

“BOOK ’EM DANNO!” ENVIRONMENTAL LIABILITY DISCLOSURE
IN A POST SARBANES-OXLEY ENVIRONMENT

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“BOOK ’EM DANNO!” ENVIRONMENTAL LIABILITY DISCLOSURE
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Economics

Abstract

Despite increasing legal and social pressure to reduce environmental impact, many corporations continue environmentally damaging industrial practices. This study seeks to understand the impact of accounting policies articulated in the Sarbanes-Oxley Act of 2002 (SOX) by studying changes in the PERI Toxic 100 Air Polluters index, pre and post SOX. Results suggest that full recognition of environmental liabilities in corporate financial statements has not increased since 2002, but important differences between companies showing improved environmental impact and those who have yet to implement changes are elucidated.

KEYWORDS: environmental accounting, environmental performance, liability disclosure, liability recognition, Sarbanes-Oxley Act

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Introduction

Accounting is the language of business, and accounting systems serve to accumulate, measure, and communicate financial information about economic entities to interested external parties (Albrecht et al., 2008). In March 2013 a Honeywell LLC predecessor, Allied Chemical, was ordered to pay a \$3 million fine for air pollution violations in Richmond, Virginia (Blackwell, 2013). Honeywell Resins and Chemicals, a major producer of ingredients used in nylon and fertilizer, did not admit to allegations that it failed to comply with Clean Air Act requirements to upgrade air pollution control equipment, detect and repair leaks of hazardous air pollutants, and to develop safeguards on benzene waste, but consented to the fine as well as an agreement to upgrade pollution-control equipment, at an estimated cost of \$66 million, and perform a mitigation project at the Virginia plant (Associated Press, 2013). A company spokesperson responded to the settlement saying, "Honeywell is committed to the highest standards of environmental compliance and sustainability at every one of our facilities." In addition, a written company statement claimed, Honeywell is "committed to the highest standards of environmental compliance." Clearly, Honeywell's actions are not in line with its public statements.

Honeywell's failure to put words into actions is not uncommon. Despite increasing legal and social pressure to reduce environmental impact, many corporations continue damaging industrial practices. On occasion, the fiscal consequences of environmental damage are recognized in the accounting statements, but more commonly environmental consequences are disclosed in the notes to financial statements or in the Management Discussion and Analysis section of the company's annual report. To be

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recognized in the financial statements, an environmental liability must be measurable with sufficient certainty and be relevant and reliable (Warfield et al., 2008).

Measurability, relevance, and reliability can be legitimate reasons for not disclosing specific financial data, but these regulations can also serve companies hoping to disguise the environmental damage they are causing.

The remainder of this paper is divided into five sections: theory, a literature review, data and methodology, results and analysis, and conclusions. Each section serves to understand the impact of accounting policies articulated in the Sarbanes-Oxley Act of 2002 (SOX) by studying changes in the PERI Toxic 100 Air Polluters index, pre and post Sarbanes-Oxley policy.

Theory

This study seeks to understand if there has been a significant impact on environmental liability recognition within firms in the post Sarbanes-Oxley environment. This section reviews market efficiency theory and information asymmetry, highlights the differences between disclosure and recognition, introduces content analysis, discusses the connections to cash flow predictability, and describes voluntary disclosure theory. Finally, it links these theories to the analysis of discretionary environmental disclosure.

Accounting information provides useful financial information about a firm's economic resources, claims to those resources, and changes in them (Financial Accounting Standards Board, 2010). Therefore, the role of accounting in market efficiency is crucial. Eugene Fama, winner of the Deutsche Bank Prize in Financial Economics, defines an efficient financial market as "one in which prices always fully reflect available information." Market efficiency is present when prices adjust rapidly to

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new information and the market can absorb large dollar amounts of securities without destabilizing prices (Block and Hirt, 1997).

The Efficient Market Hypothesis is stated in three forms – the weak, the semi-strong, and the strong. The weak form states that past price information is completely unrelated to future prices, meaning that investors are unable to predict market trends. The semi-strong form states that current prices reflect all public information available. The strong form states that all information, public and private, is immediately reflected in stock prices (Block and Hirt, 1997). While a strong market mechanism is ideal, in reality one party in a transaction often has more information compared to the other (Aboody and Lev, 2000). Therefore, efficient markets are linked to environmental liability disclosure in that, to the extent that some companies hide these liabilities and expenses while others recognize and disclose them, capital will flow to the wrong firms due to public misinformation.

