THE INFORMATION CONTENT OF SELECTED DISCLOSURES FOR MINING FIRMS: AN EXPERIMENTAL STUDY

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PREFACE

This study is concerned with certain disclosure requirements and whether these disclosures affect the investors' perception of the firm's future cash flows and hence their valuation of the firm's securities. Any project of this nature goes through many changes along the way and this was no exception. I trust that the resulting document is worthy of the effort required by those who provided guidance and assistance.

I would like to express my appreciation to Dr. James R. Boatsman, Dr. Don R. Hansen, and Dr. Janet I. Kimbrell for their scholarly instruction in the graduate seminars and for their helpful suggestions throughout the course of this project. Without their guidance and insights this study could not have been completed. The assistance and cooperation of Dr. Lanny G. Chasteen is also deeply appreciated. As committee chairman, Dr. Chasteen perused several drafts of this study and provided timely, substantive comments. The overall doctoral program experience was greatly enhanced by the unselfish sharing of time, talent and friendship of these individuals.

Nearly as important as the faculty were my peers in this endeavor. Again I could have asked for none better. The explanations, support, and comaradery of Bob Kilpatrick, Doug Laufer, and Ed Scribner were of immeasurable value.

Finally I wish to express my gratitude to two very important ladies in my life, Roxanne and Amy. Both sacrificed greatly during the years of my graduate education and neither can ever be adequately compensated.

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THE RESEARCH PROBLEM

Introduction

Statement of Financial Accounting Standards No. 39, Financial Reporting and Changing Prices: Specialized Assets (SFAS No. 39) supplements Statement of Financial Accounting Standards No. 33 (SFAS No. 33) by requiring, along with other disclosures, certain price and quantity information for mining firms. More specifically:

> Enterprises that own mineral reserves other than oil and gas shall disclose the following information for each of their five most recent fiscal years:
>
> a. Estimates of significant quantities of proved, or proved and probable (whichever is used for cost amortization purposes) mineral reserves, other than oil and gas, at the end of the year or at the most recent date during the year for which estimates can be made. If estimates are not made as of the end of the year, the disclosures shall indicate the dates for which they apply.
>
> b. The estimated quantity, expressed in physical units or in percentages of reserves, of each mineral product that is recoverable in significant commercial quantities if the mineral reserves included under section (a) include deposits containing one or more significant mineral products.
>
> c. The quantities of each significant mineral produced during the year. If the mineral reserves included under section (a) are ores that are milled or similarly processed, the quantity of each significant mineral product produced by the milling or similar process shall also be disclosed.
>
> d. The quantity of significant proved, or proved and probable, mineral reserves purchased or sold in place during the year.

e. For each significant mineral product, the average market price, or for mineral products transferred within an enterprise, the equivalent market price prior to use in a manufacturing process [FASB, 1980a, par. 13].

In addition to the above mentioned disclosure requirements, the Financial Accounting Standards Board (FASB) deliberated other issues salient to financial reporting in the mining industry. One such item concerned the particular difficulties that arise in determining the cost of mineral resource assets. The Board recognized that current cost measures can vary significantly depending upon what costs are capitalized rather than expensed. The FASB [1980a] considered whether provisions were necessary to identify those costs which should be capitalized but concluded such action was not warranted. The Board's position is debatable in view of the results of a 1980 survey of accounting practices in the coal industry [National Coal Association, 1980]. The survey indicated great diversity in the treatment of mine development costs. These costs may amount to millions of dollars and are incurred over several years. Consequently whether mine development costs are capitalized or expensed when incurred may materially affect reported net income.

Purpose

SFAS No. 33 refers to the need for experimentation on the usefulness of alternative types of information and calls for the review of the requirements of the statement. SFAS No. 39 will be comprehensively reviewed at the same time as SFAS No. 33 [FASB, 1980a]. The Board will add, amend, or withdraw requirements whenever such action is justified by evidence. The purpose of this study was to obtain some evidence which could be useful in the review process.

Specifically this study was conducted to determine whether certain disclosures related to SFAS No. 39 have information content. The relevant disclosures are the quantity/price information and the capitalization policies for development costs incurred by mining firms.

Typically market studies are undertaken to determine information content. This approach would require control and treatment groups of mining firms and daily (or weekly) returns for each firm included in the groups. Most mining firms either are large enough to meet SFAS No. 39's size requirements, and therefore are required to make price/quantity disclosures, or are not traded on a major stock exchange. This prevents the selection of a control group and effectively the utilization of the market model approach.

The stimulus of residual returns is not certain in the market setting. Events other than those under study provide competing hypotheses for explaining the return (see [Gheyara and Boatsman, 1980] for example). In the experimental setting utilized in the present study, control was provided for such events.

The present study utilized a laboratory experiment with students as surrogates for financial analysts. The subjects were provided various information sets and asked to make an assessment of prospective net cash flows. A multivariate analysis of variance (MANOVA) was used to identify significant differences in the assessments.

Literature Review

Although there is a great deal of published research concerned with financial reporting and changing prices [see Frishkoff, 1982] there is none relating to SFAS No. 39 and the mining industry. Except for

Accounting Research Study No. 11, Financial Reporting in the Extractive Industries [Field, 1969], the previously mentioned National Coal Association study, and various public accounting firm publications [Arthur Anderson & Co. 1980, Coopers & Lybrand, 1981, Peat, Marwick, Mitchell & Co., 1980] there is a paucity of research literature concerning accounting in this segment of the extractive industries.

The FASB states that:

> [f]inancial reporting should provide information that is useful to present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of prospective cash receipts.....Since investors' and creditors' cash flows are related to enterprise cash flows, financial reporting should provide information to help investors, creditors, and others assess the amounts, timing and uncertainty of prospective net cash inflows to the related enterprise [FASB, 1978, p. viii].

The emphasis on information espoused by the FASB and earlier by the AICPA [1974], has provided much of the impetus for research conducted in information economics [Demski, 1980 and Demski and Feltham, 1976] and human information processing [Ashton, 1974 and Libby, 1975].

The present study utilized a decision usefulness approach at the individual level. As a branch of human information processing research, this approach relies on user's reactions to information "as a means for inductively deriving preferred reporting alternatives" [AAA Committee on Concepts and Standards for External Financial Reports, 1977, p.10]. Ashton [1982] indicated that human information processing at the level of the individual investor may be useful in providing the desired input for accounting policy decisions. Similarly May and Sundem [1976] stated that studying the effect of financial reports on individual actions is an important topic of accounting research. Unlike modeling the decision process, this approach ignores the difficult, perhaps impossible,

problem of determining whether a decision model is right or wrong [AAA Committee on Concepts and Standards for External Financial Reports, 1977].

There are limits to the individual's capacity for processing information [Miller, 1956; Newell and Simon, 1972; and Slovic and Lichtenstein, 1971]. At some point, the cost of providing additional information (disclosure) will outweigh the marginal utility of the information. Since all the information is competing for a limited amount of processing capacity, additional information may result in information overload and, subsequently, to suboptimal decisions.

Beaver [1981] specifies a necessary condition for costless information to have a strictly positive value. This condition is that the information must be able to alter beliefs. This condition assumes there is no utility derived from simply "knowing" the information.

To further facilitate the discussion of information and information processing, it is appropriate to describe the decision process in a single-person setting. The characterization presented here is taken from Beaver [1981].

In the theory of choice it is essential that the decision-maker have more than one feasible action. In the case of an investor, the action choice is described by a set of available portfolios and a set of consumption alternatives. The investor can consume during the current period or by investing can forego current consumption for uncertain future consumption. The investor must choose between the available combinations of current and uncertain future consumption bundles. Given the amount assigned to future uncertain consumption, the investor

must then allocate the amount among the available securities, assuming securities are the only means of future uncertain consumption.

In the characterization presented here, information has potential value because uncertainty surrounds future events. Uncertainty exists in the form of a set of mutually exclusive and collectively exhaustive possible occurrences referred to as states. Each state characterizes one of the possible scenarios. The description of each state captures all economy-wide events and investor specific events.

Associated with each state is an outcome that fully describes those attributes of the state that are of importance to the investor. These consequences are usually stated in terms of a payoff. This payoff can be thought of as a cash flow to the investor.

The prospects for investor payoffs are affected by the ability of the enterprise to generate cash flows. Cash flows are necessary for the enterprise to satisfy its obligations when due and to meet other cash operating needs. These needs include reinvesting in operations and paying dividends. The entity's proficiency in generating payoffs to investors is in part affected by creditors and investors' perception of this ability to generate cash flows, which impacts on the market price of the enterprise's securities [FASB, 1978].

In a single period situation consequences (payoffs) can be denoted by c_s where $s = 1,2,\ldots,n$ and n equals the number of possible states. The portfolio chosen will imply a vector of consequences denoted C.

Investors are not indifferent to which C vector they face. The investor wants to select the portfolio with the "best" vector. A larger c_s would be preferred to a smaller c_s ceteris paribus.

The investor is characterized as if a probability assessment is formed for the occurrence of each possible state (denoted p_s). These probabilities are subjectively derived based on the investor's education, training, and experience. The investor's beliefs are also a critical part of the decision setting. These beliefs are conditional on the information the investor has. The role of information is its potential to alter the investor's beliefs.

The objective function is characterized as the maximization of expected utility, where

$$E(U) = \Sigma p_s \, U(c_s) \quad .$$

The decision-making behavior under uncertainty is characterized as if the investor was selecting an action that maximized expected utility. This is not to say the investor actually makes probability assessments and corresponding preferences for outcomes. However, if the decision-maker follows some general axioms of rational behavior, choice behavior can be described as if the investor were solving an optimization problem [Savage, 1972].

