

00E056I

00E056I
RP-CRPC-41

Development of a Corporate Environmental Policy for the Rain Forest Aerial Tram



Original letter from Luis Sánchez:

From: Fundacion del Teleférico del Bosque Lluvioso <fundacion@rainforest.co.cr>
Save Address - Block Sender
To: "'primus@wpi.edu'" <primus@WPI.EDU> Save Address
Subject: RV: Directed to Luis Sánchez
Date: Thu, 23 Mar 2000 00:53:35 -0600

Desde: luis
Enviado el: Jueves 16 de Marzo de 2000 04:26 AM
Para: 'Lauren Abrahamsen'
Asunto: RE: Directed to Luis Sánchez

Hello my name is Luis Sánchez and I am the Rain Forest Aerial Tram Foundation Manager.

Basically what we expect from this initiative is to develop an environmental policy that applies in all of the areas of the company.

This policy will be also useful to get our certification on ISO 14000 (are you familiar with this?). So our idea is to follow the requirements of the ISO 14000, which you can find in almost any library.

I guess the most efficient way to communicate would be by e-mail, but if you need to contact me, phone would be ok (better in the mornings).

You can have detailed information about the Aerial Tram at our web page:
<http://www.rainforesttram.com>

If you need further information about our activities, please let me know and I would be more than glad to get it for you, Sincerely

Luis Sánchez

Sr. Luis Sánchez

Rain Forest Aerial Tram
100 mts Oeste Edif. INS,
Calle 7, Avenida 7
San Jose, Costa Rica

July 4, 2000

Dear Señor Sánchez,

Enclosed is our completed report entitled "Development of a Corporate Environmental Policy For The Rain Forest Aerial Tram." The Aerial Tram in conjunction with Worcester Polytechnic Institute has sponsored this project. It was written during the period of March 20 through July 4, 2000. Preliminary project work was completed in Worcester, Massachusetts prior to our arrival in Costa Rica. Copies of this report are simultaneously being submitted to Professors Angel Rivera and Roberto Pietroforte for evaluation. Upon faculty review, a copy of this report will be catalogued in the Gordon Library at WPI. We thank you very much for the time you dedicated to us, and the opportunity to work with a great company.

Sincerely,

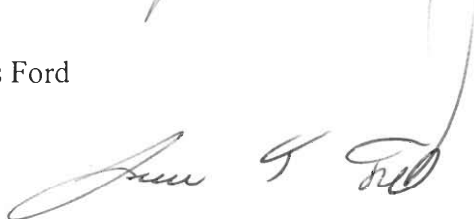
Lauren Abrahamsen



Kate Johnson



James Ford



Report Submitted to:

Roberto Pietroforte
Angel Rivera

Costa Rica, Project Center

By

Lauren Abrahamsen

James Ford

Katherine Johnson



In Cooperation With

Luis Sánchez, Foundation Manager

Rain Forest Aerial Tram

DEVELOPMENT OF A CORPORATE ENVIRONMENTAL POLICY FOR
THE RAIN FOREST AERIAL TRAM

July 5, 2000

This project report is submitted in partial fulfillment of the degree requirements of Worcester Polytechnic Institute. The views and opinions expressed herein are those of the authors and do not necessarily reflect the positions or opinions of The Rain Forest Aerial Tram or Worcester Polytechnic Institute.

This report is the product of an education program, and is intended to serve as partial documentation for the evaluation of academic achievement. The report should not be construed as a working document by the reader.

ACKNOWLEDGEMENTS

Team Aerial Tram would like to recognize and thank all of the people who have helped us complete this project. Without your efforts, this project would not have been possible.

First and foremost we would like to thank our Liaison, Luis Sánchez, for his assistance and dedication to this project. Next we would like to thank Adriana Carballo for taking time out to familiarize us with the tram site and helping us gather information. The team would also like to thank Marcela Alvarado, Adrián Gonzáles, and Miguel Solano for taking time to provide us with company information as well as assistance. We wish to express our appreciation to Merle Naranjo as well for making arrangements for us to visit the Tram site.

Team Aerial Tram is very thankful for information provided by Cesare Tolentino and Christopher Scholl. Your knowledge of ISO 14000 proved to be extremely helpful.

To all those who lent us their computers, especially Arthur Gerstenfeld, Professors Angel Rivera, and Roberto Pietroforte, thank you very much.

Finally, we would like to thank Professors Roberto Pietroforte and Angel Rivera for their invaluable suggestions and guidance throughout this project.

ABSTRACT

This report, prepared for the Rain Forest Aerial Tram, explains the steps needed for the company to achieve ISO 14000 certification, including a section of recommendations. The report, in addition, provides the company with an ISO 14000 compliant corporate environmental policy, another necessary step needed towards ISO certification. The recommendations include a list of suggestions fulfilling the clauses of the environmental policy and its implementation.

AUTHORSHIP PAGE

This report was written through the combined efforts of Lauren Abrahamsen, Katherine Johnson, and James Ford. All of these individuals contributed equally on all portions of this report.

TABLE OF CONTENTS

I. LIST OF FIGURES	5
II. LIST OF TABLES	6
III. EXECUTIVE SUMMARY	7
CHAPTER 1 - INTRODUCTION.....	10
CHAPTER 2 - BACKGROUND.....	14
2.1 ISO	15
2.1.1 ISO Overview	15
2.1.2 History of ISO.....	15
2.1.3 ISO 14000	16
2.1.4 Comparing ISO 14000 to ISO 9000.....	17
2.1.5 Development of Standards.....	17
2.1.6 Advantages of ISO 14000.....	18
2.1.7 Environmental Management Systems.....	19
2.1.8 Benefits of an EMS.....	22
2.1.9 Choosing ISO 14000 for a Company.....	22
2.1.10 The Four Steps of Planning.....	24
2.1.11 Implementation of ISO 14001	26
2.1.12 The Five Steps of Certification	29
2.2 ISO Environmental Policy	30
2.2.1 Advantages.....	30
2.2.2 Commitment	31
2.2.3 Approaches	31
2.3 Conservation, Waste Management, and Recycling	34
2.3.1 Energy Conservation.....	34
2.3.2 Water Conservation	36
2.3.3 Waste Prevention	38
2.3.4 Waste Paper	38
2.3.5 Plastics	40
2.3.6 Cleaning Products	41
2.4 National Parks Rules and Regulations.....	42
2.4.1 Galápagos Islands National Park	42
2.4.2 INBioparque Costa Rica	44
2.5 Costa Rican Environmental Law	44

2.5.1 Air	46
2.5.2 Water.....	46
2.5.3 Land	47
2.5.4 Energy Resources.....	48
2.5.5 Pollution.....	48
2.6 Interviews.....	49
2.6.1 Stanley R. Herwitz	49
2.6.2 Cesare Tolentino	50
2.6.3 Christopher Scholl	52
2.6 Conclusions.....	54
CHAPTER 3 - METHODOLOGY.....	56
3.1 Preliminary Investigation.....	60
3.2 Research in Costa Rica	60
3.3 Observations	62
3.4 Informal Interviews.....	63
3.5 Conclusion	64
CHAPTER 4 - PRESENTATION OF DATA AND ANALYSIS.....	65
4.1 Operations at the Tram Site	67
4.2 Operations at the Office.....	70
4.3 Maintenance Products Used at the Tram Site and Office	71
4.4 Information Obtained at INBioparque	76
4.5 Employee Awareness.....	77
4.6 Conclusions.....	79
CHAPTER 5 - RECOMMENDATIONS	81
Environmental Policy Objectives	81
5.1 Corporate Environmental Policy.....	81
5.3 Waste Prevention	84
5.4 Energy Conservation.....	86
5.5 Water Conservation	88
5.6 Promotion of Education	90
5.6 Suggested Purchases	90
5.7 Alternative Cleaning Products, Lubricants, and Degreasers	93

5.7.1 Cleaning Products	94
5.7.2 Lubricants and Degreasers	96
5.8 Suggestions for the Restaurant.....	97
Environmental Policy Implementation	97
5.9 Implementation Suggestions.....	98
5.10 Staff Responsibilities	99
5.11 Sign Campaign Proposal.....	102
5.11.1 Purpose.....	102
5.11.2 Suggestions for signs	103
Suggestion number one.....	103
Suggestion number two.....	104
Suggestion number three.....	104
Suggestion number four.....	105
5.11.3 Suggestions for alternative methods of education	105
Suggestion number one.....	106
Suggestion number two.....	106
Suggestion number three.....	107
Suggestion number four.....	107
5.12 Employee Memo	108
5.13 Conclusion	109
CHAPTER 6 - CONCLUSIONS	111
APPENDICES	115
Appendix A - Mission and Organization of Company	116
Description of the Company	116
Mission Statement.....	118
Work Philosophy	118
Organization of the Company	118
Team Aerial Tram.....	119
Appendix B.1 - Corporate Environmental Policy in English	123
Appendix B.2 – Corporate Environmental Policy in Spanish	125
Appendix C.1 - Employee Guidelines	127
Appendix C.2 – Directrices de Empleados	128

Appendix D.1 - Employee Memo-English	129
Appendix D.2 - Employee Memo-Spanish.....	131
Appendix E - Recommendations Booklet.....	133
Recycling	133
Waste Prevention	134
Energy Conservation.....	136
Water Conservation	138
Promotion of Education	140
Suggested Purchases	140
Alternative Cleaning Products, Lubricants, and Degreasers	143
Suggestions for the Restaurant.....	147
Environmental Policy Implementation	147
Implementation Suggestions.....	148
Staff Responsibilities	149
Documenting the Policy.....	150
Implementing and Maintaining the Policy.....	150
Communicating the Policy.....	151
Sign Campaign Proposal.....	152
Purpose.....	152
Suggestions for signs	153
Suggestion number one.....	153
Suggestion number two.....	154
Suggestion number three.....	154
Suggestion number four	155
Suggestions for alternative methods of education	155
Suggestion number one.....	156
Suggestion number two.....	156
Suggestion number three.....	157
Suggestion number four	157
Appendix F.1- Informal Interview-English	158
Appendix F.2 - Informal Interview-Spanish.....	161
Appendix G - Company Information.....	163
REFERENCES	166

I. LIST OF FIGURES

Figure 2.1 - Environmental Management System Model

Figure 3.1 - Environmental Policy Initial Implementation Tasks Flow Chart

Figure 3.2 - Methodology Flow Chart

Figure 4.1 - Inputs, Outputs, and By-Products of the Aerial Tram

Figure 4.2 - Percentage of Informative Answers vs. Question Number

Figure A.1 - Dosel S.A. Company Organizational Chart

Figure A.2 - Dosel S.A. Organizational Chart of Operations

Figure A.3 - Dosel S.A. Board of Directors

II. LIST OF TABLES

Table 4.1 - Dosel S.A.'s Five Providers and Approximate Monthly Spending On Cleaning Products, Lubricants, and Degreasers.

Table 4.2 - Maintenance Products and Prices Per Gallon for U.S. Suppliers

Table 4.3 - Maintenance Products and Prices Per Gallon for U.S. Suppliers (cont.)

Table 4.4 - Maintenance Products and Prices for Suppliers in Costa Rica

III. EXECUTIVE SUMMARY

The tropical rainforest is filled with a wealth of resources that are crucial to the global ecosystem. They convert a large amount of carbon dioxide to oxygen, help regulate the earth's temperature, and house about one third of the world's genetic biodiversity. Unfortunately, man has already usurped three-fourths of Costa Rica's tropical forests. This is a reason for the existence of organizations such as the Rain Forest Aerial Tram. The Rain Forest Aerial Tram is an organization that is committed to educating the public about the importance of rainforest conservation.

To ensure utmost environmental compatibility, many organizations of this type are seeking to adopt the ISO 14000 standards. These are a series of voluntary international environmental guidelines that are based on environmental management systems and product evaluation systems. The purpose of these standards is to improve international business. All ISO certified companies are maintained by the very same strict guidelines for quality and control of goods and services. This common feature makes international business easier because of the level playing field. The Rain Forest Aerial Tram is focusing on implementing the first standard, ISO 14001, which entails the implementation of an environmental management system.

The Rain Forest Aerial Tram predicts that by following a strict environmental policy, necessary for ISO 14001, both the Aerial Tram and the rainforest alike will benefit. The tourists may also be pleased knowing that the tram and its office are environmentally friendly, which may lead to better public relations and corporate

image. The policy will account for the non-industrial waste produced by the office as well as policies for tourists and employees to follow, thus leading to a minimal impact on the fragile ecosystem of the rainforest.

The main objective of this study was to write an ISO 14000 compliant corporate environmental policy for the Rain Forest Aerial Tram. In order to make the policy and its implementation a reality the necessary contents and courses of action had to be identified. The contents pertain to recommendations for water and energy conservation, waste prevention, and environmentally sound cleaning and maintenance products. These recommendations will assist the company in the fulfillment of the clauses in the policy. Courses of action were also identified and defined in order to facilitate its implementation, particularly in terms of policy update and maintenance, and allocations of responsibilities for certain aspects of implementation. A proposal for an educational sign campaign to be located at the Tram site was also developed.

There are not many constraints in the implementation of the environmental policy at the Aerial Tram. The few that exist include time, education, and experience. Education and experience are constraints due to the fact that most employees lack any prior knowledge or experience with ISO or ISO 14000. Time may prove to be a constraint because many of the employees do not have the time in their workday to be properly trained to follow the environmental policy as well as to understand the importance behind the company choosing ISO 14000 certification as a goal.

This study is intended to serve as a starting point for the Rain Forest Aerial Tram Company's goal of ISO 14000 certification. The team has provided the company with sufficient information, via recommendations, to begin fulfilling the

clauses of the proposed environmental policy. Through fulfillment of this policy, the Tram will be one step closer to becoming ISO 14000 certified, the goal set fourth by the company.

CHAPTER 1 - INTRODUCTION

The exotic tropical rainforest is filled with a wealth of resources. Rainforests are crucial to the global ecosystem because they convert a large amount of carbon dioxide to oxygen and help regulate the earth's temperature. They also house about one third of the world's genetic biodiversity. Unfortunately, this precious natural wonder has become endangered, rapidly succumbing to man's destruction and degradation of the land.

Man has already usurped three-fourths of Costa Rica's tropical forests. This is a prominent reason for the existence of organizations such as the Rain Forest Aerial Tram. The Rain Forest Aerial Tram is an organization that educates the public about the importance of rainforest conservation via a cable run tram ride through the canopy of the rainforest. This experience exposes the visitors to the wonders of the rainforest, as well as its fragility. The Tram also has footpaths through the rainforest for visitors to hike. The mission of the Aerial Tram implies its commitment to preserving the rainforest:

*"To see the birds, animals, and plants of the rainforest is to understand
Its beauty and the need to preserve this endangered resource."*
(Aerial Tram Mission Statement)

To ensure utmost environmental compatibility, many organizations of this type are seeking to adopt the ISO 14000 standards. These are a series of voluntary international environmental standards using environmental management systems and product evaluation systems. The purpose of these standards is to improve

international business. All ISO certified companies all over the world are maintained by the same very strict guidelines for quality and control of goods and services. This common feature makes international business easier because of the level playing field. The Rain Forest Aerial Tram is focusing on implementing the first standard, ISO 14001, which entails the implementation of an environmental management system.

The Rain Forest Aerial Tram predicts that by following a strict environmental policy, necessary for ISO 14001, both the Aerial Tram and the rainforest alike will benefit. The tourists may also be pleased knowing that the tram and its office are environmentally friendly, which may lead to better public relations and corporate image. The policy will account for the non-industrial waste produced by the office as well as policies for tourists and employees to follow, thus leading to a minimal impact on the fragile ecosystem existing within the realm of the rainforest.

The Rain Forest Aerial Tram is interested in the feasibility of implementing ISO 14001, which is accomplished through extensive investigation and planning. The main task of this project is to develop an ISO 14000 compliant corporate environmental policy for the Aerial Tram. Under the umbrella of this main task fall two secondary goals. The first is to identify environmentally sound cleaning products for the Tram to use in place of the current cleaning chemicals. The second is to begin an environmental education campaign for both the employees and the public. This campaign will hopefully instill in the public and employees a feeling of responsibility towards the environment. Preparation for this project began with research of the ISO

14000 standards to gain familiarity and understanding of the standards. With this knowledge, the project team had the tools needed to begin work on the project.

The ultimate result of this project is a one-page environmental policy statement. Also included is a list of general guidelines for employees to follow, recommendations for more environmentally sound chemicals to be utilized at both the Tram site and at the office, a proposal for an educational campaign in the form of signs, and an additional set of recommendations for improving the environmental performance of the company.

The report has six main chapters: Background Information, Methodology, Presentation of Data and Analysis, Recommendations, Conclusions, and Appendices.

The Background Information chapter is based on the analysis of the available literature, and interviews with WPI faculty and Worcester-area “experts” on the topics of ISO 14000, United States and international environmental policies, and rainforest ecology. The Methodology chapter describes the methods and strategies employed by our team to answer the research questions posed by the project. The Presentation of Data and Analysis chapter presents the resulting data from our investigations and analysis, with emphasis on the environmental impact of the company operations and implications for establishing the ISO 14000 policy. The Conclusions and Recommendations chapters encompass the steps the company needs to take for implementing a sound environmental management system, as well as provides a complete overview of the final products. It will also include all advice to the company regarding ways to reduce environmental impact, a list of alternative cleaning products and also ideas for the environmental campaign. The Appendices

include information about our company and all other relevant information including charts, tables, memos, guidelines and proposals not included within the main body.

A requirement for all WPI graduates is the Interactive Qualifying Project (IQP), which encompasses not only technical issues but also the relationship of technology to society. Related to this relationship is the interaction between technology and the environment. This relationship, as a general rule, has a negative connotation, but many WPI students work with the philosophy of sustainable development as a way to overcome this. The IQP also puts a great emphasis on teamwork in order to prepare students for employment situations that, many times, include knowledge of how to work well as part of a group. The emphasis on teamwork causes students to learn about group dynamics, how to work well with others as well as work out problems amongst team members. The completion of this project entailed the understanding of the technical contents of the ISO 14000 series, as well as their relation with economic, managerial, and environmental issues that characterize the operations of the Rain Forest Aerial Tram.

CHAPTER 2 - BACKGROUND

The purpose of this background information is to provide some basic information about ISO 14000 and environmental management. Topics include the importance and benefits of ISO 14000, environmental management systems, and what a company or firm needs to do in order to become certified for ISO 14000. This information was obtained through research at the Gordon Library at WPI, the Clark University Library, databases, and the Internet. Additional information was acquired through an interview with Chris Scholl, the environmental manager of Norton, Co., Worcester, and a meeting with Cesare Tolentino, an ISO 14000 auditor.

This chapter also includes information about environmental laws and regulations in Costa Rica, as well as information regarding office waste management, methods for recycling and environmentally safe office products. Also included in this chapter is a synopsis of the interview held with Stanley Herwitz, a Biogeography professor at Clark University. This interview provided us with general background knowledge of rainforest ecology.

The information provided in this chapter gave sufficient background to complete the objectives of this project. The research conducted enabled the team to be able to develop an ISO 14000 corporate environmental policy for the Aerial Tram. It also allowed the group to make suggestions to the Tram for better management practices in order to follow the ideas outlined in this corporate environmental policy. These suggestions include recommendations for implementing and maintaining the policy, and recommendations for environmentally sound cleaning and office supplies.

2.1 ISO

2.1.1 ISO Overview

ISO stands for the International Organization for Standardization, a global federation comprised of 118 countries headquartered in Geneva, Switzerland (Sasseville et al., 1997). ISO 14000 is a family of standards and guidelines mainly concerned with environmental management.

It is quite evident that since the 1960s many more people worldwide have become concerned about man's impact on our planet earth. Many of us are concerned about the health effects of trace contamination. The U.S. environmental protection program, for example, has grown to huge proportions. In fact, in 1993 the Environmental Protection Agency (EPA) estimated that it costs about 120 billion dollars per year to implement the enormous amount of rules and regulations that have been mandated by the government. The ever-expanding global marketplace demands that companies worldwide make an effort to minimize these negative effects.

2.1.2 History of ISO

The ISO organization was spawned in 1947 to "promote the development of international standards" (Sasseville et al., 1997). The idea of establishing standards is beneficial to the world because it helps everyone to "be on the same page" so to speak. Standards provide a basis for comparison and a foundation on which global markets are built.

2.1.3 ISO 14000

If a company or firm is concerned with environmental management, it tries to minimize its negative impacts on the environment. Therefore, it is very important for these companies to integrate a solid Environmental Management System (EMS) into their businesses. The ISO 14000 family is like a guidebook to assist a company in achieving this goal.

The ISO 14000 family originated from “ISO’s commitment to support the objective of “sustainable development” discussed at the United Nations Conference on Environment and Development, in Rio de Janeiro, in 1992” (ISO(b), pg.1, 3/26/2000). In 1993, ISO/TC 207, a technical committee on environmental management launched earlier in 1993, initiated the ISO 14000 project. Work had been done prior to this date by the ISO/IEC Strategic Advisory Group on Environment (known as SAGE), started in 1991. This group, comprised of 20 countries, 11 international organizations, and numerous environmental experts, set the standards for a new environmental approach. The first standards developed by TC 207 were published in 1996 (ISO, 3.26.2000).

Today the ISO/TC 207 has expanded to include participants from fifty-five countries, including business delegates and government experts. The ISO 14000 standards are not set in stone. They continue to evolve as private sectors provide experts to develop them. In fact, anyone could potentially give input or help in the development of ISO 14000 by simply contacting an ISO member of their country (ISO, 3/26/2000).

2.1.4 Comparing ISO 14000 to ISO 9000

ISO 14000 is very similar to ISO 9000 in that both standards have to do with management systems. ISO 9000 is concerned with quality management. The two families are not concerned with the products of companies or firms, but rather the methods by which the products are produced (ISO, 3/26/2000). Suppose a manufacturing company, such as Pratt & Whitney, would like to be ISO 14000 certified, for example, in regard to Turbine Airfoils. Only auditing the environmental safety of the airfoil itself would not satisfy the ISO auditor. The company must ensure that the entire manufacturing process from cradle to grave for producing the blade is environmentally friendly. This means that the auditor would want to examine the environmental impact of all aspects of the process, including the raw materials purchased, the casting process, machining and grinding processes, and even the packaging and shipping of the final product. It is interesting to note that in the near future ISO 14000 may become a requirement to be re-registered for ISO 9000 in certain companies. We will return to this point later in discussing the advantages of ISO 14000.

2.1.5 Development of Standards

The groups responsible for the development of standards vary among the countries involved in ISO. These groups include government agencies, private corporations, and ministries. These groups are often called “member bodies.” For example, the American National Standards Institute (ANSI) is the U.S. ISO member body. ANSI is mainly comprised of members from private companies to which the

standards apply and therefore, the U.S. government plays little role in the development of national standards (Sasseville et al., 1997).

It is unfortunate that many businesses throughout the world still view standards as “restrictive and imposing potential trade barriers” (Goodman, pg.2, 3/27/2000)

One of the goals of International Standards is to break down trade barriers that exist due to the present diversity of national standards.

International Standards should also encourage international trade by improving the quality of goods and services. It is obvious that if a product has to meet certain requirements, companies who do not provide goods and services to meet these requirements will lose business. Thus, companies will strive to stay above sea level at minimum, while others may try to pull ahead and be on the cutting edge. This means that standardization will drive most “standard products” to become good quality products.

2.1.6 Advantages of ISO 14000

ISO 14000 is a great tool for companies concerned with their impact on the environment, because it gives companies a foundation upon which to assess their operations. “ISO has a two-pronged approach to meeting the needs of business, industry, governments and consumers in the field of the environment” (ISO, pg.1, 3/26/2000). First, ISO provides a great deal of information about “standardized sampling, testing, and analytical methods to deal with specific environmental challenges” (ISO, pg.1, 3/26/2000). Over 350 International Standards have been

developed on topics such as water, air and soil quality. These data are used as a basis for environmental regulations in many countries, and they are also a method of supplying business and government with scientifically valid information about the environmental impact of an economic activity or production. Secondly, ISO introduces a strategic approach to conservation by developing standards for Environmental Management Systems that can be used in any business whether public or private, and regardless of size.

