Environmental disclosures in annual reports of Australian gold and copper mining companies with activities in Papua New Guinea and/or Indonesia

Roger L Burritt

Senior Lecturer, Department of Commerce, and Co-ordinator, Asia Pacific Centre for Environmental Accountability, The Australian National University

*Draft: not to be quoted without permission*

The Australian National University, 23 October 1997
The correct citation for this publication is:

Author: Roger L. Burritt
Year of Publication: 1997
Title: Environmental disclosures in annual reports of Australian gold and copper mining companies with activities in Papua New Guinea and/or Indonesia.
Publisher: Resource Management in Asia-Pacific Project, Division of Pacific and Asian History, Research School for Pacific and Asian Studies, The Australian National University
Place of Publication: Canberra
ISSN – 1444-187X
The Resource Management in Asia-Pacific Working Paper series seeks to provide readers with access to current research on environmental and resource issues in the Asia-Pacific. Working Papers produced by the Project aim to facilitate discussion and debate on critical resource management issues in the area, and to link scholars working in different disciplines and regions.

Publication as a ‘Working Paper’ does not preclude subsequent publication in scholarly journals or books, indeed it may facilitate publication by providing feedback from readers to authors.

Unless otherwise stated, publications of the Resource Management in Asia-Pacific Project are presented without endorsement as contributions to the public record debate. Authors are responsible for their own analysis and conclusions.

Resource Management in Asia-Pacific Project
Research School of Pacific and Asian Studies
The Australian National University
Canberra ACT 0200
Tel: +61 2 6125 9978
Fax: +61 2 6125 4896
Email: rmap@coombs.anu.edu.au
Abstract
This paper considers some preliminary evidence about environmental disclosures of Australian gold/copper mining companies with interests in PNG, Indonesia, or both. First, comment is made about the possible importance of the content of annual reports to stakeholders. Second, a framework of expectations about annual report disclosures of multinationals is developed. Third, the technique of content analysis is outlined and its advantages and disadvantages are explored. Major problems are identified with the method’s internal validity. Finally, comment is made on some preliminary findings about the environmental disclosures observed in a sample of published annual reports of Australian-based, listed mining companies between 1994 and 1996.

\[1\] See Appendix 4 for an outline of these interests.
Environmental disclosures in annual reports of Australian gold and copper mining companies with activities in Papua New Guinea and/or Indonesia

The possible importance of the content of annual reports to stakeholders.

Why report environmental information?

Annual reports used to be the preserve of shareholders. Many are still addressed solely to shareholders. However, other groups have an interest in corporate activity and gain access to and analyse the data published in annual reports. The environmentally conscious form one of these groups.

Growing awareness of the local, national and global affects of humankind on the physical environment has increased pressure on companies, through governments and review organisations, to disclose data about their environmental performance.

Environmental laws have proliferated and this brings with it a need to ensure that compliance and non-compliance with regulations are publicised. In the face of burgeoning environmental legislation industry associations are attempting to maintain control over the environmental agenda facing their members by introducing self-regulating Codes of Environmental Practice and encouraging monitoring and reporting of environmental performance. The Australian minerals industry is no exception as, in December 1996, it introduced its first ‘Code for Environmental Management’. When releasing the Code, Mr Jerry Ellis, President of the Minerals Council of Australia (MCA) said:

‘The future of the minerals industry hinges on excellence in environmental management. More than in any other way, the community judges the minerals industry by its environmental performance. Recognising the need to achieve environmental excellence and to be open and accountable to the community, Australia’s minerals industry has developed this Code for Environmental Management. The Code has been strengthened by contributions from government and non-government organisations. The Code is the centrepiece of a renewed commitment to respond to community concerns through consultation, demonstrated environmental performance, continual improvement and public reporting. We want to lift our environmental management practices and guide them into the next century and the Code and its reporting requirements will provide a measurement of our progress.’

Four comments spring immediately to mind. First, Ellis indirectly recognises that, pre-Code, the mining industry has a poor record in environmental matters, one which will be lifted by the Code. It is necessary to examine the volume and themes of disclosures made today and in the recent past in order to establish a benchmark for public reporting by the industry in the future. Only then can a ‘lift’ in performance be demonstrated.

Second, at the centre of the code is sustainable development. Managers should be:

Managing activities in a manner consistent with the principles of sustainable development such that economic, environmental and social considerations are integrated into decision making and management.

It might be expected that sustainable development will feature in disclosures of mining companies in the future, but does it do so already? Previous studies suggest that only a handful of companies worldwide undertake sustainable development reporting (UNEP and SustainAbility 1996). An examination of annual reports will provide further evidence on this point.

Third, it is not compulsory for members of the MCA to either sign up to the code or to comply with it. Hence, an analysis of voluntary disclosures made in the recent past can provide some guidance as to the volume and type of future disclosures for members who do not comply with, or sign up to, the code. Some disclosures, mentioned further below, are required by the accounting profession and should not be influenced by the Code.

---

2 Time constraints restrict this paper to the impact of a company on the physical environment (Roberts 1992, p.3)
Finally, the Code does not suggest that similar environmental standards must be adhered to in corporate overseas interests, but there is a tacit assumption that environmental management has to be integrated into all interests if ‘excellence in environmental management’ is to be achieved. In order to provide a baseline study which includes overseas activities as a possible driver of disclosures, this paper examines environmental disclosures of Australian mining companies having interests in Papua New Guinea and Indonesia. The intention is to undertake comparative work in a few years time to see whether improvement has taken place in annual report disclosures in these ‘multinational’ companies, following the release of the Code for Environmental Management.

Why examine annual reports?

