	1,196	9,337.67		
Total	1,199	10,768.72		

Descriptive Statistics for Disclosure Scores

<i>Report Location</i>	<i>Mean</i>	<i>Std. Dev.</i>
INTRO	2.68	3.48
MD&A	2.91	3.24
FINST	2.38	2.79
OTHER	.18	.91

Tamhane's Multiple Comparisons Test of Disclosure Scores by Report Location

<i>Report Locations Compared</i>		<i>Mean Score Diff. (Loc. 1 - Loc. 2)</i>	<i>Significance level</i>
<i>Loc. 1</i>	<i>Loc. 2</i>		
INTRO	MD&A	-.23	.955
	FINST	.30	.811
	OTHER	2.51	.000 ^a
MD&A	FINST	.53	.177
	OTHER	2.74	.000 ^a
FINST	OTHER	2.21	.000 ^a

TABLE 9 (Continued)

Panel B: Canadian Firms, 1994 to 1996

ANOVA Table

<i>Effect</i>	<i>df</i>	<i>Sum of Squares</i>	<i>F-Ratio</i>	<i>p-Value</i>
Between Report Locations	3	766.10	37.37	.000
Within Report Locations	596	4072.32		
Total	599	4838.42		

Descriptive Statistics for Disclosure Scores

<i>Report Location</i>	<i>Mean</i>	<i>Std. Dev.</i>
INTRO	3.31	3.90
MD&A	2.30	2.84
FINST	1.35	1.75
OTHER	.26	.98

Tamhane's Multiple Comparisons Test of Disclosure Scores by Report Location

Report Locations Compared

<i>Loc. 1</i>	<i>Loc. 2</i>	<i>Mean Score Diff. (Loc. 1 - Loc. 2)</i>	<i>Significance level</i>
INTRO	MD&A	1.01	.063 ^c
	FINST	1.96	.000 ^a
	OTHER	3.05	.000 ^a
MD&A	FINST	.95	.004 ^a
	OTHER	2.04	.000 ^a
FINST	OTHER	1.09	.000 ^a

TABLE 9 (Continued)

Panel C: U.S. Firms, 1994 to 1996
ANOVA Table

<i>Effect</i>	<i>df</i>	<i>Sum of Squares</i>	<i>F-Ratio</i>	<i>p-Value</i>
Between Report Locations	3	1151.56	48.53	.000
Within Report Locations	596	4710.33		
Total	599	5865.89		

Descriptive Statistics for Disclosure Scores

<i>Report Location</i>	<i>Mean</i>	<i>Std. Dev.</i>
INTRO	2.05	2.87
MD&A	3.53	3.50
FINST	3.41	3.23
OTHER	.09	.83

Tamhane's Multiple Comparisons Test of Disclosure Scores by Report Location

Report Locations Compared

<i>Loc. 1</i>	<i>Loc. 2</i>	<i>Mean Score Diff. (Loc. 1 - Loc. 2)</i>	<i>Significance level</i>
INTRO	MD&A	-1.48	.001 ^a
	FINST	-1.36	.001 ^a
	OTHER	1.96	.000 ^a
MD&A	FINST	.12	1.000
	OTHER	3.44	.000 ^a
FINST	OTHER	3.32	.000 ^a

^a indicates significance at less than the .01 level (two-tailed test).

^c indicates significance at less than the .10 level (two-tailed test).

The Levene test for equal variances across all report locations was conducted for each ANOVA. The Levene statistic for each ANOVA result was significant at less than the .01 level, indicating that the variances were not equal for all report locations. Thus, the results of comparing disclosure scores by report location given in table 9 are based on the Tamhane statistic, which is valid for comparing groups with unequal variances. Dunnett's T3 statistic, also valid for unequal variances, was also calculated and gave the same results as the Tamhane statistic.

Panel A of table 9 indicates that the mean report location scores for all sample firms were 2.91 for MD&A, 2.68 for INTRO, 2.38 for FINST, and .18 for OTHER. The ANOVA model indicates that at least one of these means is not equal to one or more of the others, as the F-Ratio indicates a significance of .000. The multiple comparisons test reveals that the OTHER section contains a significantly lower mean amount of environmental disclosure than do each of the report locations of INTRO, MD&A, and FINST. These findings suggest that for all Canadian and U.S. firms combined, the INTRO, MD&A, and FINST sections of the annual report are used nearly equally in disseminating environmental information, while the OTHER section is used very little.

The ANOVA results of Canadian firms' disclosure scores by report location are given in Panel B of table 2. The model is very significant, with a p-value of .000, indicating that at least one of the report locations for Canadian firms has a significantly different disclosure score. The average scores for each location are 3.31 for INTRO, 2.30 for MD&A, 1.35 for FINST, and .26 for OTHER.

The multiple comparisons test indicates that the disclosure score for the INTRO section is higher than the disclosure score for the MD&A section, with a marginal significance of .063. The INTRO score is also significantly greater than the scores for both the FINST and the OTHER sections (at the .000 level). While MD&A disclosures are less frequent than are those in the INTRO section, the MD&A score is significantly greater than the disclosure scores for both the FINST and the OTHER sections, at less than the .01 level. A significantly greater amount of environmental disclosures are found in the FINST section for Canadian firms than in the OTHER section. Overall, these results indicate that Canadian firms report significantly different amounts of environmental disclosure in each section of the annual report. The majority of the disclosures are found in the INTRO and MD&A sections, with a moderate amount in the FINST section, and a very minor amount in the OTHER section. This order is the same in which most firms create their annual report, revealing that Canadian firms provide the majority of their environmental information toward the front of the report.

Panel C of table 9 presents the ANOVA results for disclosures by report location for U.S. firms. The p-value for the model is .000, indicating that one or more report location disclosure scores are not equal. The mean disclosure scores by location are 3.53 for MD&A, 3.41 for FINST, 2.05 for INTRO, and .096 for OTHER.

The Tamhane statistic indicates that no significant difference exists between the disclosure scores for the MD&A and FINST sections. However, both the MD&A and FINST sections include a significantly higher level of disclosure (at less than the .01

level) than do the INTRO and the OTHER sections. Thus, U.S. firms provide the greatest amount of environmental information (and a statistically equal amount in each section) in the financial statements and footnotes, and in the management discussion and analysis. This result is interesting, because the financial statements and footnotes are audited by an external CPA firm, and firms are choosing to provide largely voluntary environmental information in that section.

For the examination of the annual report location of environmental disclosures, a Wilcoxon test was also conducted to compare the Canadian firms to the U.S. firms. The results are presented in table 10. Canadian firms provided a greater amount of environmental disclosure in the INTRO and OTHER sections than did U.S. firms. A higher quality of disclosure was reported by U.S. firms in the MD&A and FINST sections compared to the Canadian firms. Each of these differences is significant at less than the .01 level. The most interesting result in table 10 concerns the FINST section. The difference of 2.06 between means is the largest for any location, revealing that Canadian firms are far less inclined to provided environmental disclosures in the audited section of the annual report than are U.S. firms.

TABLE 10
Wilcoxon Test Comparing Mean Annual Report Location
Disclosure Scores: Canada vs. U.S., 1994 to 1996

<u>Report Location</u>	<u>Canadian Firms'</u> <u>Disclosure Scores</u>		<u>U.S. Firms'</u> <u>Disclosure Scores</u>		<u>Signif.</u> <u>of Diff.</u> <u>in Means</u>	<u>Signif.</u> <u>higher</u> <u>nation</u>
	<u>Mean</u>	<u>Std.</u> <u>Dev.</u>	<u>Mean</u>	<u>Std.</u> <u>Dev.</u>		
INTRO	3.31	3.90	2.05	2.87	.002	Canada
MD&A	2.30	2.84	3.53	3.50	.009	U.S.
FINST	1.35	1.75	3.41	3.23	.000	U.S.
OTHER	.26	.98	.09	.83	.003	Canada
Sample size for each location	150		150			

As shown earlier in table 7 for the 1994 to 1996 period as a whole, U.S. firms reported a significantly higher quality of total environmental disclosure than did Canadian firms. The guidelines used to create the disclosure list in Appendix A were developed by accounting standards bodies in both the U.S. and Canada. These bodies are the AICPA in the U.S. and the CICA in Canada. As the disclosure items are primarily voluntary, an understanding of how each nation's sample firms responded to the guidelines developed in each country would be useful. The results of the Wilcoxon test comparing disclosure scores separately for the AICPA guidelines and the CICA guidelines across countries are given in table 11. At the .000 significance level, response

to the AICPA guidelines was greater by the U.S. firms than the Canadian firms. Mean disclosure scores were 3.51 for U.S. firms and 0.81 for Canadian firms. Response to the CICA guidelines was not significantly different across countries, with mean scores of 5.54 and 6.41 for U.S. and Canadian firms, respectively.

TABLE 11
Wilcoxon Test Comparing Disclosure Scores per American Institute of Certified Public Accountants' (AICPA) Guidelines, and per Canadian Institute of Chartered Accountants' (CICA) Guidelines: Canada vs. U.S., 1994 to 1996

<u>Source of Guidelines</u>	<u>Canadian Firms' Disclosure Scores</u>		<u>U.S. Firms' Disclosure Scores</u>		<u>Signif. of Diff. in Means</u>	<u>Signif. higher nation</u>
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>		
AICPA	.81	.88	3.51	2.86	.000	U.S.
CICA	6.41	5.02	5.54	4.46	.188	
Sample size	150		150			

Hypotheses for Variables Potentially Affecting Environmental Disclosure Quality

Regression Diagnostics

Models 1A, 1B, and 1C each test hypotheses 3 and 4. Model 1A tests hypothesis 5. Models 1B and 1C together test hypothesis 6. These are the hypotheses proposed for variables that potentially affect environmental disclosure quality. The models are repeated here for ease of reference.

$$DISC = \beta_0 + \beta_1 POLL + \beta_2 NUMFAC + \beta_3 COUNTRY + \beta_4 RETEQ + \beta_5 SIZE + e \quad (1A)$$

$$DISAICPA = \alpha_0 + \alpha_1 POLL + \alpha_2 NUMFAC + \alpha_3 COUNTRY + \alpha_4 RETEQ + \alpha_5 SIZE + e \quad (1B)$$

$$DISCICA = \chi_0 + \chi_1 POLL + \chi_2 NUMFAC + \chi_3 COUNTRY + \chi_4 RETEQ + \chi_5 SIZE + e \quad (1C)$$

Each regression model was run separately for 1994 and 1995. Scatter plots were produced for each regression run. These plots displayed each of the independent variables on the X axis and the unstandardized residual from the model on the Y axis. The plots were examined for the existence of heteroscedasticity (i.e. non-constant variance) of the residuals. This procedure is necessary since OLS regression requires that the residuals have a constant variance. The scatter plots revealed a slightly decreasing variance of the residuals of each model for each year when plotted against *POLL* and when plotted against *SIZE*. *POLL* is the total tons of untreated pollution released by the firm, and *SIZE* is measured in separate regression runs both by average total assets and by sales revenue. The scatter plots for *NUMFAC*, *COUNTRY*, and

RETEQ indicated a near constant variance of the residuals.

To attempt to correct the heteroscedasticity problems mentioned above, the regression models were rerun with the following changes. The natural log of tons of pollution was substituted for *POLL*, and the natural log values of average assets and sales revenues were substituted for the regular measures of those variables. The scatter plots prepared after substituting the log variables indicated a nearly constant variance of the residuals plotted against each independent variable.

For each regression model run, a plot of the observed cumulative probability of the actual residuals was plotted against the expected probability for a normal distribution. These plots revealed no significant departures from normality for any of the regression models for any year.

To test for the presence of multicollinearity, variance inflation factors (VIF) were computed for each regression model. These factors measure the extent to which the variances of the estimated regression coefficients are inflated as compared to when the independent variables are not linearly related. A VIF value in excess of 10 indicates that significant multicollinearity exists (Neter et al. 1989). The highest VIF value for any variable in all the models was 1.836, thus multicollinearity is not a problem.

