

ISO 14001 and the Kraft Segment of the Pulp and Paper Industry:

International Experiment in Self- Regulation?

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per mario

Abstract

ISO 14001 is a voluntary environmental management system (EMS) standard. This standard is a *process* to achieve better environmental performance by providing an improved management framework.

ISO 14001 was developed in order to reduce trade barriers caused by the proliferation of different voluntary environmental management standards. Moreover, it offers government a tool to address environmental concerns without triggering a trade dispute. ISO 14001 registration is intended to fulfill a demand for certification of improved supplier environmental conduct.

In general, the implementation driver for ISO 14001 will be competitive and commercial pressures. This pressure will be felt throughout the supply chain. The increased importance of corporate environmental performance reports in business will be a further implementation driver.

ISO 14001 was developed through a process designed to be open and transparent. However, access to the development process has been difficult for some interested parties, notably environmental groups, small and medium sized businesses, and developing nations. The credibility, practicability and equity of ISO 14001 is heavily influenced by access to the standards development process. One of the challenges ISO 14001 faces is credibility.

Due to the generic way ISO 14001 was written, its effect on environmental performance is difficult to determine. The extent to which the ISO EMS focuses on environmental performance has been controversial. ISO 14001 can help an organization focus its efforts in areas traditional environmental regulation have not been able to target, e.g., conservation of energy and use of recycled materials. ISO 14001 will be most beneficial in areas government chooses not to regulate due to a lack of hazard. ISO 14001 can complement both government regulation and other voluntary environmental management initiatives. ISO 14001 will replace neither of these, although government can provide some of the incentives for implementation of ISO 14001.

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I: UUIntroduction

On Tuesday, December 12th, 1995, the New York Times ran a story on the Southern Peru Copper smelter in Ilo, Peru. The article explains that Southern Peru Copper is controlled by three large American companies -- Asarco Inc., the Phelps Dodge Corporation and the Marmon Group. The smelter spews 2,000 tons of sulfur dioxide into the air each day, 10 to 15 times the limit for similar plants operating in the United States. However, Southern Peru Copper complies with Peruvian environmental standards:

Environmental groups concede the plant complies with Peruvian environmental standards but say that is precisely the problem. All too often, they say, the absence of strong laws in many developing countries enables giant multinationals -- especially in the mining and chemical industries -- to play fast and loose with the local environment and the local population's health.¹

Asarco, notorious for the arsenic emissions of one of its smelters in Tacoma, Washington in the early 1980's,² provides a particularly 'good' example of a multinational whose environmental record needs improvement.

The International Organization for Standardization (ISO³) is developing voluntary international environmental management standards designed to improve the environmental performance of companies like Asarco. Based in Geneva, Switzerland, ISO is a private sector, international standards body founded in 1947. Its goal is the harmonization and development of international voluntary standards.⁴

¹ Sims C., *In Peru, a Fight for fresh Air*, The New York Times, December 12, 1995. p. D1.

² see Guttman & Thompson Ethics and Politics: Cases and Comments; Copyright © 1990 by Nelson-Hall Inc., *The Risks of Asarco* by Ether Scott, pg. 163-176

³ ISO is not an acronym; it comes from the Greek meaning "the same."

⁴ Standards are formal agreements that define the contractual, functional and technical requirements necessary to ensure that a product, process, or system does what it is supposed to do. Standardization is the process of consolidating requirements.

ISO's environmental management standards, called ISO 14000, are a series of standards and guideline documents that address environmental management, environmental auditing, eco-labeling, and other issues. This thesis focuses only on the cornerstone of the ISO 14000 series: the environmental management system standard, ISO 14001. This standard will not specify emission limits or technologies that must be used. Rather, it is a management standard designed to improve the way an organization deals with its environmental impacts and problems. The formulators of ISO 14001 assume that better environmental management will lead indirectly to better environmental performance.

Unlike traditional environmental legislation, ISO 14001 is a voluntary consensus standard developed primarily for and by the private sector. ISO's main goal is the harmonization of voluntary standards. Recent heightened international awareness of environmental problems (as evidenced by the 1992 Rio Conference and the creation of the Committee on Trade and the Environment in the World Trade Organization (WTO)) had caused a plethora of different reactions. In some instances, it spawned government regulation, and in others led to cooperative approaches between government and industry. The modern trend in the United States (U.S.) and Europe has been towards regulation. The 104th Congress has seized the trend towards "partnerships" between government and the regulated community. How will the environmental management standards developed by ISO interact with both this new trend and traditional environmental regulations that are still in place? What characteristics, if any, of ISO 14001 will make it more effective than traditional regulations in improving environmental performance?

The Asarco Company is a powerful example of where the ISO 14001 standard may be implemented in order to improve environmental performance. It also provides an excellent example of one of the fundamental difficulties the standard is likely to face: given that Asarco is complying with Peru's environmental laws, why would it voluntarily choose to adopt ISO 14001? Once this implementation question is considered, the more fundamental issue can be addressed: will ISO 14001 improve the environmental performance of a company like Asarco? Will ISO 14001 be able to achieve something that current rules and regulations cannot?

Rather than use the single example of a company like Asarco to answer these questions, I use the pulp and paper industry as a case study to examine whether ISO 14001 can address this industry's environmental problems effectively. What will push a pulp and paper company to choose to implement ISO 14001? Will ISO 14001 improve the pulp and paper industry's environmental performance? What can ISO 14001 do that traditional environmental regulation cannot? The pulp and paper industry is one of the most heavily regulated industrial sectors in the U.S.; how will ISO 14001 interact with these regulations?

I was introduced to the idea of focusing on the pulp and paper industry through my work with the Environmental Protection Agency (EPA) in the summer of 1995. At the EPA, I worked for Mary McKiel, EPA's expert on ISO 14000. We worked with the U.S. pulp and paper industry to resolve its fear of being excluded from the European market through the recent European Union eco-label criteria for fine paper. This experience convinced me that the pulp and paper industry is an ideal case study for the application of ISO 14001. The pulp and paper industry has had a long history of

environmental problems, many of which persist today. Many pulp and paper companies trade internationally, which should make ISO 14001 more appealing to them. Will ISO 14001 help the pulp and paper industry clean up its act? Will it be useful to the EPA?

The organization of this thesis is as follows. Chapter II examines the reasons ISO 14001 was developed. In particular, it will illustrate how the WTO's drive to reduce trade barriers served as an impetus for ISO 14001. The influence of the proliferation of voluntary environmental management standards and a heightened concern of environmental problems is also examined. Understanding why these standards came about will, among other things, allow the reader to understand why a company might want to become certified to ISO 14001.

Chapter III explains how ISO operates and what issues it focuses on in developing effective environmental standards. This chapter also explains what an "environmental management system" is, and how it differs from other environmental initiatives. Examining what an environmental management system is will allow the reader to understand why ISO 14001 can fundamentally change the way an organization goes about its business.

Chapter IV is my case study. I have restricted my analysis to the kraft segment of the pulp and paper industry.⁵ The first step section of my analysis characterizes the environmental impacts of the kraft process. Next, I examine if and how ISO 14001 will reduce its environmental impact. In the Conclusion, I consider: 1) why an organization would choose to implement this voluntary ISO standard; 2) whether implementation of

⁵ Within the pulp and paper sector, numerous processes are used to convert wood to pulp. The kraft process, the most popular process used, relies on powerful chemicals to break down wood to produce pulp. Largely due to the chemicals used in the kraft process, it has caused particular environmental concern. See Chapter IV.

ISO 14001 will improve the environmental performance of an organization; 3) what ISO 14001 provides that traditional environmental regulation does not; and 4) how ISO 14001 can interact with current rules and regulations.

Since environmental concerns are woven into the very fabric of our lives, both government and ISO have had to get involved in protecting the environment. Government regulates in order to protect public health and safety; ISO develops standards in order to reduce trade barriers. For all their deficiencies, legislation like the Clean Air Act and the Clean Water Act have made our air and water cleaner. ISO 14001 represents a bold new paradigm that must be examined critically. Will ISO be able to achieve something that government cannot?

II: What was the impetus for ISO 14001?

Introduction

It is important to consider why this standard came about in order to better understand ISO 14001. First, environmental regulations gained the attention of the World Trade Organization (WTO) due to their effects on international trade. The difficulties in addressing environmental concerns without triggering a trade dispute made necessary a new way of protecting the environment without hindering international trade. The proliferation of different voluntary environmental standards by industry was another major impetus for ISO 14001. Lastly, due to increased environmental concerns, ISO 14001 registration is intended to fulfill a demand for certification of improved supplier environmental conduct. These factors and the success of ISO's Quality Management Standards contributed to ISO being asked at the 1992 Rio Conference to develop an international environmental management standard.

The Influence of the WTO on Trade and the Environment

The Uruguay round of the General Agreement on Trade and Tariffs (GATT) negotiations addressed the need to remove trade barriers. The tuna-dolphin, CAFE standards, and reformulated gasoline cases demonstrate the difficulties in addressing environmental concerns without triggering a trade barrier.⁶ The WTO provided an impetus for ISO 14000 by creating a framework that makes it more difficult or possibly a trade violation for governments to address environmental concerns.

⁶ In particular, process and production methods and eco-labeling have become a concern to the WTO. See Appendix III.

The Tuna-Dolphin Case⁷

The tuna-dolphin case involved a challenge by the EU and the Netherlands to a U.S. embargo on imports of tuna under the Marine Mammal Protection Act (1972). The embargo barred imports of tuna from countries that accept tuna imports from countries that use tuna harvesting techniques that kill excessive numbers of dolphins. Australia, Canada, Japan, New Zealand, Thailand, and Venezuela made submissions as interested parties.

The WTO Dispute Panel found that the embargo fell within the range of policies to conserve exhaustible resources allowable under the Article XX(g) exception.⁸ However, the Panel also found that the embargo failed to primarily conserve an exhaustible natural resource as required under Article XX(g). The Panel argued that the nexus between the stated objective of the embargo and its implementation was too tenuous; to achieve its objective, the policies of the third country from which the exporting country imported tuna would have to be changed.

The CAFE Standards Case⁹

This case involved a dispute stemming from U.S. efforts to reduce use of fossil fuels via the Corporate Average Fuel Economy (CAFE) standards and the gas guzzler

⁷ I am greatly indebted to Steve Wolfson, Office of the General Council, EPA, for his invaluable assistance and materials for this case.

⁸ Specifically, Article XX(g) and (b) state:

“Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

...

(b) necessary to protect human, animal or plant life or health;...

(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.”

⁹ I am greatly indebted to Steve Wolfson, Office of the General Council, EPA, for his invaluable assistance and materials for this case.

tax.¹⁰ The CAFE requirements aimed at increasing the average fuel economy of passenger cars. It required each car maker or importer to meet a yearly average fuel economy standard for its entire fleet of cars. Any company that had both a domestic and an import fleet had to ensure that each fleet separately complied with the standard (“separate fleet requirement”). The current standard is 27.5 mpg. Failure to meet the CAFE standards results in the assessment of fines.¹¹ The goal of the gas guzzler tax was to encourage improvements in fuel efficiency of the least fuel efficient cars. Since 1986, new cars with a fuel efficiency of less than 22.5 mpg have been subject to the tax.¹²

The Dispute Panel rejected EU complaints that the CAFE requirements and the gas guzzler tax discriminated against foreign car manufacturers. This decision is important since for the first time a dispute panel ruled that the Article XX exception for conservation measures provided under the GATT could excuse a country’s law that would otherwise be considered a trade barrier. Moreover, the decision recognized that it is not relevant whether other, more economically efficient alternatives might be available to achieve the government’s policy objectives. The decision also rejected the notion that governments were obligated to select the least trade restrictive conservation measure. A measure is consistent as long as it clearly serves the purpose of energy conservation or environmental protection, and does not arbitrarily or unjustifiably discriminate between domestic and imported products.¹³

¹⁰ The luxury tax was also an issue of dispute in this case. Since the luxury tax served a financial rather than environmental purpose, it will not be treated here.

¹¹ Release by the Office of the United States Trade Representative, Executive Office of the President, Washington, D.C., *U.S. Fuel Conservation Measures Upheld by GATT Panel*, September 30, 1994.

¹² *Ibid.*

¹³ Discussion with Steve Wolfson, Office of the General Council, EPA, Washington, D.C. 7/96. It should be noted that the panel did agree with the EU on one issue: the separate (domestic v. import) fleet

The Reformulated Gasoline Case

On January 17th, 1996, in response to a complaint brought forward by Venezuela and Brazil, the WTO determined that the Clean Air Act's standards for reformulated gasoline discriminated against foreign oil refiners and was hence in violation of the GATT. The standards were intended to reduce emissions that produce smog and toxic air pollutants. American experts maintain that Venezuelan gasoline is high in aromatics, a major contributor to smog.¹⁴

Under the Clean Air Act, domestic producers were required to meet standards based on emissions they produced in 1990. However, since many foreign producers did not keep equivalent records, they were held to a different standard: they could only export to the U.S. gasoline that met an average quality standard. Foreign companies argued that this required them to meet higher standards than some American companies, putting them at a disadvantage.¹⁵

Originally, some believed the WTO's ruling would not force an immediate change since the EPA will accord equal treatment to domestic and imported reformulated gasoline in 1998.¹⁶ In the interim, however, the U.S. appealed the decision and lost.¹⁷ The EPA will be forced to rewrite some of the rules concerning the environmental standards for imported gasoline or face unspecified trade sanctions from Venezuela and Brazil. The WTO's Appellate Body, which is charged with reviewing decisions issued

requirement was inconsistent with the GATT (Article III:4). This was considered a technical issue, however, since this rule did not have any economic impact on EU auto manufacturers.

¹⁴ Release by the Office of the United States Trade Representative, Executive Office of the President, Washington, D.C., *U.S. Fuel Conservation Measures Upheld by GATT Panel*, September 30, 1994.

¹⁵ Sanger D., *World Trade Group Orders U.S. to Alter Clean Air Act*, The New York Times, Jan. 18, 1996, pg. C1, C5.

¹⁶ Greenwire, Wednesday February 21, 1996, Vol. 5, No. 196, Article 19. Alexandria, VA

¹⁷ David Sanger, *U.S. defeated in its Appeal of Trade Case*, The New York Times, April 30, 1996, pg. D1, D5.

by panels that hear trade complaints, acknowledged that countries had the right to control air pollution or take other steps to protect the environment -- as long as the rules applied equally to domestic and foreign companies.¹⁸

These three cases show some of the difficulties in implementing environmental regulations in the wake of the WTO. While the GATT contains language intended to allow countries to promulgate environmental laws (notable Article XX), the GATT also contains specific language that makes it difficult to promulgate environmental regulations without raising trade concerns. The WTO does not take into account *how* a product is produced when defining like products (see also Appendix III). Its policy is to judge product characteristics, not product processes and production methods (PPM's).¹⁹ However, how a product is made often determines its environmental impact (this is the premise behind lifecycle assessment). From an environmental perspective, neglecting this can be disastrous.

The WTO's influence on ISO 14000 can be further found in the WTO's calls on countries to use and participate in the development of international standards, with a view to harmonizing standards on as wide a basis as possible;²⁰ the General Agreement on Tariffs and Trade (GATT) officially favors the use of international standards in its agreement on Technical Barriers to Trade. International standards are viewed by the WTO as being a crucial means of reducing trade barriers. ISO is one of seven

¹⁸ Ibid.

¹⁹ i.e., the WTO's position has been that products should be judged by what they are and not how they got that way.

²⁰ See, for example, Annex 3 of the Code of Code Practice for the Preparation, Adoption and Application of Standards, Provision G, which states: "With a view of harmonizing standards on as wide a basis as

international standards organizations recognized by the WTO. For example, the WTO specifically asked ISO to establish a standards information system (in conformity with paragraph 1 of Article 13 of the Agreement Establishing the WTO).

Heightened global concern for our environment, followed by a plethora of environmental initiatives and the concern that addressing environmental issues was becoming increasingly difficult due to the WTO, all served to provide an impetus for the development of the ISO 14000 standards.

Harmonizing voluntary industry standards:

The heightened awareness of human impact on the environment has led to a proliferation of environmental management and other environmental standards from various standard setting bodies including:

- the British BS7750
- the European Union's EMAS²¹
- numerous eco-labeling programs (from the U.S. Green Seal to the German Blue Angel)
- other voluntary environmental management standards (outlined below).

Industry was faced with a plethora of standards to conform to, which led to confusion, increased expense due to conforming to multiple standards, and the fear that

possible, the standardizing body shall... play a full part... in the preparation by relevant international standardizing bodies of international standards..."

²¹ The European Union's (EU) Environmental Management and Audit Scheme (EMAS) in particular raised industry alarm about the ability of non-EU industry to meet the EMAS standard, and hence compete in the EU. EMAS is widely seen as one of the triggers that actually started the ISO 14000 process. Details of EMAS are outlined below.

these multiple standards would cause trade barriers.²² Conforming to multiple standards is both expensive and difficult. Different reporting requirements, conflicting demands, auditors and auditing procedures have all contributed to industry's push towards harmonization, and hence ISO: ISO's goal is the harmonization of voluntary standards. ISO 14000 was created by an entity whose main goal in harmonizing standards is to facilitate trade rather than to protect environmental quality. Some examples of the voluntary environmental management standards ISO tried to harmonize follow.

Voluntary environmental management standard programs

Examples of some voluntary environmental management standards programs include the Chemical Manufacturers Association's (CMA) Responsible Care program, the Coalition for Environmentally Responsible Economies (CERES) principles, and the International Chamber of Commerce's Business Charter for Sustainable Development. Government regulations often tell organizations what they can or cannot do (emission limits that cannot be exceeded, etc.); these voluntary programs are designed to offer guidance on what organizations should do. Also included in this section is the American Forest and Paper Association's (AF&PA) Environmental, Health, & Safety Principles. While these principles are not designed solely as management standards, they address issues at the management level. Moreover, this analysis will prove useful later in the case study on the pulp and paper industry. (For more information on AF&PA's Principles see Appendix I and Chapter 4.) The last voluntary management standard examined is European Union's Environmental Management Audit Scheme.

²² It is important to note that while multiple voluntary standards may make trade more difficult, from the legal perspective of the WTO, a voluntary standard cannot be considered a trade barrier.

Responsible Care²³ served as a model for many subsequent environmental management standards due to its emphasis on management practices, pollution prevention and continuous improvement. Its objective is to “promote continuous improvement in member company environmental, health, and safety performance in response to public concerns, and assist members’ demonstration of their improvements in performance to critical public audiences.”²⁴

Some key components of Responsible Care include:

- community awareness and emergency response
- pollution prevention
- appropriate supplier, distributor and consumer conduct
- process safety and employee health and safety
- inventory of all the waste generated and released
- performance measurement²⁵ and an overall environmental assessment
- environmental goals and a timeframe to achieve them²⁶
- employee training
- self-evaluation

The self-evaluation is confidential and no third party audit is required. The openness of Responsible Care and its development is limited. ‘Outside’ input to development of the program was restricted to the CMA Public Advisory Panel, whose members are elected by CMA. Although a community outreach program is required, reporting is required

²³ Responsible Care was modeled after the Responsible Care program set up by the Canadian CMA

²⁴ Improving Responsible Care® Implementation, Enhancing Performance and Credibility, Chemical Manufacturers’ Assoc. Ad Hoc Board Responsible Care® Committee, 1993

²⁵ For example, in the pollution prevention section the code calls for “measurement of progress... by updating the quantitative inventory at least annually.”

only on health and environmental hazards under the Community Awareness and Emergency Response section.

Unlike ISO 14001 or the Canadian Responsible Care on which it was modeled, Responsible Care does not address compliance at all. CMA expects member companies to sign the guiding principles, communicate a commitment to Responsible Care to their employees, and make “good faith” efforts to implement the codes. Membership to CMA may be revoked if a company consistently does not act in accordance with Responsible Care.

CERES,²⁷ the only program discussed here developed by non-industry groups, is based on public disclosure of environmental performance. The idea that spawned CERES was to institutionalize the capability to generate data on corporate environmental management that investors could use in decision making. Participating companies endorse principles developed by CERES which mandate:

- continuous improvement of environmental performance
- maintaining an open relationship with CERES and other outside stakeholders
- an annual CERES report, made available to the public, detailing corporate environmental practices.

None of the other programs examined here require this extent of public release, and it is the bulwark of the program. The definition of continuous improvement was left to the discretion of participating companies and of stakeholders.

²⁶ CMA has suggested five years as a reasonable timeframe from adoption to full implementation.

²⁷ These principles were originally called the “Valdez Principles” in the wake of the Exxon Valdez oil spill, but were subsequently renamed the Coalition of Environmentally Responsible Economies (CERES) principles.

The program calls for neither environmental assessment nor third party verification: the intent is that the annual report allows interested parties to draw their own conclusions. However, the report does require a self-audit, documentation of worker training programs, and information on criteria used for supplier selection. Compliance is not addressed *per se*: the annual report should include information about chemical spills, penalties received, etc. The only environmental goals required by CERES are the reduction of green-house and ozone depleting gases. Measurement systems are not addressed.

The International Chamber of Commerce's Business Charter for Sustainable Development is the only program examined here tailored exclusively to large multinational corporations.²⁸

The Charter contains sixteen principles which address:

- stakeholder communication
- environmental goals
- compliance evaluation
- measuring performance levels (on a regular basis)
- employee training
- regular self-audit.

Third party verification is not required. Additionally, an overall environmental assessment of current operations is not required; only the environmental impact of new projects must be assessed. The Charter calls on companies to 'encourage' suppliers to adopt the Charter principles, and to educate distributors and customers. There was no

opportunity for outside input in the development of the Charter. Although the Charter calls on companies to be open to outside concerns, it only requires that “appropriate information” be supplied to public, and leaves the definition of “appropriate” to the company.

The Chemical Manufacturers Association is not the only industry trade association to have adopted voluntary environmental standards. The American Forest and Paper Association (AF&PA) requires member companies to publicly pledge to adhere to its Environmental, Health, and Safety Principles as of January 1, 1996. This pledge means members will:

1. “Make environmental, health, and safety considerations priorities in operating existing facilities, as well as in planning new operations.
2. Recognize, in developing and designing products to meet customer needs, the environmental ... effects of product manufacture, distribution, use and disposal.
3. Monitor their environmental, health, and safety performance and report regularly on these matters to their Boards of Directors, as well as confirm their adherence to these principles annually to AF&PA.
4. Train employees in their environmental, health, and safety responsibilities and promote awareness and accountability on these matters.
5. Improve environmental, health, and safety performance through support of research and development that advance the frontiers of knowledge.
6. Communicate with employees, customers, suppliers, the community, public officials, and shareholders to build greater understanding on environmental ... matters.

²⁸ The Global Environmental Management Initiative (GEMI) worked closely with the International

7. Participate constructively in the development of public policies on environmental ... matters.
8. Continue to pursue energy conservation, increased energy efficiency, greater utilization of alternative fossil fuels, and opportunities for cogeneration of electricity.”²⁹

See Appendix I and Chapter IV for more details on AF&PA’s principles.

