

Issues in Accounting Education
Vol. 15, No. 1
February 2000

Development of an Integrated Course in Accounting: A Focus on Environmental Issues

D. Jacque Grinnell and Herbert G. Hunt III

ABSTRACT: Environmental issues provide a unique, timely, and important focus for an integrated course in accounting and demonstrate how accounting information is, or can be, used to support corporate environmental strategy and assess environmental performance. This type of course offers an opportunity to add value to the educational experience of both accounting and nonaccounting majors. In this article, we describe the development and structure of one such course, discuss our experiences in offering it, and summarize the perceived benefits and difficulties associated with this endeavor. Overall, we conclude that, despite some challenges in designing and offering this type of course, the benefits are significant from both instructional and professional development points of view. Furthermore, the course attempts to achieve several of the objectives laid out a decade ago by the Accounting Education Change Commission (AECC) and more recently, by the American Institute of Certified Public Accountants (AICPA) in its forward-looking *CPA Vision Project*. Perhaps most importantly, this course helps to counter the tendency, by both students and faculty, toward disciplinary insularity, a concern prominently noted by Patten and Williams (1990).

INTRODUCTION

In a recent article, Sefcik et al. (1997) suggest that environmental accounting can be usefully incorporated into existing accounting courses, and provide a focus for an integrative course to meet the objective of broadening the scope of accounting education as articulated by the Accounting Education Change Commission (AECC 1990). Encouraged by ideas presented by Sefcik et al. (1997) and Lanen (1994), we set out to design and offer a course entitled "Account-

ing and the Environment." This course was designed with the primary objective of providing students with an understanding of: (1) the role of

D. Jacque Grinnell and Herbert G. Hunt III are both Professors at the University of Vermont.

The authors gratefully acknowledge the helpful comments and suggestions from the editor, David E. Stout (editor), and from Donald E. Wygal (associate editor), Joseph J. DaCrema (editorial assistant), and two anonymous reviewers.

accounting in supporting corporate environmental strategy and (2) how various accounting subdisciplines relate to environmental issues, including application of techniques and procedures to support management decision making, performance measurement, recognition and reporting of liabilities and contingencies, capital market reactions to accounting disclosures, and tax implications of environmental cleanup expenditures. The course has been taught four times and now has been approved by the University of Vermont faculty as a permanent offering for accounting majors and nonaccounting majors alike.

We take as givens that the development and implementation of new strategies for meeting environmental challenges will be a central issue for companies in the years ahead, and that accounting, and accounting education, can play critical supporting roles. The fact that environmental issues affect all the traditional accounting subdisciplines makes environmental accounting a potentially rich area of study for an integrative accounting course offering. Sefcik et al. (1997) present a useful discussion of environmental issues within the traditional accounting subdisciplines of financial accounting, managerial accounting, accounting information systems, auditing, and tax. Our course is designed with these subdisciplines in mind and, in order to attain meaningful integration, we emphasize linkages among the subdisciplines. This paper significantly extends the work of Sefcik et al. (1997) by presenting a detailed experiential examination of the components of a successful environmental accounting course offering.

This paper provides an overview of our experiences with this course, as well as potentially useful insights and

a workable framework for others who may be interested in implementing a similar course. Specifically, we present a framework for a stand-alone course in environmental accounting that can be used by other accounting educators interested in this area. Second, we present an extensive and up-to-date reading list that should prove to be a helpful resource to students and faculty interested in environmental accounting issues, especially since there are no textbooks that fit well with the course. Third, having delivered the course four times, we have identified some problem areas in its design and delivery; hopefully others will be able to benefit from our experience in addressing these challenges and from our suggestions designed to motivate continuous improvement in the course. We are encouraged to report on our experiences in developing and teaching this course by calls from the academic accounting community to provide descriptive accounts of what faculty are doing to improve the education of their students (e.g., Stout and Rebele 1996).

The paper is organized as follows. We begin by describing the underlying philosophy and the basic organization of the course. Next, we trace the content of the course, in terms of topical coverage. Third, we present a discussion of our experiences in the course to date, the perceived benefits to students, and improvements made to the course. We conclude with a discussion of how this course, and others like it, can help achieve the objectives laid out a decade ago by the AECC and more recently, by the AICPA in its forward-looking *CPA Vision Project*.

PHILOSOPHY AND COURSE ORGANIZATION

The fundamental purpose of the

course is to enhance student understanding of how accounting information is, or can be, used to support corporate environmental strategy and to assess a firm's environmental performance. In pursuit of this overall objective, various accounting subdisciplines are studied in terms of their relationship to environmental issues, and for the purpose of gaining understanding as to how accounting concepts and techniques can be used to address and help frame the issues surrounding a variety of environmental problems.

Student Constituencies

The course is designed to meet the needs of a variety of student constituencies. It serves as an elective offering for senior undergraduate accounting majors. It also represents a required course for undergraduate business students who have chosen a "Management and the Environment" concentration within the business program at the University of Vermont and for undergraduate students from other academic units who choose to pursue a minor in "Business and the Environment." In addition, the course has appealed to M.B.A. candidates and may be taken by them for graduate credit within the constraints imposed by accreditation standards of AACSB-The International Association for Management Education.¹ Designing this course to serve students with varying backgrounds reflects our belief that accounting programs need to address the needs of future managers as well as "accounting professionals." The course provides all of these types of students with an "integrated accounting" experience built around issues related to the natural environment. In fact, because of the important interconnec-

tions between accounting and all the functional areas of business in dealing with environmental issues, the course is integrative not only among the subdisciplines of accounting, but also among the functional areas of business.

For students entering the course, prerequisite work includes the following courses: Principles of Macroeconomics and Microeconomics, Statistics, and Introductory Financial and Management Accounting. Although it could be argued that additional work in accounting and finance is desirable, it is not considered essential for this course; in fact, the participation of students with varied academic backgrounds, experiences, and perspectives is refreshing. It is challenging, however, to manage this diversity so that all students leave the course with a valuable experience.

The typical class size is about ten students, and the course is team-taught in a seminar setting by the authors of this article. We are both present in the classroom throughout the course and are both active participants in seminar discussions. We have found that our complementary backgrounds (management/cost accounting and financial accounting/tax) work well for an integrative course of this type; one of us usually has enough expertise on any particular topic to answer student questions and provide a rich discussion of the issues.

¹ AACSB accreditation standards permit M.B.A. candidates to receive graduate credit for completion of a limited number of advanced courses (i.e., beyond designated core areas) in which upper-level undergraduates also are enrolled. This usually translates to a limit of six semester hours for such courses (see AACSB 1999, 18).

Course Structure

In terms of structure, there are three fundamental and interrelated components of the course, each of which is given equal weight in assessing student performance. The first component requires active discussion by students of assigned readings from the professional and academic literature. We expect each student to be prepared to lead the seminar discussion of any of the readings assigned for a particular class meeting. The second component involves submission of written analyses of two major cases, as well as completion of a variety of relatively short problem assignments that emphasize methodology and related computations. The nature and timing of problem assignments are such that they provide a lead-in to the written case assignments that, in turn, coincide with the readings and class discussions up to that point. In analyzing and formulating the solutions to the assigned problems and cases, students are encouraged to work together. However, written submissions are required of each student on an individual basis.