The influence of each observation on each regression coefficient was calculated to test for outliers of each independent variable. This calculation is the difference between the regression coefficient determined by using all the observations and the regression coefficient estimated when each observation is individually excluded. These

differences were standardized, resulting in what are called DFBETAS. An observation is considered to have too great an influence if the absolute value of DFBETAS is larger than 1 for small to medium-size data sets (Neter et al. 1989). The largest absolute DFBETAS value for all the regression models run with the log variables for pollution and size was .37. Thus, no observations exert undue influence on the regression coefficients.

With the use of the natural log variables, the empirical models now become:

$$DISC = \beta_0 + \beta_1 LPOLL + \beta_2 NUMFAC + \beta_3 COUNTRY + \beta_4 RETEQ + \beta_5 LSIZE + e \quad (1A^*)$$

$$DISAICPA = \alpha_0 + \alpha_1 LPOLL + \alpha_2 NUMFAC + \alpha_3 COUNTRY + \alpha_4 RETEQ + \alpha_5 LSIZE + e \quad (1B^*)$$

$$DISCICA = \chi_0 + \chi_1 LPOLL + \chi_2 NUMFAC + \chi_3 COUNTRY + \chi_4 RETEQ + \chi_5 LSIZE + e \quad (1C^*)$$

where *LPOLL* is the natural log of the tons of pollution released by the firm, and *LSIZE* is the natural log of either the firm's average assets or sales revenue, as each is used in a separate regression to measure size.

Descriptive statistics of the regression variables are given in table 12. Panel A provides the statistics for model 1A*, panel B for model 1B*, and panel C for model 1C*. Statistics are provided for each year the models are run. The definition of the regression variables is provided in panel D.

TABLE 12
Descriptive Statistics of Regression Variables for Models 1A*, 1B*, and 1C*

<i>Variable</i>	1994 values			1995 values		
	<i>Mean</i>	<i>Std. Dev.</i>	<i>n</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>n</i>
<i>Panel A: Model 1A*</i>						
DISC	8.01	6.04	100	8.12	5.98	100
LPOLL	5.22	2.74	100	5.17	2.79	100
NUMFAC	5.03	5.76	100	5.16	6.11	100
COUNTRY	.50	.50	100	.50	.50	100
RETEQ	12.02	21.40	100	19.61	24.04	100
LAVAS	20.46	1.54	100	20.59	1.50	100
LSALES	20.53	1.37	100	20.70	1.36	100
<i>Panel B: Model 1B*</i>						
DISAICPA	2.09	2.40	100	2.14	2.52	100
LPOLL	5.22	2.74	100	5.17	2.79	100
NUMFAC	5.03	5.76	100	5.16	6.11	100
COUNTRY	.50	.50	100	.50	.50	100
RETEQ	12.02	21.40	100	19.61	24.04	100
LAVAS	20.46	1.54	100	20.59	1.50	100
LSALES	20.53	1.37	100	20.70	1.36	100
<i>Panel C: Model 1C*</i>						
DISCICA	5.91	4.74	100	5.98	4.69	100
LPOLL	5.22	2.74	100	5.17	2.79	100
NUMFAC	5.03	5.76	100	5.16	6.11	100
COUNTRY	.50	.50	100	.50	.50	100
RETEQ	12.02	21.40	100	19.61	24.04	100
LAVAS	20.46	1.54	100	20.59	1.50	100
LSALES	20.53	1.37	100	20.70	1.36	100

TABLE 12 (Continued)

Panel D: Definition of Variables

DISC	=	total environmental disclosure score based on the disclosure checklist in Appendix A.
LPOLL	=	the natural log of total tons of untreated pollution releases by the firm in the current year.
NUMFAC	=	the number of facilities for which the firm reported pollution releases.
COUNTRY	=	a variable that identifies the location of the firm's headquarters. For firms located in Canada and the U.S., the COUNTRY variable has the values of 1 and 0, respectively, for both Models 1A and 1C. For Model 1B, Canadian firms are coded a 0 and U.S. firms are coded a 1.
RETEQ	=	return on average equity. See table 3 for calculation.
LAVAS	=	the natural log of thousands of U.S. dollars of average assets. See table 3 for the calculation of average assets.
LSALES	=	the natural log of thousands of U.S. dollars of total operating revenues.
DISAICPA	=	environmental disclosure score for items meeting the disclosure guidelines prepared by the American Institute of Certified Public Accountants.
DISCICA	=	environmental disclosure score for items meeting the disclosure guidelines prepared by the Canadian Institute of Chartered Accountants.

Hypothesis 3

Table 13 presents the results of model 1A*, which analyzes the effects of certain firm variables on the quality of firms' total environmental disclosure. Hypothesis 3 posited that as firms faced additional environmental exposure through the release of increased pollution levels, the quality of environmental disclosures would increase. The results in table 13 reveal a positive and extremely statistically significant relation between the natural log of firms' pollution releases and the quality of their environmental disclosures. This result holds for both 1994 and 1995, and for both the asset and sales revenue measures of firm size. The findings indicate that as firms release more pollution, they provide an increased quality of environmental information in their annual reports.

Hypothesis 3 is also tested by models 1B* and 1C*. The results for model 1B* are given in table 14, and the results for model 1C* are in table 15. As shown in table 14, the relation between the natural log of pollution releases (LPOLL) and environmental disclosures measured according to AICPA guidelines (DISAICPA) is positive and significant in 1995 for both regressions. The results in table 15 show that firms' environmental disclosure quality measured by CICA guidelines (DISCICA) significantly increases as the natural log of pollution releases increases.

In summary, the results in tables 13, 14, and 15 indicate that firms provide a higher quality of environmental disclosure as their pollution levels increase. Thus, hypothesis 3 is supported.

TABLE 13
OLS Regression Analysis of Total Environmental Disclosure Score

$$\text{Regression 1: } DISC = \beta_0 + \beta_1 LPOLL + \beta_2 NUMFAC + \beta_3 COUNTRY + \beta_4 RETEQ + \beta_5 LAVAS + e$$

$$\text{Regression 2: } DISC = \beta_0 + \beta_1 LPOLL + \beta_2 NUMFAC + \beta_3 COUNTRY + \beta_4 RETEQ + \beta_6 LSALES + e$$

Variable	Coefficient	Regression 1		Regression 2	
		[t-value] (significance)		[t-value] (significance)	
Sample Year		1994	1995	1994	1995
Intercept	β_0	-13.975 [-1.637] (.105)	-4.723 [-.524] (.601)	-11.418 [-1.179] (.241)	.894 [.088] (.930)
LPOLL	β_1	.616 [2.601] (.005) ^a	.910 [3.687] (.000) ^a	.668 [2.831] (.003) ^a	.983 [4.049] (.000) ^a
NUMFAC	β_2	.061 [.509] (.306)	-.044 [-.398] (.346)	.092 [.758] (.225)	-.017 [-.156] (.434)
COUNTRY	β_3	-2.088 [-1.820] (.036) ^b	-2.144 [-1.938] (.028) ^b	-1.976 [-1.698] (.047) ^b	-2.093 [-1.884] (.032) ^b
RETEQ	β_4	-.004 [-.142] (.444)	.038 [1.650] (.051) ^c	-.007 [-.252] (.401)	.040 [1.718] (.045) ^b
LAVAS	β_5	.956 [2.154] (.017) ^b	.422 [.889] (.188)	--	--
LSALES	β_6	--	--	.806 [1.628] (.053) ^a	.120 [.229] (.420)

TABLE 13 (Continued)

<i>Statistical item</i>	<i>Regression 1</i>		<i>Regression 2</i>	
	1994	1995	1994	1995
F-value for model	6.327	6.837	5.821	6.638
Significance of F-value	.000	.000	.000	.000
R ²	.252	.267	.236	.261
Adjusted R ²	.212	.228	.196	.222
Sample size	100	100	100	100

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

^c indicates significance at less than the .10 level (one-tailed test).

TABLE 14
OLS Regression Analysis of Environmental Disclosure Score for AICPA Guidelines

$$\text{Regression 1: DISAICPA} = \alpha_0 + \alpha_1 \text{LPOLL} + \alpha_2 \text{NUMFAC} + \alpha_3 \text{COUNTRY} + \alpha_4 \text{RETEQ} + \alpha_5 \text{LAVAS} + e$$

$$\text{Regression 2: DISAICPA} = \alpha_0 + \alpha_1 \text{LPOLL} + \alpha_2 \text{NUMFAC} + \alpha_3 \text{COUNTRY} + \alpha_4 \text{RETEQ} + \alpha_6 \text{LSALES} + e$$

Variable	Coefficient	Regression 1		Regression 2	
		[t-value]		[t-value]	
Sample Year		(significance)		(significance)	
		1994	1995	1994	1995
Intercept	α_0	-3.196 [-.991] (.324)	-.554 [-.154] [.878]	-2.884 [-.802] (.425)	.556 [.140] (.889)
LPOLL	α_1	.089 [1.001] (.160)	.217 [2.218] (.015) ^b	.098 [1.108] (.136)	.227 [2.377] (.010) ^b
NUMFAC	α_2	.027 [.599] (.276)	-.029 [-.682] (.249)	.032 [.700] (.243)	-.025 [-.577] (.283)
COUNTRY	α_3	2.502 [5.778] (.000) ^a	2.861 [6.536] (.000) ^a	2.480 [5.695] (.000) ^a	2.865 [6.549] (.000) ^a
RETEQ	α_4	-.001 [-.108] (.457)	.011 [1.234] (.110)	-.002 [-.170] (.433)	.012 [1.287] (.105)
LAVAS	α_5	.168 [1.005] (.159)	.003 [.020] (.492)	--	--
LSALES	α_6	--	--	.150 [.811] (.210)	-.054 [-.263] (.397)

TABLE 14 (Continued)

<i>Statistical item</i>	<i>Regression 1</i>		<i>Regression 2</i>	
	1994	1995	1994	1995
Sample Year				
F-value for model	9.011	10.408	8.907	10.430
Significance of F-value	.000	.000	.000	.000
R ²	.324	.356	.321	.357
Adjusted R ²	.288	.322	.285	.323
Sample size	100	100	100	100

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

TABLE 15
OLS Regression Analysis of Environmental Disclosure Score for CICA Guidelines

$$\text{Regression 1: } DISCICA = \chi_0 + \chi_1 LPOLL + \chi_2 NUMFAC + \chi_3 COUNTRY + \chi_4 RETEQ + \chi_5 LAVAS + e$$

$$\text{Regression 2: } DISCICA = \chi_0 + \chi_1 LPOLL + \chi_2 NUMFAC + \chi_3 COUNTRY + \chi_4 RETEQ + \chi_6 LSALES + e$$

<i>Variable</i>	<i>Coefficient</i>	<i>Regression 1</i>		<i>Regression 2</i>	
		<i>[t-value]</i>		<i>[t-value]</i>	
		<i>(significance)</i>		<i>(significance)</i>	
Sample Year		1994	1995	1994	1995
Intercept	χ_0	-13.288 [-1.988] (.050)	-7.030 [-.997] [.321]	-11.082 [-1.460] (.148)	-2.527 [-.318] (.751)
LPOLL	χ_1	.522 [2.816] (.003) ^a	.694 [3.590] (.001) ^a	.566 [3.058] (.002) ^a	.756 [3.970] (.000) ^a
NUMFAC	χ_2	.034 [.365] (.358)	-.014 [-.163] (.436)	.060 [.632] (.265)	.008 [.091] (.464)
COUNTRY	χ_3	.439 [.489] (.313)	.717 [.828] (.205)	.530 [.581] (.281)	.772 [.887] (.377)
RETEQ	χ_4	-.003 [-.133] (.447)	.026 [1.485] (.071) ^c	-.005 [-.245] (.404)	.028 [1.545] (.063) ^c
LAVAS	χ_5	.788 [2.268] ^b (.013)	.419 [1.125] (.132)	--	--
LSALES	χ_6	--	--	.659 [1.699] (.047) ^b	.175 [.425] (.336)

TABLE 15 (Continued)

<i>Statistical item</i>	<i>Regression 1</i>		<i>Regression 2</i>	
	1994	1995	1994	1995
F-value for model	6.408	6.968	5.835	6.674
Significance of F-value	.000	.000	.000	.000
R ²	.254	.270	.237	.262
Adjusted R ²	.215	.232	.196	.223
Sample size	100	100	100	100

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

^c indicates significance at less than the .10 level (one-tailed test).

