Effective environmental management

Principles and case studies

Rory Sullivan and Hugh Wyndham

ALLEN & UNWIN

To my parents, John and Carmel Sullivan. RS
To Shirley, Katherine, Gareth and Susan. HW

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Foreword

Introduction

As Chair of the Environment Management Industry Association of Australia (EMIAA), the peak body for the environment industry, it is a privilege to be able to provide a foreword for this innovative book.

It is salutory to realise that this publication would not have been possible only a few short years ago. There was no market for a work of this type. This sunrise industry was insufficiently mature and the number of companies offering excellence in the environment was accordingly less. The past decade has seen Australian business progress a considerable distance, but we have far to go on our journey towards sustainable development.

Direction for the future—ecologically sustainable development

This book focuses on achievements made by the adoption of Environment Management Systems, with particular benefits to the companies concerned, as well as to the wider industry.

The challenge is to incorporate the best ideas into a set of principles which is meaningful and able to be applied across government, business and society in general. I suggest that much of the work has been done. The United Nations, the governments of most advanced economies, the major world and regional lending and aid agencies, the largest multinationals and our own peak industry bodies, have all accepted the principles of ecologically sustainable development (ESD). ESD is now being driven by the world's business leaders, such as the international organisations who work with the World Business Council for Sustainable Development. The concept of ESD has been well articulated and is far-reaching and comprehensive. It is undoubtedly the dictum of the new century!

ESD principles call for decision-making processes to integrate long- and short-term economic/environmental/social/equity considerations. They also call for us to think and act globally and they require broad community involvement on issues. The concept of ESD is a recognition that both people and resources matter, that we need to accept diversity —to respect different views from different people, with different objectives—and work together for a common goal. Sustainability results from synergy and convergence of thought, policy and economic and social activity.

The approach of business in this is no different. Companies are mindful of their obligations and their responsibilities—they are practitioners in a global economy with the obligations that entails. They cannot survive and prosper unless they abide by social expectations, nor would they wish to do so.

Some years ago, Professor Sharon Beder of the University of Wollongong said that *whether we like it or not, business is leading the environmental sustainability argument*. Business is making great progress and the wins of major companies such as BP and Western Mining Corporation and the many gems of small companies in the area of cleaner production are nothing short of remarkable. They are committed to a sustainable future.

ESD gives us another chance. The adoption of ESD principles as change drivers offers us both the long-term business focus needed and a window of opportunity for the implementation of the transformational strategies necessary to develop sustainable policies for the future.

When we look at uniting the environment with business, it is salutory to consider that the basic principles of ESD, in broad terms, mirror those of the methodology of management reform and TQM, and that the resultant Total Quality *Environmental* Management may represent the way forward for us all. Whatever path we take for a more sustainable environmental future, I believe that ESD will play an essential part.

In my own organisation (ACTEW Corporation), we recognised that ESD had the capacity to be more than just useful principles, but could act as the commercial driver that could transform us into a highly efficient business. The principles of ESD are now written into our governing legislation. In this last year, all staff in the organisation, whether they had direct contact with external environmental activities or not, were charged with achieving a wide range of environmental indicators as part of an annual determination as to whether a staff incentive should be paid. This gave every employee a personal stake in our environmental performance. I believe that this approach will be applied much more widely in our business community in coming years.

Benefits of this volume

It is gratifying to read the various case studies in this book. They demonstrate the conviction in leading organisations that there is a better and more sustainable way to operate, and the results are most impressive. I was impressed by the capacity of some organisations to overcome antipathy or indifference to the introduction of an environmental management system (EMS), and also with the ways that they adapted existing management systems to fit. The adoption of an EMS means working with the resources you have, your staff and their capacities, and creating a sustainable organisation. Indeed, personal experience demonstrates it is marginally easier and more efficient to begin with current managerial systems rather than superimposing a new approach. Integration and continuous improvement should be the manager's mantra! A long view is also necessary to sustain an EMS-based strategy through normal business cycles.

The adoption of an EMS offers the company the benefit of a far more competitive approach. It is increasingly accepted that good environmental performance makes good business sense for, as productivity rises, so the company becomes more competitive. It follows then that the demands of trade have meant that internationally accepted quality and competitiveness standards are accepted as drivers. Along with the demand for a better environmental output has been the adoption of quality management, combined with EMS certification.

World consumer demands have required changed standards from producers, and the rush to ISO9000 and ISO14000 have reflected the dual concerns of quality and the environment. Requirements by governments for suppliers to achieve set environmental standards have been another powerful driver. The benefits for companies are obvious: increased capacity to trade, increased competitiveness, improved corporate image, reductions in insurance costs and business risks, cost savings arising from the environmental improvements in their operations and the ease of operation and a reduction of outside regulation where EMS are in place. The adoption of an EMS is now an integral strategy for any competitive and innovative company concerned with its viability in the global market, and with its long-term sustainability.

The detailed explanation in the opening chapters of the development, implementation and operation of the EMS will fill a long-felt need for many. It was not all that long ago that we had little to declare by way of environmental achievement, and it was difficult to obtain information on how to go about implementing sound environmental practices. It was only in 1996 that the first Environmental Management

System certifications were issued in Australia, so formal environmental management systems are quite new. Similarly, activity in the Greenhouse Challenge is only a couple of years old. While we may not have the background of some northern hemisphere countries, we have achieved much in a very short time. Now, with this volume, we have a clear 'how-to' guide, and a clear demonstration as to the applicability of the set of principles. It is an excellent beginning and will be of importance to students and policy-makers as well as to environmental practitioners and, indeed, anyone with an interest in converting the theory of environmental management into practical, operational reality.

At the beginning of the 21st century, as the last chapter suggests, ESD will be the next stage of our development. Its acceptance cannot be decreed, it will only come with a wider realisation of its benefits. We have made slow progress toward that goal but I am increasingly confident that more companies will come to recognise the importance of ESD as a fundamental business driver.

I commend this volume to all those interested in our sustainable future.

Paul J. Perkins
Chairman, EMIAA
July 2000

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Contributors

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Wayne Stoll is Group Manager, Environment and Yield with Bonlac Foods, with specific responsibility for the company's strategic direction in environmental management and ongoing EMS implementation processes. Wayne graduated from the Gilbert Chandler Institute of Technology (Melbourne University) in 1981 with a Diploma of Dairy Technology, followed by a Diploma in Business Administration from La Trobe University in 1993 and an Executive Post-Graduate Diploma in Business Administration in 1999 from Monash Mt Eliza. Wayne is currently completing his MBA thesis for Monash Mt Eliza. He has been employed in the dairy industry for 26 years and has held the positions of Production Manager, Branch Manager and Regional Operations Manager responsible for manufacture.

Carl Thompson is the Corporate Quality Manager with ACTEW Corporation, whom he has been with for nine years. Carl joined ACTEW with a background in human resources management, with specific emphasis on training and development. When ACTEW moved

towards the implementation of quality systems, Carl moved from the position of Human Resources Manager of ACTEW's Services Division to Quality Manager for that division. This move culminated in his appointment as Corporate Quality Manager. ACTEW's implementation of EMSs across the organisation saw Carl's role expand to include the provision of assistance with ISO14001 site implementations as well as taking full responsibility for ACTEW's corporate EMS processes.

Preface

In the last two or three years there have been a number of books published that address environmental management systems (EMSs) and the International Standard for Environmental Management Systems ISO14001:1996. However, it seemed that these books, despite being promoted as 'how to' guides to environmental management, were actually little more than theoretical descriptions of the Standard. They focused more on interpreting the requirements of the Standard rather than on the needs of the organisations implementing systems of environmental management. There seemed to be a significant gap between theory and practice, with limited experience of the practical realities of developing and implementing such management systems. This book goes some way toward plugging that gap by providing a practitioner's perspective on environmental management. The aim is to link theory with experience and to communicate some of the core lessons we have learned from assisting organisations to manage their environmental impacts.

We also felt, based on some experiences we have had, that the management system certification process is not providing real benefit to many organisations. The exact reasons are unclear; however, one of the major limitations of the certification process as we see it is that very rigid interpretations of the ISO14001 standard are being applied. While there are many benefits to having an established approach, the most important thing is to have a system in place that works and which provides the outcomes the organisation desires. Meeting the intent of the Standard should be a secondary issue. In practice, it has been our experience that the order has been reversed in many cases. Organisations were expected to 'meet the Standard' and then hope that the management system that was developed also provided some real benefits, such as improved quality of products and services. Sometimes it seems that people spend so much time worrying about the process of quality

management that they don't have time to focus on the quality of goods and services.

Over a period of some five years, starting around 1994 with BS7750 as the model and more lately using ISO14001, we have been working with a variety of clients to assist them in developing and implementing structured and effective environmental management systems. One of the things that struck a note time and time again was the almost infinite variety of ways in which businesses operate. It seemed, therefore, that what was required was not a theoretical interpretation of the Standard, but a practical approach to the development and implementation of an EMS where the management system works for the organisation, rather than vice versa. This approach is based around the organisation defining its objectives and goals, where the management system is the tool that helps the organisation to achieve those goals. One way to demonstrate the effectiveness of that approach was to seek the views of people who have already done it. We deliberately tried to obtain as broad a mix of contributions as possible, feeling that this would provide ideas that most businesses could relate to and try.

The result is a book that will hopefully be useful to a wide range of readers, including students, business managers, directors, environmental managers and anyone who is looking for some practical advice and information about environmental management.

We have strong views on a number of issues, informed by our own experiences in this field. Many readers will have had other experiences. We hope that we can generate some ideas and offer some food for thought. More importantly, we hope that this book will help create an understanding of the critical role to be played by systems of environmental management in enabling organisations move towards the broader goals of sustainable development.

Rory Sullivan and Hugh Wyndham
September 2000

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1 Introduction

There are many benefits associated with the effective management of environmental issues, including reduced risk, improved utilisation of resources and employees, better management of regulatory compliance, reduced costs, increased revenue and improved public reputation. Many organisations have significantly improved their profits and turnover through improving materials utilisation rates, reducing energy consumption, manufacturing green products and reducing pollution and waste. On the other side of the equation, it is only necessary to look at accidents such as Bhopal and the *Exxon Valdez* to demonstrate that events that cause significant harm to human health or the environment can cost millions of dollars in clean up costs, compensation and legal fees.

The importance of the environment to overall business success is widely recognised. Indeed, it is almost a mantra among business and government leaders that the environment is not a fringe issue but, rather, is a mainstream business issue and an integral part of business excellence and total quality management. International organisations such as the World Business Council for Sustainable Development and the International Chamber of Commerce have developed environmental guidelines and standards and have promoted environmental issues among their members. At the national level, initiatives such as cleaner production demonstration projects, education programs and the development of guidance documents on environmental management have reflected the importance attached to effective environmental management by government and business. Both public and private sector organisations have responded to environmental pressures and opportunities by integrating environmental issues into their business practices through cleaner production, life cycle analysis, environmental impact assessment and public reporting.

As part of this move towards better environmental practices, many

companies have invested significant resources in the development and implementation of environmental management systems (EMSs). Many times these amounts have been invested in various pollution controls and environmental improvement activities. However, many organisations are failing to realise the full range of benefits that effective environmental management can bring. The problem is not that the importance of environmental issues is not recognised, nor is the problem one of a lack of commitment or a lack of resources. The key point is that many organisations do not effectively integrate environmental issues into their overall business activities. This has led to environmental management being treated as a non-core function, with the attendant consequences of poor implementation of management systems, limited benefits accruing from environmental management efforts and, ultimately, the environment becoming an issue of secondary importance to the organisation. These failings are sometimes put down to poor training, inadequate procedures or poor auditing processes but such arguments miss the point, which is that they are failures of the overall management of the organisation as none of them can be considered in isolation from the manner in which the organisation is managed.

Our experience in designing, developing and implementing EMSs, in both public and private sector organisations, has taught us that there are a number of features that are common to those organisations that have maximised the benefits of environmental management efforts, where these benefits are measured in terms such as competitive advantage, improved reputation and reduced adverse environmental impacts. Equally, there are management limitations that are common to many organisations that have not experienced the same range of environmental benefits.

This book identifies the key principles that must underlie any effective system of environmental management. It discusses the practical aspects of developing and implementing such a system, in particular, how the environment can be fully integrated into overall business planning. Detailed case studies from a range of public and private sector organisations are provided to illustrate these issues.

This book is broken into three sections. The first section, which presents the conceptual framework for environmental management, comprises chapters 2, 3 and 4. Chapter 2 provides an overview of the driving forces that have made the environment such an important business issue. Understanding these driving forces provides the understanding and context for explaining how the key concepts of environmental management have evolved into the framework that is now considered to represent best practice environmental management.

Chapter 3 is broken into two parts: the first describes the key steps that must be followed when developing and implementing a management system, while the second part reviews the key issues that must be addressed to ensure that a system of environmental management enables an organisation to meet its desired business and environmental outcomes. Chapter 4 reviews the environmental management system standards that have been developed, in particular the International Standards Organisation's ISO14001. There is also a discussion of the process and the advantages and disadvantages of EMS certification.

The second section (chapters 5 to 11) is a series of seven case studies from various organisations that have established systems of environmental management, providing practical examples of the principles and issues raised in the previous chapters. The organisations were chosen because of their success in effectively integrating environmental management into business management to maximise both environmental (reduced waste, improved risk management etc.) and organisational benefits (as measured in terms such as profit, turnover, quality of goods and services). The case studies cover both public and private sector organisations across a range of sizes and activities as diverse as manufacturing, construction, primary production and the provision of goods and services. The case studies have been prepared by those individuals who were responsible for the development and implementation of the system of environmental management within the organisation. They highlight the specific driving forces that encouraged the organisation to more effectively manage environmental issues, the actions taken, the lessons learned, the costs and benefits and the future of environmental management activities within the organisation.

The third section of the book (chapters 12 and 13) draws together the various themes and issues raised in chapters 2 to 11, highlighting the key lessons and specific issues raised by the case studies.

2 Evolution of environmental management

Driving forces

To fully understand the importance of the environment to business it is necessary to understand the pressures imposed on business.

Regulatory pressures

The late 1960s and early 1970s saw an upsurge of public interest in environmental policy in Europe and North America. The beginnings of modern environmental management practices in American corporations can be traced back to this time, in particular with the passing of landmark legislation such as the *Clean Air Act 1970* and the *Federal Water Pollution Control Act 1972* (Vogel, 1986; Weale, 1992).

The environment first became a political issue in Australia in the early 1970s, with many of the states passing basic air and water pollution control legislation. Historically, common law in Australia separated the acts of corporations from the acts of individuals working for the corporation, which meant that individuals could not be held responsible for the actions of a corporation. However, it was not until the significant environmental legislation changes of the early to mid-1980s that the importance of environmental protection began to be more widely recognised in the business community (A'Hearn, 1996). At around this time, most jurisdictions moved to make individuals personally responsible for pollution offences. All of the states now have environmental legislation that imposes liability on both corporations and on corporate directors and managers for the offences of their corporations; the penalties include significant fines for corporate entities and fines and prison sentences for individuals. For example, under the New South Wales (NSW) *Environmental Offences and Penalties Act 1989*, the penalties for the most significant pollution offences for corporations can be up

to $1 000 000. For individuals the penalties may be up to $250 000 or up to seven years imprisonment or both. Where a corporation contravenes a provision of the Act, each person who is a director of the corporation or is concerned with the management of the corporation is to be taken to have contravened the same provision of the Act. Furthermore, individuals can be prosecuted even if the corporation has not been prosecuted. The defences available to individuals are that the corporation contravened the provision of the Act without the constructive knowledge of the person, the person was not in a position to influence the actions of the corporation or, if the person was in a position of influence, the person took reasonable precautions and exercised due diligence to avoid the contravention.

In addition to the changes in environmental legislation, there have also been changes in the approach of regulatory bodies to the enforcement of environmental legislation. Traditionally legislation enforcement has been relatively lax, with regulatory bodies preferring to address compliance issues through negotiation rather than prosecution (Gunningham, 1994; Sullivan & Wyndham, 1998a). While the preference among regulatory bodies is still for cooperation and negotiation, most of the states have improved the funding of their regulatory bodies and there appears to be a greater willingness to use prosecution as an enforcement strategy. There have been two significant cases (in Western Australia and New South Wales) in recent years where individuals have been prosecuted and custodial sentences imposed for pollution offences.

The standard of care expected of companies is increasingly beyond that specified in legislation or standards. A good example is a recent case involving Ampol (Lipman & Roots, 1995). Ampol was the owner and lessor of a fuel depot containing underground tanks that were used for the storage of petroleum products. While filling one of the tanks, an employee of the lessee allowed the underground tank to overflow into the stormwater system, leading to pollution of a nearby creek. It was alleged that Ampol, as the owner of the land, had been negligent in not providing suitable emergency systems to ensure that such a spillage would be contained despite the fact that the spill control system was in compliance with all regulatory requirements at the time. Ampol was charged with an offence under the NSW *Environmental Offences and Penalties Act 1989* on the grounds that, as the owner of the land, it had negligently caused or contributed to the commission of the offence. In evaluating the case, it was noted that the purpose of the Act is to oblige all persons to avoid or minimise harm. Given that the site held products that were potentially harmful to the environment, it was held that it was necessary to contain any spill that may occur and which had the

potential to cause environmental harm. As Ampol had failed to take steps to contain such a spill and because serious environmental harm had ensued, Ampol was held to have fallen below the standard of conduct required of it.

In addition to the direct costs associated with prosecutions for environmental offences, such litigation is also likely to cause significant adverse publicity. Such publicity is likely to have more serious long term consequences for an organisation's reputation. For example, organisations that are successfully prosecuted are frequently named in the annual reports produced by regulatory bodies. These reports include details of the prosecutions taken, the names of the companies against which the prosecutions have been taken, the offences and whether or not the prosecutions were successful.

The changes in the regulatory climate are being reflected in the attitude of business to the environment. In a recent survey of industry in New South Wales, 86 per cent of the respondents agreed that the general public expects industry to continue to improve its environmental performance, while 79 per cent stated that improving environmental performance made good business sense (NSWEPA, 1997a). Of the organisations surveyed, some 30 per cent stated that legal requirements were the main driving force for improving environmental performance.

Other pressures

In addition to regulatory pressures, financial pressures, marketing benefits, shareholder expectations and investor requirements are all driving forces for organisations to effectively manage their environmental issues.

One of the most commonly cited advantages of improved environmental performance is the financial benefit that results from reducing both waste and the amounts of raw materials and energy required to produce a product. As an illustration, the recent Commonwealth Cleaner Production Demonstration Project involved ten companies, in a range of industrial and commercial sectors, that investigated opportunities for cutting waste, improving efficiency and saving energy and materials (Environment Australia, 1998a; 1998b). All of the participating organisations involved identified opportunities for cost savings, with most of the opportunities having payback periods of less than one year. Moore Business Systems reported that simply reducing the oven temperature in its carbon paper manufacturing process led to reduced losses from reject product (saving $96 500 per annum in chemical and paper costs), reduced paper shrinkage (saving a further $37 900 in paper costs) and reduced gas consumption (by 6 per cent). In addition, as a consequence of providing a better working

environment for employees, significant productivity improvements were achieved. Similar benefits were reported in the other organisations that participated in the Project.

There is now a significant body of evidence (from projects such as the Cleaner Production Demonstration Project) that environmental initiatives such as waste minimisation, energy conservation and process optimisation can provide significant financial benefits. In competitive markets, organisations have limited freedom to increase the prices of their goods and services so, for many organisations, the only way to improve bottom line financial performance is through improved efficiency, through reducing the quantities of raw materials and energy consumed.

In addition to more conventional measures such as profit and turnover, investors are taking a more active interest in the environmental and social implications of their investments. Increasingly, organisations are expected to demonstrate social and environmental responsibility in their operations while at the same time continuing to grow and produce profits. In recent years, shareholder meetings have been a popular forum for individuals, non-governmental organisations and shareholders to lobby boards of directors for changes to the manner in which organisations operate. A good example is the recent controversy surrounding Royal Dutch-Shell (Shell). At Shell's annual general meeting in London on 14 May 1997, over 10 per cent of Shell's investors voted in favour of a motion calling for Shell to radically overhaul its stance on environmental and human rights issues. The motion was motivated by Shell's decision to dispose of the Brent Spar oil platform by sinking the platform in the North Sea and by the social and environmental concerns surrounding Shell's activities in Nigeria. The motion requested that Shell appoint a director to oversee the implementation of an environmental policy, to monitor the implementation of the policy, to conduct external audits of the organisation's environmental performance and to report to the shareholders on environmental performance. Even though the motion was defeated, a Social Responsibility Committee was established by Shell to review the conduct of its companies with respect to Shell's business principles as well as to broader human rights and environmental issues (Shell International, 1997a; 1997b).

Environmental factors are now being explicitly considered as part of the decision-making process when financing projects (Angoorley, 1996). Particular attention is being focused on the implications of 'environmental show-stoppers', that is, those environmental issues that could prevent or significantly delay a project from proceeding or that could affect the projected rates of return from the project. In addition,

lenders are also explicitly considering legal requirements, environmental taxes and the risk of litigation (e.g. for environmental pollution or objections to the proposed development). In assessing these issues, the reputation and past environmental performance of a company is a critical factor. A poor track record in managing environmental issues may lead to higher interest charges or insurance premiums. In this context, the insurance industry is an increasingly influential player in project financing. Insurance companies in the United States have been exposed to huge liabilities from environmental issues, in particular from contaminated land clean up, accidental pollutant releases and specific pollution issues such as asbestosis. The insurance industry is taking a highly cautious approach to the provision of insurance coverage where environ- mental risks or liabilities may be involved. It is likely that organisations seeking insurance will be required to demonstrate that all environmental risks and liabilities have been identified and that a suitable system of management control is in place to deal with these risks and liabilities before an insurance company will grant insurance coverage (Clarke, 1996).

There are a range of charges and taxes now imposed on organisations that relate directly or indirectly to environmental performance, including user charges for waste disposal, environmental licences, performance bonds, environmental levies, user charges for access to resources and product charges. (For an overview of Australian experiences with economic instruments, see Environment Australia, 1997a; 1997b.) It is likely that the use of environmental taxes will continue to increase as governments search for new sources of tax revenue that are likely to have a reasonable degree of public support.

Green consumerism is still an important political issue, despite its media profile having dwindled in recent times. Over the past ten years public support for environmental goals has remained at a consistently high level. A 1997 survey found that 14 per cent of the population thought that the environment should be the top priority for government, with 22 per cent of respondents suggesting that the environment will be the most important issue for government in ten years' time (NSWEPA, 1997b). While these numbers are somewhat lower than a similar survey in 1994, where 31 per cent of those surveyed thought that the environment should be the top priority for the government (NSWEPA, 1994), the numbers clearly indicate the importance of the environment to the general community. In a recent survey of industry's attitudes to the environment, 89 per cent of respondents agreed that the general public expects industry to continue to improve its environmental performance (NSWEPA, 1997a).

The public is taking an increasingly active role in environmental protection at the local, regional and national level. Industry consultative committees at the local level, such as the Altona Complex Neighbourhood Consultative Group and associated national groups such as the National Toxics Network, have had a significant effect on the activities of business through encouraging dialogue and the development of solutions to environmental problems in a cooperative manner (Ryan, 1996). In addition, the rights of the community and community groups to be involved in decision-making processes are now guaranteed by legislation in many states. In New South Wales, the *Environmental Planning and Assessment Act 1979* (Section 123), the *Heritage Act 1977* (Section 153), the *Environmentally Hazardous Chemicals Act 1985* (Section 57), the *National Parks and Wildlife Act 1974* (Section 168A) and the *Environmental Offences and Penalties Act 1989* (Section 25) all allow any person to bring an action to remedy or restrain a breach of the relevant Act. Public interest groups are also taking an active interest in ensuring that regulatory bodies adequately implement and enforce legislation. Public interest groups can be extremely effective at achieving their goals and objectives through strategies such as using the media to publicise issues, industrial action and strategic voting and through more conventional mechanisms such as litigation.

Business attitudes to the environment

Awareness of the importance of environmental management has evolved at different rates in different sectors of the economy. It is probably fair to say that the environment was first recognised as a key business issue by those organisations that were part of larger multinationals, in particular those with American interests. This awareness was driven by the generally tighter regulations and enforcement of environmental legislation in the United States compared to Australia and, in particular, the huge liabilities incurred by many companies for the remediation of contaminated sites (Jeffrey, 1994; Ludwiszeski, 1993). It is also important to recognise that attitudes to the importance of the environment as a business issue differ markedly across different sectors of the economy. In a recent survey of industry attitudes to the environment, legal requirements were cited as the most important driving force for addressing environmental issues by 49 per cent of primary/secondary industry but by only 15 per cent of tertiary industry (NSWEPA, 1997a). For those organisations that recognise regulatory requirements as the highest priority (in particular, given the personal liability implications of failures to comply

with legislation), there is likely to be a greater emphasis on ensuring that regulatory compliance is achieved. A further implication is that, if regulatory pressures are not a significant driving force, environmental issues will probably be accorded a lower management priority and, therefore, treated as a lower priority than other business issues.

As a consequence of these variations in attitudes, there is a wide variation in the measures adopted to manage environmental issues. While some organisations have fully implemented and certified management systems in place, many have not even completed a formal or structured evaluation of their environmental risks or liabilities. The majority of organisations fall somewhere between these extremes. For example, in a recent survey of large organisations (with between 100 and 700 employees), 38 per cent of respondents had implemented quality management systems based on the ISO9000 Standard, 36 per cent had developed an environmental policy and 32 per cent had invested in new processes with environmental benefits (NSWEPA, 1997a). However, only 17 per cent had set up a formal pollution reduction program and only 15 per cent had established a formal system for environmental management.

When reviewing the historical development of environmental management, it is sometimes claimed that businesses are only recent converts to the cause of environmentalism. It is important to put this into context by recognising that most organisations did manage their environmental issues in an effective manner, the difference being that the management of these issues was generally driven by considerations such as safety or cost control rather than environmental protection. This meant that certain environmental issues were either not recognised as important or were treated as being of lesser importance than other business issues. The most significant illustration of this change in attitude is the allocation of responsibilities for environmental management within organisations. Historically, the position of environmental manager, if such a position existed, was a subset of another position such as health and safety. It was common to find that environmental managers were, in most cases, either individuals who had been moved out of line management positions or who were reaching the end of their careers. In contrast, in many organisations today, the position of environmental manager is a senior management function and most organisations have a director with explicit responsibility for environmental issues.

Redefining environmental management

The original purpose of the environmental audit, when first introduced in the United States, was to enable companies to be sure that they were complying with the range of environmental legislation that determined their responsibilities for controlling pollution. Environmental auditing techniques were pioneered by chemical and petrochemical companies, which in the early 1980s were the main market for environmental auditing services (Cairncross, 1995).

In Australia, the concept of the environmental audit was first introduced by American multinationals concerned about the dangers of acquiring environmental liabilities, in particular, contaminated land; this was despite Australia's liability legislation being more relaxed and less rigorously enforced than that of the United States (Johnsen, 1992). Tightening regulatory standards, green consumerism and pressures from financiers and insurance companies led to the development of a significant market for environmental auditing in Australia by the late 1980s. Environmental audits were conducted for a range of purposes including advising organisations on regulatory compliance, helping identify environmental liabilities, in particular as part of property transfers, and identifying opportunities for cost savings (Gunningham & Prest, 1993; Birtles, 1994).

The primary focus of environmental auditing in Australia at this time was on technical issues such as waste water treatment, waste disposal and air emissions and noise, rather than on the effectiveness of management practices and processes. For many organisations, such audits were valuable in identifying issues that needed to be addressed by the organisation; however, it was common to find that most of the recommendations resulting from the audit were simply not addressed. For a majority of the organisations, having conducted an audit or having addressed some of the issues identified in the audit process was considered sufficient to demonstrate good environmental performance, as most of the environmental audit reports prepared gave little or no guidance on how organisations could address the issues identified in the audit. The scope of the audit process was gradually extended to include guidance on the technical measures that could be taken to address the specific issues which had been identified. In many cases, this guidance was in the form of a management plan that specified the actions to be taken, the approximate costs and the priorities for action.

Unfortunately, as the allocation of resources for the implementation of management plans was usually insufficient, many plans were only ever partially implemented. Therefore, the process of developing management

plans was extended to involve the organisation's personnel and to ensure that the necessary resources were allocated to implement the required measures. Involving site personnel in the decision-making process also helped broaden the scope of the management plan from purely technical issues to encompass broader issues such as the development of procedures and training. The involvement of site personnel also helped ensure the management plan was realistic and achievable in the context of the resources available to the organisation to implement the plan.

Without the definition of suitable performance measures, it was common to find that organisations were unable to demonstrate whether or not the implemented actions had been effective in achieving the desired outcomes. Therefore, management plans were broadened to include monitoring and performance indicators to confirm their effectiveness.

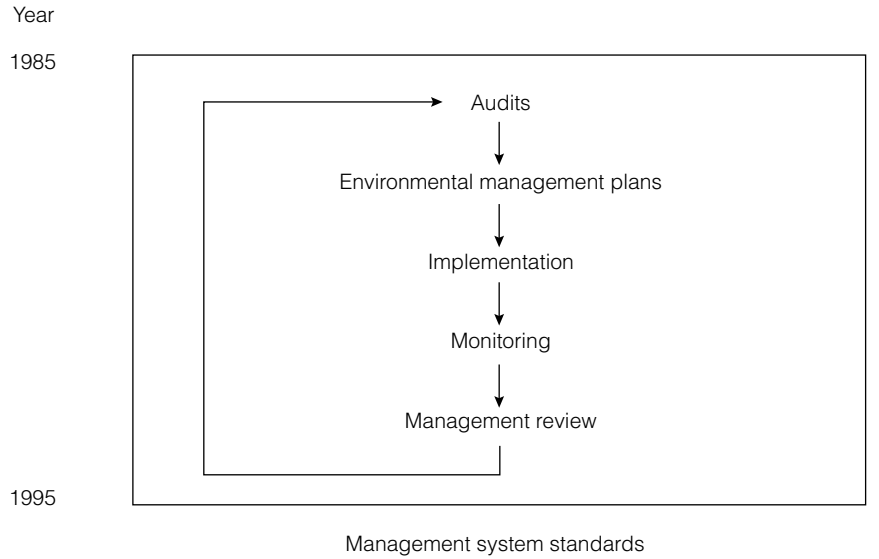
To close the loop in the audit process, the senior management review became an integral part of the audit process. Such reviews were required to ensure that all of the agreed actions had been implemented and had been effective and to identify any other areas where further actions were required.