The last voluntary management standard I will discuss is the European Union’s (EU) Environmental Management Audit Scheme (EMAS). The overall goal of EMAS is to improve EU industry's environmental performance through better management and public disclosure. It went into effect April 10, 1995 and was one of the driving forces behind the rapid timetable for ISO 14000. Participating companies must implement a formal environmental management system, establish auditing procedures and publish independently verifiable public statements regarding their environmental performance. Participation in EMAS entitles companies to register a site on an EU-authorized list of participating sites and to use an EU-approved statement of participation and logo to publicize participation.³⁰

EMAS was perhaps the most influential voluntary environmental management standard for ISO 14001. EMAS is a (voluntary) *EU-wide* scheme and allows industrial sites in *EU* member states to participate. The fear of not being able to participate in EMAS, combined with the economic importance of the EU trading block, pushed many

Chamber of Commerce on developing this charter.

²⁹ American Forest & Paper Association, *Environmental, Health, & Safety Principles*, Washington, D.C. © 1996. Available from AF&PA, 1111 19th St., NW, Washington, D.C. 20036.

³⁰ News Brief: *EMAS Registrations, Quality Systems Update*, Vol. 5, No. 10, October 1995, p. 26. Irwin Professional Publishing

companies to worry that they would be shut out of the EU market and prompted them to join the call for harmonization of environmental management standards.³¹

ISO 14001 was the answer to this call. In August 1991, ISO established a Strategic Advisory Group (SAGE) in order to assess the need for international environmental management standards to insure that standards like EMAS did not hinder trade. The threat posed by EMAS shows how the proliferation of voluntary environmental management standards provided an impetus for the development of ISO 14001.

Certification of Environmental Behavior

According to a front page article by The Wall Street Journal, environmental issues can make or break business ventures.³² Evidence for this can be found in the fact that corporate environment reports have gained importance in the past five years, second now only perhaps to government sources.³³ Companies are increasingly concerned with satisfying the expectations of a broad range of stakeholders, including investors, the public, and environmental groups. The modern trend is for companies to want to deal with environmentally responsible companies,³⁴ partly in order to minimize liability for suppliers' environmental woes.³⁵

³¹ The Committee for European Standardization (CEN) has been given the responsibility of reviewing the acceptability of ISO 14001 and related auditing documents to conformity with EMAS. It has the option of creating additional requirements as part of a "bridging" or interpretive document to make ISO 14001 acceptable in meeting the requirements of EMAS. Appendix II(a) compares ISO 14001 and EMAS.

³² Sebastian, P., *Environmental Records wield weight for corporations here and abroad*, The Wall Street Journal, Thursday, March 28, 1996, p. A1.

³³ Ibid.

³⁴ Tibor, T., *ISO 14,000 Standards*, Papermaker, October 1995, p. 44.

³⁵ Scicchitano P., *Managing the environment with ISO 14000*, Quality Digest, November 1995, p. 45

In the U.S., reasons for these trends can be found beyond regulatory pressure from the EPA, and include:

- the Securities and Exchange Commission's more stringent environmental disclosure requirements; and
- the draft federal sentencing guidelines for corporate environmental offenses, which propose mitigation of sanctions (up to 50%) where an environmental management and compliance programs are in place.³⁶

This need to demonstrate good corporate environmental performance and accountability was another impetus for the development of ISO 14001. Industry wanted ISO 14001 to help convey a positive environmental public image and reduce exposure to liability. ISO 14001 was developed with a view to fulfill this demand.

The 1992 Rio Conference

The actual trigger that started the ISO 14000 process was the 1992 United Nations Conference on Environmental Development held in Rio,³⁷ which produced Agenda 21 that had as a key component better environmental management and, like the Uruguay Round of the GATT negotiations, called for the harmonization of standards. Heightened awareness of the state of the environment and concerns that companies like Asarco would continue to take advantage of lower environmental standards in less

³⁶ Tom Tibor, *ISO 14000: A Guide to the New Environmental Management Standards*, Irwin Professional Publishing, Chicago, © 1996, p. 225.

³⁷ Even before this, the 1972 United Nations Conference on Human Environment held in Stockholm focused the world's attention on the nexus between business and the environment.

developed countries prompted the calling for the Rio Conference.³⁸ The Rio conference delegates asked SAGE to consider whether environmental management standards could serve to:

- promote a common approach to environmental management similar to ISO 9000 Quality Management Standards;
- enhance an organization's ability to attain and measure environmental performance; and
- facilitate and remove trade barriers.

Based on SAGE's findings, ISO started the development of ISO 14000 through the formation of Technical Committee 207 in 1993.

The heightened awareness of the state of the environment, the desire to harmonize standards, and the international acceptance and credibility the ISO 9000 Quality Management Standards have garnered, all prompted the Rio Conference delegates to ask ISO to develop international environmental management standards.

Conclusion

Both Agenda 21 from the 1992 Rio conference and the Uruguay Round of the GATT called for the harmonization of standards. In addition, within the U.S. government, the Office of Management and Budget's (OMB) Circular A-119 called for agency participation in public-private partnerships and voluntary standards setting

³⁸ These concerns can also be seen in the NAFTA debates in the early 1990's, where environmental groups expressed concern that U.S. industries would take advantage of Mexico's lax environmental enforcement by relocating polluting plants there.

bodies.³⁹ Through the proliferation of different voluntary environmental standards and regulations, the heightened concern for our environment, and the fear of trade barriers, we can see that there would be a push from both industry and government to start the ISO 14000 process.

³⁹ For more information on the influence of OMB A-119, see Chapter III.

III: How Is ISO Trying to Protect the Environment?

Introduction

Two key characteristics of ISO 14001 are that it is a voluntary standard and a management standard. The importance of voluntary standards are widely recognized, and government has and will continue to use and participate in the development of voluntary standards. The first section of this chapter will look at ISO 14001 in this context. ISO 14001 is also a standard that is a *process* to achieve better environmental performance. The second section of this chapter will discuss the influence of ISO 9000 on the development of the ISO 14000 as a management standard. I will then discuss the actual requirements for ISO 14001 registration. The final section of this chapter will examine ISO and the standards development process. How ISO 14001 was developed is crucial in understanding both the standard's intent and limitations.

ISO 14001 as a voluntary standard

ISO 14001 is a voluntary standard. Voluntary standards are standards that are developed by the private sector through standards developing organizations⁴⁰ and are not mandated in rules and regulations.⁴¹

⁴⁰ Some examples of standards organizations include the American Society for Testing and Materials (ASTM), the Society of Automotive Engineers (SAE), the International Electrotechnical Commission (IEC), ISO, etc.

⁴¹ The Office of Management and Budget (OMB) Circular A-119, which deals with Federal participation and use of voluntary standards, states that "voluntary standards are established generally by private sector bodies, both domestic and international, and are available for use by any person or organization, private or governmental. The terms includes what are commonly referred to as 'industry standards' as well as 'consensus standards,' but does not include professional standards of personal conduct, institutional code of ethics, or private standards of individual firms, or standards mandated by law..." *Federal Register*, Vol. 58 No. 205, Tuesday, October 26th, 1993/ Notices 57645.

Voluntary standards are widely recognized as being vital for U.S. interests.⁴² For example, in his State of the Union Message on the 23rd of January 1996, President Clinton called on Washington “to work more in partnership with... the private sector.”⁴³ The current political trend is in this direction of increased partnership:

Business does it better. That is the rallying cry on Capitol Hill and in statehouses across the country, where legislators are turning over to private companies traditional government functions ranging from running jails to exploring outer space.⁴⁴

The EPA has seized this new trend, as can be seen in a variety of its programs. The Common Sense Initiative, the 33/50 program, Project XL, and Design for the Environment are but a few examples of EPA efforts to encourage partnership with industry. Other agencies have also taken part in the trend towards public-private partnerships and voluntary programs. For example, the Department of Energy’s Climate Challenge Program helps utilities and industry find innovative ways to reduce emissions of greenhouse gases.⁴⁵

The use of voluntary standards by regulatory agencies is not a new phenomenon. One of the earliest examples of this can be seen in the National Highway Safety

⁴² For example, in voting into law the National Competitiveness Act of 1993, the U.S. Congress stated that strong and effective U.S. leadership and participation in international standards organizations are key to the long-term competitiveness of U.S. products. R. Howie, *Competing through Standardization*, Business Week, October 16, 1995. Note: article was in the ‘Special Advertising Section.’ Another example can be seen from the following excerpt from the Memorandum of Understanding between the National Institute for Standards and Technology (NIST) and the American National Standards Institute (ANSI): “The underlying purpose of this Memorandum of Understanding is to enhance and strengthen the national voluntary consensus standards system of the United States and to support continued U.S. competitiveness, economic growth, health, safety and the protection of the environment.” *Memorandum of Understanding between ANSI and NIST*, signed July 24th, 1995 by Sergio Mazza (President of ANSI) and Arati Prabhakar (Director of NIST).

⁴³ The New York Times, Jan. 24, 1996, A14. From the prepared text for the President’s State of the Union Message.

⁴⁴ Leslie Eaton, *Public Money Foots the Bills for ‘Privatized’ Foreign Aid*, The New York Times, Feb. 7, 1996, A1

⁴⁵ see *Bridge to a Sustainable Future: National Environmental Technology Strategy*, prepared under the guidance of the National Science and Technology Council. April 1995

Administration (NHTSA). One of NHTSA's first actions was to adopt a series of voluntary standards developed by the Society of Automotive Engineers.⁴⁶ The Federal Trade Commission has also relied on voluntary measures:

Although the adjudicatory and rule-making procedures are the most powerful devices at the command of the Commission, they are not the most frequently used. Rule making was utilized very sparingly until the commission rewrote its own operating procedures in 1963, and adjudicatory proceedings are initiated in cases of blatant industrial violations, and then only when everything else has failed. Most of the Federal Trade Commission's efforts over the years have been directed toward gaining voluntary compliance or informal agreement. ... [A]dvantages include: expediency, less complexity, and lower costs...⁴⁷

Voluntary standards have the advantages of not requiring public resources for their development and enforcement, and the fostering of public-private partnerships.⁴⁸

The Federal government often participates in voluntary standards developing organizations. Since the late 1970's, Office of Management and Budget (OMB) Circular A-119 has directed the federal government to participate in voluntary standards bodies and use voluntary standards wherever feasible and in the public interest. In 1993 OMB issued a revised Circular A-119, *Federal Participation in the Development and Use of Non-Government Standards*. The circular has two basic messages for the federal government:

- Agencies must preferentially use voluntary standards where those standards meet the requirements of the agency for the intended use.⁴⁹

⁴⁶ See Marshaw J. and Harfst D., *The Struggle for Auto Safety* (Harvard 1990).

⁴⁷ A.L. Fritschler and J.M. Hoeffler, *Smoking and Politics*, Fifth Edition. Prentice Hall © 1996, p.65

⁴⁸ For example, Section 3. of OMB Circular A-119 states "Many... standards, appropriate or adaptable for the Government's purposes, are available from private voluntary standards bodies. Government participation in... these voluntary bodies provides incentives and opportunities to establish standards that serve national needs, and the adoption of voluntary standards, whenever practicable and appropriate, eliminates the costs to the Government of developing its own standards. Adoption of voluntary standards also furthers the policy of reliance upon the private sector to supply Government needs for goods and services..." *Federal Register*, Vol. 58 No. 205, Tuesday, October 26th, 1993/ Notices 57645.

- When there are no voluntary standards that meet the needs of the agency, agencies are to preferentially develop such standards by working within the voluntary process.⁵⁰

The circular also directs agencies to coordinate with one another when participating in the same standards activity in order to assure, whenever possible, that federal positions are consistent.⁵¹

OMB A-119 provides the federal government a strong encouragement to use and participate in the development of voluntary standards. OMB A-119 has particular relevance to ISO 14001 for two further reasons. First, the circular requests “identification of all voluntary standards adopted by each agency for the purpose of promoting environmentally safe and energy efficient materials, products, systems, services or practices.”⁵² Second, the circular directs agencies and departments to use international voluntary standards for procurement and regulatory applications (7.a.2.).⁵³ OMB A-119 has served as an impetus for EPA participation in ISO 14000.

Companies also have an incentive to participate in ISO 14001, even though it is voluntary. For example, ISO 14001 registration can be used in marketing and

⁴⁹ Specifically, Section 6 of the Circular states “It is the policy of the Federal Government in its procurement and regulatory activities to: a. rely on voluntary standards, both domestic and international, whenever feasible and consistent with the law and regulation pursuant to law...” Moreover, Section 7.a.(1) states “Voluntary standards that will serve agencies’ purposes and are consistent with applicable laws and regulations *should be adopted* by Federal agencies...” and Section 7.a.(3) states “Voluntary standards *should be given preference* over non-mandatory Government standards...” Emphasis added. *Federal Register*, Vol. 58 No. 205, Tuesday, October 26th, 1993/ Notices 57645.

⁵⁰ Thus the Circular calls on Federal employees to join and participate in voluntary standards development organizations and committees. Participation is addressed in Sections 6.b. and 7.b.

⁵¹ This coordination is through the Interagency Committee on Standards Policy (ICSP), chaired by The National Institute for Standards and Technology (NIST) of the Department of Commerce.

⁵² *Federal Register*, Vol. 58 No. 205, Tuesday, October 26th, 1993. See also OMB A-119, section 7.a.4.iii. It should also be noted that in the opening paragraph of the Policy Guidelines section of the circular, it is stated that when standards are properly conducted they can “promote the concepts of pollution prevention and the use of recycled content materials.” Ibid.

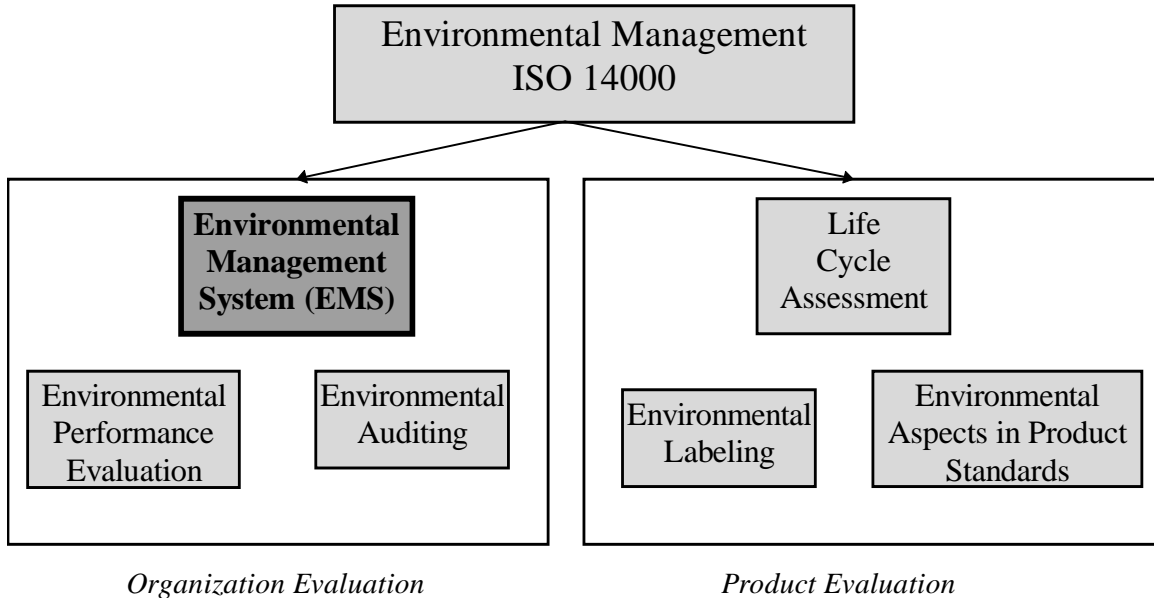
⁵³ Specifically, Section 7.a.2. states that “International standards should be considered in procurement and regulatory applications in the interests of promoting trade and implementing the provisions of the Agreement on Technical Barriers to Trade and the Agreement on Government Procurement.” Ibid.

advertising. It is not a product certification nor an environmental label and therefore cannot be displayed on a product or its packaging. This underlies the heart of whom ISO 14001 targets: industrial consumers. This standard is not intended for retail consumers, the individual buying a pad of paper at the supermarket. Instead, ISO 14001 targets, say, the chief executive officer of a company deciding which company to use as a supplier. For more information on incentives to participate in ISO 14001, see Chapters IV and V.

What is ISO focusing on?

ISO's Environmental Management Standards (ISO 14000) are a series of voluntary standards and guideline reference documents which can be conceptually divided into two parts: organization and product related. See Figure 3.1 below.

Figure 3.1: ISO 14000 Environmental Management Standards



The Environmental Management System (EMS) ISO 14001 is the most important standard of the ISO 14000 series.⁵⁴ It addresses environmental questions before a company acts or a product is manufactured and marketed. Environmental protection can no longer rely merely on end-of-pipe controls. Environmental protection and compliance can be best achieved if environmental factors -- design, raw material selection, manufacture, distribution and disposal -- are integrated into industrial operations in a systematic way.⁵⁵ The EMS is a template to achieve this systematic approach. For more information on the other ISO 14000 standards see Appendix III.

⁵⁴ ISO 14004 is a guideline document on principles, systems and supporting techniques for an EMS; it distinguishes itself from ISO 14001 in that it is only a guidance document and thus is non-auditable. It has been suggested that before organizations try to become certified to ISO 14001, they first implement ISO 14004 on their own.

⁵⁵ Article by Christopher Bell & James Connaughton, *Developments concerning the ISO 14000 Standards*, Sidley & Austin, Washington, D.C. May, 1995.

Management Standards: ISO 9000 and ISO 14000

ISO has traditionally worked on the development of technical standards. In the 1980's, however, ISO started working on the ISO 9000 Quality Management Standards. The international acceptance of the ISO 9000 standards, in combination with the request made at the Rio Conference, encouraged ISO to tackle environmental management standards.

The central concept behind both ISO 9001 and ISO 14001 is that they are “management standards.” Both ISO 9001 and 14001 can be characterized as horizontal, while performance standards can be characterized as vertical. “Horizontal” standards address issues holistically, such as strategic direction and overall business performance. “Vertical” standards, on the other hand, address a specified subset of an organization, such as effluent emissions from an on-site wastewater treatment facility. An analogy can be made with the attempt to address environmental problems on an ecosystem basis [horizontally] rather than on a media specific or crisis basis [vertically].

While there are noteworthy similarities between ISO 9000 and ISO 14000, there are some important differences. The stakeholders in ISO 14000 are very different than for ISO 9000: they are much broader (e.g., the public instead of an industrial consumer) and often have issues that strike closer to home. The purity of the air we breathe and the water we drink is woven into the very fabric of our lives; there is nothing abstract about these concerns. Also, implementation of ISO 14000 will differ from country to country according to the regulatory environment (in accordance with the mandate to comply with local rules and regulations).

What is an EMS?

The ISO 14001 Draft International Standard defines an EMS to be that part of the overall management system which includes organizational, structural changing activities, responsibilities, practices, procedure, process and services for developing, implementing, achieving, reviewing and monitoring the environmental policy.

The essence of the EMS is that it is a process-oriented tool for meeting all environmental requirements. It provides a framework to move beyond compliance to consistent, proactive management of environmental impacts. The EMS is designed to cover every aspect of an organization's business, from acquisition of raw materials to disposal of finished products.

ISO 14001 is a *process* -- not a *performance* -- standard. It is not designed to require new technology, or effluent or emission levels; there is no mandated solution to an environmental problem. ISO 14001 does not require organizations to use best available technology, but only that an organization shall consider "its technological options."⁵⁶ The annex to ISO 14001 states that "when considering their technological options, an organization may consider the use of best available technology where economically viable, cost effective and judged appropriate."⁵⁷

The only performance measures that a company must meet for ISO 14001 registration is compliance with regulation. Compliance requirements will vary between countries and even states. (This complicates the recognition of ISO worldwide.)

⁵⁶ *ISO/DIS 14001 Environmental Management Systems -- Specifications with Guidance for Use*; Clause 4.2.3. ASTM PCN: 34-014001-65, August 1995, p. 9. Note: Best available technology must be used if required for compliance since ISO 14001 requires an organization to comply with relevant environmental legislation and regulations, and with other requirements to which to organization subscribes [4.1.(c)].

⁵⁷ *Ibid.*, Annex A.4.2.3, pg. 16

Assessing regulatory compliance is also complicated by the fact that few sites are always completely in compliance.⁵⁸

Rather than focusing on specific solutions, the EMS requires an organization⁵⁹ to identify its environmental impacts,⁶⁰ to identify an environmental policy⁶¹ and objectives,⁶² and to implement the policy and achieve the objectives by following a certain system. This organization-based flexibility is what allows the EMS to be so universal.

The EMS addresses corporate:

- Environmental Policy
- Planning
 - environmental aspects
 - legal and other requirements
 - objectives and targets
 - management program
- Implementation and Operation
 - structure and responsibility
 - training, awareness and competence
 - communication
 - EMS documentation
 - document control
 - operational control
 - emergency preparedness and response
- Checking and corrective action
 - monitoring and measurement

⁵⁸ Tom Tibor with Ira Feldman, *ISO 14000*, Irwin Professional Publishing, Chicago, © 1996. p. 189.

⁵⁹ Where organization is defined as a company, corporation, firm, enterprise or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration. Note: For organizations with more than one operating unit, a single operating unit may be defined as an organization. Definitions are covered in Section 3 of ISO 14001. *ISO/DIS 14001 Environmental Management Systems -- Specifications with Guidance for Use*; Section 3, pg. 7-8, August 1995, ASTM PCN: 34-014001-65

⁶⁰ Environmental impact is defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, or services. Ibid.

⁶¹ Where environmental policy is a statement by the organization of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets. Ibid.

⁶² Environmental objective is defined as the overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable. Ibid.

- non conformance and corrective and preventative action
- records
- EMS audit
- Management review

The ISO 14001 standard is not a product nor a technical standard. The developers of ISO 14001 decided specifically to exclude the following areas from its work:

- test methods for pollutants⁶³
- setting limits regarding pollutants or effluents
- setting environmental performance levels
- standardization of products⁶⁴

In essence, a company that wants to implement an EMS has to have some form of documentation which shows how a company interacts with the environment in all of its activities, set (its own) environmental goals, and devise a way to get there. The company's policy, which is to be made available to the public, must include a commitment to pollution prevention,⁶⁵ continual improvement, and compliance. Moreover, a company has to periodically do audits and performance evaluation -- especially since one of the requirements in the EMS standard calls for continual improvement.

Continual improvement is defined as the "process for enhancing the EMS to achieve improvement in overall environmental performance, in line with the

⁶³ These are the responsibility of other TC's: TC 146, TC 43, TC 147 and TC 190 cover air, acoustic, water, and soil quality respectively.

⁶⁴ Tom Tibor with Ira Feldman, *ISO 14000*, Irwin Professional Publishing, Chicago, © 1996. p. 34

⁶⁵ Pollution prevention is defined as the use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution.

organization's environmental policy.” Thus there is a connection between continual improvement and environmental performance.⁶⁶ The degree to which ISO 14001 makes this connection has been a contentious issue. EU representatives hope to have the document approved as acceptable for demonstrating compliance with EMAS, and have pressed for the incorporation of more performance-oriented requirements (see Chapter II for more information on EMAS).⁶⁷ Other countries, including the U.S., have resisted this pressure. ISO 14001 emphasizes establishing and improving the EMS, with improved environmental performance as an implied consequence.

