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Environmental Disclosures In Annual Reports and 10Ks: An Examination

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SYNOPSIS: This study investigates the quality of environmental disclosures in 10K and annual reports (ARs) for 234 companies within 12 industries for the years 1986 through 1991. The content of environmental disclosures is examined with the aid of descriptive reporting codes, which were developed based upon the manner in which the sampled firms disclosed environmental information. The industries selected for study represent companies whose operations could have a negative material impact on the environment. Our principal findings are: (1) total AR disclosures have significantly increased since 1989; (2) petroleum refining, hazardous waste management, and steel works and blast furnaces provided the highest quality of AR disclosures; (3) the 1989-1991 time period produced a significant increase in 10K environmental disclosures; (4) petroleum refining, hazardous waste management, and steel works and blast furnaces provided the highest quality of 10K disclosures; and, (5) the overall quality of environmental disclosures is low.

Data Availability: Data available from public sources.

INTRODUCTION

In 1990, a U.S. opinion poll reported that most people feel that the environment is so important that requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of cost (Bragdon and Donovan 1990). The results of the opinion poll suggest that stakeholders[1] are concerned with the way in which corporate entities are responding to environmental concerns. There are a number of ways in which an entity can communicate to stakeholders its response(s) to environmental concerns. The mode of communication could be in the form of advertisements in newspapers and business publications, television and/or radio, and annual reports (ARs) and 10Ks.

The major objective of this paper is to determine if the present information disclosed in ARs and 10Ks is sufficient to satisfy the needs of stakeholders. This is important because if information disclosed does not satisfy stakeholders, then perhaps the FASB and the SEC should take another look at environmental disclosure requirements.

The remainder of this paper is organized as follows. The next section presents an overview of environmental reporting requirements followed by a review of prior research on environmental disclosures. Our data and method are described next, followed by a discussion of findings. The final section of the paper summarizes our results and describes limitations.

[1] A stakeholder is defined as a party who is directly affected by the actions of a corporate entity. A stakeholder can either be internal or external. Internal stakeholders are investors, creditors, and employees. External stakeholders are consumers, concerned citizens, local, state and federal government.

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OVERVIEW OF ENVIRONMENTAL REPORTING REQUIREMENTS

To date, the FASB has provided little direction for corporate disclosure of environmental matters. The only rules addressing environmental disclosure focus on issues of capitalization or expensing of environmental outlays and contingent liabilities. On the environmental outlays issue, the FASB's Emerging Issues Task Force (EITF) has released three *Issue Statements* on the treatment of costs incurred for environmental purposes. *Issue No. 90-8, Capitalization of Costs to Treat Environmental Contamination* primarily recommends expensing the cost of contamination treatment. However, capitalization is permitted if the costs: (a) extend the asset's life, increase its capacity, or improve its efficiency relative to the property's condition when originally constructed or acquired; (b) mitigate or prevent future contamination; or (c) are incurred in preparing the property for sale. Further, costs are capitalized to the extent of recoverability. *Issue No. 89-13, Accounting for the Cost of Asbestos Removal*, recommends the capitalization of costs incurred to treat asbestos as long as they are experienced within a reasonable time frame after the acquisition of property with a known asbestos problem. *Issue No. 93-5, Accounting for Environmental Liabilities*, calls for an environmental liability to be evaluated independently from any potential claim for recovery and the loss arising from the recognition of an environmental liability to be reduced only when a claim for recovery is probable of realization. Further, discounting environmental liabilities for a specific clean-up site is allowed, but not required, if the aggregate amount of the obligation and the amount and timing of the cash payments for that site are fixed or reliably determinable.

Guidance for contingency accounting is provided by FASB *Statement No. 5, Accounting for Contingencies*. According to *Statement 5*, a loss contingency should be recognized as a loss if (a) it is probable that a liability has been incurred or an asset impaired and (b) the amount of the liability or the impairment can be reasonably estimated. With regard to the measurement of a contingent loss, FASB *Interpretation No. 14, Reasonable Estimation of the Amount of a Loss*, states that when the reasonable estimate of a loss is a range and no amount within the range is a better estimate than another, the minimum amount should be accrued.

The SEC requires more specific disclosures in 10K reports. *Regulation S-K, Items 101, 103, and 303,* and *Staff Accounting Bulletin No. 92* are the rules used by the SEC to provide guidance in environmental disclosures.

Item 101 requires a general description of the business and specific disclosure of the effects that compliance with environmental laws may have on capital expenditures, earnings, and competitive position, when material. The estimated amount disclosed for capital expenditures should represent the current and succeeding fiscal years and any future periods in which those expenditures may be material.

Item 103 addresses environmental proceedings and requires disclosure of pending or contemplated administrative or judicial proceedings if: (a) such proceedings are material to the business or financial condition of the registrant, (b) such proceedings involve a claim which exceeds ten percent of the registrant's current assets, or (c) a government authority is a party to such proceedings where sanctions will be greater than $100,000.

Item 303 requires disclosure of material events and uncertainties known to management that would cause reported financial information to be unrepresentative of future operating results or financial conditions.

SEC *Staff Accounting Bulletin No. 92*, states that the rate used to discount the cash payments should be one that will produce an amount at which the environmental liability could be settled in an arm's length transaction with a third party. If, however, that rate is not readily determinable, then the rate selected should not exceed the interest rate on monetary assets that are essentially riskless and have maturities comparable to that of the environmental liability.

PRIOR RESEARCH

Prior environmental disclosure research may be divided into two distinct categories:

investor use of environmental disclosure and the reliability of environmental disclosures. The first part of this section will present the findings from survey and market based research studies. The next part will present findings from studies focusing on the reliability of environmental disclosures.

With regard to survey research, Longstreth and Rosenbloom (1973) surveyed religious organizations, universities, foundations, insurance companies, banks and mutual funds, and found that the majority of those responding took social considerations into account in the selection and retention of investments. Buzby and Falk (1978) also found investors used social information, but that this information was less important than financial disclosures. They surveyed mutual fund presidents and found that a substantial number of funds considered some social items, for example, involvement in improper or illegal business or political practices, pollution of the environment, and the sale of products which are potentially hazardous, in their investment decision process. However, the relative importance of most of the social items investigated was lower than any of the six standard financial items included in the survey.