Information asymmetry can create market outcomes that fail to be Pareto-optimal (Landsburg, 2002). Two problems arise from information asymmetry: adverse selection and moral hazard. Adverse selection occurs when people know more about their own risk characteristics than others do. The interaction between a used car seller and buyer is a good example of how one individual's greater knowledge gives a competitive edge in the used car market. Moral hazard is a problem that arises when individuals take more risks when they are insured because they themselves will not incur the cost of that particular risk. Rent insurance models moral hazard well. For example, moral hazard develops when a landlord charges higher rent costs because s/he is unable to know if the

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renter will damage the home (Landsburg, 2002). In accounting, disclosure plays a role in containing information asymmetry.

This paper focuses on accounting disclosures as they relate to environmental liabilities. The full disclosure principle is part of the conceptual framework underlying financial accounting. Full disclosure ensures that the nature and amount of financial information given in financial reports is both sufficient in detail so as to be important to users and condensed enough to remain understandable and useful. To be recognized at all, however, an item listed in the body of the financial statements must be a basic element of the financial statements, be measurable with sufficient certainty, and be relevant and reliable (Warfield et al., 2008).

Often, with contingent liabilities such as those related to environmental damage, litigation serves as the catalyst for the transition from accounting disclosure to recognition. The full disclosure principle discusses this important distinction between disclosure and recognition. Recognition is when fiscal measures are included in a firm's financial statements. Disclosure occurs when measures are not included in the financial statements but are explained within the notes to financial statements (Albrecht et al., 2008). The notes to financial statements and other supplementary information generally expand on or explain the items in the main body of financial statements. Disclosures in the notes do not have to be as certain as items recognized in the statements and therefore may be highly relevant but not reliable. Supplemental information also provides the firm manager an opportunity to discuss the significance of the firm's fiscal recognitions, as a means to ensure that prudent investors will not be misled (Warfield et al., 2008).

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While recognition results in hard disclosure measures (numbers in the financial statements), disclosure – either in the footnotes to the financial statements or in the Management Discussion and Analysis section of the reports – represents a soft disclosure measure. An analytical technique referred to as “content analysis” is required to convert this information to measures useful in statistical modeling. Krippendorff (2004) defines content analysis as a research technique for making replicable and valid inferences from texts to the contexts of their use. Replicability means that researchers should get the same results when applying the same techniques to the data regardless of the circumstances. Validity requires that results be upheld in the face of independently available evidence. Content analysis analyzes text by focusing on textual features - (disclosures found in the footnotes to the financial statements or in the Management Discussion and Analysis section of the reports) and then applying categorical understanding (presence of environmental disclosure) to the source text without bias.

A discretionary environmental disclosure constitutes an admittance of liability by a corporation. A firm would make such a disclosure if, through the actions of their business, damage to the environment were being done. In short, when a company is responsible for incidences such as pollution or toxic waste cleanup, the financial responsibility to repair the damage is referred to as an environmental liability. Unfortunately, corporations often neglect their duty to disclose environmental liabilities because they are only reported when they are *estimable* and there is a *high probability* that they will be honored (Warfield et al., 2008). Therefore, often the companies that disclose environmental liabilities do so at their discretion.

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Variations in liability disclosure greatly effect investors' ability to estimate cash flows. Reporting the reasons for changes in cash flow is useful because interested parties want to know what's happening to a company's most liquid resource (Warfield et al., 2008). Environmental liabilities are often brought to a company's attention like other contingent liabilities, such as claims and warranty costs, but environmental liabilities are distinctively problematic. Unlike other contingent liabilities, environmental costs are often difficult to estimate (Albrecht et al., 2008). Therefore, while a company may know environmental cleanup costs are probable, estimating the amount of the liability can be exceedingly challenging. This presents a problem for investors and creditors because contingent liabilities are instrumental in determining cash flows. If significant environmental liabilities are not recognized, interested investing parties are not given adequate information in determining the solvency of the firm. Thus, environmental liability disclosure is pertinent to management as well as investors and creditors, with managers having the upper hand in determining the amount and content of disclosure.

Economic voluntary disclosure theory predicts a positive correlation between environmental performance and the extent of discretionary environmental disclosures (Verrecchia, 1983; Dye 1985). Verrecchia and Dye are widely cited for their work on information disclosure; these two articles are cited in the Business Source Complete Database 56 and 148 times, respectively. The positive correlation between performance and disclosure illustrates the idea that corporations with better environmental performance desire to point out their effectiveness to the public, whereas corporations with poor environmental performance will choose to disclose less about their environmental liabilities (Clarkson et al., 2006). In practice, a manager decides to either

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release or withhold disclosure information based on the effect of the disclosure on the liability's price (Verrecchia, 1983). Investors and creditors are aware that managers are constantly exercising these discretionary decisions but cannot know the manager's expectations or motivation, because of information asymmetry. Verrecchia (1983, p. 179) suggests, "traders are unable to interpret withheld information as unambiguous 'bad news' and thereby discount the value of the firm to the point that the manager is better served to disclose what he knows." Thus, this theory predicts a positive association between environmental performance and the extent of discretionary environmental disclosures.