The ISO 14000 standards provide an “internationally recognized framework for environmental management, measurement, evaluation, and auditing” (Standards Council of Canada, pg.1, 3/26/2000). According to Sasseville, the Technical Committee 207 of ISO 14000 is made up of six international subcommittees that address these issues:

- Environmental management systems (ISO 14001/14004)
- Environmental auditing (ISO 14010, 14011, 14012)
- Environmental labeling (ISO 14020 series)
- Environmental performance evaluation (ISO 14030 series)
- Life cycle analysis (ISO 14040 series)
- Terms and definitions (ISO 14050 series)

2.1.7 Environmental Management Systems

An EMS is the first step in becoming ISO 14000 certified and is probably the most important aspect of ISO 14000. “An environmental management system is a management structure that allows an organization to assess and control the

environmental impact of its activities, products, or services” (Standards Council of Canada, pg.1, 3/26/2000). “In simplest terms, an EMS is a systematic approach to dealing with the environmental aspects of a business or other organization” (Sasseville, Wilson, Lawson, pg.9, 1997). The requirements for an EMS are outlined in ISO 14001/14004, Environmental Management Systems – Specification with guidance for use. According to the Standards Council of Canada, there are six basic elements of an EMS:

- An environmental policy, in which the organization states its intentions and commitment to environmental performance; (See figure 2.1 for implementation structure of an environmental policy).
- Planning, in which the organization analyses the environmental impact of its operations;
- Implementation and operation, i.e., the development and putting into practice of processes that will bring about environmental goals and objectives;
- Checking and corrective action, i.e., monitoring and measurement of environmental indicators to ensure that goals and objectives are being met;
- Management review, i.e., review of the EMS by the organization’s top management to ensure its continuing suitability, adequacy and effectiveness; and
- Continual improvement

A model of the six elements of an EMS is shown in the figure below. It illustrates that an Environmental Policy is the first step and that continual improvement is an ongoing process. This model can be found in any official ISO 14000-related documentation.

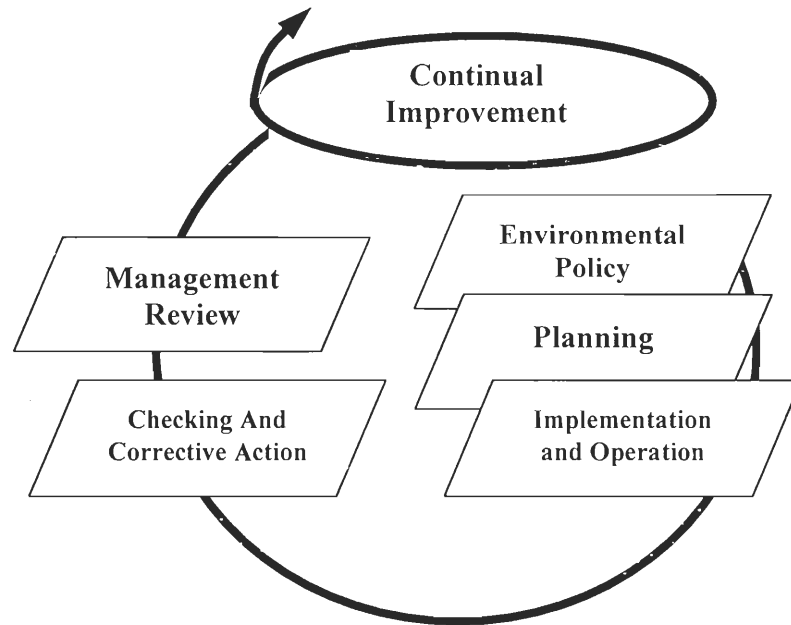


Figure 2.1

EMS Model

According to John Kinsella, there are three major components of an EMS: a written program, education and training, and knowledge of relevant local and federal environmental regulations (Kinsella, 3/27/2000). The written program states that the organization is committed to producing a high quality product with minimal negative impact on the environment. The education and training ensures that all employees are informed about and understand the purpose of the EMS. Companies must also take into consideration and abide by regulations that apply to their company.

2.1.8 Benefits of an EMS

Companies do not choose to implement ISO 14000 into their business structure unless management feels it will be of real value to the organization. Some companies may be required to implement ISO 14000 if their consumers demand it. At any rate, there are numerous clear advantages to a company, small or large, in becoming ISO 14000 registered. These benefits include:

“identifying areas for reduction in energy and other resource consumption, reducing environmental liability and risk, helping to maintain consistent compliance with legislative and regulatory requirements, benefiting from regulatory incentives that reward companies showing environmental leadership through certified compliance with an international recognized EMS standard, preventing pollution and reducing waste, responding to pressure from customers and shareholders, improving community goodwill, profiting in the market for “green” products, respond to insurance company pressure for proof of good management before pollution-incident coverage is issued, and demonstrating commitment to high-quality” (Capaccio Environmental Engineering Inc., pg.2-3, 3/26/2000)

2.1.9 Choosing ISO 14000 for a Company

A key element to the ISO 14000 standards is their voluntary adoption. ISO 14000 requires that once a company commits to an environmental policy, a plan for implementation must be produced. So why would an organization choose to finance the extensive time, energy, and money needed for planning, researching, and auditing to achieve certification on a voluntary basis? A prominent reason in adopting ISO 14000 is that these standards provide set guidelines that address the differing needs of various worldwide organizations through a common framework for managing environmental issues.

The ISO 14001 standard requires the employment of an Environmental Management System. Its guidelines, if followed properly, can lead to a higher level of efficiency in environmental management. Increased efficiency can improve trade, and lead to improved environmental performance internationally. Many governments offer incentives, usually tax related, to organizations in compliance with the EMS standards of ISO 14001 (TC207, 2000). The EMS, that an organization chooses to implement, is generally tailored to suit the particular needs of the organization, such as its business needs, the resources available (mainly financial), expectations of the stockholders (if applicable), and the expectations of its customers. This versatility of the ISO 14000 standards appeals to many organizations (TC207, 1995). Having an EMS enables an organization to control the impact of its products, services, or activities on the environment (TC207, 2000).

Large companies tend to implement ISO 14001 more rapidly than small companies for several reasons. Many larger-scale companies already have working environment management systems that, to meet ISO 14001 standards, may require a much less extensive process and resources than a company lacking some form of EMS. Simplifying the myriad of international, national, and regional environmental standards with the implementation of the ISO 14001 standard to create a common ground for a corporate environmental policy appeals to many of the larger companies. Companies that have completed the rigorous set of tasks for ISO 14000 implementation may be less willing to engage in, or even prohibit commerce with uncertified companies (Clark et al., 1999)

Smaller companies may find the path to certification cluttered with many obstacles, such as the cost of completing certification. Ultimately, many small companies are concerned that larger companies will require conformance to ISO 14001, if further business is desired (Clark, et al., 1999). As a way to avoid that from occurring, many small companies are including the cost of ISO 14001 into their annual budget (TC207, 2000). For a lower budget, many small companies declare conformance to ISO 1400 standards, while not acquiring third-party certification, thus saving money (Clark, et al., 1999).

2.1.10 The Four Steps of Planning

Once an organization has declared its EMS, it is required by the ISO 14001 standard to devise a plan for implementation. Planning should at least include:

1. Identifying the environmental aspects of its activities and specify as to which have significant impacts.
2. Identifying legal, including current government policy, and other requirements to which the organization is involved.
3. Establishing clear objectives and targets of its activities having impacts to the environment including documentation.
4. Establishing programs to achieve those objectives and targets.

(TISI, 2000)

It is a common challenge among companies to identify the actual or potential environmental impacts that can be found in products, processes, and services of the organization. ISO 14001 requires complete compliance on the part of the company to be accurate and honest regarding its findings. The company must ensure that the more severe impacts are appropriately prioritized in creating the objectives. Realistic

impacts from all aspects of the organization must be determined and then prioritized by pertinence. Current awareness is important to the organization, so this information must be updated frequently. Updating information will also facilitate plans for future improvement (Tibor, 2000).

Current and future legal requirements of the organization must also be considered. The organization must make itself aware of all government regulations that must be followed and make efforts to remain current with this knowledge. The company must also ensure that it is fulfilling all other agreements it has made with other parties, such as shareholders and other companies (Tibor, 2000).

Setting measurable and attainable goals is crucial in the planning process. The organization should ensure that the goals are realistic because of the many requirements it faces. Societal concerns and desires should be taken into account. The company should make sure to consider other promises, corporate goals and viewpoints when setting these goals. Environmental aspects should be considered, and all harmful impacts avoided. Recently developed technology should be accounted for as well as financial benefits/expenses when setting the goals. Profitability, marketability, and feasibility must also be considered when creating these goals. The views of interested parties must be kept in mind. Creating active involvement of these parties usually tends to be successful. All goals intended must comply with the environmental policy and include the commitment to the prevention of pollution (Tibor, 2000).

The goals created must be implemented through the environmental management program. The most efficient method is to designate responsibility in

achieving the objectives and targets. Details on how the goals are to be achieved must be stated along with specific times when they should be met. All new products and services must be environmentally friendly (Tibor, 2000).

Once the four main tasks of planning are fully accomplished the organization can move forward to the implementation aspects. ISO 14001 requires seven main components to be followed for successful operation of the EMS. These components are:

1. Structure and Responsibility
2. Training, Awareness, and Competence
3. Communication
4. EMS Documentation
5. Document Control
6. Operational Control
7. Emergency Preparedness and Response

(TISI, 2000)

2.1.11 Implementation of ISO 14001

The first implementation step, structure and responsibility, involves defining, documenting, and communicating the roles and responsibilities of all employees. It is the responsibility of the company to provide all resources necessary to the implementation and control of the EMS. These resources can include human resources, technology, and financial resources. Specific management representative(s) must be appointed regardless of other responsibilities. These representatives must ensure that EMS requirements are established, implemented, and maintained. They must also report on the performance of the EMS to top

management for review. This performance review can help to improve the efficiency of the EMS (ANSI/ISO, 1996).

The next step involves training, awareness, and competence. It is the responsibility of the organization to identify all training needs. All employees whose work may have a significant impact upon the environment must receive adequate and appropriate training. Procedures that ensure employees are aware of the importance of complying with the environmental policy and procedures must be established and adhered to. Employees must also be made aware of significant environmental impacts, actual or potential, of their work, and of the environmental benefits that result from following the EMS. Potential consequences of not following all procedures and policies must also be made known to all employees (ANSI/ISO, 1996).

Communication is the next step of implementation. Internal communication regarding environmental aspects of the organization and its current EMS must exist between all levels and functions of the organization. Procedures for this communication must be established and maintained. Procedures must be established for receiving, documenting, and responding to all environmentally related communication with third parties (ANSI/ISO, 1996).

The fourth step of implementation is the environmental management system documentation. The organization is responsible for establishing and maintaining all information, in either paper or electronic form, regarding the “core elements” of the EMS (ANSI/ISO, 1996).

The fifth step in the implementation process is document control. The organization must ensure that all documents required by ISO can be located. The documents must be periodically reviewed and revised if necessary. All current versions must be available to all employees. Any document deemed obsolete must be removed from all locations or, if left in its location, it must be made sure that no unintended use of the document will occur. All the documents must be legible, dated, organized, and kept for the specified amount of time (ANSI/ISO, 1996).

The next step is operational control. In this case, the organization must identify all activities that are associated with the environmental aspects of the company. The company must plan all the activities, including their maintenance. This is to ensure that the activities are performed in accordance to all specified conditions. All activities must also be documented (ANSI/ISO, 1996).

The final step of implementation is emergency preparedness and response. That requires the organization to establish and maintain procedures for accidents and emergency situations. Prevention of all environmental impacts that may be associated with any emergency situation or accident must be included in the procedures. These procedures must be reviewed and revised periodically, especially after the occurrence of any accident or emergency. If possible, the organization must test its procedures (ANSI/ISO, 1996).

Once a company has implemented its ISO 14001 EMS, the choice of either self-certifying that it is fulfilling the requirements of the standard or using an external party, an ISO 14000 Registrar, to document the company's compliance must be made. This is referred to as ISO 14001 registration or certification. Employing a

third party registrar has two major benefits over self-certification. First, external certification has more credibility to other parties involved, such as customers and regulatory agencies. The second benefit is having the expertise and guidance of a knowledgeable person brought into the organization (Enlar, 2000).

2.1.12 The Five Steps of Certification

There are five main stages in completing ISO 14001 registration. First a gap analysis is completed which includes an application or contract. A review of the company's existing program must be completed to determine what the company needs to do to bring itself into conformance with the ISO 14001 standard. The application or contract to be drafted must contain information regarding liabilities, confidentiality and all compliance procedures utilized.

The second stage involves the development of an implementation strategy that includes the selection of an ISO 14000 Registrar, if one is employed. All the documentation, including written policies, programs, procedures and forms, must be updated or reconfigured to comply with the ISO specifications. Employees must be trained and communication with all other parties must be established as needed to implement the revised policies. If not already in place, a system for measuring corrective action, management review procedures, and internal audit must be created (Enlar, 2000).

The third step towards certification consists of pre-registration internal audits. Most registrars prefer that the organization has completed a minimum of one full cycle of internal audits, and its management has had a full review prior to seeking

certification. The fourth step is the actual registration. The registrar selected by the organization performs an EMS registration audit that certifies the conformance of the EMS employed by the organization to the specific requirements of the ISO 14001 standard (Enlar, 2000).

The final step of certification is not a finite step because it demands continuous implementation and improvement. This entails altering the EMS to fulfill the ISO standard with regard to changes to company products, processes, and personnel. The EMS must also be changed to remain in accordance with any new updates made by the government or other regulatory agencies (Enlar, 2000).

2.2 ISO Environmental Policy

Clause 4.2 of ISO 14000 requires that an organization have a written and documented statement that establishes basic corporate goals and decision-making guidelines with respect to environmental issues specific to the organization's activities, products, and services. The policy is meant to be a guide. It is not a law or rule that can never be broken.

2.2.1 Advantages

Environmental policies have been set in many companies as the layout for their environmental management systems. Companies with established environmental policies have greater environmental performance, as well as higher profits in many cases (Theyel, 2000). This is because some companies are able to manage their waste and decrease costs. In other cases where environmental

procedures may cost money, improved public relations with environmentally conscious consumers and businesses help to increase profit (Theyel, 2000).

2.2.2 Commitment

The key to any effective environmental policy is commitment by the management. With senior management fully backing the policy, employees have much greater incentive to follow through with it. In any workplace hoping to initiate an environmental policy or get certified for ISO 14000, someone must fully analyze the extent to which the company affects the environment as well as the management's commitment to achieving this goal. (Rezaee, 2000). This will ensure commitment by everyone and success in the endeavor.

2.2.3 Approaches

There are different approaches for developing an environmental policy. The predominant method for undertaking environmental management existing today is waste management after-the fact. Companies are dealing with their leftovers much more efficiently than in the past. Another method that is starting to grow more popular is waste prevention. Many companies are now reviewing their production processes so that they may use their resources more efficiently and eliminate unnecessary waste (Theyel, 2000).

Another additional method is the product-oriented environmental management system (or P-EMS). This is a whole new way of thinking about prevention before production. With this method, companies are forced to think about what they

produce, what they use for production, the manner according to which production is accomplished, and how these factors effect the environment (Berkel et al., 1999).

This approach to prevention takes a great deal of managerial commitment because some very important decisions might have to be made regarding production, for example, if a company is just beginning to undertake this system their whole system of production may have to be revamped or completely redone.

One of the most important courses of action a company can take to improve environmental performance is to keep an eye out for new and more efficient technology. “In the long run, the development and widespread adoption of new technologies can greatly ameliorate what, in the short run, sometimes appear to be overwhelming conflicts between economic well-being and environmental quality” (Read, 2000, pp.47-48). Technology is being improved every day for such tasks as energy services, recycling, waste water treatment, etc. Businesses just have to learn to use these new resources properly (Read, 2000).

After an organization determines what type of environmental management system to use, written environmental policy must be documented. The ISO 14000 standards provide organizations with a framework for developing a corporate environmental policy. This framework is described in the flowchart below:

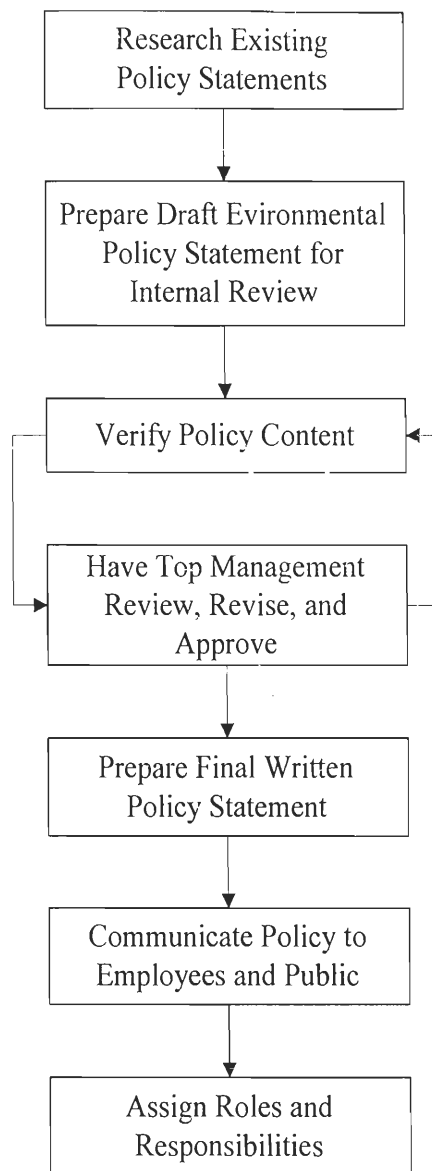


Figure 2.1 **Environmental Policy Initial Implementation Tasks**

2.3 Conservation, Waste Management, and Recycling

Before designing and implementing an environmental policy, a company must assess how its various operations impact the environment. In a company that does not produce any significant amounts of toxic or hazardous waste, the three main areas that should be addressed are energy consumption, water consumption, and solid waste management. Once these issues are addressed and any incongruence with state or national laws is identified, goals can be set to bring the company toward environmental compliance.

2.3.1 Energy Conservation

Energy consumption basically means the amount of electricity or power that a company uses on daily basis. “There is a growing awareness that energy and material use have both environmental impact and business impacts.” (Goldman, 2000, p.27) Without even thinking environmentally, energy waste means business inefficiency. Overuse of electricity can be a problem if the source of power is detrimental to the environment. For example, if a certain business received its power from a combustion plant, limiting electricity use could help to reduce the amount of gases being spewed into the atmosphere. Companies receiving electricity from hydroelectric power plants need not to be as concerned about reducing their electricity usage, since hydroelectric plants do not harm the environment as much. They may still want to reduce their consumption to help to ensure that there is enough power to supply future businesses in the area. (Goldman, 2000)

A company trying to assess how much electricity is used can ask itself the following questions:

What items in the business use the most power: the computers, refrigerators, lights, etc.? Can this power usage be minimized? Is power consumption a concern for our company? (Postel, 1985)

According to New York City's Wasteless webpage, there are several things a company can do to reduce their energy consumption. The webpage first recommends the use of ambient light whenever possible. Installing skylights and opening blinds during the day can help increase energy conservation. A multitude of lighting options are available to help to reduce energy consumption, including energy efficient lighting systems, ballasts, reflectors, sensors, and dimmers (Science, 2000).

Replacing all incandescent lighting with fluorescent lighting will help to conserve energy. If reflectors are used with the fluorescent lighting, less fluorescent bulbs will be needed, yet the same amount of light will be produced. Using electronic ballasts opposed to magnetic ballasts will also save energy. The electronic ballasts are thirty percent more efficient than their magnetic counterparts, and also improve aesthetics, reduce heat, and eliminate flickering and humming. Installing LED lights into exit signs will also reduce energy consumption. Sensors can be installed so lights turn on only when the room is occupied. Adjusting the thermostat after hours can also be an energy saving move. A company may consider installing a timer on the thermostat that will automatically control the temperature (Science, 2000).

The Wasteless web page also recommends that a company purchase *Energy Star*® products. *Energy Star*® products range from office supplies to exit signs and

will substantially help a company to use less energy. These products will also help to reduce utility bills.

2.3.2 Water Conservation

Water consumption can be a big problem in arid areas or areas where irrigation is underdeveloped. In humid or tropical zones water usage may not be a large concern for companies, but wastewater produced by these companies could pose a significant problem to the direct environment. The majority of water supplies are taken from a river and used in a business or factory, then ejected as wastewater to the closest river or stream. “After decades of this practice in industrial countries, widespread pollution made it clear that rivers and streams could not assimilate the increasing tonnage of sewage and waste dumped into them each year” (Postel, 1985).

Even small office buildings can look at their water consumption and wastewater generation. If the wastewater from the business exits into a nearby water source that could damage the surrounding area, a company should strive to reduce the amount of wastewater generated. The following are some questions a company can ask itself in order to assess whether there could be a problem with wastewater or water consumption:

1. *What kinds of toilets are used in the company, how many are there and how much water do they use per flush?*

Toilets are the main users of water in most households and probably in most office buildings. The typical U.S. toilet turns as much as 20 liters of drinking-quality

water into wastewater in one flush (Postel, 1985). The company should try to install toilets that use about 5.7 liters per flush. They could also minimize sit down stalls and try to have more stand-up stalls, because they use less water.

2. *Do the faucets, sinks, and showers (if any) use water-conserving fixtures?*

Water-conserving fixtures limit water consumption and therefore limit Wastewater generated when someone washes his or her hands or takes a shower. (Postel, 1985)

New York City's Wasteless web page gives several suggestions for a company to improve its water conservation. The first tip is to develop a system for identifying and repairing all leaks in pipes and plumbing fixtures. The page suggests assigning scheduled times for employees to check all areas in which there is a potential for some sort of leaking. Another suggestion is to attempt to find a second use for water before spilling it down the drain. For example, the water perhaps could be used for plants or flowers located inside the office. Retrofitting plumbing fixtures as toilets and sinks with water control valves could also reduce the amount of wasted water in a company. Also sinks and water fountains could be retrofitted with timed on/off valves. Hot water pipes should be insulated. The length of time needed for the water to reach the desired temperature will be lowered and the water in the pipes will

remain hotter for longer periods of time, helping to save water and energy (Science, 2000).

2.3.3 Waste Prevention

In the New York City's Wasteless web page there are suggestions that a company can follow through with a commitment to waste prevention. The page suggests developing a corporate statement declaring the company's commitment to waste prevention. Incorporated into an ISO 14000 environmental policy, the statement must be communicated to all employees with a system set up for employee feedback. The page suggests contacting all vendors and inquiring whether less packaging can be used for shipping or using reusable shipping containers. Also suggested was the use of linen-roll towels or electric hand dryers rather than C-fold towels, which are quite wasteful. Employee input is of utmost importance because it is the employees that know the most details about their job and what can and cannot be done to reduce waste and not lose efficiency (Science, 2000).

2.3.4 Waste Paper

One of the most important aspects of having a good Environmental Management System is how a company manages its waste. Landfills all over the world are filling up at very high rates. The increasing desire for an improved standard of living has caused consumption to rise. This, in turn, has caused the amount of waste produced to rise (Bystrom, 1997). Landfills just do not have the capacity for this kind of waste production. Fortunately there are alternatives to this

kind of waste handling, depending on the material in question. One of the larger waste problems, especially in non-industrial companies, is with office paper.

“Paper accounts for 40% of all municipal waste in landfills. Paper recycling reduces demand on landfills, uses 55% less water than virgin fiber production, and helps preserve our forests (Gaian, 1999).” There are two prominent alternatives to depositing waste paper into landfills. The most well known alternative is recycling. In this process the paper is broken down and its fibers are recovered for producing more paper products. This method uses a good amount of purchased energy, possibly supplied by nonrenewable resources, without supplying a surplus of energy, as opposed to making paper from virgin wood pulp. The chemicals used to dissolve the lignin in the pulp make excess material that is used in the production of more energy that can be used to dry the paper. When recycling paper, non-replaceable fuel such as fossil fuel has to be purchased to dry the paper. The use of fossil fuels causes the release of a large amount of carbon dioxide into the atmosphere, having a negative effect on the carbon dioxide balance and increasing the greenhouse effect. This process is beneficial for the preservation of forests that are needed to improve the earth’s carbon dioxide balance, so it has positive and negative aspects (Bystrom, 1997).