Buzby and Falk (1979) surveyed an additional group, university chief financial officers, in order to assess the demand for and importance of nine social items of information for investment purposes. The results indicated that university investors were not a strong source of demand for social responsibility information. Specifically, while making investment decisions, the university investors did not consider a firm's degree of negative involvement in social activities. The results also showed that the subjects preferred audited information. Rockness and Williams' (1988) survey of socially responsible mutual fund managers also failed to identify a strong demand for specific social disclosures. Their study revealed that sources of social information varied from firm to firm, with no one social criterion used unanimously. The most frequently used source of social information was that provided by the firms themselves.

With regard to market based research, Belkaoui (1976) found that the market reacted differentially to those firms that disclosed pollution control information than to those that did not disclose. Further, Anderson and Frankle (1980) found that socially disclosing firms outperformed non-socially disclosing firms, that portfolios that disclosed social information for two continuous years outperformed portfolios that disclosed social information for only one year, and that financial information on a temporary basis (for one month out of 12) had a more favorable market reaction than nonfinancial information. Ingram (1978), used a more sophisticated design. He controlled for industry, the sign of firms' excess earnings in the year of disclosure, and the year the disclosure was made. With these additional variables, Ingram found that the information content of social responsibility disclosures varied across firms. More specifically, information content was conditioned on the market segment (identified by firm-specific characteristics) rather than on a general cross-section of firms.

Shane and Spicer (1983), investigated whether security price movements were associated with the release of externally produced information about pollution control performance. The results indicated that the externally-produced disclosures had information content. Finally, Freedman and Jaggi (1986) found no significant difference between investor reaction to extensive pollution disclosures and investor reaction to minimal pollution disclosures.

With regard to research investigating the reliability of social disclosures, Rockness (1985) explored whether firms' annual report disclosures are reliable measures of social performance. It was found that regardless of the subjects' background (financial analysts, member of environmental protection organizations, environmental regulators, or MBA students) there was little difference in their judgments about firms' environmental performance from voluntary annual report disclosures. The accuracy of subjects' evaluations of social performance was also addressed. A comparison of subjects' rankings on environmental performance with the Council on Economic Priorities rankings of environmental

performance showed no significant correlation. The results indicated that although subjects made consistent rankings, they were not accurate judgments of firm performance. This lack of correlation supported earlier studies by Ingram and Frazier (1980) and Wiseman (1982).

Freedman and Wasley (1990) also investigated the relationship between actual firm environmental performance and environmental AR and 10K disclosures. They explored this relationship for firms from four highly polluting industries: steel, oil, electric utilities, and paper and pulp. Actual firm environmental performance was operationalized using indices developed by the Council on Economic Priorities (steel (1972 and 1976), oil (1974), electric utilities (1975), and paper and pulp (1972)). Their results showed that AR disclosures were only significantly correlated with external pollution control indices in the oil industry. This finding is consistent with previous research which has failed to clearly document an association between firm annual report environmental disclosures and externally produced pollution performance indices. It was also found that correlations of 10K disclosures with pollution performance indices mirrored those for annual reports: only two of the correlations were significant. Disclosure of present and potential litigation relating to environmental performance in the steel industry was significantly related to environmental performance. The final significant correlation was in the electric utility industry; environmental performance was significantly related to disclosure of information about the past and future expenditures related to pollution abatement activities.

Overall, the results of the survey and market-based studies seem to indicate that there is some use of social disclosures by one set of stakeholders, specifically investors. However, this use is not consistent across studies. The different conclusions reached in the studies may be attributable to a number of items such as differing samples and sampling methodologies. The lack of a significant relationship between environmental disclosures and actual environmental firm performance may provide another explanation for the lack of consistent investor use of social disclosures. At this time, no definitive conclusion can be made as to whether social disclosures are consistently used by or useful to investors. However, given that they are used by some investors, the following question emerges: what is the relative quality of disclosures over time? The next part of the study attempts to answer that question.

DATA AND METHOD

Initially, 294 companies from 33 industries, as defined by *Standard and Poor's Compustat Services*, were selected for inclusion in the study. The selection of the initial industries was subjective and based upon the following criteria: (1) their production process(es), transportation, storage, and/or waste disposal process(es), if not handled properly, could potentially have a negative impact on the environment, and (2) they were not regulated.[2] In order for an industry to have remained in the final sample, it had to consist of at least six companies. This additional criterion was necessary in order to draw reasonable inferences regarding industry attributes. As a result of using the additional criterion, the initial sample was reduced to 234 companies from 12 industries. Thus, industries such as forestry and coal mining were not included in the final sample of firms. Table 1 presents the industries used in the study. In terms of defining industry groups, the 12 industries in the sample were combined into six groups based on two digit SIC codes. The final six groups were: oil and gas (crude petroleum and natural gas, 1311, and drilling oil and gas wells, 1381), chemicals and chemical related (chemical and allied products, 2800, plastics, resins and elastomers, 2821, pharmaceutical preparations, 2834, soap, detergent and toilet preparations, 2840, perfume, cosmetics and toilet preparations, 2844, and paints, varnishes and lacquers, 2851), petroleum refining (2911), steel works and blast furnaces (3312), motor vehicles and car

[2]Regulated industries were excluded because the scope of the paper is limited to how non-regulated publicly traded industries have reacted to the change in public opinion regarding environmental protection.

TABLE 1
Sample Industries

SIC	Industry	Number of Companies Within Each Industry Group	
1311	Crude Petroleum and Natural Gas	72	
1381	Drilling Oil and Gas Wells	8	
	Total Oil and Gas		80
2800	Chemicals and allied Products	13	
2821	Plastics, Resins, Elastomers	9	
2834	Pharmaceutical Preparations	37	
2840	Soap, Detergent, Toilet Preps	6	
2844	Perfume, Cosmetic, Toilet Prep	9	
2851	Paints, Varnishes, Lacquers	7	
	Total Chemical and Chemical-Related		81
2911	Petroleum Refining		31
3312	Steel Works and Blast Furnaces		22
3711	Motor Vehicles and Car Bodies		9
4955	Hazardous Waste Management		11
	Total Sample		234

bodies (3711), and hazardous waste management (4955).

Content analysis was used to collect environmental disclosure data. Content analysis is a research method for making replicable and valid inferences from data to their context (Krippendorff 1980). The specific type of content analysis employed is referred to as semantical content analysis, which has been defined by Krippendorff (1980) as a method which classifies signs according to their meanings (e.g., counting the number of times a company has been cited for an environmental violation).