This paper focuses on shifts in environmental liability disclosure and recognition over the past decade; voluntary disclosure theory suggests that companies that are increasing their environmental liability disclosure will also prove to be better environmental stewards. The implementation of managerial responsibility for financial disclosure associated with the Sarbanes-Oxley Act should also affect the extent of both disclosure and recognition. The following section offers a review of the literature related to environmental disclosure and contingent liability recognition.

Literature Review

This section will look in depth at the existing literature on environmental liability disclosure and the effects of the Sarbanes-Oxley Act on the financial reporting environment. Corporate financial reporting is governed by a set of accounting standards known as the Generally Accepted Accounting Principles (GAAP). The Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB) enforce these standards. Since the Securities Exchange Act of 1934, the SEC has

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required 10-K financial filings that require limited disclosures of environmental matters and liabilities (Industrial Economics, Inc., 2008). However, corporations often neglect their duty to disclose environmental liabilities because they are only reported when they are *estimable* and there is a *high probability* that they will be honored (Financial Accounting Standards Board, 2010). The current study focuses on whether passage of the Sarbanes-Oxley Act in 2002 has significantly altered the reporting environment, especially with regard to environmental liabilities. This section investigates literature addressing the benefits and difficulties of contingent liability disclosure, characteristics of companies likely to recognize environmental liabilities, voluntary disclosure theory, and past research on the relationship between environmental disclosure and environmental performance.

Environmental accounting studies offer a range of benefits to corporations and society by improving annual accounting statements. Environmental accounting can assist investors in three broad ways (Clarkson et al., 2006). First, environmental accounting can use current valuations of environmental liabilities to assess environmental liabilities in different settings. This valuation of relevance can assist investors in making educated investment choices. Second, it can affect managerial decision-making within corporations. The strategic disclosure decisions made privately within a firm hold critical information for investors and creditors, especially in discretionary type disclosures. Third, it can give insight into the relationship between environmental disclosure and environmental performance. Thus, if companies now – in a post-Sarbanes-Oxley environment – disclose and recognize environmental items more precisely, investors are better served.

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With increasing awareness about the limited nature of our environmental resources comes increasing concern about a lack of corporate social responsibility-related disclosures in annual accounting reports, as they continue to be voluntary in many cases (Clarkson et al., 2006). Mandatory disclosure has been called something that “irritates industry without achieving a better environment” (Gilges, 1991, p.82V), while voluntary disclosure is viewed as more acceptable because this discretionary reporting allegedly reflects the needs of stakeholders (Raiborn et al., 2011). Various accounting pronouncements require disclosure of environmental matters, including FASB Statement of Financial Accounting Standards No. 5, SEC Staff Accounting Bulletin No. 92, and AICPA Statement of Position 96-1. These pronouncements seek consistency in environmental accounting; however, the nature of environmental liability claims makes reporting them quite difficult in reality. For example, often there are many potentially responsible parties for environmental damage, making it hard to determine how liable each party is. Furthermore, the SEC requires reporting environmental liabilities *unless* the firm can prove the liability will not be of interest to the investors. Moreover, estimating environmental costs can be unpredictable in cases where responsible parties seek reimbursement for cleanup costs through lawsuits (Raiborn et al., 2011). Disclosures regarding environmental liabilities increasingly are being integrated into legal requirements, but such disclosures often lack comprehensiveness to properly inform investors of the extent of the implied liability.

Despite increasing concern over environmental damage and implementation of the Sarbanes-Oxley accounting legislation in 2002, it is still difficult to quantify current disclosure practices (Viscuso, 2007). Quantifying corporate environmental disclosure is

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difficult for many reasons, including flexibility in interpretation of SEC disclosure requirements and the SEC disclosure format requirements. In addition, external users lack access to all environmental records, making it difficult to determine if fewer disclosures indicates fewer violations or perhaps a refusal to disclose environmental liabilities (Viscuso, 2007). This paper attempts to highlight changes in the type of environmental disclosures since the Sarbanes-Oxley Act to elucidate the effects of the post Sarbanes-Oxley environment.

This paper focuses on whether the post Sarbanes-Oxley Act environment has significantly changed environmental liability recognition within firms. The Sarbanes-Oxley Act of 2002, in the aftermath of large-scale accounting scandals such as Enron, significantly increased the probability and severity of potential environmental claims against corporations who fail to provide proper pollution oversight (Rogers, 2004). Under Sarbanes-Oxley, CEOs and CFOs must ensure an internal process for financial reporting of environmental estimates and accruals. Additionally, Sarbanes-Oxley requires increased protection for whistleblowers reporting questionable accounting practices. By setting up penalties for corporations that not only engage in fraudulent reporting but also retaliate against whistleblowing employees, there is increased pressure to report environmental liabilities and strong incentive for corporations to follow disclosure statutes (Viscuso, 2007).