A different way of looking at this problem is by utilizing waste paper as a source of fuel. Waste paper can be used to produce energy and therefore replace some fossil fuels. This approach releases much less carbon dioxide into the atmosphere than fossil fuels do. It also reduces the need for energy for recycling

paper, but at the same time it decreases the capability of producing more paper products, in effect putting the forests at risk (Byrstom, 1997).

Paper recycling and fuel are the two most well used forms of waste paper disposal. Science is coming up with new ways to utilize waste paper as a resource. One of these methods entails the use of biochemistry. By using enzymes, scientists have figured out ways to break down waste paper into sugars that can be used for other purposes (Wyk et al., 1999). A decision has to be made as to which process is the most environmentally friendly, and can be implemented in a realistic and cost effective manner.

2.3.5 Plastics

Waste paper is not the only waste being produced by businesses. Many companies also produce a large amount of plastic waste. Plastics tend to be easier to recycle because they can be melted down and reformed, unlike paper as the fibers tend to get damaged during recycling which cause the recycled product to be of lesser quality than the original. The biggest problem of the plastic recycling process is finding an efficient way to separate the different grades of plastics (Shent et al., 1999).

Another problem with the recycling of plastics is that, in many cases, it is not actually reducing the total amount of waste going to the landfills. There are two markets for recycled plastics. The use of recycled products for their original purpose reduces the amount of waste by the amount recycled. This is the original intention of recycling and proves to be very effective. The problem is that in many cases new

markets are opening up for recycled goods, as opposed to reusing the goods for their original purpose, causing the same amount of plastic to be produced and disposed. For example, recycled plastic bottles are many times not being used to make new plastic bottles, but polyester clothing, causing more plastic to be produced to make more plastic bottles. This is not an effective recycling practice (Fletcher, 1996).

2.3.6 Cleaning Products

Chemicals placed in the environment do not necessarily come from places such as chemical plants and other industry. Some very dangerous chemicals can be found in the average cleaning products, whether they are used in a household, an office building, or an industry. The most important aspect of whether or not cleaning products are safe for the environment pertains to the concentration of dangerous chemicals in them. “The use of an ingredient is judged environmentally acceptable if the environmental concentration of the ingredient due to all sources is lower than the no-effect level determined on the basis of an appropriately comprehensive environmental effects data base” (Sedlak, 1996, p.703). The geography where the product will be used, for example, a humid rainforest environment or a deciduous forest determines this environmental effects database. This database is then tested on the most sensitive species (plant and animal) in the environment in question. Testing on the most sensitive species ensures that the results will be conservative and without risk.

To help reduce the amount of packaging waste as well as actual chemicals being used, a company should consider purchasing cleaning supplies in concentrated

form and dilute into reusable containers (spray bottles) on-site. Also, toxic or harsh cleaners should be replaced with more environmentally sound products (Science, 2000). Users should “check labels for U.S. EPA 33/50 chemicals, and then identify alternative products. Industrial toxic chemicals that the U.S. EPA has identified for voluntary reduction or elimination are as follows: 1,1,1-Trichloroethane Mercury, Benzene Methyl Ethyl Ketone, Cadmium Methyl Isobutyl Ketone, Carbon Tetrachloride Nickel, Chloroform Tetrachloroethylene, Chromium Toluene, Cyanide Trichloroethylene, Lead, Dichloromethane Xylene.” (Science, 2000)

2.4 National Parks Rules and Regulations

Similarly to a national or state park, the big concern of the Rain Forest Aerial Tram is the preservation of habitats and wildlife. A myriad of rules and regulations has been created for national parks to help preserve the beauty and fragility of the ecosystem. By enforcing the rules upon all visitors and employees, the natural state of the environment can be preserved. Many regulations and rules of national parks can be applied to the Rain Forest Aerial Tram, thus creating less environmental disturbance. This is a step towards ISO 14000 certification.

2.4.1 Galápagos Islands National Park

The following rules, some of which are applicable to the Aerial Tram Park, are derived from the Galápagos Islands National Park:

1. No plant, animal, or remains of such (including shells, bones, and pieces of wood), or other natural objects should be

removed or disturbed. This is illegal, and can harm the ecological balance of the islands.

2. Be careful not to transport any live material to the islands, or from island to island. Check your clothing for seeds or insects before each landing and departure. Each island has its own unique fauna and flora, and introduced species can quickly destroy these ecosystems.
3. Do not take any food to the uninhabited islands, for the same reason. The orange seed you drop may become a tree.
4. Do not touch or handle the animals. They will quickly become fearful and lose their remarkable fearlessness if they are approached by human invaders.
5. Do not feed the animals. It can be dangerous to you, and in the long run would destroy the animals' social structure and breeding habits. You came here to see a completely natural situation. Please do not interfere with it.
6. Do not startle or chase any animal from its resting or nesting spot. Be especially careful among the breeding seabird colonies. An exposed booby chick can die within minutes, or be scooped up by a hungry frigate bird.
7. Stay within the areas designated as visiting sites. Watch for trails and areas marked by the white wooden stakes. This way you can experience the islands while causing as little damage as possible.
8. Do not leave any litter on the islands, or throw any off your boat. Carry along a bag of some sort if you're going to have any disposables, such as film wrappers or Kleenex. Litter is not only ugly; more importantly it can cause serious physical harm to the animals. Sea turtles, for example, will eat plastics thrown overboard and die when it blocks their digestive tract.
9. Do not deface the rocks. No graffiti - this is not the New York subway.
10. Do not buy souvenirs or objects made of plants or animals from the islands. If anyone offers you any, please advise the National Park Service.
11. Do not visit the islands unless accompanied by a licensed National Park guide. And follow his or her instructions at all times.
12. Restrict your visits to officially approved areas. There are certain areas where the public is permitted, and others where access is restricted or prohibited. Your guide and captain know which areas you are allowed to visit. Don't try to get them to take you somewhere you're not supposed to be.
13. Show your conservationist attitude. Explain these rules to others, and help to enforce them. Notify the Park Service if you see

any damage being done. You could be a decisive factor in the islands' preservation.

(Gorp, 2000)

2.4.2 INBioparque Costa Rica

These rules and regulations for INBioparque in Costa Rica could very easily be applied to the Aerial Tram.

- Please do not bring food or beverages into the park.
- Children under 12 should be accompanied by an adult.
- Smoking in the park is not permitted.
- Please leave your pets at home.
- Please stay on the trails.
- For your own safety we recommend you not to touch the plants or insects.
- Help us to keep the trails clean by not littering.
- Please avoid the consumption of food or beverages.
- Please respect the non-smoking areas.

(INBioparque, 2000).

2.5 Costa Rican Environmental Law

In 1994 an amendment was made to the political constitution of the Republic of Costa Rica. It was called article fifty. Article fifty says that all people have a right

to a healthy and ecologically balanced environment. Therefore, the law is designed to inform and act against any actions that infringe on and damage the environment.

Under this article is *La Ley Orgànica del Ambiente*, or the law of the environment.

The law attempts to provide the people and state with all necessary instruments to keep and achieve a healthy and ecologically balanced environment.

“The principles that inspire this law are the following:

- a- The environment is patrimony of all citizens... The state and individuals must cooperate in its conservation and sustainable development, which is in the public and social interest
- b- People have the right to enjoy a healthy and ecologically balanced environment as well as the duty to help conserve it.
- c- The State must watch over the rational use of the environment, attempting to protect and better the citizens’ quality of life. It is forced to uphold and defend economically and environmentally sustainable development, as long as it does not jeopardize options of future generations.
- d- If you are responsible for damaging the environment you are subject to the laws of the Republic and International Laws.” (Zeledon, p.4, 1998)

Based on these objectives and principles Regional Environmental Councils were formed. These were formed to enforce environmental laws in the areas to which the councils are assigned. “The functions of the Regional Environmental Councils are the following:

- a- Promote, by means of activities, programs, and projects, the people’s participation in the discussion and analysis of environmental policy that may affect a region

- c- Respond to any accusations and act, with the appropriate organisms, against the action
- d- Propose educational activities, programs, and projects that will promote sustainable development and the conservation of natural resources
- e- Develop and put educational activities, programs, and projects into practice to encourage a new attitude towards environmental problems and to establish the foundations for an environmental culture.” (Zeledon, p.5-6, 1998)

2.5.1 Air

Areas that are of particular concern for the Rain Forest Aerial Tram are air, water, land, energy resources and pollution. There are laws for each of these under the environmental laws of Costa Rica. First, “air is a common patrimony and must be used without hurting the general interest of the nation’s inhabitants. In this respect,

- a- Air quality, in all the national territory, must satisfy, at least, the permissible contamination levels that have been fixed by corresponding norms.
- b- Direct, indirect, visible or invisible contaminating emissions, particularly of greenhouse effect gases and those that may affect the ozone layer, must be reduced and controlled to secure good air quality.” (Zeledon, p.14, 1998)

2.5.2 Water

Second, “water is a public resource, so its conservation and sustainable use are of social interest. The following criteria must be applied for the conservation and sustainable use of water:

- a- Protect, conserve and recover (if possible) aquatic ecosystems and elements that intervene in the water cycle
- b- Protect ecosystems that allow the regulation of the water regime
- c- Keep the water system equilibrium, protecting each component in water basins.

Criteria mentioned above apply:

- a- In the elaboration and execution of any project that involves water resources
- b- In the granting of concessions or permissions for the use of any water regime component
- c- In the granting of authorization for the deviation or modification of water beds
- d- In the operation and administration of potable water, and the collection, evaluation and final disposition of wastewater or other wastes, that may be of use in industrial and population centers.” (Zeledon, p.14-15, 1998)

2.5.3 *Land*

Third, “the State must encourage and bring about renewal and conserving of land resources in the national territory. To protect and take advantage of the land, the following criteria are considered:

- a- The adequate relationship between potential use and economic capacity of ground and underground (soil and subsoil).
- b- Control of any practice that might erode or degrade land in any way
- c- Land and water conservation projects that prevent wasting away of the land.

Criteria to protect and take advantage of the land will be considered in:

- a- Determining the uses, reserves, and destinations of land

- b- The support services (of any type of technical or investigative use of nature) given by the Public Administration to any activity linked to use of the land
 - c- Conservation plans, programs, and projects and use of land
 - d- Permissions, concessions or any other type of authorization over the use of land.”
- (Zeledon, p.15, 1998)

2.5.4 Energy Resources

Fourth, energy resources are a major concern for the Aerial Tram because the company had to find a way to generate energy with only the use of fuel, specifically diesel fuel. The laws on energy resources state the following: “energy resources are essential for the country’s sustainable development. The State will play a dominant role and will dictate general and particular measures related to research, exploration, exploitation, and development of these resources, based on the National Plan of Development.” (Zeledon, p.15-16, 1998) Also, “energy resources must be used rationally and efficiently, in a way that the environment will be conserved and protected.” (Zeledon, p.16, 1998) And finally, “to give way to an economically sustainable development, competent authorities will evaluate and promote the exploration and exploitation of alternate, renewable and environmentally healthy energy sources.” (Zeledon, p.16, 1998)

2.5.5 Pollution

Finally, according to the law, pollution is “any alteration or modification of the environment that may harm the human health, attempt against natural resources, or

negatively affect the general atmosphere of the Nation. The dumping and emission of pollutants must adjust to technical regulations. The State will adopt the necessary measures to prevent or correct environmental pollution.” (Zeledon, p.16, 1998)

Based on this, “to prevent and control pollution, the State, municipalities, and other public institutions, will give priority to the establishment of adequate services in fundamental environmental health areas, such as:

- a- Water supply for human consumption
- b- Sanitary disposal of dirty waters
- c- Waste collection and management
- d- Control of atmospheric pollution
- e- Control of sound pollution
- f- Control of radioactive and chemical substances

Laws will encourage participation of all population and organizations.” (Zeledon, p.16, 1998) Also, “competent authorities will dictate the corrective measures if any environmental damage not foreseen in this code come to occur.” (Zeledon, p.16, 1998)

2.6 Interviews

2.6.1 Stanley R. Herwitz

Stanley Herwitz, a professor of Biogeography and Earth Science at Clark University, is very knowledgeable about rainforests and also familiar with Costa Rica. We first explained to him what our project entailed. Then we asked what we should look for while in the rainforest that might be an impact from the Rain Forest

Aerial Tram. In the meeting with Professor Herwitz on April 6, 2000, the project team gathered quite a bit of information regarding the rainforest and possible impacts from the use of the Tram.

Most of his suggestions could not be directly applied to this project due to lack of time and expertise, although they can be incorporated into recommendations for the Tram operations. The first idea Professor Herwitz suggested was to assess the health and well being of the rainforest. This is accomplished by determining the acreage of the forest and the diversity of tree species. Dividing the tree diversity by the acreage yields the basal area, which for a healthy forest is approximately 60 meters squared per hectare.

The canopy trees are key to the success of the rainforest. “Canopy trees are where it all happens,” said Professor Herwitz. The condition of these trees is of utmost importance in determining the well being of the forest. Excessive breakage of tree limbs, tree deaths, asymmetrical crowns, and lack of productive vegetation are signs of a forest in peril. A lack of diversity among vegetation and animals are also indicators of a troubled forest. A water source should be located, whether a stream or surface water, and tested for possible contamination from the tram or its visitors. Professor Herwitz suggested that the Rainforest Aerial Tram look into hiring an expert to examine the health of its forest.

2.6.2 Cesare Tolentino

Cesare Tolentino, a fifth year Mechanical Engineering student at WPI, is a certified auditor for ISO 9000 and ISO 14000. Mr. Tolentino has audited the

company Pratt and Whitney located in Connecticut. In our meeting with him on April 12, 2000, the project team discovered that Mr. Tolentino also completed his IQP in Costa Rica and had helpful insights as what resources would be available to the project team while in Costa Rica.

Mr. Tolentino answered the question: Does ISO delegate specific numbers, such as amount of emissions allowed by a company? “ISO does not set specific numbers for companies to follow as that would be impossible. Every country has its own regulations and ISO cannot interfere with that. ISO wants a company to state what its numbers (i.e., emissions, waste) are and how it plans on controlling and improving those numbers.”

Mr. Tolentino was asked whether it is worthwhile for a small company to obtain ISO 14000 certification, even if they are not being prompted by suppliers or other companies, but it would improve public relations. His reply was: “Definitely, as long as the increased amount of tourism would offset the cost of hiring auditors and such. It might not happen in a year, but there should be an eventual increase.

Another benefit of ISO certification can be found internally. In the company I worked for, the workers’ attitudes improved immensely. They felt they were making a difference and their work was more efficient. There is a trick to it.” The trick is not to show the new policy as a big change that everyone is mandated to follow, but rather, approach it as just a few changes that will increase efficiency while maintaining a friendly atmosphere with the environment. “Show them it is not bad for them,” Mr. Tolentino stated.

Mr. Tolentino mentioned the fact that ISO certification is not a quick occurrence. A company should plan, depending on size and the existing policy, to take between one and three years to become registered. “Depending on the gap analysis, the time it takes might be more or less.” If the auditor finds few “gaps” between the company’s existing EMS and the ISO 14001 standard, the time-line for the company to achieve registration will be reduced dramatically. On the other extreme, a company, which does not follow an EMS, should expect a longer time for registration, including time for the training of employees.

Mr. Tolentino suggested to that project team create a “game plan.” When the team first arrives in Costa Rica he suggested that they “fill in the blanks you have.” Contacting government agencies Mr. Tolentino said, should help us to familiarize ourselves with Costa Rican environmental laws. “Take things one day at a time and do not be afraid to ask questions, as the laws can get tricky,” he recommended.

2.6.3 Christopher Scholl

Chris Scholl is an Environmental Manager and Professional Engineer who currently works for Norton Company, Worcester, MA. He has worked at Norton for several years and played a key role in drafting up their environmental policy. In our meeting with Mr. Scholl on Wednesday, April 12, 2000, we asked him numerous questions concerning ISO 14000 and Environmental Management Systems.

Norton Company of Worcester is ISO 9000 registered and currently working toward ISO 14000 registration. This was a major reason for the group choosing to interview with Mr. Scholl. Norton is a large manufacturing center and

even though the Aerial Tram is only a small office building we felt that Mr. Scholl would provide some useful information.

We discussed what kinds of products were manufactured at Norton and what environmental impacts were created by their production. Mr. Scholl told the team that the company mainly produces grinding wheels, abrasives, and refractory metal parts. Their environmental concerns include hazardous waste, wastewater (sewerage), air emissions, waste oil, and storm water runoff.

The group then asked Mr. Scholl when Norton Co. began to worry about ISO 14000. He replied, "About two years ago we got two fines from the state concerning our environmental impact. Also our customers began demanding that we implement an EMS and start working toward ISO 14000." Chris stated that improved customer relations and better relations with the EPA were two beneficial reasons to start working toward ISO 14000-certification.

When asked if he predicted the ISO certification process to be an expensive venture, Mr. Scholl replied, "Yes, the major costs are from labor. It amounts to about fifty dollars per man-hour and will most likely end up costing the company about \$100,000 when it is all said and done. It will, however, be beneficial in the future simply because of our improved customer relations and processes."

The team then asked Mr. Scholl how long he expected it to take before Norton becomes ISO 14000 certified. He said, "We expect this to be a two-year process, so we should be certified by fall of 2001. You have to expect that it will take at least nine months from start to finish."

The next question the group asked was: "How long page-wise is your actual environmental policy?" He then removed a frame from his wall and showed it to us. Surprisingly, it was only two short paragraphs long. "Shorter is better," he stated "the environmental policy should be short enough so that every employee of the company can memorize it and recite it."

When asked if he thought becoming ISO 14000 certified is worthwhile for a small office company, he responded, "If improved customer relations is the *only* reason, it is still definitely worthwhile."

Chris Scholl then gave the team a few tips before they left the interview. He identified specific things we could investigate at the Aerial Tram office that may be detrimental to the environment. These things included fluorescent light bulbs (which can contain mercury), air conditioner systems and refrigerators (which may contribute chlorofluorocarbons), and machines, which may suck up electricity. "Energy saving is a big deal," he emphasized. "A business should try to cut down on its power usage whenever and wherever possible." He ended by stating, "make sure to get the key managers of the Aerial Tram to sign and support your environmental policy, in order to ensure that the company is behind this."

2.6 Conclusions

The information presented in this chapter is crucial for the understanding of the project scope. The team has investigated what ISO 14000 is and how it applies to a business, the process and benefits of certification, the major components of an environmental policy and EMS, and the procedure of implementation. The analysis

of the ISO standards has provided the necessary knowledge to develop an environmental policy for the Aerial Tram. The standards require that the company find means to reduce its environmental impacts. The investigation has also provided the team with the ability to make sound recommendations for ways to improve the company's environmental performance, such as suggestions for using more environmentally friendly cleaning products. After interviewing with Chris Scholl and Cesare Tolentino, the team was confident that an environmental policy would be of great value to the Aerial Tram Company.

This acquired knowledge provided the team with a method to accomplish goals once in Costa Rica. A full investigation of the Tram site and office company was necessary to assess the Tram's environmental impacts. From this point the team was able to determine what aspects of the company could to be improved upon.

Aspects of the company that needed to be investigated were waste disposal and recycling, energy sources and conservation, water conservation, wastewater disposal, cleaning products used, and deforestation. The next chapter outlines these procedures and methods for drafting an environmental policy for the Rain Forest Aerial Tram.

CHAPTER 3 - METHODOLOGY

In order to take the first step towards ISO 14000 certification, a corporate environmental policy must be written for the Rain Forest Aerial Tram. The company will use this policy as a foundation for an Environmental Management System (EMS). The EMS will be the first step in the ISO 14000 certification process. This policy must include every aspect of the company, including the office and the tram site operations, as well as all employee conduct.

As a part of the development of this environmental policy, an educational campaign will be initiated in order to inform the employees of the company as well as the public about the importance of environmental preservation. The education of employees and public is an important part of ISO 14001.

Another requirement of ISO 14001 is to show continual corporate environmental improvement. *Continual improvement* is defined in ISO 14001 as a “process of enhancing the environmental performance in line with the organization’s environmental policy (ISO, 1998).” ISO 14001 states that an organization is only responsible for showing continual improvement of its environmental management system, not continual improvement of its actual environmental performance. This statement means that increasing EMS efficiency and meeting government regulations is what a company is responsible for within the scope of ISO 14000. However, our team concluded that it was feasible for the Aerial Tram to improve its *actual* environmental performance and go above the minimum ISO requirements.

There are a myriad of ways for the Aerial Tram to demonstrate continual improvement of its environmental performance. In order to see how to reduce the environmental impact of the Aerial Tram's operations, the whole company had to be thought of as an entity with inputs and outputs. The inputs include such things as energy, transportation vehicles, office supplies, food, water, and workers. The outputs include the actual Tram process itself (the service), as well as wastewater, waste paper, garbage, and small amounts of noise and air pollution. The team had to find ways to reduce the amount of inputs (or to reduce the environmental impact of those inputs) as well as the amount and environmental impact of the outputs and the process by-products leading to these outputs.

One method of achieving this goal was to research more environmentally sound alternatives for the company's currently used cleaning products. This investigation led to recommendations for products that have minimal impact on the rainforest. There were also other numerous facets of the company to be improved upon. For example, no recycled paper products were purchased, and there were no water conserving fixtures in the sinks. Our team thoroughly investigated all aspects of the company operations in order to make recommendations for improvement. In this way, the environmental impact of the Tram's inputs and outputs would be reduced.

As stated above, Team Aerial Tram has three objectives. These three objectives can be compared to a pyramid in which the environmental policy, the main objective, rests at the top and is supported by the educational campaign and the recommendations for continual environmental improvement. The team has

developed a plan consisting of a series of tasks in order to complete these objectives. Please refer to Figure 3.1 to see a flowchart of these tasks.

The development of the ISO 14000 compliant corporate environmental policy can be summarized in three main steps: research and review of existing material, development, and implementation and operation. As can be seen in Figure 3.1, the research and review consisted of the ISO 14000 related documentation, investigation of the Tram site and office, and informal interviews with employees. Development consisted of writing a preliminary draft environmental policy, then a second draft, and finally submitting a final copy. Finally, implementation involved communicating the policy to employees and public and assigning roles and responsibilities for maintaining, reviewing, and updating the policy.

The goal of initiating an educational campaign was accomplished through the same informal interviews used for developing the environmental policy. This information was then used as a base for an educational memo the team wrote for the employees of the Tram. A visit to another park gave the team ideas for a sign campaign proposal. These together led to the final proposal of the educational campaign. All of these steps can are shown in the methodology flowchart (Figure 3.1).