Annual reports are important sources of data about a company

In the past, information about the environmental performance of Australian mining companies could be obtained from a number of sources as Table 1 shows:

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Sources of corporate environmental information.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Direct observation of environmental impacts.</td>
</tr>
<tr>
<td>2.</td>
<td>Reports on compliance with regulations.</td>
</tr>
<tr>
<td>3.</td>
<td>Annual reports.</td>
</tr>
<tr>
<td>4.</td>
<td>Periodic external environmental reports.</td>
</tr>
<tr>
<td>5.</td>
<td>Environmental audits.</td>
</tr>
<tr>
<td>6.</td>
<td>Strategic planning data and reports.</td>
</tr>
<tr>
<td>7.</td>
<td>Environmental impact statements.</td>
</tr>
<tr>
<td>8.</td>
<td>Reports for environmental financing and environmental liability insurance.</td>
</tr>
<tr>
<td>9.</td>
<td>Codes of environmental practice.</td>
</tr>
<tr>
<td>10.</td>
<td>Reports to the community about specific environmental issues.</td>
</tr>
<tr>
<td>11.</td>
<td>Government liaison strategies for marketing of green industries (e.g. eco-tourism).</td>
</tr>
<tr>
<td>12.</td>
<td>Technical assessments of cleaner production investments.</td>
</tr>
<tr>
<td>13.</td>
<td>Product announcement information based on environmental concerns (e.g. eco-labelling).</td>
</tr>
</tbody>
</table>

Annual environmental reporting has not been practiced in the mining industry hitherto. Annual reports are just one source of information. All forms of data reaching the public domain can be considered to be part of a company’s accountability discharge activity and, hence, annual reports, dedicated environmental and employee reports, advertising and house magazines can also be seen as vehicles of environmental accountability (Gray, Kouhy et al. 1995b, p.82). In practice, it is impossible to monitor all forms of communication about the environmental impacts and actions of corporations. Why, then, focus on the disclosures made in past annual reports?

There are a number of reasons for examining the content of annual reports:

- most of the literature on voluntary disclosure already has a focus on annual report data. Disclosure comparisons will, inevitably, be made with results of studies previously undertaken on annual report contents. This is partly for pragmatic reasons, and partly because annual reports are ranked highly as a communication source by different groups of stakeholders;
- in Australia, existing evidence indicates that annual reports are the dominant source of information used by a range of stakeholders interested in environmental impacts of corporations (Deegan and Rankin 1997, p.572). Table 2 illustrates this point. Evidence in Table 2 is in accord with observations made in the UK literature by Owen (1994, p.43);

---

1 Focus in this paper is on reporting to all stakeholders rather than on the correlation of environmental disclosure with financial accounting measures of performance, or with share market performance. Its primary concern is with what is revealed about environmental activities.
Table 2 Use of alternative sources of environmental information.

<table>
<thead>
<tr>
<th>Information Source</th>
<th>Shareholders</th>
<th>Brokers</th>
<th>Academics</th>
<th>Banks</th>
<th>Review Organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>No source other than annual report</td>
<td>33</td>
<td>14</td>
<td>10</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Separate environmental report</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Press/media</td>
<td>8</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Prospectus</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Direct company enquiry</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Lobby groups</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ethical investment funds</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other company publication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>No details provided</td>
<td>10</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total responses (114)</td>
<td>58</td>
<td>15</td>
<td>23</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: (Deegan and Rankin 1997, p.572)

- annual reports are statutory documents, required to be produced on an annual basis, whereas stand-alone environmental reports have a history of being produced infrequently (e.g. The Body Shop), or have only been produced in the last year or two in Australia and do not provide any time series data; authors claim that the annual report is probably the most important document in terms of the way an organisation constructs its own social imagery to all stakeholders (Hines 1988; Gray, Kouhy et al. 1995b, p.82);
- in a similar vein, it is only in the last twenty years that any connection has been made between accounting information, as published in annual reports, and the way that information provides support for the status quo in terms of political, social and environmental effects. Authors have now demonstrated that accounting information is an active agent in the ecological crisis, in social processes, in the implementation of political programmes and in the creation and maintenance of social structures (Tinker 1980; Maunders and Burritt 1991; Tinker, Lehman et al. 1991; Graves, Flesher et al. 1996; Funnell 1997); and
- in an ecological context, Maunders and Burritt (1991, p.13) argue that annual reports, by providing the only quantified analysis generally available, do not just provide decision support, they provide conditioning. It is conditioning about the use of monetary representation for environmental values and also about selfishness as a way to achieve allocative efficiency. Singh (1978, p.xxvi) makes the following comments:

It seems rather odd that, while our very existence is threatened by an inexorable and unsustainable destruction of resources, orthodoxy makes their allocation its main concern. The ostensible purpose is to assign the pride of place to economic efficiency. But it is evident enough that if the prevailing system had been half as efficient as it is presumed to be, from the viewpoint, let us add, not of relatively short-run private profit making alone, but of ensuring the conditions of its own continuance also, we would not even be talking of the crisis of ecology today.

In the future, compliance with the Code will require publication of an annual public environmental report. Although environmental reports will provide a useful data base for future analysis, environmental disclosure in pre-Code annual reports provides one guide as to the effectiveness of the Code in relation to

4 In 1996, WMC Ltd became the first Australian mining company to publish a separate “Environment Progress Report” (WMC Ltd 1996). However, as WMC Ltd does not operate in PNG or Indonesia this means that BHP, in 1997, was the first Australian mining company operating in Papua New Guinea to publish a stand-alone Environmental Report. It will take several years before any trends in reporting practices, relating to stand-alone environmental reports, can be discerned. The BHP 1997 Environmental Report can be found at http://www.bhp.com.au/enviro.htm
home and overseas interests. This will be important if multinationals seek to demonstrate a move away from 'selfish' short-term activity.

### What are companies with poor and excellent environmental performance expected to disclose in their annual reports?\(^1\)

Two contrasting perspectives on environmental disclosure are apparent. First, legitimacy theory suggests that a company with poor environmental performance will, in fact, have a greater volume of disclosures than other companies. This will be called the ‘legitimation’ view. Second, it is recognised that companies may seek to have excellent environmental records, and will make environmental disclosures appropriate to their perception of such excellence. This will be termed the ‘innovator’ view. Between these two extremes will be found the disclosure pattern of other companies. Such companies might be expected to disclose less information, about less topics, than ‘legitimation’ and ‘innovator’ companies.