A major term paper represents the third component of the course. Students are allowed substantial discretion in choosing a topic for the paper with the understanding that the paper must deal with a linkage between accounting and the environment in some significant way, and be tied to an appropriate literature base. The paper may be issue-oriented, industry-oriented, or individual firm-oriented (e.g., a case study). While we provide a list of potential research topics at the beginning of the course, we encourage students to follow their individual interests in choosing a topic. In this regard, we strongly recommend that students use the Internet to help identify

and research their paper topics, and to obtain the latest corporate environmental reports from firms in which they might be interested.²

Course Content

In terms of content, the course subject matter is arranged in three tiers. The first tier involves a review of the macro and global dimensions of environmental degradation and the role of governments in addressing environmental issues, including the use of "command and control" approaches (e.g., emission standards) and various market mechanisms (e.g., green taxes and tradable permits or pollution allowances). The second tier involves a review of the role and responsibilities of business in addressing environmental issues. Much of the discussion at this level centers on the choice of pollution control or pollution prevention as a fundamental management philosophy. Finally, the third tier focuses on various accounting dimensions as they pertain to environmental issues. Exhibit 1 presents an overview of the course in terms of its three-tiered

² Many companies provide timely environmental reports online that are easily accessed on the Internet. For example, Beets and Souther (1999) provide a list, and the Internet addresses, of 43 firms that currently provide such reports. In addition to individual firm web sites, web sites maintained for the following organizations provide excellent research tools in the environmental management area due to their content and extensive links to other useful sites on the Internet: Center for Social and Environmental Accounting (<http://www.dundee.ac.uk/accountancy/csear>); World Resources Institute (<http://www.wri.org>); World Business Council for Sustainable Development (<http://www.wbcsd.ch>); National Pollution Prevention Center for Higher Education (<http://www.umich.edu/~nppcpub/index.html>); Investor Responsibility Research Center (<http://www.irrc.org>); and U.S. Environmental Protection Agency (<http://www.epa.gov>).

EXHIBIT 1
Overview of the Course

Course Content	Objectives	Approximate Class Time Allotted	Student Assignments
<p>TIER 1: Study of (1) macro and global dimensions of environmental degradation and (2) role of governments in addressing environmental issues</p>	<p>To provide a threshold level of understanding of environmental issues and the complexity of problems they present for governments</p>	<p>Three class periods (75 minutes each)</p>	<ul style="list-style-type: none"> • Reading and discussion of textbook material (e.g., Cairncross 1993, 1995) • Completion of exercise related to the "Tragedy of the Commons" dilemma
<p>TIER 2: Study of (1) role and responsibility of business in addressing environmental issues and (2) alternative environmental management philosophies</p>	<p>To provide a framework for establishing a corporate strategy for achieving environmental objectives</p>	<p>Three class periods (75 minutes each)</p>	<ul style="list-style-type: none"> • Reading and discussion of textbook material (e.g., Cairncross 1993, 1995; DeSimone and Popoff 1997; Schmidheiny and Zorraquin 1996)
<p>TIER 3: Study of (1) accounting as it relates to environmental issues, (2) the role of accounting in support of corporate environmental strategy, and (3) the relationship between accounting and reporting choices and management policies, incentives and economic consequences</p>	<p>To facilitate understanding of the accounting subdisciplines as they relate to environmental issues including application of techniques and procedures to support management decision making, performance measurement and reporting, recognition and disclosure of liabilities and contingencies, capital market reactions to information, and tax implications and incentives</p>	<p>Twenty-one class periods (75 minutes each)</p>	<ul style="list-style-type: none"> • Reading and discussion of journal articles (see the Appendix) • Completion of exercises related to product costing, capital budgeting, and the recognition, measurement, and disclosure of environmental liabilities and contingencies • Written case analysis focusing on capital budgeting (e.g., "Multipaint, Inc.," Bowen et al. 1996) • Written case analysis focusing on financial reporting (e.g., <i>Purity Oil Sales</i>, Cerf and Zechnich 1994) • Completion of term paper on topic related to accounting and the environment



organization, together with a summary of the objectives, allocation of time, and primary student assignments for each tier.

Tiers 1 and 2 occupy the first three weeks of the course. Our purpose here is to provide the necessary context and establish a threshold level of understanding of environmental issues and the difficult and complex problems that these issues present. This establishes the foundation on which the remainder (Tier 3) of the course is built. In addressing the subject matter related to Tier 1 and, to a lesser extent, Tier 2, we have found that either of two books by Cairncross (1993, 1995) is well suited for framing the discussion. Both works are grounded in economics, which, not coincidentally, mirrors our own perspective. DeSimone and Popoff (1997) also provides an excellent frame of reference for discussion. This book, which we recently used for the first time, focuses on corporate environmental strategy and the means for achieving environmental objectives in an economically efficient, sustainable, and profitable manner. The book also provides an excellent opportunity to emphasize the important role that accounting can play in supporting corporate environmental strategy, and the relationship between accounting policy (and accounting system design) choices and management policy.

Along the same lines as DeSimone and Popoff's (1997) book, but with a greater emphasis on the role of world financial markets in supporting sustainable economic development, is an excellent book by Schmidheiny and Zorraquin (1996). In addition to a good discussion of eco-efficiency, financial markets, and the relationship between the two, the authors examine the various players in world financial markets, including accountants. Indeed, the

book provides a strong commentary on the central role that the accounting profession occupies in interpreting, verifying, and reporting environmental information. Thus, it provides a nice crossover from general business considerations to an examination of the role of accounting as it relates to environmental issues. It is to this third tier of subject matter that we now turn our attention.

ACCOUNTING DIMENSIONS

In this part of the course, we begin with a general overview of accounting issues related to the environment. We then investigate in more detail the key aspects of various accounting subdisciplines, including their role in supporting management decision making, measuring environmental performance, and providing managerial incentives. In addition, we examine evidence related to the economic consequences of disclosures related to environmental information.

In an attempt to present an overview of various accounting issues, we rely heavily on a paper by Gallarotti (1995) and on a book by Epstein (1996). The Gallarotti (1995) article provides an excellent discussion of the advantages of and incentives for managing firms in an environmentally sound manner, with a heavy emphasis on top-level corporate strategy. This article is particularly useful at this point in the course because it illustrates the crucial role played by accounting and accounting information in developing and implementing corporate environmental strategy. The Epstein (1996) book also provides an excellent reference base for both students and faculty, as does Statement on Management Accounting Number 4W, issued by the Institute of Management Accountants (IMA 1995).

However, to address accounting issues in depth, it is necessary to rely on a variety of other sources, primarily from professional and academic journals and working papers authored by accounting scholars. In this regard, the challenge is one of selecting appropriate and timely material from a rapidly changing and expanding literature base, while minimizing inevitable redundancy.³ In addition, difficult choices related to breadth vs. depth must be made. In our case, for example, in part because our primary interests lie elsewhere, we have chosen not to devote a specific section of the course to the many facets of environmental auditing, although the subject is addressed tangentially at various points in the course. Similarly, macro-accounting issues of the role of government (e.g., approaches to the "greening" of national income accounts) are not addressed in depth, but rather as part of the general discussion near the beginning of the course. A listing of the most current set of readings in the course, categorized by accounting topic, is presented in the Appendix.⁴ A brief discussion of each of the specific accounting areas addressed in the course is presented below.

Management Accounting

This section of the course provides a prelude to subsequent discussions related to product costing, analysis of pollution-prevention projects, and environmental performance measurement. Emphasis is placed on the importance of identifying environmental cost-behavior patterns for planning and control purposes. The behavior of environmental costs is viewed within the context of two alternative constructs. The first construct fits environmental costs into the activity-based costing (ABC) framework through the

identification of unit-level, batch-level, product-sustaining-level, and facility-level cost drivers (Hammer and Stinson 1995). The second approach uses a cost-of-quality framework and defines environmental costs in terms of prevention, appraisal, internal failure, and external failure costs (Hughes and Willis 1995). The logic behind the cost-of-quality model is especially helpful in addressing pollution prevention as an appropriate management strategy. At this point in the course, we also ask students to read a primer published by the U.S. Environmental Protection Agency (EPA 1995) to orient them to the key concepts and terms related to environmental management accounting. An alternative source is Statement on Management Accounting Number 4Z (IMA 1996).