Environmental disclosure data were collected from ARs and 10Ks for the six years 1986 through 1991. The year 1986 was selected as the starting point for our data collection efforts because it was the year in which the SEC issued its current version of Regulation S-K. Thus, five years subsequent to the issuance of the current version of Regulation S-K were investigated. Data collected from the ARs and 10Ks were coded according to the coding scheme listed in exhibit 1. The codes contained in exhibit 1 were developed based upon: (1) our interpretation of voluntary disclosures in ARs and 10Ks, and (2) the disclosure requirements mandated by the FASB and the SEC. Our general procedure for collecting and coding the data was as follows:

1. Two of the authors read the first year of AR and 10K information and independently derived codes and an evaluation of disclosures. Next, a meeting was held to discuss independent evaluations and to produce a common coding scheme.
2. Two data collecting teams, led by the authors, were established. Each team consisted of two research assistants and one author. Each team was responsible for three and one-half years of AR and 10K information. Meetings were held to train the research assistants. Each team held weekly meetings to discuss and review the data which had been coded and any prob-

EXHIBIT 1

Panel A: Annual Report Codes

Code	Description
SQD	Short qualitative discussion (not in the footnotes and less than a page)
EQD	Extended qualitative discussion (not in the footnotes and a page or more)
FN	Footnote discussion
JE	Journal entry recorded in financial statements
	Firm has been cited for environmental violations and/or is conducting remediation efforts at one or more sites and:
V1	Associated costs are significant.
V2	Company believes associated costs will not be significant or will not have a material adverse effect on the financial statements.
V3	Liability or associated costs cannot be estimated.

Panel B: 10K Report Codes

Code	Description
	Firm states that it is subject to and/or complies with laws relating to environmental protection and:
R1	Environmental protection costs have not been significant and are not expected to be significant in the future.
R2	Violations and/or monetary penalties have not been material.
R3	The company is not aware of any existing conditions which would give rise to materially adverse liability under federal, state and local environmental laws.
R4	Environmental protection costs have not been material to date or have not had a material adverse effect on the company's financial position.
R5	Does not believe costs of compliance will be material or does not expect these costs to have a material adverse effect on the company's financial position.
	Firm states that it is subject to and/or complies with strict environmental regulations and:
HR1	Compliance with these regulations increases operating costs/expenditures.
HR2	Compliance with these regulations increases operating costs; however, the incremental costs associated with compliance cannot be estimated.
HR3	The cost of compliance in the future may increase or affect the company's operations; and/or, the company could incur an environmental liability in the future.
FUT	The impact of environmental legislation on the company's costs and operations in the future cannot be estimated. (One frequently cited reason for this is that environmental laws are constantly changing.)
REF	Makes reference to financial statement footnote.
FN	Footnote discussion. This footnote appears ONLY IN THE 10K and NOT in the annual report.
LIAB	The company has accrued a liability for environmental contingencies.
REG	Firm only states that it is subject to and/or it complies with laws relating to environmental protection.
	Firm has been cited for environmental violations and/or is conducting remediation efforts at one or more sites and:
VI	Associated costs are significant.
V2	Company believes associated costs will not be significant or will not have a material adverse effect on the financial statements.
V3	Liability or associated costs cannot be estimated.

lems which may have come about in terms of data interpretation. A list of problems along with their resolutions was kept by each author.

3. The authors met bi-monthly to discuss problems and their resolutions. This step was necessary to ensure consistency in the interpretation of the data.

A weighting scheme was developed to evaluate the quality of disclosures on an individual industry and group basis. The assignment of weights to the individual AR and 10K codes was based upon the following objective: **the objective of environmental disclosures is to provide stakeholders with information that will allow them to evaluate the long- and short-term environmental concerns of an entity in terms of risk, current and prospective cash flow requirements, and consistency with societal environmental concerns.** This objective is basic but comprehensive in the sense that it incorporates the needs of all stakeholders.[3] Environmental concerns of an entity should be disclosed in the form of: (1) a policy statement regarding plans to produce, transport, store, and sell goods and/or services in the most environmentally safe manner; (2) statements regarding remediations for past actions, legal compliance, and plans for environmental improvements in operations; (3) the total dollar amount committed to such plans; (4) the dollar amount spent to date; (5) the dollar amount expected to be spent in each of the next ten years; (6) the types of environmentally-oriented assets that have and/or will be acquired and the dollar amount associated with each type of asset; and (7) the results of the environmental audit. Stakeholders should also be provided information about an entity's ability to provide products in an environmentally sustainable manner. That is, the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs.

Based upon the above objective, the following scheme is used to assess the quality of AR disclosures: JE=1; FN=2; V=3-5; SQD=4-6; and EQD=7-10.[4] In terms of the evaluation scheme, the lowest score is assigned to the least informative and the highest to the most informative disclosure(s). A discussion of the rationale used in the assignment of points to the AR codes is provided below.

Journal entry (JE) is assigned the least number of points because its informational content is limited to past actions regarding environmental concerns.[5] Thus, this disclosure type is very limited in scope. Footnote (FN) is more informative than JE because it discloses actual and expected future cash flow consequences of past environmental actions and information regarding additional past environmental actions whose future cash flow effect cannot be reasonably estimated. The fact that a firm has been cited for an environmental violation and/or is conducting remediation efforts (V) is more informative to stakeholders than FN because in addition to the information contained in FN, important environmental information is separately disclosed so that stakeholders can access, in a meaningful manner, the way in which an entity has handled a negative environmental experience. The current and expected cash flow effect of management's response to that experience is also disclosed. The assignment of points to this disclosure code takes into account the fact that an entity could have more than one environmental violation and/or remediation ef-

[3] It should be noted that this objective does not neglect the needs of investors because it should provide them with information that will allow them to assess the impact of environmental concerns on cash flows in terms of amount, timing, and related uncertainties. The inclusion of cash flow information is consistent with the objectives of financial statements as defined by the FASB.

[4] For both the AR and 10K disclosures, all disclosure types are ordered in terms of amount of information disclosed. The starting point for each level containing more information is one number higher than the previous level with two exceptions discussed later in the coding explanation. Each type of disclosure has a number of points assigned to it which is representative of the different items possibly contained within the disclosure. Exhibit 1 lists the different possible levels of disclosures within the AR and 10K codes.