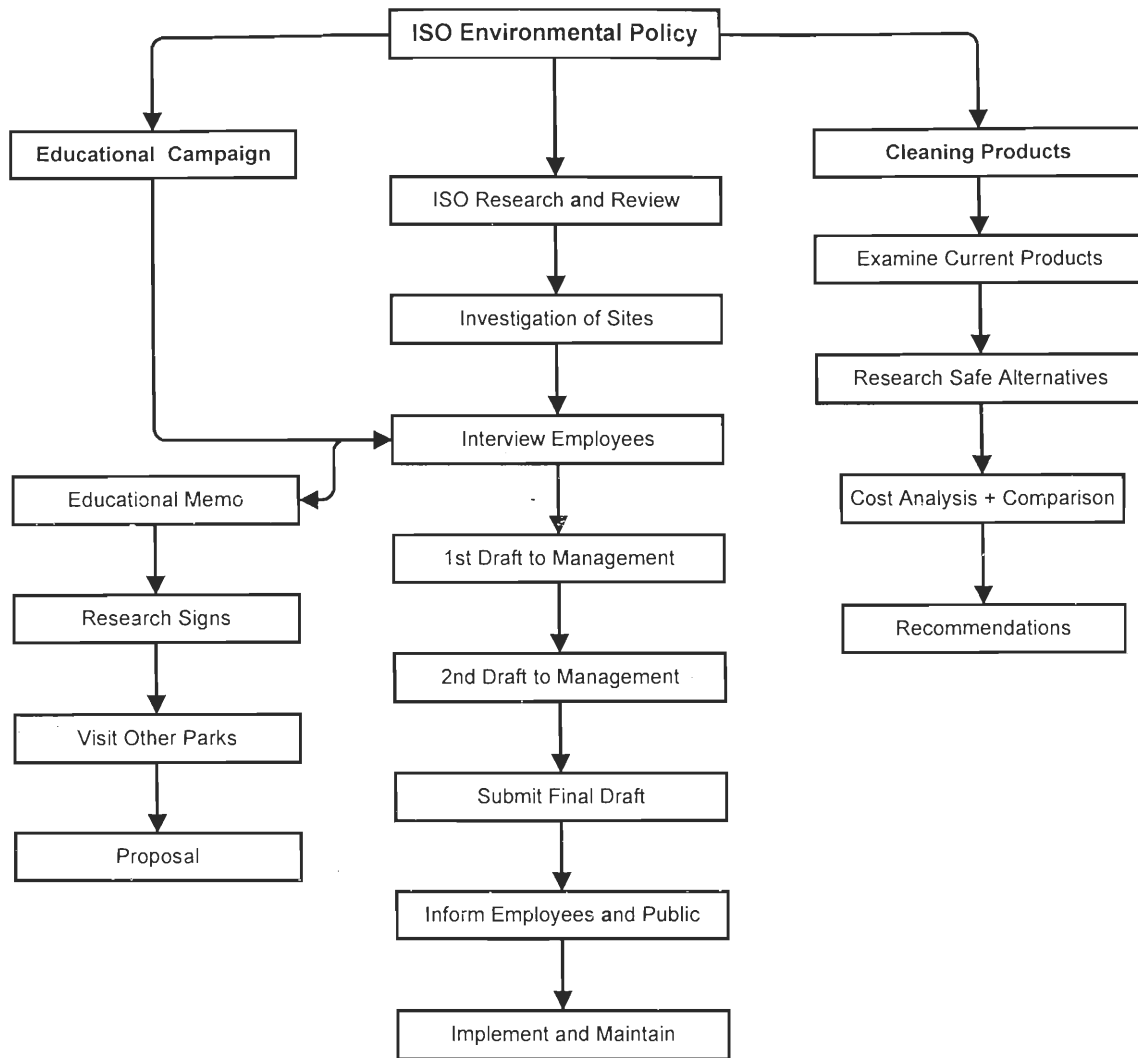


Figure 3.1

Methodology Flowchart

The team was able to make recommendations to the Tram regarding healthier cleaning chemicals through examining the current cleaning products used at the Tram. The team investigated the hazards of those materials and more environmentally sound alternatives. Recommendations were based on the relative prices of these alternatives.

3.1 Preliminary Investigation

Our preliminary research began in Worcester, Massachusetts. Our investigation concentrated mainly on ISO 14000 information. Most of this investigation was accomplished via the Internet as well as through ISO-related books and journals. Our interviews with Cesare Tolentino, an ISO 14001 auditor, and Christopher Scholl, the environmental manager of Norton Company (an ISO 14001 certified company), proved to be invaluable to the understanding of ISO 14000. Our analysis also touched upon environmental topics such as recycling and rules of national parks, via the Internet as well as specialized journals. We also interviewed with Stanley Herwitz, an ecology professor at Clark University, to gain general background knowledge on rainforests. While still in the United States we also began preparatory research for the informal interviews to be administered to the employees in Costa Rica.

3.2 Research in Costa Rica

The first week spent in Costa Rica was used to acclimate ourselves to the beliefs and functions of the Aerial Tram. We toured the Tram site itself, which gave us a more tangible idea of how the Tram worked. Another important outcome of the first week was discovering that we had two additional objectives: to begin an environmental education campaign for employees and the public and to find more environmentally sound cleaning products.

Our search for data continued in Costa Rica. The team visited INTECO, Costa Rica's member body of ISO, to continue our ISO 14000 study. The team also

visited Cederena, a library in San José, Costa Rica, and researched current Costa Rican environmental laws and regulations. This was an important task because it was necessary to verify the compliance of the to be written environmental policy. The team relied on Internet research in order to gain information on more environmentally sound cleaning products, as it proved very difficult to find such information in Costa Rican libraries.

The team also had two informal meetings with staff members to educate themselves more about the Tram. Informal meetings were used because the language barrier makes a formal interview very difficult and it was also solely for informational purposes, not for the discovery of tangible data. The first of the meetings took place with Adriana Carballo, the entrance supervisor, and Alvaro Quesada, maintenance supervisor. They informed our team about the cleaning processes, septic system, changes being made, waste disposal, and recycling. In the next meeting we spoke with Miguel Solano from the purchasing department about chemicals the company uses and the budget for them. Our liaison recommended that we contact Mr. Solano in order to get the most complete list of cleaning chemicals because his department keeps records of everything that is bought for the Tram. We asked what chemicals were purchased and what the budget was for cleaning products. We also inquired whether the company would be still interested in buying more expensive but more environmentally sound cleaning products in case of non-availability of equally priced alternatives. Mr. Solano had prepared for us a collection of labels from the products the company uses. The labels included ingredients as well

as phone numbers of the manufacturing companies. With this information the group investigated more environmentally sound alternative cleaning products.

3.3 Observations

The team found that the study could not be successfully completed only through meetings and Internet research. Observing the Tram site and the office site proved to be very helpful and insightful. These observations, in fact, became the base for developing the environmental policy and educational campaign on these observations.

The team first observed the Tram's operations through a tour of the site to assess their environmental impact. All investigated aspects of the site include the bathrooms, the power generator, and the area around it, the cabins, the cafeteria, the gift shop, the Tram itself, and all other buildings.

The group next observed the office company in operations San José in order to assess their environmental impact and to find ways for reducing this impact. We examined issues such as, bins marked specifically for recycling, whether recyclable materials were thrown in regular wastebaskets, whether the toilets were water conserving, their paper towels or hand dryers were used in the bathrooms and whether excess energy was used.

The team also visited INBIO Park, the National Institute of BioDiversity, whose goal is to educate Costa Ricans and visitors about the biodiversity of the country and the importance of preserving it. The visit aimed at gaining a better understanding of the type of sign campaign that was wanted by the Aerial Tram.

There, the group observed the type of information included on the signs, general sign design features, as well as the criteria for strategic sign placement. Visiting INBIO park was suggested by our liaison, due to his awareness of their extensive sign campaign.

The team members felt that throughout all their research and observations, a better grasp on the current knowledge of the staff was needed and this goal was better met through informal interviews.

3.4 Informal Interviews

A prominent aspect of both the environmental policy and the educational campaign for the Aerial Tram is based on the current knowledge of the staff about the environment and also about the company's current policies. In order to evaluate the current level of environmental and company awareness of the staff, we chose to administer informal interviews to twenty employees, approximately forty percent of the company. The choice of people to be interviewed was by a random sample divided into three categories: managers, supervisors, and general employees. From each of these groups we arbitrarily chose forty percent.

We began brainstorming possible questions for the staff members in Worcester, Massachusetts. The team created a list for both the employees of the Tram and the office company (See Appendix F.1). These questions were modified once we arrived in Costa Rica because some of them were directly answered by our liaison and through our investigation of the company. The questions were translated into Spanish, due to the high amount of Spanish-only speakers that work for the Tram

(See Appendix F.2). The listed questions needed to be pre-tested before administered. Pre-testing was accomplished by asking a small number of employees at the Tram and the office, to answer the questions. The next step was to see whether any modifications or clarifications were needed, including any problems with the Spanish translations.

3.5 Conclusion

By applying the procedures described above, including preliminary information gathering, research and observations of the company, and identification of its inputs and outputs, the team gathered enough pertinent information to begin the analysis of the company operations and develop sound recommendations for implementing the policy and for the fulfillment of all its clauses. Other pertinent information resulted from informal interviews and questionnaires, visits to parks and libraries, and web research. These data are presented in the next chapter along with its' examination.

CHAPTER 4 - PRESENTATION OF DATA AND ANALYSIS

This chapter discusses the findings from our investigation and their analysis. The team investigated both the Tram site and the office company to look for any operational factors that could negatively impact the environment. Since energy and water usage were two major areas of concern, any inefficient use of either of these was recorded as a problem to be solved or minimized. The same held true for areas of wastewater, garbage, pollution, and dangerous cleaning products, lubricants, and degreasers.

The team's approach to evaluating the various aspects of the Aerial Tram was based on modeling the company as a single processing entity with inputs and outputs. This model is represented in the figure below:

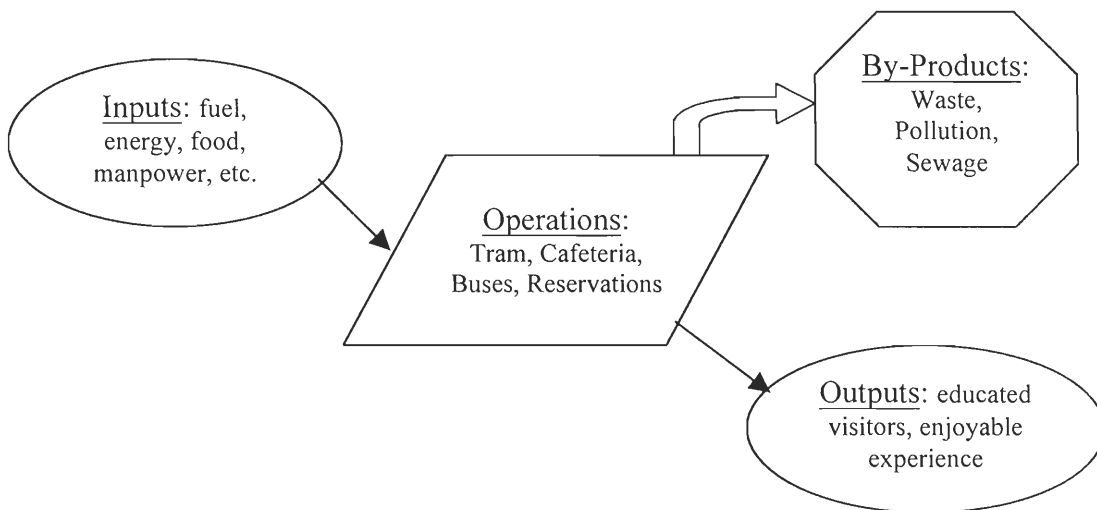


Figure 4.1 **Inputs/Outputs for The Aerial Tram**

The model consists of four parts: inputs, operations, outputs and by-products. Resources (inputs) are necessary for the operations that, in transforming inputs into

output, generate by-products or waste. A good environmental approach should minimize the energy contents of used resources and the generation of harmful by-products and maximize the recycling capabilities of the output and by-products.

In the case of the Aerial Tram the output is a visitor with a better understanding of the rainforest and the need for its preservation. At the Tram site the inputs include fossil fuels, energy, food via a catering service, water, cleaning supplies, and vehicles. These inputs are used for running and maintaining the tram itself, maintenance of the trails, operating the restaurant, restrooms and cabins, keeping the whole site clean, and transporting people to and from the site. The by-products of these operations are waste, air and noise pollution, and sewage. Office operations include management, reservations, copying, faxing, and talking on the telephone. The input to these operations consists of manpower, energy, water, food, and office equipment and maintenance supplies. The by-products of these operations are garbage, wastewater, and waste paper.

One method for improving the environmental efficiency of the Aerial Tram is to reduce the amount of unwanted inputs and by-products. In this regard, information was gathered about the company inputs and by-products. Consequently, it was possible to locate the possible environmental concern areas at the tram site and office company. This chapter discusses these areas by analyzing if and why they pose a problem for the company. Information regarding the level of employee company awareness, was gathered through the informal interviews of the employees, is presented. In addition, the information obtained from the visit to INBio park is included as it pertains to the development of the educational sign campaign. Also

included in this chapter are all data regarding cleaning and maintenance products currently used at the company and environmentally sound alternatives for those products.

4.1 Operations at the Tram Site

As mentioned above, the by-products of the tram site operations are of the biggest concern. By-products include waste, noise and air pollution, and sewage. The source for much of this is the power generator. Other areas of concern are chemical use, waste disposal, and the septic system. Other important issues include lack of use of recycled products, not enough recycling bins, and products used by companies employed by the tram.

The first area of concern was the power generator and the large amount of noise pollution it produced. The company is working to enclose it in a building to reduce the amount of noise released into the surrounding environment. The maintenance of the generator also produces oil-covered rags that should be separated from the rest of the produced waste because of their potential toxicity. A simple system of separating the oil-covered rags could be developed in order to solve this problem. The power generator is run by diesel fuel, the exhaust from which is a big concern. The generator currently has a filter that reduces the level of emissions released into the rainforest. Regular preventative maintenance on the generator, in addition, will help reduce excess emissions.

When investigating alternative power generator sources for the tram, the company found that many of the more environmentally friendly generators were built

for emergency situations, not for long-term use. Most of these generators used electricity and gasoline. Although better for the environment, these options are not feasible because the Tram needs the generators to run everyday of the year for over ten hours at a time. Environmental issues as well as the quest for more efficient power sources led to the consideration of two other, virtually non-impact, power sources: solar and wind power. Due to the climate and geography of the land around the tram these two sources proved to be inadequate to sustain the activities of the tram year round. During the rainy season the rainforest does not see much sun, and the dense rainforest of the area does not allow for the passage of much wind.

The next area of concern at the tram proved to be the chemicals used to clean the gondolas and cable wheels. The chemicals, Aluminon and SCAT 4000, are quite harmful to the environment as well as to the people who work with them. Fortunately the cleaning process is performed in an enclosed area using reusable brushes so as not to produce any waste. The clean-up process is also waste-free. WD-40, a lubricant, is used to clean any residue left on employees' hands, and then is wiped on a reusable towel. The cleaning process of the tram is satisfactory. This means that the decrease of the environmental impact of the cleaning process needs a change of the used products but not of the methods. Environmentally safe alternatives should replace the current products.

The septic system is also posing a problem. There are currently five septic tanks located in various places around the park, each with a leeching field. Unfortunately the soil around these tanks is too dense for them to leech properly. In

this regard, the company is working to have the tanks moved to areas that allow for more effective leeching by the time their next high season hits in December.

The system of waste disposal is another area of concern. Currently two maintenance men go through the waste and pick out all of the metal cans to be put aside for recycling. The rest of the garbage is either shipped to a landfill or is shipped to an incinerator. A large portion of this waste could be recycled or composted if proper techniques were used. In addition, a more elaborate classification system for separating different kinds of recyclable waste, non-recyclable waste, and organic waste would alleviate much of the waste disposal problems.

The team found that the Aerial Tram does print all of its brochures on twenty-five percent post-consumer recycled content paper. This is a positive step, but the team found out that the minimum content of post consumer recycled paper should be above thirty percent. The company has also switched its ticket system from what used to be each customer receiving a sticker to attach to his or her shirt while visiting the Tram. They found out that when the visitors were leaving the Tram site, the stickers were thrown on the ground. The company now uses paper passes that most visitors keep as souvenirs. This paper is not recycled though.

The company does not directly own and operate the restaurant/coffee counter at the Tram site, but uses the services of a caterer, who uses recycled napkins and serves all sugar and cream from one container, not individual containers. However, the restaurant has straws that are individually wrapped producing excess waste. The restaurant also sells soda and beer cans, but there are not any recycling bins located nearby.

4.2 Operations at the Office

The biggest by-product of the office is waste, the largest area of concern when investigating the office. Other problems are water usage, mostly as a result of the bathrooms, and energy use.

The first identified problem was the recycling of the office wastepaper. While the company does recycle, it does not recycle as much as it should, considering the produced amount of waste paper. One reason for this is the inaccessibility and lack of marked recycling bins. Only one bin was found in the downstairs offices in the middle of a room, not close enough to any one person's desk. For this reason, many employees throw recyclable white waste paper in the regular garbage bins. Also, a lot of non-white paper trash was found in that recycling bin, such as cellophane wrappers and a plastic soda bottle. The problem can be remedied with more recycling bins and educational campaigns, as long as employees work to make them useful.

The next encountered problem was the toilets, which are not water conserving, although this could be easily remedied. By filling the tanks of the toilets with a small soda bottle filled with sand or rocks, water conservation will be improved because less water is needed to fill up the tank. Another, more costly, option is to retrofit all the toilets with flow control valves to increase water conservation. C-fold paper towels are used for hand drying purposes in the bathrooms, one of the most wasteful methods for hand drying. Electric hand dryers or linen roll towels are better alternatives. Electric dryers, in fact, create no waste and use only a limited amount of energy, especially those with sensors that allow them to run only when hands are there to be dried. A linen roll towel, in addition, is reusable.

The office does not have hot water, eliminating the need for assessing the current method for water heating and if the hot water pipes were insulated.

The team found that there was a good amount of wasted energy in the offices. Many employees leave lights and computers on when they are not being used. Doors to air-conditioned rooms are frequently left open, causing these appliances to be turned on more often. This type of use has three negative effects: first, it costs the company more money, second, it wastes energy, and third, air conditioners emit CFC's into the air, damaging the Earth's atmosphere. The excess use of energy is something that can be mended through employee education, as long as employees work to make it successful. The office does not have a heating system, as it uses air conditioning year round. One observed positive energy conservation effort was the use of ambient or natural light in the office. There is a skylight located in the break room and sunlight is used as opposed to electric lights. Window shades are also always left open, allowing the sunlight to enter the offices.

4.3 Maintenance Products Used at the Tram Site and Office

The team met with an employee from the purchasing department, Miguel Solano, to review which maintenance products are currently used. Maintenance products at the Tram include cleaners, lubricants, and degreasers. Mr. Solano provided the team with labels of specific products and their specifications. Mr. Solano also provided information about the suppliers of these products. Table 4.1 shows Dosel's five providers, the products they supply, and approximate prices per month spent on each provider.

Provider	Address	Cleaning Products	Approx. Price/Month (Colones)
Belca de Costa Rica	Cenada-Barreal de Heredia	Beach, disinfectants, soap, toilet paper, hand towels	280,000
Chesterton Costa Rica, S.A.	Saban Sur, del colegio de Medicos y cirujanos, 50 Este y 25 Sur.	Degreaser, white grease, component cleaners, lubricants	50,000
Almacen el Colono	Guapiles Centro	Degreasers, additives, paints, dilutants, catalysts	50,000
Matra	550 metros norte de la Interseccion radial de Santa Ana, San antonio de Belen	Grease, filters, oil, acids	130,000
L and M de Pococi	50 norte de Servicentro Santa Clara Pococi-Limon	Greases and oils	40,000

Table 4.1 Dosel S.A.'s Five Providers and Approximate Monthly Spending on Maintenance Products

After determining their chemical content, several products were considered for replacement by environmentally friendly alternatives. These products consisted of floor cleaner, window cleaner, clogged pipe solvent, hand washing detergent, dish-washing detergent, bleach, insecticide, bathroom cleaner, and, as mentioned above, the dangerous cleaner/degreaser used on the tram gondolas and cable wheels. These products all contain chemicals that can be harmful to the environment. The monthly budget for maintenance products is \$1000-\$2000 and could be increased within reason if healthier alternatives are found.

Internet research provided the team with alternatives for the floor cleaner, window cleaner, hand and dishwashing detergent, liquid pipe cleaner, bathroom cleaner, and degreaser. Recycled products such as fax and copy paper, toilet paper, and garbage bags were also found as viable alternatives to replace the current products. Garbage bags that biodegrade in three years as opposed to the average time of 400 years were also found.

Alternative cleaning products were found via the Internet. The suppliers initially researched were all U.S. based companies. The identified products were more expensive than the average products found in stores, however, if the Tram company is willing to incur additional expenses, more environmentally sound products could be used. Also, by purchasing better quality products, money would be saved in the long run, due to their higher performance. In addition, the company could save money through water and energy conservation. These savings can be used to cover the gap between the current cleaning budget and the new budget for environmentally friendly products. The company commitment to the environment, in addition, should lead to a better public image. This approach could increase the number of visitors, and consequently increase revenues for the company. Tables 4.2 and 4.3 compare the costs of the considered products, in price per gallon, from U.S. based suppliers.

The large discrepancies in some of the pricing of these chemicals may be caused by their different concentration. Generally more concentrated, but more expensive, products can be spread out over a much longer period of time by diluting the product more or less depending on the severity of a job. Therefore these products

	Envirosafe, Inc.	Mail Order Catalog	Real Goods	Supra Glaze	Precision Industrial Products
Heavy-duty degreaser					\$34.08
Handwashing soap					\$31.00
Comp. Screen cleaner					\$25.48
Bathroom cleaner		\$15.86	\$9.95		\$16.75
All-purpose cleaner	\$14.95	\$13.96		\$30.00	
Window cleaner	\$9.95	\$23.92	\$8.95		
Bleach			\$19.95		
Dishwashing soap		\$15.86			
Floor cleaner	\$14.95	\$13.96			
Pipe cleaner					

Table 4.2 **Maintenance Products and Prices Per Gallon for U.S. Suppliers**

	The Clean Environment Co.	Eco-Safe Products	Safe-Tee Chem.	Pro-tek	American Environmental Health Foundation
All-purpose cleaner	\$12.20	\$37.00		\$67.00	\$21.96
Floor Cleaner	\$12.20				
Window Cleaner	\$12.20	\$25.00			\$19.96
Bathroom Cleaner	\$16.60	\$37.00	\$10.00		\$40.26
Bleach					
Pipe cleaner	\$15.20				
Dishwashing soap		\$37.00			\$18.52
Handwashing soap					\$47.92
Heavy-duty degreaser		\$50.00	\$11.50	\$67.00	

Table 4.3 **Maintenance Products and Prices Per Gallon for U.S. Suppliers
(Continued)**

have to be purchased less often and in smaller quantities, meaning less money spent in the long run.

After a brief investigation, it was determined that shipping all products from the U.S. to Costa Rica would be too expensive. The team then decided to identify suppliers in Costa Rica via the yellow pages. The companies identified as possible providers include The American Sanitary Co. S.A., Lemen de Costa Rica, and Chesterton Co. Table 4.4 shows the prices of products supplied by these companies. Shipping costs are much less when dealing with these local companies. Due to a lack of time the Team was unable to obtain the prices for all products.

	<i>Chesterton Co.</i>	<i>Lemen de Costa Rica</i>	<i>American Sanitary Co.</i>
Bleach			N/A
Disinfectant		1084.16	N/A
Detergent		323.4	N/A
Hand Soap		1154.4	
Dish Soap		1220.4	
Glass Cleaner	N/A		

**Table 4.4 Maintenance Products and Prices for Suppliers in Costa Rica
(Colones per Unit)**

4.4 Information Obtained at INBioparque

Costa Rica's National Institute of Biodiversity runs a recreational and educational park that works to educate the people of Costa Rica, as well as visitors from all over the world, about the country's great biodiversity. For this reason, a strong and effective educational campaign has been put together at the park. During the investigation much was learned about the elements necessary to implement an effective educational campaign at the tram site.

At INBioparque one of the first things visitors see is a large general information sign that shows the Institute's mission statement, the rules and regulations of the park, and its respective map, in English and Spanish. The same information is contained in a pamphlet that illustrates all of the current services and activities provided at the park.

The Tram site currently does not have any general sign for tourists. A general information board would be very helpful and interesting, preferably where tourists can view it easily. The pamphlets offered at INBio, while helpful, are not necessary. The Aerial Tram would benefit from the existence of this sign, but pamphlets add excess waste as well as production cost.

For an additional two-dollar charge visitors can buy a brochure with the necessary information to conduct a self-guided tour. All of the trails in the park are color-coded and have numbered signs. When walking along a particular trail, visitors are encouraged to stop at the signs, find the correlating number in their pamphlet, and read the information provided about the foliage nearest them. Many of the most common plants have signs that provide their scientific and common name.

The introductory video for all visitors upon entering the park was also important. This video is very informative about the history of Costa Rica's biodiversity and what happened when humans began to come to the country. The video stresses the importance of biodiversity and preserving this natural resource, by informing the viewer about the mission of the Institute.