In conclusion, many lessons have been learned about the audit process and how this process needs to be managed to ensure that an organisation's environmental issues are, and continue to be, managed effectively. The basic concepts of environmental management have developed from the lessons learned from the environmental auditing process. This evolution is illustrated in Figure 2.1, together with an indication of the time period over which this change has occurred.

Model for environmental management

The general model for a system of environmental management presented in Figure 2.2 incorporates many of the lessons learned from the evolution of the environmental auditing process. The model also provides a sequential framework for the steps involved in designing, developing and implementing such a system. Figure 2.2 is a simplified representation of the actual operation of a system of environmental management. Even in organisations with relatively few environmental issues, the relationships between the various elements will be more complex than those indicated. Ultimately, all of the elements are related to one another and the degree of relationship will be an organisational specific issue. The purpose of Figure 2.2 is to highlight the key relationships in terms of system maintenance and system review processes.

Figure 2.1 Evolution of environmental management

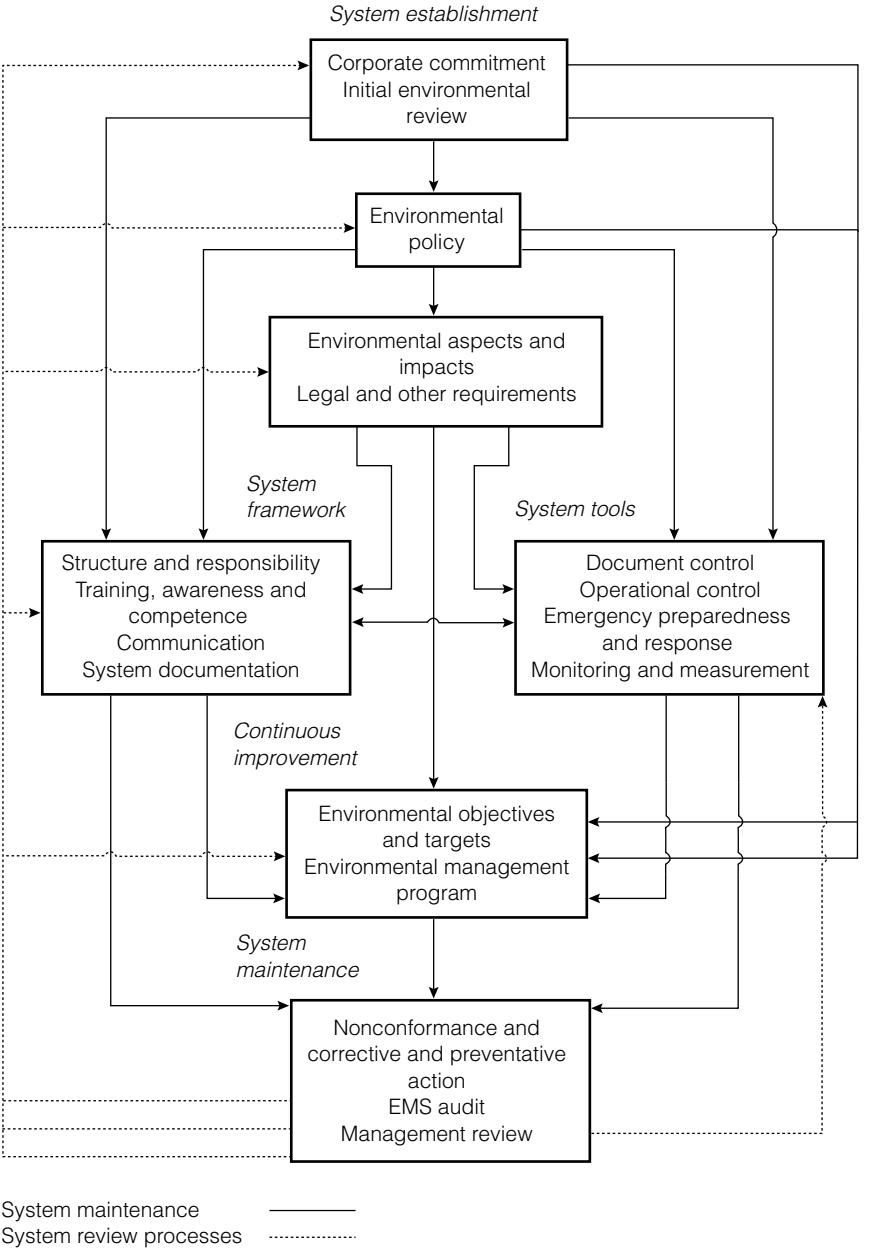


The starting point for any system of management is senior management commitment to establishing the system and ensuring the system is developed, implemented and maintained. This commitment must include the provision of suitable resources for the planning (for example, initial environmental review, identification of relevant legislation), implementation and maintenance of the system. In addition, senior management must maintain an active interest in the performance of the system and the effectiveness of the system in meeting the organisation's goals for environmental management.

The initial environmental review is the starting point for the development and implementation of a system of environmental management. The purpose of the initial review is to establish the relationship between the activities, products and services of the organisation and the environment. The scope of the initial review should include:

- the identification of the environmental impacts associated with the organisation's activities, products and services;
- an assessment of which aspects of the organisation's activities, products or services have significant impacts. Significance is defined in terms of the magnitude of environmental impacts and in terms of impacts that are, or could be, significant to the organisation (for example, costs, corporate reputation, liabilities);
- the identification of all relevant legislative and other requirements such as codes of conduct;

Figure 2.2 Interactions between key environmental management system's elements



- a review of existing management systems and structures to identify those areas that can be utilised for environmental management. This review should also identify those areas where gaps exist; and
- a review of the organisation's record in terms of accidents, incidents, complaints and non-compliance, to identify those areas or activities where there have been difficulties in managing environmental issues in order to identify priorities for management control and/or to identify where there have been failures in existing systems of management control.

The information collected from the initial review should be used as the basis for the organisation's environmental policy, which is a statement of the organisation's desired outcomes from environmental management activities. The environmental policy should define the organisation's goals and performance requirements and provide an overall framework and direction for the organisation's activities.

Based on the environmental policy and the initial environmental review, the organisation should define the objectives and targets necessary for it to meet its environmental policy. Objectives and targets can include technical objectives (for example, to reduce air emissions by a certain amount within a certain time) or management system objectives (for example, the development and implementation of a new procedure). The environmental management program defines how an organisation will achieve its objectives and targets, including the allocation of resources and funds.

There are two main elements to implementation. The first relates to human resources, specifically the role and responsibilities of employees in environmental management. This includes training, communication and the definition of responsibilities and authorities throughout the organisation. The aim is to ensure that employees understand the system, understand their roles within the system and understand the importance of environmental issues to the organisation. This knowledge must be supplemented by ownership and support of the system by employees and senior management. The second aspect of implementation is the development of management tools, including procedures for operations, emergency response, document control and records management. These elements provide the formal operating framework for the management of an organisation's environmental impacts.

System maintenance involves tracking environmental performance, assessing the effectiveness of management controls, ensuring that the system is functioning as intended and implementing mechanisms to identify, record and address any deficiencies in the system. System

maintenance provides the information necessary for management review processes, that is, the review and evaluation of the effectiveness of the management system to ensure its continuing suitability, adequacy and effectiveness. The management review process should consider the need for changes to policy, objectives and other elements of the system.

3 Environmental management system development

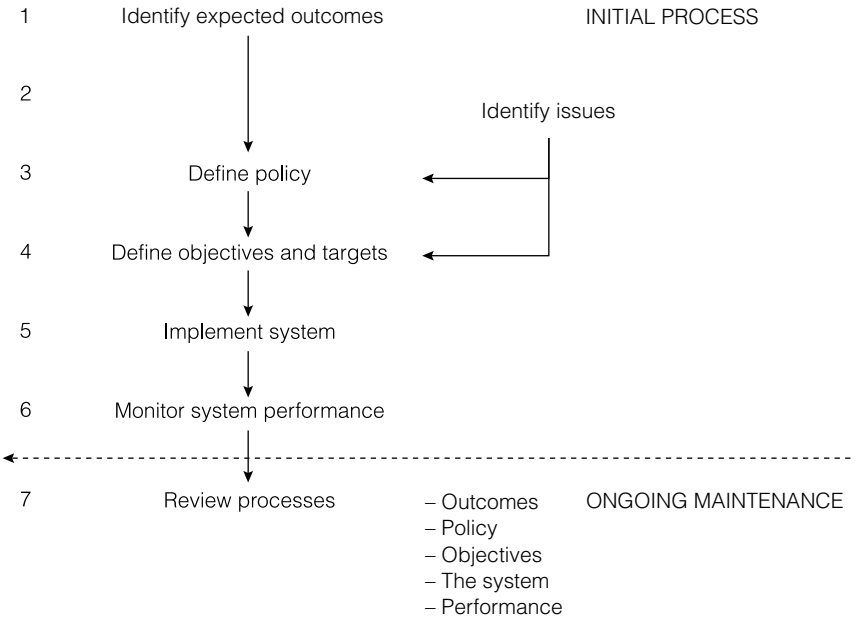
The system development process

The benefits resulting from establishing a system of environmental management vary widely. Many organisations have reported that environmental management has led to reduced costs, reduced risk, improved raw materials utilisation and increased profitability. In contrast, others have reported that environmental management initiatives have provided little benefit or that the costs of environmental management, in terms of time and resources, have far outweighed the benefits. It is our experience that organisations that have developed and implemented successful environmental management systems have followed a system development process broadly similar to that presented in Figure 3.1. In this context, successful means maximising benefits and minimising costs. Conversely, those organisations that have not realised the full benefits of environmental management tend to be those that have inadequately addressed some or all of the aspects of this process.

The management system development process presented in Figure 3.1 can be considered as comprising six key decisions that must be answered for an effective system of environmental management to be developed and implemented:

1 What are the broad outcomes, or benefits to the organisation, that are required from environmental management?
2 What are the environmental impacts associated with the organisation's activities, products and services that will affect these outcomes?
3 What is the organisation's policy in relation to environmental issues?
4 What are the organisation's objectives and targets for environmental management?

Figure 3.1 Environmental management system development process



5 What systems and procedures need to be implemented to achieve the policy and objectives and targets?
6 How is the performance of the system to be evaluated?

The development of a management system will require that each of these questions be considered in turn. That is, the questions also provide the sequence for the decisions required of senior management when developing a system of environmental management. It is essential to recognise that specific outcomes and answers to each of these questions will be determined by individual organisations based on the context within which the organisation is operating, overall management structures and objectives, existing and future commitments and plans, the size of the organisation and the availability of resources that can be committed to environmental management. The following sections consider each of these questions in turn. Because the answers are so organisation-specific, the focus is on the common features of effective management systems and the common mistakes in addressing these questions.

When considering these questions, it is also important to recognise that the development and implementation of a system of environmental management is not simply a once through process. Figure 3.1 highlights the importance of ongoing system maintenance to ensure that the system

is implemented effectively and continues to function in an effective manner.

Identifying outcomes

An essential starting point for the process of developing and implementing a system of environmental management is to obtain senior management commitment for the process. Depending on the specific organisation, senior management includes the board, the CEO and general managers. This commitment is essential to ensuring that suitable funds and resources are available for both the initial environmental review and the actions that result from this review, that is, the actions necessary to develop and implement the system.

The most critical point for senior managers to agree on is that the environment is a core business issue. In a similar manner to the other aspects of running a business, such as production, human resources and finance, environmental issues can affect profits, costs, legal status, organisational reputation, market share and relationships with external parties such as shareholders, the community and regulatory bodies. The starting point is to define the outcomes senior management expects to achieve from environmental management. In defining these outcomes, senior management must consider the environment in the context of the organisation's overall goals and position. This will require that consideration be given to the organisation's strategic direction, long and short term financial and business goals, current and future markets, funds and resources available for environmental management, legal obligations and responsibilities to stakeholders (for example, the local community, shareholders, regulatory bodies). The broad outcomes required of environmental management efforts must be consistent with these needs. If not, there will be conflict and, inevitably, the environmental outcomes will not be met.

The broad outcomes that may be considered include reducing the likelihood and/or consequences of accidental events, ensuring compliance with relevant regulations and standards, achieving cost savings, improving productivity, reducing waste, improving loss control and gaining market advantage. For example, if an organisation decides that regulatory compliance is a key outcome required from environmental management, specific goals that may be defined include identifying and evaluating the legislative implications of current activities, processes and services, identifying environmental risks, identifying likely changes in the regulatory framework and establishing and documenting a system of due diligence. Ultimately, the objectives defined by an organisation

must be relevant to the overall goals of the organisation. That is, from an organisational perspective, environmental issues are of significance because they affect the overall business. Defining outcomes in this manner will enable senior managers to understand the importance of environmental issues to the organisation and will provide the building blocks for the next stage of the process, namely the initial environmental review.

Obtaining senior management commitment for environmental management may not be an easy process for a number of reasons. First of all, for many organisations the environment is a relatively new area of management activity. Therefore, in the initial stages of establishing a system of environmental management, organisations focus much of their attention on regulatory compliance, community relations and issues that are priorities for management attention, even if they decide not to proceed with the development of a complete system of environmental management.

Second, organisations need to consider the skills available to them to manage environmental issues. In the specific context of developing and implementing an environmental management system, organisations need to access expertise in environmental science and engineering, environmental legislation and management systems design, development and implementation. In many cases, not all of this expertise will be available in-house and organisations will have to consider how best to access and utilise it. It may be that the organisation needs to hire consultants or employ full-time personnel to address these specific knowledge and information needs.

The third issue is to ensure that there is adequate capacity within the organisation to contribute to the initial environmental review. This will involve ensuring that key personnel make time available for the process and that all employees are informed of the purpose and scope of the initial review. Most organisations provide sufficient financial resources (for consultants or legal advice) for the development and implementation of their system of environmental management; however, it is often the case that internal personnel have limited time to commit to the process. This raises issues in terms of engendering ownership of the system among employees and in terms of ensuring the system is relevant to the needs of the organisation.

The process of defining the expected outcomes of environmental management has three main benefits. The first is that senior management commitment is obtained for the next stage in the process, namely the initial review (and, in most cases, for the longer term goal of effectively managing environmental issues). The second is that resources are made

available for the initial review. The third is that defining outcomes provides an analytical framework for the review and evaluation of the outcomes of the initial environmental review.

The initial environmental review

Organisations without a formal environmental management system should conduct an initial environmental review to establish the current position of the organisation in relation to the environment. The aim of the initial review should be to consider all aspects of the organisation's activities, products and services to identify strengths, weaknesses, opportunities and threats as a basis for the establishment of the system of environmental management. The scope of the initial review should include:

- The identification and assessment of the significance of the environmental effects associated with the organisation and those aspects of the organisation's activities, products or services that give rise to these effects. This should include identifying areas where environmental performance could be improved, opportunities for waste minimisation and cost savings and opportunities for reducing public health and ecological impacts.
- The identification of all relevant legislative and other regulatory requirements, such as codes of conduct. This should include both current regulatory requirements as well as the implications of potential changes in either the organisation's activities, products or services or in the regulatory framework.
- The assessment of existing management systems and structures to identify those areas of existing management systems that can be adapted for environmental management as well as those areas where gaps exist. This would involve consideration of the adequacy of existing systems of document control and record keeping, responsibilities and authorities, training programs and systems of internal and external communications.
- A review of the organisation's record in terms of accidents, incidents, complaints and non-compliance. The purpose is to identify those areas or activities where there have been difficulties in managing environmental issues, which will help identify priorities for management control.

For all activities, products and services, it is important to consider not only normal or routine operations, but also abnormal and accident situations. The environmental review should highlight the nature and

extent of problems, identify priorities for management action and identify gaps in existing systems of management control. The results of the initial environmental review should enable an organisation to develop a plan for the design, development and implementation of a system of environmental management.

Barriers to environmental management

The driving forces for improved environmental management were discussed in chapter 2. However, there can be significant organisational barriers to be overcome before an organisation can respond effectively to these driving forces. The manner in which these barriers are addressed determines how effectively an organisation responds to environmental pressures. One of the objectives of the initial environmental review should be to identify the barriers to effective environmental management within an organisation. However, these issues are frequently ignored in the initial review process as a consequence of the difficulty in describing them; they are, by their nature, somewhat intangible. That is, while technical aspects and legal issues can be described in objective, analytical terms, many of the barriers, in particular those related to organisational culture, are intangible, difficult to articulate and even more difficult to demonstrate objectively or without implying bias or personal opinion. Also, the literature on barriers to environmental management is extremely weak. The following paragraphs identify some of the most common barriers.

The first and probably most critical barrier to environmental management is the emphasis most organisations place on short term profitability (Gunningham, 1994). Because private sector companies are judged by markets and investors primarily on their short term performance, it can be difficult to justify investment in technologies that have payback periods of more than two or three years. As a general rule, organisations consider expenditure on regulatory compliance as a 'cost of doing business'. Beyond regulatory compliance, it is common to find that environmental expenditures with payback periods of greater than one to two years are not implemented, even if such investments provide significant longer term financial or other benefits, such as marketing, community relations or reduced risk (von Weizsacker *et al.*, 1997). This is particularly the case in small to medium sized enterprises, especially those that are economically marginal. Such enterprises are unlikely to adopt a long term view of their business and are most unlikely to sacrifice short term profit for environmental concerns, even when there are potentially significant long term gains to be made. This difficulty

is compounded by the time required to identify opportunities and implement solutions, especially time-consuming ones such as developing and agreeing procedures, training, generating ownership and awareness, etc. The relatively long time period required for the development and effective implementation of a system of environmental management can act as a barrier to implementing such environmental improvements.

The second barrier is the manner in which individual performance within an organisation is measured. Employees and middle managers are, in the main, judged on their contribution to short term profits, rather than long term business sustainability. Reward packages and salaries are generally tied to profit and turnover rather than broader measures such as the organisation's performance in areas like health and safety and environmental protection. This barrier is compounded by a significant degree of scepticism surrounding the economic benefits of environmental protection. For example, in a recent survey 31 per cent of respondents from industry indicated that they saw no benefits associated with improving environmental performance (NSWEPA, 1997a). This leads to the 'Steel Plate Syndrome', where the vision of senior managers fails to be translated into more effective environmental practices at the operational level. Organisations have tried to overcome this issue by integrating environmental performance into overall performance assessment for individuals. The success of such approaches is dependent on the overall importance of environmental issues to an organisation, and the actual weight assigned to environmental issues in performance evaluation. In practice, such incentives have been of limited influence because of the overwhelming weight placed on financial factors in assessing performance.

The lack of senior management commitment to environmental management is a common cause of failure of environmental initiatives. Without active support, middle managers and employees will get the impression that environmental issues are of relatively low importance to senior managers. The consequence is that environmental issues will be treated as being of lesser importance and will only be addressed once other issues have been dealt with. While the active commitment of senior management cannot guarantee the success of an organisation's environmental management efforts, the absence of such commitment will doom environmental management efforts to failure or only partial success (DeSimone & Popoff, 1998).

Organisational culture and personal relationships can be significant barriers to effecting environmental improvements. When conducting an initial review, it is important that consideration be given to the role of unions within the organisation, relationships between managers and

employees, the history of discussions and disputes and any previous environmental or similar (such as health and safety, quality) initiatives in the organisation. Defining an organisational culture is very difficult as it comprises a range of intangible factors such as power structures (official and unofficial), relationships between individuals, communication routes and employee/management attitudes. In the context of developing and implementing a system of environmental management, these factors all influence the openness of employees to new initiatives and the degree of support and opposition (both direct and passive) for environmental management. These issues can be extremely difficult to overcome, especially if there has been a history of disputes or conflict within an organisation. There are no generic or simple solutions to this issue, as they are very organisation and site specific. The critical first step, however, is to recognise the existence of the issue and to approach solutions in a manner that minimises the possibility for conflict. In the specific context of environmental management, it is important to recognise that there is a very positive attitude among the general community towards environmental protection efforts, and most employees are very willing to bring this awareness and support to the workplace if the opportunity is presented. Therefore, even though organisational culture may be a barrier to many other initiatives like safety and quality, barriers tend to be lowered in the cause of improving environmental performance.

It is important to understand the degree of knowledge within the organisation regarding environmental issues. In organisations without a history of managing environmental issues there is a general lack of environmental awareness among employees, a lack that can be characterised as being either a lack of knowledge of environmental issues generally or a lack of awareness of the importance of environmental issues to the organisation. Well focused training can provide employees with the skills and knowledge they need to fulfil their functions in an environmentally sound manner. Such training can also help to overcome some of the barriers to implementing environmental initiatives within the organisation (for example, scepticism regarding the benefits of environmental management).

A further factor has been the rapid change in the nature of employment in Australia. Many organisations have significantly reduced employee numbers, in particular in middle management, which has led to the loss of specialist expertise and knowledge of the organisation's history and past practices and a loss of capacity and resources to develop and implement a system of environmental management. This means that external consultants may be required to assist in the development and

implementation process; however, the reality is that in many cases external parties are a poor substitute for the knowledge held by existing or past employees. It is also the case that documented records frequently do not tell the complete story of a site's history or of past practices.

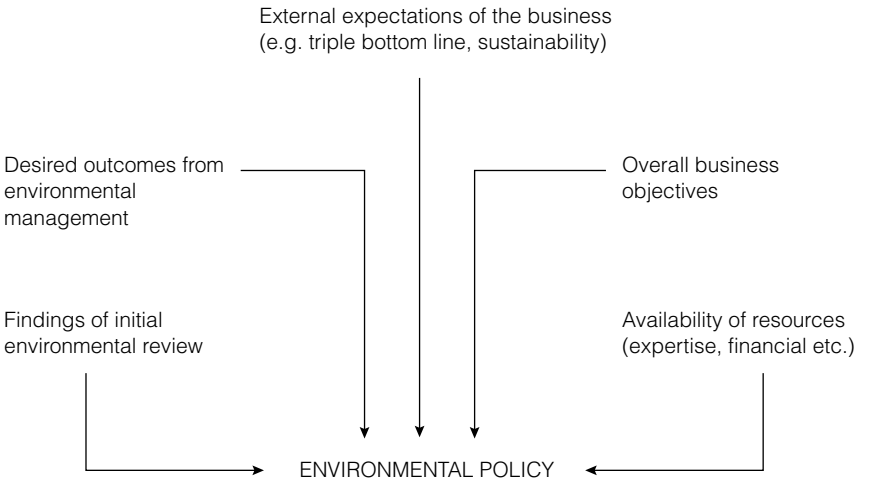
In conclusion, the initial environmental review should aim to identify barriers so they can be explicitly addressed as part of the process of developing and implementing a system of environmental management. This is not to say that these issues are easy to address, or indeed that they can even be addressed. However, a failure to identify barriers is likely to mean that the management system will take longer to develop than would otherwise have been the case, and that the implemented system may not meet the objectives set for it by senior management.

Defining an environmental policy

It is only after identifying the desired outcomes from environmental management and developing an understanding of the position of the organisation with respect to the environment, that detailed decisions can be made on the scope and objectives of environmental management. For most organisations, the first stage in the implementation of a system of environmental management is the development of an environmental policy. The key inputs to this environmental policy are the findings of the initial environmental review, the broad outcomes for environmental management, overall business objectives and an overall assessment of the position (present and future) of the organisation. An environmental policy is a statement by the organisation of its intentions and principles in relation to its overall environmental performance (ISO, 1995a). The purpose of the environmental policy is to provide a broad framework for the way in which the organisation operates. In particular, it should define how the organisation's operations, activities, products and services will interact with the environment, how environmental targets are set, the manner of the interaction between the organisation and external stakeholders, how compliance will be met and how environmental performance will be monitored, tracked and reviewed (Wilmshurst & Frost, 1997). In particular, the environmental policy must be consistent with the organisation's broader business objectives and policies.

The environmental policy must be appropriate to the nature, scale and environmental impacts of the organisation's activities, products or services. Specifically, the policy must not commit the organisation to objectives or actions which it is not able to achieve, or to expenditures which cannot or will not be made available. Any failure to meet environmental policy objectives will inevitably lead to a loss of credibility

Figure 3.2 Inputs to the environmental policy



with employees, customers and external interested parties. A specific issue to be considered in this regard is that the broad outcomes desired by the organisation from environmental management may not be achievable. It may be that the organisation has to accept that certain desired outcomes will not be achieved or that the desired outcomes may not be realistic. For example, consider the situation where a desired outcome is the elimination of all solid waste being sent to landfill. The reality of an operation (e.g. a production process) may be that some waste will continue to be produced, no matter how effective the system of management. Therefore, while the broad outcome required may be elimination of waste, a more reasonable policy statement could be that the organisation will ensure that waste generation is minimised. Such an objective, in this situation, would be much more realistic, achievable and credible.

The policy should, however, as a basic minimum, commit an organisation to continuous improvement, the prevention of pollution, and compliance with all relevant regulations and legislation. These broad objectives provide a basic framework for environmental management efforts through defining minimum performance requirements for the organisation (i.e. regulatory compliance) and committing the organisation to ongoing environmental improvements.

The scope of an environmental policy could also assign responsibilities for environmental management. These could include explicitly recognising the role of all employees in environmental protection, committing the organisation to providing the necessary resources to achieve the stated

objectives (thereby demonstrating organisational commitment to the policy) or committing the organisation to regular monitoring and performance reviews. The specific environmental issues to be covered by an environmental policy could include waste minimisation, materials consumption, pollutant releases, product design, purchasing, planning and development, education and training, and community relations.

In our experience, organisations often develop an environmental policy but then go no further in implementing a system of environmental management to ensure the environmental policy is met. The key steps to translating an environmental policy from a piece of paper to a framework for action are to have senior management support for the policy, to communicate this support to the employees, to have the policy publicly available and to monitor and review the performance against the environmental policy.

The environmental policy must be defined by, and actively supported by, senior management. Depending on the size and nature of the organisation, the senior management involved in the development and implementation of the policy should include the board of directors, the chief executive officer and division general managers. It is common to find this support demonstrated by the CEO or managing director signing, and thereby personally endorsing, the environmental policy. A critical aspect to this is ensuring that the organisation's senior management commit the necessary resources and funding to ensure that the environmental policy is implemented. This is generally effected through the allocation of management and employee time and funds for external expertise for the implementation and maintenance of the management system and for the setting and achieving of objectives and targets.

The environmental policy should be distributed to employees by senior managers. This is a tangible demonstration of senior management's commitment to the policy. Ongoing feedback should be provided to employees on the progress of the organisation towards meeting the environmental policy. In addition, the organisation should ensure that the importance of the environment to the overall business is recognised and communicated by referring to the environmental policy in company documents such as financial reports, procedures, publicity materials and training materials.

The policy should be made available to relevant internal and external parties. Many organisations have their environmental policy displayed in prominent locations such as reception areas and meeting rooms. The need for the policy to be distributed more widely should also be considered as part of the process of communicating environmental performance to external parties. In particular, copies of the

policy should be available to customers and the public on request. Copies should be provided to suppliers to demonstrate the organisation's commitment to environmental management. Organisations should also consider the inclusion of the environmental policy in annual reports (financial as well as environmental). The overall objective is to communicate to all parties the importance of environmental management to the organisation.

A commitment to monitoring the performance of an organisation against the requirements of its environmental policy provides the element of accountability necessary to ensure the policy is implemented effectively. A recent survey of CEOs in Australia indicated that the policies of over 80 per cent of the respondents included requirements pertaining to monitoring of their environmental policy (Wilmshurst & Frost, 1997). The high ranking given to monitoring requirements indicates that there is a general recognition of the importance of ensuring that the environmental policy is actually implemented within the organisation. Without suitable monitoring and review processes, the policy becomes just a 'paper' document which is not actually implemented.

Defining objectives and targets

Organisations define objectives and targets in areas such as sales, expenditures, costs and market share. In a similar manner, organisations should define objectives and targets for environmental performance. It is through the process of defining and achieving objectives and targets that organisations improve their performance and ensure the commitments specified in their policies and strategies are met. Environmental objectives and targets must be established by senior managers (at general manager and operating manager level) and should be supported by the chief executive officer (CEO) and the board of directors. The CEO, board and general manager should commit suitable resources to ensure the objectives and targets are met and should take an active interest in the organisation's progress towards achieving the objectives and targets. The purpose of this active interest is twofold. The first is, self-evidently, to ensure that the objectives and targets are actually met. The second is to provide a tangible demonstration of senior management's commitment to the overall goals of environmental management.

Environmental objectives can be defined as long term goals in regard to the environmental performance an organisation sets itself to achieve (DNV, 1994). To meet these objectives it is usual to set a series of targets, where targets can be defined as specific performance requirements that arise from the environmental objectives and which need to

be met in order to achieve the environmental objectives (DNV, 1994). That is, targets measure progress towards achieving a defined objective. In defining objectives and targets, an organisation must take account of the significant environmental impacts of its operations, activities, products or services and the requirements of its environmental policy. Objectives and targets must focus on those issues that are of greatest importance to the organisation. Objectives can address issues such as regulatory compliance, pollution prevention, reduction in environmental impacts, and continuous improvements in work practices and procedures. Examples of typical objectives include reducing the quantity of solid waste sent to landfill by a defined percentage over a defined timeframe, or achieving certification of the environmental management system within, say, five years. To meet the objective of waste reduction, suitable targets could be defined for the quantity of solid waste sent to landfill over the time period in question, for example, an organisation could define an environmental objective as being a 20 per cent reduction in the amount of solid waste sent to landfill over a two year period. Related targets could be for a 5 per cent reduction (compared to the base situation) after six months and 10 per cent after one year. Targets enable performance towards overall objectives to be assessed and can help identify, at an early stage, potential problems in meeting these objectives.