[5] It should be noted that the treatment of the cost of a past action as a capital or operating expenditure does not negate the fact that it has already occurred.

fort occurring at the same time. Thus, one point is assigned to each possibility.[6]

Short qualitative disclosure (SQD) is more informative than the reporting of an environmental violation and/or remediation efforts because at a minimum it contains information regarding an entity's environmental policy, legal compliance and restrictions, and changes in environmental regulations. Additional information disclosed in the SQD could be in the form of operating and capital environmental expenditures and the effect of environmental matters on other aspects of operations. Concisely stated, SQD is more broad based than the above codes and incorporates a number of issues included in an entity's environmental concerns. With regard to the assignment of points, four base points are assigned to SQD and an additional two points may be awarded based upon the additional information disclosed (e.g., the disclosure of operating and capital environmental expenditures or the effect of environmental matters on other aspects of an entity's operations).

Extended qualitative disclosure (EQD) is more informative than SQD because, at a minimum, it should provide the same basic information contained in SQD as well as information regarding plans for environmental improvements in operations, the total dollar amount committed to such plans, and the dollar amount spent to date. Additional information disclosed could be in the form of the dollar amount expected to be spent in each of the next five years, the types of environmentally-oriented assets that have and/or will be acquired and the dollar amount associated with each type, and the results of the environmental audit. This type of disclosure should also provide stakeholders with information regarding a corporate entity's ability to provide products in an environmentally sustainable manner. Seven base points are assigned to EQD, which is one point above the maximum for SQD.[7] An additional three points may be awarded based upon the additional information disclosed.

Based upon the objective of environmental disclosures stated earlier, the following scheme is used to assess the quality of 10K disclosures: REF=1; FN=2; FUT=3; LIAB=4; REG=5; R=5-10; HR=6-12; and V=7-13. As with the evaluation of AR disclosure codes, the lowest score is assigned to the least informative and the highest to the most informative disclosure(s). Reference (REF) is assigned the least number of points because it only directs stakeholders to information reported elsewhere. On the other hand, a footnote (FN) is more informative because it discloses actual and expected future cash flow consequences of past actions and information regarding additional past actions whose future cash flow effect cannot be reasonably estimated. Information regarding an entity's inability to estimate the impact of environmental legislation on its costs and operations (FUT) is more informative than FN because it highlights for stakeholders those environmental concerns that are being aggressively pursued by lawmakers and the uncertainty they have created on an entity's ability to predict the cash flow consequence of such concerns.[8] The recording of a liability (LIAB) is more important to stakeholders than FUT because they are provided with information that will allow them to assess the future cash flow effect of general environmental concerns.

Making a statement regarding the fact that an entity is subject to and/or complies with environmental protection laws (REG) is more informative than LIAB because it signals to stakeholders the fact that the entity is presently in compliance with environmental

[6]Due to the breadth of coverage in the definition of stakeholders, the authors have not attempted to make a value statement regarding the relative importance of each disclosure type in disclosure code V. To do so would be analogous to the construction of an aggregate utility function.

[7]Since SQD and EQD are considered two parts of the one overall category of qualitative disclosures (QDs), the entire range for QDs is 4-10, with SQDs in the lower end of the range and EQDs in the higher portion.

[8]Providing stakeholders with information regarding the environmental issues pursued by lawmakers via legislation will provide them with an opportunity to evaluate whether lawmakers' environmental concerns imposed on entities are consistent with those that have been identified by society in general.

protection laws without incurring additional costs.[9] Providing additional information on an entity's assessment of the impact of environmental protection laws (R) is more informative to stakeholders than simply making a statement that it is subject to and/or in compliance with environmental protection laws, REG, because stakeholders are provided with separately disclosed information that will allow them to assess the cash flow affect of legal compliance. In terms of the assignment of points to R, the base number of points is the same as REG.[10] However, for each disclosure possibility within R, one point is assigned.

Providing information on specific environmental regulations (HR) is more important than providing information on general environmental protection laws because stakeholders are provided with information that will allow them to evaluate the specific cash flow effect of environmental regulations that are intricately related to and inseparable from an entity's specific operations. The base points assigned to HR is six. However, because of its relative importance over R, two additional points are assigned to each item.

Information regarding the cash flow affect of environmental violations and /or remediation efforts (V) is more important than information regarding the cash flow affect of legal compliance because stakeholders are provided with information to evaluate the cash flow affect of negative environmental actions of an entity.[11] The base number of points assigned to V is seven. Because V is also entity specific, two additional points are assigned to each item.

Based on the above weighting scheme, the overall quality of AR disclosures is represented by a total score of 24 points (the sum of the maximum possible points of all disclosure items). The quality of disclosure for each firm in a given year is determined by the number of cumulative points in AR disclosures deflated by 24. This procedure allows the quality of disclosures to be quantified on a percentage basis. The quality of 10K disclosures for each firm in a given year is measured in the same manner as that for AR disclosures with the exception of the deflator employed; the total possible quality score for 10K disclosures is 50. The aggregate quality of environmental disclosures for each firm in a given year is determined by deflating the combined AR and 10K cumulative points by 74.

ASSESSMENT OF ARs AND 10Ks

AR Findings

Table 2 contains the mean, median, and standard deviation for the quality of AR, 10K, and aggregate disclosures by industry group. With respect to the quality of AR disclosures, table 2 reveals that all of the industry groups did not provide high quality disclosures to stakeholders. In terms of the relative quality of AR disclosures, petroleum refining (29), hazardous waste management (49), and steel works and blast furnaces (33) provided the highest quality of disclosures. (Appendix A contains the most frequent industry disclosures of AR codes by year and also environmental disclosures reported in ARs by year.)

T-tests were performed to determine if there is a statistically significant difference in the quality of disclosures between industry groups. Table 3 reveals that there is a significant difference in the quality of disclosures between petroleum refining (29) and the other industry groups except for hazardous waste management (49). Furthermore, there is no difference in the quality of disclosures in the hazardous waste management (49) and steel works and blast furnaces (33) industry groups.

Table 4 provides some insights regarding the quality of AR disclosures over time. The highest quality of disclosures were experienced in 1989, 1991, and 1990, respectively. T-tests were performed to determine if there

[9] In terms of evaluating this disclosure code, it is assumed that if an entity does not report or mention any cost information, then it is in compliance with environmental protection laws without incurring additional costs.

[10] R starts at the same level as REG, since REG is an implied statement of compliance with environmental protection laws and R1 is also a statement of compliance with immaterial costs to the firm.

[11] Negative environmental information is more important than legal compliance information because it informs stakeholders of costs that could have been avoided had a particular action on the part of the entity not occurred.