The present study involved the assessment of future cash flows. A sensitivity coefficient (beta value) measuring the relationship between firm specific cash flows and industry wide cash flows was one parameter examined. In addition, forecasts of firm specific cash flows were also scrutinized. It is the evaluation of future cash flows that constitutes the first step in an investment decision concerning a specific security.

The selection of securities for inclusion in a portfolio is dependent not only upon expected cash flows but also on the individual's

utility function. At present there is no consensual methodology for effectively addressing the complexities that arise when heterogenous utility functions are introduced into the present study's environment. Consequently the selection of securities for inclusion in a portfolio was beyond the scope of the present study.

The Lens Model

The work of Brunswik resulted in the development of what has become known as the Brunswik lens model. Ashton [1982] and Libby [1981] provide summaries of the model in an accounting research context.

The lens model (Figure 1) divides the world into two parts: (1) the environment, represented by the left side of the lens and (2) the judgement system of the subject, the right side of the lens. There are three basic elements of the model: (1) the distal or criterion variable (Y_e) in which the individual (subject) is interested; the subject may wish to predict the current or future value of the criterion; (2) the cues, or information sets (X_i), that may be used to judge or predict the criterion variable; and (3) the subject's prediction (Y_s). The Y_s and Y_e values will differ if the subject's use of the cue set is suboptimal relative to the environment and/or the statistical relationship between the Y_e and the cues (signals) are less than perfect [Ashton, 1982].

The lines connecting the cues with one another in Figure 1 indicate that the cues in real settings are likely to be interrelated. When two or more variables (cues) or combinations of variables are highly (but not perfectly) correlated with each other the condition is known as multicollinearity [Pindyck and Rubinfeld, 1981].

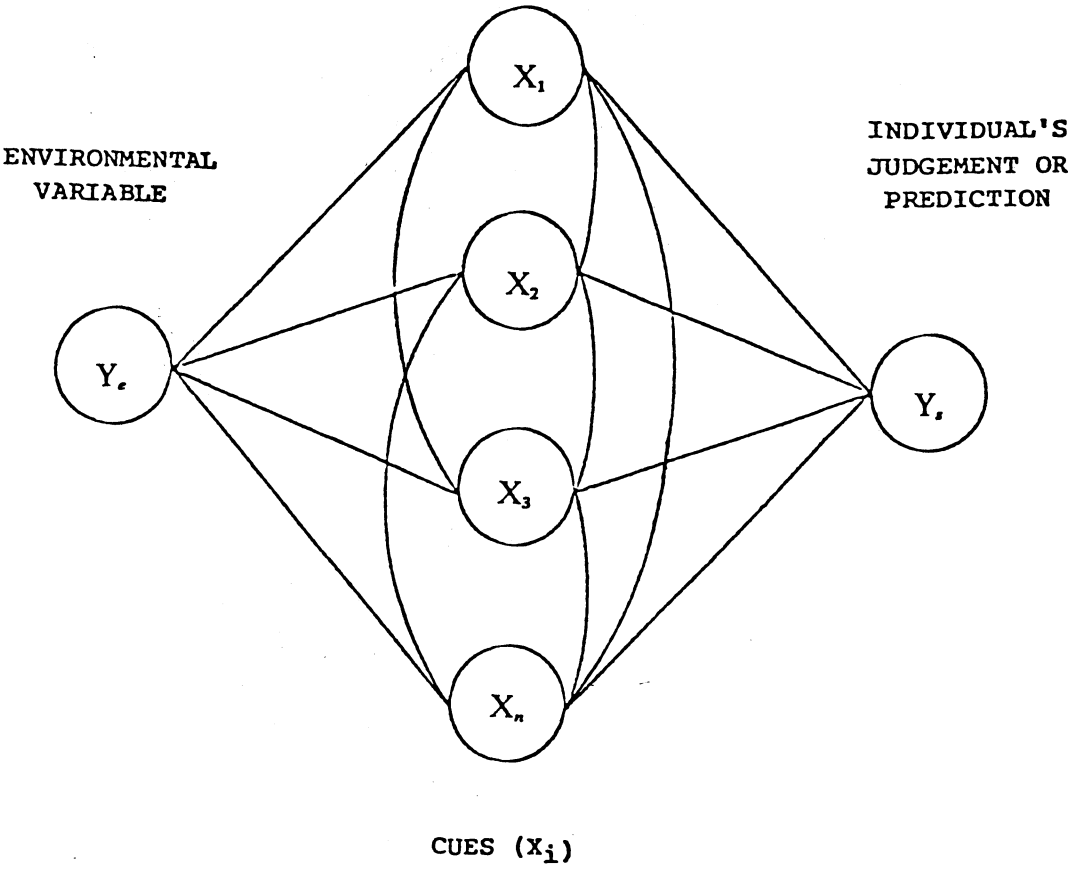

Figure 1. THE LENS MODEL

Basic to Brunswik's theory is that behavior is a joint product of the observing system and the environmental system. Consequently, changing the basic structure of the task such that it is not representative of the real setting may also change the behavior being examined [Libby, 1981].

Several researchers have utilized the lens model in studying independent auditors' evaluations of internal control [Ashton, 1982]. Boatsman and Robertson [1974] and others [Ashton, 1982] have studied materiality judgements using the lens paradigm. Libby [1979a, 1979b] employed the lens model while studying the message communicated by various types of audit reports.

Slovic, Fleissner, and Bauman [1972] utilized 13 stockbrokers and 5 MBA students in a stock rating experiment. The brokers had between one-half year and 15 years of experience. A 1/4 replication of a 2^8 factorial design was used. The subjects rated the stocks on a scale of 1 ("substantial expected decrease in value") to 9 ("substantial expected increase in value") for a 6 to 18 months period. Main effects explained 75 percent of the judgement variance. The cue earnings yearly trend was most important for the majority of the subjects. Inter-subject consensus was much better for the students than for the brokers. Moreover an inverse relationship between insight and length of experience was indicated for brokers [Ashton, 1982].

McGhee, Shields, and Birnberg [1978] utilized 8 cues on 24 MBA students ranking stock on a scale of 1 (against) to 9 (for) considering stocks for possible inclusion in a portfolio. Large individual differences in cue weighting were reported.

Unlike other lens model studies, the present study made no attempt to determine the utilization coefficients (weights assigned to the cues by subjects) or the validity coefficients (correlation coefficients between the criterion variable and the cues). In the context of the lens model, the current study was conducted to determine whether

price/quantity and mine development cost capitalization policy disclosures were utilized as cues by the subjects.

Use of Students as Surrogates

The current study utilized graduate accounting students as surrogates for investors. The subjects, in a laboratory setting, were provided various information sets and asked to make an assessment of prospective net cash flows and beta values. A MANOVA was used to identify significant differences in the cash flow assessments made by the subjects. Some research has been undertaken to investigate the effects of surrogation in accounting research [Abdel-khalik, 1974; Ashton and Kramer, 1980; Copeland, Francial, and Strawser, 1974].

Abdel-khalik [1974] applied the Mann-Whitney, Cochran, and Chi-square tests to the data from forty decisions made by bankers and students (a total of 120 tests). He noted "[b]y taking the shape of the frequency distributions of decisions, students used in this study did not predict bankers' decisions in 17 out of 40 cases. With 57% effectiveness, and with no knowledge of the direction of the bias, using students as substitutes for bankers in this situation appears to have provided unreliable measures of bankers' performance" [p.750]. This rather strong conclusion ignores all results of the Mann-Whitney and Cochran test. In these respective tests, only 8 of 40 (80% effectiveness) and 7 of 40 (83% effectiveness) reached significant levels [Ashton and Kramer, 1980].

Ashton and Kramer [1980] reported that "available evidence suggests that real-world decision makers possess information-processing characteristics and biases that are extremely similar to their student

counterparts" [p.3]. They pointed out that it was necessary (but not sufficient) to select student subjects with the skills required to complete the experimental task in order to generalize from students to nonstudents [Ashton and Kramer, 1980]. In the present study, graduate students enrolled in an extractive industries accounting course were presumed to possess the requisite skills of an investor.

The question of mine development cost capitalization policy choice closely parallels the full cost versus successful efforts question. Both situations deal with whether certain (unavoidable) costs should be capitalized or expensed when incurred. Even though most extractive industries accounting courses deal almost exclusively with oil and gas activities, that being the more common segment of extractive industries, all students in such a course are exposed to the full cost/successful efforts issue. Therefore, these students were considered appropriate surrogates for the present study.

CHAPTER II

METHODOLOGY

Information Sets

Each subject in this study was provided with one of six sets of information. All six sets contained the same scenario. The scenario placed the subject in the position of financial analyst for a large corporation. The scenario disclosed the coal mining industry's total sales and tonnage for the most recent two year period and an industry forecast for the subsequent two year period derived from a leading econometric model. The subject's immediate task was to forecast net cash flows and sensitivity coefficients for two mining companies for two subsequent two-year periods (a total of four years). Two two-year periods were chosen rather than four one-year periods to decrease the effort required as perceived by the subjects.

In addition to the scenario, each information set included comparative balance sheets, income statements, and statements of changes in financial position for two years, in condensed form, for each of two mining companies. The financial statements were taken from the annual reports of mining companies that were surveyed for either the National Coal Association [1980] study or Coopers and Lybrand [1981] nonferrous mining publication. The scenario together with the financial statement data was defined as information set A (see Appendixes).

Information set B (see Appendixes) included set A data plus the price/quantity information required for mining firms by SFAS No. 39. An examination of published financial statements for mining firms reflects significant lack of uniformity in the format used to present price/quantity information. In order to standardize the format the information was disclosed in a matrix similar to that presented in Appendix A of SFAS No. 39 [FASB, 1980a]. (See Figure 2 for an example of matrix presentation.)