### Legitimation

Legitimacy theory is concerned with the ways a company can preserve its right to continue to exist in a society which recognises that corporate activity is necessary, provided it is in accordance with the values of society. Legitimacy theory attempts to explain the circumstances used by companies which try and demonstrate credible performance when, in fact, the circumstances they find themselves in should pose a threat to their legitimacy and continued existence (Gray, Owen et al. 1996, p.46). In these circumstances, annual reports are merely ‘cosmetic’ devices. Companies rely on an unbalanced power relationship to disguise possible conflicts between them and their stakeholders.

In the face of failure of the organisation’s performance (e.g. a serious accident, or a major pollution leak), a company may follow one of the following legitimisation strategies:

1. seek to ‘educate’ its stakeholders about the organisation’s intentions to improve that performance;
2. seek to change the stakeholders’ perceptions of the event (but without changing the organisation’s actual performance);
3. distract (i.e. manipulate) attention away from the issue of concern (concentrate on some positive activity not necessarily related to the failure itself), or
4. seek to change external expectations about its performance (by, for example, explaining why a competitive, profit-seeking, wealth creating company is not actually responsible for environmental or human-rights abuses in the repressive regime in which it operates).

Evidence shows that some companies are self-laudatory in their use of environmental disclosures in annual reports, thereby painting themselves in the most favourable light in their own self-interest (Deegan and Gordon 1996). Deegan and Gordon (1996) observe that firms emphasise positive environmental information and that little or no negative environmental information disclosures are made by their sample of Australian companies. Information was obtained about fines on companies imposed by the NSW Environmental Protection Agency. Information about fines was rarely published in annual reports, but when fines were incurred an increase in the average amount of ‘positive’ environmental disclosures occurred (e.g. awards for excellent environmental reporting). A low emphasis on balancing positive and negative environmental information is thus taken to provide support for legitimacy theory.

Environmental accounting literature warns against over reliance on corporations, market mechanisms and increased managerial discretion when sustainability is the desired outcome (Burritt and Welch 1997b, p.539). Gray, Bebbington and Walters (1993, p.296) provide additional support for this view when they claim that:

The essence of environmental accountability and transparency is that environmental matters are too complex and crucial to be left entirely in the already overburdened hands of corporations.

Two reasons are provided in support of Gray et al’s (1993) view. First, they claim that it is "unreasonable" to expect corporations to add to the number of decisions they make affecting the welfare of individuals because of the lack of appropriate information about ecological impacts that corporate activities make. Second, they protest that financial markets have shown an "awesome indifference" to the social and environmental activities of the companies they own, unless there are financial gains to be made from these activities. The clear message is that without (and perhaps even with) regulation corporations will ignore the environment, if it is not in their financial interest to do so. The same tendency of corporations to ignore the

---

1 For the purpose of this paper Australian companies with interests in PNG or Indonesia, or both are termed ‘multinationals’. 
need to make trade-offs between environmental protection and economic gains is criticised by Walley and Whitehead (1994).

It is well recognised that multinationals can possess the power to overturn the wishes of sovereign nations to control activities within their own political boundaries (Burritt and Welch 1997b, p.532). Hence, it seems plausible that strategies to maintain company legitimacy, by not disclosing negative environmental information, might also be emulated in relation to overseas activities, where environmental laws can be less restrictive or not enforced. Following Hines (1988), if they are relatively powerful, multinationals, such as Australian mining companies operating in Papua New Guinea or Indonesia, could use environmental disclosures to try and legitimise their current activities. An analysis of environmental disclosures will illustrate whether negative disclosures do occur and, hence, whether legitimacy theory remains a credible explanation for the volume and type of environmental disclosures.

Threats to locate multinationals in countries with the least costly environmental restrictions; accusations of dumping of hazardous wastes in developing countries; refusal to sign an environmental code of conduct for multinationals; and suggestions that employee health and safety is put at relatively greater risk in developing countries (Dunning 1993, p.540) would all be significant by their absence from a list of disclosure themes.

The innovator. Striving for excellence, the ‘innovator’ provides a second approach to expectations about the volume and type of environmental disclosures of multinationals. Wallace (1996) typifies this stance. He enthuses that multinational companies:

...can be agents for sustainable production in developing countries (Wallace 1996, p.68).

Multinationals, he claims, will achieve this in four ways:

- the introduction of cleaner production technology;
- the introduction of technicians trained to implement and operate the technology;
- the application of environmental standards far in excess of those required by the host governments; and
- the extension of complex environmental procedures and related management tools and training programmes throughout a multinational because of the need for administrative uniformity (Wallace 1996, p.68).

Comment on each of these will signify a company with excellent environmental credentials. It is expected that an innovator will seek to disclose information that reflects excellence in environmental management and performance. For example, the MCA Code for Environmental Management refers to nine principles which, it suggests, guide excellence in environmental management in the Australian minerals industry. These are: sustainable development; environmentally responsible culture; community partnership; risk management; integrated environmental management; performance targets; continual improvement in performance; rehabilitation and decommissioning; and reporting. Presumably, a company which cannot demonstrate these principles have been adhered to is not regarded as excellent.

Bimodal expectations. In summary, two main drivers of the volume, form and themes of environmental disclosure are discernible in the literature.

Following legitimacy theory, some companies will increase their disclosure of positive environmental news in order to cover, or compensate for, negative environmental news such as a fine by a regulator (Deegan and Gordon 1996). Alternatively, such companies will simply avoid the disclosure of negative environmental news. Based on legitimacy theory it might be expected that poor environmental performance will lead a cluster of companies to increase their volume of positive environmental disclosures.

Another group of high volume environmental disclosers will be the companies which seek to adopt excellence in their approach to sustainability. Such companies will try to ‘engage’ their stakeholders (UNEP and SustainAbility 1996) by publishing environmental information in order to gain feedback from stakeholders. Feedback can then be used as one way of promoting continuous improvement towards the environmental goals of business. These companies may have little negative environmental news to disclose, but they will demonstrate this it in a systematic, transparent way, for example, by demonstrating whether

---

1 PNG and Indonesia are located under two differing international environmental law regimes. Indonesia is part of the Association of South East Nations (ASEAN) members of which adhere to the ASEAN Environment Programme (ASEP). ASEP has been in existence since 1978. PNG is part of the South Pacific Regional Environment Programme (SPREP) which was established in the early 1980s.
measurable targets have been met, and by reporting on a range of themes which are consistent with the principles of sustainability.

