Disclosure Responses to Mining Accidents: South African

Evidence

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Abstract

Mining activities generate significant social concerns in terms of employee safety and stakeholder scrutiny has increased considerably in recent years. Social and environmental accounting research is largely dedicated to environmental issues and the study of other components of social accounting is limited. This study examines safety disclosures in the annual reports, sustainability reports, and reactive corporate press releases of South African mining organisations following two major mining accidents occurring at Harmony Gold and Gold Fields' mines. Results show that organisations react to perceived legitimacy threats through increased safety disclosures. The entire mining industry evidences an increase in disclosure levels after the incidents, suggesting that organisations do respond to increased stakeholder scrutiny threatening their legitimacy. Furthermore, our results provide evidence of an association between safety disclosure levels and firm size, social performance, risk, and number of fatalities, while the media attention devoted to mining accidents appears to be unrelated to safety disclosure levels. It is possible that stakeholder pressure, which motivates corporate social disclosures according to legitimacy and stakeholder theories, consists of various factors, which combined form the motivation to report. Media attention, therefore, cannot be considered in isolation as a driver of disclosure. Rather, a combination of variables such as size, social responsibility performance, number of fatalities, risk, and media attention could serve as a proxy for social pressure.

Keywords: Safety disclosure, social responsibility, mining accidents, legitimacy, and stakeholder theory.

Introduction

The mining industry is essential to contemporary societies and economies, which cannot meet many basic needs without the minerals that mines supply. The mining industry faces difficult challenges compared to the industrial sector and is currently distrusted by many as it has failed to convince certain stakeholders that it has a 'social licence to operate'. (The Mining, Minerals and Sustainability Development (MMSD) Project, 2002). Since the mid 1990's, there has been a significant increase in the extent of research dedicated to social and environmental accounting (Deegan, 2002). Numerous studies have investigated disclosure responses to environmental matters, such as those conducted by Brown and Deegan (1998), O'Donovan (2002) and Deegan, Rankin and Voght (2000). However, the majority of these social and environmental accounting studies consider disclosure responses to legitimacy threats related to environmental issues. There is limited published research concerning responses to social legitimacy threats arising from a specific major incident, such as those reported by Patten (1992), Blacconiere and Patten (1994), Walden and Schwartz (1997), Deegan *et al.* (2000) and Cho (2009).

Mining activities generate significant social concerns in terms of their environmental impact and the health and safety of employees. Accordingly, there are an increasing number of industry stakeholders expressing concern about the social impact of mining activities. Recently, a mining accident in New Zealand in which twenty-nine mineworkers were killed and, the Chile mining disaster which trapped thirty-three mineworkers underground for an excess of sixty-nine days, captured the world media's attention and has highlighted the hazardous nature of mining and heightened awareness of mine safety issues. This study contributes to the existing literature by reviewing South African mining organisations' disclosure reactions to two specific major mining accidents with substantial social impacts due to the loss of human life.

This study contributes to existing literature regarding the application of legitimacy theory, stakeholder theory and media agenda-setting theory by examining the disclosure responses of South African mining organisations to mining accidents generating increased media attention, as well as the factors driving disclosures in these circumstances. The majority of social and environmental accounting studies considering these theories focus on environmental accounting and this study adds a social accounting setting. This study also develops a disclosure quality checklist that is specific to the mining industry, which future research

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considering the social implications of mining activities can use. The results of this study may be of interest to policy-makers, government and NGO's in the on-going debate regarding whether social disclosures reflect social performance and should be regulated. The results may be of interest to global as well as local accounting and other standard-setting bodies who are currently investigating the development of social and environmental disclosure guidelines and the regulation of these disclosures[1]. The results of this study may also be of relevance to the ongoing debate in South Africa regarding the nationalisation of the country's mines, which the African National Congress Youth League is currently advocating.

The remainder of this paper is set out as follows: Theoretical Perspectives contains a discussion of legitimacy, stakeholder, and media agenda-setting theories, followed by a discussion of the selected mining accidents. The subsequent sections present the hypotheses development and research methods, along with a discussion of the sample selection criteria. This is followed by a discussion of the results of the hypotheses testing and finally a discussion of the conclusions, limitations, and opportunities for future research.

Theoretical Perspectives

Legitimacy Theory

The majority of legitimacy management literature examines organisations' attempts to repair their legitimate status following highly publicised negative events (Patten, 1992; Deegan & Rankin, 1996; Brown & Deegan, 1998; Cho, 2009). Therefore, social disclosures are a tactical method that organisations utilise in order to manage their legitimacy. Legitimacy refers to a collective awareness and recognition of an organisation in its industry as being appropriate and acceptable (Aerts & Cormier, 2009). Without disclosure of relative information, this collective awareness and the organisation's legitimating strategies will largely go unnoticed and therefore not bring any value to the organisation attempting to manage their legitimacy.

Stakeholder Theory

While both legitimacy and stakeholder theories conceptualise organisations as a component of a broader social structure, stakeholder theory adopts a more refined viewpoint by considering

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[1] For example, the Global Reporting Initiative Sustainability Reporting Guidelines and Indicator Protocols, which is considered the benchmark of best practice, and the King Code of Governance for South Africa 2009, published by the Institute of Directors South Africa.

particular stakeholder groups within the social order (Deegan & Unerman, 2006). Stakeholder theory purports that, as diverse stakeholders have various opinions regarding how an organisation should conduct its operations, there will be numerous "social contracts" negotiated with different stakeholders rather than a single general contract with society (Deegan & Unerman, 2006). Accordingly, the organisation's sustained operation requires the support of various stakeholder groups, with the more influential or powerful a stakeholder group, the greater the organisation's incentives to adapt its operations or manage stakeholder perceptions (Gray, Kouhy, & Lavers, 1995a).   In conjunction with legitimacy theory, stakeholder theory therefore suggests that disclosures will be made to gain or maintain legitimacy with powerful stakeholders.

Media Agenda-Setting Theory

According to media agenda-setting theory, increased media attention causes an increase in society's concern for a particular matter, thereby shaping public priorities (Deegan & Unerman, 2006). Should an increase in community concerns arise, the organisation may perceive a threat to its legitimacy and accordingly implement remedial strategies.   The significance of an issue to stakeholders and the extent of pressure placed on the organisation to retain their legitimacy, influence the prominence of an issue in the media (Brown & Deegan, 1998).[2]

Prior Research

Brown and Deegan (1998) found that variations in media attention are associated with variations in disclosure and that not all industries react in the same manner, while Aerts and Comier (2009) found that negative media attention drives reactive press releases but not annual report disclosures. O'Donovan (1999) suggests that management discloses information for its own, rather than users, purposes and unfavourable changes in community perceptions of an organisation's actions provide motivation for the organisation to manage these changing public perceptions. O'Donovan (2002) found that the importance of an environmental issue has a significant impact on disclosure decisions, with most disclosure decisions based on a favourable presentation of the organisation. De Villiers and Van Staden (2006) found that a

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[2] The media has the ability to shape public opinion and therefore increase stakeholder pressure. The media also reflect issues of concern to the public (stakeholders). For the purposes of this paper, media attention includes both elements and we do not distinguish between the 'shaping' and 'reflecting' role of the media.

reduction in environmental reporting followed a preliminary period of increased disclosure due to a lack of support from powerful stakeholders for environmental issues.