Hypothesis 4

Hypothesis 4 proposed that firms with more pollution-releasing facilities would provide less environmental disclosure in their annual reports. Regression coefficients for the NUMFAC variable are provided in table 13 for the model employing overall disclosure score as the dependent variable. These results reveal that no significant relationship exists between the number of pollution-releasing facilities and the quality of environmental disclosures. Regression results in tables 14 and 15 also indicate that there is not a statistically significant relationship between NUMFAC and environmental disclosures measured by AICPA guidelines and by CICA guidelines, respectively. Thus, hypothesis 4 is not accepted.

Hypothesis 5

Hypothesis 5 posited that Canadian firms are more socially oriented than are U.S. firms and as a result would provide a higher quality of environmental disclosures in their annual reports. Regression model 1A* tests the relation of COUNTRY to total environmental disclosure. The regression results in table 13 reveal that Canadian firms (which were coded a value of 1) provided a significantly lower amount of environmental disclosure quality. Hypothesis 5 is rejected, and it is concluded that U.S. firms provide a higher quality of total environmental disclosure than do Canadian firms.

Hypothesis 6

Hypothesis 6 stated the expectation that both U.S. and Canadian firms would provide a greater quality of environmental disclosure as measured according to the

guidelines of the accounting standards body in their home country than measured according to the accounting standards body in the other country. This hypothesis is tested by the use of models 1B* and 1C*, which employ firms' environmental disclosure scores measured by AICPA guidelines and by CICA guidelines respectively. Regression results in table 14 indicate that the COUNTRY variable (which was coded as 1 for U.S. firms) is positive and significantly related to disclosures according to AICPA guidelines. This finding reveals that U.S. firms provided a significantly higher quality of environmental disclosures in accordance with AICPA guidelines than did Canadian firms. However, results in table 15 show no statistically significant relation between COUNTRY (coded here as 1 for Canadian firms) and disclosures measured by CICA guidelines. Thus, Canadian firms did not provide a significantly higher quality of environmental disclosure according to CICA guidelines than did U.S. firms. These combined results indicate that hypothesis 6 is not supported.

Hypotheses for Environmental Capital Expenditures and Operating Expenses

Regression Diagnostics

Model 2 analyzes firms' environmental capital expenditures, and tests hypotheses 7 and 9. Model 3 examines firms' environmental operating expenses, and tests hypotheses 8 and 10. Models 2 and 3 are repeated here for ease of reference.

$$ENVCAP = \phi_0 + \phi_1 POLL + \phi_2 NUMFAC + \phi_3 RETEQ + \phi_4 SIZE + e \quad (2)$$

$$ENVEXP = \gamma_0 + \gamma_1 POLL + \gamma_2 NUMFAC + \gamma_3 RETEQ + \gamma_4 SIZE + e \quad (3)$$

Each regression model was run separately by country and scatter plots were

produced. These plots displayed each of the independent variables on the X axis and the unstandardized residual from the model on the Y axis. The plots were examined for the existence of heteroscedasticity (i.e. non-constant variance) of the residuals. For model 2, the scatter plots revealed a slightly decreasing variance of the residuals when plotted against *POLL* and when plotted against *SIZE*. *POLL* is the total tons of untreated pollution released by the firm, and *SIZE* is measured in separate regression runs both by average total assets and by sales revenue. The scatter plots for *NUMFAC* and *RETEQ* indicated a near constant variance of the residuals.

To test normality of the residuals from model 2, a plot of the observed cumulative probability of the actual residuals was plotted against the expected probability for a normal distribution. The plot revealed that the model 2 residuals did not closely follow a normal distribution.

To attempt to correct the residuals to a normal distribution, the dependent variable in model 2 was changed to the natural log of environmental capital expenditures. To correct the heteroscedasticity of the residuals, the natural log of tons of pollution was substituted for *POLL*, and the natural log values of average assets and sales revenues were substituted for the regular measures of those variables.

Model 2 was rerun with the changes noted. The scatter plots prepared after substituting the log variables indicated a nearly constant variance of the residuals plotted against each independent variable. The plot of the residuals against the expected normal distribution revealed that the residuals now closely followed a normal distribution.

Thus, the empirical form of model 2 became:

$$LENVCAP = \phi_0 + \phi_1 LPOLL + \phi_2 NUMFAC + \phi_3 RETEQ + \phi_4 LSIZE + e \quad (2^*)$$

where *LENVCAP* is the natural log of the firm's current year environmental capital expenditures, *LPOLL* is the natural log of the tons of pollution released by the firm, and *LSIZE* is the natural log of either the firm's average assets or sales revenue, as each is used in a separate regression to measure size.

For model 3, the scatter plots of the unstandardized residuals from the model compared to each independent variable revealed no significant heteroscedasticity. Also, the plot of the observed cumulative probability of the actual residuals against the expected probability for a normal distribution indicated a nearly normal distribution of the residuals. Thus, the empirical form of model 3 is the same as that given above.

The variance inflation factors (VIF) for model 2* were no higher than 2.293 for Canadian firms and 2.825 for U.S. firms. The highest VIFs for model 3 were 1.929 for Canadian firms and 5.960 for U.S. firms. Since all VIFs are less than 10, no significant multicollinearity exists with either model 2 or model 3.

The influence of each observation on each regression coefficient in models 2* and 3 was examined by calculating DFBETAS. This tests for outliers for each independent variable. For model 2, all the Canadian firms' and the U.S. firms' absolute DFBETAS values were less than .20. For model 3, all absolute DFBETAS values were less than one for each country's sample. Thus, no observations exert undue influence on the regression coefficients.

Descriptive statistics of the regression variables for model 2* are given in table 16. Panel A provides the statistics for each nation's firms, as the model is run separately for Canadian firms and U.S. firms. Variables definitions are given in panel B. Of 100 original observations for each country, only 43 Canadian firms and 34 U.S. firms stated the amount of their environmental capital expenditures in either 1994 or 1995.

TABLE 16
Descriptive Statistics of Regression Variables for Model 2*, 1994 to 1995

<i>Variable</i>	<i>Canadian Firms</i>			<i>U.S. Firms</i>		
	<i>Mean</i>	<i>Std. Dev.</i>	<i>n</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>n</i>
<i>Panel A: Variable Statistics</i>						
LENVCAP	16.20	1.48	43	16.53	1.42	34
LPOLL	6.24	1.92	43	7.00	1.41	34
NUMFAC	4.23	3.23	43	8.76	10.00	34
RETEQ	15.99	11.78	43	20.67	31.11	34
LAVAS	21.08	1.13	43	21.36	1.27	34
LSALES	20.96	1.02	43	21.41	1.19	34

Panel B: Variable Definitions

LENVCAP = the natural log of U.S. dollars of current year environmental capital expenditures.

LPOLL, NUMFAC, LAVAS, and LSALES are defined in table 10, and RETEQ is defined in table 3.

Descriptive statistics of the regression variables for model 3 are presented in table 17. The U.S. firms' mean environmental expense of \$29,176,171 is large compared to the mean for Canadian firms of \$18,214,294. Also interesting is that almost the same number of U.S. firms disclosed environmental expenses as did environmental capital expenditures (35 and 34 respectively). However, only 22 Canadian firms disclosed environmental expenses while 43 of them disclosed environmental capital expenditures.

TABLE 17
Descriptive Statistics of Regression Variables for Model 3, 1994 to 1995

Panel A: Variable Statistics

<i>Variable</i>	<i>Canadian Firms</i>			<i>U.S. Firms</i>		
	<i>Mean</i>	<i>Std. Dev.</i>	<i>n</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>n</i>
ENVEXP	18,214,294	26,966,306	22	29,176,171	42,295,839	35
POLL	1960.30	1987.49	22	2086.62	2505.24	35
NUMFAC	5.77	2.78	22	10.23	10.23	35
RETEQ	13.71	9.92	22	17.88	34.28	35
AVAS	3,420,000	3,310,000	22	3,500,000	3,552,000	35
SALES	2,520,000	2,583,000	22	3,450,000	3,007,000	35

Panel B: Variable Definitions

ENVEXP = total current year environmental operating expenses stated in U.S. dollars, if disclosed in the firm's annual report.

POLL = total tons of untreated pollution releases by the firm in the current year.

NUMFAC is defined in table 10, and RETEQ is defined in table 3.

AVAS and SALES are stated in thousands of U.S. dollars, and are defined in table 3.

Hypothesis 7

Hypothesis 7 projects that firms' reported environmental capital expenditures increases as the number of firm pollution-releasing facilities increases. Model 2* examines this relationship. The regression analysis results for the natural log of environmental capital expenditures are contained in table 18. The regression coefficients on the NUMFAC variable are not significant for either Canadian firms or U.S. firms in either regression 1 or 2. These results indicate that firms' environmental capital expenditures do not vary significantly according to the number of facilities that are releasing pollution. Thus, hypothesis 7 is not accepted.

Hypothesis 8

Hypothesis 8 posits that firms' environmental operating expenses will increase as the number of firm facilities reporting pollution releases increases. Model 3 tests this hypothesis, and the regression analysis results for environmental operating expenses are given in table 19. For Canadian firms, the results reveal that no significant relationship exists between NUMFAC and the amount of environmental operating expenses incurred. For U.S. firms, the relationship between NUMFAC and environmental operating expenses is significant at the .01 level and positive as hypothesized. The findings indicate that U.S. firms incur approximately \$2.3 million in incremental environmental operating expenses for each additional facility releasing pollution. Thus, hypothesis 8 is accepted for U.S. firms but not for Canadian firms.

TABLE 18
OLS Regression Analysis of Environmental Capital Expenditures

$$\text{Regression 1: } LENVCAP = \phi_0 + \phi_1 LPOLL + \phi_2 NUMFAC + \phi_3 RETEQ + \phi_4 LAVAS + e$$

$$\text{Regression 2: } LENVCAP = \phi_0 + \phi_1 LPOLL + \phi_2 NUMFAC + \phi_3 RETEQ + \phi_5 LSALES + e$$

<i>Variable</i>	<i>Coefficient</i>	<i>Canadian Firms</i>		<i>U.S. Firms</i>	
		<i>[t-value]</i>		<i>[t-value]</i>	
		<i>(significance)</i>		<i>(significance)</i>	
<i>Regression</i>		<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>
Intercept	ϕ_0	.940 [.175] (.862)	3.138 [.542] (.591)	1.462 [.384] (.704)	-.845 [.250] (.804)
LPOLL	ϕ_1	-.004 [-.032] (.488)	.047 [.387] (.355)	.250 [1.189] (.122)	.317 [1.935] (.032) ^b
NUMFAC	ϕ_2	-.005 [-.059] (.477)	.022 [.233] (.409)	-.008 [-.365] (.359)	-.011 [-.575] (.285)
RETEQ	ϕ_3	-.005 [-.251] (.402)	-.014 [-.807] (.213)	.006 [1.087] (.143)	.002 [.428] (.336)
LAVAS	ϕ_4	.730 [2.738] (.001) ^a	--	.620 [2.794] (.001) ^a	--
LSALES	ϕ_5	--	.616 [2.160] (.019) ^b	--	.710 [3.872] (.001) ^a

TABLE 18 (Continued)

<i>Statistical item</i>	<i>Canadian Firms</i>		<i>U.S. Firms</i>	
	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>
Regression				
F-value for model	4.340	3.479	8.940	12.100
Significance of F-value	.005	.016	.000	.000
R ²	.314	.268	.552	.625
Adjusted R ²	.241	.191	.490	.574
Sample size	43	43	34	34

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

TABLE 19
OLS Regression Analysis of Environmental Operating Expenses

Regression 1: ENVEXP = $\gamma_0 + \gamma_1$ POLL + γ_2 NUMFAC + γ_3 RETEQ + γ_4 AVAS + e

Regression 2: ENVEXP = $\gamma_0 + \gamma_1$ POLL + γ_2 NUMFAC + γ_3 RETEQ + γ_5 SALES + e

<i>Variable</i>	<i>Coefficient</i>	<i>Canadian Firms</i>		<i>U.S. Firms</i>	
		<i>[t-value]</i>		<i>[t-value]</i>	
		<i>(significance)</i>		<i>(significance)</i>	
<i>Regression</i>		<i>1</i>	<i>2</i>	<i>1</i>	<i>2</i>
Intercept	γ_0	-2,319,952 [-.210] (.836)	-4,481,381 [-.382] (.707)	1,002,798 [.101] (.920)	-510,309 [-.049] (.961)
POLL	γ_1	-4,036 [-1.679] (.055) ^c	-4,244 [-1.670] (.057) ^c	-13,414 [-2.203] (.018) ^b	-10,220 [-1.972] (.029) ^b
NUMFAC	γ_2	318,726 [.179] (.430)	1,039,370 [.567] (.289)	2,262,629 [2.454] (.010) ^b	2,278,846 [2.455] (.010) ^b
RETEQ	γ_3	288,052 [.641] (.265)	361,334 [.756] (.230)	109,908 [.600] (.277)	42,097 [-.209] (.418)
AVAS	γ_4	.007 [5.043] (.000) ^a	--	.009 [2.234] (.016) ^b	--
SALES	γ_5	--	.008 [4.567] (.000) ^a	--	.008 [2.117] (.022) ^b

TABLE 19 (Continued)

<i>Statistical item</i>	<i>Canadian Firms</i>		<i>U.S. Firms</i>	
	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>
Regression				
F-value for model	10.041	8.499	3.958	3.792
Significance of F-value	.000	.001	.011	.013
R ²	.703	.667	.345	.336
Adjusted R ²	.633	.588	.258	.247
Sample size	22	22	35	35

^a indicates significance at less than the .01 level (one-tailed test).