Coal Reserves (Unaudited, thousands of tons)

	Period 2	Period 1
Proven and probable tons of coal reserves at year end	XXX	XXX
Tons of coal produced	XXX	XXX
Tons of coal reserves purchased or leased in place and increases in previous estimates	XXX	XXX
Tons of coal reserves sold in place, lease expirations and reductions in previous estimates	XXX	XXX
Average selling price per ton	$XXX	$XXX

Figure 2. Price/Quantity Matrix

The FASB chose neither to require disclosure of mine development cost capitalization policies nor to mandate such policies [FASB, 1980a]. Given the FASB's position, the capitalization policies were not always contained in the annual reports utilized for the current study.

Consequently, it was necessary to formulate capitalization policies for inclusion in information sets C through F.

The mine development cost capitalization policies formulated were as follows:

1) Mine development costs incurred to prepare an ore body for production are capitalized prior to initial production.

2) Mine development costs incurred to expand the capacity of operating mines, to develop new ore bodies, to develop mine areas substantially in advance of current production, or to maintain current production are capitalized.

These policies were derived from information provided in publications from the National Coal Association [1980] and Coopers and Lybrand [1981].

Information set C (see Appendixes) was composed of the scenario, the financial statements, and disclosure of mine development cost capitalization (MDCC) policy one. Set D (see Appendixes) contained all the information in set C plus disclosure of price/quantity data. Information set E (see Appendixes) consisted of the scenario, the financial statements, and disclosure of MDCC policy two. Set F (see Appendixes) included all data found in information set E in addition to disclosure of price/quantity data. Figure 3 presents a graphic representation of information set content.

PRICE/QUANTITY DISCLOSURE		MINE DEVELOPMENT COST CAPITALIZATION POLICY DISCLOSURES
Absent	Present	
Information Set A Cell 1	Information Set B Cell 2	Absent
Information Set C Cell 3	Information Set D Cell 4	Policy 1*
Information Set E Cell 5	Information Set F Cell 6	Policy 2**

In addition to the information noted above, each cell's information set included the scenario and financial statements for the two firms.

*Mine Development Cost Capitalization Policy 1: Mine development costs incurred to prepare an ore body for production are capitalized prior to initial production.

**Mine Development Cost Capitalization Policy 2: Mine development costs incurred to expand the capacity of operating mines, to develop new ore bodies, to develop mine areas substantially in advance of current production, or to maintain current production are capitalized.

Figure 3. Information Set Matrix

The Hypotheses

Three research hypotheses were tested in the current study. They represent a formalization of the underlying question of information content. The research hypotheses were:

H_{o1}: The price/quantity disclosures contain no information content.

H_{o2}: The disclosure of mine development cost capitalization policy contains no information content.

H_{o3}: The combination of price/quantity disclosure and mine development cost capitalization policy disclosure contains no information content.

In the context of this study, information content was assumed to exist if a significant difference was observed in the forecasts of net cash flows or in predicted beta values as the information sets were changed. Thus, the hypotheses were modified to a form more consistent with the statistical analysis utilized.

The revised hypotheses were:

H_{o1}: No overall treatment effect of price/quantity disclosures on the dependent variables.

H_{o2}: No overall treatment effect of mine development cost capitalization policy disclosure on the dependent variables.

H_{o3}: No overall treatment effect of the interaction between price/quantity disclosures and mine development cost capitalization policy disclosure on the dependent variables.

These revised hypotheses were tested using a MANOVA.

The formulation of forecasts and sensitivity coefficients for the first firm (UNICO) was treated as a learning experience for the

subjects. It was anticipated that the subjects' prediction process would be more efficient and refined on the second endeavor due to the learning curve effect [Horngren, 1982]. Therefore only the subjects' forecasts and predictions for the second firm (BICO) were used for the analysis.

Three models were utilized in hypotheses testing. Model one included only the forecast cash flows as dependent variables while model two included only predicted beta values. Model three's dependent variables were both the forecast cash flows and the predicted beta values.

The Experimental Design

This experiment contained two factors: (1) the price/quantity data and (2) the capitalization policies. The price/quantity factor has two levels: (1) presence of the information; or (2) absence of the information. The MDCC policy factor had three levels: (1) absence of disclosure concerning MDCC policy; (2) disclosure of policy one; or (3) disclosure of policy two. This provided six treatment cells.

Fifty-eight students enrolled in graduate extractive industries courses were randomly assigned to one of the six cells. Each student was subjected to the treatment (information set) relevant to the cell to which he or she was assigned. Figure 4 provides a representation of the observations. F_{ijk} is the forecast of net cash flows for the i th two-year period, given treatment j, by subject k. i = 1,2; j = 1,2,...,6; k = 1,2,...,10. B_{ijk} is the estimate of the corresponding coefficient of sensitivity.

PRICE/QUANTITY INFORMATION

MINE DEVELOPMENT COST CAPITALIZATION POLICY DISCLOSURE

Present	Absent	
$F_{111}, F_{112}, \ldots, F_{11k}$ $B_{111}, B_{112}, \ldots, B_{11k}$ $F_{211}, F_{212}, \ldots, F_{21k}$ $B_{211}, B_{212}, \ldots, B_{21k}$	$F_{121}, F_{122}, \ldots, F_{12k}$ $B_{121}, B_{122}, \ldots, B_{12k}$ $F_{221}, F_{222}, \ldots, F_{22k}$ $B_{221}, B_{222}, \ldots, B_{22k}$	Absent
$F_{131}, F_{132}, \ldots, F_{13k}$ $B_{131}, B_{132}, \ldots, B_{13k}$ $F_{231}, F_{232}, \ldots, F_{23k}$ $B_{231}, B_{232}, \ldots, B_{23k}$	$F_{141}, F_{142}, \ldots, F_{14k}$ $B_{141}, B_{142}, \ldots, B_{14k}$ $F_{241}, F_{242}, \ldots, F_{24k}$ $B_{241}, B_{242}, \ldots, B_{24k}$	Policy 1
$F_{151}, F_{152}, \ldots, F_{15k}$ $B_{151}, B_{152}, \ldots, B_{15k}$ $F_{251}, F_{252}, \ldots, F_{25k}$ $B_{251}, B_{252}, \ldots, B_{25k}$	$F_{161}, F_{162}, \ldots, F_{16k}$ $B_{161}, B_{162}, \ldots, B_{16k}$ $F_{261}, F_{262}, \ldots, F_{26k}$ $B_{261}, B_{262}, \ldots, B_{26k}$	Policy 2

F_{ijk} is the forecast of net cash flows for the i th two year period, given the j th treatment, by subject k

B_{ijk} is the estimated sensitivity coefficient of the firm net cash flows relative to the industry net cash flows for the i th two year period, given the j th treatment by subject k

Figure 4. Subjects' Observations Matrix

The subjects' responses in the form of forecasted cash flow amounts and estimates of sensitivity coefficients for each two-year period for the second firm were the dependent variables. Information content was inferred if there existed a significant difference in the forecasts of net cash flows and sensitivity coefficients as the treatment was varied. A statistical analysis was performed on the dependent variables.

The MANOVA

The two-way multivariate analysis of variance (MANOVA) is viewed as an extension of the two-way ANOVA. However with the MANOVA there are more than one observation per subject [Lindeman, Merenda, and Gold, 1980].

The MANOVA calculation is concerned with the partition of measures of variance and covariance which are collected in a matrix of sums of squares and products. This matrix is partitioned into sums of squares and products due to the same sources as in the univariate case, and a residual sums of squares and products. The resulting partitioned sums of squares and products are compared with the expectation under the null hypothesis [Chatfield and Collins, 1980].

Sample Size Determination

The determination of sample size in this study required a priori specification of the minimum change in the forecast of net cash flows that would indicate a change in the subjects' behavior. It was decided that a twenty percent increase in the variation (standard deviation) of a forecast would constitute a significant change in the subjects' behavior. In addition, alpha (probability of a type I error) and beta

(probability of a type II error) were specified at .05 and .10 respectively. With these variables specified, the sample size could be determined using the power approach [Feldt and Mahmoud, 1958; Neter and Wasserman, 1974]. The required sample size was n = 6 or N = 36 where n = cell sample size and $N = \sum n_i$. This is a univariate approach to sample size determination.

There is no universally agreed upon methodology for determining sample size in a multivariate setting. In this instance the sample size was increased to 58 to provide a more discriminating experiment.

Subjects' Reward Structure

Laboratory experiments are often criticized for failing to provide economic incentives that adequately motivate the subjects. In order to overcome this perceived deficiency and provide added realism the following reward structure was utilized. For the two firms used in the experiment the actual net cash flow was determined for the period being forecast. The ten subjects that made the most accurate forecasts received ten dollars each; the next twenty subjects, in terms of relative accuracy, received eight dollars each; the next twenty subjects received five dollars each. The researcher felt that the reward structure combined with the classroom setting insured the integrity of subject participation.

Post Experiment Data Collection

A questionnaire was developed to assist in determining the importance of several data items thought to be used in the forecasting of cash flows and predicting beta values. After completion of the

experiment, each subject completed the post experiment questionnaire. The questionnaire used Likert scale responses for questions concerning the utilization of various financial ratios and measures, and physical measures. Open ended questions concerning other methods and measures used in the forecast were included to gain additional information.

Limitations

In order to design a manageable experiment some parts of the environment were modified. The researcher did not feel that the consequences of the modifications were substantial. The main environmental alterations are discussed below.

Unquestionably annual reports are not the only source of valuable information concerning economic entities. The current study eliminated these competing sources of information from the data available to the subjects. It was determined that the volume of potentially available information would have unreasonably extended the time required for subjects to complete the experiment. For much the same reason, annual report data beyond two years of condensed financial statements were excluded.