The benefits of setting environmental targets are broader than simply enabling objectives to be met. Many organisations develop site specific or area specific targets so that all sites or areas of operation can recognise their contribution to environmental issues and act to address these issues in line with the organisation's overall policy and objectives and targets. The definition of targets involves organisations developing and implementing suitable data management and collection systems. This in turn can provide different and, frequently, broader measures of performance in terms of issues such as process management and loss control. That is, performance indicators for environmental issues can, if well defined, contribute to an overall understanding of processes and production. As an example of how organisations can define targets, it is useful to look at Western Mining Corporation (WMC). WMC is a major Australian mining company with interests in alumina and aluminium, nickel, gold, copper, uranium and various industrial minerals and fertilisers. WMC identified four aspects of its business that were priority environmental management issues: water consumption, energy usage, emissions of carbon dioxide and emissions of sulphur dioxide. WMC set the targets as laid out in Table 3.1 for each of these aspects for the period 1994–95 through to the end of 1998 (WMC, 1997a).

Table 3.1 WMC environmental targets

Targets	1994–95 (base year) quantity	Target reduction	Target quantity	1996–97 quantity	Improvement since base year	Target date	Measure
Water	1.084	15%	0.921	0.970	11%	31 Dec 1998	kilolitres per tonne of ore milled
Energy	707	15%	601	642	9%	31 Dec 1998	megajoules per tonne of ore milled
CO_2	100	15%	85	81	19%	31 Dec 1998	kilograms per tonne of ore milled
SO_2	19.13	75%	4.78	2.53	87%	31 Dec 1998	kilograms per tonne of ore milled

Organisations should make their environmental objectives available, both internally and externally. This provides a degree of accountability for environmental management practices and allows the organisation's improvement objectives to be publicly assessed and evaluated. The setting of transparent targets can also encourage behavioural change across an organisation through encouraging openness in environmental performance reporting and promoting greater employee awareness of environmental performance in the organisation. For example, WMC's environmental targets are made publicly available through its annual environmental report (WMC, 1997a; Ringwood, 1998) and are also discussed in the annual shareholder's report (WMC, 1997b). The process of defining targets has enabled WMC to identify different means for measuring the resources consumed in mining, processing and refining its products, through measuring performance in terms of the quantity of ore milled or in terms of the amount of product produced (Ringwood, 1998). That is, the process of defining targets has enabled the organisation to evaluate its performance in a manner that contributes to the organisation's understanding of both its business outcomes and its environmental impacts.

The performance of an organisation in achieving its defined objectives and targets should be evaluated on a regular basis. For board and CEO level, a review every six months is likely to be sufficient. At lower levels within the organisation, reviews will need to be more frequent (weekly to monthly depending on the specific issue).

To be effective, objectives and targets must be specific, achievable, challenging and timely. To be specific means that objectives and targets are clearly stated and understood, with no room for ambiguity or misinterpretation. In addition, it must be possible to measure performance against the objective or target. There is no benefit in setting an objective or target that cannot be achieved (for example, due to technical or feasibility limitations or due to the unavailability of the skills or resources necessary to achieve the objective or target). Irrespective of the reasons, organisations that set objectives and targets that cannot be achieved will quickly lose credibility for their environmental management efforts. Conversely, setting objectives or targets that are too easily achieved, or which would have been achieved even without the implementation of the management system, are likely to compromise the integrity of the system with employees and others familiar with the organisation's operations. This can lead to cynicism and an unwillingness to participate in environmental management initiatives because the organisation is not perceived as taking environmental issues seriously (or simply adopting a 'business as usual' approach). By not setting challenging targets, the potential of the management system to assist the organisation to achieve continuous improvement, beyond business as usual, may be diminished. In a business context, objectives and targets must be realistic improvements that generate a real return for effort. It is important to recognise that not all of the returns will be measurable in strictly dollar terms. The benefits of environmental improvements also include reduced risk of prosecution, improved employee morale and enthusiasm for environmental initiatives, improved public image and reputation, improved efficiency and quality of work, provision of a competitive edge and improved working conditions (NSWEPA, 1997a). Timely means that objectives and targets must be focused on those issues that are of high significance to the organisation; that is, issues such as the potential for non-compliance with legislation must be treated as priority items for action. These priorities need to be reflected in the defined objectives and targets.

Organisations must develop a management plan for achieving the defined objectives and targets. An integral part of the process of developing objectives and targets is the allocation of resources and responsibilities for achieving the objectives and targets. Management plans should specify the resources, means and timeframe by which the defined objectives and targets are to be achieved. However, the reality is that many potential environmental improvements fail to be implemented. The reason is frequently not because of a lack of funds for external resources (such as consultants or contractors) but because

internal personnel simply do not have the time to take on these projects and ensure they are implemented effectively. Therefore, when allocating resources and developing management plans, it is essential to ensure that the nominated staff have the time, resources and capability to address these issues effectively.

System implementation

This section discusses the basic requirements for the implementation of an effective system of environmental management in more detail. The specific issues considered are responsibilities and authorities, operational control, documentation, emergency response systems, records management and communications.

Responsibilities and authorities

The first stage in implementing a system of environmental management is to define responsibilities, accountabilities and authorities for environmental management across the organisation. These must be defined for those aspects of the organisation's activities, products or services that affect or potentially affect the environment as well as for the development and implementation of the system.

The fundamental starting point for this is that all employees have environmental responsibilities, not just those whose functions are exclusively environmental in nature. Job descriptions and performance appraisals must explicitly address environmental responsibilities and the expectations of the employee in contributing to the organisation's environmental goals. Within a system of environmental management, the specific responsibilities that need to be assigned include responsibility for implementation and maintenance of the management system (including the management of documentation and records), reporting on the performance of the system, the identification of environmental aspects and impacts, the identification, implementation and verification of corrective actions, the implementation and monitoring of management controls such as training, environmental procedures and emergency response procedures.

The definition of responsibilities, accountabilities and authorities can be considered at three main levels within an organisation, namely at senior management and board level, at middle manager level and at employee level. In addition, the environmental manager (or system manager) will have specific responsibilities allocated as part of this process.

In general terms, senior management (i.e. the board, CEO and

general managers) is responsible for defining the strategic direction for the organisation and for ensuring that these strategies are implemented. In the specific context of environmental management, this starts with the definition of the environmental policy and the objectives and targets. Senior management will also be responsible for the provision of suitable resources for ensuring the system of environmental management is effectively implemented. This must include the allocation of resources for system maintenance and improvement as well as for achieving the defined objectives and targets. In addition, senior management needs to review the performance of the organisation in achieving the environmental policy and environmental objectives and targets.

Middle managers are responsible for ensuring that the environmental management system (EMS) is effectively implemented within their areas of operation, including ensuring that employees receive appropriate training in environmental issues and that employees are competent to perform their jobs. This is of particular importance for those employees whose activities have significant, or potentially significant, environmental impacts. Managers are also responsible for ensuring that the environmental aspects of their activities are effectively controlled at all times, ensuring that suitable procedures are in place and are followed, that objectives and targets are achieved and that monitoring and corrective action systems are in place and are effective. Managers are also responsible for providing information to the board and senior managers on environmental performance, communicating on overall environmental performance to employees and providing recommendations for improving environmental performance.

All employees must be made aware that they have environmental responsibilities. This should be communicated, not only verbally but through the incorporation of environmental requirements into position descriptions, training requirements and performance appraisals. Clearly, those employees whose activities give rise to significant environmental impacts will have additional specific responsibilities and authorities.

Overall, responsibility for the EMS is generally allocated to the environmental manager or quality systems manager. This individual is commonly given the responsibility for ensuring that the system functions on a day-to-day basis, including the administrative aspects of the system such as the scheduling and conduct of audits, the collation of monitoring data, the provision of information to senior management, ensuring corrective actions are effectively addressed and recorded and ensuring that procedures are current and available. The responsibility for specific aspects of the EMS may be assigned to other individuals. For example, larger organisations often have a section responsible for identifying

training needs and for providing this training. In this situation, environmental training becomes a further aspect of the training provided by the organisation. Similarly, many organisations have a group responsible for dealing with emergency situations, under which umbrella falls the responsibility for environmental emergencies.

As part of the process of defining responsibilities and authorities, there are three issues that must be recognised and addressed. The first is the potential for the mismatch of authority and responsibility for environmental management. The second is the tendency for the environmental manager, or the individual responsible for system implementation, to be required to do all of the work necessary to ensure the system is effectively maintained and implemented. The third is the allocation of budgets for environmental issues.

The mismatch of responsibility and authority is common to many initiatives that are perceived as non-core functions for organisations. To be effective, an environmental manager's authority must be commensurate with defined responsibilities. In most organisations, environmental management is not a line management function. Where environmental issues are identified in an area or as part of an activity, the environmental manager frequently does not have the authority to amend or halt the activity. Instead, the area manager or supervisor must be requested to address the issue. In organisations with a culture of environmental commitment, where this culture is continually reinforced, this type of situation should not present a difficulty. The problem arises when a supervisor or line manager sees environmental issues as of lesser importance than the other issues to be managed, which can lead to environmental problems not being addressed at all or not being addressed in an appropriate timeframe. This situation is common in organisations where the authority of the environmental manager has not been well defined or where the organisation has failed to communicate the importance of environmental issues to its employees and managers.

The second issue to be considered is the risk that the environmental manager becomes the 'doer' as well as the manager. In many organisations, the environmental manager becomes responsible for issues that really should be the responsibility of line managers or other individuals within the organisation, usually because meeting environmental requirements is often not considered an integral part of other managers' responsibilities. That is, environmental management is treated as a low priority, to be addressed once all other issues have been addressed. The consequence is that line managers do not accept full responsibility for environmental management within their areas, leading to the environmental manager

taking on additional work to ensure the system continues to function. Therefore the overall performance of the system is dependent on the performance of a single individual. Such systems often fail when this key individual leaves the position. The other major consequence of the environmental manager being solely responsible for system maintenance and implementation is that the broader organisational objectives of identifying and implementing improvements to the system and ensuring that issues such as corrective action requests are addressed effectively tend to be neglected. That is, the strategic dimensions of this individual's position (in particular, maximising the benefits of environmental management) tend to be lost.

The provision of resources, personnel and education for environmental management is an issue in many organisations. Broad decisions on environmental expenditures are generally made at board level, the actual resources coming either from line managers' budgets or from the organisation's overall environmental budget. There are advantages and disadvantages to each approach. Allocating funds from a corporate budget can mean that managers are less reluctant to send their staff for training or to implement certain environmental improvements, because these costs are not allocated to their cost centre. In addition, providing the environmental manager with a budget is a tangible demonstration of the organisation's commitment to environmental management. The problem is that this means of budget allocation can lead to responsibility being transferred away from line managers, thereby lowering their interest in environmental management. However, if budgets are allocated to line managers, or line managers are expected to pay for environmental improvements and initiatives from existing budgets, there can be a tendency to underspend on these issues. This is because, for most organisations, the primary determinant of an individual's success is the financial performance of the cost centre to which the individual belongs. In this context, expenditure deferred or avoided is regarded as a positive measure. Therefore, in requiring line managers to take responsibility for environmental issues, accountability for and reporting on environmental expenditures must be built into job descriptions and performance reporting and evaluation mechanisms.

Operational control

Operational control involves the development and implementation of procedures to control those activities that have, or potentially have, significant environmental effects. Procedures should define the manner in which activities and operations are carried out to ensure that adverse

environmental impacts are minimised and to ensure that the organisation's environmental policy and environmental objectives and targets are achieved. The adoption of formal procedures can provide a degree of confidence that identified environmental impacts and exposures are being properly managed at all times.

The first stage in developing procedures is to identify those activities and operations that are associated with significant environmental impacts. It is critical to ensure that the activities and operations are within the scope of the organisation's control. Expressed in a different manner, organisations must deal with those issues over which they have control. These activities should be identified as part of the initial environmental review. For each of these activities and operations suitable operational controls must be developed and implemented, meaning the activities are carried out under specified conditions or in accordance with defined procedures. Procedures should:

- provide a brief overview of the purpose of the procedure;
- define how the activity is to be carried out;
- identify the safeguards or control measures to be adopted;
- detail what is to be done in the event of an accident or a deviation from specified conditions;
- provide operating criteria such as specifying emission limits or defining the range of operating conditions;
- provide reference to other documentation necessary to conduct the activity;
- specify reporting requirements, verification requirements and corrective action requirements;
- define monitoring requirements, including specifications for the calibration of monitoring equipment; and
- specify routine maintenance requirements (for example, cleaning of elements) and requirements for major overhauls of equipment.

It is not sufficient to simply write a procedure and then demand that the procedure be followed by employees. Those employees responsible for the implementation of the procedure must be involved in its development in order to ensure that the procedure reflects current work practices and activities. This will also provide an opportunity to communicate any changes that may be required to existing practices and activities. Involving employees in procedure development is a means of including them in the broader development and implementation of the management system and it can be extremely useful in helping to generate employee ownership of the system. In addition, having employees and operators involved in the development of procedures is

an opportunity to harness and record knowledge that could otherwise be lost to the organisation.

When commencing the process of developing an EMS, it is important to recognise that most activities with the potential to cause significant environmental impacts will already have some form of operational control in place. This may be either a formal written procedure or unwritten operational practices that are followed by all those carrying out the activity. In such situations, the development and implementation of procedures should build on existing practices as far as possible. This will generate employee support for the system by minimising the amount of change in their activities.

All employees responsible for applying procedures should receive initial and refresher training. Operational procedures should be reviewed on a regular basis and amended to reflect any changes in activities or operations (for example, new equipment, modifications to existing equipment) or changes in regulatory or other performance requirements. The implementation of operational controls should include the assessment of the performance of the employees in using the procedure and the effectiveness of the procedure in achieving the outcomes required. That is, procedures should not be written and then forgotten about; they must be reviewed and updated on a regular basis.

Documentation

Within a system of environmental management, documentation is required to explain how the system works. That is, documentation must provide information to the users of the system and provide guidance on specific aspects of the organisation's operations, products, activities and services. The documentation required for an EMS is likely to include guidelines for the implementation of the management system, reference materials such as the environmental policy, copies of regulations, standards and licences, registers of environmental effects, objectives and targets, monitoring records and performance reports, position descriptions, procedures and organisation charts. In simple terms, the documentation should provide a road map to the system and how the system works.

It is essential that the need for documentation be rigorously evaluated. Only those documents that are necessary for the effective operation of the system should be prepared and maintained. It is a common criticism that EMSs tend to be 'over-documented and under-utilised' or that the system is 'drowning in paper'.

The documentation held by an organisation can be divided into two broad categories, namely reference documentation and management

documentation. Reference documentation comprises the materials that an organisation needs to hold but which are not referred to on a regular basis, including environmental studies and reports, licences and permits, copies of legislative requirements and contracts. In contrast, management documentation is required to support the day-to-day operation of the management system. It includes environmental objectives and targets, management structures, site drawings, process flow diagrams, position descriptions, a register of environmental effects, a dangerous goods inventory, operating procedures, training plans, budgets and other necessary operational information. However, not all of this information will be required by all employees. For example, operators will probably require access to operating procedures on a day-to-day basis but will probably find that information on overall processes is not relevant or only needs to be considered occasionally. To ensure the functionality of the system, the need for access to information and documentation should also be evaluated. Employees must have access to the documentation they need but superfluous documentation should be removed.

To ensure that documentation is available to all those who require it and to ensure the currency of documents, organisations need to develop document control procedures. These procedures should detail where documents can be located, ensure that current versions of documents are available at all locations where they are required and ensure that all obsolete documents are removed from points of issue or use. In addition, document control procedures should provide for the review and revision of procedures, including specifying the frequency of such reviews, the scope and extent of these reviews and the sign-off and issue process to be followed. Document control procedures should also address the retention of documents (and the duration for which documents are to be retained) for legal purposes and for knowledge preservation for the organisation. Ultimately, the purpose of document control is to ensure that the correct documents are available when they are required.

Emergency response

Organisations should identify potential environmental emergencies that require an emergency response plan. Examples of the emergencies that need to be considered include loss of containment (for example, the failure of a hazardous materials storage area), fires, explosions and releases of hazardous or toxic gases.

The first stage in developing an emergency response plan is to identify all of the potential emergencies that could occur. For a specific

facility or operation, the events to be considered include equipment failure, fire and firewater run-off. The process of identifying events should also involve assessing the frequency (or likelihood of occurrence) of such events, estimating the amounts and concentrations of substances released and identifying the routes whereby releases can enter into the environment (Kingsbury, 1995). The next stage is to consider the likely transport and fate of substances in the environment, including consideration of the properties of the released materials (such as toxicity and persistence in the environment), physical site factors (such as engineering controls) and environmental factors (such as local meteorology and topography). In addition, the nature of the receiving environment should be considered. Specific attention should be paid to the location of sensitive environmental receptors, areas of ecological importance and the location of humans. All of this information should be combined to provide a description of baseline environmental conditions and an assessment of the consequences of an accident (Kershaw, 1996; Kingsbury, 1995; Sullivan, 1998). The outcome of this process should be the selection of those events or activities that need to be covered by an emergency response plan.

The emergency response plan should detail the actions to be taken in the event of an emergency, who is responsible, who should be contacted (emergency services, local community, senior management), what equipment is required and what training is required. The plan should be reviewed on a regular basis to ensure it remains relevant to the activities and operations of the organisation; in particular, the plan should be reviewed following any incidents or emergencies. The plan should be tested on a regular basis. Obviously, full scale exercises (especially where external parties such as the fire brigade are involved) are costly and impractical to run on a regular basis. Therefore, organisations generally use a combination of desktop exercises, testing of communications systems, testing of emergency equipment and test drills to assess their emergency response plans.

Records

Environmental records provide evidence of the ongoing operation of the management system and are required to demonstrate compliance with environmental regulations, to confirm that the organisation's environmental policy is being met and to provide information on the extent to which objectives and targets are being met.

The environmental records held by organisations include performance reports against objectives and targets, minutes of meetings, details

of raw materials and energy consumption, correspondence with regulatory authorities, emissions data, inspection reports, training records, inspection, calibration and maintenance records, audits and reviews, details of emergency response exercises, environmental accidents and incidents reporting, investigation and follow up, and waste handling and disposal.

Communication

Organisations need to communicate internally and externally on their environmental performance. The broad objectives of communication include demonstrating the organisation's commitment to the environment, dealing with concerns and questions about the organisation's environmental activities, products or services, raising awareness of the organisation's policies, objectives, targets and programs, and informing internal and external parties about the organisation's environmental performance (ISO, 1995a).

From an internal perspective, senior management must be provided with the information necessary to assure them that the environmental policy is being, and will continue to be, met. The types of information required could include compliance reports, environmental accident or incident reports, performance against defined objectives and targets, orders or notices from regulatory bodies, changes in legislation and capital/expense budgets. Such information must be provided in a timely manner and must be sufficient for senior management to make informed decisions on environmental management issues.

Information on environmental performance must also be provided to all employees, including performance against objectives and targets, environmental expenditures and details of new environmental initiatives. The process of employee communication is not simply about the provision of information to employees; there must also be opportunities for employees to suggest improvements to the system and to report non-compliances or nonconformances.

The techniques that can be used to provide internal communication include face-to-face meetings, the publication of annual reports, internal newsletters and email messages. Communication routes vary widely from company to company. In many cases, informal communications are as important as formal communication routes in the distribution of information, and the information communicated can comprise a mix of fact, opinion, rumour and supposition. It is, therefore, essential that consideration be given to how environmental information is distributed through the organisation and how the quality and accuracy of this

information can be assured. In broad terms, there are three main issues which must be considered in such communications. First, the most important and effective means of communication is face-to-face verbal communication, rather than printed materials or videos (Irwin & More, 1994). Second, immediate supervisors are generally regarded as being more trustworthy than senior managers or union officials as providers of information. Third, employees are primarily concerned about the future of their immediate work areas rather than company-wide initiatives or successes. Clearly, these factors need to be considered and integrated into environmental communications strategies.

While written information such as newsletters appears to be an ineffective means of communicating information, interestingly enough, most organisations see it as the primary means for distributing information to employees. Although written material is important, it is only one of the approaches available for communicating information to employees.

The parties with whom organisations need to communicate include regulatory authorities, government, local community groups, media and special interest groups. The issues covered by these communications include complaints, emergency or accident situations, community concerns and media queries. The development and implementation of procedures for external communications is essential to ensure that the information provided to external parties is an accurate reflection of the organisation's environmental performance. While each organisation will have its own specific approaches to communication, a number of general principles should be followed. First, the responsibility for external communications should be clearly defined: only nominated individuals should conduct this communication. For example, the general manager may be responsible for communication on any issues that involve media coverage or are potentially sensitive, the environmental manager may be responsible for all communication with regulatory bodies and community groups and certain other managers may be responsible for site tours and general publicity events. The aim must be to ensure that external parties are put in contact with the individuals who know most about the issues in question and who are competent to comment on these issues. In particular, individuals responsible for environmental communications need to be able to understand the business and environmental context surrounding issues of concern. Second, the individuals responsible for external communications must be suitably trained and competent, which will probably involve media and communications training. It is critical that the ability of such individuals to communicate is assessed before they are assigned responsibility for any aspect of

external communications. Third, the purpose of developing procedures for external communication is not to conceal or hide information or to provide a misleading picture of an organisation's environmental performance. Rather, the purpose is to provide accurate information that gives a realistic picture of an organisation's environmental performance or of the environmental issues of concern.

Evaluating system performance

Organisations need to monitor, measure and evaluate, on an ongoing basis, the performance of their EMS. The purpose is to ensure that the organisation is performing in accordance with the goals specified in the environmental policy and objectives and targets, to identify areas where the system is not performing as intended and to provide the basis for overall reviews of the management system.

Performance evaluation is conducted at three levels: the ongoing measuring and monitoring of performance; the auditing of the entire system or specific parts of the system to assess the performance and implementation of the system; and through overall system evaluation by senior management to ensure the ongoing suitability and effectiveness of the system and to identify areas for improvement. Performance evaluation must include processes for the implementation of recommendations, including systematic follow up and reporting to confirm the effectiveness of the actions taken.

Monitoring and measuring

It is almost a truism to say that what gets measured gets managed. The purpose of monitoring and measuring performance is to ensure that an organisation's policies, objectives and targets are achieved on a day-to-day basis.

The main reasons for measuring performance are: to monitor the success of the organisation in improving over time, to enable the organisation to benchmark itself against its competitors, to help set priorities for action, to meet the demands of external stakeholders for information about the environmental performance of the organisation, and to identify the need for action, for example, in situations where there is non-compliance with regulatory requirements. Measuring performance also enables senior management to confirm that financial resources are being used to the best possible effect, which may include being able to demonstrate that compliance is being achieved within the existing framework of environmental

expenditure or enabling cost–benefit assessments to be made of environmental expenditure.

The other important outcome from monitoring and measuring activities is the provision of a framework of accountability for environmental performance within an organisation. Managers and employees are used to having their performance assessed against defined targets. The measurement and subsequent evaluation of environmental performance integrates environmental responsibilities into position descriptions in a much more tangible manner than general requirements to 'ensure the environment is protected'. This helps introduce commitment to, and accountability for, achieving environmental outcomes that may otherwise be difficult to engender.

The first step is to identify those areas for which monitoring and measuring is required. Performance measurement can be applied to any aspect of an organisation's activities, products or services. Requirements for performance measurement must be developed in the context of an organisation's environmental policy, significant aspects and impacts and defined objectives and targets. Measurements are generally applied to three core areas: the environmental aspects of an organisation (that is, those activities, products or services over which the organisation has control), the environmental impacts associated with the environmental aspects of the organisation, and management practices. For each of these areas, organisations should define performance indicators that provide information about environmental performance of the organisation and which provide the basis for evaluating the success of environmental management efforts.

The performance indicators related to environmental aspects will, for most organisations, be focused on operational activities. Operational activities give rise to a range of environmental aspects such as energy consumption, raw materials consumption, waste water discharges and emissions to air. The performance indicators adopted should address issues such as the efficiency of the production process, the quantities of raw materials and energy consumed and the quantities of pollutants and waste produced. This information can then be used to assess issues such as changes in environmental performance over time, benchmarking against similar organisations and the financial costs and benefits of environmental expenditures.

The environmental impacts of concern to organisations include air, water, land, ecology, human health, natural resources, amenity, aesthetic values and the built environment. Organisations will have an impact on the environment through their products, activities and services and, while many of the impacts cannot be directly controlled by the

organisation, monitoring of environmental impacts can help define priorities for environmental management and provide a basis for the evaluation of the effectiveness of environmental management activities. That is, environmental monitoring can provide an indication of the overall effectiveness of environmental management efforts although it is important to recognise that, in many cases, environmental improvement or degradation cannot be directly linked to an organisation's activities as such changes are influenced by a range of factors, many of which are outside the organisation's direct control. Potentially useful environmental indicators include:

- changes in land use, as measured by the amount of land cleared or the amount of remaining habitats;
- ecological effects such as changes in the diversity of an ecosystem;
- ambient air and water quality as measured by the concentrations of various substances in the environment;
- human health effects such as the incidence of defined illnesses in a local population or surrogate measures such as blood lead levels; and
- overall rates of resource depletion, to enable the organisation to determine the significance of its contribution to these issues.

Performance indicators for organisational management and management practices encompass the people, practices and procedures at all levels of an organisation. The purpose of these indicators is to identify areas where improvements are required. Environmental performance indicators relate to issues such as regulatory compliance, the performance of the organisation in meeting objectives and targets, the time required to respond to corrective actions, the number of outstanding corrective actions, progress in implementing policies and systems, the capital and operating budgets allocated to environmental projects, the number of business units with implemented EMSs, the number of suppliers that have been environmentally evaluated, financial performance (as measured by environmental costs, cost savings from environmental improvements, new business opportunities resulting from improved environmental performance and insurance costs) and leadership and management costs (for example, the number of employees receiving environmental training, employee survey responses on environmental issues, number of suggestions for environmental improvements), and community relations/external perceptions (for example, the number of complaints, number of press reports, both positive and negative and funding provided to community initiatives).

Ultimately, operational performance, environmental impacts and management performance are all related and it is likely organisations will

need a combination of measures from all three areas to evaluate the overall performance and effectiveness of its environmental management activities. As an example, if a facility releases effluent from a waste water treatment plant into a local river or water body, performance indicators could be specified at the operational level (such as quantity of pollutants released per unit of time), environmental level (such as concentrations of various pollutants in the water column and in sediments) and management level (progress in implementing improvement programs for waste water treatment, progress in developing and implementing procedures for waste water treatment). It is the combination of all of these measures that enables the overall performance of the organisation in managing its effluent to be assessed.

Environmental performance indicators should provide an adequate representation of the environmental performance of the organisation, reflect changes in the organisation's environmental performance, provide information that can be used in predicting trends in environmental performance and be understandable, relevant, cost effective and comparable to other sites or organisations.

The first stage in defining requirements for monitoring and measuring is to define the performance indicators to be monitored and measured (as discussed above). For each of these performance indicators, an organisation should define how these are to be measured and the frequency with which such measurements should occur. Measurement specifications should include sampling and analytical protocols, analytical requirements, specifications for the calibration of sampling and analytical equipment and performance checks on software and hardware. The results of monitoring should be recorded and there should be provisions for the reporting of these results to management.

Environmental reporting

One of the specific purposes for monitoring information is in the area of corporate environmental reporting. The environmental performance of an organisation will be of concern to a range of external parties, including investors, members of the local community, political decision-makers, regulatory bodies, local government, suppliers, contractors and buyers. In addition, more specialist information may be required by parties such as academics, environmentalists and other companies. An increasing number of organisations are preparing environmental reports as a means of communicating information on their environmental performance to internal and external parties. The benefits of environmental reporting include meeting community right-to-know expectations,

creating market opportunities by promoting the environmental advantages of products, goods and services, accessing funding and insurance, raising staff awareness of the organisation's commitment to environmental management and enhancing the organisation's credibility with regulators and the community (Davis-Walling & Batterman, 1997; NSWEPA, 1997c).

When making the decision to prepare an environmental report, the first issue to address is the scope of the report. In broad terms, organisations will need to provide information on how they manage their significant environmental aspects and impacts. Depending on the audience, this will require that information is provided on the environmental policy, environmental objectives and targets, management systems, energy and raw materials usage, emissions, wastes, compliance with environmental legislation, liabilities, risks and financial expenditures (Deegan, 1996; NSWEPA, 1997c). Many, if not all, of these aspects should be covered by monitoring and measuring programs and should already be part of an organisation's environmental performance indicators. That is, the preparation of an environmental report should not require significant additional data gathering to that required by the organisation for its own internal management purposes.

There is no standard format for public environmental reports, although a number of guidance documents are available (including GEMI, 1994; NSWEPA, 1997c; UNEP, 1994; WICE, 1994). However, all environmental reports should include sections relating to the company (that is, general activities, business areas, general financial information), environmental policy and environmental objectives and targets, environmental performance, the contribution of the organisation to (as appropriate) local, regional and global environmental impacts, environmental progress (such as trends in emissions), environmental expenditures and returns, and data quality (including processes of verifying reported information). Table 3.2 provides examples of tables of contents from two recent environmental reports.

Unlike financial reporting, there are no specific requirements on the scope and content of environmental reports. It is probably fair to note that such reports have been of widely varying quality and rigour (Cairncross, 1995; Davis-Walling & Batterman, 1997; Deegan 1996). There are a number of basic expectations of environmental reports. The first and most fundamental expectation is that the report will be honest and balanced. A survey of environmental reporting in Australia has indicated that organisations tend to focus on good news rather than bad. Somewhat ironically, there has been a tendency for those organisations that have been prosecuted to report significantly more

Table 3.2 Sample tables of contents from environmental reports

WMC (WMC, 1997a)	Shell (Shell International, 1998)
Our Journey—Rewards and Challenges	*Who We Are and What We Do*
Overview	Our values, principles, commitments and policy
About WMC	Highlights
Year in brief	Message from the Chairman
Environmental impact of WMC's businesses	Issues and dilemmas
The hard issues	Listening to others
Management	Sustainable development
Environmental management systems	Climate change
Management issues	Renewable resources
Performance	Improving road safety
Environmental performance	Openness—counting the costs and benefits
Water	Dealing with industrial legacies
Energy	Global standards
Sulphur dioxide	Setting targets to improve performance
Carbon dioxide	Performance data and commentary
Tailings	Verification statement
Land	Structure of the group
Biodiversity	Glossary and definitions
Community	Guide to other publications and website
Future directions	
Site reports	
Sustainable development	
Reporting	
Structure	
Evaluation	
Supporting data	
Non-compliance incidents	
Site data	
Audits and reviews	
Glossary	

favourable information than their counterparts who have not been prosecuted (NSWEPA, 1997c). While the disclosure of negative environmental performance presents the risk of negative publicity, there is a body of experience that suggests that reporting both good and bad news enhances the credibility of an organisation in the eyes of external stakeholders (GEMI, 1994).