^b indicates significance at less than the .05 level (one-tailed test).

^c indicates significance at less than the .10 level (one-tailed test).

Hypothesis 9

Hypothesis 9 proposes that firms' environmental capital expenditures will increase as the quantity of their pollution released increases. The regression analysis results are provided in table 18. The coefficients on the LPOLL variable are significant only for U.S. firms in regression 2. The non-significance in regression 1 for the U.S. firms and in both regressions for the Canadian firms indicate that there is probably no significant relation between the natural log of firms' pollution releases and the natural log of firms' environmental capital expenditures. Thus, hypothesis 9 is not accepted.

Hypothesis 10

Hypothesis 10 posits that as firms release additional amounts of pollution, they will experience an increase in environmental operating expenses. The relationship between pollution levels and environmental operating expenses is examined by model 3. The regression results of testing hypothesis 10 are presented in table 19. The regression coefficients on the POLL variable are negative and significant at less than the .03 level for U.S. firms in both regressions. For Canadian firms, the POLL variable is negative and significant at less than the .06 level in both regressions. These results are directly opposite of those hypothesized. Thus, hypothesis 10 is rejected.

The regression results for the POLL variable in table 19 indicate that as firms release more pollution, they are experiencing a decrease in environmental operating expenses. This finding suggests that the sample firms perhaps are not incurring the costs necessary to clean up excessive levels of pollution. Firms may be incurring clean up and

other operating costs up to a certain level of pollution beyond which the environmental operating costs are not variable based on the amount of pollution released.

Summary of Results

The results from both the univariate Wilcoxon test and multivariate regression models indicated that U.S. firms provided higher quality environmental disclosures than did Canadian firms. This finding reveals that U.S. firms were more influenced by societal pressure for environmental information than were Canadian firms. In general, changes in disclosure levels over time were not significantly different between U.S. firms and Canadian firms.

As hypothesized, regression results revealed that firms' environmental disclosure quality increased as pollution levels increased. This indicates that firms provided more environmental information in their annual reports as they became increasingly exposed to environmental risks. Additional regression results indicated there was no significant relationship between the number of firm facilities and firms' environmental disclosure quality. Also, U.S. firms provided significantly higher quality AICPA disclosures than did Canadian firms, but the COUNTRY variable was not significantly related to CICA disclosure quality.

Regression models also evaluated the amount of firms' environmental capital expenditures and environmental operating expenses. These models were run separately for each country's firms. The findings were that no significant relationship exists between the number of facilities and environmental capital expenditures for either

nation's sample firms. U.S. firms' environmental operating expenses significantly increased as the number of facilities increased, but Canadian firms' environmental operating expenses did not change significantly in relation to the number of facilities. Also, the regression results did not support the hypothesized positive relationship between environmental capital costs and pollution levels, as significance was found in only one of four models. Surprisingly, both U.S. and Canadian firms had significantly lower environmental operating expenses as their pollution levels increased, which may indicate they are delaying the costs of cleanup.

Chapter VII provides the overall results and conclusions of this research.

CHAPTER VII

SUMMARY

This research contributes significantly to the environmental accounting literature.

This research improves upon previous research in several respects. It is the first accounting study to use pollution release databases to select its sample of firms. It is also the first study to use guidelines from accounting standards boards in measuring the quality of firms' environmental disclosures. The use of pollution releases is a more direct measure of firms' environmental performance than those used by prior studies. The comparison of environmental disclosures by location in the annual report is another item included in this study that no prior research has evaluated.

Issues and Results

This research examined several issues related to the environmental disclosure quality provided in the annual reports of a sample of Canadian and U.S. companies. It was discovered that total environmental disclosure quality in each of the years 1995 and 1996 was higher for U.S. sample firms than it was for Canadian sample firms. Additionally, for 1994 to 1996 as a whole, the U.S. firms' disclosure level was significantly greater than the Canadian firms' disclosure level. These results were surprising, as they were opposite of the hypothesized results. The Canadian firms' environmental disclosure quality for the subjects of environmental management and environmental performance were significantly higher, however, than was the disclosure quality by the U.S. firms for these subjects. Overall, these results reveal that investors

and other stakeholders in U.S. firms have a greater quality of environmental information available to them in annual reports than do investors and stakeholders in Canadian firms. This implies that either U.S. firms are more generous in reporting environmental information than are Canadian firms, or that stakeholders in U.S. firms are able to exert greater pressure on firms to report environmental information than are stakeholders in Canadian firms. These are issues that could be studied by future research. Since they are provided a higher quality of environmental disclosures in annual reports, stakeholders in U.S. firms may feel more at ease regarding firms' exposure to potential environmental costs and risks than do stakeholders in Canadian firms.

Changes in disclosure level were also examined. U.S. firms provided significantly higher changes in disclosures for regulatory requirements, environmental assets, and accounting policies than did Canadian firms. For 1995 to 1996 only, Canadian firms had a significantly greater change in environmental liability disclosures than did U.S. firms.

For each nation's firms separately, comparisons were made of environmental disclosure quality for each of four separate annual report locations. These comparisons revealed that the Canadian sample firms provided the majority of their environmental disclosure in the introduction and MD&A sections. The U.S. sample firms primarily used the financial statement and MD&A sections in reporting environmental information. These differences reveal the freedom that firms have in deciding where to provide environmental disclosures in the annual report. Of these annual report sections,

the financial statement section (which includes the footnotes) is the only one for which auditing standards require the gathering and evaluation of audit evidence. This result implies that auditors of U.S. firms may need to be more attentive to and knowledgeable about actual and potential environmental costs and liabilities of their clients than are auditors of Canadian firms.

The relation of environmental exposure (as measured by pollution levels) with the quality of environmental disclosures was analyzed. The results indicated a positive and significant increase in the quality of environmental disclosures as the natural log of firms' pollution releases increased. This result should provide some assurance to firm stakeholders that firms with greater levels of environmental exposure risk are providing more information about the risks they face.

Results revealed that no significant relationship exists between the number of pollution-releasing facilities and the quality of environmental disclosures. Thus, it is unclear whether stakeholders are able to obtain necessary environmental information from the media and other public sources. Also, firm facilities may be a poor proxy for the amount of environmental information available outside the annual report.

Results also indicated that Canadian firms provided a significantly lower amount of total environmental disclosure quality than did U.S. firms. Thus, U.S. stakeholders are able to make more informed decisions regarding firms' environmental risks than are Canadian stakeholders.

Additional analysis discovered that U.S. firms provided a significantly higher

quality of environmental disclosures in accordance with AICPA guidelines than did Canadian firms. However, Canadian firms did not provide a significantly higher quality of environmental disclosure according to CICA guidelines than did U.S. firms. This result implies that U.S. firms respond more completely to voluntary disclosure guidelines than do Canadian firms.

This research also considered important issues regarding the amount of environmental capital expenditures and environmental operating expenses reported by firms. Regression models were employed to evaluate how certain variables affect firms' environmental capital expenditures and environmental operating expenses.

For firms in both countries, environmental capital expenditures did not vary significantly according to the number of facilities that are releasing pollution. Other results reported that for Canadian firms, no significant relationship existed between the number of firm facilities releasing pollution and the amount of environmental operating expenses incurred. For U.S. firms, there was a positive and significant relationship between the number of polluting facilities and environmental operating expenses. These results indicate that as firms add pollution-releasing facilities, they are not incurring additional capital expenditures to prevent pollution. The implication to investors and other stakeholders is that this may cause them to discount the value of the firm and assess its environmental risk at a higher level. This is because firms appear to have not provided pollution-preventing equipment at all facilities, which would increase their potential environmental risk. U.S. firms probably have less exposure than do Canadian

firms, as they are incurring significantly greater environmental operating expenses (i.e., cleanup costs) with additional facilities.

Results found no significant relation between the natural log of firms' pollution releases and the natural log of firms' environmental capital expenditures.

Additional regression results indicated that as firms released more pollution, they experienced a decrease in environmental operating expenses. These results indicate that as firms release more pollution, they are not incurring greater environmental capital costs that may reduce future pollution. Also, as pollution levels increase, firms are significantly reducing the amount of their environmental operating expenses. Combined, these results should be rather alarming to investors and other stakeholders. The results imply that firms are delaying the incurrence of necessary environmental costs and likely have significant amounts of unrecorded future environmental obligations. In other words, firms that are releasing greater levels of pollution are not currently paying to solve the problem and thus will have to pay at some future time. Stakeholders should make themselves aware of firms' pollution levels and assess a higher level of risk as firms release more pollution.

Implication of the Results for the Theory Employed

The primary theoretical perspective presented in this study is the interpenetrating systems model as described by Preston and Post. In basic terms, the interpenetrating systems model proposes that management actions and social policy-making are interactive and interdependent with each other. Business firms, such as corporations,

are a subsystem within society that both respond to and affect general social actions. Additionally, the relationship between firms and other groups in society involves exchange, power and exploitation, and cooperation to achieve common goals. This study presents the theory as a potential explanation of why firms may provide voluntary (i.e., not required by accounting standards or the government) environmental disclosures: that other social components are able to exert enough influence to cause firms to do so.

The results of this study indicated that the sample Canadian firms and U.S. firms provided an average of 7.22 and 9.05 separate environmental disclosure items, respectively, for the 1994 to 1996 period. Results also indicate an increase in disclosure levels over time. In 1994, Canadian and U.S. firms disclosed an average of 7.12 and 8.90 environmental items, respectively. In 1996, these averages were 7.34 for Canadian firms and 9.22 for U.S. firms. While this is not an excessive amount of disclosure, it is far beyond a minimal level. Since firms are voluntarily reporting these disclosures, this indicates that social forces outside the firms have influenced firms' management to provide environmental information in the annual report. The increase in disclosure levels indicate that over time, firms are responding slightly more to desires by other components of society for environmental information. Additional results indicate that social influences outside firms have caused additional environmental reporting. This study examined 150 total annual reports for each country's firms (50 reports each year for 3 years). 43 Canadian firm reports and 34 U.S. firm reports disclosed the amount of environmental capital expenditures. Environmental operating expenses were disclosed

in 22 Canadian firm reports and in 35 U.S. firm reports. Environmental capital and operating cost data are disclosed voluntarily, indicating that outside influences have been exerted upon the firms to cause them to provide this detailed information. In summary, the findings of the study lend support to the validity of the interpenetrating systems model.