There are an infinite number of possible mine development cost capitalization policies. The choice of the two policies utilized in this experiment was consistent with current pronouncements concerning elements of financial statements [FASB, 1980b]. However, other policies could provide responses at variance with those obtained with the experiment as developed.

CHAPTER III

ANALYSIS OF DATA

Data Collection

The data collection phase of the study was performed at North Texas State University, Oklahoma State University, Texas Tech University, and the University of Denver. A pilot study was conducted utilizing eight graduate accounting students that had recently completed the graduate extractive industries accounting course at Oklahoma State University. This pilot indicated that inclusion of cash flow data could significantly reduce the time required for subjects to complete the experiment. After refining the test instrument to include cash flow data for both firms, data were gathered during regular class meetings at the four institutions.

Fifty-eight subjects participated in the experiment. Three subjects were apparently unable to formulate any response. Two additional subjects were unable to forecast beta values. Incomplete responses were deleted as required by the statistical analysis.

Distributional Assumptions

The statistical technique utilized in this analysis was the multivariate analysis of variance (MANOVA). As with most techniques, certain distributional assumptions are necessary for the analytical results to be meaningful. In the case of MANOVA, the assumption of a

multivariate normal distribution is required. The data were examined to ascertain whether this assumption was violated.

Measurements of skewness and kurtosis were utilized on each dependent variable: forecast cash flows for each company for each period, and forecast beta values for each company for each period by level of disclosure. The statistic for measuring skewness was derived by dividing the third moment of a distribution by the product of the second moment and the positive square root of the second moment. This statistic equals zero if the variable is normally distributed.

The resulting skewness measures for each dependent variable, by disclosure level, are presented in Table I. The ranges of the statistics were indicative of non-normality.

The statistic for measuring kurtosis was derived by subtracting three from the quotient of the forth moment of the distribution divided by the second moment squared. This statistic also equals zero if the variable is normally distributed.

The resulting statistics for measuring kurtosis of the dependent variables are also presented in Table I. The values of this statistic suggested non-normality of the data.

Data Transformation

Since the data derived from the experiment were inconsistent with the assumption of a multivariate normal distribution required by the MANOVA, a data transformation was required. Each of the values of the dependent variables was converted to a rank [Conover and Iman, 1981].

TABLE I

MEASURES OF SKEWNESS AND KURTOSIS ON THE DEPENDENT VARIABLES GROUPED BY DISCLOSURE

	Variable	Skewness	Kurtosis
With Price/Quantity Disclosure:			
	FCFB1	-0.01	-1.02
	FCFB2	0.25	-1.11
	BB1	-2.26	6.65
	BB2	-0.39	-0.12
Without Price/Quantity Disclosure:			
	FCFB1	0.59	1.78
	FCFB2	0.32	0.48
	BB1	-0.17	0.00
	BB2	-2.29	7.62
Mine Development Cost Capitalization Policy 1:			
	FCFB1	-0.65	0.42
	FCFB2	-0.44	-0.27
	BB1	-0.71	-0.33
	BB2	0.15	-0.16
Mine Development Cost Capitalization Policy 2:			
	FCFB1	1.21	1.84
	FCFB2	0.75	-0.46
	BB1	-0.22	-0.94
	BB2	-0.61	-1.16
Without Mine Development Cost Capitalization Policy Disclosure:			
	FCFB1	-0.31	-0.20
	FCFB2	0.52	-0.18
	BB1	-1.80	5.18
	BB2	-2.13	6.64

The rank data were analyzed using MANOVA assuming three different models. All of the models specified three independent variables: price/quantity disclosures (PQDISC), mine development cost capitalization policy disclosures (MDCDISC), and the interaction of PQDISC and MDCDISC. The dependent variables in the first model were the rank of forecast cash flows for BICO company for period one (RNKFCFB1) and the rank of forecast cash flows for BICO company for period two (RNKFCFB2).

The MANOVA

In a p dimensional multivariate analysis of variance there are p sums of squared deviations from the means to partition, one for each component measured. In addition, there are measures of covariance between the pairs of observed values of the dependent variables. These measures of covariance are presented as sums of products. The MANOVA calculation was utilized to partition these measures of variance and covariance which are collected in a matrix of sums of squares and products which is referred to as the SS&CP matrix. The SS&CP matrix was partitioned into sums of squares and cross products matrices due to the same source. In this case, the sources were the price/quantity disclosures, the mine development costs capitalization policy disclosures, the interaction of the two disclosures, and a residual sums of squares and cross products matrix which is referred to as the error SS&CP matrix.

The statistic utilized to test the null hypotheses of no treatment effect was the Wilk's criterion. The Wilk's criterion is derived by dividing the determinant of the error SS&CP matrix by the determinant of

the SS&CP matrix due to the source in question. The test statistic (L) can be transformed providing distributional approximations which enable approximate critical values to be determined. In models one and two, exact transformations to F distributions are available.

Results of Analysis

First Model

Each model provides for three sources of variation in the dependent variables. These sources are PQDISC, MDCDISC, and the interaction PQDISC*MDCDISC. The first model examined these treatments' impact on the rank of the forecast cash flows for BICO company for periods one and two (RNKFCFB1 and RNKFCFB2). The test of the null hypothesis: no overall treatment effect for PQDISC, provided an L (Wilk's criterion) statistic of 0.8228 which has an observed significance level of 0.0076 with 2 and 50 degrees of freedom.

Recall that the price/quantity disclosures included the following: 1) proven and probable tons of coal reserves at year ends, 2) tons of coal produced, 3) tons of coal reserves purchased or leased in place and increases in previous estimates, and 4) average selling price per ton. It appears that disclosure of this information as mandated by SFAS No. 39 had an impact on the cash flow forecasts of the subjects.

The test of the null hypothesis: no overall treatment effect for MDCDISC, provided an L statistic of 0.9876 which has an observed significance level of 0.9598 with 4 and 100 degrees of freedom.

The mine development cost capitalization policy disclosure issue deals with the treatment of those costs incurred either prior to the mine becoming fully operational, to substantially expand the mine, to

develop new ore bodies, to develop mine areas substantially in advance of current production, or to maintain current production, depending on the policy chosen by management. Whether the costs should be capitalized or expensed when incurred is the specific question. It appears that the treatment of these costs had no impact on the forecasts of cash flows made by the subjects. This phenomemon is similar to what was termed functional fixation by Abdel-khalik and Keller [1979] in their study examining the impact of LIFO versus FIFO inventory costing on subjects' selection of a portfolio.

There appears to be no significant impact from the combination of price/quantity disclosures and mine development cost capitalization policy disclosures on the subjects' forecasts of cash flows. The observed significance level for the test of the null hypothesis: no overall treatment effect for the interaction of PQDISC and MDCDISC was 0.1178 with an L statistic of 0.8643 with 4 and 100 degrees of freedom.

The treatment SS&CP matrices and the error SS&CP matrix for the first model are presented in Table II.

The analysis of the available data indicated that the price/quantity disclosures did affect the subjects' determination of forecast cash flows. However, neither the mine development cost captialization policy disclosures nor the interaction between PQDISC and MDCDISC appeared to impact on the rank of cash flow forecasts.

TABLE II

SUMS OF SQUARES AND CROSS PRODUCTS MATRICES FOR MODEL ONE

Treatment=PQDISC

	RNKFCFB1	RNKFCFB2
RNKFCFB1	681.0693	1085.5622
RNKFCFB2	1085.5622	1730.2869

Treatment=MDCDISC

	RNKFCFB1	RNKFCFB2
RNKFCFB1	20.7062	39.5993
RNKFCFB2	39.5993	76.9146

Treatment=PQDISC*MDCDISC

	RNKFCFB1	RNKFCFB2
RNKFCFB1	1882.6127	1656.2016
RNKFCFB2	1656.2016	1476.2338

ERROR SS&CP MATRIX

	RNKFCFB1	RNKFCFB2
RNKFCFB1	12,842.6119	11,348.6369
RNKFCFB2	11,348.6369	12,144.0646

Second Model

The impact of the three treatment effects PQDISC, MDCDISC and the interaction of PQDISC and MDCDISC on the rank of the forecasted beta

values (firm cash flow's correlation with industry cash flow) was explored with the second model. These beta values were for BICO company for periods one and two and were represented by BB1 and BB2.

In regard to the impact of the disclosures in question on the sensitivity coefficients (betas), the results were considerably different. Although this study was not designed to identify the determinants of the subjects' predictions, the following analysis indicates the specified treatment effects were certainly not determinants. It appears that the subjects did not view the price/quantity information or the manner in which development costs were treated as being significant in assessing betas.

The analysis provided for the test of the null hypothesis: no overall treatment effect for PQDISC generated an L statistic of 0.9330 with an observed significance level of 0.1892 with 2 and 48 degrees of freedom.

The impact of mine development cost capitalization policy disclosure on BB1 and BB2 was next examined. The null hypothesis: no overall treatment effect for MDCDISC, provided an observed significance level of 0.5763 from a Wilk's criterion statistic of 0.9421 with 4 and 96 degrees of freedom.

The final MANOVA on the second model was to explore the effect of the interaction between PQDISC and MDCDISC on the forecast beta values for the two periods. The analysis furnished an L statistic of 0.9299 for an observed significance level of 0.4743 with 4 and 96 degrees of freedom.

The treatment SS&CP matrices and the error SS&CP matrix for the second model are presented in Table III.

The analysis of model two and of model one were consistent in that neither indicated a significant treatment effect attributable to the disclosure of mine development cost capitalization policy nor to the interaction between mine development cost capitalization policy disclosure and price/quantity disclosure. In contrast, price/quantity disclosures alone appear to influence the forecast cash flows but not predicted beta values.