When considering the impact of environmental disasters, Patten (1992) found a considerable increase in environmental disclosures of other petroleum firms after the Exxon *Valdez* oil spill. Deegan *et al.* (2000) found that organisations provided significantly greater levels of *ex post* incident-related disclosures after a significant social incident, while Cho (2009) found that Total SA used communication strategies to legitimise their activities following the Erika and AZF incidents.

Means of Disclosing Social Information

According to the political economy perspective, financial reports are social, political, and economic documents that can be utilised as a means of legitimising issues contributing to organisations' interests (Deegan & Unerman, 2006). The annual report is a public relations document which management utilises to manage public perceptions regarding the organisation and industry (O'Donovan, 2002; Deegan *et al.*, 2000). Therefore, according to the managerial branch of stakeholder theory, powerful stakeholders identified by the organisation are the intended audience of annual report disclosures.

Stakeholder theory emphasises the need for an organisation to identify powerful stakeholders to which it is accountable and to maintain a good relationship with these stakeholders, which could include the voluntary publication of information (Van Staden, 2003). Stakeholders are powerful when they can directly control the resources the organisation requires to operate. The most powerful stakeholders in the South African economy are labour and their representatives, being labour unions and the African National Congress (ANC) (Cahan & Van Staden, 2009).

The African National Congress (ANC) is the current ruling political party in South Africa and comprehensive labour laws have demonstrated the government's readiness to intervene on behalf of labour (Van Staden, 2003). The National Union of Mineworkers (NUM) is the largest trade union in the history of South Africa and is South Africa's most influential labour union (Buhlungu & Bezuidenhout, 2008). Therefore, it is arguable that the powerful stakeholders influencing the disclosure decisions of mining organisations are investors, who have to potential to withhold or withdraw financial support; the government, who has the

ability to order safety stoppages resulting in the loss of income through decreased production; and labour unions, which have the power to instigate labour strikes.

Previous social and environmental accounting studies mainly consider annual report disclosures as the primary communications channel and the majority of these studies are dedicated to environmental issues. However, annual report disclosures comprise a single component of an organisation's public communications (Aerts & Cormier, 2009). Corporate social reporting content analysis studies that only examine the annual report could therefore risk underestimating the extent of social disclosures, and focusing exclusively on annual report disclosures may yield irrelevant or misleading results (Unerman, 2000). Other means of communication have been widely used by organisations in order to convey non-financial information, such as corporate press releases and corporate social responsibility reports (i.e. sustainability or triple-bottom-line reports) (Cho, 2009; Unerman, 2000). Therefore, this study utilises annual reports, sustainability reports, and reactive corporate press releases to measure the disclosure reactions of mining organisations to legitimacy threats arising from major mining accidents.

The majority of social and environmental accounting research has investigated environmental issues and there is, therefore, an absence of literature related to social disclosures. This study contributes to existing literature regarding application of legitimacy, stakeholder and media agenda-setting theories, and their application in social and environmental accounting by examining the disclosure responses of South African mining organisations to perceived legitimacy threats arising from mining accidents that generated increased media attention. This study also develops a disclosure index checklist, based on prior literature, which future research can use as a measure, or as a basis for the measure, of the quality of safety disclosures.

In summary:
- The media can influence public perceptions and priorities regarding social issues (media agenda-setting theory);
- When the activities of an organisation do not comply with society's expectations, legitimacy is perceived to be threatened and management is predicted to implement remedial strategies (legitimacy theory);

- The disclosure responses that management utilises to respond to perceived legitimacy threats are predicted to be focused on the needs of powerful stakeholders (stakeholder theory);
- Management does respond to public pressure from negative press (O'Donovan, 1999);
- Management uses annual reports, sustainability reports and reactive corporate press releases to reduce the effect of legitimacy threatening events (Deegan *et al.*, 2000; Van Staden & Hooks, 2007; Cho, 2009; Aerts & Cormier, 2009).

Mining Accidents

This study considers two incidents occurring in South African mines in recent years that generated considerably more media attention than other incidents. Increased media coverage of an accident in comparison to other incidents could influence, according to media agenda-setting theory, stakeholder perceptions. We use print media reports obtained from a keyword search on the SA Media database, as a proxy for media attention, as all forms of media contain repetition of other sources, for the period 01 January 2000 to 01 January 2009.

Hypotheses Development

The occurrence of major mining accidents has significant social implications and may bring the legitimacy of the mining organisation into disrepute, thereby causing stakeholders to consider revoking the "social contract".

Organisations use various means to communicate with powerful stakeholders in response to legitimacy threats, as enumerated in preceding paragraphs. Organisations responsible for the major mining incidents are likely, based on legitimacy and stakeholder theories, to implement remedial strategies in order to repair their legitimate status with stakeholders. Other organisations in the mining industry, which were not directly responsible for the accidents, are likely to disclose information regarding their safety performance, initiatives, activities, policies and procedures that limit the probability of a major mining accident occurring at their mines. Other organisations in the same industry will therefore adopt a proactive approach to managing their legitimacy.

Therefore, if there is increased concern amongst powerful stakeholders regarding mining accidents because of increased media attention, thereby threatening the organisations'

legitimacy, organisations will respond through increased safety disclosures. It is therefore hypothesised that:

H$_1$: Organisations in the mining industry are likely to increase the quality and extent of safety disclosures in the annual report, sustainability report, and reactive corporate press releases following a major mining accident.

As the disclosures of a single industry are analysed, the generalizability and construct validity of the results could be questionable. In order to address the validity threat due to the absence of industry variations and control groups, this study separates the mining industry into "gold mining organisations" and "other mining organisations". Gold mines are the most dangerous in South Africa and have higher accident and injury rates than other mines (Eweje, 2005). Gold mining is also the subsector of the mining industry directly impacted by the selected accidents, as the two incident organisations identified were primarily engaged in gold mining activities. The "other mining industry", comprising all mining activities other than gold mining, may not view incidents affecting the gold mining industry as a threat to their legitimacy due to the "bad reputation" of South African gold mines. Therefore, other mining organisations may not react to negative publicity directed at the gold mining industry. Consequently, the next hypothesis predicts the quality and extent of safety disclosures to be higher for gold mining organisations than other mining organisations due to the increased legitimacy threat. Thus, it is hypothesised that:

H$_2$: Increases in the quality and extent of safety disclosures for the gold mining industry (being the industry experiencing the incidents) are likely to be more significant than the disclosure increases of other mining organisations.