Another major proposition presented in this study is that in general, Canadian firms are more socially conscious than are U.S. firms. The results of this study do not support that position, as on an overall basis U.S. firms provided a significantly higher quality of environmental disclosures than did Canadian firms. There are several possible reasons why this theory does not hold true for the environmental disclosure behavior of U.S. and Canadian firms. Though environmental reports are not examined in this study, several firms in the sample provided environmental reports along with their annual reports. Firms that issue environmental reports would likely provide less environmental disclosure in their annual reports compared to firms that do not produce separate environmental reports. It is possible that the sample Canadian firms issued environmental reports more often than did the sample U.S. firms. If this were the case, the Canadian firms would probably provide less environmental disclosure in their annual reports than would the U.S. firms. Governmental regulation is another possible explanation for the higher level of U.S. firm disclosures. Overall, environmental laws and regulations are more extensive in the U.S. than they are in Canada. In the U.S. for example, the EPA identifies properties requiring extensive cleanup (known as

“Superfund” sites) and oversees the remediation process. In Canada, there is no governmental equivalent to the EPA or to the Superfund process. Finally, U.S. firms may provide more environmental disclosure than Canadian firms because of a greater concern about their image. That is, U.S. firms may be more focused on public relations and stakeholders perceptions than are Canadian firms. U.S. firms may provide greater levels of environmental disclosure than do Canadian firms simply because they feel a stronger need to present a clean, positive image.

Limitations

The sample firms in this study have their headquarters in the U.S. and Canada, are traded on a major stock exchange in their home country, and must report their pollution releases to their national government. The results of this study are applicable only to U.S. and Canadian firms with these characteristics. Additionally, the results are only applicable to firms with a two-digit SIC Code from 20 to 39, as only firms with those SIC Codes were included in this study.

The results are applicable only to the years 1994 to 1996, the time period studied. Additionally, only inferences regarding firms’ annual report disclosures of environmental information may be made. The study did not evaluate other sources of firms’ environmental disclosures, such as environmental reports. Thus, the results may not be representative of firms’ environmental disclosure quality provided by methods other than the annual report.

Suggestions for Further Research

Additional research on environmental disclosures could be done by applying the methods in this study to a time period other than 1994 to 1996. Also, as other nations develop and provide pollution release databases, firms in other nations could be studied concerning the quality of their environmental disclosures. Future research could also examine in greater detail the issue of the availability of environmental information outside the annual report.

This study did not examine the amount of environmental liabilities reported by firms. Further research could evaluate the adequacy of firms' reported environmental liabilities and firm characteristics affecting the amounts accrued. Environmental liability research would provide valuable insight to investors and other stakeholders regarding firms' handling of this vital issue. Future research could also estimate firms' future environmental costs and liabilities based on current pollution levels.

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APPENDIX A

ENVIRONMENTAL DISCLOSURE CHECKLIST

The following list was used to obtain the environmental disclosure scores for each firm. Each of the items on this checklist is based on environmental reporting guidelines from either the Canadian Institute of Chartered Accountants, or the American Institute of Certified Public Accountants. Most of the disclosure items are recommended for disclosure, while some are required. The document containing each guideline is stated below, as well as whether the disclosure is either recommended or required.

Disclosure for Environmental Liabilities

Required by the Canadian Institute of Chartered Accountants *Handbook Section 3060*.

1. Future removal and site restoration costs, which include costs, net of expected recoveries, for dismantling and abandoning a property.

As recommended by the Canadian Institute of Chartered Accountants in the 1993 publication, *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues*.

2. Separate financial statement disclosure of environmental liabilities.
3. Environmental liabilities that are individually material should be disclosed separately.
4. The nature of any significant measurement uncertainties relating to a recognized environmental liability.
5. The aggregate of payments to be made in each of the next five years for future environmental expenditures that have been recognized as a liability.
6. For environmental liabilities for which an estimate cannot be made, the following should be disclosed:
 - a. the nature of the expected future expenditure or loss,
 - b. an indication of the likelihood of the expenditure being made or the loss being suffered;
 - c. the timing of the expected future expenditure or loss, or an indication of any uncertainties related to timing.

As required or recommended by the American Institute of Certified Public Accountants in *Statement of Position 96-1: Environmental Remediation Liabilities*.

7. The following are some of the factors that are integral to developing cost estimates for environmental remediation liabilities:
 - a. The extent of hazardous substances at a site.
 - b. The types of hazardous substances at a site.
 - c. The range of technologies that can be used for remediation.

8. Disclosure that the entity has experienced the following benchmarks related to the estimate of an environmental liability.
 - a. Identification and verification of the entity as a party responsible for cleaning up a hazardous waste problem.
 - b. Completion of feasibility study that evaluates the entity's remediation liability.

9. With respect to recorded accruals for environmental loss contingencies, financial statements should disclose the following:
 - a. The nature of the accruals
 - b. The total amount accrued for the environmental obligation.
 - c. If any portion of the accrued obligation is discounted, the undiscounted amount of the obligation and the discount rate used in the present-value determinations.
 - d. The likelihood that a change in the estimate of the obligation will occur in the near term.

10. With respect to reasonably possible loss contingencies, including reasonably possible loss exposures in excess of the amount accrued, financial statements should disclose the following:
 - a. A description of the reasonably possible environmental obligation.
 - b. An estimate of the possible loss exposure or the fact that such an estimate cannot be made.
 - c. The likelihood that a change in the estimate of the contingency will occur in the near term.

11. Entities are encouraged, but not required, to disclose the following:
 - a. The estimated time frame of disbursements for recorded amounts of environmental obligations.
 - b. Factors that may cause the following estimates to change:
 1. The recorded environmental obligation.
 2. Reasonably possible loss exposures.
 3. Environmental gain contingencies.

- c. If an estimate of the probable or reasonably possible loss or range of loss cannot be made, the reasons why it cannot be made.
12. If probable but not reasonably estimable losses may be material, the financial statements should provide a description of the environmental obligation, and the fact that a reasonable estimate cannot currently be made.

Disclosures for Environmental Expenses

As recommended by the Canadian Institute of Chartered Accountants in the 1993 publication, *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues*.

1. Total environmental expenses, excluding the amortization of capital assets related to environmental concerns, should be disclosed.
2. The dollar amount and nature of each category making up the total environmental expense.
3. Separate disclosure in financial statements of particular environmental expenses likely to differ in the future.
4. Trends with respect to environmental matters that have had a
 - a. favorable or
 - b. unfavorable impact on net sales, revenues or income from continuing operations should be disclosed.
5. Disclose information that explains any significant change from year to year in any disclosed environmental expense figures.
6. Significant future environmental expenditures expected to be needed or required (i.e. operating expenses).
7. Disclosure of commitments made regarding future environmental operating expenditures (i.e. explain the commitment).
8. Possible future environmental expenditures or losses resulting from past events that could have a significant impact on future cash flows or financial position should be disclosed in financial statements.
9. Further details that should be provided regarding future environmental expenditures or losses caused by past events:
 - a. the nature of the expected future expenditure or loss;

- b. an indication of the likelihood of the expenditure being made or the loss being suffered;
 - c. the size of the expected future expenditure or loss; an estimate of the expenditure or loss; or an estimate of the range of possible outcomes.
 - d. the timing of the expected future expenditure or loss, or the indication of any uncertainties related to timing.
10. Disclosure needed for possible future environmental losses relating to future events or transactions:
- a. the nature of these concerns; and
 - b. the possible effect of these concerns:
 - 1. the effect on the future cash flows of the entity; and
 - 2. other possible financial effects.
 - c. A statement that there is little or no risk related to environmental concerns resulting from future events or transactions.
 - d. Actions taken by the entity that
 - 1. reduce the probability of a future environmental loss occurring.
 - 2. create a possible future environmental loss.

As required in the American Institute of Certified Public Accountant's *Statement of Position 96-1: Environmental Remediation Liabilities*.

11. Environmental remediation-related expenses should be reported as a component of operating income in income statements that classify items as operating or nonoperating.

Disclosures for Environmental Assets

As recommended by the Canadian Institute of Chartered Accountants in the 1993 publication, *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues*.

1. Disclosure of the nature and amount of current environmental expenditures on capital assets.
2. Disclosure of the nature and amount of current expenditures on other assets related to environmental concerns.
3. The major categories of other assets related to environmental concerns should be separately disclosed, together with the basis of amortization, if any.
4. Significant future environmental capital expenditures expected to be needed or required.

As required or recommended by the American Institute of Certified Public Accountants in *Statement of Position 96-1: Environmental Remediation Liabilities*.

5. An entity may provide balance sheet or other presentation of assets that relate to an environmental obligation. Among them are the following: receivables from other parties that are partially responsible for the environmental obligation, anticipated recoveries from insurers, and anticipated recoveries from prior owners.
6. With respect to assets for third-party recoveries related to environmental remediation obligations, financial statements should disclose the following:
 1. The nature of the accruals
 2. The likelihood that a change in the estimate of the asset will occur in the near term.
7. Entities are encouraged, but not required, to disclose:
 1. The estimated time frame for realization of recognized probable recoveries.
 2. Factors that may cause the estimate of third-party recoveries to change.

Disclosures on Accounting Policies

As recommended by the Canadian Institute of Chartered Accountants in the 1993 publication, *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues*.

1. Accounting policies with respect to the following should be disclosed:
 - a. what is included in the definition of “environmental costs”;
 - b. the basis on which environmental costs are expensed or capitalized;
 - c. how environmental costs are amortized to income;
 - d. the basis on which environmental liabilities are recognized.

As required or recommended by the American Institute of Certified Public Accountants in *Statement of Position 96-1: Environmental Remediation Liabilities*.

2. With respect to environmental obligations, financial statements should disclose whether the accrual for environmental remediation liabilities is measured on a discounted basis.
3. Disclosure of accrual benchmarks for environmental obligations is useful to further users’ understanding of the entity’s financial statements.
4. Additional items that entities are encouraged to disclose are:
 1. the event, situation, or set of circumstances that generally triggers recognition

- of environmental contingencies or obligations.
- 2. the accounting policy concerning the timing of recognition of recoveries.

Disclosures on Environmental Management

As recommended by the Canadian Institute of Chartered Accountants in the 1994 publication, *Reporting on Environmental Performance: Summary Report*.

1. The historical use of property in order to identify the risk of contamination.
2. The processes and programs that are in place to:
 - a. manage environmental risks and
 - b. minimize potentially harmful impacts on the local area
3. An explanation or discussion of:
 - a. the relationship of the organization with the environment
 - b. the overall environmental philosophy
 - c. the environmental issues facing the industry
4. Explanation of the environmental policy, objectives, and targets
 - a. the policy explains how the firm plans to manage its relationship with the environment: the policy provides an overall sense of direction.
 - b. objectives discuss the overall aims arising from the policy.
 - c. targets explain the detailed performance requirements that the organization sets out to achieve.
5. Environmental management system
 - a. a description of the system of managing and monitoring environmental performance.
 - b. report on the existence of an environmental audit program.
 - c. discuss timeliness of environmental audits.
 - d. discuss if corrective actions taken when needed in response to the audit.
6. Discussion of any corrective actions or plans regarding environmental performance.
7. Discussion of activities that offset environmental damage.

Disclosures on Environmental Performance

As recommended by the Canadian Institute of Chartered Accountants in the 1994 publication, *Reporting on Environmental Performance: Summary Report*.

1. How environmental performance affects the organization's financial health.

2. Information is required on items such as
 - a. effluents,
 - b. emissions,
 - c. spills, and
 - d. the use of toxic substances.
3. Discussion of the firm's environmental performance, with appropriate data provided.
4. Analysis of performance against benchmarks, including
 - a. the environmental policy
 - b. objectives
 - c. targets
 - d. trend analysis
 - e. industry best practices
 - f. compliance with laws and regulations
5. Environmental incidents
 - a. number of incidents and extent
 - b. corrective actions taken
6. Comprehensive analysis to show how environmental activities have benefited both the environment and the economic health of the firm. Example, as noncompliance decreases, fines and penalties do also.

Disclosures of Product Information

As recommended by the Canadian Institute of Chartered Accountants in the 1994 publication *Reporting on Environmental Performance: Summary Report*.

1. The environmental impacts of:
 - a. products
 - b. services
2. How environmentally responsible the firm's production methods are.
3. The extent to which a product can damage the environment.