The second key expectation is that organisations will communicate the context of their activities, products or services. The readers of an environmental report need to understand the nature of the business as well as the overall context within which the business operates, in terms of issues such as key markets, scale and geographic distribution. There has been a tendency for such communication to become 'greenwash', where the intent of communicating this information is to cloud or hide certain environmental issues. Organisations must recognise that the

philosophy underlying corporate reporting should be transparent and open communication as the basis for developing trust and credibility with stakeholders. The publication of glossy publicity documents is unlikely to contribute significantly to enhancing the credibility of an organisation.

If possible, organisations should involve stakeholders (such as local communities, environment groups, customers) in the process of developing the environmental report. This involvement can ensure that the report addresses the issues and concerns of stakeholders as well as gathering information about the environmental impacts of an organisation's operations. It is important that this involvement is not represented as legitimising the environmental report or its conclusions. There have been cases where organisations have requested the assistance of environmental groups or local community groups in developing an environmental report and then used that involvement to claim or imply that these groups have endorsed or supported the report. Such claims, obviously, run counter to the objectives of developing trust and credibility.

Another issue to consider is the usefulness of the data reported for the recipients of environmental reports. For example, while an organisation may succeed in reducing emissions per unit of production, total emissions may have increased because of an increase in production. Therefore, it is important that the preparers of environmental reports understand the needs and concerns of the likely users of the report and provide them with the information they require and in a form that is most useful to them.

A further issue in corporate reporting is the quality and reliability of the data reported. Most reports use quantitative data but very few provide any indication as to the reliability of the data. It has been suggested that about 5 per cent of the statistics in a typical environmental report are from continuous measurement, with a further 30 per cent from frequent measurements (Cairncross, 1995). The remaining data come from a combination of single readings and estimates. While in many cases estimation is the only cost-effective means of characterising emissions, it is critical that the accuracy of reported data be recognised and acknowledged. Some organisations discuss this limitation explicitly in their reports. For example, the Western Mining Corporation noted that much of the information in its environmental report relies on estimates and cautioned that while the numbers reported were based on the best available data, a high degree of precision could not be guaranteed (WMC, 1997a). To ensure the credibility of environmental reporting (and also for internal management purposes), the data that is reported must be of sufficiently high quality to provide the public

and external stakeholders with confidence in how data are measured and in the results of such measurement programs.

Many larger companies employ external consultants to review and confirm the accuracy of the information presented in their environmental reports, which can provide a level of assurance to stakeholders regarding the quality of the data presented in the report and provide assurance that the information reported is correct and not erroneous or misleading. However, verification processes vary enormously in rigour; external consultants rarely check the data directly. The general practice is to take the organisation's numbers on trust and to focus on issues such as comparing reported data against objectives and targets and conducting broad overviews of the implementation and effectiveness of the system of environmental management (Cairncross, 1995).

Environmental auditing

Environmental auditing can be defined as a systematic and documented verification process to objectively obtain and evaluate evidence to determine whether an organisation's environmental management system conforms to the environmental management system criteria set by the organisation and to communicate the results of this process to management (ISO, 1995a). Specifically, the audit process should determine whether or not the management system has been properly implemented and maintained and whether or not the organisation's environmental issues are being effectively managed.

There are two main types of audit. Management audits include audits against the specific requirements of a management system standard or specification (such as ISO14001), audits against other specified requirements to assess the effectiveness of the management system and due diligence audits to assess the effectiveness of an organisation's EMSs in the event of an offence being committed or an accident occurring. Technical audits, in contrast, tend to focus on one or a number of specific environmental issues such as energy, regulatory compliance, waste or contaminated land. The reason for differentiating between the two types of audit is that different issues are considered.

Management audits concentrate on the performance of the system and the implementation of the system but usually with limited evaluation of the effectiveness of the system in managing environmental issues. In contrast, technical audits tend to concentrate on the actual environmental performance of an organisation, with limited consideration of the management systems that underpin environmental performance. Both types of auditing are essential to ensure the performance of a management system.

Clearly, it makes no sense to have a system of environmental management that is ineffective at managing certain environmental issues. Similarly, even if, for example, a compliance audit determines that a facility is fully in compliance with all relevant environmental legislation and regulations, that audit can only be considered as a snapshot of environmental performance at the time of the audit, not a guarantee of future environmental performance. Therefore, organisations need to ensure that both types of audit form part of their system of environmental management. This may be achieved by having a program of management system audits (such as the auditing of specific elements of the management system on a regular basis) supplemented by annual technical audits to assess the effectiveness of the system against performance standards or other requirements.

Audits can be conducted internally or externally. Internal audits are conducted by the organisation itself and involve the organisation looking at its own systems, procedures and activities to ascertain whether these are adequate and are being complied with. In internal audits, the auditor and auditee both work for the same organisation or the auditor has been employed (for example, from a consultancy company) directly by the organisation and reports to the organisation. External audits are conducted by parties outside the organisation and can include certification audits, assessment of potential suppliers and regulatory audits to assess compliance.

Management review

The third level of performance evaluation is an overall management review of the EMS to assess the system's ongoing adequacy, suitability and effectiveness. The management review should consider the organisation's performance against objectives and targets, the need for changes or amendments to the environmental policy or environmental objectives and targets, the need to meet changes in the requirements of external parties and the need to reflect any changes in the organisation's activities and processes.

Effective management review is critical to the long term success of a system of environmental management. Well-focused management reviews can ensure that the organisation concentrates on the most relevant aspects of its business while also demonstrating to the organisation at large that environmental management is, and continues to be, an organisational priority.

Management review tends to be one of the weakest aspects of EMSs, in part because it is often assumed by senior management that the

existence of a management system is, of itself, sufficient to guarantee that environmental issues are being effectively managed. The other common difficulty is that most management review processes tend to get mired in the minutiae of the system rather than considering the overall objectives and performance of the system. Therefore, to ensure the effectiveness of the management review process, management review should be considered as comprising two distinct activities. The first is regular (weekly/monthly) performance evaluation at management meetings, enabling issues such as the results of audits, monitoring and measuring and corrective actions to be reviewed as well as providing reports on progress towards objectives and targets. Most organisations do this reasonably well and have information collection and reporting systems geared towards providing this information in a timely manner. However, the second aspect, the strategic management review process, tends to be more problematic and less well addressed. The purpose of the strategic management review, which should be held six monthly or annually, should be to provide an overall review of the system performance and effectiveness. The key questions to be addressed as part of the strategic management review include:

1 What is the overall performance of the organisation against defined objectives and targets? Are these objectives and targets being met? If not, why not?
2 What have the changes in the circumstances of the organisation been? This involves consideration of external circumstances such as changes in legislation, changes in consumer demand and changes in community expectations as well as internal circumstances such as changes in activities, products or services. How do these issues affect the overall goals of environmental management? Is there a need to review the environmental policy to account for these changes?
3 What have the costs associated with environmental management been? Is the expenditure effective from a cost–benefit perspective and in terms of achieving defined environmental outcomes?
4 Have there been complaints, correspondence from regulatory bodies, media coverage or requests for information from external stakeholders that indicate that certain environmental issues are not being effectively addressed?
5 Have there been any organisational changes (such as changes in the management structure or the hiring of new employees) that necessitate revisions to the scope or operation of the system?
6 Have the system auditing, checking and corrective action processes

or other internal review and feedback mechanisms identified any areas for improvement or modification to the system?

The purpose of the strategic management review is to take an overall view of the organisation's environmental performance. It should be the responsibility of the most senior levels of management (i.e. board of directors, CEO, general managers), all of whom should participate in the review process or, at least, endorse and support the findings of the review.

It is essential to recognise that conditions alter and that a system of management needs to evolve and change to keep pace with variations within and external to an organisation. The management review process is critical to ensuring that the system of environmental management remains relevant to the organisation, enables the organisation to meet its overall environmental and business objectives and does not impose undue or unnecessary cost on the organisation.

Corrective action

The three performance evaluation processes described above (monitoring and measurement, auditing and management review) will produce a series of recommendations that will need to be addressed and implemented. Organisations should ensure that these recommendations are addressed, that there are suitable mechanisms for confirming the effectiveness of the measures taken and that there is a process for reporting this information to management. When developing recommendations, it is necessary to define who is responsible for taking action, the timeframe for taking action, the actions to be taken, the resources required and the mechanism for reporting to management. The correction of identified issues is just one part of an effective corrective action system. The more fundamental requirement is to prevent the issue occurring again. Therefore, the process for corrective action should require that resources are allocated to the identification of the basic causes of the failure and to ensuring that these causes are addressed to prevent recurrence of the failure.

Organisations should establish and implement a preventative and corrective action procedure to supplement the performance evaluation processes. This should provide a mechanism for all employees to identify and report on potential causes of system failure or of environmental impact. This process can also be used to identify and communicate opportunities for improvement to the system or to the way in which environmental issues are managed. In a similar manner to corrective action, the procedure for preventative action should define responsibil-

ities for identifying and notifying preventative actions, define the actions to be taken, define the reporting process to senior management and include requirements for investigating both the identified issue and the root causes of the issue. Effective preventative action schemes should include mechanisms to provide feedback to the originator of the preventative action request on the actions taken in response to the request and on the effectiveness of these actions. This will, in turn, help engender ownership of the system among employees, as they can see that their issues and concerns are being addressed.

Key issues

For a system of environmental management to be developed and implemented, the following must be in place:

1 Senior management commitment to environmental management as a corporate priority.
2 A detailed understanding of the environmental issues to be managed. In particular, those organisations who are successful in managing environmental issues describe the importance of environmental issues in terms of overall business objectives, thereby ensuring the integration of environmental issues into the overall decision-making processes of the organisation.
3 Employee commitment to the organisation's environmental management initiatives. This requires that employees have a detailed understanding of the environmental aspects of the organisation, support the management system and environmental initiatives generally, provide suggestions for environmental improvements and alert management to failures in the management system.
4 The effective use of internal and external resources when developing and implementing the environmental management system.
5 The full integration of environmental management into overall management activities.

Senior management commitment

Senior management commitment and effective leadership are the fundamental requirements for the success of any EMS. If senior management does not actively support environmental management efforts, effective environmental management will not become a reality within an organisation. The role of senior management is to set the strategic direction for the organisation as a whole, not just on environmental matters; without active senior management support and commitment, the environment will be treated as being of lesser importance than other issues managed by the

organisation. The commitment of the organisation to environmental issues will be judged, by employees and middle managers, by the actions of senior management. While an environmental policy is an important starting point, of itself, an environmental policy is simply a piece of paper and will be regarded as such unless it is backed up by tangible actions and support. Demonstrating organisational commitment to environmental management will involve:

- providing adequate resources for environmental management;
- communicating with employees on the importance of environment to the organisation;
- motivating and empowering employees to be involved in the process of environmental management;
- taking an active interest in environmental performance; and
- ensuring that environmental issues are fully integrated into business planning and decision-making.

The most tangible manner of demonstrating commitment to environmental protection is to provide suitable resources for the development, implementation and ongoing maintenance of the system of environmental management. The process of defining objectives and targets, and the allocation of funds and resources for meeting these objectives and targets, enables senior management to demonstrate its commitment to achieving its environmental policy and to the goal of continuous environmental improvement. The objectives and targets established must stretch the organisation to move beyond the point where it would have been without a management system in place.

The environmental policy, and the associated objectives and targets, is the starting point for communicating an organisation's commitment to environmental management. Senior management should provide regular progress updates on the performance of the organisation towards meeting its environmental objectives and targets. In addition, information should be provided on broader issues such as community relations, regulatory contacts, environmental projects and other initiatives. It is particularly important that senior managers include face-to-face meetings and presentations as part of the process of communicating with employees on environmental performance. This not only provides an opportunity for employees to provide feedback on environmental issues but it is a tangible commitment of time and resources to the process of environmental management.

Senior management should take an active interest in environmental performance, in particular in the progress of the organisation towards meeting defined objectives and targets. Many organisations do this

through having the environment as an agenda item at management meetings and through periodic strategic reviews of the environmental management system. Senior management should be prepared to take action if environmental targets are not being met or if the management system is not functioning as planned.

Senior management must ensure that environmental issues are fully integrated into business planning and decision-making. This applies not only to new projects, products or services but also to the review of existing activities to assess whether the environmental performance of these can be improved. There should be a requirement that the environmental implications of all actions be considered as part of the decision-making process. In particular, business decision-making processes must explicitly consider the environmental policy, objectives and targets, regulatory requirements (current and future), costs (both capital and operating) and the expectations of stakeholders such as employees, shareholders, investors and the local community. It is a common criticism of many organisations that, while they do have an environmental policy and objectives and targets, it is not clear how or if at all these have influenced business decision-making.

In conclusion, senior management commitment to environmental management is essential to ensuring the success of environmental initiatives within an organisation. Different organisations will have different ways of demonstrating this commitment, but the critical issue is that senior management's words and policies must be supported by effective and timely action.

Issue identification and prioritisation

As with any system of management control, the first and most basic step in the development of an EMS is to identify the activities and operations that must be managed. This requires that organisations identify those aspects of their activities, products and services that impact, or could impact, on the environment and assess the significance of these in the context of the organisation's overall objectives. This identification and assessment process should be conducted by all organisations, even those who do not intend establishing a formal system of environmental management.

Scope of issue identification process

Developing an environmental management system that addresses all environmental risks, liabilities and opportunities requires organisations

to consider (a) past, present and future activities, (b) upstream, internal and downstream impacts and (c) normal, abnormal and accident conditions (Wyndham & Sullivan, 1996). However, the focus of most of the systems of environmental management developed in Australia has been on routine activities and accidental event releases only.

Past, present and future activities encompass the historic, current and planned activities of the organisation and the environmental implications of these activities. In terms of past activities, it is no longer acceptable for an organisation to claim that it should not be responsible for cleaning up polluted water or contaminated land because there was no specific prohibition of the polluting activity. A good example is the Superfund program in the United States for the clean up and restoration of contaminated hazardous sites. Under Superfund, four classes of persons can be held liable for the clean up of contaminated sites: the present owners and operators of facilities where hazardous substances are found, past owners and operators of such facilities, generators of hazardous substances and transporters of hazardous substances (Jeffrey, 1994; Ludwiszeski, 1993). The effect of the provisions of Superfund is to make organisations potentially liable for any environmental damage caused by the handling or disposal of their wastes, even in situations where this disposal complied with all relevant environmental legislation at the time of disposal.

When considering future activities, it is important to not only consider the activities, products and services of the organisation but also the context within which the organisation is operating. A common example is the manner in which land uses around many industrial activities have, over time, changed from agricultural to residential (seen in many urban centres). This has led to the management of noise and odour issues becoming an important issue for organisations in order to meet community expectations. The consideration of future activities also requires that organisations consider potential changes in environmental legislation, changes in community expectations, changes in the requirements of shareholders and investors as well as employee expectations on environmental management. Attitudes to the environment are constantly evolving and changing, and there is a clear expectation that organisations will continue to improve their environmental practices (for example, NSWEPA, 1997a). One implication is that the range of environmental issues organisations have to manage will increase. A case in point is that of global warming, which has gone from the margin of the environmental debate to a mainstream political issue in the 1990s. It can be expected (if Australia follows the pattern in other countries)

that the environmental issues likely to be on the mainstream political agenda will include air toxics and cancer-causing chemicals generally, water conservation (in particular, issues such as the importance of catchment management in public health protection) and land management (including the maintenance of biodiversity and the maintenance of the productivity of agricultural land). It is likely that these issues will be the subject of regulatory attention. In addition to the broadening of environmental legislation, it is likely that regulatory requirements will tighten. For example, the process of gaining approval for the use of new chemicals or products can be extremely expensive and time consuming and the rigour with which these need to be evaluated is constantly increasing.

Upstream impacts relate to the environmental impacts associated with suppliers, including the manner in which raw materials are produced. Downstream impacts relate to the consumption and use of products from a facility. Organisations are being forced to look outside their traditional boundaries to assess the upstream and downstream impacts of their activities; instead of solely concentrating on the impacts associated with site operations, they are increasingly expected to take account of the environmental risks of producing the raw materials they use and of the use of their products by consumers. Effectively many organisations are going to have to internalise what have hitherto been seen as external costs and not included in the production equation. For upstream effects, this may mean that organisations will only purchase raw materials from environmentally responsible suppliers or will only purchase materials that have received some form of environmental certification or ecolabelling. Downstream, organisations will need to take responsibility for the manner in which their goods, materials or services are handled, used and disposed of. One example is the concept of product stewardship, where companies try to control or influence the use and disposal of their products. The idea underpinning product stewardship is that environmental issues are a responsibility of the producer of a product, at all stages of a product's life cycle, from raw materials production through design, manufacture, marketing, distribution, use, recycling and disposal. Organisations are increasingly getting involved in the after-sales service and disposal of their products. Examples include moves towards enhancing the recyclability and reusability of motor vehicles, providing safe disposal routes for spent chemicals and residues, and assisting organisations to minimise losses through better management and maintenance practices.

The scope of an EMS should include the three types of operation, namely normal (or routine) operations, abnormal (such as periodic start up and shut down, maintenance periods) and accident conditions. Normal operations are frequently the subject of explicit regulatory controls on emission and discharge limits. Many organisations have environmental licences that address these aspects of their operations, in addition to more general regulatory requirements such as the disposal of waste in a manner that complies with legislation. Abnormal operating conditions are generally addressed through a combination of explicit licence conditions (for example, during start up some facilities are permitted to emit 'black smoke' for a limited period of time) and general regulatory requirements addressing issues such as duty of care (or due diligence). Accident conditions will need to be identified and addressed through the development and implementation of emergency plans.

It is pertinent to note that there can be extremely severe penalties for organisations and individuals in events where accidents occur. The general purpose of operational control procedures should be to ensure that an organisation is in 'normal' operations as far as possible and that abnormal operations are managed so that they do not lead to significant environmental effects. Accident and emergency situations are to be avoided.

Environmental aspects

Within the scope of the activities described above, those aspects of an organisation's activities, products or services that interact either positively or negatively with the environment and which may be covered within the scope of an environmental management system include:

- activities carried out and/or products made or used that discharge or release anything to air, land or water or have the potential to do so;
- activities that create any change to or in the environment (positive or negative), or have the potential to do so;
- activities conducted or products used or produced that generate wastes of any form;
- use of natural resources, raw materials or non-renewable resources;
- end use, storage, production or transportation of any materials used by or manufactured at the facility that may have an impact on the environment;
- the location of the facility in respect of existing or potential environmental sensitivity—ecological, residential, cultural or visual aesthetics;

- activities and operations that are controlled under environmental legislation or associated codes or standards of operation;
- past activities or operations that may have led to any damage to the environment at the facility or to the wider environment;
- proposed future developments that may result in any change to the immediate and surrounding environment;
- human health effects resulting from activities and operations, both on the facility and as a result of exposure to emissions and discharge from the property or from the use of the products produced by the facility;
- wastes and other environmental impacts generated from the supply and production of raw materials and finished goods used by the facility (organisations should consider materials used both in process activities as well as support activities such as transportation);
- the activities of contractors and suppliers of services;
- emissions to air, including odours;
- the discharge of waste water and storm water (may include fire water);
- the generation of noise; and
- accidents/natural disasters.

Clearly, the scope of an EMS may be extremely broad and there are likely to be a large number of aspects that need to be considered for inclusion within the scope of such a management system.

Environmental impacts

The assessment of the environmental impacts associated with an organisation's activities will need to take account of the nature of the receiving environment. Specifically, account will need to be taken of impacts on:

- human beings, including public health effects (acute and chronic), nuisance, odour and loss of amenity;
- flora and fauna, including species loss or harm and ecosystem disturbance;
- land, including contamination, the loss of or change to physical or topographic features, loss of agricultural land, habitat disturbance;
- water, including changes in drainage patterns, pollution, aquatic ecosystem effects, changes in ground water levels and flows;
- air and climate, including pollution, odour, contribution to regional or global pollution; and
- resource availability, including the renewability of resources and the rate of resource consumption.

The process of characterising impacts will require that account be taken of direct and indirect effects, short, medium and long term effects, cumulative effects, permanent and temporary effects and positive and negative effects. Impacts will need to be considered for each of past, present and future activities, upstream, internal and downstream impacts and normal, abnormal and accident conditions.

Recording environmental aspects and impacts

Because of the complexity of many environmental issues and because of the sheer number of issues that need to be covered by an EMS, it is important that environmental aspects and impacts are identified and recorded in a consistent, systematic manner. Many organisations develop a register of environmental effects, one of the advantages of which is that, even though certain impacts may be considered negligible at the time of conducting the assessment, these impacts are recorded and can be reviewed in the future (for example, if there are changes to legislation). This register provides a formal record of all environmental aspects and impacts of an organisation. A suggested structure for such a register is provided in Table 3.3.

Defining significance

For the majority of organisations, the fundamental environmental priority is to ensure continued regulatory compliance (NSWEPA, 1997a; Sullivan & Wyndham, 1998a). Beyond the goal of regulatory compliance, many organisations, even those with structured, well-developed EMSs, treat environmental issues as being separate from and of less importance than core business issues. This includes firms that are certified to ISO14001. There are two main reasons for this. The first is the limited awareness among senior managers of the importance of environmental management to overall business success (Sullivan & Wyndham, 1998b). The second is the tendency for environmental issues to be defined as significant solely on the basis of the scale, severity and duration of direct impacts on the environment and the likelihood of occurrence of these impacts. That is, the potential for adding value to business performance through addressing environmental issues is not included in the process of assessing significance. These factors, when combined, lead to many organisations excluding environmental factors from broader business management decision-making processes, resulting in both limited environmental outcomes and limited organisational benefits from the investment in environmental controls.

Table 3.3 Example register of environmental aspects and impacts

		1	2	3	4
Activity/ environmental aspect	Identify the activities, operations, processes, products and services which impact, or could impact, on the environment.				
Media	Identify the environmental medium affected.				
Impact	Identify the environmental effects (or impacts).				
Frequency	Determine the likelihood of occurrence of the event.				
Regulations	Identify all legislation, standards and codes of practice which apply to the activities, environmental media or impacts identified.				
Other requirements	Identify any other corporate or stakeholder requirements which are of relevance.				
Current controls	Identify the controls in place for dealing with the activity or impacts. These include engineering controls, procedures, emergency response plans, monitoring, reviews and training.				

Environmental issues are, inextricably, business issues. The environment generally and environmental aspects specifically are of importance to business through actual and potential effects, positive and negative, on business performance (Sullivan & Wyndham, 1998a). The recognition of environmental performance as a core business issue is the essential prerequisite to integrating environmental management into business management. Core business objectives include immediate and long term financial viability and meeting the many and various obligations that are imposed on, or assumed by, the organisation. These obligations include regulatory requirements, shareholder expectations, market demands, competitive drivers and community and social responsibilities. Addressing environmental issues is an integral part of meeting these obligations. Recognising these linkages is the key to ensuring that environmental issues are integrated with business decisions.

Having established environmental performance as a core business value and objective, the next step is to determine how environmental issues and impacts can affect other core business values and objectives. The significance of environmental issues should be defined in terms of significance to the organisation and not solely in terms of direct environmental impacts. This approach does not diminish the importance of managing existing and potential environmental impacts; rather, it

broadens the approach to define environmental significance in terms that are relevant to the entire business and in a manner that recognises that business objectives and environmental objectives are inextricably linked (Sullivan & Wyndham, 1998b). A high environmental priority thus becomes a high business priority and should, therefore, be treated with similar importance to other high priority business issues.

Evaluating significance in terms of core business values and objectives will ensure that a more structured approach is taken towards addressing environmental issues. The approaches that are subsequently adopted are likely to be based on a broader appreciation of the issues and, as a consequence, are likely to be directed toward satisfying both environmental and business imperatives. As an example, the management of effluent wastes should be treated as a much broader issue than the installation of end-of-pipe pollution control equipment. In a business management context (outside of environmental considerations), identifying the best solution would involve identifying all the sources of the effluent and adopting a solution that minimises the quantity of effluent produced as this will also minimise the costs of effluent treatment. Potentially, there may be significant cost savings or product improvements generated through this process, because the outcomes of the process are changes (reductions) in the volumes of waste to be treated and, commonly, the production of an effluent that is easier to treat (fewer pollutants, more concentrated solution). Just as importantly, this process can help organisations avoid the need for the installation of expensive pollution controls (helping in turn to avoid significant capital and operating costs). In one recent example, an organisation was planning on spending $5 million on a new waste water treatment plant to enable it to meet its licensed discharge limits. However, a detailed evaluation of process flows into the existing waste water treatment plant concluded that a new treatment plant was not in fact required and that the organisation could meet its regulatory requirements through a combination of separating certain waste streams, re-using certain waste streams and improving housekeeping and site management. The implementation of these recommendations cost approximately $100 000, including the consulting fees, saving the organisation both the capital cost of the waste water treatment plant and the significant waste disposal and operating costs associated with the proposed new plant.

It may be argued that defining significance in terms of an organisation's values and objectives, rather than purely in environmental terms, could lead to poorer environmental performance or a lower priority being assigned to environmental issues. In our view this is unlikely to be the case. The difficulty for business has not been a lack

of willingness to address environmental issues—rather, it has been an inability to ensure that significant environmental issues are treated as being of the same importance as other significant business issues and to have these issues integrated into overall decision-making processes. Defining significance in terms of the organisation's objectives should ensure that organisations actually do take effective action to manage their significant environmental issues while at the same time achieving improved overall business outcomes.

Assessing significance—a practical example

One commonly adopted approach to the assessment of significance is to use a series of qualitative descriptors to characterise the frequency and consequences of an environmental aspect and to combine these using an assessment matrix. The outcome will be a prioritised list of aspects that should then form the basis for the development of the organisation's environmental policy and for the development of environmental objectives and targets. While organisations do use other approaches such as semi-quantitative or fully quantitative risk assessment, the key point is that the significance of any environmental issue is a function of the likelihood of occurrence of the event and the consequences of the event.

The first step in the issue prioritisation process is to determine the likelihood and consequence of each environmental aspect associated with the organisation's activities, products or services. For the purposes of assessing the likelihood (or frequency) of occurrence of various events, environmental aspects may be ranked into one of the five categories presented in Table 3.4. Routine operations would be in categories L1 or L2, while non-routine (abnormal) activities or operations would be in categories L2 or L3. Emergency conditions are likely to be in categories L4 or L5. It should be noted that the descriptors and descriptions are not intended to be definitive guides, and different definitions or descriptions may be more appropriate for certain organisations.

Consequences can be assessed in a similar manner. If it is assumed that the critical issue for the organisation is negative or adverse publicity, qualitative descriptors for consequences could be defined in the manner presented in Table 3.5. In a similar manner to frequency, C1 means that there is no identifiable impact whereas C5 represents major negative press coverage. Clearly, most organisations will have a range of impacts about which they are concerned (for example, legal compliance, scale of environmental impacts). Therefore, in practice, organisations will have a number of tables similar to Table 3.5 that describe the significance

Table 3.4 Description of frequency of occurrence of an event

Likelihood category	Descriptor	Description
L1	almost certain	The activity or operation occurs almost all the time (e.g. continuous or near continuous operations).
L2	likely	The activity or operation occurs most of the time or very regularly (e.g. at least once per day).
L3	moderate	The activity or operation occurs occasionally (e.g. once per month).
L4	unlikely	The activity or operation could occur at some time (e.g. once per year).
L5	rare	The activity or operation occurs only in exceptional circumstances (e.g. at a frequency of greater than once per year).

Table 3.5 Description of consequences

Consequence category	Public attitude	Descriptor
C1	insignificant	No identifiable issue of concern to the public.
C2	minor	Significant global issue to which organisation is a minor contributor.
C3	moderate	1. Significant regional or local issue to which organisation is a moderate contributor; or 2. Occasional complaints received.
C4	major	1. Significant local or regional issue to which organisation is a major contributor; or 2. Regular complaints received.
C5	catastrophic	Likely to result in major negative press coverage.

of environmental aspects to the organisation.

As noted at the beginning of this section, the environmental priority attached to an environmental aspect is a function of the likelihood and the consequence. The environmental issues associated with an organisation's activities, products or services could be ranked in the following terms:

- *high*: requires immediate action by management;
- *significant*: requires management to take action within six months;
- *moderate*: requires management to implement an action plan within twelve months; and
- *low*: no actions required. Priority should be reviewed within twelve months.

These priorities can then be used to define environmental objectives and targets and to define the timeframes within which these objectives and

Table 3.6 Determining environmental priorities based on frequency and consequence

	Consequences				
Likelihood	**C1**	**C2**	**C3**	**C4**	**C5**
L1	low	moderate	significant	high	high
L2	low	low	moderate	high	high
L3	low	low	moderate	high	high
L4	low	low	moderate	moderate	significant
L5	low	low	low	moderate	significant

targets are to be met. In this context, the key objective is to provide some guidance on priorities for management action. One way to define priorities, based on likelihoods and consequences, is outlined in Table 3.6. It should be noted that this is provided for illustrative purposes only.

The qualitative approach presented here is simply one approach to assessing the significance of environmental aspects and impacts. A range of other approaches can be adopted; for example, numerical values could be used instead of the descriptive scales and priorities could be combined using a simple formula. One example of such an equation could be:

> Priority = Frequency multiplied by the sum of the severity of environmental impacts and the significance of the consequences in terms of adverse media coverage

Fully quantitative risk assessment techniques (such as public health risk assessment) should really only be used when there is a need for a very detailed investigation of a very specific issue. In most cases, quantitative techniques are unlikely to add much value to business decision-making processes or to defining environmental priorities. Quantitative techniques are of greatest use when broad business priorities have been defined and where there is a need to consider specific issues in more detail. In this context, it is essential to recognise that many environmental issues are not amenable to quantification or that quantification can give misleading results. There are major uncertainties and gaps in the available information in most areas of environmental science. Quantitative assessment techniques, while potentially offering better information for use in decision-making, are compromised by uncertainties and limitations in the available information. In addition, the use of numerical descriptors can lead to an undue confidence being placed in the results of such assessments (see, for example, Sullivan, 1998; Sullivan & Hunt, 1999).