Product Costing

A significant part of the discussion of product costing centers on the use of ABC techniques to assign environmental costs to products. Articles by Brooks et al. (1993) and Kreuze and Newell (1994) are used to demonstrate potential methodologies. In addition, we address various definitions of "full cost" accounting, including consideration of externalities, together with their

³ We scan the Internet regularly for new and emerging literature in the environmental accounting area. In addition to the web sites listed in footnote 2, the Economics Research Network, which is part of the larger Social Sciences Research Network (<http://www.SSRN.com>), routinely provides Environmental Economics Abstracts in both a working paper series and an accepted paper series. This is an excellent source for timely research articles.

⁴ We also maintain a continually updated reading list for the course on our web site. This list can be accessed directly at <http://bart.emba.uvm.edu/fachome/hunt/263readings.htm> or through a link on either of our faculty profile pages at <http://bart.emba.uvm.edu/professors/>.

related product-pricing implications. Articles by Popoff and Buzzelli (1993) and Boone and Howes (1996) are assigned as readings to provide a practical perspective on the use of full-cost accounting approaches. The important role of life-cycle analysis, assessment, and costing, including implications for product and process design, are also introduced at this point. In concluding this section, students are encouraged to read and reflect on a series of actual case studies published in *Green Ledgers: Case Studies in Corporate Environmental Accounting* (Ditz et al. 1995). These case studies document the sources and magnitude of environmental costs for several large, well-known corporations (e.g., Amoco, Ciba-Geigy, Dow Chemical Company, and S. C. Johnson Wax) and examine the use of environmental cost information for business decision making in a variety of organizational settings.

Capital Expenditure Analysis

The focus of the discussion in this area is on the analysis of pollution-prevention proposals. Building on ideas presented by Kaplan (1986), emphasis is placed on adapting the traditional discounted cash flow (DCF) model to incorporate estimates of environmental cost savings. Inherent in the assessment of investments in pollution prevention is the need to consider uncertainty and incorporate subjective factors formally and systematically in the decision-analysis framework. Accordingly, we stress alternative methodologies for doing so (e.g., see Brewer et al. 1993; Monahan et al. 1990; Raftelis 1991). In addition, we rely heavily on the Total Cost Assessment (TCA) framework advanced by the EPA (1989, 1992). The TCA framework for capital budgeting analysis requires consideration of four categories of en-

vironmental cost savings: usual, hidden, liability, and less tangible costs. A number of articles are assigned as readings (see listing in the Appendix) to demonstrate the application of various methodologies, including TCA, for assessing pollution prevention projects.

At this point in the course, students are required to submit their first written case analysis. For this purpose, we have used a challenging case entitled "Multipaint, Inc." (Bowen et al. 1996). While this case raises a variety of environmental accounting and reporting issues, we instruct students at this stage of the course to focus on the capital budgeting aspects. In doing so, students are encouraged to think in terms of the TCA framework, and to conduct DCF analyses to arrive at a recommended strategy for solving a major environmental problem. (We return to the "Multipaint" case later in the course to discuss disclosure issues and the tax treatment of environmentally related expenditures.)

Performance Measurement

In this section of the course, environmental performance measurement is viewed as a dimension within the context of the "balanced scorecard" approach first described by Kaplan and Norton (1992, 1996). Important parts of the discussion focus on the use of nonfinancial measures of environmental performance as part of continuous improvement programs, the need to identify linkages between environmental performance and financial results, and the use of "pay-for-environmental-performance" executive compensation plans designed to improve firm environmental performance. In addition, the current lack of, and therefore the need for, a common framework for tracking environmental performance is

discussed (Ditz and Ranganathan 1997).

External Reporting to Stakeholders

Starting with this section, attention is redirected from internal uses of environmental accounting information to external reporting. We begin by addressing external environmental reporting in broad terms with the interests of a variety of stakeholders in mind. Public disclosure guidelines, such as those provided by the Coalition for Environmentally Responsible Economies (CERES) and the Public Environmental Reporting Initiative (PERI), are discussed, as is the history behind their development (Hoffman 1996). In addition, the dramatic increase in the number of corporations that issue separate environmental progress reports is acknowledged, together with a recognition of the great disparity in both the content and quality of these reports (Lober et al. 1997; Beets and Souther 1999). At this point, we discuss possible reasons for this disparity, including variations among firms with respect to their corporate environmental policy/strategy and how accounting disclosures and reports reflect these differences. To promote further understanding, and to demonstrate a need for standardized external environmental reports, students are provided with access to several actual environmental progress reports issued by a variety of major corporations.⁵ Our experience indicates that external environmental reporting is a favorite term paper topic chosen by students in the course.

Environmental Liabilities and Contingencies

In this section of the course, which receives more attention than any

other area, measurement and disclosure issues related to environmental liabilities and contingencies are addressed. External reporting issues in this area continue to be controversial and of great concern to regulators (Petersen 1998).

We begin by reviewing the key aspects of major federal legislation related to pollution control and environmental remediation.⁶ In addition, students are asked to read and become familiar with the authoritative pronouncements that have a major bearing on accounting and reporting practices related to environmental liabilities and contingencies.⁷ In discussing the pronouncements of the FASB, the SEC, and the AICPA, attention is focused on three key areas: recognition and measurement guidelines, criteria for capitalization (vs. expensing) of remediation costs, and disclosure and presentation requirements.

We then discuss a variety of articles that provide commentary on the "state of the art" with respect to accounting for environmental liabilities, and that question the adequacy of information disclosure about environmental contingencies.⁸ Following this, we study a number of empirical research papers that present

⁵ As pointed out in footnote 2, many corporate environmental reports are available on the Internet. Beets and Souther (1999) provide a list of 43 firms that provide online reports.

⁶ Part 1 of AICPA (1996) Statement of Position 96-1 is an excellent resource for this purpose.

⁷ Key pronouncements include SFAS No. 5 (FASB 1975); FASB Interpretation Nos. 14 and 39 (FASB 1976, 1992); EITF Nos. 89-13, 90-8, 93-5, and 95-23 (EITF 1989, 1990, 1993, 1995); SEC SAB No. 92 and FRR No. 36 (SEC 1993, 1989); and AICPA SOP Nos. 94-6 and 96-1 (AICPA 1994, 1996).

⁸ See the Appendix, Section G, for a list of the articles that we use in the area of liabilities and contingencies.

evidence supporting various explanations of differing management recognition and disclosure decisions with respect to environmental liabilities and contingencies. We conclude this section by engaging students in a discussion of an ethical dilemma case involving the reporting of environmental contamination (Eynon and Stevens 1996). The discussion of this case is always spirited and the case is often cited by students as adding significant value to the course.

At this stage, students are required to submit their second written case analysis. In this instance, we have used a demanding case entitled *Purity Oil Sales* (Cerf and Zechnich 1994). This case, which describes an actual situation involving a Superfund site, requires students to review key authoritative pronouncements and engage in some critical thinking to formulate recommendations regarding financial reporting matters related to environmental contamination and remediation.

Market Studies/Economic Consequences

Here, we include an examination of various types of market reactions and valuations related to environmental variables. Environmental exposure, liabilities, contingencies, and regulatory costs clearly have economic consequences for companies. Students need to be aware of these consequences if they are to fully appreciate the financial implications of environmental issues.⁹ This section of the course provides an excellent follow-up to the previous one dealing with measurement and disclosure issues, because the market studies provide empirical evidence that disclosures do, in fact,

matter to investors (e.g., Blacconiere and Patten 1994; Blacconiere and Northcut 1997; Patten and Nance 1998). Furthermore, an important recent study provides evidence that environmental liability information affects not only stock prices, but also analysts' credit ratings of new bond issues (Graham et al. 1999). This is another point in the course where empirical evidence can illustrate that accounting plays an important role in managers' strategic decisions and conversely, that the potential exists for corporate environmental policy to influence management's accounting policy (accrual and disclosure) choices. Moreover, this is a good opportunity to review the evidence of linkages between environmental performance and financial performance (e.g., Cohen et al. 1995; Feldman et al. 1996; Blumberg et al. 1997).