It is also hypothesised that organisations directly responsible for the major mining accidents will perceive their legitimacy to be in more serious jeopardy than other organisations operating in the same industry. Stakeholders may transfer their support to competitors in the same industry who have greater legitimacy. Organisations directly responsible for the accidents face the possibility of production stoppages due to strikes and government sanctioned closures along with the loss of investors' financial support. These organisations will therefore seek to repair their legitimacy, while other mining organisations will attempt to maintain their legitimacy. The organisations directly responsible for the accidents will therefore seek to bring their legitimate status in line with those of their competitors. Therefore, we predict the increases in the quality and extent of safety disclosures, following a

major mining accident, of organisations directly responsible for the incidents to be greater than the disclosure increases of other organisations in the mining industry, irrespective of mining activity. Consequently, it is hypothesised that:

> H_3: Increases in the quality and extent of safety disclosures made by the organisations directly responsible for the mining accident are likely to be more significant than the disclosure increases of other organisations operating within the mining industry, irrespective of whether the other organisations conduct gold mining or other mining activities.

Previous social and environmental accounting studies (Brown & Deegan, 1998; Deegan *et al.*, 2000; Aerts & Cormier, 2009) have found that the prominence of an issue in the media influences various forms of corporate communications. Aerts and Cormier (2009) found that negative media attention results in increased disclosures in reactive corporate press releases and, Brown and Deegan (1998) found evidence supporting the media agenda-setting assumption that variations in media attention are associated with variations in social disclosures. As increased media attention increases stakeholder awareness and concern for social and environmental issues, organisations may perceive their legitimacy to be threatened and will accordingly implement remedial strategies (Deegan & Unerman, 2006). Therefore, we propose that increases in the extent of media attention directed at mining accidents will correspond with an increase in the extent and quality of safety disclosures made by mining organisations. The final hypothesis is therefore:

> H_4: The extent of media coverage of mining accidents is likely to be significantly and positively associated with the quality and extent of safety disclosures made by mining organisations.

As indicated above, predictions made by legitimacy, stakeholder, and media agenda-setting theories are utilised as the basis for the development of these hypotheses. Prior research supports these predictions, a number of which we quote above. Content analysis, proportion of pages and sentence counts are utilised as measures of the quality and quantity of safety disclosures in order to test the hypotheses.

Method

Content Analysis Checklist

This study develops and utilises a content analysis disclosure checklist as a measurement technique to establish trends in social disclosures in response to major mining accidents. The content of the annual reports, sustainability reports, and reactive corporate press releases are analysed and coded in terms of the checklist classifications. Content analysis methodology is frequently used in social and environmental accounting research, such as Cho (2009), De Villiers and Van Staden (2006), Patten (2002) and Blacconiere and Patten (1994). Content analysis in the context of social and environmental accounting provides increased insight into empirical observations of actual practice and an understanding of the relationship between the organisation and externalities (Guthrie & Abeysekera, 2006).

An eighteen-point checklist developed by De Villiers and Van Staden (2006), amended for the context of this study, serves as the basis for the development of the disclosure checklist. This study updates the disclosure checklist for the current Global Reporting Initiative (GRI) Sustainability Reporting Guidelines along with Indicator Protocols Set Labour Practices and Decent Work (LA) Mining and Minerals Sector Supplement, and the Johannesburg Stock Exchange (JSE) Sustainability Reporting Index (SRI). Checklist classifications comprise items that quantify safety information, provide financial information in respect of safety issues, and disclosure of safety performance. Safety information can therefore indicate the extent of an organisation's safety concerns relating to mining accidents.

In order to capture differences in the information contained in narrative disclosures, the content of each sentence was evaluated (Walden & Schwartz, 1997; Hughes, Anderson & Golden, 2001). During this analysis, disclosures were categorised according to the disclosure checklist and each disclosure scored according to a quality scale. The five-point quality scale developed by Van Staden and Hooks (2007) was used as follows: 0 = no disclosure; 1 = minimum disclosure, little detail and general terms; 2 = descriptive, effect on firm or policies clearly defined; 3 = quantitative, effect clearly defined in monetary values or physical quantities; 4 = comprehensive, extensive disclosure benchmarking against best practice. In order to evaluate the quality of social disclosures, we read each report, noted the presence of safety information by page number, and highlighted the disclosure. We then examined the disclosures, categorised them according to the disclosure checklist criteria and assigned a

score for each item. These procedures are consistent with those utilised by Hughes *et al.* (2001) and Van Staden and Hooks (2007).

While numerous corporate social reporting studies measure social disclosures using number of characters, words or sentences (such as Walden and Schwartz, 1997; Brown and Deegan, 1998; Deegan, *et al.,* 2000; Hughes *et al.,* 2001), it is arguable that no consideration is afforded to non-narrative disclosures (for example, photographs or graphs). A significant assumption in the utilisation of quantitative content analysis as an empirical research tool is that the extent of disclosure signifies the importance of an issue to the organisation (Deegan *et al.*, 2000). Therefore, it would be inappropriate to omit the extent of non-narrative disclosures from our study (Unerman, 2000).

We measure the extent of disclosure as the proportion of pages of the total combined corporate disclosures made in the annual reports, sustainability reports and reactive corporate press releases dedicated to safety disclosures. We determine the proportion using a grid as per Gray, Kouhy and Lavers (1995b) and Unerman (2000). As per Unerman (2000), the grid comprises twenty-five rows of equal height and four columns of equal width. The grid was placed over each disclosure page, with the extent of disclosure measured as the number of cells on the grid utilised by the disclosure (making adjustments for blank portions of pages).

The number of sentences dedicated to safety disclosures serves as a robustness check for the grid methodology in order to enhance the reliability and validity of the results. We exclude pictures from the sentence count and convert graphs, tables, and captions into sentences for counting (following Deegan *et al*., 2000 and Van Staden and Hooks, 2007). A comparison of the results of the robustness check and the grid methodology was reconciled for major discrepancies.

Social and environmental accounting research is increasingly utilising information published on organisations' websites when considering corporate social disclosures. The only information obtained from the organisations' websites for the purposes of our study was reactive corporate press releases and we did not consider other information published on the internet. Due to the grid methodology applied as a measure of extent of disclosures, namely proportion of pages, there are concerns regarding the reliability of the results when converting electronic information into a proportion of total pages. There are also inherent difficulties in

measuring disclosures made on organisations' websites due to the changing nature of websites. Therefore, we do not consider social information disclosed on the organisations' websites, which could be a possible limitation. However, information published on the internet is often a repetition of information disclosed in organisations' annual reports, sustainability reports, and corporate press releases.

Statistical analysis

We use statistical analysis to test our hypotheses. For hypothesis one to three we use means tests (independent samples t-test) and tests of medians (Mann-Whitney U test) to provide both parametric and non-parametric tests. To test hypothesis four we use a multivariate analysis with variables based on prior literature to identify whether the extent of media coverage of mining accidents is likely to be significantly and positively associated with the quality and extent of safety disclosures made by mining organisations, while controlling for other factors that could influence disclosures. We use media attention and number of fatalities as independent variables, as well as a range of control variables consisting of firm size, social performance, and risk. Studies investigating the disclosure of environmental information commonly use these variables, or the basis for these variables, as a proxy for items likely to affect organisations' social and environmental disclosures.