Irrespective of the approach adopted to defining significance, a number of key points must be remembered:

- significance is a function of the likelihood of occurrence of an event and the consequences of that event;
- organisations should define significance in terms that are relevant to the organisation, not just in terms of the magnitude of the environmental impacts; and
- when using quantitative or semi-quantitative measures to describe significance, it must be remembered that the numbers generated are not absolute measures of risk but that they simply assist in comparing and prioritising issues for management action.

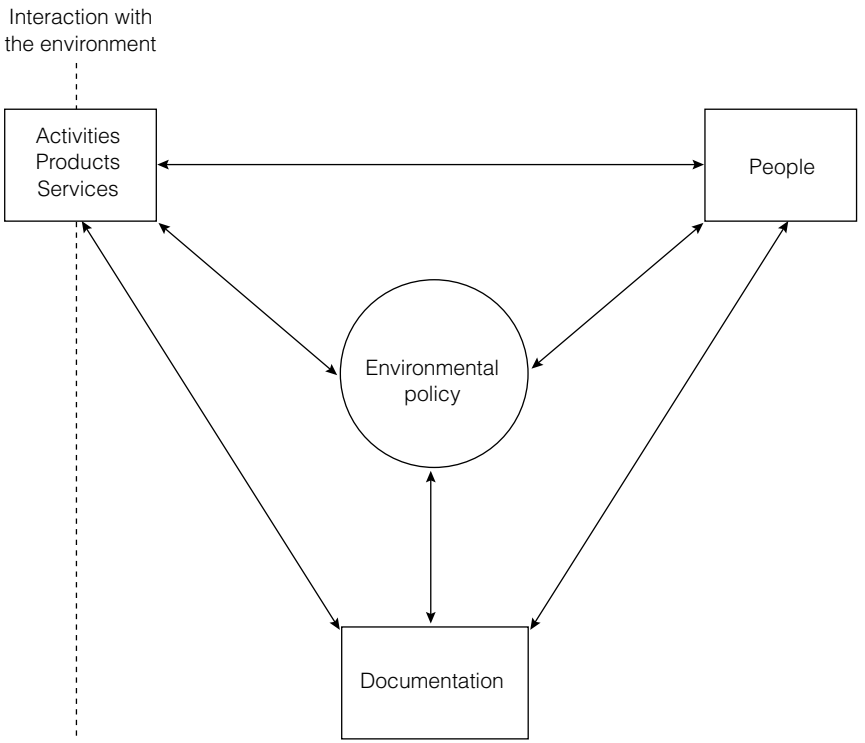
Employee commitment

It has been suggested that over 90 per cent of environmental accidents can be attributed, either directly or indirectly, to failures in management controls or to human error, with just 10 per cent being caused by failures in technical controls (DNV, 1994). That is, while the immediate causes of an accident may be identified as defective equipment or inadequate storage, the basic causes of the accident are likely to be personal factors such as lack of knowledge, skill or experience or job-related factors such as poor supervision, poor maintenance or inadequate work standards. These basic causes are, in turn, generally attributable to management failures. The most common management failures are that not all activities are covered by the EMS, that insufficient attention is paid to how activities are to be conducted or there is inadequate compliance with the requirements of the management system (Sullivan & Jack, 1995).

Most organisations, when designing and implementing their EMSs, focus virtually all of their attention on the documentation required for the system and tend to neglect the critical role of people in environmental management. This emphasis ignores the fact that the key component of any system of management is the people who use and operate the system, while the role of documentation is simply to assist people in the conduct of their activities. For a system of management to be effective, people must know the system, understand the system and be committed to the system (Woolley & Sullivan, 1997).

A system of environmental management can be considered as comprising the elements of the organisational model presented in Figure 3.3. There are three basic components that will determine whether the goals specified in an organisation's environmental policy will be achieved: the people who use the system, the documentation specifying the requirements for environmental management and the activities or processes performed by the organisation. Environmental impacts result from the interaction between the organisation's

Figure 3.3 Management system model



activities, products and services and the environment. That is, the interface between the organisation and the environment is through the organisation's processes. People are responsible for the performance of the processes and for carrying out procedures and practices defined by documentation. Documentation defines procedures and methods of management.

The effectiveness of any system of environmental management is, ultimately, determined by the people involved in the development, implementation and maintenance of the system and by the people who are responsible for conducting activities in accordance with the requirements of the system. The successful implementation of a system requires that all employees be committed to environmental care and to developing and implementing a system of management that addresses the organisation's environmental issues. This, in turn, requires that employees have the appropriate skills and knowledge to contribute to this process and to understand their roles and responsibilities for environmental management.

Developing skills and knowledge

Organisational commitment to environmental management must be accompanied by training that provides employees with the necessary environmental skills, knowledge and competencies. Employee education and training is a core element of any system of environmental management (ICC, 1991). Organisations must provide the knowledge or skills required to fully involve their employees in the process of developing, implementing and maintaining an EMS and to harness employees' knowledge and enthusiasm for this process. The success of any EMS is highly dependent on the level and appropriateness of training received by all employees.

Different employees will have different skill and competency needs. However, all employees at all levels within the organisation will require the following:

- a knowledge of their role and responsibilities for environmental management;
- a commitment to the process of environmental management;
- an understanding of the EMS;
- an understanding of the environmental issues related to the organisation;
- an understanding of the environmental issues related to the responsibilities of the employee; and
- an understanding of the legislative requirements relating to the environment.

Clearly, different employees will have different specific responsibilities for environmental management. Table 3.7 (adapted from Woolley & Sullivan, 1997) provides examples of the specific skills and knowledge required when an organisation is developing and implementing an EMS. This knowledge is in addition to the job or task specific training that will be required for those employees with specific environmental responsibilities.

Training needs analysis can provide the basis for identifying and developing the necessary knowledge, skills and competencies of employees. The key steps in training needs analysis (Woolley & Sullivan, 1997) are to:

- set environmental targets;
- identify training needs;
- identify target groups;
- develop training content for the different target groups;
- design the training program;

- deliver the training; and
- review the results.

Table 3.8 provides a typical list of training requirements for an organisation developing and implementing an EMS (Sayre 1996; Woolley & Sullivan, 1997).

Ownership and involvement

Employee commitment to environmental protection is critical to ensuring that any EMS is effectively implemented. Training should provide employees with the skills and knowledge necessary to contribute to the system design, development and implementation. The more employees can be involved in this, the greater the likelihood of acceptance of the system and positive support among employees for the system.

Engendering employee ownership of and support for a system requires four main steps—that the organisation (1) clearly defines its environmental vision; (2) provides training; (3) sets performance assessment criteria; and (4) provides rewards for good environmental performance. Senior management has a key role to play in building awareness and motivating employees by communicating the organisation's environmental values and communicating commitment to the environmental policy (ISO, 1995a). An organisation cannot expect commitment to an objective by staff when no such corporate commitment exists. Accountability with regard to environmental performance and reward structures that benefit good environmental performers are required to further reinforce involvement and commitment to achieving improved environmental performance.

When considering employee involvement in environmental management activities, many organisations do not pay sufficient attention to or fully recognise the motivations and values of employees. The majority of employees have positive values about environmental issues and want to actively contribute to the environmental performance of their organisation. However, employees must be given the knowledge, skills and competencies to contribute appropriately and effectively. Organisations should realise that there is a reservoir of environmental goodwill among their employees that can be tapped into and used in achieving better environmental management. Despite such phrases as 'people are our most important asset', the role of people in environmental management has tended to be undervalued. It remains true that a common feature of contemporary business management is that employees' personal values regarding the environment are not fully utilised to maximise the success of corporate environmental initiatives

Table 3.7 Skill and knowledge requirements for environmental management

Level of management	Knowledge/skills required
Board or managing director	• An understanding of liabilities associated with environmental impacts. • An understanding of the implications of breaches of environmental legislation (both corporate and individual liability).
Senior managers	• An understanding of which environmental issues affect the business. • An understanding of the implications of breaches of environmental legislation (both corporate and individual liability). • Knowledge of how to incorporate environmental considerations into business planning and decision-making. • An understanding of the system of environmental management. • The ability to identify opportunities for improvement. • An understanding of liabilities associated with environmental impacts.
Operations or middle managers	• An understanding of the significant environmental effects of the activities they manage, the reason these aspects are significant and the available means for controlling these effects. • An understanding of the roles of the individuals they manage in ensuring environmental protection, and the skills these individuals require to be effective in these roles. • An understanding of environmental legislative requirements and an understanding of implications of breaches of legislation (both corporate and individual liability). • The ability to identify opportunities for improvement. • An understanding of the environmental significance of decisions they make. • An understanding of the system of environmental management and their roles and responsibilities.
Operators/general workforce	• An understanding of how processes performed by the operator can impact on the environment. • Knowledge of steps they can take to minimise these impacts. • A knowledge of the legal implications of breaches of legislative requirements (both corporate and individual liability). • An understanding of responsibilities within the system of environmental management. • The ability to identify opportunities for improvement. • An understanding of relevant procedures detailed in the system of environmental management.
Employees with specific environmental related tasks	• Knowledge of what is required in normal and abnormal operating conditions and why. • Understanding of the importance to the organisation and environment of any failure to undertake their tasks properly.

Level of management	Knowledge/skills required
	• A knowledge of the legal implications of breaches of legislative requirements (both corporate and individual liability). • Understanding of how their tasks fit into the wider activities of the organisation, its policy and objectives. • An understanding of their responsibilities within the system of environmental management. • The ability to identify opportunities for improvement. • An understanding of relevant procedures detailed in the system of environmental management.
Environmental management system manager	• Awareness of the organisation's significant environmental effects and why they are deemed significant. • Understanding of techniques that might be applicable in controlling these effects. • Knowledge of trends in the development of significance, e.g. legislation, community expectations, and their relevance to business development. • Understanding of techniques to communicate and set the agenda for environmental issues within the organisation. • The identification of opportunities for improvement. • Knowledge of relevant techniques for environmental management as defined by industry codes and affiliations. • Knowledge of designing and implementing management systems.

(Wehrmeyer, 1996). This, in turn, has led to organisations missing out on broader benefits such as increased employee motivation, lower staff turnover, greater job satisfaction, closer identification with corporate goals and culture and the improved status from working in a company that cares about the environment.

Using consultants

There are general issues associated with the use of consultants in the design and implementation of an EMS; most organisations will need some external assistance as very few organisations have all of the in-house expertise required to enable them to develop and implement such a system. The key issue therefore becomes utilising consultants so that the benefits of their knowledge and expertise can be maximised while at the same time ensuring the system that is developed is effective.

Quality, environmental, safety and management consultants (to name but a few) have identified the environmental management market as a potentially lucrative source of revenue. There has been a dramatic increase in the number of consultants proclaiming their expertise in the

Table 3.8 Types of environmental training

Type of training	Purpose/scope	Suggested audience
Environmental compliance training	The purpose is to develop an understanding of legislative requirements as they apply to the organisation and its activities, products and services. The scope of the training should include the identification of legislative requirements (including standards), due diligence requirements for pollution offences and information on new legislation.	Corporate managers Employees whose actions can affect compliance
Environmental issues and awareness training	The purpose is to provide a general introduction to environmental aspects and impacts of the organisation's activities, products and services and to inform employees of the organisation's efforts on environmental management, including the responsibilities of employees within this system. Desired outcomes include instilling a sense of environmental responsibility in employees, promoting involvement in environmental management and providing a line of communication. The scope of the training should include environmental impacts of the organisation, objectives and targets, legal requirements and employee responsibilities.	All personnel
Specific procedure training	The purpose is to ensure that procedures are understood and implemented by all employees. The scope should include developing an understanding of the procedures and stress the importance of compliance with procedures at all times.	Staff who are required to perform specific duties in environmental management or the EMS, especially those covered by specific procedures
Environmental management systems training	The purpose is to inform employees of the organisation's environmental management system, including the responsibilities of employees within this system. The desired outcomes include increased sense of ownership of and involvement in the system. The scope of the training should include the structure and elements of the system, roles and responsibilities for environmental management, objectives and targets and system documentation.	All personnel

Type of training	Purpose/scope	Suggested audience
Environmental auditor training	The purpose is to provide employees with the skills to conduct routine environmental audits and, depending on the size of the organisation, to establish a core group of internal auditors that can conduct audits, thereby keeping knowledge in-house. The scope of audit training should focus on the key components of a management system and how these can be audited (including interviewing techniques, the need for objective evidence, audit planning, audit review).	Staff who will conduct environmental audits, be involved in the audit process or be involved in developing registers of environmental aspects and impacts

design, development and implementation of EMSs. This is despite the fact that formal EMSs are a relatively recent feature of business management and, as yet, relatively few companies have fully developed and implemented such systems.

It is useful to look at the quality management systems market (as this market is more mature than that for EMSs) and to see what the experience has been in this area. It is probably fair to say that there have been significant concerns regarding some of the consultancy advice that has been provided. We have worked with a number of organisations who have developed and implemented management systems where the management system has been inappropriate for the organisation (because it is overly complex, does not fit with existing management structures and systems or imposes significant additional paperwork and reporting requirements) or where the management system has not enabled the organisation to adequately address its key issues. The cost of these systems has, in many cases, been significant, both in terms of the direct costs of developing and implementing the system and in terms of the consequent costs of an inefficient or inappropriate management system (where the organisation fails to achieve the benefits that can accrue from such systems).

While the EMS market is less mature than that for quality management systems, a similar trend has emerged and much of the environmental management advice being provided leaves a lot to be desired. In part, this is driven by the commercial pressures on consultants to generate work and revenue that leads to a 'We can do that' approach to marketing and selling work to clients. It is also driven by client organisations placing undue reliance on consultants to address all of their issues for them.

One recent example is of an organisation involved in a high-profile development that was the subject of intense scrutiny by green groups and various regulatory bodies. As a consequence of the environmental sensitivity of the development, the organisation, as part of its licence conditions, was required to implement an EMS. The organisation called for tenders for the system design and development, informing tenderers that the organisation's personnel would be too busy to contribute significantly to the project and that the organisation expected the successful tenderer to do the majority of the work. The successful consultant offered to meet the organisation's requirements within a period of three months.

At the end of three months the consultant provided the organisation with a series of procedures (addressing the requirements of the ISO14001 Standard), a computerised data management system and a complete set of operational procedures. Apart from some initial discussions with the organisation on the scope and broad outcomes required from the system, the consultant had limited interaction with the organisation or with the employees responsible for carrying out the activities which led to (or had the potential to lead to) significant environmental impacts. The resulting 'management system', while ostensibly meeting the licence requirements for the development of such a system, was adopted in a piecemeal manner across the organisation, did not provide any improvements in environmental performance and led to the generation of significant additional paperwork and administration costs.

The management system was abandoned within a few months of the consultancy company completing its work. The lack of involvement of staff in the system development led to a cynical attitude among employees regarding the organisation's commitment to environmental protection. The organisation subsequently employed another consultant to help 'fix' the system. Again, the system was not implemented effectively. The reasons included a lack of demonstrated management commitment to the process (beyond the provision of resources for hiring the consultant), the lack of employee involvement in the system design and development, the lack of employee support for environmental management initiatives and the tendency for the consultant to develop procedures and systems that did not take account of the manner in which the organisation went about its core business.

The case study highlights the potential for the inappropriate use of consultants to compromise environmental management initiatives. Having said that, it is also important to recognise that many organisations that have used consultants have had extremely positive outcomes from the

process and have benefited substantially from the skills and expertise that consultants have brought.

Organisations must ensure that as much of the system as possible is designed, developed and implemented by internal personnel. This should ensure that employee ownership and knowledge of the system is maximised while also ensuring the relevance and appropriateness of the system to the organisation. Senior management should make sufficient internal resources available for employees to contribute effectively to this process, giving them, in particular, enough time to contribute to the process.

Another tendency has been for consultants to offer to do all of the work required to develop and implement a management system themselves. Many offer to provide complete management system procedures and/or software. This approach fails in virtually all cases to provide anything like an effective system of environmental management, as employees are excluded from or have limited involvement in the process which, in turn, limits their ownership and knowledge of the system. The other consequence is that the management system developed does not reflect existing management systems or work practices.

Consultants can make a significant contribution to an organisation's environmental management efforts. For this assistance to be effective, the consultant must be treated as a resource whose primary role is to assist and provide guidance and expertise to the process of developing the management system. The consultant should not be regarded as having overall responsibility for the development and implementation of the management system; rather, consultants should be considered as a source of specialist knowledge and expertise that can be harnessed to ensure the overall success of environmental management efforts. Some of the areas where consultants can contribute to environmental management are presented in Table 3.9.

Environmental training, discussed previously, is frequently provided by external parties. However, in particular in medium and large organisations, consideration should be given to training a number of employees to provide general environmental awareness training across the organisation (that is, 'train the trainer'). This would involve the consultant developing training material (overheads, exercises etc.) and providing guidance on how these materials can be used for environmental awareness training. This approach can significantly reduce the costs of training associated with EMS development. In addition, having internal staff provide awareness training ensures a site-specific perspective on environmental issues, enabling the awareness training to be related directly to employees' day-to-day activities. Such training also provides an opportunity to generate ideas for environmental

Table 3.9 Using consultants in environmental management system development

Activity	Potential for consultants to contribute to process
Initial environmental review	1. Identify the scope of activities, products and services to be covered by the management system. 2. Identify the environmental aspects of the organisation's activities, products and services which need to be managed. 3. Assist in assessing the significance of environmental issues. It is, however, essential that the criteria for assessing significance be defined by the organisation and that this process of defining significance does not become the consultant's interpretation of what is, or what should be, significant. 4. Review existing management systems to identify areas where existing systems can be adapted for environmental management and to identify gaps in existing systems. 5. Identify the legal and other requirements which the organisation is required to meet. 6. Review the organisation's records for accidents, incidents, complaints and non-compliances, to identify priority areas for management attention.
Project management	Provide guidance on the actions required to design, develop and implement a system of environmental management.
Identification of environmental aspects	1. Assist in identifying the aspects of the organisation's activities, products and services which need to be covered by the management system. 2. Assist in the process of defining significance of environmental aspects and impacts.
Legal requirements	1. Assist in identifying legal requirements. 2. Provide updates on legal requirements which apply to the organisation's activities, products and services.
Objectives and targets	1. Provide guidance on suitable objectives and targets for the organisation. 2. Provide guidance on how objectives and targets are to be met. This could include advising on the strategies which could be adopted, the quantification of resources (financial, personnel) to implement the management plan and the development of implementation schedules for achieving the agreed actions.
Training	1. Provide training on specific aspects of environmental management or environmental management systems. 2. Provide general environmental awareness training.
Emergency response	Provide specific guidance on emergency response systems, equipment and training.
Documentation and record keeping	Provide guidance on the scope and requirements of document control and records management systems.
Auditing	1. Audit the overall environmental performance of the system, for example in terms of compliance with regulatory requirements or performance against objectives and targets.

Activity	Potential for consultants to contribute to process
	2. Audit the management system against the requirements of a management system standard or against internal requirements for environmental management.
Procedure development	Provide assistance with the development of procedures. It is essential that employees responsible for conducting activities develop the procedures which are relevant to their activities. Consultants can assist with defining the scope of procedures and can also review procedures to ensure that all environmental aspects have been identified and appropriately addressed.

improvement and to demonstrate the organisation's commitment to environmental protection.

The auditing of the management system (and the performance of the system) by an external party provides an independent assessment of the effectiveness of the system and can be a very useful complement to internal audit processes. Auditing by an external party can be used to identify opportunities for improvement as well as providing an alternative perspective on the effectiveness of various environmental management initiatives. In general, such audits should be viewed as complementary to, rather than as a replacement for, internal auditing processes. That is, external auditing can best be seen as a periodic independent review of a management system that can consider issues such as regulatory compliance, opportunities for financial improvement, compliance with the requirements of a management system standard and compliance with the organisation's requirements for environmental management.

In conclusion, consultants can provide an invaluable input to the process of developing and implementing an EMS. Organisations must ensure, however, that the input of consultants is focused on the real needs of the organisation rather than being a consultant's opinion of what the organisation needs. Breaking the system development process into the activities described in Table 3.9 should assist organisations to target those areas where external expertise can be most usefully applied and where the maximum benefits will accrue to the organisation.

System integration

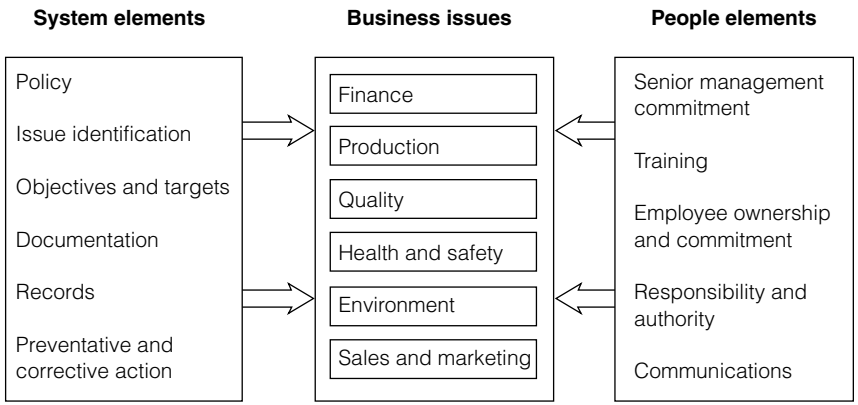
When developing an EMS it is critical that the system be integrated as far as practicable with existing systems of management control. That is, the EMS should be consistent with existing management processes and activities, should build on existing management systems and should minimise the incremental work required to implement the EMS. This

will ensure that the costs associated with the development and implementation of the EMS are minimised and maximise the likelihood of the system being effectively implemented.

While this book focuses on the specific issue of environmental management, the underlying philosophy that informs the approaches proposed is that environmental issues pose similar management problems to other complex issues. That is, while the environment presents certain unique challenges to organisations and requires, in certain cases, different or innovative management approaches to addressing these challenges, the bottom line is that the environment is a management issue and many of the management approaches, systems and processes organisations already have in place will also be directly relevant to environmental management initiatives. A model for business management is presented in Figure 3.4 illustrating how, for organisations that are explicitly addressing environmental issues, the organisation is already likely to have defined management responsibilities, provided training, established communications mechanisms, developed and implemented procedures and so forth. That is, the environment is best considered as an additional management issue rather than as an issue that requires separate management structures.

One of the most difficult aspects of implementing an EMS is guaranteeing that the system is effectively implemented and continues to be used by employees. The most effective manner of doing this is to determine that, as far as practicable, the EMS is aligned with the organisation's overall management systems. That is, organisations should utilise existing systems of management control (such as communications, responsibilities, procedures) wherever possible to minimise the amount of familiarisation required of employees in implementing an EMS. In addition, existing systems are generally well established and understood by all employees; therefore, it makes sense to build environmental management on the back of existing management systems rather than trying to impose a completely new model on an organisation. That is not to say that existing systems cannot or should not be modified or improved. Rather, the aim should be to ensure that environmental management is incorporated as seamlessly as possible into existing management structures, processes and procedures. This will minimise the incremental work required to implement the system and will also increase the likelihood of the system being accepted and welcomed by employees. This issue is clearer if one considers the converse situation, where environmental management is not based on existing management systems and structures. In such situations there will be greater resistance among the workforce to the system, the time and effort (including training) will be much greater and there is the likelihood that the environment will be seen as being of less importance than other issues (that is, the

Figure 3.4 General business management model

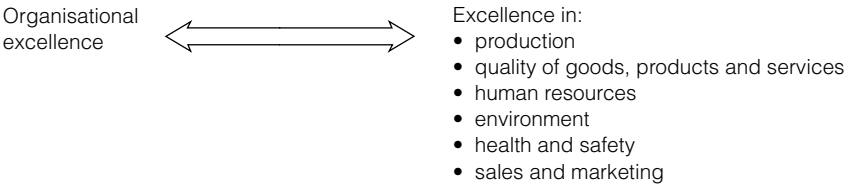


environment will not be recognised as a core business issue).

The integration of environmental management into overall business management offers a number of benefits. The first is that environmental issues become a fundamental part of the organisation's business activities. Defining the significance of environmental issues in relation to the overall business ensures that organisations recognise the importance of environmental issues to overall business goals and that environmental issues are treated as important business issues. This then ensures that environmental issues are considered when setting and achieving objectives and targets for the organisation. One of the concerns expressed about the process of developing and implementing an EMS is the significant additional paperwork and administration that appears to be required. To an extent, it is inevitable that this will happen. Establishing and maintaining an EMS will probably require that additional procedures be developed, that there will be additional documentation and record-keeping requirements and that there will be a need to explicitly manage certain issues that had not previously been the subject of management attention. However, effectively integrating environmental management into an organisation's overall management efforts should see this incremental work minimised.

From a practical perspective, a commitment to environmental excellence is a critical aspect of overall organisational excellence and is a feature of many leading edge organisations (see, for example, Cairncross, 1995; DeSimone & Popoff, 1998). Environmental excellence can be seen as a critical element of management concepts such as total quality management or zero defects (which, from an environmental perspective, can be described as zero emissions). In organisations that have adopted this type

Figure 3.5 Business excellence model



of management philosophy, the process of continuous improvement and its practical realisation through setting and achieving objectives and targets is the framework whereby excellence is achieved. In such organisations, management commitment to the development and implementation of a system of environmental management is part of overall organisational efforts towards improvement and excellence. This is illustrated in Figure 3.5.

4 Environmental management system standards and certification

An overview of standards

A number of standards for environmental management systems (EMSs) have been developed, the purpose of which is to provide a model framework for the implementation of an effective system for the management of environmental issues. The most commonly referenced standards are those developed by the International Standards Organisation, commonly referred to as ISO14001 (ISO, 1996), the British Standards Institution, BS7750 (British Standards Institution, 1994) and the European Community Eco-Management and Audit Scheme, EMAS (European Community, 1993). The three standards provide a series of objective requirements against which an EMS can be audited. That is, the standards provide criteria for the certification of an EMS.

The standards have two main features. They provide a framework for an effective EMS to ensure that an organisation meets and continues to meet its legal and policy obligations. Also, all three standards require organisations to commit themselves to a process of continuous environmental improvement. The process of setting and achieving objectives and targets is intended to provide the mechanism by which organisations can achieve continuous improvement.

The three standards are broadly similar in terms of the specified core requirements for EMSs. First of all, organisations are required to have an environmental policy that articulates the organisation's overall aims and intentions in relation to environmental management. Organisations are required to have a sound understanding of their environ-mental effects (or impacts) and of the legal requirements applicable to the organisation. Based on the environmental policy, the identified environmental effects and applicable legal requirements, objectives and targets must be defined. An environmental management program must be established to achieve these objectives and targets. The organisation must implement

the management system to achieve the defined objectives and targets by defining responsibilities and authorities, developing communication mechanisms, developing procedures and providing appropriate training. The performance of the system must be ensured through audits, reviews and corrective action and it must be monitored. The organisation must also have an overall management review process to ensure that the system is functioning as intended and is capable of meeting the requirements of the organisation's environmental policy.

The only significant difference between the three standards is that, under EMAS, organisations must prepare an environmental statement detailing how the organisation has performed in meeting its stated objectives and targets; this environmental statement must be made available to the public (Honkasalo, 1998). Apart from the EMAS requirement for public reporting, the compatibility between the standards is such that if a facility or organisation has been certified to one of the standards, the basic environmental management system should also satisfy certification requirements under the other two standards (Robinson & Clegg, 1998).

ISO14001

Background

ISO14001 has been adopted by the Joint Standards Australia/Standards New Zealand Committee QR/11 on Environmental Management as an Interim Australian Standard (Standards Australia, 1996). ISO14001 has also been adopted as a national standard in a number of countries in the South-East Asian region and it is likely that it will become the basic standard for EMSs across the region.

The International Standards Organisation (ISO) has issued a number of additional documents relating to environmental management, including ISO14004, *Environmental Management Systems—General Guidelines on* Prin*ciples, Systems and Supporting Techniques* (ISO, 1995a) as well as general guidelines relating to environmental auditing principles, ISO14010 (ISO, 1995b), environmental management system audit procedures, ISO14011 (ISO, 1995c) and qualification criteria for environmental auditors, ISO14012 (ISO, 1995d). In addition, there are other ISO environmental management standards in various stages of development, including standards relating to eco-labelling, environmental performance evaluation, life cycle assessment and product standards.

It is important to recognise that it is only the requirements of

ISO14001 that can be audited against. That is, ISO14001 provides objective criteria against which an EMS can be audited. While the information in the other ISO standards is important to consider when establishing an EMS, it is only the requirements of ISO14001 that are audited against for the purposes of certification.

The requirements of ISO14001

The introduction to ISO14001 recognises that environmental audits and reviews may not be sufficient to guarantee that an organisation not only meets, but continues to meet, its legal and policy requirements. To be effective, such audits and reviews need to be conducted in the context of a structured management system and integrated into overall management activity. The role of the ISO14001 Standard is to provide organisations with guidance on the elements of an effective EMS. The Standard has been designed to be applicable to all types of organisations.

The Standard states that, for an EMS to be successfully implemented, commitment from all levels and functions of an organisation, in particular from top management, is essential. Absolute requirements for environmental performance are not specified, other than requiring that there are policy commitments to compliance with applicable legislation and regulations and to continual improvement. The Standard notes that the development and implementation of a management system based on ISO14001 will not, of itself, guarantee environmental outcomes; to achieve optimal environmental outcomes, the system should encourage the adoption of the best available technology, where appropriate, taking due account of economic factors.

The basis of the Standard is continuous improvement based on a model of policy development, planning, implementation, checking and corrective action and management review.

The environmental policy must be relevant to the scale and nature of the organisation's activities and must include commitments to continual improvement, the prevention of pollution and compliance with relevant environmental legislation and regulations. This policy must be communicated to all employees and must be publicly available.

The first stage in planning is for an organisation to identify those aspects of its activities, products or services that give rise to environmental impacts and over which it can be expected to have an influence. The Standard defines environmental aspects as those elements of an organisation's activities, products or services that can interact with the environment. Environmental impacts are any changes to the environment, whether positive or negative, wholly or partially resulting from

an organisation's products, activities or services. Beyond this, the Standard does not further define the meaning of environmental aspect. In practice, many organisations are interpreting aspect as being the distinct processes, activities or operations that constitute their activities. The level at which this definition is applied depends on the level at which operational or management control is exercised. Depending on the organisation, control could be exercised at the level of individual items of equipment, at the level of a unit process or at the level of a complete process or a combination of a number of unit processes. The important issue is not so much the level at which control is exercised, but to recognise the differentiation between aspect (that is, those activities over which one has control or influence) and impact (that is, the effect of an aspect). Management control can only be exercised over environmental aspects, not environmental impacts. Under ISO14001 organisations are required, when setting objectives and targets, to consider those environmental aspects that give rise to significant environmental impacts.