Income Taxes

Although the Internal Revenue Code imposes a number of specific environmental taxes designed to finance various federal trust funds,¹⁰ we focus on the more general U.S. Federal income tax issues in the course. While the current tax laws are unclear with respect to the appropriate treatment of many types of environmental expenditures, new rulings continue to emerge from the

⁹ This section of the course also is important because it introduces students to the whole area of empirical research. Most undergraduates, and many M.B.A. candidates, have very limited exposure to the power and importance of these types of studies, and this provides a brief and interesting introduction to the area.

¹⁰ Examples are the Oil Spill Liability Trust Fund, the Leaking Underground Storage Tank Trust Fund, and the Hazardous Substance Superfund.

Internal Revenue Service,¹¹ making this a rich and dynamic area of study. Furthermore, some of the tax rulings (e.g., those dealing with capitalizing vs. expensing certain types of expenditures) are at odds with generally accepted accounting standards, making it important for students to pay close attention to possible discrepancies.

Our approach to the study of income tax considerations is to introduce the required readings in chronological order so that the students can observe the tax laws changing and developing over time. We begin with an article by March and Brazelton (1991) that introduces students to the uncertainties in the tax laws by examining the appropriate treatment of Superfund cleanup costs from a conceptual point of view. This is followed by an excellent article by Yancey (1992) that provides a detailed theoretical analysis of the economic performance standard as it applies to the treatment of environmental cleanup costs, and the distinction between property/service liabilities and payment liabilities. The other articles in this section include several shorter analyses of the constantly changing legal landscape with respect to environmental costs and expenditures. Even for students without any background in taxation, our brief introduction to the tax aspects of environmental expenditures forces them to acknowledge the complexities and uncertainties inherent in our income tax system, and points to inconsistencies between it and financial accounting standards.

Pollution Allowances

We examine this special topic in the course because of the expectation that tradable permits will be used increasingly by governments as a mar-

ket-based approach to dealing with environmental pollution. Discussion of this topic raises a variety of economic, ethical, social, equity, and accounting issues. We begin this section by discussing the nature of tradable permits and the rationale for their use (Stavins 1998). We then move to a discussion of accounting alternatives and their implications (Wambganss and Sanford 1996; Milne 1996). An interesting outcome of the debate over pollution allowances is that students can begin to think about accounting alternatives beyond those limited by the traditional accounting model (e.g., see Grinnell and Hunt 1999).

International Issues

To encourage students to think about environmental issues from a global perspective, and to illustrate that other countries face some of the same environmental challenges as the U.S., students are required to read several papers that address environmental accounting issues in other countries. The choice of articles in this section is based largely on our attempt to expose students to environmental accounting and reporting practices in several different countries (e.g., Roberts 1991; Niskala and Pretes 1995; Deegan and Rankin 1996) and to encourage them to compare and contrast the practices in those countries with what is done in the U.S. (e.g., Buhr and Freedman 1996).

¹¹ For example, in an important recent action, the IRS (1998) has broken new ground by ruling that the cost of removing old underground storage tanks containing industrial waste and replacing them with new ones is currently deductible. This ruling is a departure from the general tax rule that the cost of new tanks that are expected to last for several years is to be capitalized (i.e., Internal Revenue Code Section 263).

While the amount of time that we are able to devote exclusively to international issues is quite limited, there are several other places throughout the course where such issues come into play. For example, the Cairncross (1993, 1995) books referenced earlier have a very strong international perspective, as do many of the management accounting articles, especially those dealing with life-cycle costing and product take-back. We also spend some time addressing the international standards and guidelines for environmental management systems currently being developed by the International Standards Organization (*viz.*, the ISO 14000 series of standards¹²). Overall, our experience suggests that students are generally quite interested in the international area and several have chosen term paper topics that examine global and/or international issues.

OBSERVATIONS AND EXPERIENCES

To date, the course has been through four complete cycles. A total of 43 students have completed it, including 14 M.B.A. candidates, 27 undergraduate students, and two post-graduate students. Of the 27 undergraduate students, 11 were Accounting majors, nine were Management and the Environment majors, six were Finance majors, and one was an Arts and Sciences student majoring in Environmental Studies. Thus, in general, we have succeeded in attracting a relatively diverse group of business students to the course.

Our experiences with the course have enabled us to identify several benefits accruing to the students in the course and also some of the problems and challenges in managing an integrated course of this type. The next sec-

tion discusses the perceived benefits. This is followed by a section devoted to course improvements that we have made as a result of the observed problems and challenges, and in response to the feedback received from students.

Perceived Benefits

We see a number of benefits for students resulting from this type of course. First, the natural environment is a topic that appeals to today's student and, accordingly, provides an exciting focus for addressing a variety of accounting issues, integrating accounting subdisciplines and applying accounting methodologies to the analysis of real-world problems. We believe that, as a result of conventional pedagogy, students often view accounting as a freestanding discipline divorced from other business functions and independent of corporate strategy. To counter this tendency, the natural environment provides a useful context within which to study the design of accounting systems and to demonstrate the role of accounting in supporting and reinforcing corporate strategy. Consequently, our impression is that students leave the course with a fuller understanding of, and appreciation for, the critical and central role that accounting serves in the business organization, a significant benefit for both undergraduates and M.B.A. candidates.

Second, given the seminar-style setting in which the course is conducted, senior-level undergraduate

¹² The ISO 14000 series of standards will ultimately provide guidelines on the elements and supporting technologies that an environmental management system should have. The series will also address issues such as environmental labeling, life-cycle analysis, and environmental aspects for product standards (<http://www.tc207.org/faqs/index.html>).

students are exposed to a graduate-type learning experience. This setting can be a welcome departure from the usual undergraduate classroom approach to addressing accounting issues and controversies. In addition, this type of setting provides opportunity and encouragement for students to enhance their interpersonal skills.

Third, students accustomed to conventional problem solving of well-defined accounting textbook problems are confronted with situations involving significant uncertainty. Consequently, they can become attuned to the subjectivity involved in dealing with real-world accounting problems and gain greater appreciation of the need for the application of sound judgment. Also, students are forced to develop and exercise their critical thinking skills.

Fourth, students are presented with ample opportunity to apply and enhance their oral communication and writing skills. The need to hone these skills in preparation for future employment is widely recognized.

Fifth, the course content exposes students to a variety of situations involving ethical dilemmas and as a result, forces them to exercise moral reasoning skills to arrive at defensible conclusions.

A final benefit relates to the heavy reliance on material from the current professional and academic literature. Students accustomed to a textbook-based learning approach are confronted, possibly for the first time, with having to use these alternative sources of information. Also, as discussed earlier, students are strongly encouraged to seek out significant resources available through the Internet. Hopefully, this exposure instills in them an appreciation of the role and importance of journal articles, of information technology, and of the nature

and value of empirical research. Moreover, for accounting faculty, in gaining familiarity with the current professional and academic literature related to accounting and the environment, many of the significant research opportunities that exist in this emerging field become readily apparent.

Continuous Improvement Approaches and Incremental Changes

Every time we teach this course, we gain additional insights into what seems to work well and what does not. Based on the experience gained from having taught the course four times, and in response to the solicited comments and suggestions from student participants, we have made a number of changes to improve the course. These continuous revisions do not reflect a change in the philosophy of the course, but rather relate to content and delivery.

Student feedback has always been a significant factor in any decision to make changes in the pedagogy and content of the course. This feedback is solicited in two ways. First, we encourage students to make suggestions for improvements at any point during the semester. If it seems appropriate, we discuss the suggested change(s) with the entire class and take the resulting comments into account in making any course alterations. In this way, students can be involved in continuous course improvement during the semester.