Dependent Variables

The three measures of safety disclosures used in testing Hypothesis One to Three, namely disclosure index scores, proportion of pages and number of sentences, form the dependent variable in three separate models measuring disclosure levels.

Variables of Interest (Independent Variables)

Media Attention (MEDIA)

Information provided by the media is distributed more broadly than stakeholder opinions and, as a result, are likely to greater influence stakeholder perceptions of an organisation (Aerts & Cormier, 2009). According to media agenda-setting theory, increased media attention causes an increase in stakeholder concern for an issue and thereby shapes public priorities (Deegan & Unerman, 2006). Studies conducted by Brown and Deegan (1998) and Deegan *et al.* (2000) extend legitimacy theory research by examining the role of media exposure in organisations' social disclosures. The results of these studies suggest that higher levels of media attention to environmental issues increase public policy pressure, thereby causing an increase in

environmental disclosures. However, more recent studies such as Patten (2002) and Aerts and Cormier (2009) provide conflicting results. Patten (2002) finds that substantial media attention is not necessarily a driver of changes in disclosures resulting from public policy pressure, while Aerts and Cormier (2009) find that negative media attention motivates press releases but not annual report disclosures. As prior research therefore provides varied results as to the importance of media attention as a driver of legitimating social disclosures, the independent variable MEDIA attempts to determine whether the extent of media coverage influences the level of disclosure. As we include reactive corporate press releases in the disclosures analysed, the variable MEDIA is predicted to have a positive association with the level of disclosures, based on the findings of Aerts and Cormier (2009), Deegan *et al.* (2000) and Brown and Deegan (1998).

The number of print media reports during each financial year in respect of mining accidents serves as a proxy for media attention and we obtained the media reports from a keyword search of the SA Media database[3].

Number of Fatalities (FATAL)

A factor that could be driving safety disclosures is the number of fatalities experienced annually by each organisation. A positive relationship is likely to exist between the annual number of fatalities an organisation experiences and the level of safety disclosures reported. The poorer an organisation's safety performance, measured in terms of fatalities, the greater its health and safety exposure and the more the media attention the organisation will attract. This increase in media attention poses a threat to the organisation's legitimacy, thereby causing an increase in disclosures in an attempt to maintain or restore their legitimate status in stakeholder perceptions (Aerts & Cormier, 2009; Brown & Deegan, 1998). We expect a positive association between the number of fatalities and the level of disclosures.

We obtained the number of fatalities for each organisation from statistics presented in the annual reports and sustainability reports of each organisation for each year of the sample period.

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[3] The SA Media database comprises more than one hundred and twenty South African newspapers and periodicals. The print media reports are categorised according to twenty-two categories and indexed in English and Afrikaans. The database is one of the most comprehensive press cutting services, offering access to a database consisting of more than 3 million newspaper reports and periodical articles which have been indexed on computer since 1978.

Control Variables

Firm Size (SIZE)

Numerous studies find that firm size influences the quality and extent of social disclosures. The results of prior literature suggest that the level of social disclosure is positively associated with the size of the organisation (Patten, 1992; Gray *et al.*, 1995a; Cormier & Gordon, 2001; Van Staden & Hooks, 2007; Da Silva Monteiro & Aibar-Guzman, 2009; Aerts & Cormier, 2009). Firm size affects organisations' public visibility and thereby increases public scrutiny (Aerts & Cormier, 2009). Larger organisations, therefore, experience increased pressure to disclose more social information than smaller organisations do. The disclosure of social information is costly and, in comparison to smaller organisations, larger organisations are better equipped with the financial and technical resources necessary to prepare and disclose the social information (Da Silva Monteiro & Aibar-Guzman, 2009). Therefore, we predict a positive association between the control variable SIZE and the level of safety disclosures.

Previous studies measure firm size by various means, such as revenue, total assets, number of employees etc. For the purposes of this study, the log of total assets is used as a measure of firm size (SIZE), as total assets is not normally distributed with a range of 4 702 to 61 091 000 (R'000) (untabulated) whereas the range for log of total assets amounts to 3.670 to 7.790 per Table 4.

Social Performance (SRI)

Documentary evidence of social responsibility performance could have a direct influence on how the media perceives an organisation's activities (Aerts & Cormier, 2009). The media perceptions of an organisation influence stakeholder perceptions and thereby threaten the organisation's legitimacy and influence disclosures, which are a means to manage legitimacy (O'Donovan, 2002; Deegan *et al.*, 2000). Therefore, the Johannesburg Stock Exchange Sustainability Reporting Index (SRI) Best Performers listing serves as proxy for social performance. The Johannesburg Stock Exchange (JSE) classifies best performers as organisations that meet their relevant environmental threshold and all relevant core indicators in relation to society and governance and related sustainability concerns (Johannesburg Stock Exchange SRI Index, 2009). The JSE launched the SRI Index in South Africa in May 2004 to identify organisations that integrate the principles of triple-bottom line reporting and good corporate governance into their business activities. The SRI Index aims to provide a tool for

the holistic assessment of organisations' activities against globally recognised and locally relevant corporate responsibility standards and aid investors in making responsible investment decisions (Johannesburg Stock Exchange, 2009).

If an organisation achieves the status of a good corporate citizen, stakeholders will have certain expectations in relation to their social activities and, the greater the organisation's legitimacy the more maintenance will be required, and consequently those organisations are expected to have a greater level of social disclosure (O'Donovan, 2002). High levels of disclosure will therefore be required in order to keep their legitimate status on sure footing as, without disclosure, there is no awareness of social and environmental performance, and stakeholders cannot confer legitimacy. If an organisation attempts to promote itself as a good corporate citizen, maintaining their legitimacy will require them to exceed stakeholder expectations and these organisations will have continuously higher levels of disclosures (O'Donovan, 2002). However, organisations that have "bad reputations" for their social and environmental performance and activities are likely to publish high levels of social disclosures in order to try to gain or repair legitimacy and improve stakeholder perceptions. Legitimacy is far easier to maintain than to repair or gain (O'Donovan, 2002). Therefore, as it can be argued that both legitimate and non-legitimate organisations will have high levels of disclosures, no prediction is made for the association between the control variable SRI and safety disclosure levels.

The social performance variable (SRI) is defined as a dichotomous variable that assumes the value of 1 for each year that the relevant organisation achieves recognition on the Johannesburg Stock Exchange Sustainability Reporting Index Best Performers listing in the High Impact[4] category and 0 otherwise. This is as the listing does not provide rankings but presents the organisations in alphabetical order by environmental impact category.