Location of disclosures. The location of environmental accounting disclosures within annual reports is a further matter that is considered in the literature, but not because there is a sound theoretical grounding for where disclosures might be expected to appear, for there is no such grounding (Guthrie and Mathews 1985; Guthrie 1989; Gray, Kouhy et al. 1995b).

Previous studies indicate that most information about the environment is qualitative and, hence, will not be located in the financial statements section of annual reports (Gray, Kouhy et al. 1995b, p.83), unless in notes to the accounts. The mining industry in Australia is subject to professional disclosure guidance contained in Australian Accounting Standard (AAS) 7 ‘Accounting for Extractive Industries’ (AARF 1989) and Urgent Issues Group #4 ‘Disclosure of Accounting Policies for Restoration Obligations in the Extractive Industries’ (AARF 1995) which require financial information about restoration costs to be disclosed. UIG #4 was effective from 8 October 1995, mid-way through the sampled period of 1994 to 1996. This requirement necessitates examination of the financial statements, something often omitted in studies of voluntary environmental disclosures.

One other reason for examining location is the recent requirement of the Australian Stock Exchange for companies to publish a statement of Corporate Governance in their annual reports. For example, in its 1996 Corporate Governance Statement BHP lists the members of its Environment Committee, mentions that the committee has been in place since 1992, and that it monitors and reviews the company’s environmental performance, and environmental issue management and policies (BHP 1996, p.32).

Finally, Buhr (1994) notes that companies in the USA producing stand-alone environmental reports are moving much of their voluntary environmental performance information out of their annual reports in order to avoid duplication of information. Although this could present interpretation difficulties in the future for annual report disclosures of Australian companies, the absence of environmental reports in Australia in the mining industry until 1996 (or until 1997 in the case of the sample examined here) means that this possible impact is not of concern.

Audited? Information disclosed in annual reports has greater credibility to the reader if it has been audited by a third party. Financial information contained in annual reports is so audited; but most environmental information is published with no third party attestation as to its veracity. The exception to this situation is information that has been reported following a specific environmental audit (e.g. a site audit) or EIA. For example, two recent independent environmental audits of mining companies have been undertaken in Papua New Guinea.

The first, an examination of the impacts of the Ok Tedi Mine, was conducted by Rosenbaum and Krockenberger (1993) at the invitation of Ok Tedi Mining Ltd (OTML). The second, an independent review of the riverine impacts of the Porgera mine, was conducted by CSIRO at the invitation of the Porgera Joint Venture (1996).

With the possibility of a bi-modal distribution in mind, and suggestions about location and the need for audit as a way of improving credibility in the eyes of readers, a list of likely themes has been drawn from the environmental disclosure literature (see Appendix 1). This list provides a basis for content analysis, a method examined in detail below.

**Method: content analysis**

**Definition**

Content analysis is the dominant method used to examine environmental disclosures in annual reports. Originally, the technique was developed to assess the appropriateness of communication, but it has been modified to permit analysis of the particular information set being analysed (Carney 1972).

Content analysis is defined by Carney (1972, p.25) as:

...a research technique for making inferences by objectively and systematically identifying specified characteristics of messages.

Similarly, Krippendorff (1980, p.21) explains content analysis as follows:

...a research technique for making replicable and valid inferences from data to their context.

Other definitions referred to in accounting literature are provided by Weber (1990, p.9) and Holsti (1969). The purpose of content analysis is to read a story from available data. Identified disclosures are taken to
provide some indication of the importance of an issue to an entity (Krippendorff 1980), and to derive an indication of the meanings, motivations and intentions of the communicator (Gray, Kouhy et al. 1995b, p.89).

**Advantages**

To be useful, data collected using content analysis should be objective, systematic and reliable (Gray, Kouhy et al. 1995b, p.80).

**Objectivity.** An objectivity criterion requires that independent parties are able to identify similarly what is and what is not an environmental disclosure.

**Systematic.** The systematic criterion requires explicit rules to ensure that a researcher knows what observations to record, and that an alternate researcher can easily verify the observations exist and are correctly classified according to the defined categories and sub-categories. An important point is that categories of disclosure selected should be mutually exclusive as far as practical.

**Reliability.** Reliability relates to the extent to which the same results would be gained if the same process was undertaken either by the same analyst on a different sample, or by a different analyst.

Two other considerations relate to external validity and volume of data:

**External validity.** One advantage of content analysis over other methods is its high level of external validity. By drawing upon published information content analysis avoids the problem whereby acts of measurement which interfere with the behaviour of the phenomenon being assessed create increasingly contaminated observations, the deeper the observer probes (Krippendorff 1980, p.29).

**Volume of data.** Content analysis also permits the analysis of large volumes of data which can be coded by several individuals if necessary (Krippendorff 1980, p.31).

**Disadvantages**

Although content analysis is the method used most widely for examining social and environmental disclosures in annual reports (Ernst 1979; Guthrie and Mathews 1985; Gray, Kouhy et al. 1995b, p.80), it has been the subject of much criticism because of the lack of standardisation, and the questionable use of statistical analysis embodied in the scientific method adopted. Main areas of concern are identified and examined below:

**Units of data and their significance.** Content analysis is designed to extract data to answer specific questions relating to the purpose of the research. Poorly specified and broad questions are not conducive to the production of useful results from content analysis (Carney 1972, p15). For example an answer to the question ‘what is an environmental disclosure’ has to be well specified before meaningful results can be achieved. Definition of a ‘disclosure’ has received considerable attention in the accounting literature - but there is no uniformity in definitions.

Some definitions are conservative, for example, Burritt and Welch (1997a, p.75) state the following:

For measurement purposes, a disclosure was defined as ‘a passage of writing on an environmental issue, underneath a section heading in an annual report. Analysis of whether a disclosure was related to an environmental matter was determined as follows: (a) if the disclosure was classified as an environmental disclosure by the entity, the authors accepted the classification, and (b) departmental reporting guidelines were used as a second check to determine whether the disclosure was considered to be an environmental disclosure.