Voluntary environmental disclosures vary greatly in the information disclosed due to their optional nature. Research (e.g., Berthelot, Cormier & Magnan, 2002; Cormier & Magnan, 1997; Marshall, Brown & Plumlee, 2007) suggests that organizations with the following characteristics are more likely to provide voluntary environmental disclosures:

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- Financial strength;
- In environmentally-sensitive industries;
- Large and diverse shareholder ownership;
- Previously engaged in environmental legal proceedings;
- Affected by substantial media exposure regarding environmental activities;
- Previous, and likely additional, environmental difficulties;
- Previous targeting by environmental groups.

Thus, voluntary environmental disclosure is the product of numerous environmental factors and varies significantly.

As previously mentioned, economic voluntary disclosure theory predicts a positive correlation between environmental performance and the extent of discretionary environmental disclosures (Verrecchia, 1983; Dye 1985). This may indicate that corporations with better environmental performance will point out their effectiveness to the public, whereas corporations with poor environmental performance will choose to disclose less. The examination of voluntary environmental disclosures made in corporate annual reports began around 1980 using an environmental performance index created by the Council on Economic Priorities (Ingram and Frazier, 1980; Wiseman 1982). In the early 1990s, disclosures made in annual reports as well as 10-K reports filed with the SEC were used to study how indicative disclosures were of actual environmental performance. However, existing studies find mixed relationships between environmental disclosure and environmental performance, likely due to the difficulty in measuring soft disclosures, including disclosures of vision and environmental strategy claims (Clarkson et al., 2006).

In a different study of the relationship between disclosure and performance, Canadian research has attempted to gauge the effect that news media coverage regarding environmental exposure has on environmental information disclosure (Bewley and Li,

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2000). Bewley and Li suggest a negative association between environmental disclosure and environmental performance in their study of media coverage but also note a significant tendency for firms to make more environmental disclosures while under increased scrutiny by the Financial Accounting Standards Board and the Securities and Exchange Commission. Factors such as media coverage and fluctuating government scrutiny further cloud how indicative voluntary environmental disclosures really are of actual environmental performance (Clarkson et al., 2006).

The impact of environmental information disclosures on shareholder returns in a company also factors into management's decision to disclose liabilities or not. In a study examining the association between Toxic Release Inventory (TRI) disclosures and firm value, results show that the actual reported waste discharge significantly reduces firm value. Therefore, it seems the capital markets punish large polluters, and investors consider them to be a riskier investment. As investors require higher rates of return on high polluting firms, the value of those firms is lowered (Ragothaman and Carr, 2008). Cox and Douthett (2009) report similar results, which indicate environmental disclosure has a negative valuation impact on profitability. The impact of environmental disclosure on firm value is important to document as a possible explanation for deficient environmental liability reporting.

Furthermore, Toxic Release Inventory disclosures may not be carried over to financial reports or public sources at all (Freedman and Stagliano, 2008). After examining 200 high-volume emitters, Freedman and Stagliano find no correlation between the level of TRI reported toxic releases and the extensiveness of reporting in non TRI sources. This indicates that shareholders are not given all decision-relevant data

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regarding environmental liabilities. Even if TRI data are not pertinent to current operations, potential future cleanup costs will affect the bottom line and therefore are very important to decision making.

Prior literature regarding the relations among environmental disclosure and environmental performance has yielded mixed results. Patten (2002) finds that, controlling for firm size and industry classification, there is a significant negative relation between performance and disclosure. In contrast, Al-Tuwaijri et al. (2004) obtain results that suggest good environmental performance is significantly associated with more extensive quantifiable environmental disclosures. They hypothesize that their results differ from past research because they use a simultaneous equations model that articulates environmental performance, environmental disclosure, and economic performance as jointly determined (Al-Tuwaijri et al., 2004). Al-Tuwaijri et al. seek to provide insight into these ambiguities by comparing environmental disclosure and recognition with timely TRI data.

Freedman and Stagliano (2008) attempt to demonstrate the relationship between pollution data and financial disclosure using a three-part study. First, the study determines the firms with the highest toxic release amounts in 2002 based on the Toxic Release Inventory. Then the toxic releases are categorized into two groups – those that were carcinogens and those that were not. Third, Freedman and Stagliano observe the level of reporting on SEC Form 10-K filings (Form 20-F for nondomestic companies), annual shareholder reports, environmental reports, media stories, and websites. They then compare the actual toxic release data with the amount of public disclosure. This comparison reveals no relationship between total releases of toxic chemicals and

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disclosures made by firms (Freedman and Stagliano, 2008). The current study investigates whether there has been a movement from financial disclosure to recognition over the last decade, while recognizing the overarching difficulty inherent in measuring environmental liability reporting.