Disclosure of Regulatory Requirements

As recommended by the Canadian Institute of Chartered Accountants in the 1994 publication *Reporting on Environmental Performance: Summary Report*.

1. A discussion of major regulatory requirements.

As recommended by the Canadian Institute of Chartered Accountants in the 1993 publication, *Environmental Costs and Liabilities: Accounting and Financial Reporting Issues*.

2. The details of regulations and legislation that will require future environmental operating expenditures.
3. The disclosure of the following costs that are expected to be required under new legislation or regulations, for at least the following year:
 - a. environmental operating expenditures, and
 - b. environmental capital expenditures.

As recommended by the American Institute of Certified Public Accountants in *Statement of Position 96-1: Environmental Remediation Liabilities*.

4. Entities may wish to provide:
 1. a description of the general applicability and impact of environmental laws and regulations upon their business, and
 2. how such laws and regulations may give rise to environmental loss contingencies and environmental obligations.

APPENDIX B

ENVIRONMENTAL DISCLOSURE CHECKLIST ITEMS

BASED ON THE RECOMMENDATIONS OF THE CANADIAN

INSTITUTE OF CHARTERED ACCOUNTANTS IN THE

1994 PUBLICATION *REPORTING ON ENVIRONMENTAL*

PERFORMANCE: SUMMARY REPORT

This summary report addresses the issue of what general information firms should provide regarding their environmental activities by stating the following (p. 1):

Organizations of every type and size, public and private, profit and non-profit, now have to be able to satisfy customers, investors, creditors, suppliers, regulators, and the public at large that they are operating responsibly towards the environment and, if they are not, what they are doing to improve their performance in the future.

The summary report is a more succinct version of the Canadian Institute of Chartered Accountants (CICA) 1994 publication titled *Reporting on Environmental Performance*. In the foreword to the more detailed book on environmental reporting, the CICA states that an increasing demand by various parties for environmental reporting has led them to provide guidance on accounting for and reporting environmental information. The CICA explains that the primary objective of this report is to create a foundation for the reporting of an entity's environmental performance information. The report provides guidance for reporting, rather than mandatory standards (pp. i, ii).

In preparing its recommendations for environmental reporting, the CICA considered the opinions of the following:

1. various user groups, including environmental interest groups, on the usefulness of information currently provided, and on the type of information that is needed to be provided but is not currently reported;
2. directors and upper management of firms representative of Canadian business sectors regarding the needs and expectations of external users for environmental performance information; and
3. public accounting practitioners, as well as the groups in 1 and 2 above, regarding definitions, measurements, accounting methods, and reporting and

disclosure practices which should be considered for possible inclusion in recommended environmental reporting practices (p. iii).

Given below are selected recommendations (R) for information to be provided, exactly as stated in the Summary Report, followed by the wording **in bold** used in the disclosure index in this study.

- (R) An organization's environmental performance can make or break its success in the marketplace. Suppliers, customers and consumers are all concerned about the environmental impacts of products and services, both during use and on their ultimate disposal (p. 3).

1. The environmental impacts of:

a. products

b. services.

- (R) Customers who, in turn, provide other products and services, may worry that if their suppliers' production methods are not environmentally responsible, it could affect their own market acceptance (p. 3).

2. How environmentally responsible the firm's production methods are.

- (R) End consumers want to know whether a product can damage the environment (p. 3).

This information will be captured by item 1a above, the environmental impacts of products.

- (R) The general investment community, including shareholders, analysts and institutional investors, wants to know how environmental performance affects the organization's financial health. Some investors, too, will invest only in environmentally responsible organizations (p. 4).

3. How environmental performance affects the organization's financial health.

- (R) Financial institutions and other lenders want to know about the historical use of property to identify the risk of contamination. They are especially concerned since much of current legislation assigns liability to anyone owning or operating a contaminated site at any time in its life, including creditors who have seized property after a loan default. The resulting assessments affect what a creditor will accept as security and the interest charged on loans. Insurers seek similar information to develop a base for determining liability insurance coverage and

premiums (p. 4).

4. The historical use of property in order to identify the risk of contamination.

- (R) As the scope of environmental laws and regulations expands, government regulators require more information on things such as effluents and emissions, spills and the use of toxic substances. For example, in 1994, the federal government established a national database, the National Pollutant Release Inventory, that will accumulate data on the usage of 178 substances (p. 4).

5. Information is needed on items such as:

- a. effluents,**
- b. emissions,**
- c. spills, and**
- d. the use of toxic substances.**

- (R) Communities want assurance that an organization has processes and programs in place to manage environmental risks and minimize potentially harmful impacts on the local community and surrounding area (p. 5).

6. The processes and programs that are in place to:

- a. manage environmental risks and**
- b. minimize potentially harmful impacts on the local area**

The CICA stated that “When an organization decides to expand its annual report to shareholders to provide environmental information, ... a framework is needed for organizing and presenting the information being reported” (p. 6).

The CICA proposed that the following items be included in an environmental reporting framework: organization profile; environmental policy, objectives and targets; environmental management system; and environmental performance analysis. Each of these is explained below by quoting directly from the CICA Summary Report.

- (R) Organization profile
This tells readers about what the organization does and its relationship with the environment. It states the overall environmental philosophy; outlines the environmental issues facing the industry, including major regulatory requirements; and explains the environmental implications of operations and products (p. 8).

7. The organization should provide an explanation or discussion of:

- a. the relationship of the organization with the environment.**

- b. the overall environmental philosophy.**
- c. the environmental issues facing the industry.**
- d. major regulatory requirements.**

- (R) Environmental policy, objectives, and targets
This category tells readers how the organization intends to manage its relationship with the environment. The policy provides an overall sense of direction; objectives are the overall aims arising from the policy; and targets are the detailed performance requirements that the organization sets out to achieve. All targets should be measurable and should provide benchmarks against which environmental performance can be assessed (p. 9).

8. Explanation of the environmental policy, objectives, and targets

- a. the policy explains how the firm plans to manage its relationship with the environment: the policy provides an overall sense of direction.**
- b. objectives discuss the overall aims arising from the policy.**
- c. targets explain the detailed performance requirements that the organization sets out to achieve.**

- (R) Environmental management system
This category describes the system of managing and monitoring environmental performance.

One of the most contentious issues is whether to include the results of environmental audits in the environmental reports. It would be useful, however, for organizations to report on the existence of an environmental audit program, noting that it is being carried out in a timely manner and corrective actions are taken where necessary (p. 9).

9. Environmental management system

- a. a description of the system of managing and monitoring environmental performance.**
- b. report on the existence of an environmental audit program.**
- c. discuss timeliness of environmental audits.**
- d. discuss if corrective actions taken when needed in response to the audit.**

- (R) Environmental performance analysis
This last category analyzes the organization's environmental performance, using financial, operational, scientific, and other relevant statistics and data. As well, it discusses any corrective actions taken or planned. It may include:

- Analysis of performance against benchmarks (including the

environmental policy, objectives, targets, trend analysis, industry best practices, compliance with laws and regulations, etc.).

- The number and extent of environmental incidents and corrective actions taken.
- Discussion of activities that offset environmental damage (including regeneration of renewable resources and restoration of sites.)
- Discussion of environmental programs with employees, customers, suppliers, and other stakeholders.

The performance analysis should also pull together the performance results to show how environmental activities have benefited both the environment and the economic health of the firm. For example, as noncompliance situations (such as spills) decrease, so do fines and penalties.

10. Environmental performance analysis

- a. Discussion of the firm's environmental performance, with appropriate data.**
- b. Discussion of any corrective actions or plans regarding environmental performance.**
- c. Analysis of performance against benchmarks, including**
 - i. the environmental policy**
 - ii. objectives**
 - iii. targets**
 - iv. trend analysis**
 - v. industry best practices**
 - vi. compliance with laws and regulations**
- d. Environmental incidents**
 - i. number of incidents and extent**
 - ii. corrective actions taken**
- e. Discussion of activities that offset environmental damage.**
- f. Comprehensive analysis to show how environmental activities have benefited both the environment and the economic health of the firm. Example, as noncompliance decreases, fines and penalties do also.**

APPENDIX C

ENVIRONMENTAL DISCLOSURE CHECKLIST ITEMS

BASED ON THE RECOMMENDATIONS OF THE CANADIAN

INSTITUTE OF CHARTERED ACCOUNTANTS IN THE

1993 PUBLICATION *ENVIRONMENTAL COSTS AND*

LLIABILITIES: ACCOUNTING AND FINANCIAL

REPORTING ISSUES

The research report on accounting and financial reporting issues was approved by the CICA Accounting Standards Steering Committee to investigate concerns about the current state of environmental accounting. The report was prepared by an eight-member "Study Group." The CICA states its purpose as follows in the foreword of this report:

The objective of the project was to discuss the information needs of various user groups (including, but not necessarily restricted to, investors (or members) and creditors) relating to the impact of an entity's operations on the environment, and to develop proposals for consideration by the Accounting Standards Board on accounting for and reporting on environmental measures (past, present, and those contemplated for the future) within the existing financial reporting framework.

(R) below indicates selected recommendations for environmental reporting, with the wording exactly as given by the CICA. Following each recommendation is wording in **bold** used in the disclosure index in this study.

- (R) Disclosure of environmental expenses:
- Total environmental expenses, excluding the amortization of capital assets related to environmental concerns, should be disclosed in financial statements.
 - It is desirable to disclose in financial statements the dollar amount and nature of each category making up the total environmental expense shown, particularly if one category is a significant component of the total. It is also desirable to indicate where each category (or part thereof) is reflected in the income statement, if not obvious.
 - There should be separate disclosure in financial statements of a particular environmental expense if it is likely to differ in the future.

- Known trends with respect to environmental matters that have had a favourable or unfavourable impact on net sales, revenues or income from continuing operations should be disclosed in financial reports, but outside financial statements. Further, it is desirable to similarly disclose information that explains any significant change from year to year in any disclosed environmental expense figures (p. ix).

1. Disclosure of environmental expenses:

- 1. Total environmental expenses, excluding the amortization of capital assets related to environmental concerns, should be disclosed.**
- 2. The dollar amount and nature of each category making up the total environmental expense.**
- 3. Separate disclosure in financial statements of particular environmental expenses likely to differ in the future.**
- 4. Trends with respect to environmental matters that have had a**
 - a. favorable, or**
 - b. unfavorable impact on net sales, revenues or income from continuing operations should be disclosed.**
- 5. Disclose information that explains any significant change from year to year in any disclosed environmental expense figures.**

(R) Disclosure of capital assets related to environmental concerns:

- If current environmental expenditures on capital assets represent a significant component of current expenditures on capital assets or if they are likely to differ significantly in the future, their nature and amount should be disclosed in the financial statements.
- It is not necessary to segregate or disclose in financial statements the cost of capital assets related to environmental concerns (pp. ix, x).

2. Disclosure of capital assets related to environmental concerns:

The nature and amount of current environmental expenditures on capital assets.

(R) Disclosure of other assets related to environmental concerns:

- If current expenditures on other assets related to environmental concerns are significant in relation to total current expenditures on capital and other assets, or if they are likely to differ significantly in the future, their nature and amount should be disclosed in the financial statements.
- The major categories of other assets related to environmental concerns should be separately disclosed, together with the basis of amortization, if any (p. x).

3. Disclosure of other assets related to environmental concerns:

- 1. The nature and amount of current expenditures on other assets related to environmental concerns.**
- 2. The major categories of other assets related to environmental concerns should be separately disclosed, together with the basis of amortization, if any.**

(R) Disclosure of environmental liabilities:

- There should be separate disclosure in financial statements of environmental liabilities.
- Environmental liabilities that are individually material should be disclosed separately. If a counter-claim or claim against a third party has been deducted in determining the amount recognized, it is desirable that the gross amount of the liability and the amount deducted be disclosed separately.
- Any deferred charge that has resulted from the recognition of a liability for expected future environmental expenditures may be presented in the financial statements as a deduction from that related liability, provided there is note disclosure of the full amount of the liability and the disposition of the deferred charge.
- The nature of any significant measurement uncertainties relating to a recognized liability that is disclosed separately, and the range of reasonably possible outcomes, should be disclosed.
- As a minimum, the aggregate of payments to be made in each of the next five years for future environmental expenditures that have been recognized as a liability should be disclosed. If such disclosure cannot be made because there is considerable uncertainty about the timing of the future expenditures, this fact should be disclosed.
- For environmental liabilities that have not been recognized in financial statements because no estimate can be made of them, the following should be disclosed:
 - the nature of the expected future expenditure or loss, including an indication of the likelihood of the expenditure being made or the loss being suffered;
 - a statement that an estimate of the expected future expenditure or loss cannot be made;
 - the timing of the expected future expenditure or loss, including an indication of any uncertainties related to timing.
- Any unrecognized liabilities that are individually material should be disclosed separately (pp. x, xi).