TABLE 2
Descriptive Statistics for The Quality of AR, 10K, and Aggregate Disclosures by Industry Groups

	Mean	Median	Standard Deviation
13	0.04201	0.00	0.09580
	0.13637	0.12	0.13676
	0.10577	0.08108	0.10439
28	0.08736	0.00	0.15324
	0.16383	0.12	0.16664
	0.13903	0.09459	0.13877
29	0.17384	0.00	0.21645
	0.23376	0.26	0.19918
	0.21433	0.21622	0.17896
33	0.10322	0.00	0.13829
	0.20909	0.18	0.19756
	0.17475	0.12838	0.15616
37	0.04861	0.00	0.10262
	0.18074	0.16	0.17757
	0.13789	0.10811	0.13407
49	0.14710	0.00	0.19006
	0.22485	0.16	0.21230
	0.19963	0.14865	0.18936

*The numbers listed are for AR, 10K, and aggregate, respectively.

is a statistically significant difference in the quality of disclosures between years. Table 5 reveals that all differences are significant except 1986 and 1988, and 1990 and 1991.

10K Findings

Table 2 also reveals that, as with AR disclosures, the quality of 10K disclosures is low, and the highest relative mean values for qual-

TABLE 3
Test for Significant Difference in The Quality of Disclosures Between Industries' AR Reporting

	28	29	33	37	49
13	–5.5222+ (.0001)*	–8.0074 (.0001)*	–4.7795 (.0001)*	–0.4508 (.6536)	–4.4152 (.0001)*
28	—	–4.9907 (.0001)*	–1.1408 (.2551)	2.4842 (.0150)*	–2.4475 (.0167)*
29	—	—	3.5452 (.0005)*	5.9235 (.0001)*	0.9458 (.3460)
33	—	—	—	2.9620 (.0036)*	–1.6677 (.0985)
37	—	—	—	—	–3.6147 (.0005)*

+ The top number is the t-test score and the bottom number is the p-value.
* Significant at $p \leq 0.05$.

TABLE 4
Descriptive Statistics for The Quality of AR, 10K, and Aggregate Disclosures by Sample Years

	Mean	Median	Standard Deviation
86	0.04113*	0.000	0.09460
	0.14880	0.12	0.15876
	0.11388	0.09459	0.11857
87	0.01959	0.000	0.06564
	0.08239	0.00	0.12659
	0.06202	0.000	0.08833
88	0.03900	0.000	0.08987
	0.11966	0.10	0.12599
	0.09350	0.08108	0.08376
89	0.16453	0.125	0.18039
	0.26094	0.27	0.18499
	0.22967	0.20270	0.15888
90	0.12269	0.000	0.16814
	0.21761	0.22	0.17713
	0.18682	0.17568	0.15289
91	0.12981	0.000	0.19895
	0.19949	0.16	0.17884
	0.17689	0.13514	0.16167

*The numbers listed are for AR, 10K, and aggregate, respectively.

ity of disclosures are petroleum refining (29), hazardous waste management (49), and steel works and blast furnaces (33). (Appendix B contains the most frequent industry disclosures of 10K codes by year and also environmental disclosures reported in 10Ks by year.) The t-tests contained in table 6 reveal that the mean quality disclosure value for both oil and

TABLE 5
Test for Significant Difference in The Quality of Disclosures Between Years in Total AR Reporting

	87	88	89	90	91
86	2.8624+ (.0044)*	0.2505 (.8023)	–9.2670 (.0001)*	–6.4663 (.0001)*	–6.1576 (.0001)*
87	—	–2.6677 (.0079)*	–11.5500 (.0001)*	–8.7374 (.0001)*	–8.0482 (.0001)*
88	—	—	–9.5281 (.0001)*	–6.7148 (.0001)*	–6.3634 (.0001)*
89	—	—	—	2.5957 (.0097)*	1.9778 (.0485)*
90	—	—	—	—	–0.4183 (.6759)

+ The top number is the t-test score and the bottom number is the p-value.
* Significant at $p \leq 0.05$.

TABLE 6
Test for Significant Difference in The Quality of Disclosure Between Industries' 10K Reporting

	28	29	33	37	49
13	–2.8003+ (.0052)*	–6.1318 (.0001)*	–3.9749 (.0001)*	–1.7776 (.0805)	–3.2929 (.0015)*
28	—	–4.2528 (.0001)*	–2.4097 (.0169)*	–0.6680 (.5065)	–2.2431 (.0278)*
29	—	—	1.0936 (.2751)	1.8779 (.0635)	0.2978 (.7664)
33	—	—	—	0.9559 (.3412)	–0.5037 (.6154)
37	—	—	—	—	–1.2392 (.2177)

+ The top number is the t-test score and the bottom number is the p-value.
* Significant at $p \leq 0.05$.

gas (13) and chemicals and chemical related (28) are significantly different than the other industry groups except for motor vehicles and car bodies (37). However, for the other industry groups there is not a significant difference between their mean quality of disclosure values. Furthermore, over the sample time period, 1989, 1990, and 1991 produced the highest mean values, respectively (see table 4). Finally, table 7 shows that the difference in the mean quality of disclosure value for every year is significant except for 1990 and 1991.

On an aggregate basis, the quality of environmental disclosures is low. However, on a relative basis, petroleum refining (29) and hazardous waste management (49) have the highest overall mean quality of disclosure value (see table 2). Furthermore, table 8 reveals that there is a significant difference in the mean disclosure values in all industry

TABLE 7
Test for Significant Difference in The Quality of Disclosures Between Years in Total 10K Reporting

	87	88	89	90	91
86	5.0031+ (.0001)*	2.1998 (.0283)*	–7.0366 (.0001)*	–4.4247 (.0001)*	–3.2421 (.0013)*
87	—	–3.1917 (.0015)*	–12.1844 (.0001)*	–9.5002 (.0001)*	–8.1750 (.0001)*
88	—	—	–9.6560 (.0001)*	–6.8930 (.0001)*	–5.5822 (.0001)*
89	—	—	—	2.5881 (.0100)*	3.6535 (.0003)*
90	—	—	—	—	1.1012 (.2714)

+ The top number is the t-test score and the bottom number is the p-value.
* Significant at $p \leq 0.05$.