This paper studies changes in the amount of environmental liability reporting, making past methodology on how to value disclosure and recognition important. A key research design used by Clarkson et al., 2006 creates a disclosure index. This index consists of “hard” and “soft” disclosures. “Hard” disclosure items consist of a firm’s management systems put in place for environmental protection, environmental disclosure credibility, environmental disclosure specificity and environmental spending. “Soft” disclosures consist of a firm’s environmental vision and strategy, forthcoming environmental regulations and the firm’s initiatives regarding environmental accidents, audit, awards and donations. This study will use a similar index to measure disclosure within the footnotes to the financial statements or in the Management Discussion and Analysis section of the reports.

The federal government has taken steps to improve disclosure and recognition of environmental liabilities in passing the Sarbanes-Oxley Act (Viscuso, 2007). However, corporations often continue to neglect their duty to disclose environmental liabilities for many reasons. The Financial Accounting Standards Board requirement that disclosed liabilities must be estimable and probable is used as a scapegoat for not disclosing information. Additionally, the threat of legal action, difficulty in determining liable parties, and the potential effect of reporting on shareholder returns complicate disclosure even further.

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This section outlined some of the existing literature on environmental liability disclosure, though it is not exhaustive. It highlighted the benefits and difficulties of contingent liability disclosure, characteristics of companies likely to recognize environmental liabilities, voluntary disclosure theory, past research on the relationship between environmental disclosure and environmental performance, and changes to the reporting environment since the passage of the Sarbanes-Oxley Act in 2002. This study seeks to decipher any changes in the types of environmental disclosures since the Sarbanes-Oxley Act in an effort to interpret the effects of the post Sarbanes-Oxley environment on both the disclosure and recognition of environmental liabilities. The following data and methodology section offers data description and statistical models used by this study to illuminate changes in environmental disclosure and contingent liability recognition.

Data and Methodology

Sources and Sample

The list of companies used for the statistical models and analysis in this study are procured from the Political Economy Research Institute's publication of The Toxic 100 Air Polluters index. The PERI Toxic 100 Air Polluters index identifies the highest U.S. air polluters in the world. The index relies on the U.S. Environmental Protection Agency's Risk Screening Environmental Indicators (RSEI), which identify and measure the human health risk from toxic releases. The original data for RSEI are the EPA's Toxics Release Inventory (TRI), where facilities across the United States report their toxic chemical releases with supplementary data, including the degree of pollutant

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toxicity and the endangered population exposure. The Toxic 100 Air Polluters ranks corporations based on the chronic human health risk from all of their facilities.

In addition to the Toxic 100 Air Polluters index figures, data are collected from the 2011 year-end financial statements and annual reports of the companies listed in the index. Financial statements and annual reports are downloaded from the Mergent Online Database. Mergent provides internet-based access to detailed comprehensive company information. Financial statements and annual reports both from 2002 and 2011 provide information to determine the impact of implementation of the Sarbanes Oxley Act. The following information is identified for each company in each year respectively:

- Recognition in Financial Reports (dollar amounts)
- Disclosure in Notes to Statements (word count)
- Discussed in MD&A (word count)
- Litigation Liability (binary)
- Remediation Costs (binary)
- Voluntary Pro-Environmental Policy (binary)

The Political Economy Research Institute's publication Toxic 100 Air Polluters index provides data ranking corporation performance as well as specific toxic release amounts, while corporate financial reports and annual reports provide the necessary company-specific data for analysis.

We draw the sample of companies used in the analysis from the 15 most improved polluting companies and the 15 companies showing the largest degradation in rank (among the top 100) from the 2002 to 2012 rankings.¹ Only companies that appear

¹ Progress Energy Inc. merged with Duke energy in July 2012. Constellation Energy merged with Exelon in March 2012. Shaw Group merged with CB&I in February 2013. Since data are collected from the 2011 year-end reports, the data should reflect financial realities prior to the merger and are therefore pertinent to this study.

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in both the 2002 and 2012 rankings qualified for the sample. A list of firms is provided in Table 1 on the following page.