4. Disclosure of environmental liabilities:

1. **Separate financial statement disclosure of environmental liabilities.**
2. **Environmental liabilities that are individually material should be disclosed separately.**
3. **The nature of any significant measurement uncertainties relating to a recognized environmental liability.**
4. **The aggregate of payments to be made in each of the next five years for future environmental expenditures that have been recognized as a liability.**
5. **For environmental liabilities for which an estimate cannot be made, the following should be disclosed:**
 - a. **the nature of the expected future expenditure or loss,**
 - b. **an indication of the likelihood of the expenditure being made or the loss being suffered;**
 - c. **the timing of the expected future expenditure or loss, or an indication of any uncertainties related to timing.**

(R) Disclosure of commitments:

- Significant future environmental capital expenditures that involve “contractual obligations” or commitments, and that are abnormal in relation to financial position or usual business operations, should be disclosed in accordance with *CICA Handbook* Section 3280, “Contractual Obligations.”
- Significant future environmental expenditures required because of environmental legislation or regulations and that are abnormal in relation to financial position or usual business operations should be disclosed. Such expenditures should also be disclosed if required by proposed legislation or regulation that it is virtually certain will come into force.
- If an entity has made a commitment with respect to significant future environmental operating expenditures that will govern the level of expenditures for a considerable period into the future, the particulars of the commitment should be disclosed (as required in Section 3280). Similarly, if existing environmental legislation or regulations will require significant future environmental operating expenditures for a considerable period into the future, the particulars of the regulations and related expenditures should be disclosed.
- It is desirable that there be disclosure in the financial report, but not necessarily in the financial statements, of environmental capital expenditures that are planned or are expected to be required under new legislation or regulations, for at least the following year.
- It is desirable that there be disclosure in the financial report, but not

necessarily in the financial statements, of environmental operating expenditures that are planned or are expected to be required under new legislation or regulations, for at least the following year (p. xi).

5. Disclosure of commitments: (i.e. seems costs are fairly definite).

- 1. Significant future environmental capital expenditures expected to be needed or required.**
- 2. Significant future environmental expenditures expected to be needed or required (i.e. operating expenses).**
- 3. Disclosure of commitments made (i.e. explain the commitment) regarding future environmental operating expenditures.**
- 4. Disclosure of the details of environmental regulations or legislation requiring significant future environmental operating expenditures.**
- 5. The disclosure of the following costs that are expected to be required under new legislation or regulations, for at least the following year:**
 - a. environmental operating expenditures, and**
 - b. environmental capital expenditures.**

(R) Disclosure of accounting policies:

An entity's accounting policies with respect to the following should be disclosed:

- what is included in the definition of "environmental costs";
- the basis on which environmental costs are expensed or capitalized;
- how environmental costs are amortized to income;
- the basis on which environmental liabilities are recognized (p. xi).

6. Accounting policies with respect to the following should be disclosed:

- 1. what is included in the definition of "environmental costs";**
- 2. the basis on which environmental costs are expensed or capitalized;**
- 3. how environmental costs are amortized to income;**
- 4. the basis on which environmental liabilities are recognized.**

(R) Possible future environmental expenditures and impairment losses:

- "Reasonably possible" future environmental expenditures related to past events or transactions or "reasonably possible" asset impairment losses that could have a significant impact on future cash flows should be disclosed in financial statements.
- If the probability of an environmental loss related to past events or transactions is remote, but the impact could have a significant adverse effect on the financial position of the entity, it is desirable to disclose this possibility.
- With respect to possible future environmental expenditures or losses

that are disclosed in financial statements, the following details should be provided:

- the nature of the expected future expenditure or loss, including an indication of the likelihood of the expenditure being made or the loss being suffered;
 - the size of the expected future expenditure or loss; an estimate of the expenditure or loss; or an estimate of the range of possible outcomes or a statement that an estimate cannot be made;
 - the timing of the expected future expenditure or loss, including an indication of any uncertainties related to timing.
- Possible future environmental expenditures, or losses due to asset impairment, that are material should be disclosed separately. Others with similar characteristics may be grouped (p. xi, xii).

7. Possible future environmental expenditures and impairment losses caused by past events:

- 1. Possible future environmental expenditures or losses resulting from past events that could have a significant impact on future cash flows or financial position should be disclosed in financial statements.**
- 2. Further details that should be provided regarding future environmental expenditures or losses:**
 - a. the nature of the expected future expenditure or loss;**
 - b. an indication of the likelihood of the expenditure being made or the loss being suffered;**
 - c. the size of the expected future expenditure or loss; an estimate of the expenditure or loss; or an estimate of the range of possible outcomes; and**
 - d. the timing of the expected future expenditure or loss, or the indication of any uncertainties related to timing.**

(R) Possible future environmental losses relating to future events or transactions:

- An entity should disclose, in its financial statements, the industry in which it operates, the basic nature of its operations within that industry, and the particular circumstances of the entity, such as location of operations.
- If possible future environmental losses relating to future events or transactions and resulting from the public's concerns about the environment, as expressed either through legislation, regulation or public pressure, could have a significant adverse effect on the future cash flows of the entity, the nature and possible effect of these concerns should be disclosed in the financial report.

- If there is little or no risk related to environmental concerns, it may be desirable to disclose this fact in the financial report, along with an appropriate explanation.
- If the possibility of a future environmental loss exists because of a specific action by the entity or because of a specific action by others, the nature of the action and the possible effect should be disclosed in the financial report.
- If the possibility of a future environmental loss exists, but the probability of its occurrence has been reduced by actions taken by the entity, such actions should be disclosed in the financial report (p. xii).

8. Possible future environmental losses relating to future events or transactions:

1. Disclosure needed for possible future environmental losses relating to future events or transactions:

- a. the nature of these concerns; and
- b. the possible effect of these concerns:
 1. the effect on the future cash flows of the entity; and
 2. other possible financial effects.

2. A statement that there is little or no risk related to environmental concerns resulting from future events or transactions.

3. Actions taken by the entity that

- a. reduce the probability of a future environmental loss occurring.
- b. create a possible future environmental loss.

APPENDIX D

ENVIRONMENTAL DISCLOSURE CHECKLIST ITEMS

BASED ON THE GUIDANCE IN THE AMERICAN INSTITUTE

OF CERTIFIED PUBLIC ACCOUNTANT'S

STATEMENT OF POSITION 96-1: ENVIRONMENTAL

REMEDIALIATION LIABILITIES

Statement of Position 96-1 (SOP 96-1) was prepared by the Accounting Standards Executive Committee of the American Institute of Certified Public Accountants (AICPA) and cleared by the Financial Accounting Standards Board (FASB). The provisions of SOP 96-1 are effective for fiscal years beginning after December 15, 1996.

The accounting guidance provided focuses on obligations incurred in remediating problems from past environmental activities. The preface of SOP 96-1 states that:

The primary objective of SOP 96-1 is to improve and narrow the manner in which existing authoritative accounting literature is applied by entities to the specific circumstances of recognizing, measuring, and disclosing environmental remediation liabilities.

Part 2 ("Accounting Guidance"), includes the following statement which further explains the intention of SOP 96-1:

The objective of Part 2 is to provide accounting guidance with respect to environmental remediation liabilities that relate to pollution arising from some past act, generally as a result of the provisions of Superfund, the corrective-action provisions of the Resource Conservation and Recovery Act, or analogous state and non-United States laws and regulations. The recognition and measurement guidance in this Part should be applied on a site-by-site basis.

Below are the most relevant aspects of environmental information to be provided by entities in their annual reports as required or recommended by SOP 96-1. The chapter numbers, titles, section numbers, and text are exactly as given in the SOP.

The **items shown below in bold** are the ones included in the **disclosure index**, and are preceded by the heading "Disclosure Index."

Chapter 5

RECOGNITION OF ENVIRONMENTAL REMEDIATION LIABILITIES

Ability to Reasonably Estimate the Liability

(5.7) Estimating environmental remediation liabilities involves an array of issues at any point in time. In the early stages of the process, cost estimates can be difficult to derive because of uncertainties about a variety of factors. For this reason, estimates developed in the early stages of remediation can vary significantly; in many cases, early estimates later require significant revision. The following are some of the factors that are integral to developing cost estimates:

- The extent and types of hazardous substances at a site.
- The range of technologies that can be used for remediation.
- Evolving standards of what constitutes acceptable remediation.
- The number and financial condition of other potentially responsible parties (PRPs) and the extent of their responsibility for the remediation (that is, the extent and types of hazardous substances they contributed to the site).

Disclosure Index:

The following are some of the factors that are integral to developing cost estimates for environmental remediation liabilities:

- a. **The extent of hazardous substances at a site.**
- b. **The types of hazardous substances at a site.**
- c. **The range of technologies that can be used for remediation.**

Benchmarks

(5.16) At a minimum, the estimate of a Superfund (or RCRA) remediation liability should be evaluated as each of these benchmarks occurs.

1. Identification and verification of an entity as a PRP.
If, based on a review and evaluation of its records and all other available information, the entity determines that it is associated with the site, it is probable that a liability has been incurred. If all or a portion of the liability is reasonably estimable, the liability should be recognized.
2. Completion of feasibility study.
At substantial completion of the feasibility study, both a minimum remediation liability and the entity's allocated share generally will be reasonably estimable.

Disclosure Index:

Disclosure that the entity has experienced the following benchmarks related to the estimate of an environmental liability.

- a. **Identification and verification of the entity as a party responsible for cleaning up a hazardous waste problem.**

b. Completion of feasibility study that evaluates the entity's remediation liability.

DISPLAY AND DISCLOSURE OF ENVIRONMENTAL LIABILITIES

Balance Sheet Display

(7.3) An entity's balance sheet may include several assets that relate to an environmental remediation obligation. Among them are the following:

- Receivables from other PRPs that are not providing initial funding.
- Anticipated recoveries from insurers.
- Anticipated recoveries from prior owners as a result of indemnification agreements.

Disclosure Index:

An entity may provide balance sheet or other presentation of assets that relate to an environmental obligation. Among them are the following: receivables from other parties that are partially responsible for the environmental obligation, anticipated recoveries from insurers, and anticipated recoveries from prior owners.

Income Statement Display

(7.8) Environmental remediation-related expenses should be reported as a component of operating income in income statements that classify items as operating or nonoperating.

Disclosure Index:

Environmental remediation-related expenses should be reported as a component of operating income in income statements that classify items as operating or nonoperating.

Disclosure of Accounting Principles

(7.11) With respect to environmental remediation obligations, financial statements should disclose whether the accrual for environmental remediation liabilities is measured on a discounted basis.

Disclosure Index:

With respect to environmental remediation obligations, financial statements should disclose whether the accrual for environmental remediation liabilities is measured on a discounted basis.

(7.12) Because environmental remediation costs have become increasingly significant, and because the accounting for many environmental loss contingencies often involves subjective judgments, disclosure of accrual benchmarks for environmental obligations is useful to further users' understanding of the entity's financial statements. Accordingly,

entities are encouraged, but not required, to disclose the event, situation, or set of circumstances that generally triggers recognition of loss contingencies that arise out of the entity's environmental remediation-related obligations. Also, entities are encouraged to disclose their policy concerning the timing of recognition of recoveries.