Primary Mineral Extraction Activity (RISK)
The results of the hypotheses testing suggest that the primary mineral extraction activity of an organisation could have an impact on the level of safety disclosures. Untabulated results indicate that organisations primarily engaged in gold mining activities have the highest level

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[4] All business activities have an impact on the environment to varying degrees. The SRI Index therefore classifies organisations according to the extent of their environmental impact as being high, medium or low impact. (Johannesburg Stock Exchange, 2009).

of safety disclosures while diamond-mining organisations have the lowest level of safety disclosures. Therefore, the control variable RISK determines the impact of the type of mineral extraction activity on the safety disclosures. This variable also serves to control for industry in that it considers the specific subsector of the mining industry that the organisation is primarily involved. Organisations involved in mineral extraction activities with higher fatality rates are more likely to have higher levels of safety disclosures than organisations involved in mineral extraction activities with lower fatality statistics, due to the increased legitimacy threat. Therefore, this study predicts a positive association between RISK and safety disclosure levels.

The Department of Minerals and Energy publishes mining fatality statistics classified according to the type of minerals in their Mine Health and Safety Inspectorate Annual Report (Department of Minerals and Energy, 2008/2009). These statistics are used to create the following variables: Gold mining = 7, Platinum = 6, Coal = 5, Other = 4, Diamonds = 3, Chrome & Iron Ore = 2, Copper = 1, Manganese = 0. A rating of 7 indicates a very high-risk type of mining industry and 0 denotes a very low risk mining industry. The fatality statistics presented in the Department of Minerals 2008/2009 Annual Report are categorised from highest to lowest and a weighting assigned to each mineral classification, with the highest weighting value assigned to the highest fatality statistic. There are no significant fluctuations in the weighting categories over the sample period. Therefore, the 2007 fatality statistics, which are the latest statistics published in the Department of Minerals and Energy 2008/2009 Annual Report serves as proxy for RISK. As a sensitivity analyses, the model was rerun using dichotomous variables of ONE for high risk mining activities and ZERO for low risk mining activities, with diamond mining serving as the cut-off point for the low risk classification. No significant variations occur between these untabulated results and the results presented in Tables 5 and 6.

Model

The model is tested separately for each measure of disclosure analysed during the hypothesis testing, namely, disclosure index scores (Index), number of sentences (Sentences) and proportion of pages (Proportion), thereby providing a measure of disclosure quality and quantity, for each year under analysis. Thereafter, additional dichotomous variables (YEARDUM) for each financial year are included in the model to control for the influence of the different years. The final model is therefore:

$$Disclosure = \beta_0 + \beta_1 MEDIA + \beta_2 FATAL + \beta_3 SIZE + \beta_4 SRI + \beta_5 RISK + \beta_6 YEARDUM + e$$

Sample

The population of this study consists of organisations conducting mining operations in South Africa, with the unit of analysis being the individual mining organisations. The sample consists of all organisations conducting mining operations in South Africa that are classified on the McGregor BFA database[5], across all boards of the Johannesburg Stock Exchange (consisting of the Main Board, ALT-X, Development Capital, Venture Capital and the African Board), belonging to the mining sector. The selected organisations are required to have annual reports available for a consecutive period of five years from 2005 to 2009 and for mining operations to be the primary business activity for the entire sample period. The reasons for selecting these years are as follows:

- 2009 is the latest available reporting date at the time of this study and recent information is the most useful and relevant;
- Consecutive years take into consideration potential lag effects;
- Five years are adequate to identify changes in disclosure over a period; and
- The identified mining accidents occurred during late 2007 and early 2008.

Annual reports serve as the selection criterion as they are the primary means of stakeholder communication. Many mining organisations conduct mining operations in several different countries. Therefore, as a further sample selection criterion, organisations are also required to conduct a significant portion of their mining activities in South Africa. For the purposes of this study, a "significant portion" is fifty percent of the organisation's turnover derived from South African mines. We obtained annual reports, sustainability reports, and reactive corporate press releases from the BFA McGregor database and company websites.

This study considers the potential for the selected incidents to be an event after the reporting period in terms of International Financial Reporting Standards. An event after the reporting period is an event occurring between the end of the reporting period and the date when the report is authorised for issue (International Accounting Standards Board, 2010). Therefore, the dates of the directors' declaration in the annual reports were inspected to determine whether the accidents could amount to an event after the reporting period, which would affect

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[5] The McGregor BFA provides stock market information and research data and news.

the disclosures made in reports for years ending prior to the accidents. Accordingly, if the mining accident occurred during or after the financial year-end but before the date of the directors' declaration, the report is considered to be affected by the incident, as opposed to using the end of the reporting period as the allocation criteria. This method of allocation is similar to that of Deegan *et al.* (2000).

Results

Hypothesis One

Table 1 shows variations in the disclosure quality and extent of all organisations operating in the mining industry for the years prior and subsequent to the mining accidents, as well as the years affected by each incident. Panel A provides the results of the analysis with the disclosure index score as the measure of disclosure quality; Panel B gives the proportion of pages as a measure of disclosure extent, and Panel C the number of sentences. The first comparison examines the increase in disclosure levels from before the incident to the incident year. The mean disclosure quality almost doubles during the period before the mining accidents and the incident year, with Panel A reflecting an increase in mean disclosure index scores from 22.132 to 40.526 (t = 7.202 significant at the 0.01 level). There are also significant increases during the first comparison for the proportion of pages and number of sentences, with mean disclosures increasing from 0.009 to 0.017 (t = 5.349 significant at 0.01) and 40.009 to 93.263 (t = 3.939 significant at 0.01) respectively, per Panel B and C. The Mann-Whitney test only shows significance for sentences, i.e. the median sentences increase significantly from before the incident to the incident year.

<< Insert Table 1 >>

The second comparison examines fluctuations in disclosure levels before and after the major mining accidents. Again, we see significant increases at the 1% and 5% levels (however, the Mann-Whitney test is not significant for proportion of pages). The final comparison examines fluctuations in disclosures from the incident year to the period after. Here we see significance when using the t-test while the Mann-Whitney test only shows significance for sentences.

Our results (Table 1) therefore support hypothesis one, which predicts that the entire mining industry is likely to increase the quality and extent of safety disclosures following a major mining accident.

Hypothesis Two

Hypothesis two relates to whether the increases in the quality and extent of safety disclosures of the gold mining industry (the industry experiencing the major incident) are more significant than the disclosure increases of other organisations operating within the mining industry. Table 2 shows that generally the gold mining industry reflects a greater increase in the extent and quality of safety disclosures than other mining organisations. The first comparison examines the increase in disclosures from before the incidents to the incident year. There are no significant differences between the disclosures of the gold mining and other mining for this comparison.

The second comparison examines the increase in disclosure levels before and after the major mining accidents. Here we see that only for sentences there is a significant difference with gold mining companies disclosing significantly more (at the 5% level) sentences than other mining companies.

<< Insert Table 2 >>

The third comparison examines increases in disclosure levels from the incident year to the period after. Here we see that only for proportion of pages there is a significant difference with gold mining companies disclosing significantly more (at the 5% level) than other mining companies.