Third Model

The final model utilized in the study examined all of the previously employed dependent variables: (1) rank of forecast cash flows for BICO company for period one, (2) rank of forecast cash flows for BICO company for period two, (3) rank of predicted beta value for BICO company for period one, and (4) rank of predicted beta value for BICO company for period two. A MANOVA was incorporated to test the same three null hypotheses as with models one and two.

When all the variables included in models one and two are utilized as dependent variables in model three, again the price/quantity disclosures appear to have a significant impact. As can be seen from the data analysis presented below, the dramatic affect of price/quantity information on cash flow data overcomes the somewhat weak (if any) impact that price/quantity information has on the betas taken alone. As might be expected based on the results of testing the previous two models, the mine development cost capitalization policy disclosures and the interaction of the two disclosures were not significant.

TABLE III

SUMS OF SQUARES AND CROSS PRODUCTS MATRICES FOR MODEL TWO

Treatment=PQDISC

	RNKBB1	RNKBB2
RNKBB1	794.4626	623.4061
RNKBB2	623.4061	489.1799

Treatment=MDCDISC

	RNKBB1	RNKBB2
RNKBB1	418.3597	124.9292
RNKBB2	124.9292	255.9022

Treatment=PQDISC*MDCDISC

	RNKBB1	RNKBB2
RNKBB1	441.7665	594.3092
RNKBB2	594.3092	843.9707

ERROR SS&CP MATRIX

	RNKBB1	RNKBB2
RNKBB1	12,175.9111	6218.1056
RNKBB2	6218.1056	12,227.9472

The test of the null hypothesis: no overall treatment effect of price/quantity disclosures, provided an L statistic of 0.7781 with 4 and

46 degrees of freedom. This test statistic corresponds with an observed significance level of 0.0190.

The null hypothesis: no overall treatment effect of mine development cost capitalization policy disclosure on RNKFCFB1, RNKFCFB2, RNKBB1, and RNKBB2 was subjected to testing using a Wilk's criterion test statistic. The calculated value of the test statistic was 0.9134 with 8 and 92 degrees of freedom. The observed significance level of the L statistic was 0.8288.

The impact of the interactive effect of both types of disclosures was the object of the last analysis performed on the rank data. The test of the null hypothesis: no overall treatment effect of the interaction PQDISC and MDCDISC, generated an L statistic of 0.8309 with 8 and 92 degrees of freedom. The observed significance level of the value of the Wilk's criterion is 0.360.

The treatment SS&CP matrices and the error SS&CP matrix for the third model are presented in Table IV.

The analysis of model three, which included both the ranks of forecast cash flows and predicted beta values, was not inconsistent with the analysis of the previous two models. The null hypothesis of no overall effect of price/quantity disclosures, was rejected at an alpha level of 0.05. Similarly as with the first two models, the third model demonstrated no overall effect of mine development cost capitalization policy disclosure and no overall effect of the interaction of PQDISC and MDCDISC at an alpha level of 0.10.

TABLE IV

SUMS OF SQUARES AND CROSS PRODUCTS MATRICES FOR MODEL THREE

Treatment=PQDISC

	RNKFCFB1	RNKFCFB2	RNKBB1	RNKBB2
RNKFCFB1	676.9680	1073.2218	733.3661	575.4643
RNKFCFB2	1073.2218	1701.4171	1162.6316	912.3042
RNKBB1	733.3661	1162.6316	792.4626	623.4061
RNKBB2	575.4643	912.3042	623.4061	489.1799

Treatment=MDCDISC

	RNKFCFB1	RNKFCFB2	RNKBB1	RNKBB2
RNKFCFB1	33.6297	47.2829	-50.0750	-92.6779
RNKFCFB2	47.2829	66.7540	-60.6833	-130.6735
RNKBB1	-50.0750	-60.6833	418.9292	124.9292
RNKBB2	-92.6779	-130.6735	124.9292	255.9022

Treatment=PQDISC*MDCDISC

	RNKFCFBB1	RNKFCFBB2	RNKBB1	RNKBB2
RNKFCFBB1	1836.7281	1674.9024	803.4117	1199.1942
RNKFCFB2	1674.7281	1554.9097	786.6462	1135.6304
RNKBB1	803.4117	786.6462	441.7665	594.3092
RNKBB2	1199.1942	1135.6304	594.3092	843.9707

ERROR SS&CP MATRIX

	RNKFCFB1	RNKFCFB2	RNKBB1	RNKBB2
RNKFCFB1	12,839.3833	11,334.0111	5,512.7972	3,857.0194
RNKFCFB2	11,334.0111	12,063.2556	3,994.4056	4,284.7389
RNKBB1	5,512.7972	3,994.4056	12,175.9111	6,218.1056
RNKBB2	3,857.0194	4,284.7389	6,218.1056	12,227.9472

The summary statistics in Table V indicate that the ranks of the forecast cash flows are sensitive to the price/quantity disclosures but the predicted beta values are not. Analysis discloses no apparent responsiveness of the ranks of forecast cash flows or beta values to mine development cost capitalization policy disclosure nor to the interaction between price/quantity disclosures and mine development cost capitalization policy disclosures.

TABLE V

SUMMARY STATISTICS

	SOURCE	Degrees of Freedom	Observed Significance Level
MODEL ONE			
(Cash Flow Forecasts)	P/Q	2, 50	.0076
	MDCDISC	4, 100	.9598
	P/Q*MDCDISC	4, 100	.8643
MODEL TWO			
(Beta Predictions)	P/Q	2, 48	.1892
	MDCDISC	4, 96	.5763
	P/Q*MDCDISC	4, 96	.4743
MODEL THREE			
(Cash Flow Forecasts	P/Q	4, 46	.0190
& Beta Predictions)	MDCDISC	8, 92	.8288
	P/Q*MDCDISC	8, 92	.3600

Post Experiment Questionnaire.

The questionnaires completed by the subjects at the conclusion of the experiment were designed to provide data concerning the importance of several items in the completion of the experimental task. The items: financial ratio analysis, company's share of the market, Wharton forecast of the gross national product, sales trend, mine development cost capitalization policy disclosure, Wharton forecast of coal production, price/quantity disclosure, and Department of Energy output and forecast information were rated by the subjects using a Likert scale. For analysis the scale was quantified as follows: extremely important-5, very important-4, important-3, very unimportant-2, and extremely unimportant-1. The mean response and standard deviation for each item are provided in Table VI.

The analysis of the questionnaire data indicated that the company's sales trend had the largest mean score (importance) among the items listed. The second most important item was the Wharton forecast of coal production. The least important of the items considered was mine development cost capitalization policy disclosure which is consistent with the results of the MANOVA's that were performed on the three models previously discussed.

Table VII provides the mean and standard deviation of the importance values of the items classified by level of disclosure.

A series of analysis of variance (ANOVA) proceedures were performed to determine whether the values assigned by subjects to the various items included in the questionnaire were affected by the presence or absence of price/quantity and mine development cost capitalization policy disclosures. The quantified measure of importance for each item

was utilized as the single dependent variable in nine seperate models. Each model was formulated with price/quantity disclosure, mine development cost capitalization policy disclosure, and the interaction of the two disclosures as the independent variables.

TABLE VI

MEAN AND STANDARD DEVIATION OF LIKERT RESPONSES ON THE IMPORTANCE OF VARIOUS ATTRIBUTES IN THE EXPERIMENTAL TASK

Item	Mean	Standard Deviation
Financial Ratio Analysis	3.19	1.03
Company's Market Share	2.54	0.91
Wharton Forecast of the GNP	3.23	0.87
Sales Trend	3.75	0.66
Mine Development Cost Capitalization Policy Disclosure	2.32	0.99
Wharton Forecast of Coal Production	3.46	0.95
Price/Quantity Disclosure	3.04	1.30
Department of Energy Output and Forecast Information	3.05	1.03

TABLE VII

MEAN AND STANDARD DEVIATION OF LIKERT RESPONSES ON THE IMPORTANCE OF VARIOUS ATTRIBUTES IN THE EXPERIMENTAL TASK, BY DISCLOSURE

	Mean (Standard Deviation)	
Attribute	With Price/Quantity Disclosure	Without Price/Quantity Disclosure
Financial Ratio Analysis	3.36 (0.99)	3.03 (1.05)
Company's Share of the Market	2.50 (0.79)	2.59 (1.02)
Wharton Forecast of the GNP	3.18 (0.98)	3.28 (0.75)
Sales Trend	3.93 (0.66)	3.59 (0.63)
Mine Development Cost Capitalization Policy Disclosure	2.36 (0.91)	2.29 (1.08)
Wharton Forecast of Coal Production	3.54 (1.07)	3.38 (0.82)
Price/Quantity Disclosure	2.81 (1.30)	3.26 (1.29)
Department of Energy Output and Forecast Information	2.93 (1.05)	3.18 (1.02)

The ANOVAs indicated that sales trend's measure of importance was affected by price/quantity disclosure and the interaction of price/quantity disclosure and mine development cost capitalization policy disclosure at an alpha level of 0.05. The subjects' measures of importance attributed to price/quantity information was sensitive to

mine development cost capitalization policy disclosures but at an alpha level of 0.10 rather than 0.05. The importance of the Department of Energy's output and forecast information was shown to be sensitive to the interaction of price/quantity disclosure but again at the 0.10 alpha level.

No other questionnaire item proved to be sensitive to the controlled changes in disclosure at the alpha level of 0.10.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Overview

The purpose of this research was to explore the issue of information content in regard to disclosures proposed for or required by SFAS No. 39. The disclosures in question were: (1) for the most recent five years, the market price and physical quantities of mineral reserves held, quantities of minerals produced, and reserves purchased and/or sold in place (price/quantity disclosures); and (2) the capitalization policies utilized for mine development costs incurred by the firm.