The introductory video at the tram needs to be updated because its main focus is on Dr. Donald Perry explaining his adventures of researching the canopy and how the building the tram came about. The impact of the video would be greatly improved by explaining why it is important to study the canopy and by providing more specific insights about what can be found in the canopy. This information would give tourists a better idea about the importance of preserving the rainforest.

Visitors to the tram have the opportunity to take a self-guided tour through the rainforest, but this walk is futile without information about the value and intricacies of the rainforest. By numbering different areas and points of the tour and supplying an informational booklet, visitors would be able to have a better experience from the visit. The tour path, in addition, should be equipped with signs that show the scientific and common names of certain plants and related information.

4.5 Employee Awareness

Communication with and full cooperation of the employees are an integral part of implementing a successful corporate environmental policy. To find out how much the employees knew about their company mission, the contents of ISO, and

how agreeable they were to complying with their company's wishes, some informal interviews were conducted. The employees were asked the following questions:

1. Are you aware of the environmental concerns of the Rain Forest Aerial Tram?
2. Are you aware of the existing environmental policies of the Rain Forest Aerial Tram?
3. If so, what are they?
4. Have you heard of ISO or ISO 14000?
5. If so, describe them.
6. Would you happily comply with an environmental policy set up by your company that will help the environment?
7. Would you still comply even if it requires changes or extra effort in your daily routine? (See Appendix F for complete questionnaire in English and Spanish).

The findings show that all of the employees are aware of the company's environmental concerns and that measures exist to deal with them. Only eighty-three percent of employees, however, could explain these measures. Less than fifty percent has any pre-existing knowledge of ISO or ISO 14000, but those who have heard of it are quite knowledgeable (See Figure 4.2). Every employee fully understands the importance of complying with an environmental policy that will improve the company's environmental standing and is willing to fully cooperate in its implementation.

The fact that most employees are knowledgeable about the company's environmental concerns is a very good start for the ISO certification process. All employees, however, need more awareness about ISO, ISO 14000, and why their

company has set ISO certification as a goal. These considerations will be distributed to all employees in an informational memo. Distributing this memo would ensure the same level of information and understanding among all the employees. It is futile to

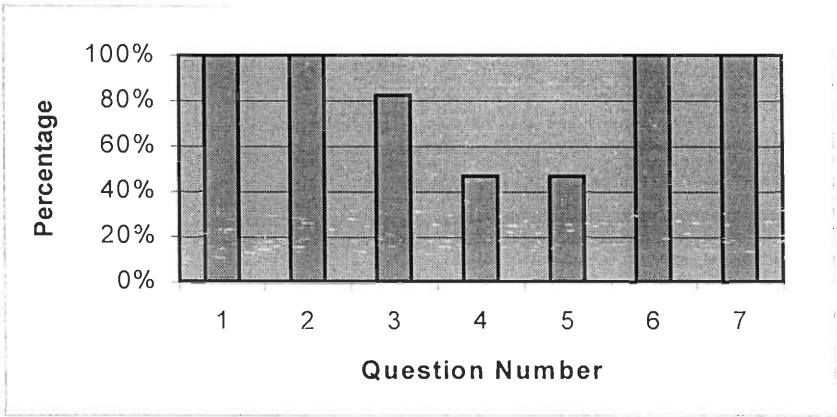


Figure 4.2 **Percent of Informative Answers vs. Question #**

aim at ISO certification without the understanding of the personnel. Demonstrating awareness and environmental concerns as well as the fostering of cooperative spirit are the building blocks for the improvement of corporate culture and performance. These features will make the implementation of an ISO 14000 environmental policy a more effective and easy task to perform.

4.6 Conclusions

The above illustrated analysis has produced several important findings. Waste disposal appears to be a problem at both the tram site and at the office. Energy and water use are problems at the office, but not at the tram. The chemicals used to clean both the office and tram site are a problem, but it can be easily remedied. There is a

no use of recycled products at the office and tram site as well. While these products are not important for waste reduction, they show the company's commitment to the environment. The visit of INBioparque has suggested many inputs for the development of education material that is currently lacking at the Tram. The interviews conducted show that the employees need to be educated about ISO and ISO 14000.

These considerations are input for the next logical step: the development of the recommendations for improving corporate operations, so that implementation of ISO certification becomes a reality. The analysis has shown the possibility of using alternative cleaning products for the company, including different options based on price. The interviews have helped to identify some of the content of the informative memo for the personnel. Finally, the visit of INBio Park has given the group sufficient background to recommend a sign campaign, as well as ideas for interactive education and other ways to involve the public in the importance of the Rain Forest Aerial Tram's mission.

CHAPTER 5 - RECOMMENDATIONS

The recommendations this chapter represents are the application of all of the gathered information. The chapter is divided into two sections: Environmental Policy Objectives and Environmental Policy Implementation and Maintenance. The first part contains the actual environmental policy as well as the Team's suggestions for improved environmental performance. The second part contains suggestions for implementing, updating, maintaining, and communicating the policy, as well as the identification of the responsible parties required to carry these actions out. It also contains the team's ideas and suggestions for the educational campaign.

Environmental Policy Objectives

This section pertains to the proposed corporate environmental policy. It also includes all of the recommendations for the continual improvement of the Rain Forest Aerial Tram operations. These suggestions will help the company fulfill the clauses of the environmental policy, leading the Tram in the right direction for ISO 14000 certification.

5.1 Corporate Environmental Policy

Mission

“To promote environmental awareness in saving rainforests through innovative ecological solutions, education, and exciting research to create a world class tourist experience.”

It is our mission to provide a world-class educational experience while helping to protect the rainforest environment. We are committed to the integration of environmentally safe management practices throughout all aspects of our business. We will constantly strive to continually improve these practices and the environmental quality of our activities and services.

Corporate Goals:

- Comply with local environmental laws and regulations and adopt more stringent standards if considered necessary by management.
- Strive for ever-increasing efficiency in all aspects of our business regarding environmental performance. This will include the departments of accounting, maintenance, reservations, reception, and all other operations of the company.
- Eliminate or reduce waste through preventative practices.
- Recycle and conserve when at all possible minimize environmental impact.
- Evaluate the company environmental progress and measure it against previously established corporate goals.
- Incorporate environmental considerations into all management and business decisions.
- Strive to educate the public and tourists about the value of the rainforest and all natural resources and the importance of preserving them.
- Communicate with employees and external parties regarding the company environmental issues.
- Ensure that all employees know their environmental role and responsibility.
- Promote environmentally friendly practices for business and home; and
- Lead other tourism companies by setting an example with strides towards environmental improvement.

5.2 Recycling

Although the Tram does recycle, their methods are not efficient, resulting in a poor recycling program. The team has developed several recommendations to make this process more efficient at both the Tram site and the office company. These include increasing the amount of recycling bins and the recycling of fluorescent light bulbs and construction debris.

In the office, more effort should be spent for recycling paper. The simplest solution is to add additional recycling bins throughout the office. Bins should be placed beside every employee's desk as well as next to the copy machine, fax machine, and printer due to the high volume of paper that goes through those areas. Bins should also be set up in the kitchen, break room, and throughout various offices that collect beverage containers, such as glass bottles and soda cans. With this arrangement, more paper will be recycled rather than fill the waste bins.

At the Tram site, more recycling bins should be set up throughout the park. It is especially important to place them near the regular garbage bins. This arrangement will facilitate the correct placement of recyclables because it will not be inconvenient for visitors. The close location of a recycling bin to a trash receptacle will help to prevent visitors throwing non-recyclable trash into a recycling bin. Specific markers for paper, metal, and plastic currently differentiate the existing bins. Signage should be placed alongside them to clearly indicate what is acceptable or not acceptable for each type of bin in as few words as possible.

When the fluorescent light bulbs are burnt, they should not be thrown out in the regular trash because of their mercury content. They should be collected in their

original containers and shipped to fluorescent lamp recyclers (See Appendix G for a list of recyclers).

A substantial amount of construction and demolition debris can be recycled. Due to the current construction at the Tram, this recommendation may be too late for effective use, but it would be useful for any future construction. Recycling options should be discussed with the construction contractor.

5.3 Waste Prevention

Waste prevention, also known as source reduction, means using less material to complete a job, therefore reducing the amount of waste produced. Waste prevention can reduce purchasing costs and lessen the amount of material that must be managed for recycling and waste disposal. Suggestions include replacing paper towel use with electric hand-dryers or linen roll towels, reduction methods for paper consumption, and manners to reuse containers.

In the bathrooms, C-fold paper towels are used for hand drying. This is a wasteful method. C-fold towels are delivered individually and people tend not to use just one paper towel. The towels also stick together, therefore causing people to take more than one item at a time. Since the Tram site itself has both paper towels as well as electric hand-dryers, it would be best to remove the paper towels all together, therefore eliminating any paper waste. In the office company, only C-fold paper towels are used for hand drying. It would be best for the company to replace this type of paper towel dispensers with electric hand-dryers, once again eliminating all paper waste. Electric hand-dryers with sensors would be best suited for the company's

needs. These activate only when a person puts his or her hands beneath the nozzle and automatically shuts off when the hands are removed, reducing power consumption. Another option is to install linen roll towels. These devices are a self-recycling, continuous loop of a durable towel. A person will dry his or her hands and the towel will then loop around through a small box where it is sanitized. Another waste prevention method involves using reusable rags for cleaning purposes. These rags can be laundered and reused, therefore reducing the amount of paper towels used for cleaning.

Due to the extensive amount of paper use within the office, the team has developed several suggestions to reduce waste. The first suggestion is to reduce the actual amount of used paper. This can be accomplished through increasing the use of electronic mail for correspondence between employees and other businesses. When information is distributed to employees, it would be more efficient to post several bulletins or memos in prominent areas, as opposed to handing a copy to every employee. A bulletin board may be put up, and all employees notified that all notices would be placed there for them to read. When making copies or printouts, employees should consider making double-sided copies. This method will cut copy paper consumption almost in half. When paper is no longer needed, and ready to be disposed, the employees should consider using it as scrap paper. This will extend the life of the paper and prevent new sheets of paper being used for scrap paper. Two-way envelopes can be purchased when mailing an item to a company that requires a reply, therefore reducing the amount of paper consumption and waste. In this regard,

most documents should be stored electronically rather than in the form of hard copies. Storing files electronically will also save space in the office.

Containers from any sort of product can be reused as a container for the storage of: new cleaning products if it had to be diluted, items bought in bulk, small items that may get lost easily such as nails, rubber bands, pencils, etc. Bigger containers such as buckets and barrels can also be used for storage of larger items or turned into trash/recycling bins. Some barrels can also be sent to a drum refurbishing company to be re-manufactured and used again.

5.4 Energy Conservation

Energy is often a large expense for a company. There are many ways to reduce energy consumption, which save money and help the environment at the same time. The company currently spends approximately 315 dollars per month on the office's electric bill. The team has developed several recommendations for energy conservation including the use of ambient light, the installation of fluorescent lights and energy conserving devices, posting reminder notices, and sub-metering the company.

The Tram can first continue to use ambient light as much as possible. All blinds should be left open to minimize the use of artificial lights. This of course is not possible all the time, such as when it is cloudy or dark outside. For these times, compact fluorescent lights (CFLs) should be installed in place of any incandescent lights used. These lights use less energy, are more efficient, and last longer than incandescent bulbs. They usually fit into incandescent light fixtures, eliminating any

retrofitting costs. When used in place of incandescent bulbs, CFLs substantially reduce energy costs because they produce more light per watt. Although more expensive than typical incandescent light bulbs, they last ten times as long, paying for themselves in a short period of time. CFLs cost between twelve and twenty-five dollars (3600 to 7500 colones) but last between 7,500 to 10,000 hours compared to 750 hours of a standard incandescent bulb, according to General Electric Lighting and TechnaBright specifications. Fewer CFLs need to be installed if reflectors are installed as well. CFLs create the same amount of light, but use substantially less energy.

The team observed that a lot of employees leave rooms unattended without turning off the lights. Posting reminders reading “Please turn off the lights when leaving the room” may prompt the employees to turn off the lights. Another reminder could solicit employees to keep doors of air-conditioned rooms shut. This step may help to conserve energy by not having to run the air-conditioning longer to compensate for the lost cold air. The office can also consider installing double pane windows. With better thermal resistance, the efficiency of the air conditioner would be increased. The drawback of this option is its high cost. The Tram, in addition, could install occupancy sensors and/or timers for rooms with limited use, such as the stockroom or restrooms. This will limit the light usage to only when the room is occupied, increasing energy efficiency.

It would be worthwhile for the Tram to consider sub-metering the occupied space in order to monitor energy use. Sub-metering will allow the company to locate

large energy drains. With the knowledge of its largest energy drains, the company can take actions to reduce the energy consumption of these areas.

5.5 Water Conservation

Excess water usage is found throughout many companies. If steps were taken to conserve water, a company would not only help the preservation of natural resources, but it would incur savings. Although the Tram spends only approximately thirty-six dollars per month on water, the following recommendations will help to reduce that amount further. These recommendations include water reduction methods and devices for toilets and sinks, suggestions for water conservation memos, reasons for increasing sweeping and reducing mopping, and the planning of a systematic check for leaks throughout the office and Tram site.

A major cause of excess water usage is through non-efficient or broken plumbing fixtures, such as high-water toilets and leaking faucets. The Tram can take several steps to increase the efficiency of water use. One method is to retrofit the toilets with flow control valves that utilize less water per flush. Another method is homemade and very inexpensive. It involves taking a small one-liter or two-liter plastic soda bottle with the label removed, and filling it with either sand or small pebbles. This bottle is then placed in the toilet tank, thus reducing the volume of water required to fill the tank.

The sinks at the Tram site and office can be retrofitted with water flow restrictors or aerators, which reduce the amount of water flow, without loss of efficiency. Timers can also be installed on the sinks. These devices will ensure the

faucets are only left on for a specific amount of time. An easy, inexpensive method that may help to keep the water turned off is to post reminders by the sinks that read “Please shut water off after use.”

To reduce the amount of mopping needed, dry sweeps should be performed daily. By removing all the debris off the floor, there is less need for mopping the floor because the debris will not have become ground into the floor. If spills are cleaned up immediately, mopping is not needed. This arrangement saves water as well as reduces the amount of chemicals used in the mopping process.

The team also recommends that the Tram develop a system for identifying and repairing leaking pipes, water faucets, and toilets. A plan of systematic check for all areas that are prone to leaking or have potential to leak should be developed. Leaking pipes, sinks, and toilets usually go unnoticed for extended periods of time, dripping away company water.

5.6 Promotion of Education

Another objective in the fulfillment of the corporate environmental policy is the promotion of education to both the public and the employees.

The company should continue its endeavors for educating every visitor to the Tram. This thrust should be based not only on rainforest preservation, but also on the importance of the rainforest as an entity, on efforts for minimizing the use of natural resources, and preserving the Earth's ecosystem. The main objective of this education should be to instill in each visitor a sense of responsibility towards the betterment of the environment. Methods according to which this goal can be accomplished are illustrated later in this chapter.

Many of the employees of the company are well educated in regards to the environment. However, many of the employees lack knowledge of ISO and ISO 14000. This issue should be addressed through company training. ISO topics should not be the only type of issue discussed in the training. The employees should also be made aware that their daily work activities could be modified to reduce impacts on the environment. Many of these modifications, such as energy and water conservation efforts, have been explained already in this chapter.

5.6 Suggested Purchases

The Tram currently does not purchase any products with post-consumer recycled contents. The purchase of recycled products would help the company to promote the use of recovered materials and close the "recycling loop." The latter consists of purchasing a product, its recycling, and the purchase of that recycled

product. This approach will help to create a market for materials that are collected for recycling. Suggested recommended purchases include items made of post-consumer recycled content, refurbished products, and items in bulk or concentrated form.

An important factor to be considered by the Tram is the purchase of all copy paper, writing paper, and letterhead paper with post-consumer recycled contents, because of the extensive use of office paper for copies and printouts. In this regard, the U.S. Environmental Protection Agency recommends a content of thirty percent. The Tram currently prints all of its brochures on twenty-five percent post-consumer recycled content paper. It would advantageous for the company to consider using a higher percentage of recycled content.

Other recycled products that the Tram should consider purchasing are recycled paper towels, toilet paper, and napkins. Paper towel and napkin use should be as limited as possible, but this is not an option for toilet paper. Since these products are difficult to be recycled, they should be purchased with a post-consumer recycled content. Recycled paper towels and toilet paper should be purchased from Lemen de Costa Rica S.A. The company supplies 100% recycled content paper towels and toilet paper. Please refer to Appendix G for Lemen's company information.

There is also market availability for garbage bags made of one hundred percent recycled plastic and for biodegradable garbage bags that degrade in three years, as opposed to four hundred years of a typical bag. Soy-based or water based inks should be purchased for printing. These inks release fewer volatile organic compounds (VOCs) than oil-based inks when used, which is better for the

environment. The use of these items will lessen the environmental impact of the Tram's operations.

Recycled products, such as engine coolant and re-refined lube oils, can be purchased for the tractor and other machinery located at the Tram. Since the site is going through a period of construction, the company should look into purchasing recycled cement and products, such as floor tiles and patio blocks that are made of recycled material.

The company can also consider purchasing refurbished products as opposed to brand new products. There are a multitude of refurbished items available for purchase, from computers to printer toner cartridges. The latter, when completely used, can be shipped back to the manufacturer to be refurbished. Many companies include shipping instructions and labels within their product box. Taking all of these measures will not only save money, but prevent those items from being thrown into landfills, lessening the Tram's impact on the environment.

The company can also negotiate with its suppliers the delivery of products with recycled content and the reduction of excess packaging when shipping products. All office supplies such as pens and staples should be bought in bulk, and when possible, all chemicals and drinks should be purchased concentrated. This approach will save the company money, since buying in bulk or in concentrate is usually less expensive than buying in smaller quantities. It will also reduce the amount of waste produced due to the fewer containers needed to house the products.

5.7 Alternative Cleaning Products, Lubricants, and Degreasers

After determining the effectiveness and cost of various brands of safe cleaners, lubricants, and degreasers, the team has compiled a list of these recommended products for use at the Aerial Tram Company. While environmentally friendly, some of these products may be more expensive than the currently used ones. The team recommends that the Tram spend the extra money, because this slight increase in cost will yield better environmental performance, and demonstrate environmental commitment. In some cases the use of higher quality products on the tram, specifically lubricants, could save money in the long run, due to reduced parts wear, maintenance, and non-scheduled down time.

Many of the possible suppliers were eliminated as an option due to the fact that they are located in the U.S. and the shipping costs would substantially raise the price of the products. In some cases the products alone were also too expensive. The team located three suppliers in Costa Rica. Two U.S. based suppliers, however, are recommended: Envirosafe, Inc. and Chemsources, the first one for its competitive prices and environmentally friendly products, and the second one for its high performance products. Both suppliers are situated in good locations for shipping to ports in Costa Rica.

The following recommendations are broken up into two categories: *cleaning products* and *lubricants and degreasers*. In both categories the companies or suppliers are listed with their respective products. Please refer to Appendix G for the information of each mentioned company or supplier.

5.7.1 Cleaning Products

This category includes companies or suppliers for various cleaners for many different applications both at the Tram site and office. These products include all-purpose cleaners, disinfectants, bleach, detergents, dishwashing soap, hand soap, glass cleaner, and odor eliminators. As stated by the contested companies, all of these products are environmentally safe.

The American Sanitary Company, located in San Francisco de Dos Rios, Costa Rica, supplies bleach and a wide range of disinfectants. These products are manufactured at Lonza Inc., in a high technology plant. The incorporated electrolytic process is safe for the environment because sodium chloride is used instead of chlorine. The process also produces no waste material and no wastewater. For these reasons the Team recommends that the Aerial Tram purchases bleach and disinfectants from the American Sanitary Co. These products should be used at the Tram site and office to clean the restrooms and other surfaces necessary of being sanitized.

Lemen de Costa Rica, located in San Jose, Costa Rica, supplies environmentally safe and biodegradable disinfectants, detergents, and hand and dishwashing soaps among other cleaning products. The team recommends that the Tram purchase detergent and hand and dishwashing soap from Lemen. The purchase of ADZ-60 detergent and Sani-Fresh hand soap is highly recommended. ADZ-60 is biodegradable, and Sani-Fresh contains only alcohol and is 100% biodegradable and water-soluble.

Envirosafe is a U.S. based company that specializes in manufacturing environmentally safe cleaners and disinfectants. Its All Purpose Cleaner/Degreaser is recommended for use at the Tram Site kitchen. This general cleaner is safe for use on all surfaces, is a “Chefs in America Gold Medal Winner,” and food service certified. Since the company is located in the U.S., additional costs must be added for shipping. However, the company is located in California, a good shipping location for Costa Rica.

The team also suggests purchasing Envirosafe’s “One-Step Germicidal Cleaner/Deodorant” for disinfecting and deodorizing the restrooms at the Tram site and office. This concentrated disinfectant is Federal EPA registered and tested to be an effective germicidal cleaner.

Chesterton Costa Rica S.A. is an ISO 14000 certified industrial supply company. All their products are manufactured with environmental friendliness in mind. The purchase of Chesterton 099 glass cleaner is recommended to clean windows at the office and Tram site, as well as on computer screens.

Chemsource is a Florida based distributor of Safecare commercial and industrial cleaning products and lubricants. The team recommends one of their products, Safecare SC-1000, to remove grease from the Aerial Tram components because it is biodegradable, non-toxic, non-flammable, fully filterable, and does not react with the cleaning surface.

5.7.2 Lubricants and Degreasers

The Aerial Tram currently purchases lubricants, white grease, and degreasers from Chesterton Costa Rica S.A. The company is ISO 14000 certified and it supplies environmentally safe products, thus the team advises that the Aerial Tram make an effort to purchase lubricants and degreasers from Costa Rica solely from this company. There are also suppliers in the U.S. that distribute safe, high performance lubricants and degreasers. These products are more expensive with added shipping costs, however they are totally environmentally sound and are of high quality. The use of these products at the tram could cut down on parts wear and maintenance, and save the Aerial Tram money over an extended period of time. The distributors of these products are listed below.

As stated above, Chemsources is a Florida based distributor of Gemtek Safecare commercial and industrial cleaning products and lubricants. Safecare Safelube lubricant could be used on the Tram to replace the current grease used on the aluminum wheels that the cable rides on. The team consulted a representative of Chemsources, Cal Iesbach, who stated that this high performance lubricant would be ideal for the tram applications. As stated in Gemtek's website, this lubricant contributes to longer product life, meets EPA standards and is biodegradable, and is totally safe to work with.

As for a degreaser, the team recommends SafeCare Products SC1000 All Purpose Cleaner. The product SC1000 would be effective in removing grease or other lubricants off the aluminum wheels of the Aerial Tram. Mr. Eisbach also mentioned that GEMTEK's aircraft cleaner would be the ideal solution for removing

grease off of aluminum. GEMTEK, in addition, produces a light oil which is far superior and more environmentally friendly than WD-40, a lubricant currently used at the Tram site to remove grease.

5.8 Suggestions for the Restaurant

The restaurant/coffee counter at the Tram site operates through a catering service contracted out to an outside company. The Tram cannot directly change the processes of this service; however, it can influence what is purchased and used at the restaurant. It would be best for the restaurant to buy condiments in bulk, thus reducing the amount of packaging needed. The restaurant should continue using refillable containers for such things as sugar and cream. In addition, it would be beneficial to use straws from a dispenser rather than individually wrapped straws. This will save not only money but also excess waste paper. The restaurant should continue using its recycled napkins, but it should use rags that can be washed and reused rather than paper towels. The restaurant also serves beverages such as beer and soda in cans. Currently there is only one bin in the restaurant for all garbage. It would be advantageous to set up recycling bins inside the restaurant.

Environmental Policy Implementation

The aforementioned objectives of the environmental policy and of water and energy conservation, recycling, waste prevention, cleaning products, purchases, and restaurant operations need to be met in order to implement the company environmental policy. The following recommendations focus on ways for meeting

these objectives and facilitating the transition into the implementation of the policy. The section contains suggestions for putting the policy into effect, updating, maintaining, and communicating the policy, including the identification of the responsible parties required to carry these actions. This section, in addition, includes an informational memo for employees and suggestions for the educational campaign. The education of the employees and the public is an important aspect of ISO 14000 implementation.