Second, in addition to having students fill out the formal end-of-semester course evaluations required by our institution, we devote the last class meeting of the semester to a focus-group meeting, i.e., a session in which we solicit verbal comments and recommendations from students to guide future changes and improvements. Also, to allow for anonymous comments and

suggestions, we distribute a two-page questionnaire prior to the last class meeting that asks each student to respond to several open-ended questions about the content and delivery of the course. We then consider this collective end-of-semester feedback in designing the next cycle of the course.

Given the lack of a comprehensive textbook in the area, and thus our reliance on a long list of assigned readings, it is not surprising that the most common complaint registered by students relates to the volume of the reading material and the redundancy of some of the articles. Accordingly, we have made a concerted effort to limit the volume of, and the redundancy in, the readings. Initially, we decided to err on the side of including more, rather than less, material based on the belief that by doing so we would avoid overlooking critical points and that students would attain additional insights.

Now, having gained a better understanding ourselves, we are able to be more critical in our selection of materials and thereby reduce the amount of redundancy. Nevertheless, within the literature on accounting and the environment, as in any emerging area of study, authors typically feel compelled to provide a frame of reference for the uninitiated. Consequently, in selecting reading material for the course, some contextual redundancy is unavoidable. Further, limiting the inclination to expand the total volume of assigned readings presents an ongoing dilemma as we discover significant new research findings being reported.

Due to the rapidly expanding nature of the literature base, we have found it necessary to frequently update the reading list, sometimes even during the conduct of the course. We also ask the students to rate each article on the reading list in terms of its value to them. While

not the only determinant, these ratings have been useful in revising the reading list for the course. The reading list for the most recent semester (Spring 1999), reflecting this ongoing process of change, refinement, and improvement, is presented in the Appendix.¹³

A second adjustment in course content was made in response to the expressed need of students for more context and a better understanding of environmental issues before embarking on the study of the role of accounting. Accordingly, we decided to dedicate more reading and time at the beginning of the course to a review of global/macro issues and to the study of the role and responsibility of government and business in addressing environmental degradation.

A third change that we made in the course was caused by the disparate accounting backgrounds of the students. Ultimately, we expect all students to understand the essential elements of authoritative pronouncements and accounting methodologies.¹⁴ Early on, it became apparent that we had made unrealistic assumptions about the students' baseline knowledge of accounting and that many students were deficient in their mastery of fundamental concepts and procedures. Consequently, we now allow some time, interjected at appropriate points in the course, for brief review of relevant accounting concepts and methodologies. These periodic reviews, which relate primarily to product

¹³ Also, see footnote 4 for the address of our web site that contains the current version of the reading list.

¹⁴ In general, the key pronouncements of the AICPA, FASB, and SEC related to environmental matters (as enumerated in footnote 7) are not technically complex. Consequently, we find that nonaccounting students are as adept as accounting majors in understanding the essential elements of these pronouncements.

costing, capital budgeting, and recognition of losses and estimated liabilities, are reinforced by the assignment of related short exercises and problems. Inasmuch as our course seems to appeal generally to highly motivated students willing to address their individual deficiencies with minimal instructor assistance, we have found that the problems arising from the varied accounting backgrounds of students have been satisfactorily addressed through the use of these brief reviews and related assignments.

A fourth change that we have made is in response to the need expressed by students for help in gaining perspective and integrating the readings related to the various subdisciplines being studied. To accomplish this, we now pose a few "before-the-fact" questions for the students to consider as they work their way through the articles. In addition, we provide some "after-the-fact" summaries that are intended to compare and contrast articles, and to integrate groups of articles.¹⁵ Our experience suggests, for example, that students have a particularly difficult time understanding the nature, and digesting the results, of empirical investigations. Accordingly, we have discovered that this is an area where it is especially useful to provide students with "after-the-fact" summaries of the studies.

One of the most recent improvements that we have instituted relates to the students' choice of term paper topics. Because detailed coverage of some topical material of potential interest for term papers necessarily comes late in the semester, students may be unaware of the research possibilities or of their interest in the topic(s) in a timely fashion. In response to this problem, and to allow students greater latitude in identifying a research topic in which they are genuinely interested, we now provide, early in the course, a brief summary of

the nature of the various accounting subdisciplines and how they relate to environmental issues. We also require that students submit a short proposal describing their project one month prior to the paper's due date. This tends to discourage procrastination, allows us to provide constructive feedback, and permits sufficient time to obtain needed research materials.

Finally, we have found that many students, especially undergraduates, are often reluctant to question and critically evaluate the reading materials, and to speak up in class. This problem likely stems from the inexperience of undergraduate students with seminar-type courses. This poses a problem, since the success of the course depends heavily on active student participation in classroom discussions. Our style is not to coerce students into participating by assigning specific discussion responsibilities to particular students. However, we often remind students that classroom participation is a major determinant of their course grade, emphasizing the critical importance of having them involved in the course and the importance of their participation to the success of the course. We do occasionally call on "reluctant" students, in a nonthreatening way, to express their views. We also periodically speak with these students outside of class about their lack of participation if we think it appropriate.

CONCLUDING COMMENTS

In a letter dated May 25, 1999, inviting participation in the 1999 BELL (Business-Environment-Learning-Leadership) Conference, Dean B. Joseph White of the University of Michigan's School of Business Administration writes:

¹⁵ Examples of "before-the-fact" questions and "after-the-fact" summaries are available, on request, from the authors.

The clarion call for ecologically, socially and economically sustainable human development is probably the "number-one megatrend" reshaping business, and thus management education, in the next century....I can think of no challenge more important than that of redirecting management education toward community, the environment, and a sustainable future.

We could not agree more with Dean White's sentiment. In fact, we view the need for sound management practices related to the natural environment as critical to contemporary business success and accordingly, worthy of study by all business students.

It now has become clear how important it is for accountants, in particular, to develop an understanding of this area and the critical role they will play in assisting managers to incorporate environmental considerations into business decisions and the development of corporate environmental strategy. Furthermore, accountants will likely be called upon to provide attestation services with respect to corporate environmental reports, if, as some believe, environmental reporting standards are developed to increase the validity and comparability of these reports (Beets and Souther 1999). Insofar as accountants in the next century need to be well versed in matters related to the environment, we maintain that academic accounting programs have a responsibility to address environmental considerations.

Despite our strong advocacy of, and belief in, a course in accounting and the environment, faculty should not commit to offering such a course without a full understanding of the effort involved in undertaking it. First, since

a substantial portion of the literature base related to environmental accounting is relatively new and spread across a diverse set of journals, books, and other information sources, a significant time investment by faculty is necessary. Second, because the type of integrative course described here cuts across several accounting subdisciplines, individual instructors may find it a challenge to become well versed in all these areas. Accordingly, it may be necessary and desirable for faculty to combine talents in delivering this type of course. Indeed, this is one of the reasons we chose to collaborate in offering our course. Despite the extra time involved in meetings outside of class to discuss the course, the arrangement has worked very well because our respective areas of expertise complement each other, leading to a much richer classroom discussion of the readings.

Finally, we have found that incorporating environmental accounting into students' educational experiences helps achieve several of the agenda items identified by Patten and Williams (1990) as necessary for accounting educators to respond to the future needs of the profession as envisioned by the Accounting Education Change Commission (1990).¹⁶ Moreover, we believe the type of course

¹⁶ For example, of the seven agenda items identified by Patten and Williams (1990, 176), we believe five are significantly addressed in our course: (1) broadening the undergraduate curriculum; (2) developing students' intellectual, interpersonal, and communication skills; (3) making "learning to learn" a primary classroom objective; (4) moving away from a curriculum based on accounting standards to one based on an information development and distribution function for economic decision making; and (5) improving the quality of those attracted to careers in accounting by dealing with topics that have contemporary relevance and urgency (e.g., environmental issues).

we describe in this paper advances the goals and is consistent with the spirit of the forward-looking *CPA Vision Project* recently articulated by the AICPA (1998). Among other things, the *Project* emphasizes the need for future members of the CPA profession to understand how new forces will affect the future, either as threats or opportunities; to develop values and competencies necessary to support sound business and

economic practices in a challenging global environment; to be attuned to broad issues and to understand the realities of the business environment; and to exercise critical-thinking skills in order to provide quality advice for strategic decision making. It is precisely these qualities and attributes that we seek to develop in our students through this course.