The need to demonstrate good corporate environmental performance was an impetus for the development of ISO 14001 (see Chapter II). It is critical to understand that ISO 14001 does not require a third party audit: *registration* to ISO 14001 does.⁶⁸ An organization can either self declare conformance to ISO 14001 or seek a third party audit. The only way an organization can be registered to ISO 14001 is to have a third party audit. Companies may choose not to undergo a third party audit for financial reasons⁶⁹ or liability concerns; a major concern of industry is that troublesome audit

⁶⁶ Where environmental performance is defined as measurable results of the environmental management system, related to an organization's control of its environmental aspects, based on its environmental policy, objectives and targets.

⁶⁷ How to measure environmental performance is a fascinating question that falls under the auspices of SC 4: Environmental Performance Evaluation, and is beyond the scope of this thesis.

⁶⁸ The terms accreditation, registration, and certification can cause confusion. Accreditation is what an auditor undergoes to be able to certify or register a company. Registration and certification are synonyms in common usage. Registration, as defined by the Conformity Assessment Committee of ISO, is defined as a procedure by which a body indicates relevant characteristics of a product, process, or service, or particulars of a body or person, and then includes or registers the product, process, or service in an appropriate publicly available list. Certification is a procedure by which a third party gives written assurances that a product, process, or service conforms to specific requirements. Accreditation is a procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks.

⁶⁹ The cost of a third party audit is uncertain and varies tremendously based on a host of factors (e.g., whether the organization already has a management system [e.g., ISO 9001], the size of the organization, etc.).

findings will attract regulators.⁷⁰ ISO 14001 does not require disclosure of audits findings, whether internal or performed by a third party. Industry concern is due to the fact that anytime an audit is performed, information can be uncovered and a record is created. The role of self declaration versus registration for ISO 14001 remains uncertain.

Uncertainties in this area are aggravated by a variety of concerns.⁷¹ Who ensures the competency of the ISO 14001 registrars? What criteria are used in the accreditation process? To what degree do auditors assess the management process rather than environmental performance and compliance with local regulations? Under what conditions is ISO 14001 registration recognized and accepted worldwide?

In summary, the key sources of controversy for ISO 14001 are the role of self declaration versus registration and the extent to which the standard addresses environmental performance. The interaction between ISO 14001 and existing regulatory controls will be heavily influenced by how the registration issues are resolved. The key to the EMS is that it is a process-oriented tool to be used by management: ISO 14001 is a management standard. Examining ISO's other management standards, ISO 9000, can be useful in understanding the ISO 14000 standards.

ISO

ISO is a non-governmental organization, and all of the standards it develops are voluntary. To date, ISO is comprised of the national standards bodies of over 100

⁷⁰ Paul Scicchitano, *Managing the Environment with ISO 14000*, *Quality Digest*, November 1995, p. 43.

⁷¹ Environmental auditing is the concern of ISO/TC 207 SC 2. Part of the uncertainties in this arena are due to the fact that SC 2's work is still in the development stage.

countries.⁷² Participation in ISO varies by country; some countries are represented by governmental or quasi-governmental bodies and others are represented by private organizations.⁷³ Members are either full voting, observer, or liaison members. The United States, which is a voting member, is represented by American National Standards Institute (ANSI). ANSI is a private sector body.⁷⁴

ISO works through a structure of Technical Committees (TC's), and each TC is given a number. For example, TC-207 is working on the environmental management standards, and TC-176 worked on the quality management standards. All the standards promulgated by TC-207 are assigned the 14000 designation (and all the standards that came from TC-176 were assigned the 9000 designation). TC-207 for Environmental Management Standards is charged with developing environmental management standards that avoid the proliferation of conflicting and inconsistent national and regional standards: "standardization in the field of environmental management tools and systems."⁷⁵

⁷² It is impossible to say exactly how many countries are represented at ISO since this number has been steadily increasing. According to ISO's homepage on the World Wide Web as of 4/30/96 [<http://www.iso.ch/infoe/intro.html>], representatives from "some 100 countries" participate in ISO. According to Tom Tibor, *ISO 14000*, (Irwin, 1996), this number is 111. The EPA Standards Network Fact Sheet *ISO 14000: International Environmental Management Standards*, (May 1995, EPA/742-F-95-006) gives this number as "over 120."

⁷³ A member body of ISO is the national body "most representative of standardization in its country." [<http://www.iso.ch/infoe/intro.html>] Only one such body from each country is accepted for membership. The "most representative" standards body is determined at the national level based on the function of standards organizations within a given country. ISO's role is to recognize and accept, not to choose.

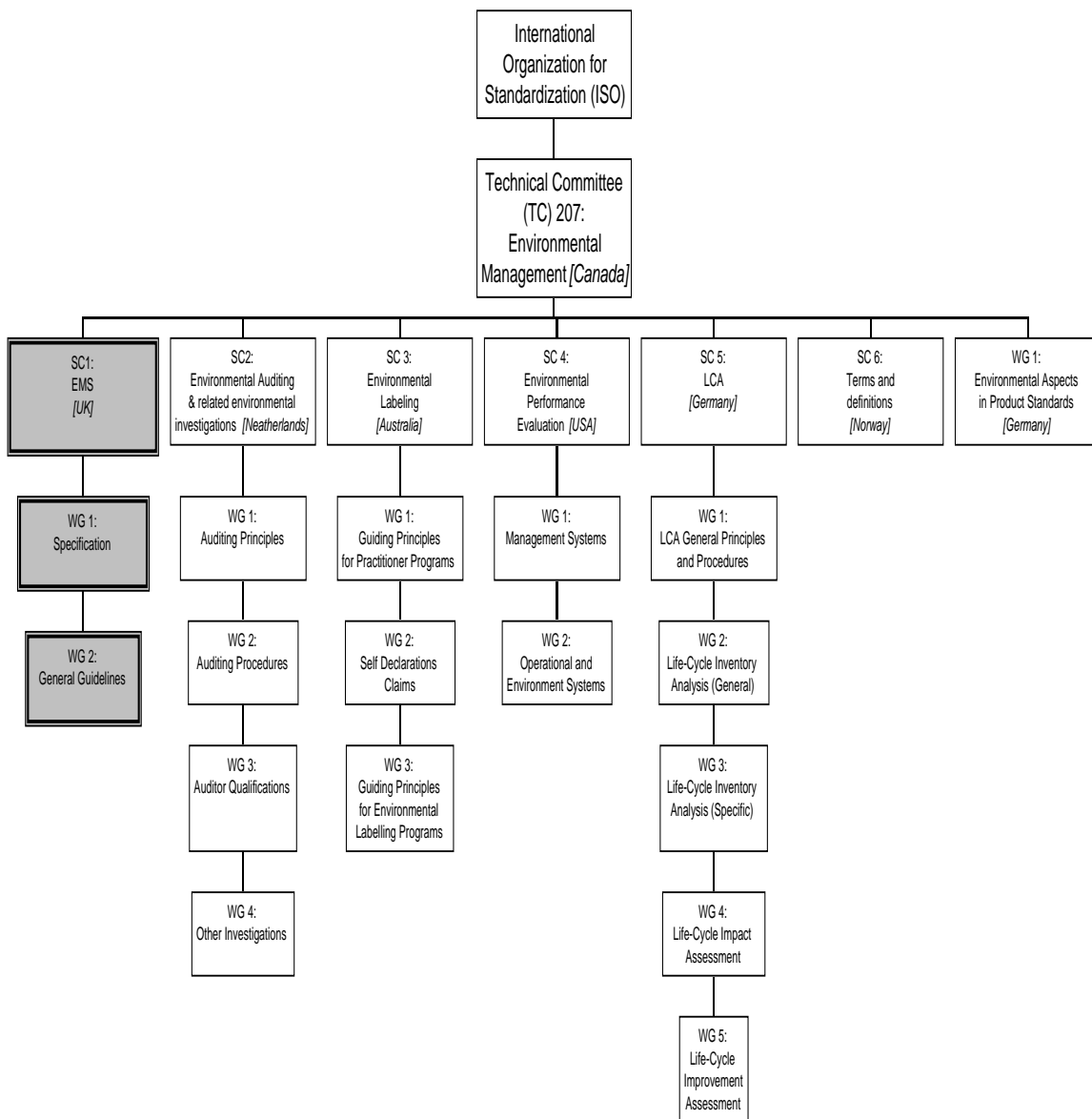
⁷⁴ ANSI is not a standards developer. ANSI maintains policies and procedures for the development, review, and coordination of voluntary standards, i.e., through a set procedure ANSI will gather private sector standards that are already out there and through consensus (which ISO also operates under) come up with one standard which then is designated as an American National Standard. ANSI is composed of over 1,300 companies, 250 professional, technical, trade, consumer and labor organizations and 30 Federal and state government agencies. Its goals are to:

- administer the US private sector voluntary standardization system
- maintain a national consensus process for accrediting American National Standards
- serve as the US national member to ISO and the International Electrotechnical Commission.

⁷⁵ Tom Tibor with Ira Feldman, *ISO 14000*, Irwin Professional Publishing, Chicago, © 1996.

The TC's are usually subdivided into Subcommittees (SC's), which are then further subdivided into Working Groups (WG's). Leadership responsibility for TC-207 and its subcommittees has been assigned to various countries. See Figure 3.2. The U.S. was assigned the secretariat for SC 4: Environmental Performance Evaluation. Dorothy Bowers of Merck chairs SC 4 and ANSI staff administers the secretariat.

Figure 3.2: Organizational Structure of ISO 14000

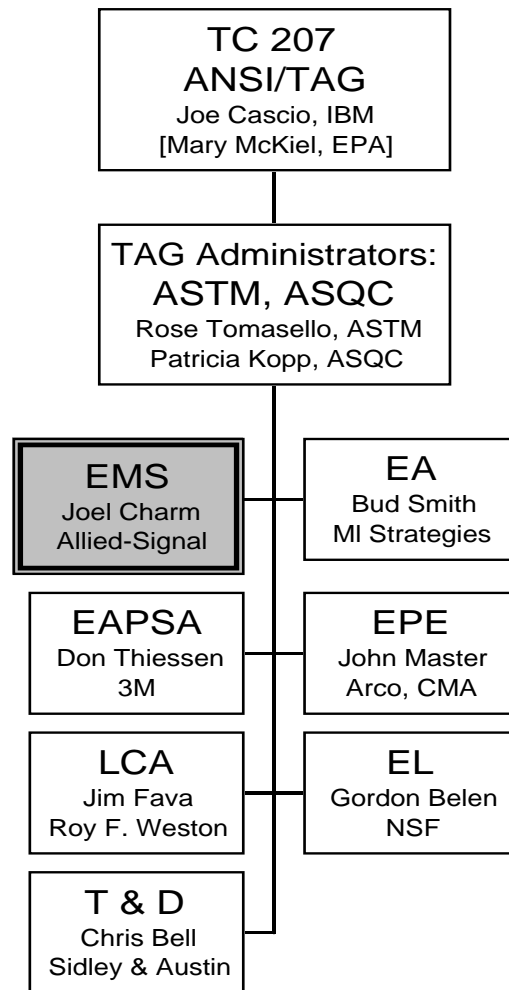


U.S. involvement in the development of ISO 14001

As mentioned previously, the U.S. is represented at ISO by ANSI. ANSI sets up a Technical Advisory Group (TAG) when it participates on an ISO Technical Committee. The TAG develops and transmits to ISO its national position on a particular standard. TAG's are comprised of companies, associations, government agencies, etc. TAG's are open to all interested parties from the U.S. This means that a company, trade organization, government agency, or an environmental non-governmental organization (ENGO) can invite itself to TAG meetings.

Industry has been very active in the U.S. TAG to TC 207. Industry representatives chair the TAG and all its sub-TAG's. Moreover, the TAG is administered by the Association of Testing and Materials (ASTM) and the American Society of Quality Control (ASQC). Both ASTM and ASQC are private sector bodies. See Figure 3.3.

Figure 3.3: The U.S. TAG



The EPA has also been active in the U.S. TAG to TC 207.⁷⁶ Mary McKiel, Office of Pollution Prevention and Toxics, was recently elected vice-chair of the TAG. Moreover, EPA formed the EPA Standards Network in 1993 in order to coordinate and plan EPA involvement in the U.S. input to ISO. The Network consists of representatives from offices throughout EPA and is organized parallel to the structure of the U.S. TAG to

⁷⁶ EPA has not been the only agency participating in the development of ISO 14000. For example, along with the EPA, the Department of Energy and the Department of Commerce were represented on the U.S. delegation at the last meeting of TC 207 in Oslo, Norway, June 1995. *Trip Report: Annual Meeting of the ISO Technical Committee for Environmental Management*, Oslo, Norway June 22 - July 2, 1995. Mary McKiel, Office of Pollution Prevention and Toxics, EPA.

TC 207. EPA has representatives from the EPA Standards Network in all the subTAG's except for subTAG 6 (for Terms and Definitions).

- SubTAG 1 (EMS): Jim Horne, Office of Wastewater Management;
- SubTAG 2 (EA): Cheryl Wasserman, Office of Enforcement & Compliance Assistance
- SubTAG 3 (EL): Julie Lynch, Office of Pollution Prevention & Toxics
- SubTAG 4 (EPE): John Harman, Office of Pollution Prevention & Toxics
- SubTAG 5 (LCA): Mary Ann Curran, Office of Research & Development

These individuals are voting participants in the U.S. TAG, with full rights and responsibilities accorded all other TAG members.

Some ENGO's have also been active in the TAG, both as observers and voting members. Examples include the Environmental Defense Fund, Greenpeace, the National Wildlife Foundation, and others. It should be noted that the U.S. TAG voted to adopt ISO 14001 upon completion as a U.S. Standard through the ANSI Procedures for Synchronization of the National and International Standards.

What does this really mean?

ISO is committed to have open and transparent standards development processes.⁷⁷ The issue in the development of the ISO 14000 standards has not been one

⁷⁷ The process of standards development by consensus is designed to operate in an open and transparent fashion. There is no mention of openness and transparency in ISO's mission statement. However, in a strategy document available on the World Wide Web, ISO states that it "shall be organized in a democratic manner and attempt to accommodate the views and wishes of all its members with governance values *respecting the need for balanced representation* and consensus-based decision making." Emphasis added. <http://www.iso.ch/presse/strategy/strategy.html>

of openness, but accessibility. Active representation is critical at both national (U.S. TAG) and international (TC 207) meetings -- simply being present is how one is heard:

The ability to influence the development of the ISO 14,000 series of standards requires participation in ISO/TC 207 from the beginning of standard development. In other words, one must be at the table from the time pen is put to paper on a continuous basis.⁷⁸

Actively participating in the U.S. TAG are ANSI, several private sector standards developers (e.g., American Society of Quality Control, American Society for Testing and Materials, etc.), industry standards organizations (e.g., Society of Automotive Engineers, etc.), and government standards organizations (National Institute of Standardization and Technology). All of these regularly send their members and stakeholders notification of ongoing or planned standards activities. Much of this information is public and available on-line or in libraries for those who seek it out.⁷⁹

Individual companies and trade associations also participate in the U.S. TAG. Small and medium sized businesses find it harder than large businesses to send representatives to meetings of the U.S. TAG, let alone to TC 207 meetings. Small and medium sized businesses are under-represented in the ISO 14000 process. ISO tried to address this by having one of the guideline documents for Environmental Management Systems deal solely with special considerations affecting small and medium sized organizations.

Participation by environmental non-governmental organizations (ENGO's) varies. The standards process is a demanding and time consuming process. It is ongoing because

⁷⁸ Description by the American Forest and Paper Association (AF&PA) in a paper describing ISO 14000. *ISO 14,000: A Process for International Environmental Management Standards*, p. 4, available from AF&PA, 111 19th St., NW; Suite 88; Washington, D.C. 20036.

⁷⁹ Email communication with Mary McKiel, vice-chair of the U.S. TAG. 3/18/96. mckiel.mary@epamail.epa.gov

revisions of standards are required at three to five year intervals. Environmental groups and communities typically do not focus resources toward standards processes, partially because the measurable payback time can be very long term.⁸⁰ Moreover, at the technical committee level, meetings are often far away and expensive to go to due to their international nature.⁸¹ Thus, environmental groups have been reticent about participating in the U.S. TAG. Some of the active environmental liaisons at the international TC 207 level are the World Wildlife Federation, the Environmental Defense Fund and the United Nations Environmental Program.⁸² The National Wildlife Federation, the Environmental Law Institute and other environmental groups are forming their own outreach and educational vehicles.⁸³

The EPA has been very concerned about outreach to stakeholders. To this end, EPA awarded \$450,000 in Environmental Technology Initiative grants to ANSI for outreach to small and medium sized enterprises, environmental groups, and states. Since 1995, ANSI has conducted workshops and seminars around the U.S., helping educate these stakeholder groups about ISO 14000.⁸⁴ Consultants and training organizations (e.g., CEEM, Executive Enterprises, Irwin Publishing, etc.) have also held workshops.

At the TC-207 meeting in Oslo, Norway in June 1995, the Dutch government provided a grant which enabled many developing countries to attend the meeting.⁸⁵

⁸⁰ Ibid.

⁸¹ John Wolfe, Secretary to TC 207, estimates that the net expenses incurred in the development of the ISO 14,000 series now exceeds 100 Million Canadian Dollars per year. The last meeting of TC 207 was held in Oslo, Norway, and the next meeting is expected in May 1996 in Durban, South Africa.

⁸² *Trip Report: Annual Meeting of the ISO Technical Committee for Environmental Management*, Oslo, Norway June 22 - July 2, 1995. Mary McKiel, Office of Pollution Prevention and Toxics, EPA.

⁸³ Email communication with Mary McKiel, vice-chair of the U.S. TAG. 3/18/96. mckiel.mary@epamail.epa.gov

⁸⁴ Ibid.

⁸⁵ *Trip Report: Annual Meeting of the ISO Technical Committee for Environmental Management*, Oslo, Norway June 22 - July 2, 1995. Mary McKiel, Office of Pollution Prevention and Toxics, EPA.

(After the meeting, the Netherlands called on other countries to help contribute to a fund to insure that developing countries could continue to afford to send representatives. The U.S. has not yet contributed.) Thus the major issues for developing countries, ENGO's, and small and medium sized businesses have been access, communication and funds. It has been the philosophy of the U.S. TAG leadership to encourage any and all to participate;⁸⁶ finding the most effective and far reaching channels, however, has proven difficult.

In sum, the openness of the development of ISO 14001 has not been the problem - it is an issue of accessibility. Especially given the uncertainties in the registration process, ISO would be well advised to facilitate access to the standards development process. This will augment the credibility of ISO 14001.

⁸⁶ Email communication with Mary McKiel, vice-chair of the U.S. TAG to TC 207. 3/20/96
mckiel.mary@epamail.epa.gov

IV: The Pulp and Paper Industry

Introduction

The U.S. is a leading producer of pulp and paper products. Canada and the U.S. have 5% of the world's population, 15% of its paper mills, and produce 36% of its paper.⁸⁷ U.S. exports of pulp and paper products, in particular to the European Union (EU) and Pacific Rim countries, received a boost from the successful conclusion of the North American Free Trade Agreement (NAFTA) and the Uruguay Round of the GATT.⁸⁸ However, the pulp and paper industry's environmental performance is facing increased international scrutiny. This increased scrutiny has important ramifications for its international trade.

In 1995 the EU developed eco-label criteria for fine paper.⁸⁹ U.S. industry's response was acrimonious, claiming that the criteria were developed as a trade barrier rather than for environmental protection. The importance of environmental issues to the pulp and paper industry due to their effect on trade are unmistakable. Many eco-labels specifically target paper products.⁹⁰ Sustainable forestry has also become major source of concern.

Rather than focusing on sustainable forestry or eco-labeling, I have chosen to focus on the environmental management practices of the pulp and paper industry (a brief

⁸⁷ Gary A. Smook, *Handbook for Pulp and Paper Technologists*, 2nd Edition, Vancouver: Angus Wilde Publications, © 1992. p. 3

⁸⁸ EPA, *Profile of the Pulp and Paper Industry*, Office of Enforcement and Compliance Assurance, Washington, D.C. September 1995, EPA 310-R-95-015, p. 14

⁸⁹ *Eco-labelling of Photocopying and Non-impact Printing Paper*, Criteria Document, Final Draft, May 1995. European Commission on Eco-Labeling.

⁹⁰ For an overview of eco-labels worldwide, see EPA *Status Report on the Use of Environmental Labels Worldwide*, Office of Pollution Prevention and Toxics, Washington, D.C., September 1993. EPA 742-R-9-93-001.

examination of the applicability of ISO 14000 to sustainable forestry is treated in Appendix IV). ISO 14001, with its goals of reducing trade barriers and protecting the environment, should be of particular interest to the pulp and paper industry. Will mills choose to implement ISO 14001? The pulp and paper industry is one of the most heavily regulated industrial sectors in the U.S.; how will ISO 14001 interact with these regulations? What can ISO 14001 do that traditional environmental regulation cannot? Will ISO 14001 improve a mill's environmental performance?