5.9 Implementation Suggestions

In order to properly implement an ISO 14000 environmental policy every employee in the company has to become educated about their roles and responsibilities in the certification process. In order for this to occur someone has to train the employees as well as monitor the effectiveness of the training. Another employee has to be responsible for periodically reviewing the environmental policy and keeping it up-to-date with the progress of the company. After speaking with Luis Sánchez, the liaison, it was concluded that someone would have to be hired to accomplish the first task. No employee at the company currently has the proper training or time to educate the rest of the employees. This person's services will no longer be needed after the policy and EMS have been implemented. The periodical updating of the environmental policy will be the responsibility of Sr. Sánchez. It should also be the responsibility of the hired person, working with Sr. Sánchez, to develop an EMS for the company.

Training must be complemented with the involvement of personnel. The first task is to ask employees for input on ways to work with the environment. Employees may have practical and potentially successful ideas for waste prevention or other ways to help the environment. By involving employees in this process, many may become actively involved in working to achieve the company's goal of certification. In addition, the sharing of all data with the employees and keeping them updated will show the impact of their actions and that they can make a difference. A managerial policy of positive reinforcement will show employees that their efforts to help the environment do not go unnoticed. This small but effective method of incentive costs little. It will ultimately raise company morale and cause workers to really want to help the environment.

Managers may also need some motivation to work with the new policy. A way to involve the managers and show them the effectiveness of the policy is to provide them with monthly or quarterly reports. These reports should reflect energy and water usage as well as rates of waste generation. This will show the true costs associated with energy use and waste management. These costs should decrease with the implementation of the environmental policy and even more with the EMS. This documentation will convince managers about the effectiveness of these practices and it may also motivate them to work to reduce these costs even more.

5.10 Staff Responsibilities

According to ISO 14001, roles and responsibilities must be assigned for putting the corporate environmental policy into effect. The foundation should be

made solely responsible for documenting, implementing and maintaining, and communicating the policy. This is to ensure that the company is behind its policy and every employee is aware of it.

5.10.1 Documenting the Policy

Documenting means that the environmental policy must be in written form. Luis Sanchez, the current foundation manager, will be responsible for keeping the environmental policy up-to-date and effective. Mr. Sanchez should keep a controlled master copy of the policy on file, and make copies available to the employees and any other interested parties. An ISO certification auditor will most likely ask to see a written copy of the policy.

5.10.2 Implementing and Maintaining the Policy

According to ISO clause 4.2, the implementation and maintenance of an environmental policy requires that an individual be assigned to periodically review and revise it as appropriate and oversee its distribution and communication to employees of the company. As stated earlier, Luis Sanchez, manager of the foundation, will be responsible for this implementation, maintenance, distribution, and communication. The policy must be reviewed and revised on a periodic basis to reflect the changes in operations and goals. The frequency of the reviews depends on the rate of change of a company's procedures, but at minimum they should be conducted at least every two years. The review meeting should include top

management and the relevance of the policy should be considered taking into account the following factors:

- Changes in company goals
- Achievement of goals since the last policy review
- Changes in laws and regulations
- Recent commitments to new industry standards

(ISO, 1998)

5.10.3 Communicating the Policy

Communication involves distributing the policy and making it easily available as well as ensuring the understanding of its content. The foundation manager can use many methods of communicating the policy to the employees of the Aerial Tram. The simplest method would be to post the policy in areas of the company where employees would see it, including the restrooms. Other innovative methods to broadcast the environmental policy include:

- Publishing the policy in a company newsletter
- Posting the policy on the company's Web site
- Including a copy of the policy in paycheck envelopes once or twice a year.

Communication of the policy also includes external parties. According to clause 4.2, the Aerial Tram's environmental policy must be made available to the public upon request. There are numerous ways to make it available, including:

- Presenting the environmental policy statement in the Tram's annual report

- Mailing or e-mailing the policy in response to a specific request
- Including the environmental policy on the Tram's Web site.

The Aerial Tram's environmental policy is much more likely to be taken seriously by all employees and workers if it has strong support and attention of top management. But the environmental policy statement alone is not enough; commitment to the environmental policy and environmental concerns by top management is essential. This commitment can be demonstrated through memos to employees that show the management's expectations for the Tram's environmental performance, and observations or sponsorship of environmental events, such as Earth Day celebrations (ISO, 1998).

5.11 Sign Campaign Proposal

5.11.1 Purpose

The Rain Forest Aerial Tram Company is dedicated to the preservation of the rainforest. One method for helping to preserve this fragile environment is through education. The Company currently runs a program that gives school children the opportunity to ride the tram free of charge. In exchange, the school must educate the children about the wonders of the rainforest, the repercussions of its destruction, and the importance of its preservation.

The tram needs a way for educating the public about the importance of these issues. Beyond informing that smoking is not allowed while at the tram, there are no attempts to inform or educate the public. By simply visiting the Aerial Tram, riding through the lush canopy, and hiking through the trails perhaps some people will

realize the importance of preserving the rainforest. However, to see is not always to understand. Education about the rainforest can foster a better sense of awareness than simple observation. While it is true that the tour guides at the tram provide a plethora of information, a comprehensive environmental education campaign will greatly enhance the visitors' understanding of the need for preserving the tropical rainforests of Costa Rica.

5.11.2 Suggestions for signs

Several courses of action can be taken for improving the educational impact of the Rain Forest Aerial Tram, some of which are more easily accomplished than others. These include signs for general information about the Rain Forest Aerial Tram, information about plants and animals of the rainforest, convincing visitors to recycle while at the park and once they return home, and informing visitors of what they can do to preserve the environment. The general information sign is the most critical for the tram, but the other suggestions would also help to make an impact on visitors.

Suggestion number one

The installation of signs with general information about the company is the most important task. The sign should be placed where every visitor can easily see it, as opposed to the entrance by the road, and contain three types of critical information. First, it should include a list of the rules and regulations for the park. For example, the sign could read, "no smoking, do not bring food or animals unless instructed by

your guide, do not touch the plants or animals unless permitted by guide, and do not feed the animals.” Next, the sign should include the tram’s mission statement. This information alone will help visitors to understand, to some degree, the reason for the establishment of tram and the importance of understanding the rainforest and its preservation. Finally, the sign should have a map of the park that shows the Tramline as well as the available trails, so that visitors have a better concept of the area covered by the tram. This sign would be most effective if written in both English and Spanish.

Suggestion number two

Several signs containing information about different plants and animals of the rainforest would be very educational. Signs like these should be placed along the self-guided trails and explain the scientific and common names of plant and animal species as well as some interesting features. For example, this tree smells like licorice and is used to cure stomachaches.

Suggestion number three

A sign placed near the trash receptacles with factual information about waste disposal and recycling would be helpful. This sign will help visitors realize how much waste is produced and helpful it is to recycle. It will urge visitors to separate their garbage into the appropriate bins. An example of the possible contents of the signs can be found in the NYC Wasteless webpage. “New York City residents dispose of approximately 1050 tons of food waste daily. The weight of all paper

towels annually disposed of in the city waste stream is heavier than almost 14,000 adult elephants. The length of all the paper bags discarded annually in New York City is equal to the length of approximately 170,000 Brooklyn Bridges.” The facts included on the sign could be related to worldwide waste issues or strictly to Costa Rica’s waste problems.

Suggestion number four

A sign or signs explaining what people can do at home for preserving their environment is another suggestion. The content would include tips on reducing, reusing, and recycling waste. A typical suggestion would invite people to recycle, turn off lights and water, plant trees, volunteer for environmental organizations, use compost piles, and buy recycled and biodegradable products.

5.11.3 Suggestions for alternative methods of education

The feasibility of the educational suggestions depends on the availability of funding. While they are more complex than signs and involve more technology, they would be effective methods of educating the public. Suggestions include a new introductory video, an exhibit demonstrating the interaction between plants and animals in the rainforest, ways to make a visual impact on people as to the importance of preserving the environment, and ways to teach children the names and images of animals in the forest as well as how to spot them.

Suggestion number one

The introductory video at the tram is informative about how and why the tram was built. While this information is interesting, there are better ways to express the importance of the tram to visitors. Instead of explaining its building process in such detail, more would be learned if data about what has been discovered about the canopy since the building of the tram were available. Information about the plants and animals that live in the treetops and how they live together and depend on each other for survival should be made known to the public. This would facilitate the tram's mission of preserving the rainforest and educating the public. In addition, it would make visitors much more knowledgeable upon commencement of their journey through the treetops.

Suggestion number two

An exhibit that demonstrates the interaction between different plant and animal species would be very effective. The exhibit should show the consequences of rainforest depletion. The cutting down of one tree can cause a plant or animal to lose its home and die. This action affects other plants or animals that may depend on the first for survival, thus initiating a domino effect. Mass destruction of the rainforest has already caused the extinction of many plant and animal species. This concern should be demonstrated visually to visitors. A good visual representation would be to show an actual chain of life, a large model of what species depend on others for survival. The domino effect can be shown by having the lowest member of the chain "die" because it has lost its home. By assigning each species in the chain a light and

having it turn off as the species die one by one, the public will see the impact of cutting trees on the plants and animals of the rainforest. This will demonstrate the importance of not destructing the rainforest or any forest environment to children and adults alike.

Suggestion number three

Another way to visually demonstrate the importance of saving the environment is through actual photography. To show pictures of the beautiful, pristine forests in the protected areas of the country directly compared to pictures of air pollution contaminated water, and garbage along roads and streams will make people more aware of the consequences of their actions. Making people aware that they have a choice about what kind of environment they live and that their children will make an impact on it, depending on how they choose to handle their own waste.

Suggestion number four

A good way to teach children how to spot animals, so that they see more of them while on the tram, is a pictorial representation. A picture could display a rainforest with animals blended into the environment. Placed beside the display would be the names of animals hidden in the picture. If a child cannot find an animal all he or she has to do is to push a button next to the name and the profile of the animal will light up. Besides teaching children how to look for animals in the rainforest, the pictorial representation will also teach them the names of the animals and what they look like.

5.12 Employee Memo

The following is the content of the informational memo to be distributed to the company personnel.

"To see the birds, animals, and plants of the rainforest is to understand its beauty and the need to preserve this endangered resource."

-Aerial Tram Mission Statement

Since its creation, the Rain Forest Aerial Tram has had the goal of educating the public about the preservation of the rainforest by using creative means of education to "create a world class tourist experience." The company is currently trying to meet new challenges: the improvement of its impact on the environment and the enhancement of its public image. Therefore, the company is striving to become ISO 14000 certified.

ISO is the International Organization for Standardization, which sets standards and regulations for businesses all over the world. Every company in compliance with an ISO regulation knows that all other ISO compliant companies, regardless of the base country of the company, are following the same high standards for goods and service. Compliance with these standards is beneficial to international business, but it is completely voluntary. Compliance shows true commitment.

ISO 14000 contains a set of standards and regulations concerning environmental issues in businesses. The standards help companies to manage and monitor their environmental impact and performance. Compliance with these standards shows corporate environmental commitment to consumers, general public, and other interested businesses for the Rain Forest Aerial Tram. The evidence of environmental commitment is becoming ISO 14000 certified.

This ISO certification will help the Rain Forest Aerial Tram to achieve its goals of improved environmental performance and public exposure. A monitoring and management system of environmental performance will help the company in protecting the fragile environment of the rainforest. It will also improve public image by showing the company's commitment to the environment.

Every employee of the tram plays a large part in making this endeavor a reality. Employees must understand why the company is so committed to protecting the environment and act as role models to each other and the public. Each employee is an integral part of this commitment and can make a difference.

5.13 Conclusion

The team has provided a comprehensive set of recommendations for the Rain Forest Aerial Tram with the hope that the company incorporates as many as possible into their operations. The set encompasses suggestions for improving the Tram's environmental performance and efficiency, drafting a corporate environmental policy, and methods for training, implementing, maintaining, and communicating the proposed policy. The team, in addition, has proposed ideas and suggestions for an

environmental education campaign to increase the awareness of the Tram's goals and to stress the importance of preserving the rainforest. If properly followed, these recommendations will be of great assistance in the auditing process and facilitate the path of the company towards ISO 14000 certification.

CHAPTER 6 - CONCLUSIONS

Through the analysis of the collected data, the team was able to develop several recommendations that are aimed at fulfilling the ISO 14000 compliant corporate environmental policy of the Rain Forest Aerial Tram. These recommendations include: a corporate environmental policy, a booklet of suggestions including a section for alternative cleaning products, a list of guidelines for employees, an educational memo, and an educational sign proposal. This chapter also addresses the limitations the team faced while completing this project, as well as ideas for additional IQPs that could be completed in conjunction with the Aerial Tram.

Where feasible, each clause of the policy is accompanied by suggestions for the implementation of its contents. Recommendations were given for methods of waste prevention, continual improvement, employee and public education, allocation of roles and responsibilities for the implementation of the policy, as well as procedures for water and energy conservation and recycling. Two clauses are not supported by recommendations for implementation. These clauses are: *comply with national environmental laws and regulations and adopt more stringent standards if deemed necessary by management*, and *evaluate the company's environmental progress and measure against previously established corporate goals*. The first clause lacks recommendations because the Aerial Tram is aware of which Costa Rican environmental laws apply to their organization. The implementation of the policy will assure compliance with the local laws. The implementation of the second

clause is difficult because, in order to accomplish this, the company needs an Environmental Management System (EMS), currently not yet developed. The EMS will delineate ways for achieving the goals established in the environmental policy. Once these ways are established, evaluating and measuring the company's progress will be facilitated.

The team has prepared a booklet of all the recommendations required to implement the environmental policy and approaches to continually improve environmental performance. The booklet contains all of the recommendations given in the previous chapter, including a section of recommendations for environmentally sound cleaning products. If all the recommendations are followed, all the clauses of the corporate environmental policy will be fulfilled, (with the exception of the aforementioned two clauses), thus facilitating the path toward an ISO 14000 environmental management system.

The group also prepared a proposal for an educational sign campaign that not only demonstrates the ideas of the team but also the importance of the information being presented. It was given and explained to our liaison, Luis Sánchez. His understanding will facilitate the presentation of these ideas to upper management and their acceptance. The proposal contains recommendations for the content of the signs and their locations, ideas for interactive displays, and suggestions for improving the introductory video. It also elucidates how these changes will improve the educational impact of the tram.

An educational memo was written for the employees of the Tram. From the informal interviews with the employees, it was found that most had very little or no

prior knowledge of ISO or ISO14000. It is important for the employees to have a strong understanding of these concepts as well as a good comprehension as to why the Tram has set ISO 14000 certification as a goal. An important aspect of ISO 14000 implementation requires that employees are knowledgeable about the environmental policy, and its compliance with it. The understanding of the basis for the policy will teach employees the need for it and facilitate any transition to word the compliance with the new policy. In addition to the environmental policy, a suggested set of guidelines is supplied to give the company a more structured approach to assist employees in following the policy and applying the recommendations to their daily routines.

The difficulty in obtaining pertinent data in Costa Rica was one limiting factor of this project. Language barrier was an impediment in reviewing available literature and interviewing several of the employees at the company. This limitation was lessened through conversations with bilingual employees at the company, although some information was lost through the translation. Time also proved to be a limiting factor in completing the project. Visits to recycling centers and a more in-depth investigation of the sign campaign were aspects that could have improved the depth of the recommendations. Unfortunately, due to time constraints, they had not been feasible.

As far as future IQP projects are concerned, once the environmental policy has been implemented a group could develop the Environmental Management System in cooperation with the Rainforest Aerial Tram Company. An IQP group could also

develop an ISO 14000 training and education program for the employees of the company.

APPENDICES



RAIN FOREST

AERIAL TRAM

COSTA RICA

TELEFERICO DEL BOSQUE LLUVIOSO®

Appendix A - Mission and Organization of Company

Most of the following information was acquired through company materials provided by the Rain Forest Aerial Tram's webpage, (<http://www.rainforesttram.com>). Some other information was obtained through discussion with our liaison, Luis Sánchez, and the Rain Forest Aerial Tram employees.

Description of the Company

Dr. Donald Perry is the founder of the Tram. He pioneered exploration of the rainforest canopy in 1974 and his passion for the rainforest and its preservation lead to the opening of the Rain Forest Aerial Tram in October of 1994. In May of 1999, the Aerial Tram foundation came into being. It is a non-profit foundation that concentrates on educating children about the rainforest with hope that they will realize their actions will have consequences on the environment. Then when they grow older perhaps they will make responsible decisions regarding environmental issues.

Visitors to the Tram take an 80-minute, 2,600-meter ride on one of twenty-two open-air gondolas through the rainforest canopy on a cable run tram. Each gondola can hold up to five passengers and one guide. The guide provides background information to the visitors as well as acts as the expert "ears and eyes" of the ride. They are trained at spotting animals and plants that the normal, inexperienced visitor usually misses. While on the ride the tourists can indulge

themselves with the exotic flora and fauna that flourish in the upper and lower levels of the rainforest. The Tram also offers a forty-five minute guided tour through various trails that meander through the rainforest. There are also self-guided tours, as well as cabins for overnight stay, a restaurant, a coffee shop, and a gift shop.

The Aerial Tram was designed so as not to disturb the fragile balance of the tropical rain forest. During its construction steps were taken to insure minimal damage to the exotic plants and animals. Small trails were made, and construction materials were suspended by ropes and pulled through the forest along these trails. Also, the large steel towers used to support the cable were flown to the site by helicopter and lowered in place from above. Therefore no vehicles were needed to transport these materials and only a small number of trees needed to be cut.

Keeping the site clean is very important to the Aerial Tram Company. Littering is prohibited as well as smoking, and no food or drinks are allowed while riding on the tram. These rules ensure that the many tourists that visit each year do not sully the beauty of the rain forest.

The Aerial Tram is located on the northern edge of the Braulio Carrillo National Park, which is approximately one hour from Central San José. The Tram is situated on 1000 acres of private reserve. Since the reserve contains a transition area from a rainforest to a mountain forest, there is a large plant and animal diversity, which can be noticed from the Tram ride.

The major source of financial funding is through its ticket sales (Adult ticket US \$49.50, Child/Student \$24.75). It is the tourists that keep the Tram running, which is why it is of the utmost importance for the company to show its commitment

to the environment. This keeps the tourists leaving with a feeling satisfaction, knowing their money was used for a good cause. The Tram also has the goal of instilling, in all visitors, a sense of responsibility towards the environment.

Mission Statement

“To see the birds, animals, and plants of the rainforest is to understand its beauty and the need to preserve this endangered resource.”

“To promote environmental awareness in saving rainforests through innovative ecological solutions, education, and exciting research to create a world class tourist experience.”

Work Philosophy

“The company will adopt a philosophy of working as a team, and the pursuit of continuous improvement that will be accomplished through principles of honesty, honor, and humbleness.”

Organization of the Company

Dosel S.A. Corporation owns ninety-two percent of the Rain Forest Aerial Tram. It is publicly owned through the Costa Rican Stock Exchange. There is a board of directors and advisory committee that represent the shareholders and make all final decisions pertaining to managerial issues and policy. This chain of command for Dosel S.A. is represented in Figure A.1. The secretary of the board of directors,

Jeffrey Carrette, holds the position of General Manager for the Rain Forest Aerial Tram Company. The General Manager makes all final decisions related to the company, but the Assistant General Manager runs most of the operations, including both the business aspect that takes place in San José and the running of the operations at the tram site. Figure A.2 shows an overview of the Company's chain of command and clearly defines the responsibilities of the Assistant General Manager. Underneath the Assistant General Manager is an Operations Manager. This position is responsible for all of the activities that take place at the tram site, as shown in Figure A.3. (Buote et al.,1999).

Team Aerial Tram

Our team shares the Tram's commitment to the environment. Our main objective is to develop a corporate environmental policy that will supply the company with guidelines for achieving ISO 14001 certification. Our liaison, Luis Sánchez, is the manager of the Tram Foundation. Mr. Sánchez also wishes for the team to become involved in the educational campaign about the importance of preserving the rainforest.

Dosel S.A. Company Organizational Chart

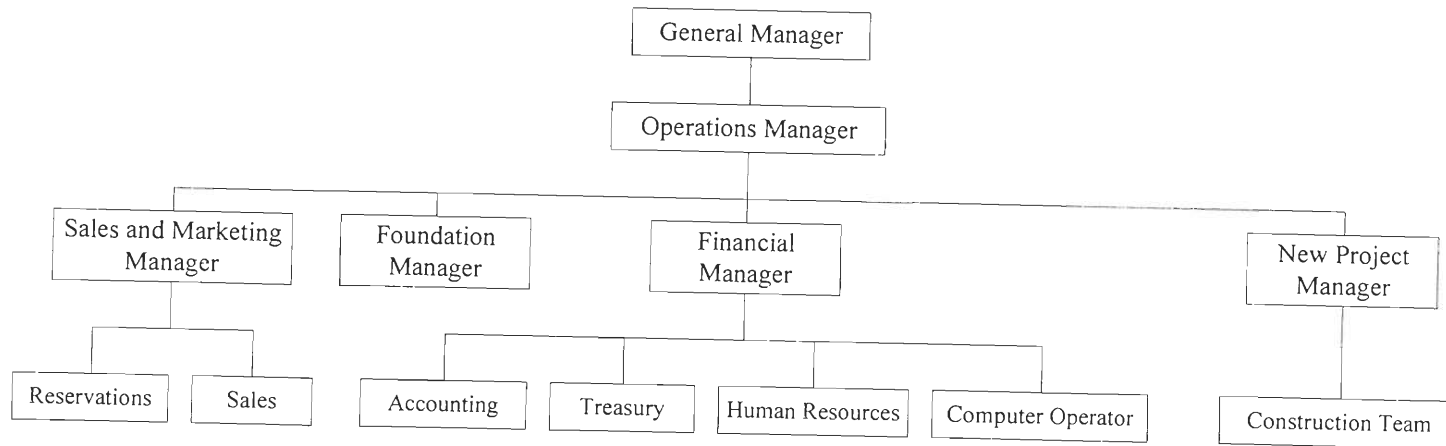


Figure A.1

Dosel S.A. Organizational Chart of Operations

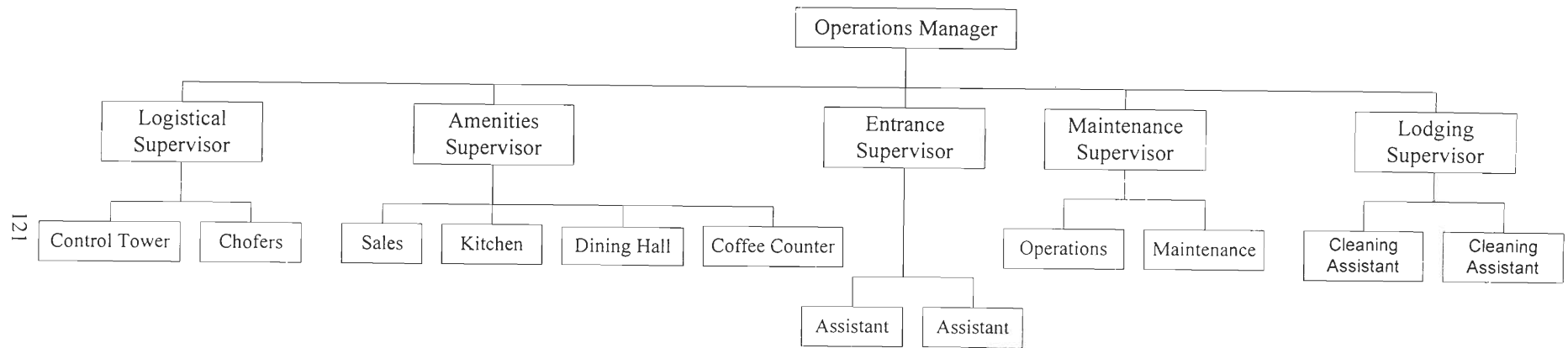


Figure A.2

Dosel S.A. Board of Directors

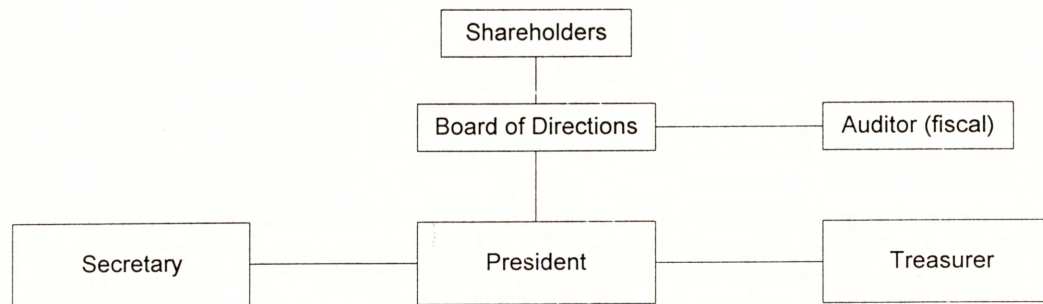


Figure A.3

Appendix B.1 - Corporate Environmental Policy in English

Rain Forest Aerial Tram Corporate Environmental Policy

Mission

“To promote environmental awareness in saving rainforests through innovative ecological solutions, education, and exciting research to create a world class tourist experience.”