Hence, if there is no section heading, there is no environmental disclosure. This definition would not include published information about, for example, the name and contact details of an environmental officer as an environmental disclosure. However, it could be argued that this is a critical piece of information for determining responsibility for corporate environmental performance.

Other definitions could be accused of lacking environmental meaning. Authors most frequently simply use the volume of disclosure in pages, fractions of pages, lines, sentences, words disclosed, or some mix of
these\(^7\) (Mathews 1993; Hackston and Milne 1996), rather than identify the nature of each disclosure. It is a common assumption that the significance of a disclosure can be meaningfully represented by the quantity of disclosure, whatever the measure of quantity might be (MacArthur 1988; Deegan and Gordon 1996, p.189). The need to demonstrate internal validity, to ensure replication of results is possible, has led to an oversimplification in measures used. Hence, Deegan, 1996 #128, p.189\(^9\] counts words because: by counting words, which are the smallest possible units of analysis, maximum robustness to error in calculating quantity of disclosure is achieved.

In these circumstances it is questionable whether quantity of disclosure represents the significance of a disclosure to the discloser, or to the stakeholder concerned about environmental accountability. There is a danger that theoretical insights will not eventuate from a mere “count” of disclosures (Krippendorff 1980, p.22).

Objectivity of measurements. A key problem of content analysis relates to the lack of ‘intersubjective testability’ of data collected and classified. Ideally, the values and beliefs of the researcher should not influence the result of the data examination (Lindkvist 1981, p.34). If there is no intersubjective agreement about the measures of disclosure adopted, then the quantitative results may be biased (Gray, Owen et al. 1987; Hackston and Milne 1996)

To improve the objectivity of data collection and classification, attempts are usually made to ensure that at least two coders examine and classify the data in the process of transforming qualitative data into a quantitative form for analysis. To achieve a reduction in subjectivity a clear statement of procedures needs to be developed, and a suitable definition of environmental disclosure adopted. The results can then be replicated by other researchers. Reliability is increased as subjectivity is reduced. Note the following comments by Hackston and Milne (1996, p.84):

To enable content analysis to be performed in a replicable manner, an interrogation instrument,\(^8\) checklist, and decision rules were developed...Three rounds of pretesting were performed by the two authors and an additional academic staff member. These pretesting rounds produced increasingly convergent views as to what constituted a corporate social disclosure sentence, and led to the formulation of several decision rules...Although the three coders believed these pretesting rounds had produced high levels of coding reliability, the final round was formally assessed using content analytic reliability measures.

Content analytic reliability measures are statistical tests of inter-coder reliability.\(^9\) They give the aura of objective measures, but in the extreme leave the impression that the research method strives for effect, rather than assessment of research objectives. Whatever the extent of coding reliability achieved, it is impossible to escape the subjectivity inherent in determining decision rules, and the inferences drawn from the data analysed.

Definition of environmental disclosure. Apart from the definitional issue raised above two other practical issues are to the fore.

First, when interpreting the theme of a disclosure (e.g. is it related to air pollution or ocean pollution) there may be multiple meanings attributed to the sentence, words, or section that mean a classification choice has to be made. For example, Hackston and Milne include the following decision rules: “Tables which provide information which is on the checklist should be interpreted as one line equals one sentence and classified accordingly” and “If any sentence has more than one possible classification, the sentence should be classified as to the activity most emphasized in the sentence.”

---

\(^7\) Hackston and Milne (1996, p.89) provide information about average sentences and pages disclosed with a maximum and minimum specified to indicate the range (e.g. 3.8 pages max; 0.02 pages min. from a sample of 39 companies.

\(^8\) The interrogation instrument was presented in a matrix form and included themes of disclosure set against various sentence characteristics.

\(^9\) Specifically, Scott’s pie and Krippendorff’s alpha coefficients to assess inter-coder agreement levels.
Second, lack of disaggregation of disclosures by theme, form of evidence, and type of news, has led to an overemphasis on incident rates (i.e. the number of disclosing companies as a percentage of the total sample of companies), at the expense of frequency of disclosures.

**Independent audit.** The veracity of environmental disclosures is not of direct concern to the method of content analysis. Most environmental disclosures take place on a voluntary basis, are not audited by an independent third party, and may involve ‘puffery’ or ‘cosmetic’ applied to actual environmental performance. If the research aim is to check whether environmental performance of companies has improved, or to track movement towards sustainability, then unaudited data may produce a bias in the picture presented of the status quo using content analysis. Analysis of voluntary environmental disclosures may not provide representative measures of actual environmental performance, and may even misrepresent a company’s relative performance (Wiseman 1982, p.61).

Subject to the above restrictions, content analysis does provide a method for establishing what the disclosures of a company are, and a number of descriptors about those disclosure including - the form, location, volume, and themes of disclosure. The results can be used as baseline data to demonstrate what environmental issues a company feels it needs to make transparent. It does not, however, demonstrate the motive for disclosure. Interpretation of the themes of disclosure can help to establish whether principles of sustainability are well represented, and if so where on the bi-modal distribution a company’s environmental disclosures place it.

**Sample of companies**

The basis of sample selection was dependent on four criteria:
1. The company had to have an interest in PNG or Indonesia.
2. The company must be listed on the Australian Stock Exchange
3. The company’s interest must be in gold or copper, and
4. Annual reports had to be accessible for two of the three years 1994-96.

A total of 53 annual reports of listed Australian gold/copper companies with interests in PNG and/or Indonesia formed the basis for results of this paper.

The sample was made up as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>PNG</th>
<th>Indonesia</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>19</td>
<td>7</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>1995</td>
<td>20</td>
<td>8</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>1994</td>
<td>14</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Total Reports</td>
<td>53</td>
<td>22</td>
<td>22</td>
<td>9</td>
</tr>
</tbody>
</table>

Names of companies included in the sample are listed in Appendix 2, and available reports are shown in Appendix 3.

The sample of annual reports examined relates to companies with interests in the gold and/or copper mining industries of Papua New Guinea and/or Indonesia at the beginning of 1997. Only companies listed on the Australian Stock Exchange are examined in this paper. This means that a number of overseas companies (e.g. Freeport-McMoran from the USA, Bre-X from Canada, and OTML - a private company) are not included. It is intended to examine these reports at a later time as part of a larger project.