The results for the comparison of increases in disclosure therefore only provide limited support for hypothesis two.[6]

Hypothesis Three

Table 3 presents the results of the hypothesis testing for hypothesis three where we compare the results of organisations directly impacted by the major mining accidents (grouping Incident) to those of organisations that did not experience a major incident (grouping Non-incident). The first comparison examines the increase in disclosure levels from before the accidents to the incident year. The organisations experiencing a major incident display a higher mean increase in disclosure levels compared to the non-incident organisations.

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[6] One of the reasons for lack of statistical significance could be the low number of companies (4) in the gold mining group, as a visual comparison of the means suggest significant differences in most instances, yet statistical significance is only achieved in two cases.

However, none of these are significant except for sentences. The second comparison examines the disclosure increases for the period before the accidents to after. The mean increase in disclosure levels for sentences is significantly higher for the incident organisations but none of the other measures are significant. The third comparison examines the increase in disclosure levels from the incident year to the period after. Only proportion of pages gives a significant result.[7]

Our results give limited support for hypothesis three, which proposes that increases in safety disclosures made by the organisations directly responsible for the mining accidents are likely to be more significant than the disclosure responses of other organisations.

<< Insert Table 3 >>

The results of the hypothesis testing for hypothesis one to three show that the entire mining industry is likely to increase the quality and extent of safety disclosures following a major mining incident that threatens their legitimacy. The results further show that the increase is more significant for organisations operating within the gold mining industry, which was the affected subsector. The increases in safety disclosures made by organisations directly responsible for the mining accidents (the incident organisations) are also likely to be more significant than the disclosure increases of other organisations engaged in mining activities, but the last two hypotheses are not supported by all the disclosure measures analysed.

Hypothesis Four

Since hypothesis one to three shows that mining organisations increase their disclosures following a major mining accident, it would be of relevance to find the factors that may have influenced these disclosures.

Descriptive Statistics

Table 4 reports the descriptive statistics regarding the sample organisations' dependent and independent variables. The mean media exposure is 23.6 articles per organisation. Firm size, on average, is large, as can be expected from mining organisations, with a mean log of total assets of 6.327. The number of fatalities approaches six fatalities per organisation. The

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7 Again this lack of significance could be influenced by the small number of companies (2) in the incident group, see previous footnote. See also the first sensitivity test (Point-Biserial Correlation) in the further analysis section.

disclosure index scores are very low with a mean score of 27.021 out of a possible 136. The mean number of sentences is 60.705 while the mean proportion of pages is only 1%.

<< Insert Table 4 >>

Bivariate Analysis

Table 5 presents the Pearson correlations for the variables. The results for the independent variable, media exposure (MEDIA), provide some support for hypotheses four, which predicts that the extent of media coverage of mining accidents is likely to be significantly and positively associated with the level of safety disclosures, as media attention is significantly correlated with the disclosure index score at the 0.05 level. No correlation is present between MEDIA and number of sentences and proportion of pages. The highest correlation between any of the independent variables is 0.522 for SIZE and FATAL and therefore, there is no basis for concerns regarding multicollinearity.

The number of fatalities is significantly correlated with the disclosure index, number of sentences and proportion of pages at the 0.01 level. The results of the bivariate analysis suggest that the strongest influence on disclosure is the size of the organisation, followed by the primary mineral extraction activity, which serves as a proxy for risk, number of fatalities, and the social performance of the organisation. These results further support the decision to control for size, risk, and social performance in a multivariate analysis.

Very high correlations exist between the three dependent variables with the disclosure index score significantly correlated with number of sentences (0.786), and proportion of pages (0.775), and number of sentences significantly correlated with proportion of pages (0.792). All correlations between the dependent variables are very significant at the 0.01 level. These results suggest, firstly, that the internal validity of the measures of disclosure is high ($p = 0.000$) as the number of sentences gives rise to proportion of pages and, secondly, the high correlations between disclosure quality (disclosure index) and extent (proportion and sentences) could indicate low levels of social "window-dressing".

<< Insert Table 5 >>

Multivariate Analysis

Table 6 provides the results of the multivariate analysis with Panel A presenting the results without any control for the different years and Panel B presenting the results after controlling

for year (YEARDUM). The F-values indicate that all three models, namely disclosure index scores, proportion of pages and number of sentences, are statistically significant at the 0.01 level, irrespective of controlling for the YEARDUM or not. Table 6 presents the coefficients of the disclosure index score model (Index), the proportion of pages model (Proportion), and the number of sentences model (Sentences) and their associated P-values. Irrespective of YEARDUM, the coefficients for SIZE and RISK are significant at the 0.01 level. SRI is significant at the 0.01 level for the disclosure index score and number of sentences before controlling for YEARDUM, and significant at the 0.05 and 0.01 levels for the Index and Sentences, respectively, after controlling for year. Significant coefficients are present for the independent variable MEDIA at the 0.05 level for the Index and Sentences measures before controlling for YEARDUM. After controlling for YEARDUM, MEDIA is not statistically significant for any of the measures of disclosure. MEDIA therefore appears to be unrelated to disclosure levels for all three models.

<< Insert Table 6 >>

The multivariate analyses therefore shows that the extent of media attention given to mining accidents does not influence extent and quality of safety disclosures significantly, after controlling for the year variables and therefore we find no support for hypothesis four. This is in line with the findings of Patten (2002) and Aerts and Cormier (2009), who infer that media attention is not a driver of corporate social disclosures. The results of the multivariate analysis suggest that the size of the organisation has the greatest effect on safety disclosures, followed by risk. These results support those of the bivariate analysis, however, the degree of influence of the social responsibility indicator and the number of fatalities on safety disclosures is mixed. The results therefore suggest that large organisations that are socially responsible and face high risk, have higher levels of disclosure than other organisations.[8]

Further Analysis
We do a number of further analyses to consider the robustness of the results of this study.

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[8] We also repeat our analysis using MEDIA X YEARDUM interaction terms (untabulated). We ran this regression with and without the MEDIA variable. None of the interaction terms are significant and the significance of the variables of interest does not change.

Point-Biserial Correlation

We use a point-biserial correlation test as a robustness check for hypothesis three as, due to the small size of the incident organisations sample (two), the validity of the results may be questionable. The point-biserial correlation test determines if the change in disclosure relates to whether or not it is published by the incident organisations or other sample organisations. The disclosure changes in the number of sentences for the period before to the incident year, and before to after the incidents, are significant with correlation coefficients of 0.613 (one-tailed significance of 0.003) and 0.571 (one-tailed significance of 0.006) respectively. None of the changes for the disclosure index scores and proportion of pages are significant. The results of the point-biserial correlation combined with the comparison of means suggest that increases in disclosure are more significant for incident organisations than for other organisations, but that only the increase in number of sentences is directly attributable to the disclosures being made by an incident organisation.