As part of the planning process, an organisation must also identify the legal and other obligations that are applicable to the environmental aspects of its activities, products or services. Based on the significant aspects, the environmental policy and the identified legal and other requirements, organisations must develop objectives and targets and an environmental management plan to ensure these objectives and targets are met.

The implementation of an EMS should involve the definition of roles, responsibilities and authorities necessary for effective environmental management. This must include the provision of the resources necessary for the effective implementation of the system. Organisations must appoint specific management representative(s), who are responsible for ensuring that the system requirements are established and maintained and for reporting on the performance of the system to senior management.

Training needs should be identified and the organisation should ensure that all employees whose work may create a significant impact on the environment are competent on the basis of appropriate training, education and experience. All employees should be aware of the importance of conformance with the environmental policy and procedures, the significant environmental impacts of their activities, their roles and responsibilities for environmental management and the potential consequences of departing from specified procedures.

Procedures for internal and external communications regarding environmental aspects and the EMS generally should be established. The organisation must establish and maintain information in paper or electronic form to describe the system and provide direction to related

documentation. The organisation should establish and maintain procedures for the control of documentation so that documents can be located, periodically reviewed and approved and so that current procedures are available at all times and obsolete documents are retained or disposed of as appropriate.

The implementation of the system should include the development and implementation of procedures to ensure that the operations and activities associated with significant environmental aspects are conducted under specified conditions. Procedures must also be developed and implemented for accident and emergency situations. These procedures should be reviewed, and revised as necessary, after the occurrence of accidents or emergency situations.

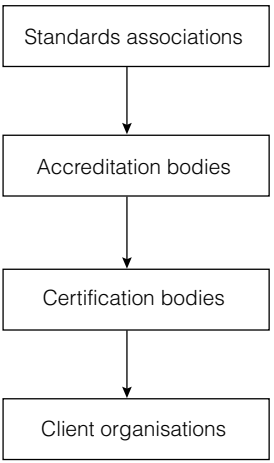
Checking and corrective action involves the monitoring and measurement of the key characteristics of the organisation that can have a significant impact on the environment. Such monitoring should include the recording of information to track performance and assess conformance with the organisation's objectives and targets. In particular, monitoring should include the periodic evaluation of compliance with relevant environmental legislation and regulations. Checking and corrective action processes should include procedures addressing the handling and investigation of nonconformances, environmental record keeping and auditing of the EMS. The records to be maintained should include training records, the results of audits and reviews and those records necessary to demonstrate the performance of the system. Auditing of the system should include assessing whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained. The results of such audits should be provided to senior management.

The organisation's top management should, at suitable intervals, review the overall management system to ensure its ongoing effectiveness, adequacy and suitability. The management review should consider the need for changes to policy, objectives and other elements of the EMS based on the results of system audits, changing circumstances and the organisation's commitment to environmental improvement.

Certification and accreditation

One of the major issues associated with the issue of standards for EMSs has been the role of certification of such systems, both in terms of meeting regulatory requirements as well as the costs and benefits to organisations of such certification. Before reviewing this debate, it is important to understand what the certification process actually involves.

Figure 4.1 Relationship between parties to the certification process



Parties to the certification process

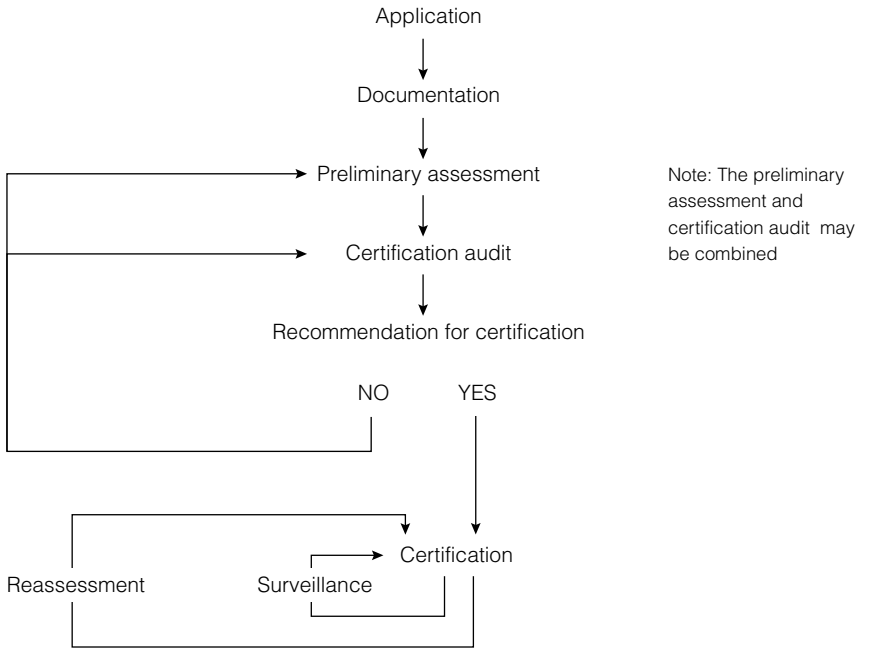
The management systems certification process involves four main parties: national standards associations, accreditation bodies, certification bodies and client organisations. The relationship between these parties is illustrated in Figure 4.1.

National standards associations generally have some form of government authority or charter to develop and publish standards in areas of interest. For example, in Australia, the national standards body is Standards Australia.

Accreditation bodies have national government body authority to set operating criteria, at a national level, for the operation of certification bodies. The Joint Accreditation System of Australia and New Zealand, JAS-ANZ, was established in 1991 as a result of a formal agreement between the Australian and New Zealand governments. JAS-ANZ has two main roles. The first is to be the accreditation body for management system certification, including quality management systems and EMSs. The second is to establish mutual recognition agreements with other accreditation bodies on a bilateral and multilateral basis. Corresponding organisations in other countries include the United Kingdom Accreditation Service (UKAS), the United States Registrar Accreditation Board (RAB) and the Dutch Rood voor Accreditie (RvA).

Certification bodies audit the management systems of client organisations to assess conformance with the relevant standards. The manner in which these organisations provide their service is determined by the JAS-ANZ requirements (JAS-ANZ, 1998). The role of the certification

Figure 4.2 Environmental management system certification process



body is to assess whether the client's EMS complies with the requirements of the standard to which it wishes to be certified and that the client meets its own internal objectives (as articulated in the client's policy statements, objectives and targets) and external requirements (such as licence conditions) for environmental management. The certification of an EMS is a public statement that the client organisation is following a documented system that enables it to comply with the requirements of the standard.

The certification process

The general process for the certification of an EMS has been specified by JAS-ANZ (JAS-ANZ, 1998) and is illustrated in Figure 4.2. It is pertinent to note that the process specified by JAS-ANZ has been based on guidance issued by the International Accreditation Forum to enable accreditation bodies to harmonise the application of the standards against which they assess certification bodies (JAS-ANZ, 1998).

Once an organisation has committed itself to gaining certification, a formal application must be submitted to its chosen certification body. The application must include information about the scope of the

certification (for example, the company name, address, number of sites to be covered, scope of activities) as well as a copy of the core elements (in general terms, the system procedures and other core documentation) of the EMS.

Certification bodies review the documentation against the requirements of the standard. A report on the findings of this desktop review is generally provided to the client organisation. The document review is also used to develop a checklist and plan for the initial and main assessments.

JAS-ANZ specifies that the audit of an organisation's EMS should take place in at least two stages at the organisation's premises, although there is the freedom for an alternative approach to be adopted if this can be justified (for example, when dealing with a very small organisation). The objectives of the preliminary assessment (Stage 1) are to gain an understanding of the EMS in the context of the organisation's aspects and impacts, policy and objectives. The preliminary assessment should review the adequacy of the organisation's process for identifying and assessing the significance of environmental aspects and impacts, confirm that environmental licences are in place, confirm that the EMS is designed to achieve the organisation's environmental policy and confirm that the organisation's internal audit processes conform to the requirements of the standard. The preliminary assessment should enable a decision to be made on whether to proceed to the certification audit.

In the course of the preliminary assessment, the certification body will gather information such as management system documentation, a description of the organisation and its activities, an indication of the organisation's significant aspects and impacts, information on how continuous improvement is achieved, internal audit programs and reports and copies of licences and permits. The preliminary assessment does not cover the entire scope of the management system but, in general terms, concentrates on the early implementation and continuous improvement parts of the system. The purpose is to check that the system is ready for the certification audit. A report on the findings of the initial review is provided to the organisation's management.

The objective of the certification audit (Stage 2) is to confirm that the organisation adheres to its policies, objectives and procedures, that the management system meets all of the requirements of the standard and that the management system is achieving the organisation's policy objectives. The certification audit focuses on how the organisation identifies and evaluates environmental impacts, the process for developing objectives and targets, the implementation, monitoring and recording of the environmental management program, and the application

of continuous improvement mechanisms such as corrective and preventative action, audits and reviews. The performance of the EMS is examined not only against the requirements of the standard but against relevant legal obligations (legislation, licence conditions, etc.) as well as against performance in achieving defined objectives and targets.

At the end of the audit process, the certification body must meet with the client organisation's management to provide a written or oral indication regarding whether the organisation's EMS meets the particular certification requirements. This meeting is also intended to provide an opportunity for the organisation to ask questions about the findings of the audit. The certification body prepares a report detailing the findings of the audit and identifying any actions to be taken to remedy identified nonconformances. Any major system failures will mean that certification cannot be granted at that time. Certification will not be granted until the certification body has established that effective action has been undertaken to address these system failures. Based on the information gathered during the audit process, the certification body makes a recommendation on whether or not to register the organisation's EMS. This recommendation, together with supporting documentation, is provided to JAS-ANZ, which assesses (and generally approves) the recommendation. Once certification is granted, a certificate is presented outlining the scope of the certification and the sites covered by the certification.

Following certification, certification bodies are required to conduct periodic surveillance and reassessment to verify that the organisation's EMS continues to comply with the certification requirements. In general, surveillance audits should be conducted at least once per year and reassessments at least once every three years.

The certification bodies issue various guidance documents to assist their client organisations understand the scope of the certification process and the key issues to be addressed in certification. The documentation issued by the National Association of Testing Authorities (NATA) emphasises not only the conformance of the system with the requirements of the standard but also the effectiveness of the system (NATA, 1996). Particular attention during the main assessment (the certification audit) is paid to the processes for identifying and evaluating environmental aspects and associated objectives and targets, the implementation, monitoring and recording of the environmental management program and the application of continuous improvement mechanisms such as corrective and preventative action, audits and reviews. However, in line with the requirements of JAS-ANZ, NATA does not require that an organisation be in complete compliance with legislation for

certification to be granted so long as the organisation has identified the non-compliance and is acting to remedy the non-compliance. The focus of assessment is on the continuous improvement aspects of an organisation's environmental performance, rather than being an exclusive focus on the documentation aspects of the system. NATA recognises that for the certification process to be credible (such as with environmental organisations), certified EMSs must be seen to provide tangible environmental benefits and improvements.

Det Norske Veritas (DNV) has similar requirements for the certification of EMSs. For new systems, DNV recognises that these systems may not be fully implemented at the time of the certification process (DNVQA, 1996). In such situations, DNV will recommend certification if a number of conditions are met. First of all, the management system must have been fully designed to meet all the requirements of ISO14001, even if full implementation is not complete. Second, all staff must have been made aware of the organisation's environmental aspects and impacts and objectives and all key staff must have received training based on a training needs analysis. Third, performance monitoring and measurement must have commenced and auditing must be fully programmed. Finally, a management capability for legislative and regulatory compliance must be demonstrated or programs to achieve regulatory requirements must have been agreed with the appropriate regulators.

To certify or not to certify?

The certification of an EMS to a standard such as ISO14001 can provide a range of benefits to an organisation. The internal benefits include independent auditing of the system and providing a focus (and key performance measure) for environmental management efforts. The certification process is essentially an independent audit of the system. The certification audit should be conducted by experienced auditors with both management systems and environmental experience. Therefore, the audit process can help identify areas of weakness in the management system or in the processes for managing environmental issues. An independent audit is also likely to be taken more seriously by an organisation, meaning that identified issues are more likely to be treated seriously and addressed. Certification can also be a key performance indicator for environmental management efforts, enabling the organisation to confirm the ongoing effectiveness of the EMS. The external benefits of certification include marketing/PR, the potential to access new markets,

meeting the requirements of customers and reduced regulatory compliance costs. Certification provides an external confirmation that an organisation's EMS meets the requirements of an international standard.

In addition, certification enables organisations to distinguish themselves from their competitors in certain markets. It may be the case that market forces will require certain organisations to achieve certification to ISO14001. The most obvious situation is where organisations are looking to export goods or services and where certification to ISO14001 may be a prerequisite to accessing a new market. It is also possible, given the international interest in ISO14001 and the adoption of ISO14001 as a standard in many countries, that organisations will be required to be certified to ISO14001 as a prerequisite to obtaining access to certain markets (EMIAA, 1997). It is also likely that, as organisations obtain certification to ISO14001, they will require their suppliers and customers to have certification to this or equivalent standards. That is, certification may become a precondition for doing business or for being on certain tender lists.

A certified EMS may also reduce the costs of regulatory compliance. For example, under the Victorian *Environment Protection Act 1994*, licensees who demonstrate an ability for and commitment to environmental management can be accredited (A'Hearn, 1996). The benefits of having an accredited licence include simplified licensing requirements, a reduction in licence fees and simplified approval requirements for most new works. One of the requirements of accredited licensees is that they have a sound EMS in place (certification to ISO14001 is one means of demonstrating this). Similar schemes have been proposed in Western Australia and for the United Kingdom, although none have yet reached the same degree of adoption or success as the Victorian scheme.

It has been proven, however, that an undue emphasis on achieving and maintaining certification has a number of potentially significant drawbacks. The first is that gaining certification can become the primary goal (and the solitary measure of success, at least in the eyes of senior management) of environmental management. The implicit assumption is that, once a system is certified, the management system will continue to ensure environmental outcomes are achieved. However, this is not a complete picture because the certification process is, of its very nature, more of a sampling exercise than a comprehensive audit. Therefore, the certification process does not guarantee that all of the organisation's environmental aspects are being effectively managed. Certification to ISO14001 is simply a third party verification that every requirement of the ISO14001 Standard has been met. It does not necessarily imply that

best practice environmental outcomes are being achieved nor is it intended to imply that specific levels of environmental performance have been achieved for activities, products or services (Krut & Gleckman, 1998). In this context, it is interesting to note that there has been one case of an organisation in the United Kingdom that had been certified to BS7750 being fined for a spill of chlorinated solvent that polluted an amenity lake (*ENDS*, 1997).

The second issue is that certification demands that a level of documentation is in place to demonstrate that the system is working effectively. While the purpose of documentation is to confirm the performance of the system (that is, to enable performance to be objectively assessed), the reality is that many EMSs become cumbersome paper systems geared towards demonstrating compliance with the requirements of a standard rather than adding value (or improving environmental performance) to the business (Beck & Woolfson, 1998). In addition, the maintenance of such a system can be a significant drain on resources in terms of both cost and employee effort. Therefore, it is imperative that the system be designed to be as compatible as possible with existing management systems and that the level of incremental documentation required be kept to the absolute minimum.

The third major issue is that many organisations use the certification process (or the receipt of certification) as a measure of progress towards the implementation of an EMS. It is not uncommon to find that, once certification is received, many organisations relax their efforts on environmental management, perceiving that the system is now implemented and that there is nothing more to be done. We are aware of a number of organisations who have had difficulties in maintaining certification because of this shift in management focus or because of the perception that the hard work is already done.

It should be noted that some of the concerns over the merits of management system certification have resulted from companies' experiences with quality management systems (Gome, 1996). At the end of 1995, almost 9000 Australian companies had been certified to ISO9000. In many cases the main driving force was the general expectation of government purchasers that certification to this standard was necessary to gain work. For many companies, this led to quality certification being seen as an objective in itself rather than quality management being seen as a tool to add value to a business or improve the way in which a business operated (Lorimer & Coman, 1997). The problem was that, without an understanding of the importance and utility of such systems or of how they could actually benefit business, many organisations simply implemented a system that would gain certification. In this

context, it is interesting to note that the Australian government decided in 1996 that Australian companies would no longer be required to conform with ISO9000 to secure government contracts (Hulbert, 1996).

In conclusion, there are benefits and pitfalls associated with the certification of an EMS. Our overall view is that it is important that both sides of the argument are recognised and that the real reasons for system certification are articulated early in the process. We recognise that many organisations commence the process of developing and implementing an EMS without making a decision as to whether or not certification is the desired endpoint of the process. If certification is considered a possible outcome, even if not in the short term, we would recommend that, as far as practicable, the system be aligned with the requirements of one of the EMS standards, such as ISO14001. This should enable certification to be achieved, if or when this is required, with minimal changes to procedures or other elements of the system.

5 The *ACTEW Corporation*

Carl Thompson

Introduction

ACTEW is quite a success story. It is one of the largest businesses in the Australian Capital Territory and ranks in the top 400 businesses in Australia. As the provider of energy, water and waste water services to the people of the ACT, ACTEW is greatly aware that the energy and water use activities of the community have a high environmental impact. Consequently, ACTEW's ability to manage these activities is crucial to the overall impact the community has on the environment.

ACTEW has recognised that it can only succeed in the long term if it can manage its business by using resources in a sustainable way, consistent with community wishes. Hence, the focus for ACTEW's environmental management performance is to move towards more sustainable development in the use of resources to meet the need for its services to be offered in an economically and ecologically sustainable way. Ecological sustainability represents a balancing of environmental needs and development directions. The importance that ACTEW places on ecologically sustainable development (ESD) is reflected not only in the corporation's Vision Statement, but also within its Corporate Plan and Five Year Environment Management Plan.

ACTEW became committed to ESD long before three of its sites joined ten other organisations in 1996 as the first in Australia to have their EMSs certified to ISO14001. This certification was just part of ACTEW's pro-active management of environmental risks in its business areas to ensure that the organisation performed at a level beyond regulatory compliance and achieved best-practice environmental management.

Company description

The ACTEW Corporation began operations on 1 July 1995 as a result of the corporatisation of the ACT Electricity and Water Authority. The legislation underpinning the operation of the company includes the *Energy and Water Act 1988* and the *Territory Owned Corporations Act 1990*. ACTEW's major functions are fourfold.

- To supply energy. This includes energy purchasing, the operation of its electricity distribution system, the management of customer demand and the development of sustainable energy systems. The evolving energy markets have provided challenge, risk, uncertainty and competition for ACTEW. In addition to operating the ACT electrical network, ACTEW, since early 1997 through one of its wholly-owned subsidiaries, ACTEW Energy, has been committed to operating in the contestable electricity market.
- Water supply, involving the management of customer demand and the operation of its water supply system. Water is supplied from three main dams—Googong, Bendora and Corin—in two catchment areas. The Cotter Dam is used as a reserve storage, for use only in a severe drought.
- Waste water management, including the operation of Canberra's sewage treatment plant Lower Molonglo Water Quality Control Centre (LMWQCC), the operation of the sewage collection system and the development of waste water reduction strategies. The LMWQCC discharges into the Murrumbidgee River system and the level of treatment is believed to be the highest in Australia.
- Subject to final board and government approval, the development of a high technology communications system that will deliver telephone, television, video, internet and other services via a network of optic fibre and copper cable.

ACTEW provides these services to the 320 000 residents of the ACT and also provides its skills and seeks business opportunities elsewhere in Australia and internationally.

The ACTEW Corporation employs over 900 staff and operates under a seven person board appointed by the voting shareholders (the Chief Minister of the ACT and the Deputy Chief Minister). Operations are managed by the chief executive officer (who is also a board member), supported by six divisional executives. The chief executive officer is the only executive director.

At the time of writing, six divisions make up ACTEW's management structure. Five operational areas within three of these divisions

are operating to ISO14001 systems: the LMWQCC, Water Supply, ACTEW Logistics, Network Technical Services and Network Systems.

Environmental aspects of ACTEW's operations

The potential for environmental harm resulting from ACTEW's activities is particularly high when the diversity of operations is considered. As can be seen from the above, much of ACTEW's day-to-day business revolves around environmental management. But there are many other significant environmental issues that ACTEW needs to manage. For example, a major issue for ACTEW is ensuring that Canberra's treated waste water has minimal impact on the receiving waters of the Molonglo and Murrumbidgee rivers. This is crucial, not only to the people of the ACT and to those people living further downstream, but also to the well-being of the rivers' aquatic ecosystems. In addition to the obvious environmental issues associated with ACTEW's core functions, ACTEW has a wide range of associated activities with the potential to impact on the environment. For example, ACTEW undertakes significant construction work such as trench digging, pipe laying, pole erection and cable laying, all of which can be potentially hazardous to the environment if not well managed.

Driving forces

By the very nature of its activities, ACTEW's role involves significant potential impact on the environment, especially as regards waste water discharges. As a consequence, environmental management is, and has been for many years, a high corporate priority and is integral to overall business performance. The main forces driving ACTEW to minimise and effectively manage these impacts are discussed below.

The community and corporate citizenship

Canberra is located in a particularly sensitive environment and the community of the ACT demands a high standard of environmental protection. As the electricity and water utility in Canberra, ACTEW is expected to match its environmental performance with the aspirations of the community it serves. Meeting these expectations has always underpinned ACTEW's operating philosophy. The corporatisation of ACTEW in 1995 did not influence or change its approach to environmental management—it just reinforced it.

One of the critical issues for ACTEW has been the recognition that it must work in partnership with the community on environmental protection issues. This is driven by two main changes: that communities are no longer prepared to entrust their well-being to an organisation of experts, and that there are many in the community who want to become personally involved in decisions that affect their environment. As the ACT community has high expectations regarding environmental protection, ACTEW is geared to meet those expectations as part of the process of being a good corporate citizen.

There remains considerable scope in the ACT to reduce energy and water consumption and to minimise waste production without reducing quality of life. As a service utility, ACTEW has an obligation to ensure that all relevant environmental information is put before the community and that this information is discussed and evaluated and strategic plans formulated and implemented with full community support. Consequently, ACTEW manages its environmental issues in accordance with, and because of, community expectations, views and opinions. This approach assists ACTEW to comply with the environmental aspects of its legislative obligations. In addition, this process of community consultation is seen as gaining a competitive advantage for ACTEW's environmental 'image' and 'reputation' in the utility industry. Furthermore, this consultative approach has enabled it to identify ideas and opportunities for technological and operational innovation.

ACTEW's corporate plan requires measurement of performance on stewardship of the environment as well as on the quality and reliability of services. This enables it to track and evaluate its performance over time as well as against its competitors.

Regulatory environment and beyond compliance

ACTEW operates under the ACT *Environment Protection Act 1997*, which places responsibility on all ACT organisations (both in the public and in the private sector) and on individuals for protection of the environment. The legislation has stringent penalties in the event of non-compliance. ACTEW must also comply with the *Territory Owned Corporations Act 1990*, under which ESD is spelt out as a mandatory part of ACTEW operations. Clearly, as for any organisation, regulatory compliance is a key issue for ACTEW. ACTEW maintains its compliance by regularly reviewing its operations in light of pertinent legislation and keeping abreast of changes in legislation.

However, compliance is just one aspect of its objectives for environmental management. A major driving force in ACTEW's endeavours

to achieve excellence in environmental management is to continually strive for best-practice environmental management, rather than simply complying with legislation. Its philosophy is that working in 'beyond compliance' mode will drive it towards future success and keep it competitive with the industry leaders.

Employee awareness and the adoption of environmental duty of care

Environmental performance and EMSs are only as good as the people who implement them. Thus another driving force towards EMS implementation was to ensure that staff became as environmentally aware as possible. This was seen as a critical aspect of ensuring the effective implementation and maintenance of ACTEW's EMSs. This, in turn, enables it to better control potential impacts, meet community expectations, comply with environmental legislation and ensure that the environmental care ethic is 'owned' by all employees.

A vision for the future

Achieving ESD is not a short term activity. It requires an agreed long term vision and a clear plan of delivery. In turn, this requires knowledge and assurance and confidence in organisational directions. To facilitate this, ACTEW is developing a vision of the organisation in 2010, a vision to be tested with the community and other agencies to ensure that it is moving in the directions required by them.

As part of this process ACTEW has released its Future Water Supply Strategy for the ACT, which provides a blueprint (or a vision) for a more sustainable delivery of water supply up until 2040. This document will then guide ACTEW towards the effective and efficient environmental management of its water resources and infrastructure, in line with community and stakeholder expectations.

Managing environmental issues

Introduction

ACTEW has been actively engaged in the management of its environmental issues for almost a decade. Ten years ago, even though ACTEW had no formal environmental management controls in place, it was fully aware of its environmental and associated community and legislative

responsibilities. These issues were generally addressed on a corporate basis.

Reports on environmental activities began to appear in ACTEW's Annual Reports in the late 1980s. These environmental reports developed into significant Annual Report addendums from 1992. Over this time, it became increasingly clear that a comprehensive organisational system of environmental management was needed. The ACTEW corporate EMS was launched in 1995. The corporate EMS, in turn, paved the way for the implementation of site-specific EMSs from mid-1996. These site-specific EMSs provided the mechanism (or management framework) for the corporate EMS to be effectively implemented at the site level. This process, in turn, fundamentally changed the way in which the corporate EMS functioned.

Corporate environment management system

The years 1991 to 1994 were significant for the development of ACTEW's corporate EMS. During these years, ACTEW introduced a number of innovative major environmental initiatives that established it as a major player in environmental management and which paved the way for the development of future environment management plans (EMPs) and EMSs. These initiatives included:

- a comprehensive environmental audit of the LMWQCC sewage treatment facility;
- the release of the Future Water Supply Strategy;
- the construction of an exhibition energy efficient house;
- the launch of a conservation education kit to ACT primary schools;
- the construction of water efficient 'Xeriscape' demonstration gardens;
- community consultation on environmental issues through open fora;
- the renegotiation of LMWQCC's discharge licence, resulting in arguably the toughest licence conditions of any inland sewage treatment plant in Australia; and
- the commencement of work on the design of a pilot effluent re-use plant.

In 1995 ACTEW produced its Corporate Environment Management Plan 1995–2000. This comprehensive document recognised the need for ACTEW to move towards more sustainable development and use of resources. The corporate EMP set policy directions in areas such as:

- the integration of environmental duty of care into business planning;

- the provision of strong community leadership on electricity and water issues;
- exercising due environmental diligence in the provision of essential services;
- striving to ensure that operations contribute to the overall environmental sustainability of the ACT;
- the promotion of the efficient use of electricity and water, as well as the minimisation of waste, and the re-use and recycling of these resources; and
- the adoption of an open and informative approach to the ACT community on environmental issues.

The corporate EMP also covered policy directions in many other areas, from heritage protection and public health and safety to strategic development and greenhouse issues, thus giving a clear definition and focus to the corporate EMS. This five year EMP was launched as a public document, assisting both the community and staff to more clearly see ACTEW's vision and framework for the continual improvement of its environmental management performance. The tasks, philosophies and policies outlined in the EMP were implemented throughout the organisation via the corporate EMS.

ACTEW wanted to ensure that its corporate EMS was consistent with world best environmental practice. Five principles were identified as being critical to achieving this aim: strong leadership, line management responsibility, continuous monitoring and improvement, extensive consultation with stakeholders and the integration of environmental considerations into everyday management.

The EMS was based on four simple steps: to establish a plan, establish commitment, ensure capability, and evaluate, learn and improve. Consequently, ACTEW's corporate EMS is based on the ISO14000 Standard and on the 'plan-do-check-review' cycle of continuous improvement. Specifically, the EMS recognises the critical influence of external stakeholders on both ACTEW's business decision-making processes and on the operating environment in which ACTEW finds itself. Key areas that received immediate attention included employee awareness, environmental risk assessment, development of the capacity to undertake self-audits and improvement of progress reporting.

Annual environment action programs (EAPs) are produced to supplement the corporate EMP, thereby ensuring that initiatives set out in the plan are identified, allocated and incorporated within divisional and branch business plans. Progress on the tasks set out in each EAP is reported internally to both executive and corporate (board) environment

management committees as well as externally through public environmental fora and in ACTEW's Annual Reports.

While the corporate EMS was considered effective in many ways and won ACTEW many accolades for its thoroughness and depth of coverage of environmental issues, ACTEW recognised that there were opportunities to further improve its environmental performance. This, however, necessitated the implementation of site-specific EMSs.

Site-specific environmental management systems

In 1996, the Joint Accreditation Services of Australia and New Zealand (JAS-ANZ) conducted a pilot program designed to accredit potential certification bodies to certify EMSs to the ISO14001 Standard. Each of the certification bodies involved in the pilot program sought volunteer organisations that would become part of the program through the implementation of ISO14001. The idea was for JAS-ANZ to evaluate the certification bodies' performance during initial audits of the volunteer organisations, granting them accreditation status at the conclusion of successful audits. The volunteer organisations, under the pilot program, had the opportunity to become the first in Australia to be certified to ISO14001.

ACTEW, recognising the pilot program as an opportunity to both consolidate and progress its environmental management efforts, selected three of its sites to volunteer for ISO14001 implementation. ACTEW had been asked to join the pilot program by NATA Certification Services International (NCSI) and Det Norske Veritas (DNV), both of whom were seeking to be accredited by JAS-ANZ.

ACTEW commissioned environmental consultants to guide and assist with EMS implementation at each of the three sites. As the JAS-ANZ pilot program was run within an extremely tight timeframe, the EMS implementation process was swift, with the work being carried out in the period March through to July 1996. Following NCSI's and DNV's successful audits and subsequent appointment as ISO14000 accredited certification bodies, ACTEW's three sites were, thanks to the hard work put in by both the consultant and ACTEW staff, awarded ISO14001 certification in August 1996.

Since then, ACTEW has embarked on a program of ISO14001 system implementation at all of its major operational sites, with each site seeking certification in its own right. As the system design and implementation processes have been reasonably similar across all sites, and as space restrictions for this chapter prevent a description of each,

the LMWQCC will be used to illustrate the process followed by ACTEW in developing and implementing site-specific EMSs.