Annual reports for the three year period 1994, 1995 and 1996 were sought for these companies. Two methods were used to obtain reports. First, a questionnaire was distributed to companies requesting copies of their annual reports for the periods they had operated in PNG or Indonesia. Second, annual reports of non-respondents from either the AGSM, the ASX library at the University of Sydney were photocopied, one company’s reports were examined on CD ROM at the National Library of Australia and copies taken of relevant pages. Some companies could not provide copies of earlier reports, or their reports have not yet been accessed. A final listing of available reports is listed in Appendix 3.

---

10 Using incident rates, a company making one sentence disclosure on the air pollution is treated as equal to a company which discloses 50 sentences on air pollution.
A total number of 53 annual reports have been analysed. Of these, there were 19 reports for 1996 (no Bougainville Copper Ltd), 20 for 1995 (all of the sample), and 14 for 1994 (Lihir only started in 1995, and four reports are unavailable at this stage for Aberfoyle, Ashton, Meekatharra and Lone Star).

Annual reports of two other companies, RGC and Straits Resources, have yet to be analysed. Data were manually coded from annual reports by the author from hard copies of reports, or directly from CD ROM. For measurement purposes a disclosure was defined in three ways - in total words, in sentences, and as one of twenty three themes identified from a survey of the literature. At this stage the measures have yet to be confirmed by a third party.

It was possible to have multiple environmental themes recorded in a single passage, in which case each mention of an environmental theme was considered to be a separate disclosure. This basis of recognition has the potential to hide the size of the disclosure. While size of disclosure does not necessarily reflect importance, and length of disclosure is not representative of its quality, an analysis of the frequency of disclosure themes and changes in disclosure themes over the period is sufficient to reflect the importance of a disclosure.

The form of disclosure was also examined. Were the disclosures financial, physical or qualitative in nature? Analysis by conventional accountants has tended to place a high weighting on disclosures of monetary consequences. However, non-financial disclosure is likely to be the more powerful means of discharging environmental accountability because transparency is sufficient to demonstrate whether sustainability is being sought. Hence, no differentiation is made here between the relative importance of physical, financial and qualitative disclosures - in order to remove any bias that weighting systems introduce towards environmental disclosures of a financial kind.

**Analysis of results**

The purpose of this section is to examine trends, and any observed differences between disclosures in the PNG and Indonesia groups of sampled annual reports. Previous discussion indicates that: the total volume of environmental disclosures is expected to have increased in the period; and that there are no grounds for expecting differences between disclosure levels of companies with interests in PNG or Indonesia. Also, given present accounting requirements for disclosure it is expected that rehabilitation themes will dominate, and given ASX requirements it is anticipated that there will be additional comments about environmental themes made in a Statement of Corporate Governance.

A word of warning. Results are incomplete at this stage for several reasons:
- the sample of companies analysed are those with an Australian Stock Exchange listing. No companies with a primary listing in Canada, the USA and the UK are included;
- independent checks on the interpretation of data have yet to be undertaken by a third party. Until independent checks have been made the conclusions must be considered speculative and subjective; and
- there is less data for Australian companies with activities in Indonesia in 1994 because reports for companies such as Lone Star, and Meekatharra were not available. This will influence any interpretation of trend information which compares PNG and Indonesia groups.

Given the previous problems limited descriptive statistics have been used in the following analysis. Analysis is undertaken in four stages:
1. forms of disclosure are compared in total, and for the different groups for the 1994-1996 period;
2. volumes of disclosure are compared for the 1994 - 1996 period in total and by group;
3. type of news is compared for the 1994 - 1996 period in total and by group; and
4. the relative importance of 23 identified themes was assessed.

**Form of disclosure**

Chart 1 shows that environmental disclosures in physical and financial terms are the exception rather than the rule. Indeed, there is a greater number of financial disclosures about the environment than is normal in other industries because of the requirements of Australian Accounting Standard (AAS7) and Urgent Issues Group (UIG) 4 to disclose information about rehabilitation and restoration costs of companies in the extractive industries. However, the average of financial information about the environment has not
increased greatly since the tightening of accounting requirements in 1995. The Chart also provides confirmation of the results of previous studies insofar as there is an upward trend in the average number of disclosures being published by the sample of companies in the period 1994 -1996. These results mean that there is very little quantified information provided by the sample of companies - something that separate environmental reporting under the Code of Environmental Management should change.

Chart 1: Form of Disclosure

Chart 2 shows the average disclosure levels for companies with activities in PNG, Indonesia, or in both countries. One clear observation is that, although there are only three companies with interests in both countries, this group provides a higher proportion of descriptive environmental information than either of the other groups. Higher disclosure could be the result of a size effect, but this has yet to be tested. Also, the PNG group result demonstrates a 50% increase in average descriptive environmental disclosures in 1996. This reflects a general concern with the ramifications of the Ok Tedi dispute which affected BHP Ltd. This is in line with expectations of legitimacy theory suggesting that when an environmental problem occurs other countervailing positive disclosures are made.
**Volume of Disclosure.**

Results shown in Figure 1 demonstrate that choice of measure does have an impact on the way disclosure trends can be interpreted. While the average number of themes disclosed increased across the period, volume of words and sentences both declined in 1995, before increasing substantially in 1996.

**Figure 1: Total Volume of Disclosures using various measures.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Words</td>
<td>300.8</td>
<td>274.1</td>
<td>518.3</td>
</tr>
<tr>
<td>Sentences</td>
<td>12.5</td>
<td>11.2</td>
<td>22.8</td>
</tr>
<tr>
<td>Themes</td>
<td>6.9</td>
<td>7.3</td>
<td>11.1</td>
</tr>
</tbody>
</table>

While the increase in total number of themes is in line with expectations, the decline in number of words and sentences is not. Differences such as those observed in these different measures increase the need to provide a theoretical justification for the measure used, rather than merely relying on the need to improve internal validity as has often been past practice. This author’s preference is to focus on identifiable themes, but to include all themes rather than those which follow a sub-heading indicating ‘environmental disclosures ahead’. Volume of disclosure by group can be seen in Figure 2.