Changes in Disclosures

We also conduct a multivariate analysis examining the changes in dependent and independent variables over the sample period. The year to year changes in the variables for four years are therefore used and the analysis performed for all three models, namely disclosure index scores (Index), proportion of pages (Proportion) and number of sentences (Sentences). The first analysis examines the year on year change for the four years and the second analysis the total change from the beginning of the sample period (2005) to the end of the sample period (2009). The F-value is significant at the 0.05 level for Index for both the year on year change and the total change, suggesting that the model is statistically significant. The F-values for the changes in the models Proportion and Sentences are not significant. For the year on year change, the only significant result is for ΔSIZE ($p = 0.005$) and the only significant results for total change were ΔSRI ($p = 0.009$) and ΔFATAL ($p = 0.051$).

Period Control

In order to determine if the large number of year variables (five) distort the results of the multivariate analysis, we also perform the regression analysis by controlling for period rather than year. We first use three periods (before, incident year, and after) and then repeat the test using two periods (before and after). The results are consistent with those of the multivariate analysis controlling for year. The only significant variation is for the variable FATAL, which

is significant at the 0.01 level when controlling for period as opposed to at the 0.05 level when controlling for year.

Combined Quality/Extent Measure

We also use a combined measure of disclosure quality and quantity in the analysis by dividing the disclosure index scores by the number of sentences. This variable forms the dependent variable for the multivariate analysis sensitivity test and we compute the model both before and after controlling for the dichotomous year variables. Untabulated results indicate that the F-values are significant at the 0.01 level for both analyses. The only significant result is for the variable FATAL.

Lagged Fatality Variable

There is a possibility that organisations only react to mining accidents in the year subsequent to the incident. Therefore, we also perform the regression analysis using the number of fatalities as a lagged variable, i.e. using the fatalities of year x-1 with the disclosures and other variables of year x. We perform this regression both before and after controlling for year. Untabulated results indicate the lagged fatalities measure perform the same way as the fatality measure (i.e., the lagged fatality measure is significant at the 0.01 level for Sentences irrespective of controlling for year). All the other variables behave the same as in the main analysis and the use of the lagged measure does not change the significance of the *Media* measure. The results for the lagged fatality variable therefore do not differ significantly from the results obtained during the main analysis.

Conclusions

Our results show that the entire mining industry reacts to the legitimacy threat posed by the two major mining accidents through increased safety disclosures in annual reports, sustainability reports, and reactive corporate press releases. Consistent with hypothesis one, results document a significant increase in the mean disclosure quality and extent for the entire mining industry after the major mining accidents. There is also some evidence that the mining sector experiencing the incident (Gold mining) disclosed more information than other mining organisations and that the organisations directly impacted by the incidents disclose more than the other organisations in the sample that did not experience a major accident. However, these last two observations do not hold for all the disclosure measures and comparisons and is therefore not very convincing.

Furthermore, our results provide evidence of an association between firm size, social performance, type of primary mineral extraction activity, number of fatalities, and safety disclosure levels. The media attention devoted to mining accidents appear to be unrelated to safety disclosure levels, while significant correlations exist for firm size, social performance, type of primary mineral extraction activity and disclosure levels. Our results do not support hypothesis four, as media attention appears not to influence safety disclosures. This is consistent with Patten (2002), who infers that substantial media attention is not necessarily a driver of changes in disclosures resulting from public policy pressure, and Aerts and Cormier (2009), who infer that negative media attention motivates reactive corporate press releases but not annual report disclosures. It is possible that stakeholder pressure, which motivates corporate social disclosures according to legitimacy and stakeholder theories, consists of various factors, which combined form the motivation to report. Media attention, therefore, cannot be considered in isolation as a driver of disclosure. Rather, a combination of variables such as size, social responsibility performance, number of fatalities, risk, and media attention could serve as a proxy for social pressure.

We contribute to the existing literature regarding the application of legitimacy, stakeholder, and media agenda-setting theories by examining the disclosure responses, directed at powerful stakeholders, of South African mining organisations to mining accidents generating increased media attention, thereby threatening their legitimacy. We also develop a disclosure quality checklist that is specific to the mining industry, which future research considering the social implications of mining activities can use. Our results may be of interest to accounting standard-setting bodies who are currently investigating the development of social and environmental reporting guidelines and policy-makers considering the regulation of social and environmental disclosures.

A limitation of our study is the small sample size, which could influence the validity of the results and inferences. Therefore, the generalizability of the findings may be questionable as the sample consists of a single industry within a single country that has a very distinct and unique nature with specific risks and operating environments. However, previous social and environmental accounting studies have utilised small sample sizes (e.g., Van Staden & Hooks,

2007). In addition, South Africa has one of the largest and most diverse mining industries in the world, making South Africa the ideal place to conduct a study on mining accidents.

Due to the grid methodology applied to measure the extent of disclosures, there are concerns regarding the reliability of the results when converting electronic information into proportion of pages. Therefore, this study does not consider social information disclosed on the organisations' websites, other than annual reports, sustainability reports and reactive corporate press releases, which could be a possible limitation. However, information published on the internet can be considered a repetition of information disclosed in the annual reports, sustainability reports, and corporate press releases. Future research could extend the research approach to include information published on organisations websites as well as to other countries and industries with similar reputations for workplace accidents, such as the construction industry and chemical plants. An area of future research could be to develop similar checklists for these industries and perform a comparative study of the disclosure reactions.

The results of this study are consistent with legitimacy and stakeholder theories and suggest that organisations attempt to alter their social disclosures following major social events affecting the organisation and its industry. This study provides a further resource for those studying disclosure responses to legitimacy threatening events. The comparison of disclosure quality and extent support the view that organisations make social disclosures for strategic purposes and corporate communications are utilised as a means to manage perceptions and the organisation's legitimate status with stakeholders. The findings support the supposition that organisations use corporate communications as a means to reduce the effect of actions or events that are hazardous to the organisation's reputation and image (Deegan *et al.*, 2000).

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Tables

Table 1 - Comparison of disclosures of organisations in the mining industry before and after incidents

	1st Comparison		2nd Comparison		3rd Comparison	
	Before	**Incident**	**Before**	**After**	**Incident**	**After**
Panel A – Disclosure index score						
N	19	19	19	18	19	18
Mean	22.132	40.526	22.132	33.278	40.526	33.278
Std Dev	13.395	24.450	13.395	18.493	24.450	18.493
Median	24.000	33.500	24.000	38.500	33.500	38.500
z-stat and sig	1.728		1.969***		-1.063	
t-stat and sig	7.202***		7.635***		-7.225***	
Panel B – Proportion of pages						
N	19	19	19	18	19	18
Mean	.009	.017	.009	.016	.017	.016
Std Dev	.008	.016	.008	.012	.016	.012
Median	.008	.019	.008	.017	.019	.017
z-stat and sig	1.063		1.405		-.399	
t-stat and sig	5.349***		5.692***		-4.676***	
Panel C – Sentence count						
N	19	19	19	18*	19	18*
Mean	40.009	93.263	40.009	97.389	93.263	97.389
Std Dev	44.269	96.081	44.269	97.043	96.081	97.043
Median	18.500	46.500	18.500	76.500	46.500	76.500
z-stat and sig	1.993**		2.248**		1.993**	
t-stat and sig	3.939***		4.258***		4.231***	