TABLE 8
Test for Significant Difference in The Quality of Disclosure Between Industries Aggregate Reporting

	28	29	33	37	49
13	–4.2124+ (.0001)*	–7.7759 (.0001)*	–4.7896 (.0001)*	–1.7032 (.0937)	–3.9452 (.0002)*
28	—	–5.1738 (.0001)*	–2.3852 (.0181)*	0.0591 (.9531)	–2.5101 (.0142)*
29	—	—	2.0946 (.0370)*	3.4013 (.0009)*	0.5494 (.5839)
33	—	—	—	1.6204 (.1079)	–0.9220 (.3586)
37	—	—	—	—	–2.0859 (.0392)*

+ The top number is the t-test score and the bottom number is the p-value.
* Significant at $p \leq 0.05$.

groups except for motor vehicles and car bodies (37) and hazardous waste management (49). Motor vehicles and car bodies' (37) mean value is significantly different than that for petroleum refining (29) and hazardous waste management (49). Hazardous waste management's (49) mean value is significantly different than that for oil and gas (13), chemicals and chemical related (28), and motor vehicles and car bodies (37). Over the sample time period, 1989, 1991, and 1990 produced the highest mean values, respectively (see table 4). Finally, table 9 shows differences in aggregate disclosures across sample years for all industry groups. All the differences in the mean value of the quality of disclosures are significant except between the years 1990 and 1991.

TABLE 9
Test for Significant Difference in The Quality of Disclosures Between Years in Aggregate Reporting

	87	88	89	90	91
86	5.3653+ (.0001)*	2.1480 (.0323)*	–8.9344 (.0001)*	–5.7666 (.0001)*	–4.8071 (.0001)*
87	—	–3.9552 (.0001)*	–14.1078 (.0001)*	–10.8116 (.0001)*	–9.5377 (.0001)*
88	—	—	–11.5980 (.0001)*	–8.1888 (.0001)*	–7.0059 (.0001)*
89	—	—	—	2.9728 (.0031)*	3.5621 (.0004)*
90	—	—	—	—	0.6829 (.4950)

+ The top number is the t-test score and the bottom number is the p-value.
* Significant at $p \leq 0.05$.

CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS

The analysis of environmental disclosure behavior of unregulated, potentially environmentally harmful firms over the sample years 1986 through 1991 indicates cross-sectional and longitudinal differences. An analysis of total AR environmental disclosures shows that petroleum refining, hazardous waste management, and steel works and blast furnaces provided the highest quality of disclosures. Additionally, the highest quality of disclosures were experienced in the end of the sample period during 1989, 1990, and 1991. For 10K disclosures, the highest quality of disclosures were found in the petroleum refining, hazardous waste management, and steel works and blast furnaces industries. The disclosure pattern for 10Ks was identical to that of ARs.

In 1994 Price Waterhouse surveyed 445 companies operating in industries determined to be most likely to encounter environmental issues. The responses revealed that companies have expanded and continue to expand their financial statement and 10K environmental disclosures. The independent assessment of environmental disclosures in the current study corroborates this evidence. Both AR and 10K environmental disclosures have increased during the sample period.

An analysis of total AR disclosures has revealed that they have significantly increased since 1989. The significant increase was most likely aided by the FASB's issuance of *Issues No. 89-13* (1989) and *90-8* (1990), environmental accidents such as the Valdez oil spill (1989), and general public mandates such as the announcement by CERES regarding the Valdez Principles (1989), the 20th anniversary of Earth Day (1990), and the passage of the amendments to the clean air act (1990).

The analysis of 10K disclosures has revealed that 1989 through 1991 produced significant increases in the level of disclosures. In addition to the aforementioned FASB and general public influences, the increased volume of 10K disclosures was also most likely influenced by SEC mandates such as the issuance of the current version of *Regulation S-K* (1986), the *SEC Financial Reporting Release No. 36* —Management's Discussion and Analysis of Financial Condition and Results of Operations; Certain Investment Company Disclosures (1989), and obtaining information directly from the Environmental Protection Agency regarding major environmental violators (1990).

The overall quality of AR and 10K environmental disclosures was low, indicating that less than 20 percent on average of the possible disclosures were presented. Despite this fact, the quality of certain industries' disclosures was significantly greater than others. Specifically, petroleum refining, hazardous waste management, and steel works and blast furnaces had higher quality disclosures than the remaining sample industries. These industries may be in the most need of environmental disclosures because of their heightened environmental sensitivity.

This study has several limitations. First, the database represents a stratified, judgmental sample from industries identified as heavy polluters. This limits the ability to generalize the results of the study to the entire population of firms. Additionally, the lack of a comparison group of firms from industries with low pollution levels precludes any comparison between high and low polluters. Third, given the presentation diversity among ARs and 10Ks, a certain level of subjectivity was necessary in coding and quantifying the different types of disclosures. Finally, many disclosures may be highly correlated over time. For example, if a firm discloses an environmental contingency in one year, the same contingency will probably be disclosed in the next few years. This limits the ability to draw conclusions regarding changes in disclosure over time.

The disclosures found in the ARs and 10Ks do not adequately cover the informational needs of stakeholders because they do not provide detailed and aggregate information regarding future environmental plans and the dollar amount necessary to carry them out. Further, information is not provided regarding plans to produce products in an environmentally sustainable manner. Finally, the vast differences in the disclosures found in ARs and 10Ks reveal the need for a framework for en-

vironmental disclosures that can be used in the reporting of environmental concerns in both ARs and 10Ks. Thus, the FASB should take a closer look at its present position on environmental reporting.

Overall, increasing disclosure trends could be considered a first step toward improved environmental disclosure. Lack of consistent regulatory mandates from such bodies as the FASB and SEC is troubling. The results of this study indicate differential levels of environmental disclosure across industries, but given that all of the sample industries had a great need for environmental disclosure, this should not necessarily be the case. The differential levels may result from the lack of specific guidelines.

APPENDIX A
Environmental Disclosures Reported In Annual Reports by Year

Year	SQD	EQD	FN	V1	V2	V3
1986	41	7	13	2	9	4
	(1)+	(4)	(2)	(6)	(3)	(5)
1987	9	1	15	0	9	3
	(2)	(4)	(1)	(5)	(2)	(3)
1988	43	6	3	0	1	1
	(1)	(2)	(3)	(5)	(4)	(4)
1989	59	49	68	5	50	7
	(2)	(4)	(1)	(6)	(3)	(5)
1990	62	26	35	5	39	6
	(1)	(4)	(3)	(6)	(2)	(5)
1991	74	30	64	1	52	7
	(1)	(4)	(2)	(6)	(3)	(5)
Total	288	119	198	13	160	28
	(1)	(4)	(2)	(6)	(3)	(5)

+ Ranking in terms of reporting frequency.