Once again, a warning is sounded about the small sample sizes which led to the statistics in Figure 2. With this caveat, examination of the statistics shows a difference between the volume of disclosures of companies with an interest in PNG or Indonesia, and the volume of disclosures related to companies with interests in both. Disaggregated data shows a larger number of inconsistencies between the measures. Volume of words has increased throughout for the ‘Both’ group, but has declined in 1995 for the PNG and Indonesia groups, before increasing again in 1996, to a higher level than in 1994. Sentences as a measure of volume display the same characteristics as words. Themes show an increase for all groups through the period.
Figure 2: Volume of Disclosure by Group

<table>
<thead>
<tr>
<th></th>
<th>Both</th>
<th>PNG</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Words</td>
<td>1994</td>
<td>1995</td>
<td>1996</td>
</tr>
<tr>
<td></td>
<td>588.7</td>
<td>652.7</td>
<td>1503.0</td>
</tr>
<tr>
<td>Sentences</td>
<td>24.3</td>
<td>27.0</td>
<td>64.7</td>
</tr>
<tr>
<td>Themes</td>
<td>11.3</td>
<td>11.4</td>
<td>16.3</td>
</tr>
</tbody>
</table>

**Type of News**

Chart 3 indicates the lack of information provided about negative environmental impacts of the sample companies. Insofar as the average volume of positive environmental disclosures consistently exceeds negative disclosures, these results accord with previous studies. Whether this is an indication that legitimacy theory is a better explanator of these results than the innovator view remains an open question until themes of disclosure are also examined.

While the group with interests in both countries consistently has a higher level of disclosures than the PNG and Indonesia groups, the difference is only marginal when neutral and negative disclosures are examined. However, the ‘Both’ group provides a much larger volume of positive disclosures than the other two groups. Again, a size effect is yet to be explored.
Figure 3: Type of News by Group

<table>
<thead>
<tr>
<th>Type</th>
<th>Both</th>
<th>PNG</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>11.3</td>
<td>2.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Neutral</td>
<td>3.7</td>
<td>1.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Negative</td>
<td>0.7</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Themes

Finally, it is the themes disclosed which permit some comment about whether the sample represents a group of legitimists, or a group of innovators.

Figure 4: Themes of Environmental Disclosures

<table>
<thead>
<tr>
<th>No</th>
<th>Themes</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Environmental Policy</td>
<td>5</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>Environmental Management</td>
<td>21</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>Environmental Risk Management</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Environmental Audit</td>
<td>7</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Goals/Standards/Targets</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Compliance With Standards</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Awards</td>
<td>4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Inputs</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Processes</td>
<td>5</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>Product Stewardship</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Wastes</td>
<td>7</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>Land</td>
<td>19</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>13</td>
<td>Air</td>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>Water</td>
<td>1</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>15</td>
<td>Spills</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Noise / Odours</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>Environmental Spending</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>Rehabilitation Costs</td>
<td>11</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td>19</td>
<td>Environmental Cost Accounting</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Ecologically Sustainable</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Other</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>Education/Training</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>Total</td>
<td>96</td>
<td>141</td>
<td>211</td>
</tr>
</tbody>
</table>
Reporters with an ‘excellent’ performance might be expected to show their involvement with ESD (Theme 20) and the principles of ESD, yet only two observations were made about sustainability. In 1996, CRA, which should probably be excluded as it is now a UK based company, made the comment that it had ‘renewed its commitment to the ICC Business Charter of Sustainable Development’. In 1995 MIM mentioned sustainable production in the context of continuous improvement in environmental performance. Beyond these comments no company specifically mentioned ecologically sustainable development. It is probable that excellent companies would also report performance against targets (Themes 5 and 6), but these are not the most frequent disclosures, even though they have increased over the period. Given that two of the highest frequencies of themes disclosed (Themes 12 and 18) are those required by the accounting profession, the evidence does not suggest an industry poised at the door of excellence in disclosure and transparency. Instead, it suggests an industry which still needs to ‘measure up’ in terms of its transparency.

**Concluding comments**

No summary of the paper will be presented here because the results are preliminary. A larger sample of company annual reports is to be explored over a longer period of time, and cross-checks must be made before any concrete statements can be made.

Possible adherence to the industry Code for Environmental Management provides the gold/copper mining industry with an opportunity to improve its measurement and public disclosure of environmental performance and show legitimacy theory to be misguided. Preliminary evidence presented in this paper suggests there is a long way for the industry to go before it can be categorised in the ‘excellent’ bracket.
**Appendix 1: Coding Scheme for Environmental Disclosure**

1. Company Name
2. Country of Operations
3. Organisation Number
4. Year of Report
5. Form of Disclosure
   1. Qualitative
   2. Physical
   3. Financial
   4. Total
6. Company Characteristics
   1. Size - Total Assets
   2. Net Income
   3. Sales
   4. R & D Expenditure
   5. Other Stock Exchanges
7. Location
   1. Chairman’s Review
   2. Directors Report
   3. Corporate Governance Statement
   4. Review of Activities
   5. Financial Accounts
   6. Notes to the Accounts
9. Volume of disclosure
   1. Words
   2. Lines
   3. Sentences
   4. Theme Topic
10. Type of news.
    1. Positive
    2. Neutral
    3. Negative
11. Themes
    1. Environmental policy
       - list of environmental objectives
       - environmental issues of concern
       - prioritisation of environmental issues in terms of their impacts
    2. Environmental management system
       - BS7750/ISO 14,000
       - Responsible persons
    3. Risk management
       - Environmental impact assessment
    4. Environmental audit
5. Goals and targets
   - goals outlined
   - targets for goals
   - performance against targets
   - actions taken

6. Compliance with standards
   - legal standards
   - legal proceedings
   - industry standards (codes)
   - other benchmarks
   - non-compliance with standards

7. Awards

8. Inputs
   - research and development
   - energy management
   - raw materials, non-renewable resources used

9. Processes
   - technology employed
     - capital equipment

10. Product stewardship
    - life cycle analysis
    - eco-labelling

11. Wastes
    - recycling
    - reduction
    - reuse
    - tailings

12. Land rehabilitation and remediation

13. Air emissions

14. Water effluent

15. Spills

16. Noise and odours

17. Environmental spending
    - amount
      - total;
      - capital expenditure,
      - operating expenditure
      - themes of environmental costs by theme
    - details
      - actual costs recognised (expenses, assets, and liabilities)
      - losses and contingent liabilities
      - provisions
      - catastrophe reserves
      - commitments