Unlike most information content studies which use the market model, this study made use of an experiment methodology. This experiment utilized students enrolled in a graduate extractive industries accounting course as surrogates for investors. Each subject was given the task of forecasting cash flows and cash flow sensitivity coefficients for each of two firms for a four-year period. Subjects' forecasts for the first firm were treated as a learning experience and only the forecasts for the second firm were considered in the subsequent analysis. Multivariate analysis of variance was used to analyze the data.

As mentioned earlier, information content studies are usually conducted within the context of a market study and information content

is assumed to exist if an abnormal return on securities is exhibited. With the experimental setting in this study, information content was implied if the ranks of the forecasts and/or sensitivity coefficients (betas) provided by the subjects were significantly different when the specified disclosures were provided.

Experimental studies of this nature have been criticized for not providing subjects with realistic economic incentives. The study, in an attempt to overcome these perceived deficiencies, made $360 available for the subjects who provided the most accurate predictions.

The analysis of the data provided by the experiment indicated that the price/quantity disclosures mandated by SFAS No. 39 appear to have information content. These price/quantity disclosures influenced the ranks of forecast cash flows but not on the ranks of the predicted beta values. The disclosure of mine development cost capitalization policies, which was considered by the FASB but not mandated in SFAS No. 39, did not appear to have a significant impact on the ranks of forecast cash flows or predicted betas. There also was no evidence of information content in the interaction of the two disclosures.

Based on the data analysis, one could conclude that the FASB made the proper decision if information content was the appropriate selection criterion. The disclosure that appears to possess information content, price/quantity disclosure, was mandated while the disclosure that apparently lacks information content was the not required. This is not to say that information content was the selection criterion or that it was a proper criterion. Given the political and socioeconomic environment at the time these issues were being considered, there may

well have been other considerations involved, not the least of which being the perceived necessity for a national energy data base.

The post experiment questionnaires completed by the subjects were analyzed to ascertain the effect the disclosures had on the importance of several items believed to have been used in the forecasting process. The items, in order of importance as reported by the subjects, were sales trend, Wharton forecast of coal production, Wharton forecast of the GNP, financial ratio analysis, Department of Energy output and forecast information, price/quantity disclosures, company's market share, and mine development cost capitalization policy disclosure. A series of ANOVAs were performed to ascertain what impact the price/quantity and development cost capitalization policy disclosures had on the perceived importance of the various items. The results of the analyses indicated that the importance of sales trend was the only item affected by the disclosures at an alpha level of .05. Only the price/quantity disclosure and the interaction of price/quantity and mine development cost capitalization policy disclosure had significant impact.

Limitations

Being an experimental study, the environment within which the subjects operated was controlled. This controlled environment resulted in a restriction of the information available to the subjects. It is possible that the information disseminated in the controlled disclosures would have been available from competing informational sources. Given such a situation, information content attributed to the mandated disclosure might not exist in an uncontrolled setting.

There were a large number of feasible mine development cost capitalization policies that could have been utilized in this experiment. It is possible, but not likely, that conducting the experiment using other policies would have produced results that were at variance with those obtained.

It is possible that a non-trivial amount of the variation in the dependent variables (cash flow forecasts and sensitivity coefficient predictions) could be attributed to the use of different schools to provide subjects. There was no control provided for this possible source of variation in the experiment. The MANOVA proceedure would accumulate this potential variation in the residual (error) SS&CP matrix. The resulting inflated matrix would make it more difficult to reject the null hypotheses. An examination of the observed significance levels in Table V indicates that only the treatment effect of price/quantity disclosures in model two was likely to have been affected to the point of statistical significance. This would not be inconsistent with the conclusion that only the price/quantity disclosure had information content.

A SELECTED BIBLIOGRAPHY

Abdel-khalik, A.R. (1974), "On the Efficiency of Subject Surrogation in Accounting Research," The Accounting Review (October), pp.743-50.

_____ and T.F. Keller (1979), Studies in Accounting Research No. 16; Earnings or Cash Flows: An Experiment on Functional Fixation and the Valuation of the Firm (Sarasota, Florida: American Accounting Association).

Arthur Anderson and Company (1980), Coal Industry Reference Binder (New York: Arthur Anderson and Company).

Ashton, R.H. (1974), "An Experimental Study of Internal Control Judgements," Journal of Accounting Research (Spring), pp.143-57.

_____ and S.S. Kramer (1980), "Students as Surrogates in Behavioral Accounting Research: Some Evidence," Journal of Accounting Research (Spring), pp.1-15.

_____ (1982), Studies in Accounting Research No. 17; Human Information Processing in Accounting (Sarasota, Florida: American Accounting Association).

_____ (1974), Objectives of Financial Statements, Vols. 1 and 2 (New York: American Institute of Certified Public Accountants).

Beaver, W.H. (1981), Financial Reporting: An Accounting Revolution (Englewood Cliffs, New Jersey: Prentice-Hall).

Boatsman, J.R. and J.C. Robertson (1974), "Policy - Capturing on Selected Materiality Judgements," The Accounting Review (April), pp.342-52.

Burns, W.J. (1966), "The Accounting Period Concept and Its Effect on Management Decisions," Journal of Accounting Research Supplement, pp.1-14.

Chatfield, C. and A. Collins (1980), Introduction to Multivariate Analysis (London: Chapan and Hall).

Committee on Concepts and Standards for External Financial Reports (1977), Statement on Accounting Theory and Theory Acceptance (Sarasota, Flordia: Accounting Association, 1977).

Coopers and Lybrand (1981), Financial Reporting and Tax Practices in Nonferrous Mining, 10th ed. (New York: Coopers and Lybrand).

Conover, W.J. and R.L. Iman (1981), "Rank Transformations as a Bridge Between Parametric and Nonparametric Statistics," The American Statistician (August), pp.124-9.

Copeland, R.M., A.J. Francia, and R.H. Strawser (1973), "Students as Subjects in Behavioral Research," The Accounting Review (April), pp.365-72.

Demski, J. and G. Feltham (1976), Cost Determination: A Conceptual Approach (Ames, Iowa: Iowa State University Press).

_____ (1980), Information Analysis, 2nd ed. (Reading, Massachusetts: Adison - Wesley).

Feldt, L. and M. Mahmoud (1958), "Power Function Charts for Specifying Numbers of Observations in Analyses of Variance of Fixed Effects," The Annals of Mathematical Statistics (September), pp.871-77.

Ferguson, G.A. (1976), Statistical Analysis in Psychology and Education (New York: McGraw - Hill).

Field, R.E. (1969), Financial Reporting in the Extractive Industries (New York: American Institute of Certified Public Accountants).

Financial Accounting Standards Board (1978), Statement of Financial Accounting Concepts No. 1. Objectives of Financial Reporting by Business Enterprises (Stamford, Connecticut: FASB).

_____ (1980a), Statement of Financial Accounting Standards No. 39. Financial Reporting and Changing Prices: Specialized Assets - Mining and Oil and Gas (Stamford, Connecticut: FASB).

_____ (1980b), Statement of Financial Accounting Concepts No. 3. Elements of Financial Statements of Business Enterprises (Stamford, Connecticut: FASB).

Frishdoff, P. (1982), Financial Reporting and Changing Prices: A Review of Empirical Research (Stamford, Connecticut: FASB).

Gheyara, K. and J. Boatsman (1980), "Market Reaction to the 1976 Replacement Cost Disclosures," Journal of Accounting and Economics (Fall), pp. 107-125.

Horngren, C.T. (1982), Cost Accounting: A Managerial Emphasis (Englewood Cliffs, New Jersey: Prentice Hall).

Libby, R. (1975), "Accounting Ratios and the Prediction of Failure: Some Behavioral Evidence," Journal of Accounting Research (Spring), pp.150-61.

_____ (1979a), "Bankers' and Auditors' Perceptions of the Message Communicated by the Audit Report," Journal of Accounting Research (Spring), pp.99-122.

_____ (1979b), "The Impact of Uncertainty Reporting on the Loan Decision," Selections from the Research Opportunities in Auditing Program, Supplement to Journal of Accounting Research, pp.35-57.

_____ (1981), Accounting and Human Information Processing: Theory and Applications (Englewood Cliffs, New Jersey: Prentice-Hall).

Lindeman, R.H., P.F. Merenda, and R.Z. Gold (1980), Introduction to Bivariate and Multivariate Analysis (Glenview, Illinois: Scott, Foresman and Company).

May, R.G., and G.L. Sundem (1976), "Research for Accounting Policy: An Overview," The Accounting Review, (October), pp.747-763.

McGhee, W., M.D. Shields, and J.G. Birnberg (1978), "The Effects of Personality on a Subject's Information Processing," The Accounting Review (July) pp.681-97.

Miller, G.A. (1956), "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity to Process Information," Psychological Review (March), pp.81-97.

National Coal Association (1980), Results of 1980 Survey of Accounting Practices in the Coal Industry (Washington, D.C.: NCA).

Neter, J. and W. Wasserman (1974), Applied Linear Statistical Models (Homewood, Illinois: Richard D. Irwin).

Newell, A. and H. Simon (1972), Human Problem Solving (Englewood Cliffs, New Jersy: Prentice - Hall).

Peat, Marwick, Mitchell and Company (1981), Principles and Presentation, A Review of 1979 Annual Reports: Mining (New York: Peat, Marwick, Mitchell).

Pindyck, R.S., and D.L. Rubinfeld (1981), Econometric Models and Economic Forecasts, 2nd ed. (New York: McGraw - Hill).

Savage, L. (1972), The Foundations of Statistics, 2nd rev. ed. (New York: Dover Publications).