Methodology

To evaluate if discretionary environmental disclosure has changed significantly since the passage of the Sarbanes-Oxley Act in 2002, this study analyses both environmental toxic release data and financial reporting data. The Toxic 100 Air Polluters index published by the Political Economy Research Institute provides toxicity values based on required company reporting to the EPA. Content analysis techniques are employed to analyze pertinent environmental disclosure information. Disclosure of environmental liabilities in the notes to financial statements and discussion of environmental issues in the Management Discussion and Analysis section of the company's annual report are valued by a word-count dedicated to the discussion of environmental matters. Content analysis also identifies the presence of litigation liabilities, remediation costs, and voluntary pro-environmental corporate policies using a binary code reflecting if such issues affected the company.

Word counts are collected after downloading financial statements and annual reports for all companies in the sample for both the 2002 and 2011 years from the Mergent Online Database. All company report documents are saved into searchable portable document format (PDF) computer files. We use the search function to locate all written references to the word "environment." Once all occurrences of the word "environment" are located, we manually read through the document and omit references to environments not related to applicable environmental issues. For example, references to "credit environment" or "investment environment" are not pertinent to this study and

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TABLE 1

*Most and Least Improved PERI Toxic 100 Ranking Companies.
(2012 versus 2002)*

Most Improved Companies	Least Improved Companies
Ford Motor Co.	Northrop Grumman Corp.
Dominion Resources Inc.	American Electric Power
International Paper Co.	Emerson Electric
Tesoro Corp.	Exelon Corp.
Boeing Co.	Berkshire Hathaway
Archer Daniels Midland Co.	Chevron Corp.
General Motors Corp.	Sunoco
Progress Energy Inc.	Honeywell International
AES Corp.	PPG Industries Inc.
E.I. du Pont de Nemours	Owens Corning
AK Steel Holding	Marathon Oil Corp.
US Steel Corp.	Public Service Enterprise Group
Weyerhaeuser Co.	Pfizer Inc.
Nucor Corp.	Shaw Group
Constellation Energy	Praxair Inc.

Source: Political Economy Research Institute (PERI). (2012). The toxic 100 air polluters. Retrieved, 2012, from <http://www.peri.umass.edu/toxicair2012/>.

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are therefore not included in the word count data. After identifying all environmental references in the documents, a word-count is collected for each company's documentation of environmental disclosure and discussion in both years. In addition, we make binary documentation for the presence of litigation liabilities, remediation costs, and/or voluntary pro-environmental policies. If environmental liabilities are recognized on the financial statements, the liability amount is also documented. All words used in paragraphs where environmental matters are discussed are included in the word-count in order to isolate discussion of environmental liabilities more precisely than by including all words used under broad statement heading titles. For example, this study does not include all words used in a section entitled "Contingent Liabilities" because many words in this section are dedicated to liabilities unrelated to environmental matters. However, this study does include all paragraphs from a "Contingent Liabilities" section that pertain to environmental issues.

Regression analysis is used to compare the air pollutant toxic release data with the information collected through content analysis. Absolute changes in a company's Toxic 100 Air Polluters index ranking are regressed against word-count values of disclosure of environmental liabilities in the notes to financial statements and discussion of environmental issues in the Management Discussion and Analysis section of the company's annual report in addition to the presence of company litigation liabilities, remediation costs, and voluntary pro-environmental corporate policies to investigate the correlation between environmental performance and financial disclosure. Absolute change references a company's change in rank on PERI's Toxic 100 list. A negative change represents a company moving from a higher rank in 2002 (higher polluter) to a

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lower rank (lower polluter) in 2012. For example, Ford Motor Company was ranked 7th in 2002 and 80th in 2012. Therefore, Ford Motor Company experienced a change of -73, illustrating an improvement in rank placement. A list of companies, their 2002 and 2012 ranking, and their absolute change in rank can be found in Table 2 on the following page. Both content and regression analysis are performed for each company in the sample in both years to inspect the efficacy of policy shifts due to the passage of the Sarbanes-Oxley Act as determined by data comparison.

Results and Analysis

We predict that investigation of PERI Toxic 100 Air Polluters 2002 data when compared with 2011 data will reveal that discretionary environmental recognition, disclosure, and discussion have increased significantly since the passage of the Sarbanes-Oxley Act. Both formal recognition and footnote disclosure provide information more likely to relate to adherence to accounting requirements, while Management Discussion and Analysis is prone to “window-dressing” behavior reflecting embellishment of past actions and future environmental promises. Thus, poor performers’ recognition and disclosure should logically increase because of legal requirements enforced through the passage of the Sarbanes-Oxley Act. Top performers’ discussion of environmental matters is expected to increase in the Management Discussion and Analysis section as these companies gain an advantage in pointing out their success to shareholders. This section offers statistical evidence to support or refute our hypotheses.

Financial data acquired from the Mergent Online Database provided data on environmental recognition. See Table 3 on a subsequent page for a summary of companies’ environmental recognition. Six of twenty (30%) of the companies analyzed

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TABLE 2

Absolute Change in Rank for Sample Companies.