ISO14001 at the Lower Molonglo Water Quality Control Centre

Environmental issues are a key consideration for the operation of LMWQCC. Without effective and reliable treatment, waste water from an inland city the size of Canberra would pose a major environmental hazard that could impact adversely on the riverine system and on downstream users. Consequently, waste water from Canberra must be returned to receiving waters in as good a condition as feasible. To ensure responsible environmental management, to meet community expectations and to comply with regulatory obligations, the LMWQCC has implemented not just an EMP integrated with quality management systems (QMSs), but has also implemented a range of scientific and engineering projects including various monitoring programs and ecological studies.

The certified (to ISO9002) QMS established at the LMWQCC in early 1995 had proved to be an active, efficient and powerful management tool for the plant. The site EMS was built on and integrated with this system, utilising ISO9002's management framework and adding specific environmental management requirements as specified by ISO14001. The specific requirements (which formed new system procedures) that were added were environmental aspects, legal and other requirements, objectives and targets, environmental management program, communication and emergency preparedness and response. It is important to recognise that most of these had already existed in some form prior to the decision to develop and implement an EMS. Much of the EMS development work involved codifying and formalising existing practices and expanding the scope of management efforts to encompass all of the environmental aspects at the LMWQCC. Therefore, the integration of the EMS into the existing QMS was not a dramatic innovation for the LMWQCC. Rather, it was a natural progression in the way the organisation had been developing, and an extension of previous organisational and environmental initiatives.

Environmental performance must be constantly reviewed to maintain a focus on the most important environmental issues and to ensure continuous improvement. The LMWQCC has utilised its quality assurance (QA) system and EMS to provide a framework for achieving continuous improvement. The objectives for EMS/QA for the LMWQCC are stated in the LMWQCC policy statement. The quality objectives are to employ quality and best practice, to operate in a climate of continuous

improvement based on a total commitment to quality and to attain a consistent product that meets the needs of stakeholders. The environmental objectives are to identify and manage significant environmental impacts of the operations, to maintain the ecological health of the receiving waters, to promote sustainable management and waste minimisation and to promote consultation with the community. To achieve these objectives, all employees in the organisation are responsible and accountable for their performance and actions, and are encouraged to participate in and contribute to the EMS/QMS. Management is responsible for providing appropriate resources and training.

The LMWQCC was the first sewage treatment facility in Australia to gain certification to ISO9002, and was in the first group of organisations in Australia certified to ISO14001. The EMS and QMS have been substantially integrated into one management system, which underpins the LMWQCC approach to effective and responsible management and to ensuring that regulatory requirements are achieved. All other sites implementing ISO14001 within ACTEW have also adopted this approach.

The QMS and EMS incorporate a number of features to facilitate regulatory compliance and improve management of operational performance. These include effective systems for documentation of procedures, records management, auditing, corrective action as a basis for improvement and quality planning.

A key feature of the EMS is the EMP. This was initially developed following an environmental audit and risk assessment, to identify significant environmental aspects of the operations. Following the identification of these significant aspects, objectives and targets were developed, forming the basis of an action program and performance measures for the EMP. The LMWQCC EMP is reviewed annually, with monthly status reports submitted to management. The EMP is aligned with the corporate EMS objectives and targets.

To summarise, the LMWQCC has developed a comprehensive EMP. This program is all encompassing, not just addressing the requirements of ISO14001 but aiming at achieving 'beyond compliance' performance. The program includes scientific and environmental monitoring programs (for example, process and effluent monitoring, ecological studies, environmental research projects) aimed at developing a better understanding of potential environmental and ecological impacts of the operations. The program also includes engineering projects to improve operational and environmental performance and, of course, the integration of the quality and environmental management systems.

The costs and benefits of environmental management

Corporate environmental management systems

Costs

The specific costs associated with the development and implementation of ACTEW's corporate EMS are difficult to quantify due to its evolution over a lengthy period (over the last decade or so).

ACTEW has long understood that good environmental management makes good business sense, and has allocated significant resources in order to achieve this aim. In 1993, when the decision was made to produce and release a Future Water Supply Strategy and a Five Year EMP (1995–2000), the position of environmental strategist was established. This full-time senior position was devoted entirely to the growth and development of these programs, which culminated in ACTEW's corporate EMS. Once the EMS was fully established and running smoothly, the commitment of a full-time position was no longer warranted.

The financial aspects of the corporate EMS have traditionally been absorbed within operational budgets of affected branches, divisions and corporate areas. Consequently, ACTEW is unable to place an accurate figure on the cost of implementation and subsequent system maintenance. However, the benefits of operating a best-practice EMS have far outweighed the substantial operational costs. ACTEW is looking to move towards more definitive environmental accounting in the future in order to better clarify the costs associated with EMS development, maintenance and improvement.

Benefits

The benefits of ACTEW's corporate EMS have been far reaching, both within and without the organisation.

As ACTEW's environmental policy directions and priorities are comprehensively documented in the corporate EMP and annual EAPs, both the community and staff are able to become fully aware of the corporation's environmental goals and objectives and particularly of the tasks that will be undertaken each year. Also, by effectively integrating these tasks into divisional business plans and ensuring that required resources are allocated, environmental improvements required under the EMPs and EAPs are being systematically completed. ACTEW's view is

that the cost of issuing the five-year EMP and annual EAPs as public documents has been most worthwhile, ensuring not only community and staff awareness, but also that valuable feedback is received on the programs and tasks.

One of the main benefits of having a corporate EMS has been that, through the system's environment effects register, the key environmental aspects of the corporation's business activities were able to be identified. Potential impacts were then able to be prioritised and strategies formulated for appropriate responses. These strategies ranged from general protection of the environment in which ACTEW operates on a daily basis (through the development and implementation of operating procedures and controls), signing on to the Electricity Supply Association's Environment Code of Practice, research and development of waste water reduction strategies through to the signing of a Cooperative Agreement with the federal government's Greenhouse Challenge Office (which commits ACTEW to actively engage in reducing greenhouse gas emissions).

The corporate EMS has also been of great benefit to the community that ACTEW serves, especially in the areas of energy and water efficiency. The EMPs and annual EAPs outline strategies and tasks that advise and educate the public on these issues, allowing the community to work with ACTEW in an endeavour to achieve a more sustainable environment. This helps ACTEW not only respond to one of its key driving forces (that is, meeting community expectations) but also provides it with the ability to meet its vision of an ecologically sustainable future.

The other major benefit of the corporate EMS was that it established ACTEW's reputation as a leading environmentally oriented utility. This assisted the corporation to be awarded contracts in locations such as Fiji, China, Tonga, Samoa and Cambodia.

Site-specific environmental management systems

Costs

As stated above, ACTEW engaged consultants to assist in ISO14001 implementation at the first three of its sites to receive a site-specific EMS program. The costs associated with this consultancy were in the vicinity of $65 000 (around $21 500 per site). This was in addition to the fees charged by the auditing bodies NCSI and DNV, which were around $2000 per year each for the initial certification audit and ongoing six-monthly surveillance audits at each site. Because ACTEW's

site EMSs have been integrated with existing certified ISO9002 QA systems, auditing fees have been minimised by having the surveillance audits simultaneously cover both the quality and environmental management systems.

The internal costs associated with implementation were minimised through the utilisation of the QA managers from each site. These positions, which had been established to implement and maintain ISO9002 certification, were expanded to encompass environmental duties (specifically, the development, implementation and maintenance of the site-specific EMSs). The EMS/QA managers worked closely with the consultant and were integral to the successful certification of their respective sites.

Throughout the implementation phase, as real and potential impacts that needed to be managed were identified, the cost of addressing these issues was absorbed within operational budgets. As a consequence, an exact figure cannot be quoted for this aspect of implementation but it is estimated to be much less than the cost of the consultancy. In considering these costs, it is important to recognise that (a) most of the significant environmental aspects of the LMWQCC's operations were already effectively managed through the QMS; and (b) many of the new issues to be addressed were 'must do' issues, such as issues relating to compliance. In this context, the major benefit of the EMS development process was that it enabled these issues to be identified and integrated into the overall management function at the LMWQCC.

ACTEW considered the consultant's fees to be money well spent, for the expertise and experience gained by ACTEW's EMS/QA managers during the consultancy, when combined with some excellent texts now available (see the references by Brown below), enabled ACTEW to successfully implement ISO14001 at its other operational sites without the need for external consultants. All costs for these subsequent certifications were absorbed internally and were minimal when compared with the first site's costs.

Benefits

Because of the alignment of site-specific objectives and targets with the objectives and targets specified in the corporate EMS, ACTEW has found that the benefits of EMS implementation and certification have been similar across each of the sites. The benefits discussed here are specific to the LMWQCC, but are broadly typical of the benefits at other sites.

One of the major benefits and more successful outcomes from

implementing ISO14001, and of integrating it with ISO9002, was the achievement of a positive cultural change among management and the general workforce, which has contributed to improved operational performance. For example, the implementation of an EMS at the LMWQCC and the subsequent certification of the EMS to ISO14001 have assisted in raising the awareness of staff with regard to their obligations in the operation of the plant. The system also provided a clear framework for staff to use their judgment and knowledge when making decisions and contributed to improved performance through:

- a greater willingness to accept responsibility in decision-making and actions;
- improved risk assessment and risk management. In particular, this resulted from the broadening of the scope of the risk assessment process to explicitly account for the environmental aspects of the LMWQCC's operations;
- a greater willingness on the part of employees to identify system breakdowns, report hazards, and identify potential improvements; and
- a more collaborative and cooperative two-way relationship with the regulator (Environment ACT). The certification of the LMWQCC's EMS to ISO14001 was seen as a tangible demonstration of ACTEW's commitment to improved environmental management.

One of the commonly cited concerns regarding structured systems for environmental and quality management is that the initiative and inventiveness of staff may be inhibited because of the bureaucracy and prescriptiveness of the systems. However, this concern was quickly dispelled at the LMWQCC. The auditing and corrective action procedures were used as an effective (and highly pro-active) mechanism to encourage staff to identify deficiencies and potential improvements in the plant's operations. This, in turn, encouraged innovation, and the subsequent cultural changes have delivered significant bottom line savings to the organisation through efficiency gains and improved performance.

Operating performance has continued to strengthen following introduction of EMS/QA, through effective use of the systems' features. For example, ACTEW's performance against regulatory requirements and its unit operating costs have both continued to improve. In spite of a stringent environmental authorisation, the LMWQCC has achieved 100 per cent compliance for effluent discharge limits for over two and a half years, and an incinerator emission compliance in excess of 99.5 per cent is now being achieved. Most of ACTEW's site and corporate

performance targets are being achieved or exceeded. For example, the weight of industrial and office waste leaving the site is 30 per cent below the initial target, and 35 per cent below that of the previous year. Power consumption is 8 per cent below target, and 10 per cent below the previous year. These translate directly into improved bottom line performance. ACTEW's overall experience has been that the EMS has directly contributed to both improved environmental performance and reduced operational costs.

Community consultation is a key feature, and benefit, of the EMS. The objectives of the community consultation program are to enhance communication between community groups and the LMWQCC to enable community issues and concerns to be identified and enable the organisation to demonstrate achievements in environmental performance. This process is also designed to improve cooperation, understanding and trust. Although community consultation had always been a feature of the LMWQCC's operations, certification to ISO14001 enhanced this aspect and provided a more structured framework for community consultation. The community consultation program at the LMWQCC now includes site visits and presentations, participation of LMWQCC employees in community forums, the publication of papers in technical journals, presentations to technical conferences and community groups, the preparation of annual environmental performance reports and upgrading the web page to communicate up-to-date information on the LMWQCC, including environmental performance, to the community. This program generates two-way communication and feedback, both essential benefits of this EMS, which allows efficient environmental management to be seen, demonstrated and acknowledged by the community.

The EMS/QA systems provide a mechanism for identifying training needs. Consequently, a comprehensive five-year organisational training program has been developed for all staff, with many benefits resulting.

Prior to implementation, there was some hesitancy and a reluctance to take on the extra workload associated with EMS/QA. It is probably fair to say that some areas of resistance persist, as in this initial stage the systems were viewed by many staff as being bureaucratic and unnecessarily adding to workloads. However, the potential benefits that the systems could provide for day-to-day work were soon seen. There was a conscious effort from the beginning to ensure staff as a whole participated in the development and implementation of ISO14001 and in the preparation of documentation. This spread the workload and provided a large number of staff with experience, involvement and ownership. Wide staff participation has been one of the strengths of EMS/QA at

the LMWQCC, and a key factor in creating a robust system within a relatively short period.

To summarise, the EMS implemented at the LMWQCC (and this can be related, in the main, to other ACTEW sites) has played an important role in enhancing operational and staff performance, and has contributed to the successful management of a complex environmental function operating under stringent licence conditions. The wide acceptance of the EMS and participation by staff at all levels has been a key feature of its success in supporting the LMWQCC to achieve business objectives and meet its regulatory requirements.

The lessons learned

Site environment management systems

ACTEW, through careful planning and management, has achieved ISO14001 certification at its selected sites with few, if any, problems. All certifications were awarded as a result of initial audits, and subsequent surveillance audits have found the systems to be operating exceptionally well at each site. One site, however, having experienced staffing difficulties and subsequent system maintenance problems, requested a three-month lapse in certification status until the EMS could be brought up to speed again. In hindsight, the site should not have allowed this to happen, for the lapse created an inordinate amount of work to be undertaken before certification could be re-awarded.

ACTEW's smooth and successful site implementations were due in no small way to full commitment from the organisation, management and staff. However, prior to implementation there was some hesitancy from staff. To address this, senior management championed the process, supporting the benefits, encouraging staff and overcoming fears.

As mentioned earlier, resourcing system implementation was not a real issue, with existing QA managers at each site working full time on the program, being supported, as required, with staff from both operational and corporate areas. This minimised the costs of consultants and other external resources to ACTEW. As discussed above, subsequent EMS development and implementation projects at other sites have not required any external resources or consultants.

There were clear benefits of having one integrated system for EMS and QA. The ISO14001 systems were built on the established ISO9002 site systems, with modifications being made, as appropriate, to documentation, audits, corrective actions and other procedures. Full integration

has transpired at all sites with management review meetings addressing both environmental and quality issues.

ACTEW found that although the initial site implementations went very smoothly under the guidance of consultants, later implementations using solely in-house expertise were also smoothly brought to the same successful conclusion.

Corporate environment management system

Since ACTEW's operational sites have been conforming to their own EMSs, the corporate system has virtually taken second place. Prior to site certifications, the corporate EMS, through its EMP and production of its annual EAPs, dictated the environmental tasks that sites were to undertake. Now that sites operate to their own objectives and targets and EMP, conduct their own awareness and site management training programs and ensure 'due diligence' at the local level, the corporate EMS has had to be adjusted to (a) remain relevant to the environmental objectives of ACTEW as a whole and (b) reflect the substantial transfer of responsibility for and ownership of environmental issues from corporate to the sites. The adjustments to the corporate EMS have included the incorporation of site tasks and plans into the annual EAP, a more refined and efficient reporting system for sites to reflect achievements corporately (and publicly), changes to the executive environment management committee's structure and changes to the corporate environment policy (to better reflect site operations).

One major problem that needed to be confronted corporately was to decide how staff would come to terms with the plethora of legislative requirements that ACTEW's many and varied operations encountered. Clearly, it was inefficient to expect each site to develop (and maintain) its own register of legal requirements. The solution was the creation of an Environmental Legislation Register, a database of relevant legislation networked electronically to all employees. A small team was established to review corporate and site-specific environmental aspects and to identify what legislation affects them, that is, what legislation ACTEW must comply with and what legislation could potentially impact on operations. Given the complexity and diversity of work that ACTEW is engaged in, this proved to be a complex task. The database was broken down in its application into ACTEW's different operational areas, and a plain English, simple explanation of each piece of relevant environmental legislation was included. Following a few refinements to the system, based on employee and user feedback, all employees have

access to a very user-friendly register that acts as their principal avenue for understanding legal obligations.

The current status of implementation

ACTEW has virtually completed its EMS implementation program across the organisation. Having commenced this process in early 1996, it has had time to refine, improve and reflect on the systems that have been established to date. The corporate EMS is currently undergoing minor changes to better reflect what is happening organisation-wide and, in particular, the work being done under site ISO14001 certifications.

A major initiative being embarked upon is that of combining site systems to form 'divisional systems'. That is, ACTEW's two main operational divisions, Water and Energy, are each amalgamating their site systems in order to be able to apply for division-wide EMS and QMS certification. For example, the LMWQCC's systems will become part of a wider water division certification. Also, it is intended that the division-wide systems will incorporate certification to Occupational Health and Safety Standard AS/NZS4801, giving each division a complete management package.

Conclusions

Environmental management remains alive and well within ACTEW following a decade of implementation and refinements. The corporate EMS and ISO14001 certification processes have been seen as excellent business decisions, ensuring good environmental corporate citizenship and responsible business risk management.

As the largest inland city in the driest continent, Canberra and the ACT have provided a particular challenge for ACTEW in the provision of potable water and the disposal of effluent. In meeting these challenges, ACTEW has become a leader in environmental management and in achieving the principles of ESD. Because it has the biggest influence over the Canberra environment in industry terms, ACTEW, through its EMSs, is demonstrating its commitment to the community, customer consciousness, due diligence and willingness to go 'beyond compliance'. ACTEW's senior management is committed to ensuring ACTEW performs exceptionally as far as environmental issues are concerned. This will continue.

ACTEW would encourage, for all the beneficial reasons outlined above, other organisations to consider the implementation of an EMS.

The long term benefits are not just ACTEW's, for: 'We have not inherited the earth from our ancestors, we have borrowed it from our children.'

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6 ABB Engineering Construction

John Alexander

Company overview

Over the last 40 years, ABB Engineering Construction (AEC) has developed into one of the largest organisations in the engineering construction field operating in Australia. The company is a wholly-owned subsidiary of the global corporation Asea Brown Boveri (ABB), and is ABB's principal construction arm in the Asia-Pacific region. Established in 1951 to satisfy Australia's power generation and transmission needs, the company, through its size and experience, has refined and developed its specialist skills in these markets and diversified to offer clients a full range of construction services. Today, AEC is a leading supplier of services to the power generation and transmission, oil and gas, petrochemical, mining and materials processing, heavy industrial plant and rail industries throughout Australia and the Asia-Pacific region.

AEC has a workforce of approximately 1200 permanent staff. During major projects (for example, the Collie Power Station, the Port Kembla Copper Smelter and the Calvale–Tarong transmission line), AEC's total workforce, when contract labour is considered, can swell to double that number.

Over the last three to four years, AEC has been actively engaged in managing environmental issues on all of its fixed sites and projects. At the time of applying for certification of its environmental management system (EMS), AEC had nineteen fixed sites (including four fabrication shops) and nine major construction projects. The major projects (such as the Collie Power Station) involved not only the management of environmental issues during construction and commissioning, but also the management of these issues as part of the design phase (by ensuring that the design procedures included requirements to

review environmental impact studies and integrate these studies into the design).

Driving forces

ABB's global objectives have, historically, included the commitment to 'Think Global, Act Local' on environmental issues. The further commitment to be environmentally aware started in 1992 when ABB became a signatory to the ICC Business Charter for Sustainable Development (ICC, 1991). This led to a worldwide requirement for all ABB companies to develop ways of implementing the sixteen elements within the ICC charter into the way they conduct their businesses.

Guidelines on how to meet the requirements of the ICC charter were published by ABB's Corporate Environmental Affairs Division in 1993 and seminars on these guidelines were subsequently held in ABB companies across the world.

In 1995, AEC began monitoring and measuring emissions, waste and energy consumption as a starting point in establishing trends in environmental performance. This requirement for monitoring was driven by ABB's Corporate Environmental Affairs Division as part of ABB's global strategy to monitor emissions. At the same time, environmental officers were appointed in all ABB companies to monitor the implementation of these initiatives.

Due to these corporate initiatives and the increasing requirement for environmental controls on projects by its clients, a strategic plan was presented to AEC's senior management in 1995 for the inclusion of environmental procedures (based on the requirements of ISO14001) into existing management systems. At around the same time, AEC's managing director requested a review and improvement of the documented management system. This combination of events proved to be the ideal opportunity to incorporate environmental procedures into AEC's management system. In 1996, AEC's senior management decided to adopt a fully integrated management system, rather than stand alone systems for quality, environment and safety. The implementation of the environmental elements into its everyday activities culminated in certification to ISO14001 for all of AEC's operations during 1997.

Apart from meeting ABB's corporate objective of all of its companies being certified to ISO14001 before the end of 1998, AEC's management, in general, genuinely believed that AEC's everyday activities could be refined to protect, and possibly even enhance, the environment. It was unconditionally agreed by all management to adopt the sixteen

principles from the ICC charter and incorporate these principles into the way in which it does business.

Managing environmental issues

The commitment to operate with concern for the environment has been an integral part of ABB's activities for several years. The decision to meet the requirements of ISO14001 was viewed by AEC's senior management as a natural progression in the continuous improvement objectives of the company as well as enabling AEC to meet ABB's corporate directives.

The commitment to meeting the requirements of ISO14001 was documented as an action plan. The following issues were identified as the key tasks necessary to achieving certification to ISO14001:

- Identify all environmental aspects of operations.
- Identify the legislative issues not addressed.
- Identify the requirements for operating procedures.
- Identify the resources required.
- Revise and issue an environmental policy.
- Align all operations to ISO9001/ISO14001 elements.

The first stage began in 1996 when AEC's management documentation was revolutionised. The cumbersome suite of organisational operating procedures (which were contained in several volumes) was discarded and replaced with a network-based Lotus Notes database. This database was made available to all users. Creating this electronic system greatly facilitated the process of integrating AEC's various management systems (for quality, safety and environment) into a single database, structured to reflect the way it does business.

How it was achieved

System integration

AEC has had a quality management system in place since it was first established. During 1993/1994, it was decided that a formal review and certification by an independent third party would be of benefit to AEC and would also give the system credibility with its clients. Initially, the separate business units within AEC applied for and achieved certification separately. The certification to ISO9001 for all operations was achieved during 1994. One of the consequences of AEC's business units being

certified separately was that AEC had to undergo four separate surveillance audits/recertification processes each year, leading to the situation where the certifying body was auditing some part of its operations approximately every three months. This became very cumbersome and time consuming and was, clearly, not cost effective. During the year preceding the implementation of environmental management, it was decided to incorporate all of AEC's operations into a single, multi-site certificate. This was seen by AEC's management as a very practical and useful 'continuous improvement' initiative.

The 'cultural' change in accepting 'environmental' procedures was never an issue within AEC, due to the existing ISO9001 system being well established (the company was well past the first triennial assessment by a third party) at the time the decision was made to achieve certification to ISO14001. The real issue (and benefit) was the initiative to develop an integrated management system, where single procedures were produced encompassing quality, environmental and safety issues in a single instruction. Unfortunately, AEC was unable to fully include safety into the integrated procedures. This was due to significant changes at the same time in the organisation's approach to safety management, which led to a parallel database for safety procedures being established.

Development process

As noted above, a directive from ABB's corporate head office had requested that all ABB companies in the world achieve certification by the end of 1998. In addition, AEC had recognised that its customers were increasingly expecting it to offer environmental management as part of its overall services. At this time, AEC had developed much of the necessary capability to achieve certification as a consequence of its growing experience in meeting environmental management issues on existing projects.

Where an existing management system has been produced to meet the requirements of the ISO9000 series of standards, the elements common to ISO14001 need very little adjustment to ensure they address environmental issues. The common elements, which had already been addressed through AEC's certified quality system, included management review, planning, document control and records. Tailoring these procedures to meet the requirements of ISO14001 was considered a lower priority, as any changes required to these procedures were minimal. Therefore, it was the elements in ISO14001 that differed significantly from AEC's certified quality management system that were targeted first. These elements were policy, environmental aspects and impacts,

objectives and targets, an environmental program, defining significance, emergency response and continuous improvement.

The process of producing the new integrated system became the responsibility of the Manager, Quality and Environment, who became the driver of the initiative. It is important to recognise that AEC's executive management had given the Manager, Quality and Environment the responsibility and the necessary authority for ensuring that the system of environmental management would be implemented and certified. This senior management commitment was supplemented by the provision of the necessary resources (both internal personnel and the hiring of external expertise) to ensure the system was implemented. In addition, a cost recording process was put in place to monitor the costs of implementation.

Policy

AEC's existing health, safety and environment policy already included many of the environmental initiatives required by ISO14001. The additional changes required to meet ISO14001 were minimal and, as a consequence, were readily accepted by executive management and the workforce.

Procedures

The next phase of developing the system of environmental management involved writing the new procedures. As discussed above, the first procedures developed were the environmental management elements of ISO14001, in particular, identifying environmental risk (aspects and impacts), identifying impacts that could escalate into incidents (assessing significance), setting the objectives and targets for each location and developing an environmental program.

The company had recently installed, globally, a computerised network using Lotus Notes, where existing quality system procedures had been changed into a flow process/matrix type format (see Table 6.1). These procedures were centrally controlled and amended from a single source. Following this restructure of the procedures it was the opportune moment for the company to embark upon certification to ISO14001.

As each procedure was produced, it was distributed to all management for review and comment. Tight schedules were placed on the return of comments to meet the deadline for certification set by the managing director. The key to acceptance of the procedures across the

Table 6.1 AEC procedure format

No.	Activity	Who	Reference	Output	Comments
1	At kick-off stage of any facility, project/contract, determine if any operations have environmentally sensitive aspects. May have been determined at estimate stage. Ref: OP-BD-02	PM/ SM LECO PE DE	Contract specification, location map, local acts and statutes, previous audits, monitoring data, employee/customer/ public complaints Exh. 1 (maps) ☐ List of Acts C-PM-02.1 ☐	Kick-off checklist. Summary of A+Is (Summary of Environmental Aspects and Impacts) JSEA C-PM-01.1 JSEA S-350/351 A+I-1-BL	The identification of environmental aspects for the scope of work, new/modified facilities, operations to be performed and plant/ equipment to be used shall be listed on the summary sheet/JSEA form for analysis, prior to commencement of work (site or factory). For projects, within one week of site establishments.
2	Review all aspects listed on the summary sheet or the JSEAs to determine potential impact on the environment. (Note: summary sheets only may be used for a fixed site.)	PM/ SM LECO DE	Summary sheet/JSEA Location map Process map Local acts and status Previous audits	Summary sheet/JSEA Approval (sign and date) Establish metric to monitor and report outcomes Summary sheet A+I-1-BL	The relationship of aspects and impacts is one of cause and effect (actual and potential) (a register of effects may be of assistance in establishing monitors). May produce a cause and effect diagram. Generic A+Is C-PC-02. 2
3	Conduct a risk assessment of all environmental impacts identified.	PM/ SM LECO (Team)	Summary sheet/JSEA (cause and effect program) Ref: OP-PC-01.3 ☐ Ref: OP-PC-05.1 ☐	Evaluation (report) List of effects summary sheet/JSEAs (listing aspect and impacts)	Analysis may include - immediate employee impact - immediate environmental impact - regulatory compliance - best practice compliance - long term effect Generic A+Is OP-PC-02.2

organisation was to make the procedures sufficiently generic to be acceptable to all the operations within AEC (that is, construction, maintenance, administration, transmission lines, fabrication and manufacturing). At this stage, to ensure that AEC was proceeding in the right direction, its third party certification body (Lloyds Register Quality Assurance) held a document review session. After the incorporation of the comments received from Lloyds, the suite of new procedures was presented to AEC's managing director for final acceptance and approval.

Ideally, all employees should be involved in the development of procedures. However, it was agreed that only a limited number of employees needed to be included. The emphasis on the elements of ISO14001 that differed from the requirements of ISO9000 meant that most of the new procedures developed related to management processes. In addition, the major environmental impacts addressed (such as greenhouse gas emissions) were of a management decision level. As a consequence, it was considered sufficient to only involve middle and senior management in procedure development.

Integrated management

A generic list of company procedures is presented in Table 6.2. It is evident that these procedures do not follow the elements of any standard. In fact, the procedures were designed to address the way AEC does business, commencing from business development through to project management, engineering, construction and, finally, commissioning. To be accepted by AEC's managers and employees, the environmental procedures had to fit into the business structure. Those procedures that already addressed the common elements in both ISO9000 and ISO14001 (such as document control, management review, records) only required minor adjustment to ensure they adequately addressed environmental issues. The unique environmental procedures were then inserted into that part of AEC's overall system of procedures where they would be recognised and become most effective. The specific environmental procedures developed were project management, determination of environmental aspects and impacts, emergency planning and recovery, environmental planning and administration, environmental objectives and targets, process management, job safety and environmental analysis, environmental control and monitoring and measurement of environmental performance.