Slovic, P., and S. Lichtenstein (1971), "Comparison of Bayesian and Regression Approaches to the Study of Information Processing in Judgement." Organization Behavior and Human Performance (June) pp.649-744.

_____, D. Fleissner, and W.S. Bauman (1972), "Analyzing the Use of Information in Investment Decision Making: A Methodological Proposal," Journal of Business (April) pp.283-301.

APPENDIXES

The following appendixes are a synthesis of the six information packets that were provided to the subjects in the experiment. Appendix A contains the items common to all of the information packets. These items are: (1) general instructions, (2) general information, (3) UNICO, Inc. consolidated balance sheet, (4) UNICO, Inc. consolidated statement of changes in financial positon, (5) BICO, Inc. consolidated balance sheet, (6) BICO, Inc. consolidated statement of changes in financial position, and (7) the subject's response sheet.

Appendix B contains the UNICO and BICO income statements with all the combinations of price/quantity disclosures (absent or present) and mine development cost capitalization policy disclosure (absent, policy 1, or policy 2) utilized in the experiment. Each pair (UNICO/BICO) of these income statements in combination with the data contained in appendix A made up an information packet.

APPENDIX A

ITEMS COMMON TO ALL INFORMATION PACKETS

GENERAL INSTRUCTIONS

The FASB has stated that financial reporting should provide information that is useful to investors, creditors, and others in assessing the amounts, timing, and uncertainty of prospective net cash inflows. It is within this context that this experiment was developed.

In the information sets you have received you will find (1) a general information sheet; (2) a Unico information packet; (3) a Bico information packet; (4) a response sheet; and (5) an envelope. The Unico and Bico information packets contain the financial statements of two coal mining companies referred to as Unico, Inc. and Bico, Inc. These are actual published statements and both companies were rendered unqualified audit opinions.

In each case you will be asked to predict net cash flows from operations (NCF) for the two upcoming two-year periods. For the same two two-year periods you will also be asked to estimate the firm's sensitivity coefficient (beta value). A sensitivity coefficient (beta) is a measure of the relationship between an individual firm's change in NCF (net cash flows) and the market wide change in NCF. For examples: (a) if the firm's NCF increased (decreased) by 15% and the market wide NCF increased (decreased) by 15% the firm's beta would be +1.0 [+.15 / +.15 = +1.0 or -.15 / -.15 = +1.0]; (b) if the firm's NCF increased (decreased) by 12% and the market wide NCF increased (decreased) by 10% the firm's beta would be +1.2 [+.12 / +.10 = +1.2 or -.12 / -.10 = +1.2]; (c) if the firm's NCF decreased (increased) by 6% and the market wide NCF increased (decreased) by 8% the firm's beta would be -.75 [-.06 / +.08 = -.75 or +.06 / -.08 = -.75]; (d) if the firm's NCF decreases (increases) by 30% and the market wide NCF increases (decreases) by 20% the firm's beta would be -1.5 [-.30 / +.20 = -1.5 or +.30 / -.20 = -1.5]. As illustrated, the beta value will be positive if the market and firm NCF move in the same direction; it will be negative if they move in opposite directions.

Please provide all the information requested above on the response sheet. After you have completed the response sheet to your satisfaction, open the envelope and complete the enclosed questionnaire. It is important that you provide the information requested for Unico prior to examining Bico's data.

GENERAL INFORMATION

Economy Wide Information

Growth (Decrease) in GNP (nominal dollars):	
Period 1	23.6%
Period 2	20.1%
Wharton Econometric Forecast of GNP Growth:	
Period 3	22.9%
Period 4	26.0%

Industry-Wide (coal) Information

Wharton Econometric Forecast for Growth Rates of Coal Production:	
of Coal Production (nominal dollars):	
Period 3	52.2%
Period 4	49.1%

Production in thousands of tons:	
Period 1	1,451,299
Period 2	1,653,475
Forecast* for period 3	1,663,400

U.S. coal consumption:	
Electric utilities	70.6%
Coke plants	7.2
Exports	13.3
Other industrial users	9.0
Residential/commercial	.9
	100.0%

*U.S. Department of Energy. Assumes weak economic recovery.

Below you will find the consolidated income statements, balance sheets, and statements of changes in financial position for Unico, INC. for (two-year) period one and (two-year) period two:

UNICO INC. CONSOLIDATED BALANCE SHEET (in thousands)

	Period 2		Period 1	
ASSETS				
Cash		$ 5,440		$ 4,797
Marketable securities		95,274		58,769
Accounts receivable	$ 37,777		$ 32,828	
less: Est. uncollectible	235		250	
		37,542		32,578
Inventories		17,988		15,955
Total Current Assets		156,244		112,099
Black lung benefit-escrow account		35,967		24,015
Marketable equity securities at cost (Market $12,840,000 period 2; $7,604,000 period one)		11,770		7,132
Other		12,603		4,162
Costs recoverable under sales contracts		234,449		214,065
Property, plant and equipment (at cost):				
Coal lands and real estate	43,543		38,493	
Plant and equipment	485,512		254,718	
	529,055		293,211	
less: Accumulated depreciation, depletion and amortization	148,377		122,188	
		380,678		171,023
Deferred Charges:				
Prepaid royalties	5,849		3,749	
Deferred income taxes	40,750		22,318	
Deferred sales allowances	1,463		1,693	
Deferred equipment lease cost	9,336		3,542	
Other	3,707		596	
		61,105		31,898
Total Assets		$ 892,816		$ 564,394
LIABILITIES				
Current Liabilities:				
Accounts payable		29,054		15,577
Accrued payroll and other accruals		21,278		21,696
Accrued mine closing costs		9,596		--
Income taxes		3,441		6,674
Current maturities of L-T debt		22,904		2,561
Total Current Liabilities		86,273		46,508
Advance payments on coal	--		5,234	
Workers' compensation awards and pending claims	13,526		7,805	
Black lung benefits	115,452		72,200	
		128,978		85,239
Notes payable, long-term	6,120		1,863	
Subsidiaries' liabilities (not guaranteed by parent): Notes payable, long-term	398,857		338,745	
Capital lease obligations	192,192		18,193	
		597,169		358,801
SHAREHOLDERS' EQUITY				
Common stock, par $1, auth. 5,000,000				
Issued: period 2: 3,348,232 shares	3,348			
period 1: 3,327,832 shares			3,328	
Capital in excess of par	9,519		9,175	
Retained Earnings	67,529		61,343	
		80,396		73,846
Total Liabilities and Stockholders' Equity		$ 892,816		$ 564,394

UNICO INC. CONSOLIDATED STATEMENT OF CHANGES IN FINANCIAL POSITION (in thousands)

	Period 2	Period 1
Sources of Working Capital:		
Operations:		
Net income	$ 10,867	$ 22,190
Add items not affecting working capital:		
Depreciation, depletion and amortization	47,855	27,857
Black lung benefits	31,301	18,487
Costs recovered under sales contracts	12,942	3,337
Provision for mine closings	3,161	--
Deferred income taxes	(18,432)	(8,255)
Total from Operations	87,694	63,616
Long-term borrowings	106,241	187,391
Interim borrowings (reductions)	(4,724)	(38,070)
Increase in capital leases	192,660	21,105
Proceeds from sale of fixed assets	11,714	12,237
Net book value of property disposals	2,194	1,856
	$ 395,779	$ 248,135
Applications of Working Capital:		
Additions to property, plant, and equipment: expenditures	81,755	60,479
capital leases	192,660	25,745
Costs recoverable under sales contracts	33,326	109,830
Purchase of marketable equity securities	4,638	7,132
Investment in venture capital partnership	7,500	--
Current maturities and payments of L-T debt	55,808	6,274
Cash dividends	4,681	3,773
Other-net	11,031	3,682
Increase in working capital	4,380	31,220
	$ 395,779	$ 248,135

Supplemental Cash Flow Information:

Working capital provided from operations	$ 87,694	$ 63,616
Add: Increase in current liabilities	39,765	
Less: Decrease in current liabilities		20,574
Increase in current assets	44,118	51,794
Cash flow from operations	$ 83,341	$ (8,752)

Below you will find the consolidated income statements, balance sheets, and statements of changes in financial position for BICO Inc. for (two-year) period one and (two-year) period two:

BICO INC. CONSOLIDATED BALANCE SHEET (in thousands)

		Period 2		Period 1
ASSETS				
Current Assets:				
Cash		$ 3,787		$ 3,229
Short-term investments		870		100
Receivables	$ 69,475		$ 52,177	
Less est. uncollectible	868		1,319	
		68,607		50,858
Recoverable federal income tax		--		11,446
Inventories		32,041		24,166
Other current assets		1,017		2,482
Total current assets		106,322		92,281
Property, plant, and equipment:				
Land and mineral rights	35,576		34,284	
Plant and equipment	419,051		404,552	
	454,627		438,836	
Less accumulated depr. and depletion	194,751		155,951	
		259,876		282,885
Other assets		10,098		12,088
Total Assets		$ 376,296		$ 387,254
LIABILITIES and SHAREHOLDERS EQUITIES				
Current Liabilities:				
Notes payable-banks		4,500		12,000
Current maturities of L-T debt		4,929		441
Accounts payable		30,959		22,099
Accrued liabilities		22,923		21,322
Taxes on income		2,016		1,909
Total Current Liabilities		65,327		57,735
Long-term debt	81,906		86,839	
Accruals: Black lung benefits	24,573		16,284	
Workers' comp.	4,284		4,209	
Deferred income taxes	20,066		24,898	
		130,829		132,230
Minority interest		16,635		19,349
Shareholders' Equity				
Preferred stock $1 par, authorized 1,000,000 shares, none issued				
Common stock $2.50 par, authorized 12,000,000 shares, 6,819,872 issued		17,050		17,050
Other paid in capital		20,464		20,464
Retained Earnings		125,991		140,426
Total Shareholders' Equity		163,505		177,940
Total Liabilities and Shareholders' Equity		$ 376,296		$ 387,254