Disclosure Index:

- 1. Disclosure of accrual benchmarks for environmental obligations is useful to further users' understanding of the entity's financial statements.**
- 2. Additional items that entities are encouraged to disclose are:**
 - 1. the event, situation, or set of circumstances that generally triggers recognition of environmental contingencies or obligations.**
 - 2. the accounting policy concerning the timing of recognition of recoveries.**

Disclosures for Environmental Remediation Loss Contingencies

(7.18) Paragraphs 9 and 10 of FASB Statement No. 5 provide for disclosures related to three different aspects of loss contingencies: (a) recognized losses and reasonably possible (additional) loss exposures, (b) probable but not reasonably estimable losses, and (c) unasserted claims. Following are the disclosures that are required or encouraged by Statement No. 5, SOP 94-6, and this SOP for each aspect.

Recognized Losses and Recoveries of Losses, and Reasonably Possible Loss Exposures

(7.20) With respect to recorded accruals for environmental loss contingencies, and assets for third-party recoveries related to environmental remediation obligations, financial statements should disclose the following:

- a. The nature of the accruals, if such disclosure is necessary for the financial statements not to be misleading, and, in situations where disclosure of the nature of the accruals is necessary, the total amount accrued for the remediation obligation, if such disclosure is also necessary for the financial statements not to be misleading.
- b. If any portion of the accrued obligation is discounted, the undiscounted amount of the obligation and the discount rate used in the present-value determinations.
- c. If the criteria of SOP 94-6 are met with respect to the accrued obligation or to any recognized asset for third-party recoveries, an indication that it is at least reasonably possible that a change in the estimate of the obligation will occur in the near term.

Disclosure Index

With respect to recorded accruals for environmental loss contingencies, financial statements should disclose the following:

1. The nature of the accruals.
2. The total amount accrued for the environmental obligation.
3. If any portion of the accrued obligation is discounted, the undiscounted amount of the obligation and the discount rate used in the present-value determinations.
4. The likelihood that a change in the estimate of the obligation will occur in the near term.

With respect to assets for third-party recoveries related to environmental remediation obligations, financial statements should disclose the following:

1. The nature of the accruals.
2. The likelihood that a change in the estimate of the asset will occur in the near term.

(7.21) With respect to reasonably possible loss contingencies, including reasonably possible loss exposures in excess of the amount accrued, financial statements should disclose the following:

- a. The nature of the reasonably possible loss contingency, that is, a description of the reasonably possible remediation and an estimate of the possible loss exposure or the fact that such an estimate cannot be made.
- b. If the criteria of SOP 94-6 are met with respect to estimated loss (or gain) contingencies, an indication that it is at least reasonably possible that a change in the estimate will occur in the near term.

Disclosure Index

With respect to reasonably possible loss contingencies, including reasonably possible loss exposures in excess of the amount accrued, financial statements should disclose the following:

1. A description of the reasonably possible environmental obligation.
2. An estimate of the possible loss exposure or the fact that such an estimate cannot be made.
3. The likelihood that a change in the estimate of the contingency will occur in the near term.

(7.22) Entities also are encouraged, but not required, to disclose the following:

- a. The estimated time frame of disbursements for recorded amounts if expenditures are expected to continue over the long term.
- b. The estimated time frame for realization of recognized probable recoveries, if

realization is not expected in the near term.

- c. If the criteria of SOP 94-6 are met with respect to the accrued obligation, to any recognized asset for third-party recoveries, or to reasonably possible loss exposures or disclosed gain contingencies, the factors that cause the estimate to be sensitive to change.
- d. If an estimate of the probable or reasonably possible loss or range of loss cannot be made, the reasons why it cannot be made.

Disclosure Index

Entities also are encouraged, but not required, to disclose the following:

1. **The estimated time frame of disbursements for recorded amounts of environmental obligations.**
2. **The estimated time frame for realization of recognized probable recoveries.**
3. **Factors that may cause the following estimates to change:**
 - a. **the recorded environmental obligation.**
 - b. **assets for third-party recoveries.**
 - c. **reasonably possible loss exposures.**
 - d. **environmental gain contingencies.**
4. **If an estimate of the probable or reasonably possible loss or range of loss cannot be made, the reasons why it cannot be made.**

Probable But Not Reasonably Estimable Losses

(7.25) Even though an entity may not be able to establish a reasonable estimate of a material loss or a range of reasonably estimable material loss exposure that must be recorded, in many cases it can determine early in the investigation whether the costs of environmental remediation, in fact, may be material (that is, the upper end of the range of the reasonable estimate of the loss is material). If an entity's probable but not reasonably estimable environmental remediation obligation may be material, the financial statements should disclose the nature of the probable contingency, that is, a description of the remediation obligation, and the fact that a reasonable estimate cannot currently be made.

Disclosure Index

If the probable loss may be material, the financial statements should provide a description of the environmental obligation, and the fact that a reasonable estimate cannot currently be made.

Conclusions on Loss Contingencies and Other Matters

(7.31) Entities may wish to provide a description of the general applicability and impact of environmental laws and regulations upon their business, and how the existence of such laws and regulations may give rise to loss contingencies for future environmental

remediation. Such disclosures often acknowledge the uncertainty of the effect of possible future changes to environmental laws and their application, and they are frequently made on an aggregated basis, considering the entity's total exposures for all its environmental sites.

Disclosure Index

Entities may wish to provide:

- 1. a description of the general applicability and impact of environmental laws and regulations upon their business, and**
- 2. how such laws and regulations may give rise to environmental loss contingencies and environmental obligations.**

APPENDIX E

REPORTING STANDARDS FOR CONTINGENT LIABILITIES

The following requirements are presented by the FASB in SFAS 5 and Interpretation 14, and by the CICA in the *CICA Handbook*, Section 3290.

	<u>FASB</u>	<u>CICA</u>
Contingent liabilities must be recorded in the financial statements when:		
1. It is probable that a liability has been incurred or an asset has been impaired, and	Yes	Yes
2. The amount of the loss can be reasonably estimated.	Yes	Yes
If the loss is likely and only a range of loss can be estimated, then:		
1. If one amount within the range is the best estimate of the probable loss, that amount shall be accrued, or	Yes	Yes
2. If no amount within the range is a better estimate than any other amount, then the minimum amount in the range shall be accrued.	Yes	Yes
The existence of a contingent loss shall be disclosed in the notes to the financial statements when:		
1. The future event confirming the loss is likely to occur, but the amount of the loss cannot be reasonably estimated, or	No	Yes
2. A loss accrual has been made and the confirming future event is likely to occur, but there exists an exposure to loss in excess of the amount accrued, or	No	Yes
3. The occurrence of the confirming future event is not determinable.	No	Yes
4. A loss contingency is not accrued because one or both of the requirements (probable existence, reasonably estimatable) are not met, or an exposure to loss exists in excess of the amount accrued, and at least a reasonable possibility exists that a loss or additional loss may have been incurred.	Yes	No

VITA

Paul A. Ashcroft, CPA
 Auburn University at Montgomery
 School of Business, Department of Accounting and Finance
 7300 University Drive
 Montgomery, Alabama 36124-4023
 (334) 244-3494
 E-mail: pashcroft@monk.aum.edu

EDUCATION

Texas A&M University
 Doctor of Philosophy in Accounting, May 1999
 Minor: Sociology

University of South Alabama
 Master of Business Administration, June 1992

University of Southern Mississippi
 Bachelor of Science in Accounting, May 1984

SCHOLARSHIPS AND HONORS

KPMG Peat Marwick Foundation Doctoral Scholarship, 1994

Attended Southwest AAA Doctoral Consortium, San Antonio, March 29-30, 1996

PROFESSIONAL EXPERIENCE

Assistant Professor, Auburn University at Montgomery, Department of Accounting and Finance, September 1998 to present.

Lecturer, Texas A&M University, Department of Accounting, 1996-1997.

Research Assistant, Texas A&M University, Department of Accounting, 1993-1998.

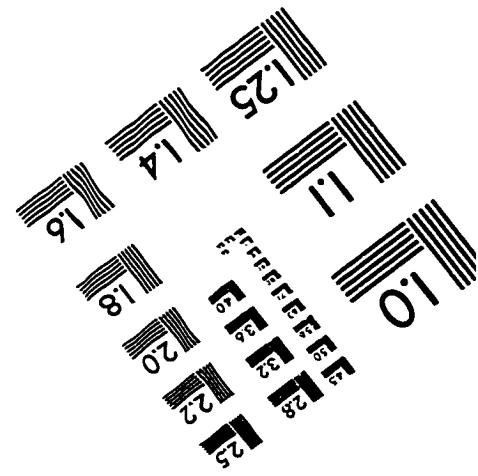
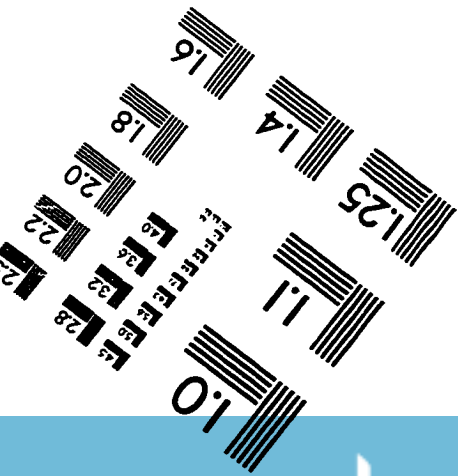
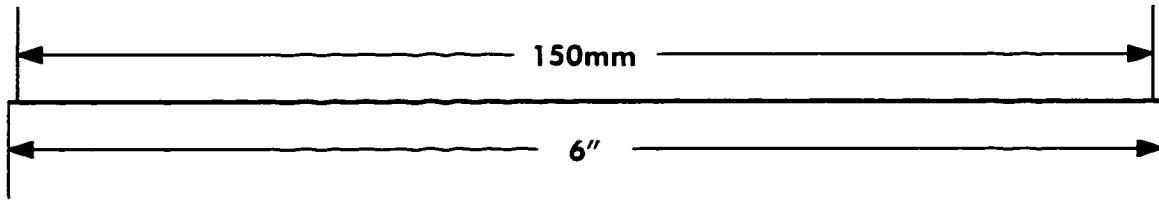
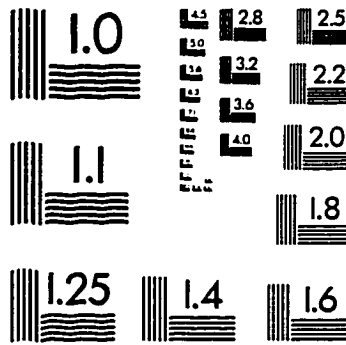
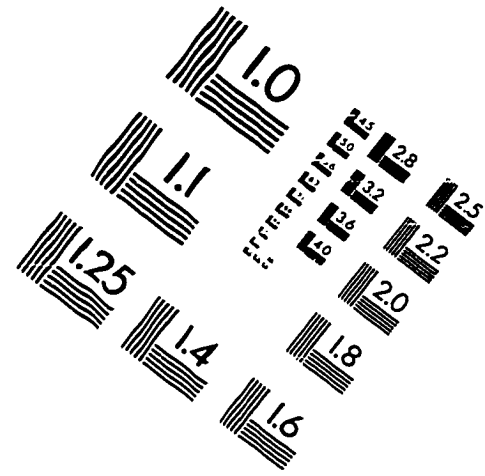
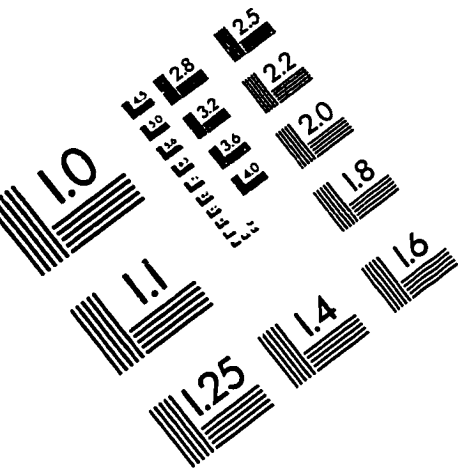
Instructor, Miami University, Oxford, Ohio, Department of Accounting, 1992-1993.

Tax Accountant, Moore & Powell CPA's, Biloxi, Mississippi, 1990-1991.

Controller, Acappella Music Group, Inc., Paris, Tennessee, 1986-1990.

Staff Accountant, Moore & Powell CPA's, Biloxi, Mississippi, 1984-1986.

IMAGE EVALUATION TEST TARGET (QA-3)



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