It is our mission to provide a world- class educational experience while helping to protect the rainforest environment. We are committed to the integration of environmentally safe management practices throughout all aspects of our business. We will constantly strive to continually improve these practices and the environmental quality of our activities and services.

Corporate Goals:

- Comply with local environmental laws and regulations and adopt more stringent standards if considered necessary by management.
- Strive for ever-increasing efficiency in all aspects of our business regarding environmental performance. This will include the departments of accounting, maintenance, reservations, reception, and all other operations of the company.
- Eliminate or reduce waste through preventative practices.
- Recycle and conserve when at all possible minimize environmental impact.
- Evaluate the company environmental progress and measure it against previously established corporate goals.
- Incorporate environmental considerations into all management and business decisions.
- Strive to educate the public and tourists about the value of the rainforest and all natural resources and the importance of preserving them.

- Communicate with employees and external parties regarding the company environmental issues.
- Ensure that all employees know their environmental role and responsibility.
- Promote environmentally friendly practices for business and home; and
- Lead other tourism companies by setting an example with strides towards environmental improvement.

Appendix B.2 – Corporate Environmental Policy in Spanish

Teleférico del Bosque Lluvioso **Corporativa Política Ambiental**

Objetivo

“Nuestro objetivo es promover la consciencia sobre el medio ambiente, con la finalidad de salvar al bosque lluvioso a través de soluciones ecológicas innovadoras, educación y una investigación emotiva, creando así una experiencia única el mundo.”

Es nuestra misión proveer una experiencia única el mundo, mientras protegemos el bosque lluvioso. El Teleférico del Bosque Lluviosa esta comprometido a la integración de practicas operativas ambientalmente sanas, en todas los aspectos de nuestro negocio. Trataremos de mejorar continuamente estos ejercicios y la calidad ambiental de nuestro servicios.

Objetivos Corporativos:

- Cumplir con leyes ambientales y adoptar estándares más estrictos si fuese necesario.
- Luchar por un mejoramiento constante en la eficiencia en todos aspectos de nuestro negocio, concerniente al aspecto ambiental. Esta estrategia incluiría los departamentos de contabilidad, mantenimiento, recepción, reservaciones, y otras operaciones de la compañía.
- Eliminar o reducir desechos por medio de ejercicios preventivos.
- Reducir, reutilizar, y reciclar cuando sea posible y así minimizar el impacto ambiental.
- Evaluar progeso ambiental de la compañía y determinarlo contra la meta corporativa establecida anteriormente.
- Incluir consideraciones ambientales en toda decisión administrativa.
- Educar al publico y los visitantes sobre el valor del bosque lluvioso y los recuros naturales y la importa de conservarlos.

- Generar una comunicación constante con los empleados y grupos externos respecto al compromiso ambiental de la compañía.
- Asegurar que todo empleados conozcan papel y repsonsibilidad ambiental.
- Promover prácticas ambientalmente sanos tanto para la compañía como para los hogares.
- Inducir a otras compañías de turismo a asumir el reto ambiental, a través del ejemplo.

Appendix C.1 - Employee Guidelines

1. Conserve paper.
 - Make double-sided copies.
 - Use waste paper for scrap paper.
 - Limit use of paper towels and napkins.
2. Recycle as much paper as possible. Put all recyclable paper in recycle bins.
3. Conserve energy.
 - Turn off lights and computers when not needed.
 - Keep doors to air-conditioned rooms closed.

Appendix C.2 – Directrices de Empleados

4. Conserve el papel.

- Haz copias de doble lado.

- Use el papel de basura por papel pedazo.

- Limite el use de toallas de papel y servietas.

5. Recicle tanto papel como posible. Ponga todo papel reciclabe en los basuros de recicle.

6. Conserve el energia.

- Apague los luces y computadoras cuando no necesita.

- Mantenge cerrar los puertos del cuartos del aire-condicionado.

Appendix D.1 - Employee Memo-English

Our Goal:

“To promote environmental awareness in saving rainforests through innovative ecological solutions, education, and exciting research to create a world class tourist experience.”

From its creation, the Rain Forest Aerial Tram has had the goal of educating the public about the preservation of the rainforest using creative means of education to "create a world class tourist experience." The company is currently trying to meet new challenges in the environmental field. These are to improve our positive impact on the environment and increase positive public exposure. Because of this, the company is striving to become ISO 14000 certified.

ISO is the International Organization for Standardization. This organization sets standards and regulations for businesses all over the world. In case companies in conformance with an ISO regulation know that they are following the same high standards for goods and service as all other ISO compliant companies, regardless of the base country of the company. Compliance with these standards is completely voluntary for companies to undertake. The conformance to these standards shows true commitment and because of this, both international and national business may improve.

ISO 14000 is the set of standards and regulations related to environmental issues in businesses. It is a way for companies to manage and monitor their

environmental impact and the quality of performance. Compliance to this standard shows companies' environmental commitment to consumers, general public, and other interested businesses. This is why this is important to the Rain Forest Aerial Tram.

This certification will help the Rain Forest Aerial Tram achieve their goals of improved environmental performance and public exposure. The system of monitoring and managing environmental performance will allow the company to help protect the fragile environment of the rainforest. It will also improve public relations by showing the company's commitment to the environment.

Every employee of the tram plays a large part in making this a reality. Employees must understand why the company is so committed to protecting the environment. Once this is understood it is easy to see that each employee acts as a role model, to the public as well as to each other. Each employee is an integral part of this commitment and you can make a difference.

Appendix D.2 - Employee Memo-Spanish

Objetivo:

“Nuestro objetivo es promover la consciencia sobre el medio ambiente, con la finalidad de salvar al bosque lluvioso a través de soluciones ecológicas innovadoras, educación y una investigación emotiva, creando así una experiencia única el mundo.”

Desde su creación, el Teleférico del Bosque Lluvioso ha tenido el objetivo de educar al público acerca de la preservación del bosque lluvioso usando medios creativos de educación para “crear una experiencia turística de clase mundial.” La compañía está constantemente tratando de asumir nuevos retos en el campo ambiental. Estos son para mejorar nuestro impacto positivo in el ambiente e incrementar el conocimiento del público acerca de nuestros fines. Debido a esto la compañía está optando por obtener la certificación ISO 14000.

ISO es la Organización Internacional para la Estandarización. Esta organización establece estándares y regulaciones para empresas alrededor del mundo. En esta forma las compañías que cumplir con esas regulaciones ISO, saben que otras empresas afiliados a ISO están siguiendo los mismos altos estándares para bienes y servicios, sin importar en qué país se encuentre la base de la compañía. El seguir estos estándares muestra una verdadera dedicación y debido a esto , los negocios nacionales e internacionales pueden mejorar sus estándares de calidad.

ISO 14000 es el establecimiento de estándares y regulaciones relacionadas con temas ambientales en empresas. Es una forma de que las compañías dirijan y monitoren su impacto ambiental y la calidad de sus acciones. Siguiendo este estándar las compañías muestran su dedicación ambiental a sus consumidores, público en general, y otros negocios interesados. Es por ello que es importante para el Teleférico del Bosque Lluvioso.

Esta certificación ayudará al Teleférico del Bosque Lluvioso a llevar a cabo sus metas de lograr un mejoramiento del ambiente y concientización del público. El sistema de monitoreo y acciones de dirección ambiental ayudarán a la compañía a proteger el frágil ambiente del bosque lluvioso. Esto también mejorará las relaciones públicas a través del reconocimiento de la dedicación de compañías por el ambiente.

Cada empleado del Teleférico juega un papel muy importante para hacer este compromiso realidad. Los empleados deben comprender por qué la compañía trabaja tan duro protegiendo el ambiente. Una vez que esto es comprendido es fácil ver que cada empleado asuma un rol modelo, tanto para el público como con cualquier otra persona. Cada empleado es una parte integral de este esfuerzo y usted puede hacer la diferencia.

Appendix E - Recommendations Booklet

The purpose of the suggestions in this booklet is to help the Rain Forest Aerial Tram implement an environmental policy. These suggestions will also help the company work towards continual improvement of its environmental performance in order to begin the certification process for ISO 14000.

Recycling

Although the Tram does recycle, their methods are not efficient, resulting in a poor recycling program. The team has developed several recommendations to make this process more efficient at both the Tram site and the office company. These include increasing the amount of recycling bins and the recycling of fluorescent light bulbs and construction debris.

In the office, more effort should be spent for recycling paper. The simplest solution is to add additional recycling bins throughout the office. Bins should be placed beside every employee's desk as well as next to the copy machine, fax machine, and printer due to the high volume of paper that goes through those areas. Bins should also be set up in the kitchen, break room, and throughout various offices that collect beverage containers, such as glass bottles and soda cans. With this arrangement, more paper will be recycled rather than fill the waste bins.

At the Tram site, more recycling bins should be set up throughout the park. It is especially important to place them near the regular garbage bins. This arrangement will facilitate the correct placement of recyclables because it will not be inconvenient

for visitors. The close location of a recycling bin to a trash receptacle will help to prevent visitors throwing non-recyclable trash into a recycling bin. Specific markers for paper, metal, and plastic currently differentiate the existing bins. Signage should be placed alongside them to clearly indicate what is acceptable or not acceptable for each type of bin in as few words as possible.

When the fluorescent light bulbs are burnt, they should not be thrown out in the regular trash because of their mercury content. They should be collected in their original containers and shipped to fluorescent lamp recyclers (See Appendix G for a list of recyclers).

A substantial amount of construction and demolition debris can be recycled. Due to the current construction at the Tram, this recommendation may be too late for effective use, but it would be useful for any future construction. Recycling options should be discussed with the construction contractor.

Waste Prevention

Waste prevention, also known as source reduction, means using less material to complete a job, therefore reducing the amount of waste produced. Waste prevention can reduce purchasing costs and lessen the amount of material that must be managed for recycling and waste disposal. Suggestions include replacing paper towel use with electric hand-dryers or linen roll towels, reduction methods for paper consumption, and manners to reuse containers.

In the bathrooms, C-fold paper towels are used for hand drying. This is a wasteful method. C-fold towels are delivered individually and people tend not to use

just one paper towel. The towels also stick together, therefore causing people to take more than one item at a time. Since the Tram site itself has both paper towels as well as electric hand-dryers, it would be best to remove the paper towels all together, therefore eliminating any paper waste. In the office company, only C-fold paper towels are used for hand drying. It would be best for the company to replace this type of paper towel dispensers with electric hand-dryers, once again eliminating all paper waste. Electric hand-dryers with sensors would be best suited for the company's needs. These activate only when a person puts his or her hands beneath the nozzle and automatically shuts off when the hands are removed, reducing power consumption. Another option is to install linen roll towels. These devices are a self-recycling, continuous loop of a durable towel. A person will dry his or her hands and the towel will then loop around through a small box where it is sanitized. Another waste prevention method involves using reusable rags for cleaning purposes. These rags can be laundered and reused, therefore reducing the amount of paper towels used for cleaning.

Due to the extensive amount of paper use within the office, the team has developed several suggestions to reduce waste. The first suggestion is to reduce the actual amount of used paper. This can be accomplished through increasing the use of electronic mail for correspondence between employees and other businesses. When information is distributed to employees, it would be more efficient to post several bulletins or memos in prominent areas, as opposed to handing a copy to every employee. A bulletin board may be put up, and all employees notified that all notices would be placed there for them to read. When making copies or printouts, employees

should consider making double-sided copies. This method will cut copy paper consumption almost in half. When paper is no longer needed, and ready to be disposed, the employees should consider using it as scrap paper. This will extend the life of the paper and prevent new sheets of paper being used for scrap paper. Two-way envelopes can be purchased when mailing an item to a company that requires a reply, therefore reducing the amount of paper consumption and waste. In this regard, most documents should be stored electronically rather than in the form of hard copies. Storing files electronically will also save space in the office.

Containers from any sort of product can be reused as a container for the storage of: new cleaning products if it had to be diluted, items bought in bulk, small items that may get lost easily such as nails, rubber bands, pencils, etc. Bigger containers such as buckets and barrels can also be used for storage of larger items or turned into trash/recycling bins. Some barrels can also be sent to a drum refurbishing company to be re-manufactured and used again.

Energy Conservation

Energy is often a large expense for a company. There are many ways to reduce energy consumption, which save money and help the environment at the same time. The company currently spends approximately 315 dollars per month on the office's electric bill. The team has developed several recommendations for energy conservation including the use of ambient light, the installation of fluorescent lights and energy conserving devices, posting reminder notices, and sub-metering the company.

The Tram can first continue to use ambient light as much as possible. All blinds should be left open to minimize the use of artificial lights. This of course is not possible all the time, such as when it is cloudy or dark outside. For these times, compact fluorescent lights (CFLs) should be installed in place of any incandescent lights used. These lights use less energy, are more efficient, and last longer than incandescent bulbs. They usually fit into incandescent light fixtures, eliminating any retrofitting costs. When used in place of incandescent bulbs, CFLs substantially reduce energy costs because they produce more light per watt. Although more expensive than typical incandescent light bulbs, they last ten times as long, paying for themselves in a short period of time. CFLs cost between twelve and twenty-five dollars (3600 to 7500 colones) but last between 7,500 to 10,000 hours compared to 750 hours of a standard incandescent bulb, according to General Electric Lighting and TechnaBright specifications. Fewer CFLs need to be installed if reflectors are installed as well. CFLs create the same amount of light, but use substantially less energy.

The team observed that a lot of employees leave rooms unattended without turning off the lights. Posting reminders reading “Please turn off the lights when leaving the room” may prompt the employees to turn off the lights. Another reminder could solicit employees to keep doors of air-conditioned rooms shut. This step may help to conserve energy by not having to run the air-conditioning longer to compensate for the lost cold air. The office can also consider installing double pane windows. With better thermal resistance, the efficiency of the air conditioner would be increased. The drawback of this option is its high cost. The Tram, in addition,

could install occupancy sensors and/or timers for rooms with limited use, such as the stockroom or restrooms. This will limit the light usage to only when the room is occupied, increasing energy efficiency.

It would be worthwhile for the Tram to consider sub-metering the occupied space in order to monitor energy use. Sub-metering will allow the company to locate large energy drains. With the knowledge of its largest energy drains, the company can take actions to reduce the energy consumption of these areas.

Water Conservation

Excess water usage is found throughout many companies. If steps were taken to conserve water, a company would not only help the preservation of natural resources, but it would incur savings. Although the Tram spends only approximately thirty-six dollars per month on water, the following recommendations will help to reduce that amount further. These recommendations include water reduction methods and devices for toilets and sinks, suggestions for water conservation memos, reasons for increasing sweeping and reducing mopping, and the planning of a systematic check for leaks throughout the office and Tram site.

A major cause of excess water usage is through non-efficient or broken plumbing fixtures, such as high-water toilets and leaking faucets. The Tram can take several steps to increase the efficiency of water use. One method is to retrofit the toilets with flow control valves that utilize less water per flush. Another method is homemade and very inexpensive. It involves taking a small one-liter or two-liter plastic soda bottle with the label removed, and filling it with either sand or small

pebbles. This bottle is then placed in the toilet tank, thus reducing the volume of water required to fill the tank.

The sinks at the Tram site and office can be retrofitted with water flow restrictors or aerators, which reduce the amount of water flow, without loss of efficiency. Timers can also be installed on the sinks. These devices will ensure the faucets are only left on for a specific amount of time. An easy, inexpensive method that may help to keep the water turned off is to post reminders by the sinks that read “Please shut water off after use.”

To reduce the amount of mopping needed, dry sweeps should be performed daily. By removing all the debris off the floor, there is less need for mopping the floor because the debris will not have become ground into the floor. If spills are cleaned up immediately, mopping is not needed. This arrangement saves water as well as reduces the amount of chemicals used in the mopping process.

The team also recommends that the Tram develop a system for identifying and repairing leaking pipes, water faucets, and toilets. A plan of systematic check for all areas that are prone to leaking or have potential to leak should be developed. Leaking pipes, sinks, and toilets usually go unnoticed for extended periods of time, dripping away company water.

Promotion of Education

Another objective in the fulfillment of the corporate environmental policy is the promotion of education to both the public and the employees.

The company should continue its endeavors for educating every visitor to the Tram. This thrust should be based not only on rainforest preservation, but also on the importance of the rainforest as an entity, on efforts for minimizing the use of natural resources, and preserving the Earth's ecosystem. The main objective of this education should be to instill in each visitor a sense of responsibility towards the betterment of the environment. Methods according to which this goal can be accomplished are illustrated later in this chapter.

Many of the employees of the company are well educated in regards to the environment. However, many of the employees lack knowledge of ISO and ISO 14000. This issue should be addressed through company training. ISO topics should not be the only type of issue discussed in the training. The employees should also be made aware that their daily work activities could be modified to reduce impacts on the environment. Many of these modifications, such as energy and water conservation efforts, have been explained already in this chapter.

Suggested Purchases

The Tram currently does not purchase any products with post-consumer recycled contents. The purchase of recycled products would help the company to promote the use of recovered materials and close the "recycling loop." The latter

consists of purchasing a product, its recycling, and the purchase of that recycled product. This approach will help to create a market for materials that are collected for recycling. Suggested recommended purchases include items made of post-consumer recycled content, refurbished products, and items in bulk or concentrated form.

An important factor to be considered by the Tram is the purchase of all copy paper, writing paper, and letterhead paper with post-consumer recycled contents, because of the extensive use of office paper for copies and printouts. In this regard, the U.S. Environmental Protection Agency recommends a content of thirty percent. The Tram currently prints all of its brochures on twenty-five percent post-consumer recycled content paper. It would advantageous for the company to consider using a higher percentage of recycled content.

Other recycled products that the Tram should consider purchasing are recycled paper towels, toilet paper, and napkins. Paper towel and napkin use should be as limited as possible, but this is not an option for toilet paper. Since these products are difficult to be recycled, they should be purchased with a post-consumer recycled content. Recycled paper towels and toilet paper should be purchased from Lemen de Costa Rica S.A. The company supplies 100% recycled content paper towels and toilet paper. Please refer to Appendix G for Lemen's company information.

There is also market availability for garbage bags made of one hundred percent recycled plastic and for biodegradable garbage bags that degrade in three years, as opposed to four hundred years of a typical bag. Soy-based or water based inks should be purchased for printing. These inks release fewer volatile organic

compounds (VOCs) than oil-based inks when used, which is better for the environment. The use of these items will lessen the environmental impact of the Tram's operations.

Recycled products, such as engine coolant and re-refined lube oils, can be purchased for the tractor and other machinery located at the Tram. Since the site is going through a period of construction, the company should look into purchasing recycled cement and products, such as floor tiles and patio blocks that are made of recycled material.

The company can also consider purchasing refurbished products as opposed to brand new products. There are a multitude of refurbished items available for purchase, from computers to printer toner cartridges. The latter, when completely used, can be shipped back to the manufacturer to be refurbished. Many companies include shipping instructions and labels within their product box. Taking all of these measures will not only save money, but prevent those items from being thrown into landfills, lessening the Tram's impact on the environment.

The company can also negotiate with its suppliers the delivery of products with recycled content and the reduction of excess packaging when shipping products. All office supplies such as pens and staples should be bought in bulk, and when possible, all chemicals and drinks should be purchased concentrated. This approach will save the company money, since buying in bulk or in concentrate is usually less expensive than buying in smaller quantities. It will also reduce the amount of waste produced due to the fewer containers needed to house the products.

Alternative Cleaning Products, Lubricants, and Degreasers

After determining the effectiveness and cost of various brands of safe cleaners, lubricants, and degreasers, the team has compiled a list of these recommended products for use at the Aerial Tram Company. While environmentally friendly, some of these products may be more expensive than the currently used ones. The team recommends that the Tram spend the extra money, because this slight increase in cost will yield better environmental performance, and demonstrate environmental commitment. In some cases the use of higher quality products on the tram, specifically lubricants, could save money in the long run, due to reduced parts wear, maintenance, and non-scheduled down time.

Many of the possible suppliers were eliminated as an option due to the fact that they are located in the U.S. and the shipping costs would substantially raise the price of the products. In some cases the products alone were also too expensive. The team located three suppliers in Costa Rica. Two U.S. based suppliers, however, are recommended: Envirosafe, Inc. and Chemsources, the first one for its competitive prices and environmentally friendly products, and the second one for its high performance products. Both suppliers are situated in good locations for shipping to ports in Costa Rica.

The following recommendations are broken up into two categories: *cleaning products* and *lubricants and degreasers*. In both categories the companies or suppliers are listed with their respective products. Please refer to Appendix G for the information of each mentioned company or supplier.

Cleaning Products

This category includes companies or suppliers for various cleaners for many different applications both at the Tram site and office. These products include all-purpose cleaners, disinfectants, bleach, detergents, dishwashing soap, hand soap, glass cleaner, and odor eliminators. As stated by the contested companies, all of these products are environmentally safe.

The American Sanitary Company, located in San Francisco de Dos Rios, Costa Rica, supplies bleach and a wide range of disinfectants. These products are manufactured at Lonza Inc., in a high technology plant. The incorporated electrolytic process is safe for the environment because sodium chloride is used instead of chlorine. The process also produces no waste material and no wastewater. For these reasons the Team recommends that the Aerial Tram purchases bleach and disinfectants from the American Sanitary Co. These products should be used at the Tram site and office to clean the restrooms and other surfaces necessary of being sanitized.

Lemen de Costa Rica, located in San Jose, Costa Rica, supplies environmentally safe and biodegradable disinfectants, detergents, and hand and dishwashing soaps among other cleaning products. The team recommends that the Tram purchase detergent and hand and dishwashing soap from Lemen. The purchase of ADZ-60 detergent and Sani-Fresh hand soap is highly recommended. ADZ-60 is biodegradable, and Sani-Fresh contains only alcohol and is 100% biodegradable and water-soluble.

Envirosafe is a U.S. based company that specializes in manufacturing environmentally safe cleaners and disinfectants. Its All Purpose Cleaner/Degreaser is recommended for use at the Tram Site kitchen. This general cleaner is safe for use on all surfaces, is a “Chefs in America Gold Medal Winner,” and food service certified. Since the company is located in the U.S., additional costs must be added for shipping. However, the company is located in California, a good shipping location for Costa Rica.

The team also suggests purchasing Envirosafe’s “One-Step Germicidal Cleaner/Deodorant” for disinfecting and deodorizing the restrooms at the Tram site and office. This concentrated disinfectant is Federal EPA registered and tested to be an effective germicidal cleaner.

Chesterton Costa Rica S.A. is an ISO 14000 certified industrial supply company. All their products are manufactured with environmental friendliness in mind. The purchase of Chesterton 099 glass cleaner is recommended to clean windows at the office and Tram site, as well as on computer screens.

Chemsource is a Florida based distributor of Safecare commercial and industrial cleaning products and lubricants. The team recommends one of their products, Safecare SC-1000, to remove grease from the Aerial Tram components because it is biodegradable, non-toxic, non-flammable, fully filterable, and does not react with the cleaning surface.