Within the pulp and paper industry, there are a variety of methods for converting wood chips to pulp and then paper. Some of these processes include: dissolving, chemical, semi-mechanical, and mechanical. The kraft process is an example of a chemical process. A break down of the U.S. pulp production is shown in Table 4.1 below:

Table 4.1: U.S. Pulp Production, 1990 (short tons)⁹¹

| | USA |
|-----------------------------|---------------|
| Dissolving | 1,293 |
| Chemical pulp, paper grades | |
| Total sulfite | 1,561 |
| Total bleached kraft | 27,562 |
| Total unbleached kraft | 22,188 |
| Total kraft | 49,750 |
| Semimechanical | 4,219 |
| Mechanical | 6,452 |
| Total | 63,275 |

As can be seen from Table 4.1, the kraft process is the most common process in the U.S. This, combined with the kraft process' pervasive environmental problems, led

me to focus on the kraft process. Moreover, my background in chemical engineering and the applicability of the environmental management system to a chemical system such as the kraft process (e.g., pollution prevention) further encouraged me to restrict my analysis to this sub-section. Specifically, the bleached kraft segment of the pulp and paper industry has caused particular environmental concern, and thus I decided to restrict my analysis to this sub-segment. Approximately 35% of U.S. pulp mills use bleached kraft processes, comprising 47% of the pulp production capacity in the U.S.⁹²

The purpose of pulping is to separate the tightly bound fibers in the wood chips into individual fibers so they can later be formed into paper products. The basis of the kraft process involves cooking wood chips in a solution of sodium hydroxide and sodium sulfide. The alkaline attack causes fragmentation of the lignin molecules⁹³ into segments whose sodium salts are soluble in the cooking liquor. A simplified schematic of the kraft liquor cycle is shown in Figure 4.1 below.⁹⁴ White liquor containing the cooking chemicals (sodium hydroxide and sodium sulfide) is used to cook the chips in the digester. Thus the inputs to the digester are the wood chips and cooking (or white) liquor, and the outputs are pulp and black liquor, which contains the cooking chemicals and dissolved lignin. The pulp exiting the digester is termed brownstock pulp, and it still contains lignin and spent cooking chemicals. Before entering the bleaching stages, the brownstock passes through a series of washing and screening/cleaning stages. The black liquor is concentrated and burned in the recovery furnace to yield an inorganic smelt

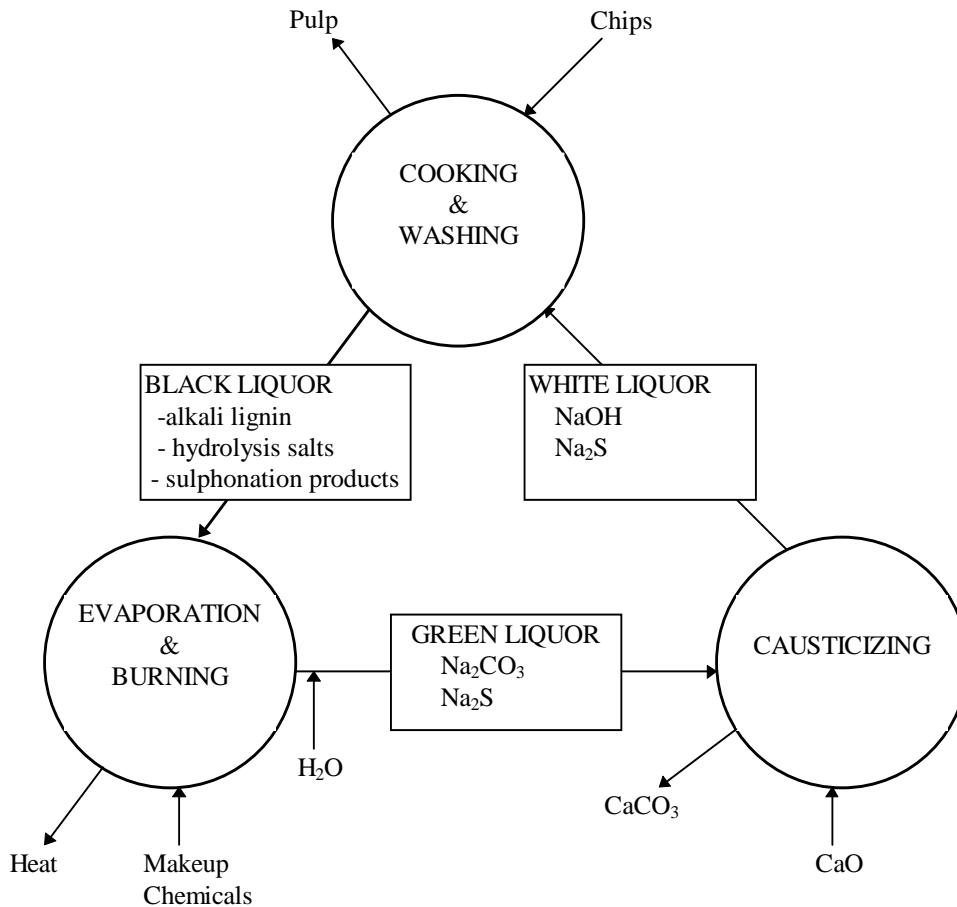
⁹¹ Adapted from Smook, *Handbook for Pulp and Paper Technologists*. © 1992, p.36

⁹² American Paper Institute, *1992 Statistics of Paper, Paperboard, & Wood Pulp*, 1992, New York.

⁹³ More precisely, the chemical structure of lignin consists primarily of phenyl propane units linked in three dimensions. During pulping, the linkages between the propane side chains and the benzene rings are broken, freeing the cellulosic fibers (Smook, ©1982, p. 6).

consisting of sodium carbonate (Na_2CO_3) and sodium sulfide (Na_2S). The smelt is dissolved to form green liquor, which is reacted with quick lime (CaO) to convert Na_2CO_3 into sodium hydroxide (NaOH) and regenerate the original white liquor:⁹⁵

Figure 4.1: Simplified Schematic of the Kraft Process



⁹⁴ Adapted from Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 67

⁹⁵ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, p. 66

Environmental Concerns of the Bleached Kraft Process

As mentioned previously, the bleached kraft segment of the pulp and paper industry has caused particular environmental concern. Kraft pulp is darker than pulps produced through other processes, and therefore requires more bleaching chemicals.

Table 4.2 compares the brightness⁹⁶ of kraft pulp with other types of pulp:

Table 4.2: *Approximate Brightness Ranges for Unbleached Pulps*⁹⁷

| Brightness Range⁹⁸ | Type of Pulp |
|--------------------------------------|--------------------------------|
| 15-30 | kraft |
| 40-50 | NSSC, ammonium bisulfite |
| 50-65 | groundwood, bisulfite, sulfite |

As shall be discussed later, the brightness of pulp is an important control parameter in pulp and paper processes, and will have a large influence on the environmental impacts of a plant, primarily due to the bleaching process.

‘Kraft’ is German for strong: the kraft process produces structurally strong paper. Kraft paper is stronger than many other kinds of paper due to the selective attack of the cooking chemicals on wood constituents. The low lignin content of kraft pulp, combined with its structural strength, allow highly bleached, or bright, paper products to be produced. These two factors, a dark pulp and a pulp that can be highly bleached, explain

⁹⁶ Brightness is the measure of reflectivity of a sheet of pulp or paper measured under standardized conditions. Brightness is used to indicate the degree of whiteness. For reference, this thesis is printed on paper with a brightness of ca. 90.

⁹⁷ Gary A. Smook, *Handbook for Pulp and Paper Technologists*, 2nd Edition, Vancouver: Angus Wilde Publications, © 1992. p. 163

⁹⁸ The instrument most commonly used in measuring brightness is the Zeiss Elrepho brightness meter; the units of brightness are called Elrepho units.

the high volume of bleaching chemicals used by the kraft segment of the pulp and paper industry.

Many of the environmental concerns associated with the bleached kraft process are attributable to the chlorine-based compounds typically utilized to produce bleached pulp. The persistence, non-biodegradability, and toxicity of some of the chlorinated organic compounds formed during chlorine-based bleaching is reflected in the high level of concern that has been generated. In particular, the discovery in 1988 of dioxin in bleached kraft mill effluents and solid wastes aroused a lot of concern.⁹⁹

The bleached kraft segment's environmental concerns are not limited to those attributable to the use of chlorinated reagents. Other concerns include biological oxygen demand (BOD₅)¹⁰⁰, pH, total suspended solids (TSS), effluent color, water use and sludge volumes. Chloroform and other air pollutants are also a concern. A more detailed examination of the environmental impacts of the kraft process follows.

Effluents

Effluent guidelines for various subcategories of the pulp and paper industry were first promulgated in 1974 and 1977. Guidelines primarily for secondary fiber and non-integrated mills were promulgated in November, 1982, and Best Current Technology (BCT) standards were promulgated in 1986.¹⁰¹ These guidelines established limits for

⁹⁹ EPA, 1988. *U.S. EPA/Paper Industry Cooperative Dioxin Screening Study*. Office of Water Regulations and Standards, Washington, D.C., March 1988. EPA 440-1-88-025

¹⁰⁰ BOD₅ represents the 5-day biochemical oxygen demand of effluents, and is the most common parameter used in the U.S. and will be used hereafter.

¹⁰¹ EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. pg. 88, 91.

the conventional pollutants BOD₅, TSS, and pH, and for the priority pollutants zinc, pentachlorophenol, and trichlorophenol.¹⁰²

Wastewater discharges from most mills are covered by BCT and BAT limitations in 40 CFR Part 430.¹⁰³ The Federal Water Pollution Control Act (commonly referred to as the Clean Water Act (CWA)) and its subsequent amendments mandated a three stage approach. The first called for meeting discharge criteria to ‘best practical technology’ (BPT), while the second stage, started in 1983, required criteria to ‘best available technology economically feasible’ (BAT).¹⁰⁴ The last stage involved the Best Current Technology (BCT) criteria. Due to increased effectiveness of current technologies, effluent limitations stipulated for new plants were generally similar to BAT. See Table 4.3 below.

Beyond these guidelines, states have the option of addressing issues like color, etc. through National Pollution Discharge Elimination System (NPDES) permits (CWA §402). Since receiving waters vary in so many ways -- from assimilative capacity to salinity, etc. permit requirements vary. Pulp and paper mills are currently the subject of an integrated rulemaking covering effluent guidelines for process wastewater discharges¹⁰⁵ and National Emissions Standards for Hazardous Air Pollutants.¹⁰⁶

¹⁰² EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-1. The Clean Water Act regulates pollutants under three categories: priority pollutants (which includes various toxic pollutants), conventional pollutants (BOD, TSS, fecal coliform, oil and grease, and pH), and non-conventional pollutants (any pollutant that does not fit in either of the other two categories).

¹⁰³ EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. p. 91.

¹⁰⁴ Smook, © 1982, p. 354

¹⁰⁵ EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. p. 88

¹⁰⁶ These rules apply to mills in Standard Industry Codes (SIC) 2611, 2621, 2631, and 2661. Under Title III of the 1990 CAA Amendments, Maximum Achievable Control Technology (MACT) standards for the pulp and paper industry along with effluent guidelines were proposed in December of 1993. Ibid. pg. 88, 92-94.

Resource Conservation and Recovery Act (RCRA) rules under development may also affect wastewater treatment in surface impoundments.¹⁰⁷ Additionally, the discovery in 1988 of dioxins in bleached kraft mill effluents has triggered further restrictions under the Clean Water Act and an ongoing risk assessment will determine the need for additional restrictions on the disposal of wastewater treatment sludge. Under CWA Section 304(l), many bleached chemical pulp mills have permit limitations for specific dioxins issued as Individual Control Strategies.¹⁰⁸ Lastly, mills may be subject to storm water discharge regulations (through the 1987 amendments to the CWA),¹⁰⁹ and the national pretreatment program (CWA §307(b)), which controls the discharge of pollutants to publicly owned treatment works.

Table 4.3: EPA guidelines for effluent limitation, lb/ton of product (maximum for 30-day averages)¹¹⁰

| | 5-Day BOD (lb/ton) | | | Suspended Solids (lb/ton) | | |
|----------------------------|--------------------|------|----------|---------------------------|-----|----------|
| | BPT | BAT | New Mill | BPT | BAT | New Mill |
| unbleached kraft | 5.6 | 2.7 | 3.1 | 12 | 3.7 | 7.5 |
| market bleached kraft | 15.8 | 7.1 | 5.3 | 31.7 | 5.2 | 5.8 |
| market bleached sulfite | 41.7 | 20.1 | 9.3 | 53.3 | 6.9 | 5.8 |
| paperboard from wastepaper | 3 | 1.3 | 1.5 | 5 | 1.6 | 4 |
| nonintegrated fine paper | 8.5 | 2.7 | 2.7 | 11.8 | 1.4 | 2.8 |

Chlorinated Organic Compounds:

¹⁰⁷ Ibid.

¹⁰⁸ Ibid., p. 91.

¹⁰⁹ Storm water discharge permits are given according to eleven categories. Pulp and paper production facilities may fall into two categories. Category ii: Facilities classified as SIC 24 -- lumber and wood products (except wood kitchen cabinets), SIC 26 -- paper and allied products (except paperboard containers and products); and Category xi: SIC 265 -- paperboard containers and boxes, SIC 267 -- converted paper and paperboard products. EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. pg. 82-84.

¹¹⁰ Adapted from Smook, ©1982, p. 353.

The first issue confronted with effluent emissions of chlorinated organic compounds is how to test for them. A variety of methods have been used to measure chlorinated organic content of effluents. These measures include:

- Total Organic Chlorine
- Total Organic Halogens
- Absorbable Organic Halogens (AOX)
- Extractable Organic Halogens

In recent years, AOX has increasingly become the standard measure. In the U.S., this was influenced in part by the EU's decision to use AOX as its standard, as it did, for example, in the criteria for the EU eco-label for fine paper in 1995.¹¹¹ To estimate AOX, the following equation has been suggested:¹¹²

$$AOX = k * \left\{ C + \frac{H}{2} + \frac{D}{5} \right\} * \{1 - e_B\} \quad \text{kg/metric ton pulp}$$

where C , H , and D = respectively, the molecular chlorine, hypochlorite and chlorine dioxide charges in kg per ton of pulp (with H and D expressed as equivalent molecular chlorine)

e_B = AOX removal efficiency of the biological treatment system (40% for aerated stabilization and 33% for activated sludge)

k = 0.08 when the bleach plant operates with less than 70% chlorine dioxide substitution; or $0.08 \times [1.7 - (\% \text{subst}/100)]$ where substitution is greater than

¹¹¹ Criteria Document, *Eco-labeling of Photocopying and Non-impact Printing Paper*, Final Draft, May 1995. Further evidence for the widespread use of AOX can be found in the hundreds of case studies summarized in EPA *International (Non-U.S.) Industrial Pollution Prevention: A Case Study Compendium*. EPA-820-R-95-005, August 1994.

70%.

The major classes of identified compounds in bleach plant effluents are: chlorinated acids, chlorinated phenolics, chlorinated aldehydes, ketones, and lactones, and chlorinated hydrocarbons.¹¹³ However, the bulk of the chlorine is organically bound to very large molecules (molecular weight > 1,000) which have not been identified. These compounds are difficult to deal with since, due to their large size, these molecules are difficult to break down in treatment.¹¹⁴

Despite the potential environmental damage of many of the chlorinated compounds identified in pulp and paper mill effluents, only a few have been the subject of regulatory attention. These include: dioxins and furans, chloroform, and chlorates.¹¹⁵

Dioxins and furans are a class of chlorinated organic compounds that contain two aromatic carbon rings joined by a bridge of carbon-carbon and carbon-oxygen bonds.¹¹⁶ They are a byproduct generated by the chlorination of nonchlorinated precursors (e.g., lignin) during complex reactions that occur during bleaching. Even though their concentration in mill effluent is typically very low, there has been a high level of concern due to their extremely high toxicity and reproductive- and endocrine- disrupting effects, their persistence, and potential for bioaccumulation.¹¹⁷

¹¹² EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-10

¹¹³ Ibid.

¹¹⁴ Ibid.

¹¹⁵ Ibid.

¹¹⁶ Ibid., p. 2-11

¹¹⁷ Ibid. The reproductive- and endocrine- disruptive effects of dioxins in particular have been aroused much attention. See for example *Our Stolen Future: How We Are Threatening our Fertility*, by Theo Colburn, 3/96 Penguin, *Hormone Copycats* by the National Wildlife Federation (April 1994) or *The Truth about Dioxin* by Vicki Monks, National Wildlife, August/September 1994, pg. 4-12.

Lignin content is believed to be very influential in dioxin and furan formation. Oils used as defoamers and natural compounds in mill effluents have been suggested as other sources. In the last several years the replacement of precursor-containing defoamers has caused a significant decrease in dioxin production.¹¹⁸

Dioxins and furans are particularly problematic because wastewater treatment does not destroy them. Rather, conventional wastewater treatment acts as a separatory process, transferring the dioxins and furans from the effluent to the sludge. In a joint statement, the pulp and paper industries of Canada and the U.S. have expressed their commitment “to the reduction and prevention of toxic discharges, in order to protect human health and the environment.” The statement goes on to say that “today, after investing in process modifications and new technologies, the industry has markedly-reduced dioxin and furan discharges...”¹¹⁹ The statement claims that “dioxin and furan discharges have been reduced by at least 90% by mills in both countries,”¹²⁰ yet fails to say relative to what discharge standard this reduction was achieved. In any case, increased awareness and technological advances have reduced dioxin and furan emissions from previous levels.

Chloroform: Chloroform is associated with chlorine-based bleaching. The largest source is the sodium hypochlorite (NaOCl) bleaching stage. If this stage is not used, then the chlorination and extraction stages are the major sources. Other sources

¹¹⁸ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-11

¹¹⁹ *Pollution Prevention: A Joint Statement by the Pulp and Paper Industries of Canada and the United States*. October 1993. Taken from the World Wide Web 4/96. <http://gopher.great-lakes.net:2200/0/Economics/paper-pulp/pollprev.txt>

¹²⁰ Ibid.

include elemental chlorine and chlorine dioxide stages.¹²¹ The rate of chloroform generation is a function of:

- hypochlorite charge: generation increases with the charge of the hypochlorite used in bleaching, at a rate proportional to the square root of the amount of hypochlorite used;
- lignin content: generation is proportional to the lignin content of the bleached and extracted pulp;
- chlorine factor: the chlorine factor is a ratio of molecular chlorine to pulp. Generation of chloroform increases with increasing chlorine factor;
- pH: generation increases with increasing pH (more alkaline);
- chlorine dioxide substitution: increasing substitution generally decreases generation of chloroform;
- chlorine stage temperature: reducing this temperature generally reduces generation of chloroform.¹²²

Chloroform is discharged into both air and aqueous effluents, and is considered a toxic pollutant under the Clean Water Act and a hazardous air pollutant under the Clean Air Act. Due to its volatility, a large percentage of the chloroform escapes as fugitive air emissions through bleach plant vents. Of the chloroform that remains in the bleach plant effluent, most of it is ultimately released to the atmosphere due to evaporation from the wastewater treatment system or from the receiving waters.¹²³ Since both its aquatic

¹²¹ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-20.

¹²² Ibid.

¹²³ Ibid., p. 2-12.

toxicity and bioaccumulation potential are low, chloroform in pulp and paper effluents is not considered to be a significant aquatic hazard.¹²⁴

Chlorate: Chlorate (ClO_3^-) is a byproduct formed during chlorine dioxide bleaching. Thus chlorate is a significant concern only in mills that use chlorine dioxide substitution.¹²⁵ In general, chlorate removal in secondary wastewater treatment is achieved easily provided that secondary treatment includes an anoxic section.¹²⁶

Other Toxic Compounds:

Resin and fatty acids are pulping byproducts which coagulate to form a “soap” that is skimmed from the pulp during the recovery process.¹²⁷ This soap can cause a foam overflow and thus escape into the effluent stream. This is of concern due to the soap’s high toxicity to many aquatic species.¹²⁸ Preventing foam overflows and spills effectively prevents the soap from entering receiving waters.

Solids:

The solids load in untreated effluent of a kraft mill consist mainly of:

- dirt, grit, and fiber from the wood preparation stages
- screen rejects and spills from the pulping area
- fiber and dissolved lignin solids from the pulp bleaching stages

¹²⁴ Ibid. It should be noted that chloroform is regulated as a toxic under the CWA since at higher concentrations chloroform is considered a significant aquatic hazard.

¹²⁵ Ibid., p. 2-13. Use of an anoxic section varies. Since chlorate formation is a function of chlorine dioxide substitution, the necessity for an anoxic section is largely commensurate with the extent of chlorine dioxide substitution.

¹²⁶ Ibid.

¹²⁷ The soap is generally incinerated, though it can also be captured and processed into tall oil and sold as a byproduct. Ibid., p. 2-13.

- fiber and additives washed from the early stages of papermaking.¹²⁹

Suspended solids are of concern for a variety of reasons. They can become trapped in the gills of fish and cause stress, secondary infection, and possibly suffocation.¹³⁰ They can settle out and accumulate at the bottom of the receiving water body producing a BOD that results in oxygen depletion, allowing anaerobic bacteria and other undesirable life forms which produce methane and hydrogen sulfide to take over.¹³¹ Suspended solids are less of a concern now than they were in the past, largely due to significant reductions achieved by industry. By 1993, U.S. pulp and paper industry claimed reductions of approximately 80% in TSS.¹³² Concern remains, however, because heavy metals, dioxins, and other chlorinated and unchlorinated compounds tend to adsorb to any remaining particles.

Suspended solids are either removed by settling or flotation processes used in primary wastewater treatment or by biological processes that occur during secondary processing. A portion of the inorganic fraction of the suspended solids is not removed by either the primary or secondary treatment, and is thus discharged with the final effluent.¹³³

Biological Oxygen Demand:

¹²⁸ Ibid.

¹²⁹ Ibid, p. 2-2.

¹³⁰ Ibid.

¹³¹ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 351.

¹³² *Pollution Prevention: A Joint Statement by the Pulp and Paper Industries of Canada and the United States*. October 1993. Taken from the World Wide Web 4/96. <http://gopher.great-lakes.net:2200/0/Economics/paper-pulp/pollprev.txt>

¹³³ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-3.

Biological Oxygen Demand (BOD₅) is the tendency of an effluent to consume dissolved oxygen from receiving waters.¹³⁴ Waters deficient in dissolved oxygen will have an impaired ability to support aerobic life and may become foul-smelling due to increased activity of anaerobic organisms. Since biological oxygen demand is a function of the decomposition of organic matter in the effluent, reducing the total organic content of the water will reduce BOD₅.

High BOD₅ result from various stages in the pulping and bleaching process. Typical sources and amounts of BOD₅ generated in a kraft mill are summarized in Table 4.4 below:

Table 4.4: Typical Sources and Amounts of BOD₅ generated in Kraft Mills¹³⁵

| Source | BOD Contribution (lb/ton) |
|-------------|---------------------------|
| Wood Yard | 0 to 10 |
| Pulping | 0 to 50 |
| Recovery | 2 to 20 |
| Bleaching | 3 to 40 |
| Papermaking | 5 to 30 |

BOD₅ contributions associated with bleaching are due to dissolved lignin, other carbohydrates, and fiber dissolved during bleaching.¹³⁶

Most BOD₅ is removed during secondary treatment. In an oxidation lagoon, a 30-day retention removes 85 to 90% of BOD₅, while an aerated lagoon can accomplish similar reductions in 3 to 5 days. The most popular high rate treatment method, the

¹³⁴ Ibid., p. 2-4.

¹³⁵ Ibid., p. 2-5.

¹³⁶ Ibid.

activated sludge system, usually has retention times between 3 and 8 hours.¹³⁷ In the United States, “the installation of effluent treatment systems and process improvements have produced reductions of approximately 90% for BOD.”¹³⁸

Color:

Color is a measure of an effluent’s interference with the transmission of light.¹³⁹ The principal concern of color is an aesthetic one, though high doses of color can disrupt photosynthesis and aquatic life. The compounds contributing to color are also associated with water taste problems and can stabilize some bivalent metal ions by chelation.¹⁴⁰ Color regulations are usually established at the local level based on narrative criteria in the facility’s NPDES permit (e.g., “no significant impact on receiving water color”).

The brown color of pulp mill effluents is due to tanin and lignin derivatives which originate from wood handling, chemical pulping and bleaching operations.¹⁴¹ Almost all of the color load in Kraft pulp mill effluent comes from the caustic extraction stage in the bleach plant and the first chlorination stage. Secondary wastewater treatment methods are largely ineffective in treating color due to the slow biodegradation of these compounds. Some improvements can be achieved by implementing changes in plant design (e.g., elimination of wet debarking, bleach process modifications, etc.), but

¹³⁷ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, pg. 358-360.