Most Frequent Industry Disclosers of Annual Report Codes by Year

Year	SQD	EQD	FN	V1	V2	V3
1986	1311(1;12)+ 2911(1;12) 2800(2;4) 3312(2;4) 1381(3;3) 2834(3;3)	1311(1;3) 4955(2;2)	2911(1;4) 3312(2;3)	2821(1;1) 3312(1;1)	2834(1;3) 2911(2;2) 3312(2;2)	2800(1;2) 1311(2;1) 2821(2;1)
1987	2911(1;3) 1311(2;2) 2834(2;2)	2821 (1;1)	3312(1;4) 2834(2;3) 2800(3;2) 3711(3;2)	—	2834(1;2) 3312(1;2) 1311(2;1) 2800(2;1) 2821(2;1) 2911(2;1) 4955(2;1)	3312(1;2) 2834(2;1)
1988	1311(1;22) 2911(2;7) 2800(3;4) 3312(3;4)	3312(1;3) 4955(2;2)	3312(1;2) 2911(2;1)	—	2800(1;1)	1311(1;1)
1989	1311(1;9) 2911(1;9) 2834(2;8) 3312(3;7) 1381(4;5) 2800(4;5) 2851(5;4) 3711(5;4)	2911(1;16) 4955(2;9) 2800(3;7) 1311(4;5) 2821(4;5)	2911(1;21) 1311(2;9) 2821(3;8) 3312(4;7) 2834(5;6) 4955(6;5)	1311(1;3)	2911(1;11) 2834(2;8) 2821(3;7) 2800(4;5) 3312(4;5)	1311(1;1) 2800(1;1) 2834(1;1) 2844(1;1) 2911(1;1) 3312(1;1) 3711(1;1)
1990	1311(1;16) 2911(2;10) 3312(2;10) 2834(3;7) 2800(4;4) 2821(4;4) 2851(4;4)	2911(1;10) 4955(2;6) 2800(3;3) 2840(4;2) 3312(4;2)	3312(1;7) 2834(2;6) 2911(3;5) 2821(4;4) 4955(4;4) 1311(5;3) 2800(5;3)	2911(1;3) 1311(2;1) 2834(2;1)	2911(1;11) 3312(2;6) 2834(3;5) 1311(4;4) 2821(4;4) 2800(5;3) 2851(5;3)	2911(1;3) 1311(2;1) 2851(2;1) 4955(2;1)
1991	2911(1;23) 1311(2;10) 2834(3;8) 3312(3;8) 2800(4;6) 2851(5;5)	2911(1;11) 2800(2;6) 2821(3;5) 4955(3;5)	2911(1;17) 2812(2;8) 1311(3;7) 2834(3;7) 2800(4;6) 2851(5;5) 3312(5;5)	2911(1;1)	2911(1;15) 2800(2;8) 2821(3;6) 2834(4;5) 2851(4;5) 1311(5;3) 2844(5;3) 4955(5;3)	2911(1;3) 3312(2;2)

+ (ranking; frequency)

APPENDIX B
Environmental Disclosures Reported in 10K Reports by Year

Year	FUT	REF	LIAB	FN	REG	R1	R2	R3	R4	R5	HR1	HR2	HR3	V1	V2	V3
1986	45	6	10	25	25	7	0	7	28	35	40	1	32	9	37	11
	(1)+	(12)	(9)	(7)	(7)	(11)		(11)	(6)	(4)	(2)	(13)	(5)	(10)	(3)	(8)
1987	25	2	4	4	18	8	0	6	25	20	23	1	17	4	13	3
	(1)	(11)	(9)	(9)	(4)	(7)		(8)	(1)	(3)	(2)	(12)	(5)	(9)	(6)	(10)
1988	40	2	7	9	36	9	1	5	33	51	38	3	8	7	13	9
	(2)	(12)	(9)	(7)	(4)	(7)	(13)	(10)	(5)	(1)	(3)	(11)	(8)	(9)	(6)	(7)
1989	76	18	21	2	20	17	10	6	32	51	88	1	88	8	72	17
	(2)	(8)	(6)	(13)	(7)	(9)	(10)	(12)	(5)	(4)	(1)	(14)	(1)	(11)	(3)	(9)
1990	62	20	21	16	22	7	7	5	27	51	31	8	57	9	76	25
	(2)	(10)	(9)	(11)	(8)	(14)	(14)	(15)	(6)	(4)	(5)	(13)	(3)	(12)	(1)	(7)
1991	50	17	34	12	24	2	29	5	25	41	22	10	35	7	76	25
	(2)	(10)	(5)	(11)	(8)	(15)	(6)	(14)	(7)	(3)	(9)	(12)	(4)	(13)	(1)	(7)
Total	298	65	97	68	145	50	47	34	170	249	242	24	237	44	287	90
	(1)	(11)	(8)	(10)	(7)	(12)	(13)	(15)	(6)	(3)	(4)	(16)	(5)	(14)	(2)	(9)

+ Reporting frequency.