Corporation	2002 Rank	2012 Rank	Absolute Change in Rank
Ford Motor Co.	7	80	-73
Dominion Resources Inc.	19	91	-72
International Paper Co.	27	95	-68
Tesoro Corp.	22	86	-64
Boeing Co.	13	64	-51
Archer Daniels Midland Co.	10	56	-46
General Motors Corp.	20	65	-45
Progress Energy Inc.	29	71	-42
AES Corp.	51	90	-39
E.I. du Pont de Nemours	1	36	-35
AK Steel Holding	16	49	-33
US Steel Corp.	2	33	-31
Weyerhaeuser Co.	42	72	-30
Nucor Corp.	14	41	-27
Constellation Energy	33	70	-37
Northrop Grumman Corp.	17	10	7
American Electric Power	35	24	11
Emerson Electric	56	40	16
Exelon Corp.	83	66	17
Berkshire Hathaway	34	16	18
Chevron Corp.	64	42	22
Sunoco	55	32	23
Honeywell International	44	17	27
PPG Industries Inc.	75	47	28
Owens Corning	45	15	30
Marathon Oil Corp.	84	51	33
Public Service Enterprise Group	48	11	37
Pfizer Inc.	89	43	46
Shaw Group	87	35	52
Praxair Inc.	88	30	58

Source: Political Economy Research Institute (PERI). (2012). The toxic 100 air polluters. Retrieved, 2012, from <http://www.peri.umass.edu/toxicair2012/>.

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TABLE 3

*Summary of Company Environmental Recognition.
(2012 versus 2002)*

Company	Recognition in Financial Reports (USD)	Change in Recognition (USD)
Boeing Co.	758,000,000.00	758,000,000.00
Boeing Co. '02	-	
E.I. du Pont de Nemours	316,000,000.00	(1,758,000,000.00)
E.I. du Pont de Nemours '02	2,074,000,000.00	
Honeywell International	723,000,000.00	648,000,000.00
Honeywell International '02	75,000,000.00	
International Paper Co.	1,958,000,000.00	(379,000,000.00)
International Paper Co. '02	2,337,000,000.00	
Progress Energy Inc.	16,000,000.00	16,000,000.00
Progress Energy Inc. '02	-	
Tesoro Corp	93,000,000.00	93,000,000.00
Tesoro Corp '02	-	

Source: Mergent Online Database. Retrieved, 2013, from www.mergentonline.com

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recognized environmental liabilities in the body of their 2011 financial statements. Of these six, two-thirds showed either stable or improved environmental spending. Both E.I. du Pont de Nemours and International Paper Co. showed an increase in environmental liabilities on their financial statements, but recognition was present in both 2002 and 2011 for both companies. Environmental recognition did not increase significantly contrary to our hypothesis.

Means testing between company disclosure in 2002 and 2011 reveals a significant difference between footnote disclosure between top performing and poor performing companies. Poor performers have increased their disclosure, while top performers show a marked decrease in disclosure since 2002. Figure 1, on the following page, shows a mean comparison test between poor performing company disclosures in 2002 and 2011. The resulting t-statistic (4.7135) shows that poor performing companies disclose significantly more in 2011 than in 2002. This difference between means is statistically significant at a 99% confidence level. This increase in poor performer disclosure is likely driven by policy requirements, as footnote disclosure is more prominent than management's discussion in annual company reports. The decrease in top performer disclosure is explained as a direct consequence of a decrease in environmental liability recognition required on the financial statements. Figure 2, on a subsequent page, shows a mean comparison test between top performers and bottom performers in 2011. The resulting t-statistic (-2.9497) shows that poor performing companies disclose significantly more than top performing companies in 2011. This difference between means is statistically significant at a 99% confidence level. Fewer recognizable environmental liabilities require less footnote explanation.

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FIGURE 1

Mean Comparison Results for Poor Performing Companies.

```
. ttest disclosure11== disclosure02
```

Paired t test

variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
disc1~11	10	873.4	157.6763	498.6164	516.7113	1230.089
disc1~02	10	502	117.5967	371.8733	235.9778	768.0222
diff	10	371.4	78.79428	249.1694	193.155	549.645

```
mean(diff) = mean(disclosure11 - disclosure02)          t = 4.7135
Ho: mean(diff) = 0                                     degrees of freedom = 9
```

```
Ha: mean(diff) < 0          Ha: mean(diff) != 0          Ha: mean(diff) > 0
Pr(T < t) = 0.9995          Pr(|T| > |t|) = 0.0011          Pr(T > t) = 0.0005
```

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FIGURE 2

Mean Comparison Results for Top Performing and Poor Performing Companies in 2011.

```
. ttest top11disclosure== bottom11disclosure
```