APPENDIX

Accounting and the Environment—Supplemental Readings**A. Overview of Accounting Issues**

1. Kleiner, A. 1991. What does it mean to be green. *Harvard Business Review* (July-August): 38–47.
2. Gallarotti, G. M. 1995. It pays to be green: The managerial incentive structure and environmentally sound strategies. *The Columbia Journal of World Business* (Winter): 38–57.
3. Owen, D. 1993. The emerging green agenda: A role for accounting. In *Business and the Environment*, edited by D. Smith, 55–74. New York, NY: St Martin's Press.
4. Sefcik, S. E., N. S. Soderstrom, and C. H. Stinson. 1997. Accounting through green-colored glasses: Teaching environmental accounting. *Issues in Accounting Education* (Spring): 129–140.

B. Management Accounting—General

5. Sammer, J. 1998. What it means to be green, part one of a series. *Controller Magazine* 4 (1) (January): 45–47.
6. Sammer, J. 1998. What it means to be green, part two of a series. *Controller Magazine* 4 (2) (February): 49–50, 52.
7. Hamner, B., and C. H. Stinson. 1995. Managerial accounting and environmental compliance costs. *Journal of Cost Management* (Summer): 4–10.
8. Hughes, S. B., and D. M. Willis. 1995. How quality control concepts can reduce environmental expenditures. *Journal of Cost Management* (Summer): 15–19.
9. Sarkis, J., and A. Rasheed. 1995. Greening the manufacturing function. *Business Horizons* (September-October): 17–27.
10. Boer, G., M. Curtin, and L. Hoyt. 1996. Effective environmental cost management. Working paper, Vanderbilt University.
11. Sainivasan, N. 1997. The economics of ISO 14000. *Today's CPA* (January): 24–27.
12. Environmental Protection Agency (EPA). 1995. *An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms*. Washington, D.C.: U.S. EPA.

C. Product Costing

13. Brooks, P. L., L. J. Davidson, and J. H. Palamides. 1993. Environmental compliance: You better know your ABCs. *Occupational Hazards* (February): 41–46.
14. Kreuze, J. G., and G. E. Newell. 1994. ABC and life-cycle costing for environmental expenditures. *Management Accounting* (February): 38–42.
15. Popoff, F. P., and D. T. Buzzelli. 1993. Full-cost accounting. *Chemical and Engineering News* (January 11): 8–10.
16. Epstein, M. J. 1996. Accounting for product take-back. *Management Accounting* (August): 29–33.
17. Larson, C., and N. S. Soderstrom. 1997. Life cycle assessment as a tool for environmental measurement. Working paper, University of Colorado at Denver.
18. Boone, C., and H. Howes. 1996. Accounting for the environment. *CMA Magazine* (June): 22–24.

D. Capital Expenditure Analysis

19. Kaplan, R. S. 1986. Must CIM be justified by faith alone? *Harvard Business Review* (March-April): 87–95.
20. Kite, D. 1995. Capital budgeting: Integrating environmental impact. *Journal of Cost Management* (Summer): 11–14.

21. Brewer, P. C., A. W. Gatian, and J. M. Reeve. 1993. Managing uncertainty. *Management Accounting* (October): 39–45.
22. White, A. L., M. Becker, and D. E. Savage. 1993. Environmentally smart accounting: Using total cost assessment to advance pollution prevention. *Pollution Prevention Review* (Summer): 247–259.
23. Bailey, P. E. 1991. Full cost accounting for life cycle costs—A guide for engineers and financial analysts. *Environmental Finance* (Spring): 13–29.
24. Raftelis, G. A. 1991. Financial and accounting measures as part of pollution prevention assessment. *Environmental Finance* (Summer): 129–150.
25. Grinnell, D. J., and H. G. Hunt III. 1999. Capital budgeting for pollution prevention. *Journal of Cost Management* (July/August): 3–9.

E. Performance Measurement

26. Kaplan, R. S., and D. P. Norton. 1992. The balanced scorecard—Measures that drive performance. *Harvard Business Review* (January-February): 71–79.
27. Ditz, D., and J. Ranganathan. 1997. *Measuring Up: Toward a Common Framework for Tracking Corporate Environmental Performance*. Washington, D.C.: World Resources Institute.
28. Pojasek, R. B., and L. J. Cali. 1991. Measuring pollution prevention progress. *Pollution Prevention Review* (Spring): 119–130.
29. Ilinitch, A. Y., N. S. Soderstrom, and T. E. Thomas. 1998. Measuring corporate environmental performance. *Journal of Accounting and Public Policy* (Winter): 383–408.
30. Campbell, K., and N. Soderstrom. 1996. Executive compensation and environmental exposure. Working paper, University of Connecticut and University of Washington.

F. External Reporting to Investors (and other stakeholders)

31. Hoffman, A. J. 1996. A strategic response to investor activism. *Sloan Management Review* (Winter): 51–64.
32. Adair, W. H., Jr., W. H. Boies, and S. H. Meadows. 1991. The 1990s: A new era of formal and informal corporate disclosure. *Journal of Corporate Accounting and Finance* (Spring): 289–307.
33. Stanwick, S. D., and W. Hillison. 1992/1993. Six reasons why you should reexamine your environmental reporting. *Journal of Corporate Accounting and Finance* (Winter): 205–217.
34. Lober, D. J., D. Bynum, E. Campbell, and M. Jacques. 1997. The 100 plus corporate environmental report study: A survey of an evolving environmental management tool. *Business Strategy and the Environment* 6: 57–73.
35. Freedman, M. 1993. Accounting and the reporting of pollution information. *Advances in Public Interest Accounting*: 31–43.
36. Verma, K., V. Milledge, and D. Wiest. 1997. Measurement of corporate environmental performance: The role of regulatory enforcement policies in the oil and gas industry. Working paper, University of Massachusetts Boston.
37. Beets, S. D. and C. C. Souther. 1999. Corporate environmental reports: The need for standards and an environmental assurance service. *Accounting Horizons* (June): 129–145.

G. Measurement and Disclosure Issues Related to Environmental Contingencies and Liabilities

38. Coller, M., and G. W. Harrison. 1995. On the use of the contingent valuation method to estimate environmental costs. *Advances in Accounting*: 169–193.
39. Surma, J., and D. Petracca. 1994. The continuing environmental accounting challenge facing the petroleum industry. Paper presented to the API Downstream Accounting Subcommittee, Price Waterhouse, March 30.

40. Munter, P., R. Sacasas, and E. Garcia. 1996. Accounting and disclosure of environmental contingencies. *The CPA Journal* (January): 36–37, 50–52.
41. Hochman, J. 1997. Cleaning up environmental accounting. *Today's CPA* (April): 38–43.
42. Zuber, G. R., and C. G. Berry. 1992. Assessing environmental risk. *Journal of Accountancy* (March): 43–46, 48.
43. Johnson, L. T. 1993. Research on environmental reporting. *Accounting Horizons* (September): 118–123.
44. Barth, M. E., M. F. McNichols, and G. P. Wilson. 1997. Factors influencing firms' disclosures about environmental liabilities. *Review of Accounting Studies* 2: 35–64.
45. Ely, K., and E. Stanny. 1997. Is the way management discloses information on their PRP status related to the level of institutional ownership and analyst following? Working paper, Emory University.
46. Kennedy, J., T. Mitchell, and S. E. Sefcik. 1998. Disclosure of contingent environmental liabilities: Some unintended consequences. *Journal of Accounting Research* (Autumn): 257–277.
47. Northcut, W. D. 1995. Environmental accounting policies in firms subject to Superfund cleanup costs. Working paper, University of Arizona.
48. Lawrence, C. M., and I. K. Khurana. 1997. Superfund liabilities and governmental reporting entities: An empirical analysis. *Journal of Accounting and Public Policy* 16: 155–186.
49. Mitchell, L. B. 1995. Comparability in accounting for contingencies: The case of Superfund. Working paper, Claremont McKenna College.
50. Eynon, G., and K. Stevens. 1996. Instructional case: Ethical dilemmas in reporting environmental liabilities. *Issues in Accounting Education* (Fall): 393–402.