¹³⁸ *Pollution Prevention: A Joint Statement by the Pulp and Paper Industries of Canada and the United States*. October 1993. Taken from the World Wide Web 4/96. <http://gopher.great-lakes.net:2200/0/Economics/paper-pulp/pollprev.txt>

¹³⁹ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-6.

¹⁴⁰ *Ibid.*

¹⁴¹ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 361

external treatment methods are more common. These include lime, alum or polymer coagulation, member processes, activated carbon adsorption, and filtration through soil substrata.¹⁴²

Solid Wastes

Sludges:

The main source of solid waste in mills is bark. Bark is not considered an environmental hazard.¹⁴³ Sludge is the second largest contributor to the solid waste stream of mills. Wastewater treatment sludge does not present an environmental hazard *per se*: it is the trace constituents that are partitioned from the effluent that cause the hazard.¹⁴⁴ As mentioned previously, sludge has become a significant concern due to the potential for dioxins to be transferred from the effluent to the sludge.

Two different types of sludges are generated in mills. Primary treatment removes suspended solids, and thus primary sludge consists primarily of matter removed from the pulp by physical properties (e.g., flotation, screening, etc.). It may also contain coagulants and flocculants used to enhance settling of solids. Thus primary sludge consists primarily of the original constituents of the wood input of the mill, and is considered less environmentally hazardous than the secondary sludge.¹⁴⁵

¹⁴² Ibid.

¹⁴³ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-14

¹⁴⁴ Ibid.

¹⁴⁵ Ibid., p. 2-15

Secondary or biological treatment produces sludges consisting almost exclusively of bacterial and fungal biomass. Since sludges are concentrated before disposal,¹⁴⁶ pollutants that are transferred to this sludge are often concentrated, and therefore secondary sludge has caused particular environmental concern.¹⁴⁷

Under the terms of a 1988 consent decree (*EDF/NWF v. Thomas*, D.D.C. No. 85-0973, July 27, 1988) EPA announced in November, 1991 their finding that there was insufficient evidence of potential risk to justify regulation under the Resource Conservation and Recovery Act (RCRA) of landfill or surface impoundment disposal of bleached pulp and paper sludge. Under a separate consent decree, (*EDF v. Reilly*, D.D.C. No.89-0598) EPA is required to determine if mill wastewater treatment sludge should be considered hazardous waste. The decree specifies an exception based on the use of oxygen delignification, ozone bleaching, preox bleaching, enzymatic bleaching, hydrogen peroxide bleaching, oxygen and peroxide enhanced extraction, or any other technology involving substantially similar reductions in uses of chlorine-containing compounds. Rules for the land application of sludge have been deferred due to the signing of a land stewardship agreement between AF&PA and the EPA.¹⁴⁸

Ash:

Mills generate two types of ash: fly and bottom ash. Fly ash consists of micron-sized particles transported by flue gases and (ideally) trapped by emission control

¹⁴⁶ Dewatering (or concentrating) processes are typically carried out by some permutation of filtration, centrifugation, and pressing (Smook, © 1982, p. 362).

¹⁴⁷ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. pg. 2-15, 16.

devices. These fine particles are formed during sublimation of various soda compounds (e.g., Na_2SO_4 , Na_2CO_3) as the furnace gases are cooled.¹⁴⁹ Bottom ash consists of noncombustible particles that collect at the bottom of the combustion chamber. The main sources of ash are the power boiler and recovery furnace.¹⁵⁰ The lime kiln is another source of ash. Some mills use wet scrubbers capture particulate and gaseous pollutant species which are concentrated in the resulting sludge. Both ash and scrubber sludge present disposal problems due to their low pH.¹⁵¹

Other Wastes:

Mills produce other solid wastes beside those previously mentioned. Dry wood preparation and groundwood pulping produce significant residuals. Pulping rejects (e.g., bark, knots) also contribute to mills solid waste generation. In general, these solid wastes are not of great concern since they are used as much as possible as fuel.¹⁵² Mills also generate industrial solid wastes (e.g., pallets, construction debris, shipping containers, etc.).¹⁵³

¹⁴⁸ EPA 1995, *Profile of the Pulp and Paper Industry*, Office of Enforcement and Compliance Assurance, Washington, D.C., EPA 310-R-95-015, September 1995. p. 90.

¹⁴⁹ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 365.

¹⁵⁰ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-16.

¹⁵¹ Ibid.

¹⁵² Note: Wood fuels usually produce high quantities of particulates on combustion. Thus these solid wastes are not of great concern as solid waste, but their use as fuels should be accompanied by appropriate measures to reduce emissions of particulates.

¹⁵³ Ibid., p. 2-17.

Air Pollutants:

Air discharges are regulated under the 1970 Clean Air Act (CAA) and its amendments.¹⁵⁴ The provisions of the CAA are administered by the EPA through a system of permits.¹⁵⁵ The major air pollutant concerns are reduced sulfur compounds, particulate, hazardous air pollutants (HAPs), and volatile organic compounds (VOC's). NO_x and SO_x are also of concern. Table 4.5 below summarizes the major air pollutants and their sources.

Table 4.5: Major Air Pollutants and their Sources¹⁵⁶

| Type | Source |
|----------------------------|--|
| fine particulates | principally soda fume from the recovery furnace |
| coarse particulates | mainly 'fly ash' from hog fuel and coal-fired boilers |
| sulfur oxides | recovery furnace and power boiler |
| nitrogen oxides | from all combustion processes |
| reduced sulfur gases | from pulping and recovery operations |
| volatile organic compounds | noncondensable gases from digester relief and spent liquor evaporation |

Reduced Sulfur Gases:

The four reduced sulfur compounds of concern for a kraft mill are hydrogen sulfide (H₂S), dimethyl sulfide [(CH₃)₂S], methyl mercaptan [CH₃SH] and dimethyl disulfide [(CH₃)₂S₂]. These compounds are collectively known as total reduced sulfur gases (TRS) and are all derived from sodium sulfide (Na₂S), one of the two primary

¹⁵⁴ Hazardous air pollutant standards are given in Section 112 of the CAA.

¹⁵⁵ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 364.

¹⁵⁶ *Ibid.*, p. 365.

cooking chemicals used in the kraft process.¹⁵⁷ Sulfur containing compounds are a concern primarily due to the odor problems they cause. They are not persistent in the environment and do not appear to bioaccumulate. Table 4.6 below gives some of the characteristics of TRS gases.

Table 4.6: Characteristics of Kraft Mill Reduced Sulfur Gases¹⁵⁸

| Compound | Chemical Formula | Type of Odor | Approx. Odor Threshold |
|--------------------|-----------------------------------|-------------------|------------------------|
| hydrogen sulfide | H ₂ S | rotten eggs | 1 ppb |
| methyl mercaptan | CH ₃ SH | rotten cabbage | 1 ppb |
| dimethyl sulfide | CH ₃ SCH ₃ | vegetable sulfide | 10 ppb |
| dimethyl disulfide | CH ₃ SSCH ₃ | vegetable sulfide | 10 ppb |

The major sources of TRS emissions are digester blow and release gases, multiple-effect evaporator noncondensibles, and recovery boiler exhaust gases. Other minor sources contribute to TRS emissions. The noncondensibles from digesters and evaporators are low-volume, high concentration sources, while the recovery furnace gases are high volume, low concentration sources. Low volume sources are easily treated by incineration. High volume sources are more difficult to treat, and best results are achieved by reducing emissions at the source by such means as black liquor oxidation, low-odor recovery design, and proper operation of the recovery boiler.¹⁵⁹ Approximately 12 to 13 kg of TRS are generated per ton of pulp.¹⁶⁰

¹⁵⁷ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-17.

¹⁵⁸ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 366.

¹⁵⁹ Ibid.

¹⁶⁰ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-18.

In 1978, under §111 of the CAA, EPA promulgated New Performance Standards (NSPS).¹⁶¹ Kraft mills constructed or modified after September 26, 1976 are subject to these standards, which have emission limits, monitoring and reporting requirements for particulate matter and TRS. TRS emission limitations are also regulated under CAA 111(d), which covers State plans for non-criteria pollutants.

Particulates:

As mentioned previously, fine particulates are emitted primarily from the recovery furnace. Coarse particulates are derived mainly from hog fuel¹⁶² or coal-fired boilers due to carryover of ash and char. The lime kiln and dissolving tank vents are also significant sources of particulates.¹⁶³ The volume of ash depends on the type of fuel used: coal and wood produce significant volumes of ash, while oil and gas produce little or no ash.¹⁶⁴ As mentioned earlier, particulate emissions are subject to the NSPS. Emissions from both the recovery furnace and power boilers are subject to CFR Part 60.280.¹⁶⁵ Emissions of particulate, sulfur dioxide and nitrogen oxide from fossil fuel fired boilers are limited under 40 CFR Part 60 Subpart D if constructed or modified after

¹⁶¹ The NSPS applied to recovery furnaces, smelt dissolving tanks, lime kilns, digester systems, brownstock washer systems, multiple effect evaporators, black liquor oxidation systems, and condensate stripper systems. Minor revisions were made to these standards on May 20, 1986 (FR 18538). EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. pg. 88-89.

¹⁶² In general hog fuel consists of waste wood and wood chips.

¹⁶³ Smook, *Handbook for Pulp and Paper Technologists*, © 1982, Canada: Joint Executive Committee of the Vocational Education Committees of the Pulp and Paper Industry, p. 365.

¹⁶⁴ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-18.

¹⁶⁵ *Ibid.*, p. 2-18.

August 17, 1971. More stringent limits are imposed on systems constructed or modified after June 19, 1984 (Subpart Db).¹⁶⁶

Fine particulates are especially of concern due to their ability to bypass the respiratory filters thus allowing the bloodstream to extract the toxic elements. According to the May 1995 EPA's Aerometric Information Retrieval System, the pulp and paper industry sector emitted 35,579 short tons per year of particulate matter of 10 microns or less, and 113,571 short tons per year of total particulates.¹⁶⁷

Volatile Organic Compounds (VOC's):

Most VOC's are generated during pulping (and oxygen delignification if used), and are derived from lignin, carbohydrates, and extractives in the pulp finish. Their major sources include digester blow gases, the chemical recovery evaporators, and the brownstock washer and knoter hoods. Other sources include the later stages of bleaching and papermaking, where residual VOC's are gradually released from the pulp.¹⁶⁸ Typical VOC emissions of kraft mills include alcohols, phenols, chloroform, acetone, methyl compounds, and turpentine-based organics.¹⁶⁹ According to the May 1995 EPA's Aerometric Information Retrieval System, the pulp and paper industry sector emitted 96,875 short tons of VOC's per year.¹⁷⁰ VOC's are of concern primarily due to their role in the formation of photochemical oxidants and their adverse health effects.

¹⁶⁶ EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. p. 89.

¹⁶⁷ *Ibid.*, p. 64.

¹⁶⁸ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. pg. 2-18, 19.

¹⁶⁹ *Ibid.*, p. 2-19.

¹⁷⁰ EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. p. 64.

Under Title I of the Clean Air Act, the EPA established National Emission Standards for Hazardous Air Pollutants (NESHAPs), designed to control emissions of particular hazardous air pollutants.¹⁷¹ Several VOC's including chloroform, methanol, hydrogen chloride and chlorine are identified as Hazardous Air Pollutants (HAPS) and are subject to Maximum Achievable Control Technology (MACT) standards. (MACT is defined as the control technology achieving the maximum degree of reduction in the emissions of HAPS, taking into account costs and other factors.¹⁷²) Moreover, under Title I of the 1990 CAA Amendments, emissions of VOC's are regulated based on the ozone classification of the area. Pulp and paper facilities identified as a major source are subject to Reasonably Available Control Technology (RACT).¹⁷³ Under Title III of the 1990 CAA Amendments, MACT standards for the pulp and paper industry along with effluent guidelines were proposed in December of 1993. MACT targeted methanol, hexane, toluene, methyl ethyl ketone, chloroform, chlorine, formaldehyde, acrolein, and acetaldehyde.¹⁷⁴

Other Hazardous Air Pollutants (HAP's):

In addition to chloroform (see *Effluents* section), mills generate methanol, hydrogen chloride, and chlorine, all of which are classified as HAP's. Methanol is the largest volume HAP, and is emitted mostly at the black liquor oxidation stage. Newer recovery boiler designs eliminate the black liquor oxidation stage (in favor of indirect

¹⁷¹ Ibid. p. 87.

¹⁷² Ibid., p. 87.

¹⁷³ Ibid., pg. 93-93.

¹⁷⁴ Ibid., p. 93.

contact evaporation), and thus new mills will emit substantially less methanol.¹⁷⁵ Other emission sources include: digester blow valves, knotter and washer hood vents, evaporator vents, and turpentine recovery process. Plants practicing high chlorine dioxide substitution may also have emissions from acid sewers.¹⁷⁶ Methanol is toxic to humans in moderate to high doses. It is unlikely to persist in water or bioaccumulate, and is believed to have low toxicity to aquatic organisms. Due to its high volatility, methanol evaporates readily, where it can react with air to produce formaldehyde which contributes to the formation of air pollutants and is a known carcinogen.¹⁷⁷

Hydrogen chloride is emitted from several sources, including washer and seal tank vents (especially under high chlorine dioxide substitution). Chlorine is released from various bleaching stage tower and washer vents.¹⁷⁸

In addition to restrictions under the CAA, all but the smaller mills are subject to the Emergency Planning and Community Right-to Know Act (EPCRA 1986), also known as Superfund Amendments and Reauthorization Act Title III. This statute was designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans. In particular, EPCRA §313 requires facilities, which fulfill a variety of criteria, to report releases and transfers of toxic chemicals, allowing EPA to compile the national Toxic Release Inventory (TRI) database. The pulp and paper industrial sector falls in the Standard Industry Code (SIC)

¹⁷⁵ E EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. pg. 2-19, 20.

¹⁷⁶ Ibid.

¹⁷⁷ EPA, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995, p. 61.

¹⁷⁸ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, Office of Research and Development, Washington, D.C., August 1993. EPA/600/R-93/110. p. 2-21.

range of 2611-2631, and according to the 1993 TRI database, the average combined releases and transfers of the pulp and paper industry was 706,000 pounds (per facility).¹⁷⁹ Mills may also be subject to §302(a) (Emergency Planning) and §304 (Emergency Notification of Extremely Hazardous Substance Release).

SO_x and NO_x:

NO_x are byproducts of high temperature combustion processes. The main sources of NO_x emissions are the recovery and power boiler, and the lime kiln. NO_x emissions can usually be controlled by operating these combustion units with minimum flame temperature and limited excess air. Sulfur oxides are also emitted from the recovery and power boiler.

Pursuant to Title 1 of the CAA, the EPA established national air quality standards to limit levels of criteria pollutants; both SO₂ and NO₂ are classified as criteria pollutants. Title 1 also calls on states to develop a State Implementation Plan (SIP), allowing states to establish requirements for SO₂ and NO₂ emissions. As mentioned earlier, emissions of SO₂ and NO from fossil-fuel fired boilers are subject to limitations under 40 CFR Part 60 Subpart D and Db. SO₂ is also regulated under Title IV of the CAA, which calls for reductions in emissions of sulfur dioxide by allowing limited emission allowances.

According to Smook, SO_x emissions are “a relatively minor problem in kraft mills.”¹⁸⁰

However, according to the May 1995 EPA’s Aerometric Information Retrieval System (AIRS), the pulp and paper industry sector was the second largest emitter of SO₂ (after

¹⁷⁹ TRI data is of limited use since it is only intended to give a general sense as to the relative scale of releases and transfers within each sector profiled under TRI. Of the 14 industry sectors profiled in the 1993 TRI, pulp and paper had the fifth largest average releases and transfers per facility. EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. p. 67.

the petroleum refining industry sector).¹⁸¹ Of all the industry sectors given in the AIRS database, the pulp and paper sector was the largest emitter of NO₂.¹⁸²

Potential Role of ISO 14001

Will ISO 14001 reduce some of the environmental impacts of the kraft segment of the pulp and paper industry? There are two components to the answer of this question. First, are mills are going to implement ISO 14001? Second, if a mill does implement ISO 14001, how will this change the mill's environmental impact?

Are mills interested in implementing ISO's EMS?

All the environmental managers of pulp and paper companies whom I have asked this question have given the same answer: "we don't know yet." Upon further prodding, "if consumer demand and our competition forces us to" was added to this answer.¹⁸³

What do these two answers mean? The first is reasonable, since the standard is not yet in final format. Yet certain predictions can be made, largely using the second answer.

Perhaps the most valuable lessons can be learned from the ISO 9000 Quality Management Standards. A technical sales representative of both Alabama River Pulp and Alabama Pine Pulp, responding to the question of how many pulp and paper companies he knew of that were not ISO 9000 certified, responded that he knew of

¹⁸⁰ Smook, © 1982, p. 365.

¹⁸¹ EPA 1995, *Profile of the Pulp and Paper Industry*, EPA 310-R-95-015, September 1995. p. 64.

¹⁸² The pulp and paper industry sector emitted 541,002 and 394,448 short tons per year of respectively sulfur dioxide and nitrogen dioxide. Ibid.

¹⁸³ In particular, employees from Simpson Tacoma Kraft, Alabama River Pulp, Boise Cascade, Champion International, Alabama Pine Pulp, and Weyerhaeuser were most helpful to me. I am very grateful for all

none.¹⁸⁴ The reasons a mill would want ISO 9000 certification are much the same for ISO 14000 certification. The original impetus to implement ISO 9,000 came from (industrial) consumer demand and concerns about competitiveness.¹⁸⁵ (The biggest impact of 14001 will be in the manufacturer-supplier area, rather than end consumer since certification to ISO 14001 applies to facilities, not end products.) Companies from Europe in particular demanded ISO 9000 certification as a condition to do business in the early 1990's, and some say that ISO 9000 certification has become a *de facto* requirement.¹⁸⁶ The decision to seek certification is a corporate decision that is largely a function of consumer demand (and hence also of competition). The success and widespread use of ISO's quality management standards, in particular in the pulp and paper sector, point to implementation of ISO 14001 amongst mills. Moreover, ISO 14001 may be a way of reducing liability, insurance premiums, etc. (see Chapter V).

Participation by the American Forests and Paper Association (AF&PA) in the U.S. TAG also points to the interest mills have in ISO 14001.¹⁸⁷ Participation by members of the pulp and paper industry in voluntary environmental initiatives is another indicator. For example, 31 mills are currently participating in EPA's 33/50 program.¹⁸⁸ Other examples include the Simpson Tacoma Kraft Company, which was selected to

the assistance that was provided! It should be noted that both Boise Cascade and Champion International are currently in the process of reviewing ISO 14000.

¹⁸⁴ Telephone conversation with Chuck Barber, 3/14/96.

¹⁸⁵ These standards are not targeting retail consumers -- the individual consumer buying a pad of paper at the supermarket -- but the CEO of a company deciding which company to use as a supplier of pulp. This is a key difference between ISO 14001 and EMAS, which provides a logo which can be used as an eco-label of sorts.

¹⁸⁶ See, for example, AF&PA's *ISO 14000: A Process for International Environmental Management Standards*. Available from AF&PA, 1111 19th Street, NW, Suite 88, Washington, D.C. 20036.

¹⁸⁷ Patricia Layton is coordinating AF&PA's participation in ISO/TC 207. AF&PA is active in the U.S. TAG and several ad hoc groups, such as the ISO Legal Issues Forum and the Trade Issues Forum.

participate in the Environmental Leadership Program, and Georgia-Pacific, which is participating in both the WasteWi\$e and the Climate Wise Recognition Programs.¹⁸⁹ AF&PA's Environmental, Health, and Safety Principles are perhaps the most interesting comparison with ISO 14001. (For more information on these principles see Chapter 2 and Appendix I.)

In the introduction to these principles, AF&PA states that “in keeping with its long-standing history of ... voluntary efforts in environmental, health, and safety stewardship, the industry wished to reaffirm these commitments and to evidence its future intentions in a set of written principles.” AF&PA's Principles are of interest not only because they point to participation by members of the pulp and paper industry in voluntary environmental initiatives, but also because they raise the issue of harmonization. Is ISO 14001 going to replace AF&PA's Health, Environment and Safety Principles? How will these two initiatives interact? There are many similarities between AF&PA's principles and ISO 14001. However, there are some important differences between these two programs.

AF&PA's Environment, Health and Safety Principles and ISO 14001

The guidelines for AF&PA's first principle call on companies to “seek out areas for continual improvement,” “to make environmental considerations an integral part of ... planning,” and to “develop, implement, and enforce policies, plans, and procedures in order to achieve compliance with environmental ... regulations.”¹⁹⁰ ISO 14001 requires

¹⁸⁸ EPA Sector Notebook Project, *Profile of the Pulp and Paper Industry*, Office of Enforcement and Compliance, Washington, D.C. EPA 310-R-95-015, September 1995, pg. 113-114. The 33/50 program encourages voluntary reduction in releases of 17 toxic pollutants from industrial sites.

¹⁸⁹ *Ibid.*, pg. 115-117.

¹⁹⁰ American Forest & Paper Association, *Environmental, Health, & Safety Principles*, Washington, D.C. © 1996.

“a commitment to continual improvement,” an environmental policy, and “a commitment to comply with relevant environmental legislation and regulations.”¹⁹¹ Although both programs require compliance with rules and regulations, ISO 14001 has stronger language. It requires a “commitment to comply,” while AF&PA’s principles demand policies, plans, and procedures to achieve compliance, providing a less immediate nexus.

Similarly, ISO 14001 has stronger language regarding continual improvement and pollution prevention. ISO 14001 requires a commitment to preventing pollution (§4.1), while the guidelines for principle 2 call on companies to consider available pollution prevention measures. (Also in terms of continual improvement, ISO 14001 requires management review, which AF&PA’s Principles do not).

Information disclosure and communication is a central component of AF&PA’s Principles, and is addressed in the implementing guidelines of the following principles: 2 (customers and consumers), 3 (internal), 4 (employee training), 5 (cooperation within the industry), 6 (any interested parties), and 7 (through participation in public policy). ISO 14001 addresses these issues in §4.3.3 - 4.3.6.

One of the fundamental differences between the two programs is that AF&PA’s principles do not require implementation of an “environmental management system.”¹⁹² Rather, AF&PA principles require the appointment of managers to coordinate environmental issues and the designation of responsibility for environmental activities. Internal communication between local managers, corporate environmental staff, and

¹⁹¹ ISO/DIS 14001, *Environmental Management Systems -- Specifications with Guidance for Use*, August 1995, ASTM PCN: 34-014001-65. Section 4.1, p. 8.