Paired t test

variable	obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
top11disclosure	10	327.7	63.42485	200.567	184.223	471.177
bottom11disclosure	10	873.4	157.6763	498.6164	516.7113	1230.089
diff	10	-545.7	184.9996	585.0202	-964.1983	-127.2017

mean(diff) = mean(top11disclosure - bottom11disclosure) t = -2.9497
 Ho: mean(diff) = 0 degrees of freedom = 9

Ha: mean(diff) < 0 Ha: mean(diff) != 0 Ha: mean(diff) > 0
 Pr(T < t) = 0.0081 Pr(|T| > |t|) = 0.0162 Pr(T > t) = 0.9919

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Means testing between company discussion in 2002 and 2011 provides further insight into environmental accounting changes. Discussion word-count reveals a large increase in management's discussion for both top and bottom performers across the board. Bottom performing company discussion means increased by 757.7 words from 2002 to 2011 while top performing company discussion means increased by 1090.2. This overall increase has two main implications. First, top performing companies, who have shown a marked decrease in footnote disclosure, are likely to boast about their positive accomplishments, driving discussion word-count up. Secondly, the overall increase in discussion (for both types of firms) elucidates the fact that this study's word-count data approach fails to account for the contextual meaning of the management's discussion. While word-counts are effective in expressing the amount of time dedicated to environmental issues discussion, they cannot reveal the connotation of such discussion, nor its intention. In particular, we do not know if the management's discussion reflects on the positive environmental accomplishments of the previous year or if the discussion merely lists promises for future environmental action.

Conclusions

This study seeks to understand if there has been a significant impact on environmental liability recognition within firms in the post Sarbanes-Oxley environment. Environmental liabilities are often brought to a company's attention like other contingent liabilities, such as claims and warranty costs, but environmental liabilities are distinctively problematic because recognition requires estimates that are both probable and estimable. The federal government has taken steps to improve disclosure and recognition of environmental liabilities in passing the Sarbanes-Oxley Act, but FASB

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liability requirements, the threat of legal action, determining liable parties, and the potential consequences to shareholder returns complicate financial recognition and disclosure.

We predicted that investigation of PERI Toxic 100 Air Polluters 2002 data when compared with 2011 data would reveal that discretionary environmental recognition, disclosure, and discussion have increased significantly since the passage of the Sarbanes-Oxley Act. Poor performers' recognition and disclosure would increase because of legal requirements enforced through the passage of the Sarbanes-Oxley Act, while top performers' discussion of environmental matters was expected to increase in the Management Discussion and Analysis section. Analysis shows that environmental recognition did not increase significantly, contrary to our hypothesis, though means testing between company disclosure in 2002 and 2011 reveals significant differences in footnote disclosure between top performing and poor performing companies. Poor performers have increased their disclosure, while top performers show a marked decrease in disclosure since 2002. The increase in poor performer disclosure is likely driven by policy requirements, as footnote disclosure is more prominent than management's discussion in annual company reports. The decrease in top performer disclosure is explained as a direct consequence of a decrease in environmental liability required on the financial statements; fewer recognizable environmental liabilities require less footnote explanation. In addition, discussion word-count reveals a large increase in management's discussion for both top and bottom performers. This increase implies that top performing companies use the Management Discussion and Analysis section to boast about

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environmental improvements, while bottom performers use it as a forum for promising environmental improvement in the years to come.

While this study raises important questions about environmental accounting, it has significant limitations. Primarily, the small sample of company data narrows the scope of our findings. More company data and different measures of environmental impact are needed to broaden the scope of this study. In addition, the word-count method used in valuing discussion in the Management Discussion and Analysis section of annual reports is oversimplified. Word-count analysis successfully communicates how often environmental liabilities were discussed but fails to factor in the meaning of the words used. Our word-count method was unable to differentiate between companies (usually top performers) discussing accomplishments of the past year and companies (usually poor performers) window-dressing what they promise to do in the future. Future research must value word-meaning in addition to word-count in its analysis. Furthermore, this study failed to investigate the significance of mean comparison results for top performing and poor performing companies in 2002. Mean comparison in 2002 is only meaningful if further research is done on company rank changes prior to that year. Caution is required in interpreting the results of this study, and we acknowledge its limitations.

The Sarbanes-Oxley Act of 2002 increased managerial responsibility for financial disclosure of environmental liabilities. Full recognition of environmental liabilities in corporate financial statements has not increased since 2002, but this study reveals important differences between companies showing improved environmental impact and those who have yet to implement changes. Understanding these differences is important

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for corporate financial health, for potential investors, and for all who rely on the stability and wellbeing of our physical environment.

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