Most Frequent Industry Disclosers of 10K Report Codes by Year

Year	FUT	REF	LIAB	FN	REG	R1	R2	R3
1986	1311(1;13)+ 2911(2;9) 4955(3;6) 2800(4;4) 2851(5;3) 3312(5;3) 3711(5;3)	2821(1;2) 2834(1;2)	2800(1;3) 2811(1;3) 4955(2;2)	3711(1;7) 3312(2;5) 4955(3;4) 2800(4;3) 2911(4;3)	1311(1:17) 3312(2;3)	1311(1;4)	—	1311(1;4)
1987	1311(1;13) 2821(2;4) 1381(3;2) 2800(3;2) 2840(3;2)	2800(1;1) 2834(1;1)	2800(1;2) 2851(2;1) 3312(2;1)	1311(1;2) 2834(2;1) 3312(2;1)	1311(1;12) 2834(2;4)	1311(1;3) 2834(2;2)	—	1311(1;2) 2834(1;2) 2844(1;2)
1988	1311(1;13) 2911(2;10) 3312(3;4) 2851(4;3) 3711(4;3) 4955(4;3)	2834(1;1) 3711(1;1)	2911(1;2) 3312(1;2) 3711(1;2) 1311(2;1)	2911(1;7) 2800(2;1) 4955(2;1)	1311(1;14) 4955(2;6) 2911(3;5) 3312(3;5)	1311(1;6) 2834(2;2)	2851(1;1)	2911(1;2) 1311(2;1) 2840(2;1) 2844(2;1)
1989	1311(1;26) 2911(2;14) 3312(3;12) 4955(4;7) 2821(5;5)	1311(1;4) 2821(2;3) 2834(2;3) 2911(2;3) 2800(3;2)	3312(1;5) 2821(2;4) 2800(3;2) 2851(3;2) 2911(3;2) 3711(3;2)	3312(1;1) 4955(1;1)	1311(1;10) 2834(2;4) 2844(3;2) 2911(3;2)	1311(1;3) 2840(1;3) 2911(1;3) 2834(2;2) 2844(2;2) 4955(2;2)	4955(1;5) 2911(2;3)	1311(1;4) 2800(2;1) 3711(2;1)
1990	1311(1;16) 2911(2;14) 3312(3;10) 4955(4;6) 1381(5;4)	2821(1;5) 2800(2;4) 2911(2;4) 1311(3;2) 2834(3;2)	2800(1;4) 2851(1;4) 2911(2;3) 3312(2;3) 1311(3;2)	2911(1;6) 2800(2;4) 2821(3;3)	1311(1;9) 2834(2;6) 4955(3;3)	2800(1;2) 2834(1;2) 2821(2;1) 2911(2;1) 4955(2;1)	3312(1;2) 3711(1;2) 1311(2;1) 2834(2;1) 2851(2;1)	4955(1;2) 2844(2;1) 2911(2;1) 3711(2;1)
1991	2911(1;12) 1311(2;10) 3312(2;10) 1381(3;4) 4955(3;4)	2911(1;5) 2821(2;2) 2834(2;2) 2851(2;2) 4955(2;2)	2911(1;7) 1311(2;6) 2800(2;6) 2851(3;4) 2834(4;2) 3312(4;2)	4955(1;4) 1311(2;3) 3312(2;3)	1311(1;7) 2834(2;5) 2911(2;5) 2844(3;3)	2840(1;1) 2851(1;1)	3312(1;12) 2911(2;7) 4955(3;5)	1311(1;2) 1381(2;1) 3312(2;1) 4955(2;1)

+ (ranking; frequency)

Continued on next page

Most Frequent Industry Disclosers of 10K Report Codes by Year

Year	R4	R5	HR1	HR2	HR3	V1	V2	V3
1986	1311(1;11) 1381(2;3) 2834(2;3) 2851(2;3) 2800(3;2) 2844(3;2)	2834(1;12) 1311(2;3) 2851(2;3) 2911(2;3) 3312(2;3) 4955(2;3) 2800(3;2) 2840(3;2)	1311(1;16) 2911(2;8) 2800(3;4) 3312(4;3) 4955(4;3)	2911(1;1)	1311(1;15) 4955(2;6) 3312(3;4)	2834(1;2) 3312(1;2) 3711(1;2) 4955(1;2) 2911(2;1)	2911(1;8) 2800(2;7) 3312(2;7) 2834(3;6) 4955(4;4)	2911(1;3) 3711(1;3)
1987	1311(1;11) 1381(2;4) 2840(3;3)	2834(1;7) 1311(2;6) 1381(3;2) 2821(3;2)	1311(1;10) 2800(2;5) 1381(3;2) 2821(3;2) 2834(3;2)	1311(1;1)	1311(1;11) 2821(2;2)	1311(1;2) 2800(2;1) 2834(2;1)	2800(1;3) 2834(1;3) 2821(2;2) 2840(2;2) 3312(2;2)	2800(1;1) 2821(1;1) 3312(1;1)
1988	1311(1;12) 1381(2;4) 2834(2;4) 2800(3;3) 2844(3;3)	2834(1;14) 1311(2;9) 2911(3;8) 3312(4;5) 2800(5;3) 2851(5;3)	1311(1;12) 2911(1;12) 2800(2;3) 2834(2;3) 3711(2;3)	1311(1;2) 4955(2;1)	2911(1;3) 1311(2;2) 3711(2;2)	2834(1;2) 1311(2;1) 2800(2;1) 2821(2;1) 2911(2;1) 3312(2;1)	2911(1;4) 2840(2;2)	2911(1;3) 1311(2;2) 2821(2;2)
1989	1311(1;18) 1381(2;6) 2834(3;2) 3711(3;2)	2384(1;12) 1311(2;10) 2800(3;6) 2911(3;6) 3312(3;6) 2812(4;3)	2911(1;24) 1311(2;13) 3312(3;12) 2800(4;7) 2821(4;7)	2800(1;1)	1311(1;36) 2911(2;11) 3312(3;10) 4955(4;8) 2821(5;7)	1311(1;3) 2800(2;2) 2821(2;2)	2911(1;15) 3312(2;12) 2834(3;8) 2800(4;7) 1311(5;6) 2821(5;6) 4955(5;6)	2821(1;3) 2911(1;3) 3312(2;2) 3711(2;2) 4955(2;2)

Most Frequent Industry Disclosers of 10K Report Codes by Year

Year	R4	R5	HR1	HR2	HR3	V1	V2	V3
1990	1311(1;5)	1311(1;14)	2911(1;10)	2911(1;3)	1311(1;22)	2911(1;4)	2911(1;14)	2911(1;9)
	1381(1;5)	2834(2;9)	3312(1;10)	3312(2;2)	2911(2;10)	1311(2;2)	3312(2;12)	2834(2;3)
	2384(1;5)	2911(3;8)	1311(2;3)		1381(3;5)		2834(3;10)	1311(3;2)
	2844(2;3)	3312(4;5)	4955(2;3)		2800(3;5)		2800(4;9)	2821(3;2)
	2851(2;3)	2800(5;4)			2821(4;4)		2821(5;7)	2851(3;2)
	2911(2;3)	2851(6;3)			3312(4;4)		2851(6;6)	3312(3;2)
					4955(4;4)		4955(7;5)	3711(3;2)
1991	1311(1;9)	1311(1;8)	2911(1;12)	1311(1;3)	2911(1;13)	1311(1;3)	2911(1;16)	2911(1;13)
	1381(2;7)	2834(1;8)	2800(2;2)	3312(1;3)	1311(2;8)	2911(1;3)	2834(2;12)	3312(2;6)
	2844(3;3)	2800(2;6)	2834(2;2)	2911(2;2)	3312(3;5)	2834(2;1)	3312(2;12)	2844(3;2)
		2911(3;5)	3312(2;2)	4955(2;2)	1381(4;3)		2800(3;6)	
		3312(4;4)					4955(3;6)	
		2851(5;3)					1311(4;4)	
							2821(4;4)	
							2844(4;4)	
							2851(4;4)	
							3711(4;4)	

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