¹⁹² Structure and responsibility are addressed in §4.3.1 of ISO 14001.

senior management on environmental issues and internal mechanisms for performance assessment are also required.¹⁹³

The fact these last two aspects are *internal* is important in terms of credibility. While both programs emphasize information disclosure and communication, ISO 14001 heavily emphasizes the maintenance of environmental records for documentation. AF&PA's Principles do not share this emphasis. An integral component of ISO 14001 is the environmental policy, which is to be made available to the public. AF&PA's Principles do not call for a corporate environmental policy. Rather, it mandates that companies publicly pledge to the principles. Perhaps more importantly, AF&PA's Principles do not require an audit, although membership to AF&PA can be revoked if the principles are not followed adequately. It is unclear how or who defines "adequately." No company has had their membership revoked yet, though this may be due to the fact that the program is mandatory only as of January 1, 1996.¹⁹⁴

Philip Morris, environmental manager at Alabama River Pulp, believes that one of the key changes that implementation of ISO 14001 will produce is the increased record keeping and degree of formality in the handling of environmental issues.¹⁹⁵ This facilitates verification, both for the auditor and, where access to documents is required, to consumers and the public, and thus leads to increased credibility. AF&PA's Principles do not require a similar level of transparency. The increased environmental

¹⁹³ Specifically, the implementing guidelines for principle 3 require the appointment of "an upper management individual(s) or committee(s) to guide and lead corporate activities concerning environmental... issues," the designation of "a responsible individual(s) at each manufacturing location to be accountable for environmental... activities," and communication between local managers, corporate environmental staff, and senior management. American Forest & Paper Association, *Environmental, Health, & Safety Principles*, Washington, D.C. © 1996.

¹⁹⁴ Telephone conversation with Marilyn Haugen, American Forest and Paper Assoc., 15:30, 3/27/96, (202) 463-2700.

documentation required by ISO 14001 is one of the advantages expected from implementing ISO 14001.¹⁹⁶

The implementing guidelines for principle 4 address employee training, as does §4.3.2 of ISO 14001. AF&PA Principles provide for sanctions against employees. However, it seems dubious that a significant portion of the environmental woes of the pulp and paper industry can be attributed to the environmentally-malicious intent of employees. None of the other voluntary management initiatives examined in this work share AF&PA's emphasis or approach.

AF&PA's principles address several issues ISO 14001 does not: the improvement of environmental performance through support of research and development, participation in the formulation of public policy, and energy conservation.¹⁹⁷ While energy concerns were not specifically included in ISO 14001 (probably due to their generic nature), they were explicitly addressed in ISO 14004. Moreover, one would expect that a mill, with its high energy requirements, would identify this as a significant environmental (and economic) impact, and therefore address energy in its environmental policy. Recommending corporate participation in the formulation of environmental policy can both be construed as environmentally progressive and self-serving. I expect neither of these two differences to be significant.

ISO 14001 has provisions for emergency preparedness and response; AF&PA's Principles do not. Given the EPCRA reporting requirements, this is probably not a

¹⁹⁵ Telephone conversation with Philip Morris, 3/11/96, (334) 743-8501.

¹⁹⁶ Ibid.

¹⁹⁷ While ISO 14001 does not specifically target energy conservation, energy (as an environmental aspect) is explicitly addressed in ISO 14004.

significant omission. Table 4.7 summarizes the similarities and differences between AF&PA's Principles and ISO 14001.

Table 4.7: ISO 14001 and AF&PA Environment, Health, and Safety Principles

| | ISO 14001 | AF&PA's Principles | Comments on AF&PA's Principles |
|--|-----------------------|-------------------------------------|---|
| ENVIRONMENTAL POLICY | 4.1 | not addressed | Does not require an environmental policy beyond pledging to adhere to the principles. |
| PLANNING | | 1.a), b), d), 3.a) | Only requires mills to seek out areas for continual improvement, instead of a commitment to continual improvement. Also, does not require pollution prevention [should be <i>considered</i> in 2.d)], employee involvement, nor that the plan be made public. |
| Environmental aspects | 4.2.1 | not addressed | |
| Legal and other requirements | 4.2.2 | implied in 1.d) | |
| Objectives and targets | 4.2.3 | 3.a) | No communication to public required |
| Environmental Management Program | 4.2.4 | not addressed | The principles do not require an EMS, but 3.b), c) address management issues. |
| IMPLEMENTATION AND OPERATION | | | |
| Structure and responsibility | 4.3.1 | 3.b), c), d) | The principles require internal communication . |
| Training, awareness and competence | 4.3.2 | 4. | AF&PA's principles emphasize disciplinary action against employees. |
| Communication | 4.3.3 | 2.c), 3.d), 4.e), 5.b),c),d), 6, 7. | AF&PA's principles have broad communication requirements, but does not require any documentation to corroborate any communication. |
| Environmental documentation | 4.3.4 | not addressed | |
| Document control | 4.3.5 | not addressed | |
| Operation control | 4.3.6 | implied in 1.c), 2.a), 3.a) | |
| Emergency preparedness and response | 4.3.7 | not addressed | |
| CHECKING AND CORRECTIVE ACTION | | | |
| Monitoring and measurement | 4.4.1 | 1.e), 3.a), 2.a), 4.b), 6.f) | Includes requirement to review employee compliance and communications efforts. |
| Non-conformance & corrective & preventive action | 4.4.2 | 1.e), f), 4.d) | |
| Records | 4.4.3 | not addressed | |
| EMS audit | 4.4.4 | not addressed | This is an extremely important difference. The principles require only a pledge and not an audit (neither internal nor third party). |
| MNGMT REVIEW | 4.5 | 1.f) | |
| <i>public policy</i> | not addressed | 7. | ISO 14001 does not require this. |
| <i>research</i> | not addressed | 5. | This is an important difference between ISO 14001 and AF&PA's Principles. |
| <i>energy efficiency</i> | not specif. addressed | 8. | Due to the generic nature of ISO 14001, this issue was not specifically addressed. |

Is ISO 14001 going to replace AF&PA's Principles? At AF&PA, Amy Schaffer believes the AF&PA Environmental Principles, as well as the Sustainable Forestry Initiative Principles, will serve as the basis for ISO 14001 certification for the forest and paper industry.¹⁹⁸ The principles would be part of the organization's policy, as part of the organization's legal and other requirements, and would be incorporated into an organization's thinking on objectives and targets. She does not believe that the Principles would serve in lieu of 14001, but will enhance it.¹⁹⁹ Marilyn Haugen, also at AF&PA, characterized AF&PA's Environment, Health, and Safety Principles as a possible avenue to fulfill ISO 14001 requirements.²⁰⁰

Despite the fact that ISO 14001 was created with the intent of harmonizing standards differences remain between ISO 14001 and AF&PA's Principles. The nature of these differences, however, indicate that ISO's standard can be used to meet AF&PA's standards. (Presumably with the caveat that, in addition to the requirements of ISO 14001, a mill would have to participate in the formulation of public policy, examine in particular its energy use, and support research and development.) In any case, Amy Schaffer's comments indicate that AF&PA does not foresee ISO 14001 replacing their principles. In other words, AF&PA's Principles will remain, and ISO 14001 will be one possible avenue to satisfy (almost all of) AF&PA's requirements.

In sum, participation by mills in the ISO 9000 Quality Management Standards, the numerous advantages attributed to ISO 14001 implementation (e.g., reduced liability, increased environmental documentation etc.), industry participation in voluntary

¹⁹⁸ Email communication with Amy Schaffer, Regulatory Affairs, American Forest and Paper Association, 3/29/96. Amy_Schaffer@afandpa.ccmil.compuserve.com

¹⁹⁹ Ibid.

environmental initiatives, and the fact that ISO 14001 is expected to complement AF&PA's Environment, Health, and Safety Principles all point to pulp and paper industry's implementation of ISO 14001.

How can ISO's EMS change a kraft mill's environmental impact?

Is the EMS going to be successful in "greening" kraft mill operations? In trying to answer this question, I have picked several examples of how a kraft mill could reduce its environmental impacts, and examined whether the EMS would influence this decision. In particular, towards the end of this Chapter, I examine two examples of pollution prevention technologies, extended delignification and enzyme catalysis, in order to see if ISO 14001 would influence a decision to implement either of these technologies.

Dioxins, furans, and difficult decisions:

If a mill decides to reduce its dioxin and furan emissions in its effluent, it can attempt to do so in various ways. One possibility is to rely on secondary wastewater treatment. Secondary wastewater treatment, however, does not destroy dioxins and furans. Rather, the treatment acts as a separatory process that transfers the dioxins and furans to the sludge;²⁰¹ thus disposal of the sludge becomes problematic. This provides an excellent example of the advantages of multi-media regulation and pollution prevention.

²⁰⁰ Telephone conversation with Marilyn Haugen, American Forest and Paper Association, 15:30, 3/27/96, (202) 463-2700.

²⁰¹ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, EPA/600/R-93/110, p. 2-12.

However, a company that shifts dioxin from its fluid to its solid waste discharges shifts its regulatory problem from the CWA to RCRA. Moreover, the 1990 Pollution Prevention Act (PPA) will provide similar incentives to prevent pollution as ISO 14001's required commitment to pollution prevention. Where ISO 14001 can be useful is when reductions in dioxin emissions cause increased emissions of some other pollutant.

Beside relying on secondary wastewater treatment, there are many other ways a mill can attempt to reduce dioxin and furan emissions in its effluent. Many in the pulp and paper industry believe that the Elemental Chlorine Free (ECF) process is an environmentally friendly means of producing bleached pulp.²⁰² For example, this process is reported to "virtually eliminate dioxin in pulp and paper waste water."²⁰³ The ECF process, however, substitutes chlorine dioxide as the pulp bleaching agent, thus increasing the risk of chloroform emissions.

The difficulty now is not the transfer of a pollutant to a different medium, but the choice between environmental pollutants and risk: from dioxin to chloroform. Will ISO 14000's EMS help a company see this environmental trade-off?²⁰⁴ There are several components of ISO's EMS which should help a mill clarify this decision. In general, the standard contains requirements based on the dynamic cyclic process of "plan, implement,

²⁰² *Environmental Challenges Facing the Pulp and Paper Industry*, Taken from the World Wide Web.

²⁰³ Ibid.

²⁰⁴ It should be noted that dioxins and furans are but just one example where environmental trade-offs occur. Another example is the recycle and reuse of mill process waters, which are extremely effective in reducing in-plant losses. The extent of recycle, or degree of closure, is limited by buildups of temperature and impurities. In particular, the ability of water to dissolve water is inversely related to temperature. Thus increasing recycle may decrease water consumption and other environmental aspects of mill operation, but increase the BOD₅ of the effluent. However, the BOD₅ contribution associated with wood yard (due to wood particles and dissolved organics that remain in the wash water after logs are debarked) can be reduced by dry debarking. Dry debarking generates no effluent load at this stage, but results in higher BOD₅ levels in later pulping operations since more bark remains on the logs, requiring a higher volume of white liquor. Another example is in the area of energy conservation, where alternative fuels

check, and review.”²⁰⁵ More specifically, one of the requirements of the EMS is that management has to define an environmental policy that provides a “framework for setting and *reviewing* environmental objectives and targets.”²⁰⁶ The environmental impacts of the organization must be kept up-to-date, and its objectives and targets must be reviewed.²⁰⁷ ISO 14001 requires an organization to “establish and maintain documented procedures to monitor and measure on a regular basis the key characteristic of its operations and activities that can have a significant impact on the environment.”²⁰⁸ Moreover, the standard requires periodic management review of the EMS.²⁰⁹ Lastly, the organization’s required commitment to both continual improvement and pollution prevention should help clarify the trade-offs. In sum, the various components of ISO 14001 require an organization to proceed through a highly formalized structure designed to clarify environmental trade-offs. Ultimately, the standard does not tell the mill what decision to make, but how to make it.

Reducing “soap” overflow:

The “soap” discussed earlier can enter the effluent stream by causing foam overflows and spills. The EMS requires an organization to “establish and maintain procedures for defining responsibility and authority for handling and investigating non-conformance, taking action to mitigate any impacts caused and for initiating and

such as wood residues and nonrecyclable recovery paper are used. Use of these kinds of fuels will probably cause an increase in particulate formation. Examples of these kinds abound.

²⁰⁵ ISO/DIS 14001, *Environmental Management Systems -- Specification with Guidance for Use*. Draft Date: August 1995. ASTM PCN: 34-014001-65. Annex A, Section 4.0, p. 14.

²⁰⁶ ISO/DIS 14001, *Environmental Management Systems -- Specification with Guidance for Use*. Draft Date: August 1995. ASTM PCN: 34-014001-65. Section 4.5, p. 8. Emphasis added.

²⁰⁷ *Ibid.*, Sections 4.2.1 and 4.2.3, p. 9.

²⁰⁸ *Ibid.*, Section 4.4.1, p. 12.

completing corrective and preventive action.”²¹⁰ An organization is also required to identify operations and activities associated with identified environmental aspects, and to establish and maintain “documented procedures to cover situations where their absence could lead to deviations from the environmental policy and the objectives targets.”²¹¹ The annex of the standard specifically includes the stipulation that consideration should be given to normal and abnormal operations.²¹² Also, appropriate worker awareness, training and competence, as mandated by ISO 14001,²¹³ should reduce the risk of overflows and spills. Through the process of ‘plan, implement, check and review,’ ISO 14001 is intended as an environmental optimization tool. Part of that optimization should include preventing spills and overflows.

VOC’s and Best Available Technology:

Several of the VOC’s emitted by pulp and paper mills are identified as Hazardous Air Pollutants (HAPS) under the 1990 Clean Air Act Amendments. Emissions of these compounds are subject to Maximum Achievable Control Technology (MACT) emission limitations. VOC’s provide an excellent example of why ISO 14000 should not replace current rules and regulations.²¹⁴ In the absence of the CAA, ISO 14001 would mandate less than what current rules and regulations do: “In order to achieve environmental objectives, the environmental management system should encourage organizations to consider implementation of best available technology where appropriate and where

²⁰⁹ Ibid., Section 4.5, p.13.

²¹⁰ Ibid., Section 4.4.2, p.12.

²¹¹ Ibid., Section 4.3.6, p. 11.

²¹² Ibid., Annex A, Section 4.2.1, p. 16.

²¹³ Ibid., Section 4.3.2, p. 10.

economically viable. In addition, the cost effectiveness of such technology should be fully taken into account.”²¹⁵ Since ISO 14001 requires a commitment to compliance with rules and regulation, mills implementing ISO 14001 would have to abide by MACT emission limitations for VOC’s. In the absence of the CAA requirements, there would be a decrease in the level of control technology required, and one would expect this to cause an increase in VOC emissions.

Pollution Prevention Options:

The brightness of pulp is an important criterion in the pulp and paper industry. Higher brightness requirements imply both higher costs and environmental impact due to the increased volume of bleaching chemicals used. Moreover, the higher the brightness requirement, the more difficult it is to use alternative bleaching processes. Most pulp mills use chemicals to achieve a target brightness of 88 to 90%. Pollution prevention technologies involving non-chlorine bleaching stages are more competitive with conventional processes in the 70 to 80 brightness range.²¹⁶

Brightness is not the control parameter of choice before the pulp enters the bleaching stages. Rather, the amount of lignin remaining in the fiber following chemical pulping is the pulping parameter that is used.²¹⁷ The lignin content is measured with the

²¹⁴ Note: 14001 requires compliance with all rules and regulations. Therefore, this comparison is meaningful only under the assumption of the absence of rules and regulations like the Clean Air Act.

²¹⁵ ISO/DIS 14001, *Environmental Management Systems -- Specification with Guidance for Use*. Draft Date: August 1995. ASTM PCN: 34-014001-65. p. 6.

²¹⁶ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, EPA/600/R-93/110, pg. 1-13 and 5-2. It should be noted that many integrated mills are able to use pulp with lower brightness levels (80 - 88%), while non-integrated mills have traditionally had to meet higher brightness requirements (p. 5-2).

²¹⁷ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, EPA/600/R-93/110, p. 5-2.

kappa number test, which is usually measured at the exit of the brownstock washer. It is the kappa number that is used to determine the amount and type of bleaching chemicals required to produce pulp of a desired brightness.

Lowering the kappa number reduces the amount of bleaching chemicals required, and at sufficiently low kappa numbers it becomes possible to use more ‘environmentally friendly’ bleaching chemicals (e.g., chlorine dioxide, peroxide, oxygen, etc.). Lignin is essentially the ‘glue’ that holds the components of pulp together.²¹⁸ Moreover, the basis of bleaching is delignification, since it is the chromomorphous groups on the lignin that cause color.²¹⁹ Lowering the lignin content lowers the kappa number and facilitates bleaching: the amount of bleaching chemicals required to achieve a certain paper brightness is proportional to the amount of lignin remaining in the pulp after the pulping process.²²⁰

However, the less lignin, the structurally weaker the pulp becomes (and paper subsequently produced from it). Reduction of the kappa number was traditionally achieved by increasing the residence time in the digester. This increase in residence time, however, causes the pulping chemicals in the digester to be less selective and begin to attack the cellulose material, thereby degenerating the strength of the pulp. Extended delignification is a technology developed by the Swedish Forest Products Research

²¹⁸ More precisely, lignin is an amorphous, highly polymerized substance, whose principal role is to form the middle lamella which cements the fibers together (Smook, ©1982, p. 6).

²¹⁹ The brightness of pulp is measured by its ability to reflect monochromatic light in comparison to a known standard (usually magnesium oxide). The instrument most commonly used is the Zeiss Elephro reflectance meter (Smook, ©1992, p. 163).

²²⁰ Recall also that lignin is thought to provide most or all of the precursors associated with dioxin formation, and thus lignin content is believed to largely determine the extent of dioxin and furan formation.

Institute in the late 1970's that allows the kappa number to be reduced without causing the undesirable loss of strength.

Extended Delignification

In conventional batch Kraft pulping, the digester is filled with chips and then given a one-time charge of cooking chemicals. The alkali concentration is initially high, and then falls as the cooking proceeds. In extended delignification, the cooking chemicals are added at several points throughout the cook. Improved selectivity is achieved by:

- a more uniform concentration of effective alkali ($\text{NaOH} + 1/2 \text{Na}_2\text{S}$) throughout the cook (lower at beginning, higher at end);
- maximizing the concentration of hydrogen sulfide ions (HS^-), especially during the initial phase of the cook;
- minimizing the concentration of dissolved lignin at the end of the cooking process;
- and
- maintaining low temperatures at the beginning and end of the cook.²²¹

Costs of extended delignification vary based on various factors. Due to the reduced use of bleaching chemicals that extended delignification allows, savings can offset capital investments that are required for this process.

The environmental benefits of extended delignification (brought about by reducing the pulp kappa number and hence the quantity of bleaching chemicals used) are well documented,²²² and include and reductions in:

- AOX
- polychlorinated phenols and other chlorinated organics
- BOD
- color
- energy use²²³

How would ISO 14000 affect a decision whether or not to use extended delignification? ISO 14001 requires a commitment to pollution prevention, and it is clear that extended delignification is effective in preventing pollution. The standard calls for the establishment of an (appropriate) environmental policy *defined by the organization*; it does not state specific environmental performance criteria; “...this standard does not establish requirements for environmental performance...” In other words, ISO 14001 only demands a commitment to pollution prevention -- it is up to the organization to decide how to implement that commitment. A mill may decide to use extended delignification or any other kappa number reducing technology (e.g., oxygen delignification, ozone delignification, etc.), or it may decide in its environmental goals to concentrate on other issues. If a mill wishes to be certified to ISO 14001, it will have to prove to the auditor that it has a commitment to pollution prevention. The mill may choose extended delignification as a means to prove this commitment to the auditor, or it may choose any number of other technologies, some of which may be more effective, and some may be less effective.

²²¹ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, EPA/600/R-93/110, p. 4-11.

²²² *Ibid.*, p. 4-21. Also, see Appendix IV.

²²³ Bleaching chemicals are usually produced on-site through large energy inputs to raw inorganic minerals (e.g., brine to produce caustic and chlorine). See Smook, © 1982, p. 154.

Enzyme Treatment of Pulp

Albzyme, an enzyme blend secreted by wood-inhabiting microbes, is believed to catalyze the hydrolysis of the main bonding agent between lignin and cellulose. This action is believed to improve the accessibility of bleaching chemicals to pulp and enhance the extractability of lignin.²²⁴ This technology has been shown to bring about reductions in the amounts of bleaching chemicals needed, followed by subsequent reductions in AOX levels and chlorinated organics.²²⁵

Enzyme catalysis is a very new technology and was discovered out of a push for technological innovation. Within the pulp and paper industry there are many other examples like enzyme catalysis. EPA's international industrial pollution prevention case study compendium²²⁶ summarizes over 100 cases, from using sugarcane bagasse to application of black liquor desilication, where innovative techniques were used to prevent pollution. ISO 14001 does little to encourage technological innovation. While it requires a commitment to pollution prevention and continual improvement, it does not explicitly encourage research and development. A mill may choose to emphasize research in its environmental goals, or it may not even mention it. This is a significant difference between ISO 14001 and AF&PA's Environment, Health, and Safety Principles.

If this lack is compared to the MACT or the BAT standards mandated by the CAA and the CWA respectively, it becomes clear why ISO 14001 can supplement

²²⁴ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, EPA/600/R-93/110, p. 4-79. Also, see Appendix IV.

²²⁵ See Appendix IV.

current rules and regulations, but not replace them. ISO 14001 does little to provide mills with the impetus to invest in research and ‘push the envelope’ in terms of developing innovative pollution prevention technologies. This may be an environmental drawback of ISO 14001.

Encouraging research and development is a tricky issue. It is difficult for traditional “command-and-control” regulations to *encourage* research. In general, research and development flows principally from market and technology demands: ISO 14001’s commitment to pollution prevention and continual improvement could provide a technical or market demand. In any case, like AF&PA’s Principles, ISO 14001 could have explicitly required support of research and development in order to improve environmental performance.

Conclusion

ISO 14001 has the potential to help reduce the environmental impact of kraft mills. The extent to which ISO 14001 will fulfill this potential depends on the likelihood of mills implementing ISO 14001. The widespread adoption of ISO 9001 in the pulp and paper sector points to a high likelihood of ISO 14001 adoption by mills. Moreover, an increased demand for documentation of corporate environmental behavior points to implementation of ISO 14001. In addition to the likelihood of implementation, other factors will influence the extent to which ISO 14001 will help reduce the environmental impact of kraft mills. ISO 14001 should not, however, be seen as an end. Rather,

²²⁶ EPA, *International (Non-U.S.) Industrial Pollution Prevention: A Case Study Compendium*, EPA-820-R-94-005, August 1994.

implementation of ISO 14001 is the beginning of a process to achieve improved environmental performance.

Mills should be willing to implement ISO's EMS for a variety of reasons, such as to fulfill AF&PA's requirements, to enhance environmental documentation and hence liability, etc. In addition, even though ISO 14000 and ISO 9000 are intended to be applicable to any industry, the pulp and paper industry's strong interest in the international and European market might encourage interest in ISO certification. (In 1991, U.S. exports of paper grade wood pulp to Western Europe totaled 2.1 metric tons.²²⁷) At least initially, I expect that ISO 14000 will garner the most interest from organizations involved in international (especially European) trade.

The widespread certification to ISO 9001 in the pulp and paper industry suggests that ISO 14001 certification can also be expected within this industry. ISO 9001 certification is designed to insure consistency in quality, that products meet specification. Since certification requires a third party audit, this eliminates customers' need to perform their own audit. ISO 14001 would provide much the same thing, i.e., a stamp of approval. Moreover, mills seem generally satisfied with ISO 9000. Janet Giddings who implemented ISO 9000 at Alabama River Pulp believes ISO 9000 benefited her company. For example, it forced her company to keep updated documented procedures, allowing critical operating parameters to be targeted. Presumably, similar benefits can be accrued from ISO 14001.