H. Market Reactions to Environmental Information

51. Cohen, M. A., S. A. Fenn, and J. S. Naimon. 1995. *Environmental and Financial Performance: Are They Related?* Washington, D.C.: Investor Responsibility Research Center.
52. Little, P., M. I. Muoghalu, and H. D. Robison. 1995. Hazardous waste lawsuits, financial disclosure, and investors' interests. *Journal of Accounting, Auditing and Finance* (Spring): 383–398.
53. Blacconiere, W., and D. M. Patten. 1994. Environmental disclosures, regulatory costs and changes in firm value. *Journal of Accounting and Economics* (November): 357–377.
54. Blacconiere, W., and W. D. Northcut. 1997. Environmental information and market reactions to environmental legislation. *Journal of Accounting, Auditing and Finance* (Spring): 149–178.
55. Campbell, K., S. E. Sefcik, and N. S. Soderstrom. 1996. Disclosure of private information and reduction of uncertainty: Environmental liabilities in the chemical industry. Working paper, University of Connecticut and University of Washington.
56. Graham, A., J. J. Maher, and W. D. Northcut. 1999. Environmental liability information and bond ratings. Working paper, Virginia Polytechnic Institute and State University.
57. Patten, D. M., and J. R. Nance. 1998. Regulatory cost effects in a good news environment: The intra-industry reaction to the Alaskan oil spill. *Journal of Accounting and Public Policy* (Winter): 409–429.

I. Income Tax Issues

58. March, M. W., and J. K. Brazelton. 1991. Superfund cleanups: The financial costs high, the tax treatment uncertain. *Taxes* (November): 682–688.
59. Yancey, T. H. 1992. Emerging doctrines in the tax treatment of environmental cleanup costs. *Taxes* (December): 948–973.
60. Gibby, D. J., and R. Patella. 1993. Deductibility of environmental remediation costs.

Journal of Accountancy (December): 44–46, 48–49.

61. Riordan, D. A., and S. N. Cairns. 1994. Deduction of toxic waste cleanup costs may be a hazardous position. *Management Accounting* (February): 34–37.
62. Gallagher, M. G. 1996. Environmental cleanup costs. Working paper, The George Washington University.
63. IRS scrubs old TAM and allows cleanup-cost deduction. 1996. *Taxation for Accountants* (August): 119–120.
64. Whitehead, R., B. Yelvington, B. Humphrey, and P. Spikes. 1997. Will the IRS please call the EPA...again. *The CPA Journal* (March): 40, 42–45.

J. Accounting and Reporting Issues Related to Pollution Allowances

65. Stavins, R. N. 1998. What can we learn from the grand policy experiment? Lessons from SO₂ allowance trading. *Journal of Economic Perspectives* (Summer): 69–88.
66. Wambganss, J. R., and B. Sanford. 1996. The problem with reporting pollution allowances. *Critical Perspectives on Accounting* (December): 643–652.
67. Milne, M. J. 1996. Capitalizing and appropriating society's rights to clean air: A comment on Wambganss and Sanford's accounting proposal. *Critical Perspectives on Accounting* (December): 681–695.
68. Grinnell, D. J., and H. G. Hunt III. 1999. Gifted pollution allowances: Recognizing a liability to society. Working paper, University of Vermont.

K. International Environmental Issues—Selected Accounting Studies

69. Niskala, M., and M. Pretes. 1995. Environmental reporting in Finland: A note on the use of annual reports. *Accounting, Organizations and Society* (August): 457–466.
70. Roberts, C. B. 1991. Environmental disclosures: A note on reporting in mainland Europe. *Accounting, Auditing and Accountability Journal*: 62–71.
71. Deegan, C., and M. Rankin. 1996. Do Australian companies report environmental news objectively? *Accounting, Auditing and Accountability Journal*: 50–67.
72. Buhr, N., and M. Freedman. 1996. A comparison of the quality of environmental disclosure in Canada and the United States. Working paper, Binghamton University.
73. Cormier, D., and M. Magnan. 1997. Investors' assessment of implicit environmental liabilities: An empirical investigation. *Journal of Accounting and Public Policy* 16: 215–241.

REFERENCES

- AACSB-The International Association for Management Education (AACSB). 1999. *Achieving Quality and Continuous Improvement through Self-Evaluation and Peer Review*. Standards for Accreditation: Business Administration and Accounting. St. Louis, MO: AACSB.
- Accounting Education Change Commission (AECC). 1990. Objectives of education for accountants: Position statement number one. *Issues in Accounting Education* 5 (Fall): 307–312.
- American Institute of Certified Public Accountants (AICPA). 1994. *Disclosure of Certain Significant Risks and Uncertainties*. Statement of Position 94–6. New York, NY: AICPA.
- . 1996. *Environmental Remediation Liabilities*. Statement of Position 96–1. New York, NY: AICPA.
- . 1998. *CPA Vision Project*. <[http:// www.cpavision.org/project](http://www.cpavision.org/project)>.
- Beets, S. D., and C. C. Souther. 1999. Corporate environmental reports: The need for standards and an environmental assurance service. *Accounting Horizons* (June): 129–145.
- Blacconiere, W., and D. M. Patten. 1994. Environmental disclosures, regulatory costs and changes in firm value. *Journal of Accounting and Economics* (November): 357–377.

- , and W. D. Northcut. 1997. Environmental information and market reactions to environmental legislation. *Journal of Accounting, Auditing and Finance* (Spring): 149–178.
- Blumberg, J., A. Korsvold, and G. Blum. 1997. *Environmental Performance and Shareholder Value*. Geneva, Switzerland: World Business Council for Sustainable Development.
- Boone, C., and H. Howes. 1996. Accounting for the environment. *CMA Magazine* (June): 22–24.
- Bowen, R. B., S. E. Sefcik, and N. S. Soderstrom. 1996. Multipaint, Inc. *Journal of Accounting Case Research* 3 (2): 55–66.
- Brewer, P. C., A. W. Gatian, and J. M. Reeve. 1993. Managing uncertainty. *Management Accounting* (October): 39–45.
- Brooks, P. L., L. J. Davidson, and J. H. Palamides. 1993. Environmental compliance: You better know your ABCs. *Occupational Hazards* (February): 41–46.
- Buhr, N., and M. Freedman. 1996. A comparison of the quality of environmental disclosure in Canada and the United States. Working paper, Binghamton University.
- Cairncross, F. 1993. *Costing the Earth*. Boston, MA: Harvard Business School Press.
- . 1995. *Green, Inc.: A Guide to Business and the Environment*. Washington, D.C.: Island Press.
- Cerf, D., and D. W. Zechnich. 1994. *Purity Oil Sales— Superfund Site: A Case on Accounting for Environmental Matters*. Case No. 94–04. New York, NY: AICPA Case Development Program.
- Cohen, M. A., S. A. Fenn, and J. S. Naimon. 1995. *Environmental and Financial Performance: Are They Related?* Washington, D.C.: Investor Responsibility Research Center.
- Deegan, C., and M. Rankin. 1996. Do Australian companies report environmental news objectively? *Accounting, Auditing and Accountability Journal*: 50–67.
- DeSimone, L. D., and F. Popoff. 1997. *Eco-Efficiency: The Business Link to Sustainable Development*. Cambridge, MA: The MIT Press.
- Ditz, D., J. Ranganathan, and R. D. Banks, eds. 1995. *Green Ledgers: Case Studies in Corporate Environmental Accounting*. Baltimore, MD: World Resources Institute.
- , and ———. 1997. *Measuring Up: Toward a Common Framework for Tracking Corporate Environmental Performance*. Washington, D.C.: World Resources Institute.
- Emerging Issues Task Force (EITF). 1989. *Accounting for the Cost of Asbestos Removal*. Issue No. 89-13. Norwalk, CT: Financial Accounting Standards Board.
- . 1990. *Capitalization of Costs to Treat Environmental Contamination*. Issue N. 90-8. Norwalk, CT: Financial Accounting Standards Board.
- . 1993. *Accounting for Environmental Liabilities*. Issue No. 93-5. Norwalk, CT: Financial Accounting Standards Board.
- . 1995. *The Treatment of Certain Site Restoration/Environmental Exit Costs When Testing a Long-Lived Asset for Impairment*. Issue No. 95-23. Norwalk, CT: Financial Accounting Standards Board.
- Environmental Protection Agency (EPA). 1989. *Pollution Prevention Benefits Manual*. Washington, D.C.: U.S. EPA.
- . 1992. *Total Cost Assessment: Accelerating Industrial Pollution Prevention Through Innovative Project Financial Analysis*. Washington, D.C.: U.S. EPA.