RICO INC. CONSOLIDATED STATEMENT OF CHANGES IN FINANCIAL POSITION (in thousands)

	Period 2	Period 1
Sources of Working Capital:		
Operations:		
Net income (Loss)	$(14,435)	$ 3,133
Add items not affecting working capital:		
Depreciation and depletion	50,431	45,742
Workers' compensation and black lung	18,099	9,329
Deferred taxes	(4,832)	12,429
Equity in earnings of subsidiary	--	(3,026)
Minority interest	2,691	566
Total from Operations	51,954	68,173
Proceeds from Long-term borrowing	10,392	49,371
Disposal of plant and equipment	1,908	2,247
Other	1,882	1,672
Decrease in working capital	--	16,022
	$ 66,136	$ 137,485
Application of Working Capital:		
Additions to property, plant, and equipment	$ 29,330	$ 85,958
Cash dividends paid	--	21,824
Reduction of accrual for workers' compensation	9,832	6,543
Dividends paid to minority shareholders	5,200	--
Non-current items of subsidiary at date of acquisition, net	--	39,634
Investment in subsidiary	--	(16,474)
Reduction in Long-term debt	15,325	--
Increase in working capital	6,449	--
	$ 66,136	$ 137,485

Supplemental Cash Flow Information:

Working capital provided from operations	$ 51,954	$ 68,173
Add: Increase in current liabilities	7,592	32,493
Less: Increase in current assets	14,041	16,471
Cash flow from operations	$ 45,505	$ 84,195

RESPONSE SHEET

UNICO, Inc:

Net Cash Flow Forecast for Period 3 $_____

Period 4 $_____

Estimate of Sensitivity Coefficient (Beta) for Period 3 _____

Period 4 _____

BICO, Inc:

Net Cash Flow Forecast for Period 3 $_____

Period 4 $_____

Estimate of Sensitivity Coefficient (Beta) for Period 3 _____

Period 4 _____

To facilitate payment to those making the most accurate forcasts/estimates, please provide the following information:

NAME _____

SOCIAL SECURITY NUMBER _____

STREET ADDRESS _____

CITY, STATE, AND ZIP _____

Thank you for your assistance in this exercise. It is sincerely appreciated.

APPENDIX B

INCOME STATEMENTS WITH DIFFERING LEVELS OF DISCLOSURE UTILIZED IN INFORMATION PACKETS

UNICO INC. CONSOLIDATED INCOME STATEMENT (in thousands)

	Period 2		Period 1	
Net Sales		$ 884,807		$ 592,887
Interest, Gain on sale of assets, and Miscellaneous		28,908		14,268
Royalties, Rental and other Operating income		10,432		5,745
		924,147		612,900
Costs and expenses:				
Cost of sales	$ 738,181		$ 493,938	
Selling, administrative and general	20,025		13,914	
Depreciation, depletion and amortization	47,855		27,857	
Provisions for mine closings	16,245		--	
Interest on long-term liabilities	93,493		44,989	
Deferred profit-sharing contribution	1,037		2,140	
		916,836		582,838
Income before income taxes		7,311		30,062
Income taxes (benefits)		(3,556)		7,872
Net Income		$ 10,867		$ 22,190
Retained Earnings beginning of period		61,343		42,926
Less Dividends per share: $1.13 period 1				3,773
$1.40 period 2		4,681		
Retained Earnings end of period		$ 67,529		$ 61,343
Earnings Per Share		$ 3.25		$ 6.64

UNICO INC. SELECTED FOOTNOTE DISCLOSURES:

Mine Development Cost Capitalization Policy

Mine development costs incurred to prepare an ore body for production are capitalized prior to initial production.

UNICO INC. CONSOLIDATED INCOME STATEMENT (in thousands)

	Period 2		Period 1	
Net Sales		$ 884,807		$ 592,887
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UNICO INC. SELECTED FOOTNOTE DISCLOSURE:

Coal Reserves (unaudited, thousands of tons)

	Period 2	Period 1
Proven and probable tons of coal reserves at year end	5,514,000	5,707,000
Tons of coal produced	24,580	19,387
Tons of coal reserves purchased or leased in place and increases in previous estimates	364,000	462,000
Tons of coal reserves sold in place, lease expirations and reductions in previous estimates	532,420	1,000
Average selling price per ton	$ 33.16	$ 28.37

Mine Development Costs Capitalization policy

Mine development costs incurred to prepare an ore body for production are capitalized prior to initial production.

UNICO INC. CONSOLIDATED INCOME STATEMENT (in thousands)

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BICO INC. CONSOLIDATED INCOME STATEMENT (in thousands)

	Period 2		Period 1	
Sales		$ 928,111		$ 681,918
Cost and expenses:				
Cost of coal sold	$ 835,142		$ 612,597	
Depreciation and depletion	49,830		45,056	
Selling, general and admin.	53,072		40,381	
Interest expense	18,957		5,563	
Total expenses		957,001		703,597
Income from coal operations		(28,890)		(21,679)
Equity in earnings of subsidiary		—		3,026
Interest income		3,591		2,457
Other income		6,398		5,343
Gain on sale of subsidiary		2,130		--
Income (Loss) before taxes		(16,771)		(10,853)
Income taxes (benefits)		(5,027)		(14,552)
Minority interest		2,691		566
Net Income (Loss)		$(14,435)		$ 3,133
Retained Earnings beginning of period		140,426		159,117
		125,991		162,250
Less Dividends per share of $3.20 in period one		--		21,824
Retained Earnings end of period		$ 125,991		$ 140,426
Earnings (Loss) Per Share		$(2.12)		$ .46

BICO INC. SELECTED FOOTNOTE DISCLOSURE:

Mine Development Cost Capitalization Policy

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BICO INC. SELECTED FOOTNOTE DISCLOSURE:

Coal Reserves (Unaudited, thousands of tons)

	Period 2	Period 1
Proven and probable tons of coal reserves at year end	1,200,285	1,246,411
Tons of coal produced	23,965	13,779
Tons of coal reserves purchased or leased in place and increases in previous estimates	--	493,390
Tons of coal reserves sold in place, lease expirations and reductions in previous estimates	22,161	--
Average selling price per ton*	$29.55	$34.72

*Decrease in selling price is attributable to inclusion of lower-priced western coal.

Mine Development Cost Capitalization Policy

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Selling, general and admin.	53,072		40,381	
Interest expense	18,957		5,563	
Total expenses		957,001		703,597
Income from coal operations		(28,890)		(21,679)
Equity in earnings of subsidiary		--		3,026
Interest income		3,591		2,457
Other income		6,398		5,343
Gain on sale of subsidiary		2,130		--
Income (Loss) before taxes		(16,771)		(10,853)
Income taxes (benefits)		(5,027)		(14,552)
Minority interest		2,691		566
Net Income (Loss)		$(14,435)		$ 3,133
Retained Earnings beginning of period		140,426		159,117
		125,991		162,250
Less Dividends per share of $3.20 in period one		--		21,824
Retained Earnings end of period		$ 125,991		$ 140,426
Earnings (Loss) Per Share		$(2.12)		$ .46

BICO INC. SELECTED FOOTNOTE DISCLOSURES:

Coal Reserves (Unaudited, thousands of tons)

	Period 2	Period 1
Proven and probable tons of coal reserves at year end	1,200,285	1,246,411
Tons of coal produced	23,965	13,779
Tons of coal reserves purchased or leased in place and increases in previous estimates	--	493,390
Tons of coal reserves sold in place, lease expirations and reductions in previous estimates	22,161	--
Average selling price per ton*	$29.55	$34.72

*Decrease in selling price is attributable to inclusion of lower-priced western coal.

BICO INC. CONSOLIDATED INCOME STATEMENT (in thousands)

	Period 2		Period 1	
Sales		$ 928,111		$ 681,918
Cost and expenses:				
Cost of coal sold	$ 835,142		$ 612,597	
Depreciation and depletion	49,830		45,056	
Selling, general and admin.	53,072		40,381	
Interest expense	18,957		5,563	
Total expenses		957,001		703,597
Income from coal operations		(28,890)		(21,679)
Equity in earnings of subsidiary		--		3,026
Interest income		3,591		2,457
Other income		6,398		5,343
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VITA 2

Larry Edward Watkins

Candidate for the Degree of

Doctor of Philosophy

Thesis: THE INFORMATION CONTENT OF SELECTED DISCLOSURES FOR MINING FIRMS: AN EXPERIMENTAL STUDY

Major Field: Business Administration

Biographical:

Personal Data: Born in Clinton, Oklahoma, August 11, 1946, the son Mr. and Mrs. Lawrence F. Watkins.

Education: Graduated from Clinton High School, Clinton, Oklahoma, in May, 1964; received Bachelor of Science degree in Accounting from Southwestern Oklahoma State University, in 1970; received Master of Accountancy degree from Oklahoma University in 1976; enrolled in graduate courses at Northern Arizona University, 1977-79; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in May, 1984.

Professional Experience: Assistant Hospital Administrator, Park View Hospital, 1970-72; Hospital Administrator, Vail Valley Medical Center, 1972-74; graduate teaching assistant, Oklahoma University, 1975; graduate research assistant, Oklahoma University, 1976; Assistant Professor of Accounting, Northern Arizona University, 1976-80; Lecturer in Accounting, Oklahoma State University, 1980-83; Visiting Assistant Professor of Accounting, Oklahoma State University, 1983-84.

Professional Organizations: American Accounting Association and the American Institute of Certified Public Accountants.