There are, however, some important differences between ISO 9000 and 14000 that should be pointed out. The quality management standards have a clear nexus

between what the standards are insuring (product quality) and the value of the product. With ISO 14001 this nexus is more tenuous: paper made from pulp that comes from a mill that has high particulate emissions can still often be sold for the same price as paper made from pulp from a ‘cleaner’ mill. The success of ISO 14001 depends on whether “environmentally responsible” behavior is economically competitive, or whether external factors (e.g., consumer preferences, liability concerns, etc.) are sufficient to bring about “environmentally responsible” behavior even if this incurs added costs.

Environmental concerns are continually on the rise and constantly pervading the business world. One example of this is the rapidly increasing number of eco-labels targeting pulp and paper products.

Market forces are ... important. In particular, mills that sell pulp or paper into certain environmentally discerning international markets may be forced to adopt further pollution prevention measures in order to comply with the demands of their customers for ‘environmentally responsible’ paper and pulp products.²²⁸

Corporate environment reports have gained importance in the past five years,²²⁹ and businesses are learning new ways to calculate costs that better reflect true costs, i.e., including environmental costs. There is increasing evidence that there is the market demand for “environmentally responsible” behavior (see also Chapter V).

As mentioned earlier, Philip Morris, environmental manager at Alabama River Pulp, believes that one of the key changes brought about by implementation of ISO 14001 is the increased record keeping and degree of formality in the handling of environmental issues. Why would a mill want to go through a process that is so

²²⁷ American Paper Institute, *Exports of Pulp, Paper, Paperboard and Converted Products to World Markets -- 1991*, International Department, New York

²²⁸ EPA 1993, *Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry*, EPA/600/R-93/110, p. 1-3.

bureaucratic and replete with requirements? (Industrial) consumer demand, competition, and environmental credibility associated with ISO certification are going to be the main factors influencing this decision. Moreover, there are some within the environmental management field in the paper industry who believe that implementing ISO 14001 will not be excessively bureaucratic and expensive. Brian Wood, from Weyerhaeuser, believes ISO 14001 implementation will only be bureaucratic and expensive if an organization chooses to make it so. If an organization is already organized “lean,” ISO 14001 will be implemented “lean.”²³⁰ This holds especially true for mills that have already implemented ISO 9000 or already have the key elements of a management system from another system (e.g., AF&PA’s Principles).

How will implementation of ISO 14001 change the environmental impact of a mill? The best way to answer this question is to wait five years and gather field data. Until then, certain predictions can be made. ISO 14001 has certain components that are designed to help a mill see environmental trade-offs. It forces a mill to commit to continual improvement, compliance, and pollution prevention. It requires an environmental policy that is available to the public. Moreover, the third party audit and the documentation required lend credibility to certification.

The example given previously of one of the benefits of ISO 9000 forcing a mill to keep updated documented procedures, allowing critical operating parameters to be targeted, is an excellent example of how a management system can be used to optimize

²²⁹ Sebastian, P., *Environmental Records wield weight for corporations here and abroad*, The Wall Street Journal, Thursday, March 28, 1996, p. A1.

²³⁰ Email communication with Brian Wood, scientist at Weyerhaeuser. 3/26/96. woodb@wdni.com

operations to reduce environmental impact. Reducing soap overflows is another example of how ISO 14001 could help bring about this optimization.

The examples I have given of ISO 14001's impact on the environmental performance have been guided by the regulatory framework the pulp and paper industry faces. This is a limited view, since it does not take advantages of the voluntary nature of ISO 14001. Government regulates in order to protect public health and safety; standards for something as dangerous as dioxin will continue to be promulgated by government. In this respect, ISO 14001 can complement regulation to the extent it encourages pollution prevention, continual improvement, and emphasizes the need to incorporate environmental decisions in all parts of management. ISO 14001 promises to be able to reduce the environmental impact of mills in ways that government regulation cannot. For example, one of the environmental targets defined by a mill may be to increase energy conservation or use of recycled materials -- something that regulation would find difficult to target. Currently, if a buyer cares how much effort a supplier has made to reduce pollutant discharges, she can consult various government sources, such as the Toxic Release Inventory (TRI).²³¹ The TRI, however, aggregates emissions and transfers; it is not designed to give information about reductions in specific pollutants. ISO 14001 registration, with its extensive documentation requirements and third party audit, could be an alternate source of environmental information. ISO 14001 has the potential of not only complementing regulation, but also providing incentives for environmental excellence in areas traditional environmental regulation finds difficult to target.

²³¹ The Toxic Relief Inventory is but just one example. EPCRA reporting requirements, other community-right-to-know laws, etc. are other available sources. In general, however, sources available from the government will provide information about hazardous materials and emissions, rather than more innocuous environmental benefits like decreased water consumption or solid waste generation.

My analysis of the applicability of ISO 14001 to the pulp and paper industry has largely been characterized by the words ‘can,’ ‘might,’ and ‘if.’ This is due in large part to the fact that the standard was written to be as general as possible. However, by not specifying more precisely how continual improvement is to be achieved, best available technologies and research in general are going to suffer.

The generic nature of ISO 14001 makes it difficult to pinpoint how ISO 14001 will affect environmental performance. Brian Wood from Weyerhaeuser believes ISO 14001 implementation will not improve environmental performance directly. Rather, he believes that an organization which implements an ISO 14001-compliant system which matches their existing corporate culture will achieve improved environmental performance indirectly via the integration of environmental concerns into basic business planning.²³² Philip Morris, environmental manager at Alabama River Pulp, also believes ISO 14001 will cause “no significant change in the quality of the environment *per se*.”²³³ He predicts that the degree of formality and record keeping required by ISO 14001 will force a company to think carefully about its environmental decisions. I believe that the requirements for communication with the public and other interested parties, the third party audit, and the optimization the management system is designed to bring about will be the main contributors to the effect ISO 14001 will have on the environment. Moreover, the application of an ISO 14001-compliant management system should be seen as the *start* of a process by which an organization will improve their environmental performance over time. Achieving certification therefore is the start not the end point of an improvement process. The particular medium or performance measure used by the

²³² Ibid.

organization will vary depending on public pressure, applicable regulation, cultural differences and the environmental performance history of the organization.

²³³ Telephone conversation with Philip Morris, 3/11/96, (334) 743-8501.

V: Conclusion

Why would an organization voluntarily choose to implement ISO 14001? If an organization chooses to implement ISO 14001, will this improve the organization's environmental performance? How will ISO 14001 interact with government regulation? By applying the results of the case study, I attempt to answer these questions. My examination of the kraft segment of the pulp and paper industry has demonstrated that ISO 14001 has the potential of being environmentally beneficial. To be able to fulfill this potential, ISO 14001 will have to fulfill numerous criteria. Perhaps most importantly, ISO 14001 will have to be credible. Its credibility will influence both the demand for ISO 14001 and how it will interact with government regulations. EPA's interaction with ISO 14001 will influence an organization's decision to implement ISO 14001, and thus industry demand for ISO 14001. EPA will be a key player in determining how ISO 14001 and government regulation interact. A key criterion for the success of ISO 14001 is that there must be a demand for it. Lastly, implementation of ISO 14001 will have to improve environmental performance.

Credibility

Oswald Dodds, chairman of TC-207's subcommittee 1, believes that "the use of ISO 14001 will tell the world at large ... that the company has a concern about the environment and environmental performance, and how they affect and are affected by the

environment around them.”²³⁴ ISO 14001, however, faces some serious challenges in terms of credibility. The reasons for this are three-fold:

- certification to ISO 14001 is independent of an organization’s past environmental record
- the development of the standard has not been an accessible process
- ISO’s EMS measures whether a company meets its standard for its management system rather than for its environmental performance.

The accessibility of the standard developing process in particular is of concern to many both involved in the process and outside of it. Two of the EPA’s top concerns of 14001 are 1) openness, both in the standards development process and the conformity assessment structure, and 2) disclosure of information to communities.²³⁵ Involving a broad range of interested parties in the ISO 14000 process is necessary to ensure the viability and acceptance of the system. Due to the credibility they command, the participation of environmental groups in particular is essential to ensure the credibility of the ISO process. They have not been able to participate as fully as they should have. Participation by developing countries and small and medium sized businesses is also essential to ensure the equity and practicability of the standard.

Beyond addressing the accessibility of the standards developing process, both TC 207 and the U.S. TAG should look towards third party audits as an important means for establishing credibility. Some of the concerns in the establishment of a credible registration system include:

- consistent interpretation of the standard

²³⁴ *ISO 14001 Standard on its Way*, Quality Systems Update, Special Report, July 1995

- role of self-declaration
- accreditation of the registrars (certification bodies)
- competence of the ISO 14001 auditors
- recognition of ISO 14000 registration certificates worldwide.

Moreover, U.S. industry has expressed grave concerns about public and regulatory agencies' access to the results of the audit.²³⁶ Representatives from other regions, such as the EU, have argued for greater public disclosure of audit findings as a means to enhance the credibility and utility of audits.²³⁷ Public confidence in third-party certification, even when the certification is tied to a national accreditation system, will hinge on the integrity and openness of the system. I believe that if U.S. industry's stance dominates, both ISO 14001 and the environment will lose out.²³⁸ ISO 14001 must be credible to be effective; one of the most effective means of ensuring credibility is to make registration to ISO 14001 more open and transparent.

In the U.S., it is still unsure who will perform the third party audit for ISO 14001, and who will certify these auditors.²³⁹ This is a source of anxiety to many in U.S. industry since many countries have certification bodies that have already been designated to certify ISO 14001. Every European country has a "Competent Body" (whose role it is

²³⁵ Email communication with Mary McKiel, Office of Pollution Prevention and Toxics, EPA, 3/28/96.

²³⁶ Whether ISO 14001 audits are privileged and confidential information was one of the three main legal concerns of the ad hoc legal issues forum of the U.S. TAG. *Lawyers contemplate legal hurdles of ISO 14001*, Quality Systems Update, Vol. 5, No. 10, October 1995. Irwin Professional Publishing

²³⁷ Perrone M., Kirkpatrick D., *Green Becomes Standard*, Export Today, May 1995, p. 58.

²³⁸ U.S. industry's intransigence in this matter is even less reasonable given EPA's new self-audit policy (see later).

²³⁹ For ISO 9000 this was done by a joint effort of the American National Standards Institute and the Registrars Accreditation Board. This was not found to be a satisfactory solution for ISO 14000 (see *Down to the wire: who will provide registrar accreditation, auditor certification in U.S.?*, Quality Systems Update, Vol. 5, No. 10, October 1995. Irwin Professional Publishing or *RAB weighs accreditation options; remains undeterred by ANSI decision*, International Environmental Systems Update, Vol. 2, No.

to register sites) and an “Accreditation Body” (whose role it is to accredit Environmental Verifiers) for EMAS. For example, in the United Kingdom (UK), the UK Accreditation Service (UKAS) has accredited 13 certification bodies to certify BS 7750²⁴⁰ and as of 13th December 1995 these can all now certify to ISO 14001 DIS.²⁴¹ The Comite Francaise d’Accrediation (COFRAC) has accredited five companies as ISO 14001 registrars.²⁴²

EPA and ISO 14001

ISO’s EMS, through its holistic approach to environmental protection, can help EPA achieve its original mission.²⁴³ President Nixon recognized the need for multi-media regulations and pollution prevention when he created the EPA in 1970 through the Reorganization Plan No. 3:

Many agency missions, for example, are designed primarily along media lines -- air, water, and land. Yet the sources of air, water, and land pollution are interrelated and often interchangeable. A single source may pollute the air with smoke and chemicals, the land with solid wastes, and a river or lake with chemicals and other wastes. Control of the air pollution may produce more solid wastes,

11, p.4, November 1995, CEEM Information Services.). Though still uncertain, it appears that the Global Environment and Technology Foundation will have a key role.

²⁴⁰ Recall from Chapter II that BS 7750 is a British standard, and was one of the first environmental management system standards.

²⁴¹ According to an electronic discussion group on ISO 14001, the EU countries have the following accreditation bodies: DANAK (Denmark), FINAS (Finland), COFRAC (France), Bundesumwelt Ministerium (Germany), Ministry for the Environment (Greece), National Accreditation Board (Ireland), Ministerio deli Ambiente (Italy), Ministerie de l’Environnement (Luxemborg), Road voor Certificate (Netherlands), Norwegian Accreditation (Norway), Direccao-Geral Ambiente (Portugal), MOPTMA (Spain), SWEDAC (Sweden), UKAS (UK).

²⁴² *ISO 14001 Certificates Awarded in France*, International Environmental Systems Update, Vol. 2, No. 11, p.3, November 1995, CEEM Information Services.

²⁴³ While EPA hopes to use ISO 14001 in some of its initiatives, it does not plan to incorporate compliance with the ISO 14001 standard into current or future regulations.

which then pollute the land or water. Control of the water-polluting effluent may convert it into solid wastes, which must then be disposed of on land.²⁴⁴

ISO's EMS, through its holistic approach to environmental protection, can help EPA achieve its original mission. As was seen in the case study, the EMS's required commitment to compliance, continual improvement and pollution prevention can complement environmental regulation and encourage environmental performance improvements in areas traditional environmental regulation finds difficult to target.

Beyond ISO 14001's holistic approach, ISO 14001 can be useful to the EPA for several other reasons. ISO 14000 can be useful to the EPA given the difficulties in dealing with environmental issues in the wake of the WTO.²⁴⁵ ISO 14001 represents a tool available to the EPA that will not be challenged as a trade barrier by the WTO.

Since ISO 14001 is voluntary, it can be used to complement various voluntary initiatives at EPA. There have been strong signals from Carol Browner, Administrator of the EPA toward increased flexibility and voluntary initiatives.²⁴⁶ Voluntary efforts are now a central component of EPA's mission statement: "[the]Agency's priorities include emphasizing flexibility and innovation, working in partnerships with private and government groups."²⁴⁷ Examples of voluntary initiatives at EPA include the Common Sense Initiative, the Consumer Labeling Initiative, the Environmental Leadership

²⁴⁴ U.S. House of Representatives. Committee on Government Operations. 1970. *Reorganization Plan No. 3 of 1970 (Environmental Protection Agency): Hearings*. 91st Congress, 2nd Session (July 22, 23, and August 4). H. Doc. No. 91-366, 91st Cong., 2nd Sess.

²⁴⁵ Recall the three cases discussed in Chapter II: the Tuna-Dolphin case, the CAFE standards, and the Reformulated Gasoline case.

²⁴⁶ These calls for increased flexibility are also heard from the White House, Congress, and other political voices. See, for example, the final report by the President's Council for Sustainable Development, or *Adversaries back pollution rules on the books, but flexibility urged*, The New York Times, February 12, 1996, pg. A1, B7.

²⁴⁷ Taken from the World Wide Web. <http://www.epa.gov>

Program, Project XL, and Design for the Environment. ISO 14001 can complement these initiatives.²⁴⁸

According to Cheryl Wasserman, associate director for policy analysis in EPA's Office of Federal Facilities Enforcement, EPA is likely to encourage the use of ISO 14000 as part of its compliance assurance outreach programs.²⁴⁹ On January 22, 1996, the EPA published a final policy statement, *Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations*. This policy encourages companies to voluntarily discover and report to the EPA their own violations of environmental laws. In exchange for this self reporting and upon meeting certain criteria, EPA will not seek or will reduce penalties.²⁵⁰ ISO 14001, with its commitment to compliance and audit requirements, is ideally suited to complement this policy. Companies should be encouraged to audit themselves to confirm that they are complying with pollution rules and to minimize waste in manufacturing.²⁵¹ How much control the companies should be granted over the resulting information and how much protection they should earn by coming forward will not be answered by ISO 14001; ISO 14001 audits can be a source of information to the EPA.

²⁴⁸ ISO 14001 currently serves as the basis for a Project XL. The project was submitted by AT&T Microelectronics (now called LUCENT Technologies) and targets water permits under the National Pollutant Discharge Elimination Program. LUCENT plans to use the implementation of ISO 14001 as the vehicle for discovering and correcting environmental problems that it might not otherwise find. EPA (and the appropriate state Agencies) will work closely in a monitoring and technical assistance mode to help AT&T achieve the improvements. Email communication with Mary McKiel, Office of Pollution Prevention and Toxics, EPA, 3/28/96.

²⁴⁹ Cheryl Hogue, *Firms accredited under ISO 14000 might garner credit under sentencing guidelines*, 11/25/94, No. 225, © 1994 by The Bureau of National Affairs, Inc., Washington, D.C. pg. A-8, 9.

²⁵⁰ W. Shirley 1996. *EPA Issues Policy on Self-Policing*, Chemical Engineering Progress, February 1996, p. 25

²⁵¹ John Cushman, *Many States give polluting Firms new Protections*, The New York Times, April 7, 1996, pg. A1, A12.

ISO 14001 can be of use to the enforcement arm of EPA for another reason. Since ISO 14001 requires a commitment to compliance, this allows EPA the possibility of focusing its attention on ‘bad actors’ -- companies that are environmentally egregious. The extent to which EPA can focus on ‘bad actors’ is a function EPA’s access to audit results and the credibility of registration, both of which remain areas of controversy.

Examples of some other potential uses of ISO 14001 by EPA and other agencies (such as the Justice Department) include:²⁵²

- to recognize due diligence in complying with regulations and therefore to reduce penalties for noncompliance
- to schedule fewer routine inspections and achieve faster permitting procedures²⁵³
- to reduce the number of regulatory inspections and audits of manufacturing processes
- to streamline reporting and monitoring burdens
- implementation of ISO 14001 could become a condition of business loans or reduced insurance premiums.²⁵⁴

Demand for ISO 14001

My case study showed that there are various reasons mills may want to implement ISO 14001, including reduced trade barriers and regulatory oversight, liability concerns, etc. In using the pulp and paper industry, I happened to have chosen an industry that had

²⁵² It should be noted that since ISO 14001 is a voluntary program and there are costs associated with both its implementation and certification, ISO 14001 is not the only way to take advantage of these benefits.

²⁵³ Germany is also looking at the role ISO 14001 can play in simplification of its permitting procedures. Tom Tibor, *ISO 14000*, Irwin Professional Publishing, Chicago, © 1996. p. 10

already demonstrated a keen interest in international management standards. Moreover, the pulp and paper industry's strong international component can only contribute to its interest in ISO 14001. Can a similar conclusion be drawn for other industries, even those with little international activity? Evidence of the extent of interest outside of the pulp and paper industry in ISO 14001 can be seen from a variety of sources. Examples include:

- the U.S. TAG voted to adopt ISO 14001 upon completion as a U.S. Standard through the ANSI Procedures for Synchronization of the National and International Standards;²⁵⁵
- the Big Three automakers (Ford Motor Co., Chrysler Corp., General Motors) indicated their interest in ISO 14001 at a supplier meeting in October 1995;²⁵⁶
- a 1995 survey indicated that 60% of midsize manufacturers favor drawing up international environmental management standards;²⁵⁷
- another survey demonstrated the extent of interest in ISO's standards (69% of U.S. corporate controllers believe ISO 9,000 certification is important to their companies in doing business in the global marketplace);²⁵⁸

²⁵⁴ In fact, the governments of Brazil and Japan have recently introduced legislation to require that applicants for government-backed loans and grants have an "environmental management system." Email communication with Mary McKiel, Office of Pollution Prevention and Toxics, EPA, 3/20/96.

²⁵⁵ *U.S. seeks to gain competitive advantage by publishing ISO 14001 look-alike*, Quality Systems Update, Vol. 5, No. 10, October 1995. Irwin Professional Publishing.

²⁵⁶ *Big Three warn suppliers of possible industry EMS requirements*, International Environmental Systems Update, Vol. 2, No. 11, p.1, November 1995, CEEM Information Services.

²⁵⁷ Perrone M., Kirkpatrick D., *Green Becomes Standard*, Export Today, May 1995, p. 56.

²⁵⁸ *ISO Certification critical to global competition, say U.S. Corporate controllers*, Copyright 1995 by Business Wire, Dec. 21, 1995, from Newsgroup: clari.biz.industry.banking.releases

- on March 28, 1996, the Wall Street Journal published an article on its front page on the importance of environmental performance records for corporations in the U.S. and abroad.²⁵⁹

There are many reasons beyond the regulatory incentives mentioned previously why companies should be interested in implementing ISO 14001.²⁶⁰ Environmental issues can make or break business ventures, especially in emerging global markets. The importance of corporate environment performance reports have gained importance in the past five years, second now only perhaps to government sources.²⁶¹ ISO 14001 has a heavy emphasis on environmental record keeping and documentation, and is thus ideally situated to fill this demand.

In general, the implementation driver for ISO 14001 will be competitive and commercial pressures. The trend is for companies to want to deal with environmentally responsible companies.²⁶² Registration may also be a way of minimizing liability for suppliers' environmental woes.²⁶³

²⁵⁹ Sebastian, P., *Environmental Records wield weight for corporations here and abroad*, The Wall Street Journal, Thursday, March 28, 1996, p. A1. While ISO 14001 is not a performance record, its required documentation and audits can provide the means of compiling an environmental performance record.

²⁶⁰ The regulatory incentives mentioned previously focused on the U.S. Other countries are also considering ways of using ISO 14001. The United Kingdom's Ministry of Defense may require potential vendors to achieve EMS registration, and the Dutch government may use EMS registration to issue permits and check compliance among regulated companies. The Brazilian, Argentinean, and Chilean governments are considering applying pressure on companies in key sectors such as petroleum, mining, and the pulp and paper industry to implement ISO 14001. Tom Tibor, *ISO 14000*, Irwin Professional Publishing, Chicago, © 1996. p. 10

²⁶¹ Sebastian, P., *Environmental Records wield weight for corporations here and abroad*, The Wall Street Journal, Thursday, March 28, 1996, p. A1.

²⁶² Tibor, T., *ISO 14000 Standards*, Papermaker, October 1995, p. 44. Note also that reasons for this can be found beyond the EPA, and include the Securities and Exchange Commission's more stringent environmental disclosure requirements, and the draft federal sentencing guidelines for corporate environmental offenses, which propose mitigation of sanctions where proactive management programs are in place.

²⁶³ Scicchitano P., *Managing the environment with ISO 14000*, Quality Digest, November 1995, p. 45

There is a strong interest in the ISO 14000 standards, and there are many incentives for companies to consider implementation of ISO 14001. These incentives hold true for industries that do not share the same characteristics of the kraft segment of the pulp and paper industry. If market pressure drives registration, it will not just be on large multi-national companies, but also on small companies that are part of the supply chain.

Companies are realizing that environmental responsibility is a business issue. Industry sectors and trade associations are setting up environmental codes of good practice and management principles to address public interests and enhance corporate image. The CMA's Responsible Care program, the CERES principles, the ICC's Business Charter for Sustainable Development, and AF&PA's Environmental, Health, & Safety Principles are but just a few examples. Table 5.1 below outlines the requirements of these initiatives and compares them to EMAS and ISO 14001.