- . 1995. *An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms*. Washington, D.C.: U.S. EPA.
- Epstein, M. J. 1996. *Measuring Corporate Environmental Performance: Best Practices for Costing and Managing an Effective Environmental Strategy*. Chicago, IL: Irwin Professional Publishing.
- Eynon, G., and K. Stevens. 1996. Instructional case: Ethical dilemmas in reporting environmental liabilities. *Issues in Accounting Education* (Fall): 393–402.
- Feldman, S. J., P. A. Soyka, and P. Ameer. 1996. *Does Improving a Firm's Environmental Management System and Environmental Performance Result in a Higher Stock Price?* Fairfax, VA: ICF Kaiser International, Inc.
- Financial Accounting Standards Board (FASB). 1975. *Accounting for Contingencies*. Statement of Financial Accounting Standards No. 5. Norwalk, CT: FASB.
- . 1976. *Reasonable Estimation of Amount of Loss*. FASB Interpretation No. 14. Norwalk, CT: FASB.
- . 1992. *Offsetting of Amounts Related to Certain Contracts*. FASB Interpretation No. 39. Norwalk, CT: FASB.
- Gallarotti, G. M. 1995. It pays to be green: The managerial incentive structure and environmentally sound strategies. *The Columbia Journal of World Business* (Winter): 38–57.
- Graham, A., J. J. Maher, and W. D. Northcut. 1999. Environmental liability information and bond ratings. Working paper, Virginia Polytechnic Institute and State University.
- Grinnell, D. J., and H. G. Hunt. 1999. Gifted pollution allowances: Recognizing a liability to society. Working paper, University of Vermont.
- Hamner, B., and C. H. Stinson. 1995. Managerial accounting and environmental compliance costs. *Journal of Cost Management* (Summer): 4–10.
- Hoffman, A. J. 1996. A strategic response to investor activism. *Sloan Management Review* (Winter): 51–64.
- Hughes, S. B., and D. M. Willis. 1995. How quality control concepts can reduce environmental expenditures. *Journal of Cost Management* (Summer): 15–19.
- Institute of Management Accountants (IMA). 1995. *Implementing Corporate Environmental Strategies*. Statement on Management Accounting Number 4W. Montvale, NJ: IMA.
- . 1996. *Tools and Techniques of Environmental Accounting for Business Decisions*. Statement on Management Accounting Number 4Z. Montvale, NJ: IMA.
- Internal Revenue Service (IRS). 1998. Business expenses—underground storage tank replacement costs. Revenue Ruling 98–25. *Internal Revenue Bulletin* 19 (May 11).
- Kaplan, R. S. 1986. Must CIM be justified by faith alone? *Harvard Business Review* (March–April): 87–95.
- , and D. P. Norton. 1992. The balanced scorecard—Measures that drive performance. *Harvard Business Review* (January–February): 71–79.
- , and ———. 1996. *The Balanced Scorecard*. Boston, MA: Harvard Business School Press.
- Kreuze, J. G., and G. E. Newell. 1994. ABC and life-cycle costing for environmental expenditures. *Management Accounting* (February): 38–42.
- Lanen, W. N. 1994. Pollution prevention and accounting. National Pollution Prevention Center for Higher Education. Working paper, University of Michigan.

- Lober, D. J., D. Bynum, E. Campbell, and M. Jacques. 1997. The 100 plus corporate environmental report study: A survey of an evolving environmental management tool. *Business Strategy and the Environment*: 57-73.
- March, M. W., and J. K. Brazelton. 1991. Superfund cleanups: The financial costs high, the tax treatment uncertain. *Taxes* (November): 682-688.
- Milne, M. J. 1996. Capitalizing and appropriating society's rights to clean air: A comment on Wambganss and Sanford's accounting proposal. *Critical Perspectives on Accounting* (December): 681-695.
- Monahan, T. F., M. J. Liberatore, and D. E. Stout. 1990. Decision support for capital budgeting: A model for classroom presentation. *Journal of Accounting Education* (Fall): 225-239.
- Niskala, M., and M. Pretes 1995. Environmental reporting in Finland: A note on the use of annual reports. *Accounting, Organizations and Society* (August): 457-466.
- Patten, D. M., and J. R. Nance. 1998. Regulatory cost effects in a good news environment: The intra-industry reaction to the Alaskan oil spill. *Journal of Accounting and Public Policy* 17 (Winter): 409-429.
- Patten, R. J., and D. Z. Williams. 1990. There's trouble—Right here in our accounting programs: The challenge to accounting educators. *Issues in Accounting Education* 5 (Fall): 175-179.
- Petersen, M. 1998. Cleaning up in the dark: Companies disclose little about costs of toxic sites. *New York Times* (May 14): D1, D4.
- Popoff, F. P., and D. T. Buzzelli. 1993. Full-cost accounting. *Chemical and Engineering News* (January 11): 8-10.
- Raftelis, G. A. 1991. Financial and accounting measures as part of pollution prevention assessment. *Environmental Finance* (Summer): 129-150.
- Roberts, C. B. 1991. Environmental disclosures: A note on reporting in mainland Europe. *Accounting, Auditing and Accountability Journal*: 62-71.
- Schmidheiny, S., and F. J. L. Zorraquin. 1996. *Financing Change: The Financial Community, Eco-Efficiency, and Sustainable Development*. Cambridge, MA: The MIT Press.
- Securities and Exchange Commission (SEC). 1989. *Interpretative Release, Management's Discussion and Analysis of Financial Condition and Results of Operations; Certain Investment Company Disclosures*. Financial Reporting Release No. 36. *Federal Register* (May 24): 22427-22436.
- . 1993. *Views of the Staff Regarding Accounting and Disclosures Related to Loss Contingencies*. Staff Accounting Bulletin No. 92. *Federal Register* (June 14): 32843-32947.
- Sefcik, S.E., N. S. Soderstrom, and C. H. Stinson. 1997. Accounting through green-colored glasses: Teaching environmental accounting. *Issues in Accounting Education* (Spring): 129-140.
- Stavins, R. N. 1998. What can we learn from the grand policy experiment? Lessons from SO₂ allowance trading. *Journal of Economic Perspectives* (Summer): 69-88.
- Stout, D. E., and J. E. Rebele. 1996. Establishing a research agenda for accounting education. *Accounting Education: A Journal of Theory, Practice and Research* (1): 1-18.
- Wambganss, J. R., and B. Sanford. 1996. The problem with reporting pollution allowances. *Critical Perspectives on Accounting* (December): 643-652.
- Yancey, T. H. 1992. Emerging doctrines in the tax treatment of environmental cleanup costs. *Taxes* (December): 948-973.