18. Rehabilitation costs
    - operating costs
    - provisions
    - contingent liabilities
    - other

19. Environmental cost accounting

20. Sustainable development reporting
    - statement that the organisation subscribes to principles of sustainable development
    - details re principles - precautionary, polluter pays, etc.
    - attempt to connect environmental and economic dimensions
• impact on biosphere and habitat carrying capacity
• natural trust account
• eco-asset sheet
• natural capital

21. Other sources of environmental information (e.g. environmental report; environmental audit)
22. Education/Training
23. Biota/Habitat
24. Total Disclosures of Themes

Adapted from: (Roberts 1992; UN 1992; Owen 1994; Gray, Kouhy et al. 1995b; Deegan and Gordon 1996; Hackston and Milne 1996; Buhr and Freedman 1997; Burritt and Welch 1997a; Burritt and Cummings 1997c)
Appendix 2: Twenty companies in the sample.

Aberfoyle Ltd 2
Ashton Mining Ltd 2
Auridiam Consolidated NL1
Aurora Gold Ltd 2
Australian Gold Fields NL1
Bougainville Copper Ltd 1
Consolidated Rutile Ltd 2
CRA Ltd 3
Gasgoyne Gold Mines NL 2
Highlands Gold Ltd 3
Lihir Gold Ltd 1
Lone Star Exploration NL 2
MACMIN NL 1
Meekatharra Minerals Ltd 2
MIM Holdings Ltd 3
Newcrest Mining Ltd 2
Niugini Mining Ltd 1
Pelsart Resources NL
The BHP Co Ltd 1
Union Mining NL 1

Code: 1= PNG, 2 = Indonesia, 3 = Both countries

---

11 Questionnaires requesting annula reports were sent to 43 companies identified as having an interest in PNG or Indonesia. These companies included 17 based in Canada and the USA, leaving a total of 26 possible Australian companies.
**Appendix 3: Number of reports available for the twenty companies.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberfoyle Ltd 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashton Mining Ltd 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auridiam Consolidated NL 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aurora Gold Ltd 2</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Australian Gold Fields NL1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bougainville Copper Ltd 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolidated Rutile Ltd 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRA Ltd 3</td>
<td>z</td>
<td>z</td>
<td>z</td>
</tr>
<tr>
<td>Gasgoyne Gold Mines NL 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highlands Gold Ltd 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lihir Gold Ltd 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lone Star Exploration NL 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MACMIN NL 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meekatharra Minerals Ltd 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIM Holdings Ltd 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newcrest Mining Ltd 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niugini Mining Ltd 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelsart Resources N L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The BHP Co Ltd 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union Mining NL 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

x = PNG, Y = Indonesia, Z = Both countries.
### Appendix 4: PNG / Indonesia interests of twenty companies in the sample.

<table>
<thead>
<tr>
<th>Company</th>
<th>PNG</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashton Mining Ltd 2</td>
<td>Owns 31.9% of Aurora’s. Aurora produces at Mt Muro</td>
<td></td>
</tr>
<tr>
<td>Auridiam Consolidated NL1</td>
<td>Drilling on Woodlark Island gold project.</td>
<td></td>
</tr>
<tr>
<td>Aurora Gold Ltd 2</td>
<td>Has 90% ownership of PT Indo Muro Kencana which operates the Mt Muro mine, Central Kalimantan. Developing Toka Tindung gold in north Sulawesi</td>
<td></td>
</tr>
<tr>
<td>Australian Gold Fields NL1</td>
<td>Advanced exploration of Morobe Gold Project.</td>
<td></td>
</tr>
<tr>
<td>Bougainville Copper Ltd 1</td>
<td>Panguna mine, Bougainville. Affairs managed by CRA Minerals (PNG) Pty Ltd.</td>
<td></td>
</tr>
<tr>
<td>Consolidated Rutile Ltd 2</td>
<td>Joint ventures drilling in Dawagu and Obano, Irian Jaya. Objective is to advance other targets.</td>
<td></td>
</tr>
<tr>
<td>CRA Ltd 3</td>
<td>17% interest in Lihir Gold, Lihir Island</td>
<td>10% interest in Grasberg mine. 90% of Kelian mine - in pit and mine area drilling programmes.</td>
</tr>
<tr>
<td>Gasgoyne Gold Mines NL 2</td>
<td>Porgera gold mine. Freida River feasibility studies. Ramu feasibility studies.</td>
<td>45% interest in Awak Mas, Sulawesi - bankable feasibility study under way.</td>
</tr>
<tr>
<td>Highlands Gold Ltd 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lihir Gold Ltd 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lone Star Exploration NL 2</td>
<td></td>
<td>45% ownership of Awak Mas project (10% PT Asminco Bara Utama).</td>
</tr>
<tr>
<td>MACMIN NL 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wapolu mine in production.
Mt Sinivet (ex Wild Dog)
gold production expected late 1997.

Meekatharra Minerals Ltd 2
- Exploration tenements
  - Ciemas project, West Java.
  - Way Linggo North Vein gold mine, Sumatra.
  - 70% interest in Kukusan COW.
  - 6 new COWs in Sumatra and northeast Kalimantan.
  - Interests in 5 new KP’s in Pandegland, Purwakarta and Tasmalaya, West Java.
  - First pass exploration of Bird’s Head, Irian Jaya.

MIM Holdings Ltd 3
- Sold 65% interest in Highlands gold in June 1996, but had interests in the period.

Newcrest Mining Ltd 2
- Gosowong prospect, Halmehera islands.

Niugini Mining Ltd 1
- Lihir Island

Pelsart Resources N L 2
- Ampalit/Cempaga Buang.
- Mirah.

The BHP Co Ltd 1
- Ok Tedi

Union Mining NL 1
- Wapolu

Code: 1 = PNG, 2 = Indonesia, 3 = Both countries
Bibliography