Table 5.1: Comparison of Several Voluntary Management Standards with ISO 14001

| | Responsible Care | CERES | ICC Charter | EMAS | AF&PA's Principles | ISO 14001 |
|--|---------------------------------|----------------------------------|--------------------------------|-------------|-------------------------------|---|
| Assess environmental releases | Required | Implied | Limited | Required | Implied | Required |
| Establish measurement systems | Required | Not addressed | Required | Required | Required | Required |
| Set goals | Required | Implied | Not addressed | Required | Required | Required |
| Employee training | Required | Implied | Required | Required | Required | Required |
| Self-audit | Required -- results only to CMA | Required -- results to CERES | Required -- results internal | Required | Not required | Required -- results internal |
| Third party verification | Voluntary | Not addressed | Not required | Required | Not required | Required for certification |
| Supplier conduct | Required | Implied | Implied | Required | Not addressed | Limited |
| Distributor & consumer conduct | Required | Not addressed | Required | N/A | Implied | Limited²⁶⁴ |
| Compliance with environmental laws | Not addressed | Required disclosure of penalties | Compliance evaluation required | Required | Required as a goal | Required in goals |
| Outside involvement in program development | Limited | Broad | Not addressed | N/A | Not addressed | Open but problems with accessibility |
| Information disclosure | Limited | Broad | Limited | Broad | Broad | Limited |
| Openness to outside concerns | Required | Required | Required | Broad | Broad | Documentation of response required |

CMA is looking to integrate verification of Responsible Care management systems with ISO 14001 certification.²⁶⁵ In fact, there is enough similarity between the two programs to forgo the development of separate auditing systems for Responsible

²⁶⁴ Clause 4.3.6 of ISO/DIS 14,001 requires organizations to establish and maintain “procedures related to the identifiable significant environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to *suppliers and contractors*.” Emphasis added.

²⁶⁵ A. Lucas and M. Roberts, *Environmental Management Standard set for 1995 Debut*, Chemical Week, November 9, 1994, p. 34.

Care and ISO 14001.²⁶⁶ From the case study, we have seen that AF&PA does not foresee ISO 14001 replacing their principles. Rather, ISO's EMS can be used to meet AF&PA's Environment, Health and Safety Principles.

ISO 14001 bridges sector-specific programs by setting a standard for all environmental management systems. The generic nature of ISO 14001 will allow its implementation to satisfy many of the criteria of other initiatives. However, these other initiatives are not going to disappear and ISO 14001 will not replace them. Rather, the ISO EMS may be a means of fulfilling the requirements of other voluntary environmental management initiatives.

Beyond the advantages mentioned previously, ISO 14001 can be useful for other reasons. Some foreign governments already are considering the acceptance of third-party registration to ISO 14001 as an optional way of demonstrating compliance with environmental permitting requirements.²⁶⁷ ISO 14001 can be useful for countries like Mexico, which has extensive environmental laws but lax enforcement.²⁶⁸ Since the standard requires compliance (with laws in the country of operation), it is the company that has to pay an auditor to certify that it complies with the appropriate laws. This is yet another example of why the credibility of auditors and the registration process is so important.

²⁶⁶ Ibid.

²⁶⁷ *U.S. seeks to gain competitive advantage by publishing ISO 14001 look-alike*, Quality Systems Update, Vol. 5, No. 10, October 1995. Irwin Professional Publishing.

²⁶⁸ see also *Business leaders urge implementation in Mexico*, International Environmental Systems Update, Vol. 2, No. 11, p.10, November 1995, CEEM Information Services.

Improving Environmental Performance

The effect of ISO 14001 on companies' environmental impact is extremely difficult to determine due to the broad way the standard was written. By looking at some practical examples within the pulp and paper industry, certain strengths and weaknesses of ISO 14001 can be identified.

The ISO EMS is a tool designed to help an organization establish and meet its own environmental policy goals. Evidence of compliance with applicable rules and regulations, a commitment to continual improvement and pollution prevention all have to be included. By mandating that consistent compliance with applicable laws and regulations is maintained, ISO is recognizing that a perfect management system is not enough. The EMS can be for internal use as a vehicle for improving environmental performance, achieving greater cost efficiencies, and improving communication of environmental performance with stakeholders (be they consumers, the public, insurers, etc.).

The European Environmental Bureau has launched a campaign against ISO 14000. It charged that ISO 14000 was developed by a system driven mainly by transnational companies, rather than a system where the law is defined by public authorities with public debate. Two of the Bureau's other main criticisms were that complying with local rules and regulations can often times not be enough (as the Southern Peru Copper Smelter exemplifies), and that the standard mandates that a company meet requirements set out for its management system rather than for its environmental performance.²⁶⁹

²⁶⁹ Reuters, *Warning on Worldwide Environmental Standards*, [Seattle Post-Intelligencer](#), October 27, 1995.

This last criticism cuts to the heart of what ISO 14001 is. Since it is a management system, and has as its fundamental premise that better environmental management will bring better environmental performance, this is the nature of the beast. Like the ISO 9,000 standards on quality management, the environmental management system deals with the process and not the end results. However, TC-207 should have tried to make the nexus between management and performance more immediate by modeling itself more on EMAS²⁷⁰. Another key criticism, as the examples of enzyme catalysis and VOC emissions given in the case study demonstrate, is that ISO failed to recognize the importance of pushing for research and innovation.

ISO 14001 is not a panacea. On March 22, 1996, the Justice Department filed suit against Asarco Inc., demanding pay for environmental damage caused by an Idaho mine operated in part by Asarco.²⁷¹ A useful way of thinking about ISO 14001 is that it is a tool to optimize (minimize) the environmental impact of an organization; i.e., ISO 14001 cannot fundamentally change the character of an organization that flaunts environmental laws or simply does not care. Moreover, ISO 14001 is unlikely to bring about improvements in environmental performance without the support of environmental laws.

Environmental laws still have their place, and ISO 14001 can serve to complement them. ISO 14001 can also complement other voluntary environmental activities, which also have their place. In the Idaho mine case, Asarco has said that the litigation will probably delay any cleanup. Voluntary initiatives foster public-private partnerships, and are designed to avoid exactly this kind of situation. Ultimately, the environmental effect of ISO 14001 remains yet to be seen. There are still strong

²⁷⁰ Recall that this was a contentious issue in the ISO 14001 development process. See Chapter II.

sentiments that industry may not deserve the trust the new programs like ISO 14001 invest in it. Bhopal, Love Canal, and the Cuyahoga River are not easily forgotten.

But to join industry and government in partnership is to invite the lion to lie down with the lamb. Sometimes it works, but all too often the result is lamb stew for lunch...²⁷²

ISO 14001 has the potential of reducing the environmental impact of industries throughout the world. Fundamentally, one would expect industry to be doing many of the things ISO 14001 or other management systems mandate. Yet the recent heightened interest in total quality management indicates that this may simply not be the case. If ISO 14001 has garnered the necessary credibility and is implemented by an organization operating under strong environmental laws, I predict that it will succeed.

²⁷¹ Cushman, J., *U.S. Sues Mining Companies over Pollution*, New York Times, March 23, 1996, p. A 10.

²⁷² Burkholz, H., *The FDA Follies*, (Basic, 1994), p. 5.

Appendix I: AF&PA's Environmental, Health, and Safety Principles

AF&PA requires member companies to publicly pledge to adhere to AF&PA's Environmental, Health, and Safety Principles. These principles are summarized below. In addition to the principles, implementing guidelines for each principle have also been included. Since I am concentrating on the environmental implications of these principles, I have not included references to health and safety principles. (Source: American Forest & Paper Association, *Environmental, Health, & Safety Principles*, Washington, D.C. © 1996.)

AF&PA's Environmental, Health, and Safety Principles:

1. Make environmental, health, and safety considerations priorities in operating existing facilities, as well as in planning new operations:
 - a) Strive to eliminate environmental concerns in company operations and to seek out areas for continual improvement;
 - b) Develop, implement, and enforce policies, plans, and procedures in order to achieve compliance with environmental regulations;
 - c) Use sound practices in the environmental area;
 - d) Make environmental considerations an integral part of strategic planning and capital budgeting processes in order to anticipate and manage future concerns;
 - e) Initiate corrective action immediately if a situation arises which may lead to significant adverse effects on employees, the public, or the environment;
 - f) Use operating experiences to reassess performance and to make appropriate short- and long-term improvements in operations.

2. Recognize, in developing and designing products to meet customer needs, the environmental ... effects of product manufacture, distribution, use and disposal:

- a) Develop programs and monitor their effectiveness in reducing environmental concerns in product manufacture, distribution, use and disposal;
- b) Continue the ongoing financial commitment to environmental protection;
- c) Provide customers and communities with pertinent information relating to the environmental concerns of product manufacture, distribution, use and disposal;
- d) Consider available measures, including source reduction or substitution, external treatment, and engineering controls, in deciding how to best prevent or reduce pollution.

3. Monitor their environmental, health, and safety performance and report regularly on these matters to their Boards of Directors, as well as confirm their adherence to these principles annually to AF&PA:

- a) Develop internal environmental goals and programs, with mechanisms in place to assess operations and progress;
- b) Appoint an upper management individual(s) or committee(s) to guide and lead corporate activities concerning environmental issues.
- c) Designate a responsible individual(s) at each manufacturing location to be accountable for environmental activities;
- d) Coordinate activities and information on environmental matters among local managers, corporate environmental staff, and senior management.

4. Train employees in their environmental, health, and safety responsibilities and promote awareness and accountability on these matters:

- a) Develop and implement education, training, and communication programs in environmental policies and procedures for employees, stressing the importance of compliance with the law;
 - b) Conduct regular reviews of employees' compliance with applicable regulations and company requirements;
 - c) Encourage and recognize individual and team efforts to improve environmental performance;
 - d) Take appropriate disciplinary action against employees who fail to follow environmental policies, procedures, and regulatory requirements;
 - e) Encourage employees to participate in activities and technical organizations which focus on environmental concerns, as well as to pursue continuing education in these areas.
- 5) Improve environmental, health, and safety performance through support of research and development that advance the frontiers of knowledge:
- a) Focus effort and resources on the most significant environmental issues;
 - b) Pursue opportunities for greater cooperation among all sectors in identifying, prioritizing, managing, and funding environmental initiatives;
 - c) Promote sound environmental principles and practices throughout the industry and share ideas consistent with proprietary and legal considerations;
 - d) Recognize the international dimensions of environmental concerns, and support efforts to share knowledge and to develop sound solutions through international cooperation.

6. Communicate with employees, customers, suppliers, the community, public officials, and shareholders to build greater understanding on environmental ... matters:

- a) Respond accurately and promptly to questions and concerns of interested parties, particularly in the event of a situation which may require corrective action;
- b) Seek out interested parties regularly and communicate on industry activities and performance;
- c) Work with others to address concerns and to reach consensus on important issues;
- d) Carefully evaluate criticisms and complaints concerning industry activities;
- e) Support information exchange programs and environmental education efforts;
- f) Regularly evaluate the effectiveness of the ongoing communications effort.

7. Participate constructively in the development of public policies on environmental ... matters:

- a) Work with government entities in the development of public policies that are based on sound scientific principles and economically achievable technologies;
- b) Encourage employees to contribute to the development of industry positions through involvement in internal company deliberations, trade associations, and/or technical organizations;
- c) Keep aware of progress on issues so contribution can be made during the development process;
- d) Inform and educate public officials regularly on the nature of the company activities and their compatibility with environment goals.

8. Continue to pursue energy conservation, increased energy efficiency, greater utilization of alternative fossil fuels, and opportunities for cogeneration of electricity:

- a) Increase utilization of renewable domestic energy sources and process residues, primarily wood residues, spent pulping liquors, and hydropower;
- b) Enhance energy efficiency through improvements of product and process technologies;
- c) Continue expanding the industry's ability to self-generate electricity from alternative fuels -- including wood residues and nonrecyclable recovery paper -- as well as from clean-burning domestic fossil fuels.

Appendix II: ISO 14001, EMAS and BS 7750

Table AII.1: Comparison of ISO 14001, EMAS and BS 7750²⁷³

| System Element | ISO 14001 | EMAS | BS 7750 |
|----------------------------------|----------------------------|---|----------------|
| EMS | 4.0 | Annex I, Part B | 4.1 |
| Preparatory Environmental Review | Annex A.4.2.1 | Article 3, Paragraph b Annex I, Part C | Annex A.1.2 |
| Environmental Policy | 4.1 | Annex I, Part A and D | 4.2 |
| Organization and Personnel | 4.3.1, 4.3.2 | Annex I, Part B2 & D11 | 4.3 |
| Environmental Effects/Aspects | 4.2.1, 4.2.2 | Annex I, Part B3 & D2/3 | 4.4 |
| Objectives and Targets | 4.2.3 | Annex I, Part A4 | 4.5 |
| Environmental Mngmt Program | 4.2.4 | Annex I, Part A5 | 4.6 |
| Manual and Documentation | 4.3.4, 4.3.5 | Annex I, Part B5 | 4.7 |
| Operational Controls | 4.3.6, 4.3.7, 4.4.1, 4.4.2 | Annex I, Part B4 & D6-7 | 4.8 |
| Records | 4.4.3 | Annex I, Part B5 | 4.9 |
| Audit | 4.4.4 | Annex I, Part B6, Annex II | 4.10 |
| Management Review | 4.5 | Annex I, Part B1 | 4.11 |
| Environmental Statement | N/A | Article 5 & Annex V | N/A |

²⁷³ Adapted from homepage of the Quality Network, <http://www.quality.co.uk.emas.html>

Table AII.2: Differences between ISO 14001 and EMAS

| ISO 14001 | EMAS |
|---|---|
| A draft (international) standard | An EU legislative instrument |
| Applies to the international arena | Applies to the entire EU |
| Can apply to whole or only part of an organization | Applies to sites only |
| Applicable to an organization's activities, products and services in any sector | Restricted to site-specific industrial activities |
| Applicable to non-industrial activities, e.g., transport and local government | Non-industrial activities can only be included on an experimental basis |
| Focuses on organizations implementing environmental management systems; indirect link to environmental improvements emerging from the system | Direct focuses on environmental performance improvements at a site and the provision of information to the public |
| Environmental policy commitment to continuous improvement of environmental management system and compliance with relevant environmental legislation | Environmental policy commitment to continuous improvement of environmental performance and compliance with relevant environmental legislation |
| Environmental management audits concerned with the assessment of environmental management system only | Environmental audit assesses management systems, processes, factual data and environmental performance |
| Frequency of audits not specified | Maximum audit frequency specified at three years |
| Only the environmental policy must be publicly available | A description of the environmental policy, program and management system made publicly available in the statement |
| Only the environmental policy must be publicly available | A description of the environmental policy, program and management system made publicly available in the statement |
| Public statement not required, consideration must be given to external communication (subclause 4.3.3) but left up to management as to how much information to disclose | Public environmental statement and annual simplified statement including factual data essential |

Appendix III: The other ISO 14,000 standards

The other standards

The Life Cycle Assessment (LCA) standard deals with all the environmental attributes of a product, process, or service. The assessment runs all the way from raw material extraction to final disposal. The LCA standard is intended for life-cycle professionals as a means to standardize the approaches and methodologies used to conduct LCA's. Currently there is no consensus on what the correct methodology is, creating problems in terms of classification and possibly trade barriers. Of all the standards in the 14,000 series, this is the one that still requires the most work.

Environmental performance evaluation (EPE)²⁷⁴ allow organizations to answer the fundamental question: how are we doing? The evaluation is a process that will allow environmental performance to be measured, analyzed, and described based on agreed upon criteria: environmental performance indicators.²⁷⁵ This process would include identifying significant risks and effects on the environment, assessing how well environmental goals are being met, and communicating with stakeholders. It should be noted that one of the purposes of EPE is stakeholder communication, and that EPE should appropriately consider interested parties' expectations and concerns, as well as regional, cultural, and socio-economic factors.

LCA is a vital component of Environmental Aspects in Product Standards (EAPS), since it allows the life cycle stages where the greatest environmental impacts

²⁷⁴ EPE is defined in the draft of ISO 14031 standard as review of an organization's environmental aspects to determine whether objectives are met.

occur to be identified. The idea behind EAPS is to incorporate environmental aspects in the development of product standards. The standard is meant to be used by standards developers to assist them in incorporating desirable attributes into product standards.

Environmental auditing (EA) will offer organizations guidance on determining whether the EMS they have implemented conform to requirements, and whether they are in compliance with applicable rules and regulations. The official scope of SC 2 is “standardization in the field of environmental auditing and related environmental investigations.” Included in ISO’s work on environmental auditing are general principles of EA, specific auditing procedures for various types of audits, and guidelines for environmental site assessments. Also, ISO is setting out qualifications for environmental auditors (e.g., there are requirements for education and work experience, formal on the job training, etc.). This last area is considered to be extremely important since the auditor is vital in lending credibility to the steps an organization has taken to improve its environmental performance.

The environmental labeling standard will provide requirements for the three eco-label types.²⁷⁵ The eco-labeling standard will address issues like developing a standard terminology, definitions, symbols, test methods, test summary, reporting standards, etc. The labeling standard is meant to create procedures and principles for labeling programs like the Green Seal or Blue Angel programs. It is intended that programs could follow this standard and avoid the kinds of situations which have evolved where differing national and regional labeling programs have unwittingly created trade barriers

²⁷⁵ Any quantifiable attribute of an organization’s activities that characterizes the potential implications of these activities with respect to the environment

²⁷⁶ Type I is essentially a third-party seal of approval, type II can be characterized as single-claim labels, and type III consist essentially of a (environmental) report card.

Eco-labeling and the WTO

Recent WTO dispute panel decisions have shown that environmental labeling may become a potential barrier to trade, and has therefore become a significant concern to the WTO. The WTO's premise has been to judge product characteristics, not product processes and production methods (PPM's). However, many in the environmental field believe this is short sighted at best, and that the environmental consequences of production should be included in product labeling. The WTO has not decided whether inclusion of PPM criteria in labeling programs will be considered a trade barrier, and hence a violation of the GATT.

For example, in the tuna-dolphin case brought forward by the EU and the Netherlands,²⁷⁷ the GATT Dispute Panel found that the embargo was inconsistent with the GATT Article XI prohibition on import restrictions (other than duties, taxes, or other charges). The reason the Panel came to this conclusion was its definition of *like products*.²⁷⁸ The U.S. had argued that the embargo was justified under the exceptions in GATT Article XX. Article XX(g) provides an exception for measures taken to conserve an exhaustible natural resource. Article XX(b) provides an exception for measures taken to protect animal life or health.

²⁷⁷ It should be noted that the tuna labeling issue was brought to the WTO twice: once by Mexico (where the U.S. embargo targeted imports of tuna from Mexico) and the other time by the EU and the Netherlands (where imports from imports from countries were targeted).

²⁷⁸ Annex 3 of the Code of Code Practice for the Preparation, Adoption and Application of Standards, Provision D states: "In respect of standards, the standardizing body shall accord treatment to products originating in the territory of any other Member of the MTO no less favorably than that accorded to *like products* of national origin and to like products originating in any other country." (Emphasis added.) Also, Provision I states: "Wherever appropriate, the standardizing body shall specify standards based on product requirements in terms of performance rather than design or descriptive measures."

Eco-labeling is another excellent example of the difficulties in addressing environmental concerns due to the WTO and other multi-lateral environmental agreements. PPM's are arguably one of the most effective means of reducing the environmental impact of a process or product since they get at *how* the product is made (this is also the concept behind pollution prevention). Eco-labeling presents one of the few means available to regulatory agencies and others to get at PPM's. Yet the WTO has created a framework that makes it more difficult, even possibly a trade violation, to do this.

Registration only applies to 14001; however, conformity assessment will most likely be an issue for both the EMS standard and for the eco-labeling standard. The eco-labeling standard is not designed to come up with an international system for product certification. Its goal is to establish the *principles and procedures* to be followed by labeling programs. The advantages of having a uniform approach include mutual recognition among existing programs (international recognition), uniform product criteria from different programs, and minimization of impact on international trade. This process will no doubt be difficult. The first question (especially given the fact that the standard is voluntary) is: will national labeling programs (such as "Blue Angel" and "Green Seal") adopt the standard and seek recognition? Even though many eco-label programs are active in the ISO 14,000 process,²⁷⁹ what they will ultimately decide can not be answered yet. In any case, conformity assessment of EL certification programs will require:

- the endorsement and participation of national labeling programs

- the establishment of a mutual recognition system between different programs
- some international supervision.

Conformity will most likely have advantages both for the consumers and the programs themselves.

Timeframe for ISO 14,000 standards

The target dates for the various specification documents are:

- | | |
|--|-------------|
| • EMS specification and guidance standards | May 1996 |
| • principles of environmental auditing | July 1996 |
| • eco-labeling principles and practices | End of 1996 |
| • environmental performance evaluation | 1998 |
| • life cycle assessment | 1997-1998 |

Currently, six documents have reached Draft International Status. These are:

- DIS 14,000: *Environmental Management Systems -- General Guidelines on Environmental Management Principles, Systems, and Supporting Techniques*
- DIS 14,001: *Environmental Management Systems -- Specification with Guidance for Use*
- DIS 14,010: *Guidelines for Environmental Auditing -- General Principles*
- DIS 14011.1: *Guidelines for Environmental Auditing -- Audit Procedures -- Part 1: Auditing of environmental management systems*
- DIS 14012: *Guidelines for Environmental Auditing -- Qualification criteria for environmental auditors*

²⁷⁹ For example, representatives from both the Scientific Certification Systems and Green Seal have been

- DIS 14,060: *Guide for the inclusion of environmental aspects in product standards*

active at the U.S. TAG level.

Appendix IV: Forestry applications of ISO 14000

The development of the ISO 14,000 standards is occurring at a time of heightened attention of sustainable forestry issues. Despite claims by those who manage the forests, it is evident that the forest industry's customers and the public are looking for assurances that forests are being managed on a sustainable basis. In light of this, the demand for third-party certification of sustainable forestry practices is on the rise. The need for harmonized international principles and criteria for sustainable forestry can be seen by the plethora of initiatives already out there:

- Montreal Process
- Helsinki Process
- UNCSD Intergovernmental Panel on Forests
- Forest Stewardship Council
- conventions on biodiversity and global climate change
- numerous eco-label programs targeting paper products

However, at the recent plenary session in Oslo (June 1995), the Canadian and Australian proposal to have a standard specific to the forestry industry was decisively rejected.²⁸⁰ TC-207 opposed a sector specific standard because it first wants to give the 'generic standard a chance.' A New Zealand-led study group is examining this question for ISO. The results of this study will be presented at the next annual meeting of TC-207 scheduled for Durham, South Africa in June/July 1996.

²⁸⁰ see *Forestry Standard Rejected*, Papermaker, October 1995, p. 45.

The elements of ISO 14,000 with potential application to forestry operations include:

- ISO 14001 Environmental Management Systems
- ISO 14010, etc. Environmental Auditing
- ISO 14031 Environmental Performance Evaluation

The elements where forest products applications remain to be determined include:

- ISO 14020, etc. Environmental Labeling
- ISO 14040, etc. Life Cycle Assessment
- ISO 14060 Environmental Aspects of Product Performance

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