Lubricants and Degreasers

The Aerial Tram currently purchases lubricants, white grease, and degreasers from Chesterton Costa Rica S.A. The company is ISO 14000 certified and it supplies environmentally safe products, thus the team advises that the Aerial Tram make an effort to purchase lubricants and degreasers from Costa Rica solely from this company. There are also suppliers in the U.S. that distribute safe, high performance lubricants and degreasers. These products are more expensive with added shipping costs, however they are totally environmentally sound and are of high quality. The use of these products at the tram could cut down on parts wear and maintenance, and save the Aerial Tram money over an extended period of time. The distributors of these products are listed below.

As stated above, Chemsources is a Florida based distributor of Gemtek Safecare commercial and industrial cleaning products and lubricants. Safecare Safelube lubricant could be used on the Tram to replace the current grease used on the aluminum wheels that the cable rides on. The team consulted a representative of Chemsources, Cal Iesbach, who stated that this high performance lubricant would be ideal for the tram applications. As stated in Gemtek's website, this lubricant contributes to longer product life, meets EPA standards and is biodegradable, and is totally safe to work with.

As for a degreaser, the team recommends SafeCare Products SC1000 All Purpose Cleaner. The product SC1000 would be effective in removing grease or other lubricants off the aluminum wheels of the Aerial Tram. Mr. Eisbach also mentioned that GEMTEK's aircraft cleaner would be the ideal solution for removing

grease off of aluminum. GEMTEK, in addition, produces a light oil which is far superior and more environmentally friendly than WD-40, a lubricant currently used at the Tram site to remove grease.

Suggestions for the Restaurant

The restaurant/coffee counter at the Tram site operates through a catering service contracted out to an outside company. The Tram cannot directly change the processes of this service; however, it can influence what is purchased and used at the restaurant. It would be best for the restaurant to buy condiments in bulk, thus reducing the amount of packaging needed. The restaurant should continue using refillable containers for such things as sugar and cream. In addition, it would be beneficial to use straws from a dispenser rather than individually wrapped straws. This will save not only money but also excess waste paper. The restaurant should continue using its recycled napkins, but it should use rags that can be washed and reused rather than paper towels. The restaurant also serves beverages such as beer and soda in cans. Currently there is only one bin in the restaurant for all garbage. It would be advantageous to set up recycling bins inside the restaurant.

Environmental Policy Implementation

The aforementioned objectives of the environmental policy and of water and energy conservation, recycling, waste prevention, cleaning products, purchases, and restaurant operations need to be met in order to implement the company

environmental policy. The following recommendations focus on ways for meeting these objectives and facilitating the transition into the implementation of the policy. The section contains suggestions for putting the policy into effect, updating, maintaining, and communicating the policy, including the identification of the responsible parties required to carry these actions. This section, in addition, includes an informational memo for employees and suggestions for the educational campaign. The education of the employees and the public is an important aspect of ISO 14000 implementation.

Implementation Suggestions

In order to properly implement an ISO 14000 environmental policy every employee in the company has to become educated about their roles and responsibilities in the certification process. In order for this to occur someone has to train the employees as well as monitor the effectiveness of the training. Another employee has to be responsible for periodically reviewing the environmental policy and keeping it up-to-date with the progress of the company. After speaking with Luis Sàncchez, the liaison, it was concluded that someone would have to be hired to accomplish the first task. No employee at the company currently has the proper training or time to educate the rest of the employees. This person's services will no longer be needed after the policy and EMS have been implemented. The periodical updating of the environmental policy will be the responsibility of Sr. Sàncchez. It should also be the responsibility of the hired person, working with Sr. Sàncchez, to develop an EMS for the company.

Training must be complemented with the involvement of personnel. The first task is to ask employees for input on ways to work with the environment. Employees may have practical and potentially successful ideas for waste prevention or other ways to help the environment. By involving employees in this process, many may become actively involved in working to achieve the company's goal of certification. In addition, the sharing of all data with the employees and keeping them updated will show the impact of their actions and that they can make a difference. A managerial policy of positive reinforcement will show employees that their efforts to help the environment do not go unnoticed. This small but effective method of incentive costs little. It will ultimately raise company morale and cause workers to really want to help the environment.

Managers may also need some motivation to work with the new policy. A way to involve the managers and show them the effectiveness of the policy is to provide them with monthly or quarterly reports. These reports should reflect energy and water usage as well as rates of waste generation. This will show the true costs associated with energy use and waste management. These costs should decrease with the implementation of the environmental policy and even more with the EMS. This documentation will convince managers about the effectiveness of these practices and it may also motivate them to work to reduce these costs even more.

Staff Responsibilities

According to ISO 14001, roles and responsibilities must be assigned for putting the corporate environmental policy into effect. The foundation should be

made solely responsible for documenting, implementing and maintaining, and communicating the policy. This is to ensure that the company is behind its policy and every employee is aware of it.

Documenting the Policy

Documenting means that the environmental policy must be in written form. Luis Sánchez, the current foundation manager, will be responsible for keeping the environmental policy up-to-date and effective. Mr. Sanchez should keep a controlled master copy of the policy on file, and make copies available to the employees and any other interested parties. An ISO certification auditor will most likely ask to see a written copy of the policy.

Implementing and Maintaining the Policy

According to ISO clause 4.2, the implementation and maintenance of an environmental policy requires that an individual be assigned to periodically review and revise it as appropriate and oversee its distribution and communication to employees of the company. As stated earlier, Luis Sanchez, manager of the foundation, will be responsible for this implementation, maintenance, distribution, and communication. The policy must be reviewed and revised on a periodic basis to reflect the changes in operations and goals. The frequency of the reviews depends on the rate of change of a company's procedures, but at minimum they should be conducted at least every two years. The review meeting should include top

management and the relevance of the policy should be considered taking into account the following factors:

- Changes in company goals
- Achievement of goals since the last policy review
- Changes in laws and regulations
- Recent commitments to new industry standards

(ISO, 1998)

Communicating the Policy

Communication involves distributing the policy and making it easily available as well as ensuring the understanding of its content. The foundation manager can use many methods of communicating the policy to the employees of the Aerial Tram. The simplest method would be to post the policy in areas of the company where employees would see it, including the restrooms. Other innovative methods to broadcast the environmental policy include:

- Publishing the policy in a company newsletter
- Posting the policy on the company's Web site
- Including a copy of the policy in paycheck envelopes once or twice a year.

Communication of the policy also includes external parties. According to clause 4.2, the Aerial Tram's environmental policy must be made available to the public upon request. There are numerous ways to make it available, including:

- Presenting the environmental policy statement in the Tram's annual report

- Mailing or e-mailing the policy in response to a specific request
- Including the environmental policy on the Tram's Web site.

The Aerial Tram's environmental policy is much more likely to be taken seriously by all employees and workers if it has strong support and attention of top management. But the environmental policy statement alone is not enough; commitment to the environmental policy and environmental concerns by top management is essential. This commitment can be demonstrated through memos to employees that show the management's expectations for the Tram's environmental performance, and observations or sponsorship of environmental events, such as Earth Day celebrations (ISO, 1998).

Sign Campaign Proposal

Purpose

The Rain Forest Aerial Tram Company is dedicated to the preservation of the rainforest. One method for helping to preserve this fragile environment is through education. The Company currently runs a program that gives school children the opportunity to ride the tram free of charge. In exchange, the school must educate the children about the wonders of the rainforest, the repercussions of its destruction, and the importance of its preservation.

The tram needs a way for educating the public about the importance of these issues. Beyond informing that smoking is not allowed while at the tram, there are no attempts to inform or educate the public. By simply visiting the Aerial Tram, riding

through the lush canopy, and hiking through the trails perhaps some people will realize the importance of preserving the rainforest. However, to see is not always to understand. Education about the rainforest can foster a better sense of awareness than simple observation. While it is true that the tour guides at the tram provide a plethora of information, a comprehensive environmental education campaign will greatly enhance the visitors' understanding of the need for preserving the tropical rainforests of Costa Rica.

Suggestions for signs

Several courses of action can be taken for improving the educational impact of the Rain Forest Aerial Tram, some of which are more easily accomplished than others. These include signs for general information about the Rain Forest Aerial Tram, information about plants and animals of the rainforest, convincing visitors to recycle while at the park and once they return home, and informing visitors of what they can do to preserve the environment. The general information sign is the most critical for the tram, but the other suggestions would also help to make an impact on visitors.

Suggestion number one

The installation of signs with general information about the company is the most important task. The sign should be placed where every visitor can easily see it, as opposed to the entrance by the road, and contain three types of critical information. First, it should include a list of the rules and regulations for the park. For example,

the sign could read, “no smoking, do not bring food or animals unless instructed by your guide, do not touch the plants or animals unless permitted by guide, and do not feed the animals.” Next, the sign should include the tram’s mission statement. This information alone will help visitors to understand, to some degree, the reason for the establishment of tram and the importance of understanding the rainforest and its preservation. Finally, the sign should have a map of the park that shows the Tramline as well as the available trails, so that visitors have a better concept of the area covered by the tram. This sign would be most effective if written in both English and Spanish.

Suggestion number two

Several signs containing information about different plants and animals of the rainforest would be very educational. Signs like these should be placed along the self-guided trails and explain the scientific and common names of plant and animal species as well as some interesting features. For example, this tree smells like licorice and is used to cure stomachaches.

Suggestion number three

A sign placed near the trash receptacles with factual information about waste disposal and recycling would be helpful. This sign will help visitors realize how much waste is produced and helpful it is to recycle. It will urge visitors to separate their garbage into the appropriate bins. An example of the possible contents of the signs can be found in the NYC Wasteless webpage. “New York City residents

dispose of approximately 1050 tons of food waste daily. The weight of all paper towels annually disposed of in the city waste stream is heavier than almost 14,000 adult elephants. The length of all the paper bags discarded annually in New York City is equal to the length of approximately 170,000 Brooklyn Bridges.” The facts included on the sign could be related to worldwide waste issues or strictly to Costa Rica’s waste problems.

Suggestion number four

A sign or signs explaining what people can do at home for preserving their environment is another suggestion. The content would include tips on reducing, reusing, and recycling waste. A typical suggestion would invite people to recycle, turn off lights and water, plant trees, volunteer for environmental organizations, use compost piles, and buy recycled and biodegradable products.

Suggestions for alternative methods of education

The feasibility of the educational suggestions depends on the availability of funding. While they are more complex than signs and involve more technology, they would be effective methods of educating the public. Suggestions include a new introductory video, an exhibit demonstrating the interaction between plants and animals in the rainforest, ways to make a visual impact on people as to the importance of preserving the environment, and ways to teach children the names and images of animals in the forest as well as how to spot them.

Suggestion number one

The introductory video at the tram is informative about how and why the tram was built. While this information is interesting, there are better ways to express the importance of the tram to visitors. Instead of explaining its building process in such detail, more would be learned if data about what has been discovered about the canopy since the building of the tram were available. Information about the plants and animals that live in the treetops and how they live together and depend on each other for survival should be made known to the public. This would facilitate the tram's mission of preserving the rainforest and educating the public. In addition, it would make visitors much more knowledgeable upon commencement of their journey through the treetops.

Suggestion number two

An exhibit that demonstrates the interaction between different plant and animal species would be very effective. The exhibit should show the consequences of rainforest depletion. The cutting down of one tree can cause a plant or animal to lose its home and die. This action affects other plants or animals that may depend on the first for survival, thus initiating a domino effect. Mass destruction of the rainforest has already caused the extinction of many plant and animal species. This concern should be demonstrated visually to visitors. A good visual representation would be to show an actual chain of life, a large model of what species depend on others for survival. The domino effect can be shown by having the lowest member of the chain "die" because it has lost its home. By assigning each species in the chain a light and

having it turn off as the species die one by one, the public will see the impact of cutting trees on the plants and animals of the rainforest. This will demonstrate the importance of not destructing the rainforest or any forest environment to children and adults alike.

Suggestion number three

Another way to visually demonstrate the importance of saving the environment is through actual photography. To show pictures of the beautiful, pristine forests in the protected areas of the country directly compared to pictures of air pollution contaminated water, and garbage along roads and streams will make people more aware of the consequences of their actions. Making people aware that they have a choice about what kind of environment they live and that their children will make an impact on it, depending on how they choose to handle their own waste.

Suggestion number four

A good way to teach children how to spot animals, so that they see more of them while on the tram, is a pictorial representation. A picture could display a rainforest with animals blended into the environment. Placed beside the display would be the names of animals hidden in the picture. If a child cannot find an animal all he or she has to do is to push a button next to the name and the profile of the animal will light up. Besides teaching children how to look for animals in the rainforest, the pictorial representation will also teach them the names of the animals and what they look like.

Appendix F.1- Informal Interview-English

Hello! We are a group of students from WPI, a technical university in the United States. Our group is working with the Rain Forest Aerial Tram as part of an international studies program. The Rain Forest Aerial Tram is interested in having a positive impact on the environment, specifically the rainforest. In order to better their environmental practices and public relations the Rain Forest Aerial Tram is striving to acquire ISO 14000 certification, a system of environmental management. Our group is helping the Rain Forest Aerial Tram develop the first step in this certification process: writing an environmental policy. We are collecting information about the company to create this policy. Please take a few minutes of your time to answer our questions. Our group and the Rain Forest Aerial Tram greatly appreciate your attention. Thank you.

1. Are you aware of the environmental concerns of the Rain Forest Aerial Tram?
2. Are you aware of the existing environmental policies of the Rain Forest Aerial Tram?
3. If so, what are they?
4. Have you heard of ISO or ISO 14000?
5. If so, describe them.
6. Would you happily comply with an environmental policy set up by your company that will help the environment?

7. Would you still comply even if it requires changes or extra effort in your daily routine?

Appendix F.2 - Informal Interview-Spanish

Somos un equipo de estudiantes de WPI, una universidad tecnológica en Los Estados Unidos. Nuestro equipo está en estos momentos trabajando con el Teleférico del Bosque Lluvioso como parte de nuestro programa de estudios internacionales. El Teleférico del Bosque Lluvioso tiene la preocupación de tener un impacto positivo en el medioambiente, específicamente el bosque lluvioso. Como parte de sus esfuerzos para mejorar sus prácticas y relaciones públicas el Teleférico del Bosque Lluvioso desea adquirir certificación de acuerdo a la Norma ISO 14001, un sistema de administración ambiental. Nuestro equipo desea ayudar al Teleférico del Bosque Lluvioso a lograr esta meta por medio de guiar a Teleférico del Bosque Lluvioso en sus primeros pasos: crear una política ambiental. En estos momentos estamos intentando coleccionar información sobre la compañía para poder crear una política ambiental. Le rogamos que nos brinde algunos minutos de su tiempo para responder nuestras preguntas. Nuestro equipo y el Teleférico del Bosque Lluvioso apreciarán enormemente su atención.

Responda con varias oraciones por favor.

1. ¿Esta usted consciente de las preocupaciones ambientales de parte del Teleférico del Bosque Lluvioso? ¿Si sí, que sabe sobre las preocupaciones ambientales?
2. ¿Esta usted consciente de algunas de los compromisos ambientales del Teleférico del Bosque Lluvioso?

3. ¿ Si los conoce, describa brevemente cuales son los compromises?
4. ¿ Ha usted escuchado sobre ISO? ¿Sobre la norma ISO 14000?
5. ¿ SI ha escuchado, puede usted describir brevemente en que consiste?
6. ¿ Estaría usted dispuesto a contribuir con una politica ambiental que ayudara a mejorar o a proteger el ambiente? ¿ Por qué?
7. ¿ Estaría usted dispuesto a colaborar con dicha politica ambiental, aun si requiriera algun tipo de consideracion adicional en su rutina diaria? ¿Por qué?

Appendix G - Company Information

The following is a list of names, addresses, and contact information for manufacturers or distributors of environmentally safe office supplies, cleaning products, lubricants and degreasers.

American Sanitary Company S.A. – Bleach and Disinfectants

Sn Fco de Dos Rios Apdo. 3130-1000, San Jose. phone: 250-0000 fax: 250-5055

Lemen De Costa Rica - Industrial Detergents, Productos y Químicos de Limpieza
General, recycled office supplies

Curridabat

phone: 286-0868 fax: 226-0949

Envirosafe, Inc – Cleaners and Disinfectants

P.O. Box 620356 Woodside, CA 94062-0356

phone: 800 227-9744 fax: 650 369-3711

Chesterton Costa Rica S.A. – Grease, Lubricants, Degreasers, Glass Cleaner

Sabana Sur, del colegio de medicos y cirujanos, 50 Este y 35 Sur

phone: 232-6348 fax: 290-7331

Chemsource Co. – Commercial and Industrial Cleaning Products and Degreasers

Miami, Florida

phone: 561-883-0111 fax: 916-237-4366

The following are lists of companies that may be contacted for further research on topics given in the Recommendations chapter of this report:

*For additional information regarding alternatives to chemicals and processes used:
Contact the following:*

Joint Service P2 Technical Library at <http://enviro.nfesc.navy.mil/p2library>

U.S. EPA's EnviroSenSe program at <http://es.epa.gov>

If chemicals are expired, or if you no longer use them, you can contact a licensed hazardous waste disposal company for removal or, if the material is still usable, check with local waste exchanges for opportunities to sell or donate the materials to a company that can use them. These companies are located in the United States, but may be able provide additional information for Costa Rican use.

Partial List of Hazardous Materials Removal Services

Philip Services Corp., Allwaste and Serv-Tech

120 South Fourth Street

Bay Shore, N.Y. 11706

Phone: (516) 586-033

Fax: (516) 586-0727

Environmental Products & Services Inc.

P.O. Box 315

Syracuse, NY 13209

Phone: (315) 471 0503

Fax: (315)-475-8920

For additional information on energy conservation contact:

U.S. EPA's Green Lights Program.

(202) 233-9178 or visit their Web site at: <http://www.epa.gov/greenlights.html>.

ENERGY STAR® Web site at: <http://www.epa.gov/energystar/>

For information on vendors of recycling equipment and coolant reclaimers, visit:

U.S. EPA's VendInfo Web site at: <http://es.epa.gov/vendors/>

For off-site composting, a source of information is the Composting Council's Guide to Commercial Food Composting.

<http://CompostingCouncil.org/index.html>.

REFERENCES

- American Health Foundation. *American Health Foundation*, [Online]
<http://www.aehf.com> [7/1/2000].
- ANSI/ISO. (1996). *Environmental Management System- Specification with Guidance for Use*. Milwaukee: ASQC.
- Bystrom, S. and Lonnstedt, L. (1997). Paper Recycling: Environmental and Economic Impact. *Resources, Conservation and Recycling*. Vol. 21, pp. 109-127.
- Bystrom, S. and Lonnstedt, L. (2000). Paper Recycling: A Discussion of Methodological Approaches. *Resources, Conservation and Recycling*. Vol. 28, pp. 55-65.
- Capaccio. *ISO 14001 Overview by Capaccio Environmental Engineering, Inc.*, [Online]
http://www.iso14000.com/Implementation/iso14_000_overview.htm [3/25/2000].
- Chesterton. (2000). *The World of Chesterton*, [Online]
<http://www.chesterton.com> [6/22/2000].
- Clean Environment Co. *The Clean Environment Company*, [Online]
<http://www.ecomall.com/biz/clean.htm> [7/1/2000].
- Eisenbud, Merrill (1993). *How Clean is Clean? How Safe is Safe?* Madison: Cogito Books.
- Enlar. (2000). *Path to ISO 14001 Registration*, [Online]
<http://enlar.com/ISO14000.html> [3/24/2000].
- Envirosafe Co. (1999). *Envirosafe Cleaning Products*, [Online]
<http://www.envirosafe2000.com> [7/1/2000].
- Fletcher, B.L. and Mackay, M. (1996). A Model of Plastics Recycling: Does Recycling Reduce the Amount of Waste? *Resources, Conservation and Recycling*. Vol. 17, pp. 141-151.
- Gemtek. *Gemtek Products - Safely Cleaning Planet Earth*, [Online]
<http://www.gemtek.com> [7/1/2000].

- Goldman, Matthew. (2000, March). Integrate Environmental Management into Business Functions, *Chemical Engineering Progress*, Vol 96/No.3. 27-33.
- Goodman and Veritas. (2000). *Is ISO 14001 an Important Element in Business Survival*, [Online]. www.iso14000.com/Implementation/dnv_article.htm [3/26/2000].
- Gaian. (1999). *Recycled Paper Products*, [Online] <http://www.mamagaia.com> [6/6/2000].
- Mail Order Catalog, LLC. (2000). *Mail Order Catalog*, [Online] <http://www.healthy-eating.com> [7/1/2000].
- Herwitz, S.: *Interview on April 6, 2000 at Clark University*, Worcester, MA.
- ISO. (2000). *ISO and the Environment*, [Online] <http://www.iso.ch/9000e/isoanden.htm> [3/26/2000].
- ISO(2). (2000). *Where ISO Came From and Who Is Behind It*, [Online] <http://www.iso.ch/9000e/14kfrom.htm> [3/26/2000].
- Kinsella. (2000). *ISO 14000 Standards for Environmental Management*, [Online] <http://www.iso14000.com/Implementation/ISO14000intro.htm> [3/24/2000].
- Postel, Sandra. (1985). *Conserving Water: The Untapped Alternative*. United Nations: Worldwatch Institute.
- Precision Industrial Products. *Precision Industrial Products*, [Online] <http://www.precisionindustrial.com> [6/15/2000].
- Protek. *For the Food Industry*, [Online] <http://www.protek.com.au> [7/1/2000].
- Razaee, Z. and Elam, R. (2000). Emerging ISO 14000 Standards: A Step-By-Step Implementation Guide. *Managerial Auditing Journal*, Vol. 15, pp. 60-67.
- Read, Peter. (2000). An Information Perspective on Dynamic Efficiency in Environmental Policy. *Information Economics and Policy*, Vol.12, pp. 47-68.
- Real Goods Trading Corp. (2000). *Healthy Home and Planet*, [Online] <http://www.realgoods.com> [7/1/2000]
- Sasseville, D.R., Wilson, G. and Lawson, R.. (1997). *ISO 14000 Answer Book*. New York: John Wiley & Sons, Inc.

Scholl, C.: *Interview on April 12, 2000 at Norton Company*, Worcester, MA.

Science. (2000). *New York City Wasteless*, [Online]
<http://www.nycwasteless.com> [6/7/2000].

Sedlak, Richard I. (1996). Environmental Risk Assessment of Cleaning Product Ingredients. *Chemosphere*, Vol. 32, No. 4, pp. 703-715.

Shent, H., Pugh, R.J. and Forssberg, E. (1999). A Review of Plastics Waste Recycling and the Floatation of Plastics. *Resources, Conservation and Recycling*. Vol. 25, No. 2, pp. 85-109.

Standards Council of Canada (SCC). (2000). *Questions and Answers about ISO 14000*, [Online]. <http://www.scc.ca/iso14000/infobref.html> [3/24/2000].

Subramanian, P.M. (2000). Plastics Recycling and Waste Management in the US. *Resources, Conservation and Recycling*. Vol. 28, pp. 253-263.

TC207. (1995). *Environment- ISO 14000 Standards Focus on the User*. [Online]
<http://www.tc207.org/articles/pos.cfm?id=140> [3/24/2000].

TC207. (2000). *ISO/TC207 Frequently Asked Questions*. [Online]
http://www.tc207.org/faqs/faqs_main.html [3/24/2000].

Theyel, Gregory. (2000). Management Practices for Environmental Innovation and Performance. *International Journal of Operations & Product Management*, Vol. 20, No. 2, pp. 249-266.

Tibor, Tom. (2000). *Environmental Management System Requirements*. [Online]
<http://www.quality.org/ISO14001/csover4.html> [3/24/2000].

TISI. (2000). *What is ISO 14000 Series?*, [Online]
<http://www.tisi.go.th/14000/14000-1.html> [3/24/2000].

Tolentino, C.: *Interview on April 12, 2000* in Worcester, MA.

van Berkel, R., van Kampen, M. and Kortman, J.. (1999). Opportunities and Constraints for Product-oriented Environmental Management Systems. Vol. 7, No. 6, pp. 447-455.

van Wyk, J.P.H., Mogale, M.A. and Moroka, K.S. (1999). Bioconversion of Waste Paper Materials to Sugars: *An Application Illustrating the Environmental Benefit of Enzymes*. *Biochemical Education*. Vol. 27, pp. 227-228.

Zeledon, R. (1998). *Código Ambiental*. San José: Editorial Porvenir S.A.