Notes:
Std Dev is the standard deviation
z-stat is the z-statistic from comparing the medians of the various groups using a Mann-Whitney U test
t-stat is the t-statistic from comparing the means of the various groups using a One-Sample T test
* Trans Hex was excluded from the 2nd and 3rd comparisons as the Gold Fields incident occurred during the 2009 financial year
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table 2 – Comparison of disclosure increases of organisations in the gold and other mining industry before and after incidents

	1st Comparison		2nd Comparison		3rd Comparison	
	Gold Mining	Other Mining	Gold Mining	Other Mining	Gold Mining	Other Mining
Panel A – Disclosure index score						
N	4	15	4	15	4	15
Mean	13.750	8.333	15.917	7.656	2.000	-.533
Std Dev	7.136	9.678	5.412	16.216	2.160	10.385
Median	14.000	13.000	15.000	16.833	2.000	2.000
z-stat and sig	1.453		1.351		.458	
t-stat and sig	1.037		.986		.476	
Panel B – Proportion of pages						
N	4	15	4	15	4	15
Mean	.004	.009	.012	.003	.008	-.005
Std Dev	.007	.018	.008	.009	.005	.012
Median	.003	.003	.010	.003	.008	.000
z-stat and sig	-.600		1.700		2.900***	
t-stat and sig	-.554		1.745		2.136**	
Panel C – Sentence count						
N	4	15	4	15	4	15
Mean	82.750	26.800	117.333	34.900	34.500	8.267
Std Dev	67.648	50.568	60.565	64.070	25.371	32.539
Median	91.000	9.833	106.000	52.167	30.000	16.000
z-stat and sig	1.554		2.000**		1.654	
t-stat and sig	1.842		2.308**		1.485	

Notes:
Std Dev is the standard deviation
z-stat is the z-statistic from comparing the medians of the various groups using a Mann-Whitney U test
t-stat is the t-statistic from comparing the means of the various groups using an Independent Samples T test
** Significant at the 0.05 level
*** Significant at the 0.01 level
1st Comparison is the increase from before to incident year
2nd Comparison is the increase from before to after
3rd Comparison is the increase from incident to after

Table 3 – Comparison of disclosure increases of organisations with a major incident and non-incident organisations before and after incidents

	1st Comparison		2nd Comparison		3rd Comparison	
	Incident organisations	Non-Incident organisations	Incident organisations	Non-Incident organisations	Incident organisations	Non-Incident organisations
Panel A – Disclosure index score						
N	2	17	2	17	2	17
Mean	14.000	8.941	15.333	8.696	1.000	-.118
Std Dev	2.828	9.692	1.414	15.621	1.414	9.810
Median	14.000	5.500	15.000	8.000	1.000	1.000
z-stat and sig	1.198		.864		.203	
t-stat and sig	.718		.586		.157	
Panel B – Proportion of pages						
N	2	17	2	17	2	17
Mean	.003	.008	.013	.004	.010	-.004
Std Dev	.006	.017	.013	.008	.007	.012
Median	.003	.003	.013	.005	.010	.000
z-stat and sig	-.531		.930		2.125**	
t-stat and sig	-.410		1.367		1.593	
Panel C – Sentence count						
N	2	17	2	17	2	17
Mean	138.500	26.824	166.833	38.775	28.000	12.118
Std Dev	12.021	48.058	34.648	60.923	22.627	33.507
Median	139.000	4.000	167.000	20.000	28.000	6.000
z-stat and sig	1.865		1.993**		.866	
t-stat and sig	3.198***		2.870***		.644	

Notes:
Std Dev is the standard deviation
z-stat is the z-statistic from comparing the medians of the various groups using a Mann-Whitney U test
t-stat is the t-statistic from comparing the means of the various groups using an Independent Samples T test
** Significant at the 0.05 level
*** Significant at the 0.01 level
1st Comparison is increase from before to incident year
2nd Comparison is increase from before to after
3rd Comparison is increase from incident to after

Table 4 – Descriptive Statistics

	N	Mean	Median	Std Dev	Min.	Max.
MEDIA	95	23.600	46.000	31.015	.000	92.000
FATAL	95	5.610	23.500	9.898	.000	47.000
SIZE	95	6.327	5.730	1.056	3.670	7.790
SRI	95	.105	.500	.309	.000	1.000
RISK	95	4.737	3.500	2.033	.000	7.000
Index	95	27.021	28.500	15.801	.000	57.000
Sentences	95	60.705	148.000	70.462	.000	296.000
Proportion	95	.012	.020	.011	.000	.040
Valid N (listwise)	95					

Std Dev is the standard deviation.

Table 5 – Bivariate Analysis

	N	Proportion	Sentences	Index	RISK	SRI	SIZE	FATAL
MEDIA	95	.088	.196	.210*	.000	.031	.107	.139
FATAL	95	.370**	.555**	.406**	.438**	.320**	.522**	
SIZE	95	.578**	.620**	.657**	.304**	.306**		
SRI	95	.253*	.439**	.375**	.079			
RISK	95	.437**	.435**	.405**				
Index	95	.775**	.786**					
Sentences	95	.792**						
Proportion	95							

** Correlation is significant at the 0.01 level (1-tailed)
* Correlation is significant at the 0.05 level (1-tailed)

Table 6 – Multivariate Analysis

	Expected Sign	Index		Sentences		Proportion	
		Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Panel A							
INTERCEPT		-4.464***	.000	-4.432***	.000	-4.283***	.000
MEDIA	+	2.145**	.018	1.754**	.042	.504	.308
FATAL	+	-.836	.406	1.759**	.041	-.474	.318
SIZE	+	6.232***	.000	4.448***	.000	4.914***	.000
SRI		2.706***	.008	3.307***	.001	1.128	.262
RISK	+	3.196***	.000	2.909***	.003	3.370***	.000
N		95		95		95	
F-value		20.788***		22.405***		12.856***	
Adj. R^2		.513		.532		.387	
Panel B							
INTERCEPT		-3.043***	.003	-3.253***	.002	-3.412**	.001
MEDIA	+	.528	.300	.571	.285	.326	.373
FATAL	+	-.526	.301	2.096**	.020	-.421	.337
SIZE	+	5.913***	.000	3.519***	.000	4.907***	.000
SRI		2.298**	.024	2.837***	.006	0.932	.354
RISK	+	3.123***	.000	2.901***	.000	3.346***	.000
YEARDUM		Controlled		Controlled		Controlled	
N		95		95		95	
F-value		11.752***		13.914***		7.616***	
Adj. R^2		.507		.553		.388	

Notes:
Significance at the 0.10 level has been ignored
** Significant at the 0.05 level
*** Significant at the 0.01 level
Where direction of association is expected test is one-tailed, otherwise two-tailed