Obviously none of this could have been achieved without support and approval from senior management and intensive training. Initially,

Table 6.2 AEC generic list of procedures

ISO9001 clause no.	ISO14001 clause no.	Operational procedures	Description
4.1.2	4.1/4.4.3	OP-0	Integrated Management System—Operational Manual
4.2.1	4.2/4.4.3	Policy Manual	Policies—Quality, Safety, Environment
4.1.3	4.4.3/4.6	OP-MG-01	Management Review & Communication
4.1.1		OP-MG-02	Quality & Environmental Management System
4.3		OP-BD-01	Business Development—Planning & Reporting
4.3	4.3.1	OP-BD-02	Business Development—Tender & Contract Review
		OP-FM-01	Project Financial Authorities—Budgets & Forecasts
		OP-FM-02	Insurances
		OP-FM-03	Credit Management
4.2.3	4.3.1	OP-PM-01	Project Management—Start-Pack
4.2.3	4.3.1	OP-PM-02	Project Management—Project Kick-Off
	4.3.1/2/3/4	OP-PM-02.1	Project Management—Determination of Environmental Impacts & Risk Assessment
4.9	4.3.1	OP-PM-04	Project Management—Site Establishment
	4.4.7	OP-PM-04.2	Project Management—Emergency Planning & Recovery
4.9		OP-PM-04.3	Project Management—Plant & Equipment
	4.3.1	OP-PM-05	Project Management—Planning & Administration
	4.3.1/4	OP-PM-05.1	Project Management—Environmental Planning & Admin.
	4.3.3/4	OP-PM-05.2	Project Management—Environmental Objectives & Targets
4.19		OP-PM-06	Project Management—Servicing Requirements
4.1.3	4.4.3/4.6	OP-PM-07	Project Management—Project Review/Reporting
4.4.4	4.3.1	OP-DS-01	Engineering—Tender Design (Major Projects)
4.4.5	4.3.1	OP-DS-02	Engineering—Contract Design (Major Projects)
4.4	4.3.1	OP-DS-03	Engineering—Minor Projects
		OP-DS-04	Engineering—HAZOPS
4.5	4.4.5	OP-DC-01	Document Control—General
4.5.1/3	4.4.3/4/5	OP-DC-02	Document Control—Preparation & Issue of Documentation
4.5	4.4.5	OP-DC-03	Document Control—Site
4.5	4.4.5	OP-DC-04	Document Control—Manufacturing
4.16	4.4.5/6	OP-DC-05	Document Control—Records & Archives
	4.5.3	OP-DC-06	Document Control—Management of Records
		OP-DC-07	Document Control—Archiving of Files
		OP-DC-08	Document Control—AEC—Disposal Schedule
4.6	4.4.6	OP-SM-01	Supply Management—Procurement
4.6.2	4.4.6	OP-SM-02	Supply Management—Supplier/Subcontractor Selection
4.6.4.1/2		OP-SM-03	Supply Management—Expediting/Monitoring
4.10.2		OP-SM-04	Supply Management—Material Control
4.15		OP-SM-05	Supply Management—Handling, Storage, Pack. & Delivery

ISO9001 clause no.	ISO14001 clause no.	Operational procedures	Description
4.9	4.4.6	OP-PC-01	Process Management—Construction
4.9		OP-PC-01.1	Process Management—Construction (Civil)
		OP-PC-01.2	Process Management—Work Permit Administration
	4.4.6	OP-PC-01.3	Process Management—Job Safety & Environmental Analysis
4.9		OP-PC-01.4	Process Management—Construction (Structural)
4.9		OP-PC-01.5	Process Management—Construction (Piping)
4.9		OP-PC-01.6	Process Management—Construction (Mech./Elec. Equip.)
4.9	4.4.6	OP-PC-02	Process Management—Manufacturing
	4.4.6	OP-PC-02.1	Process Management—Environmental Control (All Sites)
	4.5.1	OP-PC-02.2	Process Management—Monitoring, Meas't of Env. Perf.
4.10	4.5.1/2	OP-PC-03	Process Management—Inspection, Testing & Verification
4.11	4.5.1	OP-PC-04	Process Management—Calibration
4.18	4.4.2	OP-HR-01	Human Resources—Arranging, Delivering Training
	4.4.2	OP-HR-01.1	Human Resources—Identification of Training Needs (Salary)
	4.4.2	OP-HR-01.2	Human Resources—Identification of Training Needs (Wages)
4.1.2.1	4.4.1	OP-HR-02	Human Resources—Position outlines
	4.4.2	OP-HR-03	Human Resources—Staff Inductions
4.17	4.5.4	OP-QM-01	Compliance Audits—IMS
4.14	4.5.2	OP-QM-02	Corrective & Preventative Action
4.20	4.5.1	OP-QM-03	Statistical Process Control

a presentation was made to management detailing the proposed aims, changes and implementation strategy. It was only once the strategy had approval from management (and a budget approved by the CEO and the finance manager) that the actual work of implementing the system could proceed.

It is relatively easy to write and issue procedures. The real test is to make them readily available, easily understood and workable to all personnel who need to use and follow the procedures. The implementation of an EMS would not have been considered if there were any serious doubts regarding the commitment of AEC's management and people to the process. The general consensus was that the majority of its operations already incorporated good environmental management practices in some form or other, even if the word environment was not explicitly highlighted. It was evident from AEC's safety management activities, particularly on petrochemical sites, that it was managing most

of the basic issues already. It had conducted risk assessment studies and had an established risk management committee formed from senior management.

Initial environmental status

AEC's environmental champion was the existing quality manager, who had been instrumental in establishing the ISO9001 system and the subsequent development of the revised electronic management system. It was logical to allow the quality manager to manage the 'environmental' system. Adding in the environmental elements to the existing system was the easy part; the implementation process was where specialist expertise was required.

Due to the nature of the company, with several fixed locations and many project operations throughout Australia and the Pacific Rim, certification for a multi-site operation was the most cost-effective option for AEC. The reason is that it is only necessary to have two visits (a total of twelve person-days) per year by the third party auditors. This minimises the costs of certification, as well as reducing the amount of management time and effort that needs to be invested in the certification process.

It was critical that the current regulatory compliance status of the company be established before any system or procedures could be implemented. It was, therefore, necessary to audit all of AEC's locations prior to the initial third party audit. Environmental consultants were contracted to conduct compliance audits on the major fabrication facilities. In parallel with this audit process, various environmental procedures were developed and partially implemented. At one of AEC's major facilities a management systems gap analysis was conducted, as part of the compliance audit, to determine if the procedures produced met the requirements of the ISO14001 Standard. Following these audits, the resulting reports provided an excellent indication of AEC's compliance status and identified the remedial actions required to meet local environmental legislation. During this period, which spanned several months, training commenced on environmental awareness for the employees (see Training and environmental responsibility below).

As AEC's projects and maintenance operations across the country comprised similar activities and used the same basic plant and equipment, it was relatively easy to determine if these other operations were also in compliance with relevant legislation and regulations. As part of the process of developing the system, it was necessary to establish central/corporate controls on audits, procedures, work instructions,

Table 6.3 Extract from typical aspects and impacts register

Activity	Activity leading to aspect/impact	Environmental aspect	Environmental impact(s)	Rating of significance
	Fuel storage	Storage tanks, leaks or seepage (migration)	Soil, stormwater, groundwater contamination	1,3,2,2,2,0,0,1, 11
Construction activities—earthworks/ excavations	Vehicles, equipment	Erosion, slope instability, silting of watercourse Oil leaks, spillage Stormwater Vehicle fumes Noise Dust	Silting of watercourses Damage to marine life	1,3,2,2,2,0,0,1 11
	Drilling/boring	Removal/disposal of spoil	Landfill concern, location of borrow pits, spoil etc.	1,3,2,2,2,0,0,1 11
	Explosives (handling and use)	Storage (AS 2187) Noise/vibration Dust Penetration of aquifers Unfilled holes		10,3,3,3,3,0,1,2 25
	Explosives (storage)	Blast walls/ magazine (safety)	Socio-economic damage Flora and fauna habitat Licences/legislation	1,3,3,3,2,0,3,2 17
Civils	Concrete	Stormwater and groundwater pollution	Raising of sediment and pH levels in watercourse	1,3,2,2,2,0,0,1 11
		Damage to unexpected underground service	Raising of silt and sediment levels, penetration of aquifer	1,3,2,2,2,0,0,1 11

legislation (library of acts and regulations), reports, general information and the review of overall compliance.

Environmental aspects and impacts

Most of AEC's operations (both factories and project sites) have significant effects on the environment. Through the integrated management system, each operation and site is obliged to identify the environmental aspects and potential impacts associated with its everyday business activities. To establish these aspects and impacts, a review of environmental issues is conducted for every project at the kick-off stage (that is, following contract award).

At the project kick-off, the project manager and the environmental officer review the contract requirements, the proposed operations (work breakdown), proposed equipment, local legislation and any environmental issues identified in the environmental impact statement (if available). From this review an initial register of aspects and impacts is produced. The general issues that need to be considered for construction activities are air quality, stormwater, waste water, noise, traffic, flora and fauna, archaeology, visual amenity and emergency response. Most of these issues are very generic and are defined in the relevant acts and regulations for the respective state. Means of prevention for these are detailed in the Building Code of Australia (the 'Blue Book'). Utilising the information from the Blue Book and other informative literature (such as the 'Wet Tropics Code of Practice'), AEC was able to produce detailed work instructions to cover its particular type of work.

Environmental significance

AEC developed a set of questions and a scoring system to determine the significance of each environmental impact and to identify priority issues for management attention. Environmental impacts scoring 10 or above are deemed significant and require some form of action. Those impacts scoring 10 or higher are also included in the site register of significant environmental aspects and impacts.

Environmental objectives and targets

The identified significant impacts form the basis for the site environmental objectives. The objectives are usually to be actioned and completed within the life of the project. For fixed locations (such as the fabrication facilities and offices), these objectives were established during the initial setting up of the system (first pass audits) and have been reviewed regularly to address any changes in the facility or operations. The impacts scoring below 10 are not neglected; they are reviewed after the significant impacts have been actioned, to determine if they have since become more significant (for example, as a consequence of changes in legislation). All the objectives listed are reviewed and actions to prevent or mitigate the impacts are developed and agreed with all relevant stakeholders. AEC's internal audit, monthly reporting and management review processes all help ensure that the objectives and targets are progressed to completion within the agreed timeframes.

The objectives set out in the site program are, generally, first identified and considered during the initial commercial risk analysis and

Table 6.4 Determining significance

	Issue	Rating	
1	Regulatory issue? (licences, permits, etc.)	0	No
		1	Could become an issue
		10	Yes
2	Direct ABB responsibility?	0	None
		2	Partial
		3	Total
3	Environmental policy issue?	0	No
		1	Minor impact
		2	Substantial impact
		3	Major impact
4	Environmental objective/target issue?	0	No
		1	Minor impact
		2	Substantial impact
		3	Major impact
5	Possible threat or risk to company? (includes accidental discharge)	0	No risk or exposure
		1	Minimal
		2	Substantial
		3	Major
6	Waste minimisation issue?	0	No loss
		1	Minor loss
		2	Substantial loss
		3	Major loss
7	Natural resources conservation issue? (energy, gas, water, fuel, etc.)	0	No
		1	Minimal
		2	Substantial
		3	Major
8	Community complaint issue?	0	Not an issue
		1	Minimal
		2	Substantial
		3	Major

the estimating process prior to contract award. These are then reviewed following contract award and are accepted as part of site activities. However, they also represent potentially significant environmental impacts and need to be monitored during the course of the project life. An example of typical site management objectives is presented in Table 6.5.

Training and environmental responsibility

Training and education have proved to be the most time consuming and frustrating parts of AEC's implementation of an EMS. This is a particular consequence of AEC being a multi-site organisation, spread across Australia and South-East Asia.

Environmental awareness training commenced in parallel to the site

Table 6.5 Typical site management objectives

	PTR division: Middle Ridge–Oakey 110kV Queensland		Construction Manager: Angelo Capello Project Manager: Sam Rantucci LECO: Sam Rantucci
1.1	Reduce the risk of socio-economic and ecological damage	Complete by FEB 99	Obtain explosives licences. Provide suitable storage/containment. Ensure correct procedures available. Only licensed personnel to be used.
1.2	Reduce the risk of socio-economic and ecological damage	FEB 99 and ongoing	Provide weed management instructions. Ensure vehicle washdown in place. Provide recognition of weeds (training). Comply with powerlink 'green sticker'.
1.3	Reduce the risk of damage to archaeological and culturally significant areas	Complete by FEB 99	Provide work instructions and the means to identify areas of archaeological significance, ensuring these areas are clearly identified and avoided where possible.
1.4	Reduce impact of noise emissions	MAY 99 and ongoing	Conduct noise monitoring survey at selected locations around site to establish base-line data on emissions. Ensure all work related noise is restricted to working times allocated.
1.5	Reduce risk of groundwater/ stormwater contamination	FEB 99 and ongoing	Provide spill kits (i.e. drysorb and black rubbish bags) on site at strategic locations.
1.6	Reduce risk of groundwater/ stormwater contamination	FEB 99 and ongoing	Prevent contamination of soil/watercourse by providing preventative procedures & initiate monitoring activities (weekly auditing of activities).
1.7	Reduce risk of erosion	Complete by FEB 99	Minimise soil erosion by implementing erosion control methods as defined in the environmental work instructions. Issue work instructions to foundation/erection crews at induction.

auditing process. AEC used consultants for the initial major site audits, the initial environmental awareness training and the initial Local Environmental Control Officer (LECO) workshops. With the awareness training, AEC used the consultants at two major sites. It then used an in-house training package, customised to reflect the company's policies, to cover the other sites. The same strategy was employed for the LECO workshops. Initially AEC used the consultants for three major sites (factories) where their specialised expertise was necessary. Then, utilising an internally produced training package, it provided the training workshop at the other AEC locations.

The training packages have been extensively developed to include actual site experiences and have now evolved to a situation where they

convey a very practical hands-on knowledge of how the company addresses environmental issues in real situations.

Each location and site has appointed a minimum of one LECO. The LECO has the responsibility for identifying and reporting all environmental aspects of the site and assisting in the mitigation of impacts relating to these aspects. Each site is obliged to establish a program of environmental objectives and targets during the life of the project.

The current status and the future

AEC's integrated management system has developed into a substantial database of procedures, work instructions, plans, forms and other necessary tools to drive an engineering and construction business. Including environmental management into its overall management system has allowed AEC to serve its customers' needs better and, in fact, has given it a technical edge over its competitors. The certification of its management system to ISO14001 allows it to not only better understand the environmental impact statement documents that are a familiar part of all the major works tenders it bids for, but also to demonstrate that it can meet these requirements in the way it does business.

AEC plans to be around for the long haul and it is important that it demonstrates that it is a good corporate citizen. Through a common database on its internal computer network, AEC has constant access to environmental issues encountered by the company all over the world. In addition, ABB compiles and issues an annual environmental management report that details the company's research and development achievements, the development and application of best available technology and new environmental initiatives in areas such as energy reduction, greenhouse gas emissions reductions and pollution prevention. These issues are constantly reviewed by AEC to determine how it can become part of the 'big picture', make significant contributions to environmental protection and still be cost effective. Some of these issues have been incorporated into its local initiatives such as becoming a signatory to the Australian government's Greenhouse Challenge. These local initiatives are issued to each division within AEC to review for incorporation at local level (that is, to form part of the aspects and impacts on fixed sites or projects).

Case study: The Greenhouse Challenge

To develop its commitment to sustainable development and to support the Australian government in meeting its international greenhouse commitments, AEC made a conscious decision to become a signatory to the Greenhouse Challenge program. The program commits AEC to reducing greenhouse gases over a period of time. As a starting point in this process, it examined its operations and identified that some of the initiatives already started as part of its overall environmental improvements also contributed to a reduction in greenhouse gas emissions.

As most of AEC's projects are contract driven, environmental impact studies and licence agreements have already been established by its clients. Therefore, it has been agreed with the Australian Greenhouse Office that the initiatives listed on AEC's Greenhouse Challenge agreement will only apply to its fixed sites (that is, its fabrication facilities). Its fabrication shops, offices, plant and equipment use significant amounts of energy. Its monitoring of energy usage over the last three years has enabled AEC to establish targets for reductions in energy usage. Its policy is not only to reduce energy usage, but also to put something back through constructing carbon sink(s) within its premises across Australia.

These initiatives were incorporated into site objectives and targets, with the overall aim being to reduce greenhouse gas emissions through a combination of energy savings, the use of carbon sinks, recycling and waste reduction. Figure 6.6 provides an illustration of typical site environmental objectives and targets. Each of these initiatives is discussed briefly below.

The three main fabrication shops, Tomago, Clayton and Kwinana, together with Head Office in Sydney will continue to pursue a reduction in electricity consumption. This will be achieved through four main strategies, namely by incorporating automatic shutdown of machinery and office equipment when not in use, the installation of 'intelligent' management systems for office lighting, refinements in compressed air usage and further employee training and education. AEC also has a significant number of vehicles, plant and equipment that use various fuels for their operations (petrol, diesel, gas). A new planned maintenance program is being implemented to ensure each piece of equipment is running efficiently with optimum performance, thus minimising the use of fuel/energy. In addition, each item of plant and equipment is being examined to determine its suitability for conversion to alternative fuel sources (such as LPG).

Other environmental initiatives

Although the three main fabrication facility sites are not large, they contain areas where erosion and wind-blown dust can cause environmental concerns. Planning has commenced on the revegetation of significant sections of each site, where groundcover and stability can be established by the planting of trees and shrubs. The benefits include the improved appearance of AEC's facilities and providing carbon sequestration (that is, acting as a carbon sink). In addition, in the case of its major site in Tomago (near Newcastle, New South Wales), tree planting helps minimise soil instability in an area that is prone to erosion and to sand and dust migration into the adjacent catchment area. The tree planting on the Tomago site will consist of a riparian corridor linking existing and remnant native vegetation in the catchment area. The planting and direct seeded areas include mixed tree species, shrubs and grasses. This will also apply to a lesser degree at the two other sites in Victoria and Western Australia. Access to these areas is denied to the general public as they are private land, fenced and in mainly industrial areas. The company will fully fund the materials, labour and administrative costs of the tree planting projects. There may also be the opportunity to involve the local community (primary school) in the planting at Tomago as a local school project.

One of AEC's obvious environmental impacts is waste generation. It has adopted a range of initiatives that have been aimed at reducing waste generation. Many of these initiatives have also provided significant benefits in terms of reduced energy consumption. For example, many of AEC's construction sites involve the demolition of existing infrastructure. During these operations, concrete components, timber, steel (rails) and other various fittings and fixtures are reused or recycled, thereby avoiding the need for new items to be produced. As another example, the major commodity used by AEC is steel. An improvement program to optimise the use of steel and reduce the quantity of steel waste produced in fabrication shops commenced several years ago. This has resulted in less steel waste. New initiatives have been devised to further minimise steel waste by expanding this program to all manufacturing operations and improving the quality of all activities, helping further reduce the quantities of scrap produced. This commitment to waste reduction applies at all levels of AEC's operations. It provides ongoing employee education and training in recycling and waste reduction issues, covering all aspects of its operations. Even in its offices, it emphasises the importance of reducing paper waste and provides cups

Table 6.6 Tomago fabrication facility: objectives and targets

Objective	Target	Actions required	Completion date	Performance measure(s)	Monitoring & reporting period	Responsible person
1. Reduce impact of greenhouse gas emissions—energy usage	Monitor energy usage and determine a reduction strategy	Commence recording of energy usage—Jan. 99	Jan.–Dec. 99	Hours worked versus Kwh	Quarterly	Factory manager (G. Clabrough)
2. Reduce impact of greenhouse gas emissions—carbon sink	Planting of trees/shrubs to reduce carbon dioxide in atmosphere	– Determine number of trees/shrubs – Planting program – Ongoing review	By June 99 Commence Aug. 99	Area (acres) No. of plants	Quarterly	Factory manager (G. Clabrough)
3. Reduce impact of landfill—waste reduction	Determine a waste reduction strategy for steel and paper usage	– Determine steel waste – Set a benchmark (e.g. 12% scrap) – 3 year reduction plan	Start Jan. 99	Total tonnes purchased Total tonnes scrap (%)	6 monthly	Factory manager (G. Clabrough)
4. Reduce potential for stormwater or groundwater pollution—oil leak or spill from waste oil storage	Prevention of contamination to ground or catchment areas	– Provision of bunding to divert run-off – Provision of spill kits at strategic locations (additional areas to be determined)	Completion by May 99 Completion by May 99	Completed? Yes/No Completed? Yes/No	Internal audit	G. Clabrough S. Wallace (audit)

Objective	Target	Actions required	Completion date	Performance measure(s)	Monitoring & reporting period	Responsible person
5. Reduce potential for stormwater or groundwater pollution—cleaning solvent leak or spill from chemical storage and compressor shed	Prevention of contamination to ground or catchment areas	– Provision of spill kits within store and containment within bunding	Completion by May 99	Completed? Yes/No	Internal audit	C. Pistachia S. Wallace (audit)
6. Reduce potential for stormwater or groundwater pollution—liquid waste and residue removal	Prevention of contamination to ground or catchment areas	– Provision of spill kits within store and containment – Assessment of subcontractors and licensed waste contractor	Completion by May 99	All suppliers/ subcontractors	Internal audit	C. Pistachia A. Read (Supp.) S. Wallace (audit)

or mugs to employees, eliminating the need for the purchase of disposable plastic or paper cups.

Lessons learned

The implementation of an EMS has provided many benefits to AEC, particularly the status of the company operations in relation to regulatory compliance on the fixed sites. There have also been a number of important lessons learned from the process.

First of all, it is important to avoid extensive (or over) use of consultants. The problem with using consultants is that you can end up with their interpretation of the standard and their prejudices on the best way to manage environmental issues. However, consultants can walk away from the developed system, possibly leaving behind a system that does not meet organisational requirements. Having said that, consultants do have an important role to play in situations where specialist expertise is required (for example, site contamination, hazardous waste disposal). This specialist expertise is particularly important where there are regulatory requirements involved. In AEC's case, it used consultants early in the implementation process to audit the sites for compliance, to conduct a 'gap analysis' of the system against the requirements of ISO14001 and to provide initial environmental awareness training. AEC still uses consultants for ongoing improvements to its fixed sites, particularly soil contamination studies and for legislative advice.

Second, it is essential that companies take responsibility for their management systems and ensure that the development and implementation of management systems are carefully managed on a day-by-day basis. If at all possible, organisations should nominate an environmental champion who is responsible for implementing the system. The environmental champion must also have the authority to ensure that the system is implemented and that the necessary resources and support are available. The environmental champion does not necessarily have to be the organisation's quality manager. However, it is important that the environmental champion is a senior manager, as this is a tangible demonstration of senior management's commitment to environmental management. In addition, noting the comments above regarding the use of consultants, it is strongly recommended that organisations develop their own in-house expertise. This could be achieved either by employing an environmental expert or by training the environmental champion. The whole point is that there must be ownership of the

system. The individual driving the implementation process (and following on with the management) really requires a detailed knowledge of the company and how it operates, and must also be prepared to take responsibility for the longer term effective operation of the system.

Timing is crucial, but it is also a luxury that is frequently not available. If one has the luxury of time and adequate resources, it is certainly better if one can proceed with management system development and implementation processes slowly. AEC had an extremely tight schedule for the development and implementation of its EMS. It had a defined completion date from ABB Corporate that was significantly reduced by its local executive. Initially it was about 75 per cent ready by the first visit by Lloyd's (desktop review). Following the desktop review, it had a list of actions to help it address the crucial areas. If it had had more time to set up and implement the system, particularly training and compilation of records, the initial assessment would have had a better result. Notwithstanding this, AEC did manage to achieve certification at the first attempt.

Current status

At the time of writing, AEC is almost two years into managing environmental issues in all operations. Its view is that the benefits attained have far outweighed the cost and effort. The company is certified to ISO14001 and has submitted a Letter of Intent to the Australian Greenhouse Office to become a signatory to the Australian Greenhouse Challenge. At the time of writing, the issue of a Cooperative Agreement is imminent. Energy consumption has been reduced at head office and energy monitoring is now in place at all fixed locations. All of AEC's operations practice good environmental management through the implementation of the system. Its fixed locations, both factories and offices, have taken on a more attractive appearance through 'greening' and the reduction of waste. The project sites are more visibly tidy and stormwater and erosion controls are more widely used and visible than was the case in the past. The benefits include having a favourable impression on clients as well as providing a tangible demonstration of environmental improvement.

AEC has also found that having a structured management system in place helps it respond to issues as they arise. It had a minor legislative infringement at one of its factories, in the form of an accidental discharge to the stormwater drainage system. This discharge of contaminated water, containing a small amount of heavy metal, was caused by

the shutting down of the process plant for maintenance purposes. Due to the water treatment plant being shut down shortly before the process plant was shut down, a small quantity of untreated water was discharged to the drains. The manual monitoring process in operation at the facility at the time of the incident did not detect the discharge, but a routine check by the local authority did pick up the problem (increased levels of pollutants). The process operations were listed on the aspects and impacts register and the discharge from these operations had been identified as a 'significant' impact. However, the control measures in place were inadequate (as evidenced by the occurrence of the incident). As a result of the incident, it was necessary to totally review the process, implement revised procedures for maintenance activities and implement more rigorous monitoring, sampling and testing. A long term, fail-safe solution, including electronic monitoring and emergency shut-off systems, which will involve capital expenditure, has been budgeted for in the next financial year. The proposed solutions have been accepted by the local authority. The key lesson learned from this experience was the importance of reviewing the aspects and impacts on a regular basis to ensure they have been analysed accurately and to ensure that the controls (technical and operational) are suitable. The benefit of the EMS was that it enabled AEC to determine the root causes of the incident and provided it with a decision-making framework to identify suitable solutions. It also helped it implement systems to minimise the likelihood of such an event occurring again.

Conclusions

The inclusion of 'environment' into AEC's language has certainly broadened its approach to many of the activities that it is involved in. As one of the first construction companies in Australia to achieve certification to ISO14001, AEC's management system has provided it with the means to say 'yes' to environmental issues that its competitors cannot answer. In addition, there are substantial financial benefits associated with monitoring and streamlining processes and activities to enable better distribution of resources. AEC has benefited from cost savings due to reduced energy and electricity usage, reduced waste generation (and hence, reduced landfill costs) and material use optimisation. However, like quality management, the playing field will level out with more and more companies achieving certification to ISO14001 and adopting their own environmental initiatives. By this time, AEC

hopes that it will have developed its initiatives further to keep it at the forefront of the industry based on its environmental performance.

As an environmentally sensitive company and as a future environmental initiative, AEC feels it has a duty to pass on the knowledge and possible benefits it has gained to both its supplier/subcontractor chain and, in particular, its customers. AEC sees this as part of its continuous improvement cycle and as the next stage in its environmental management processes. To this end it is analysing its major suppliers (covered by its national agreements) to determine their environmental standing. From this database AEC will identify those that it feels require assistance in developing some form of environmental management, in areas such as their sourcing of raw materials or in the improvement of processes or methods to reduce energy use and/or greenhouse gas emissions.

The implementation of an EMS has enhanced AEC's overall business performance and increased its capability to meet its clients' requirements. It has also raised its corporate image in the international community through being an integral part of an environmentally sensitive global company (ABB) and being the first segment of that company to achieve ISO14001 certification.

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7 Argyle Diamond Mines

Rebecca Knol

Introduction

Argyle Diamond Mines (Argyle), based in the East Kimberley region of Western Australia, is the world's largest producer of diamonds. In 1997, Argyle commenced the development and implementation of an environmental management system (EMS) based on the ISO14001 Standard across its operations division. The system was implemented in a ten-month timeframe and was certified in December 1997. Argyle was the second Rio Tinto Business Unit to achieve certification to ISO14001.

Company description

Argyle's mine site is located 100 km south of Kununurra in the Kimberley region of Western Australia. The mine is situated in the headwaters of Smoke and Limestone creeks, both of which drain into Lake Argyle about 35 km north-east of the main ore body. Diamonds are currently mined from the AK1 lamproite pipe and from the alluvial gravels in Smoke Creek.

The Argyle Diamond Mines Joint Venture (ADMJV) was established in 1982 to provide for the development, mining and management of the diamond interests of the participants. The resource-based companies Rio Tinto Limited and Ashton Mining Limited hold 59.7 per cent and 40.1 per cent respectively of the ADMJV. The remaining 0.2 per cent is held by the Western Australian Diamond Trust. The manager of the ADMJV is Argyle Diamond Mines Pty Limited (Argyle/ADM), a wholly-owned subsidiary of Rio Tinto Limited that operates the mine under a management agreement. The Argyle Diamond Mine operates

under a state agreement act, the *Diamond (Argyle Diamond Mines Joint Venture) Agreement Act 1981.*

The mining operation comprises two distinct operations, namely AK1 and alluvials. The AK1 operation involves two mainstream departments (mining and process). A third mainstream department, alluvials, manages the alluvials mining operation. In addition there are two support departments, logistics and health, safety, environment. Approximately 650 personnel are employed by Argyle at the mine site.

The AK1 operation is mined using conventional open cut methods and the alluvial operation is mined using strip mining methods. Argyle mines approximately 38 megatonne (MT) of material per year, of which 11.5 MT is processed. Approximately 40 million carats of diamonds are produced each year. The high stripping ratios (waste/ore mined) result in the generation of a substantial amount of waste rock and the diamond extraction process results in a high proportion of tailings material. The management of these wastes is a primary consideration. On average, approximately 80 hectares of land are disturbed each year.

The environmental section is responsible for the management of environmental programs on site including rehabilitation, waste management, surface and ground water management, environmental education and awareness, flora and fauna protection and environmental research. The development of an EMS enabled the environmental section to transfer the responsibility for sound environmental management to the operational departments.

Driving forces

Argyle's commitment to continued best practice in environmental management at the mine site in the East Kimberley region of Western Australia was the principal driving force underpinning the implementation of an EMS. In a competitive environment it was critical that the system was transparent to the core process, focused on the actual or potential risks to the business, provided a framework for closure planning, was cost effective and was achievable within a twelve-month timeframe.

While comprehensive environmental management programs were already in place at the mine site, the majority of programs had developed and expanded during the mine life but had not been formally reviewed in the context of actual or potential risks to the business. The need to develop a framework for the coordination of environmental programs was identified in 1996.

The system was implemented during a time of declining reserves, declining commodity prices and closure planning. With these economic imperatives, it was critical that the EMS was relevant to the business rather than a bureaucratic layer. Therefore, it was decided that the EMS would only be implemented at the operations site, not in the Perth-based head office.

Another key driver was that the development of an EMS would enable the operation to meet some of the key requirements of both the Rio Tinto Corporate Environmental Policy and the Minerals Council of Australia Code for Environmental Management, of which Rio Tinto is a signatory on behalf of all its Australian operations.

Due to the environmental sensitivity of the region in which the mine operates, environmental management has always been an integral part of the operation. It was recognised that the implementation of an EMS would further strengthen environmental management by providing a strategic framework for addressing significant environmental risks to the business, and would enable the high level of environmental awareness to be maintained and enhanced across the mine.

At the time of implementation, closure planning was being considered, although recent increases in world commodity prices and further developments have extended the mine life. A conceptual closure plan had been prepared, identifying key activities that needed to occur during the decommissioning phase. The implementation of an EMS was seen as a pivotal tool that could be used to incorporate the requirements of mine closure into the operational phase of the mine. The EMS was also seen as assisting in minimising the costs of closure by utilising available resources, facilitating discussions with key stakeholders on closure objectives, facilitating the research required to fulfil closure objectives and rationalising existing monitoring and management programs.

Managing environmental issues

Existing systems

Since the development of the mine in 1982 and the commencement of production in 1985, a comprehensive environmental management program had been in place. Throughout the operational life of the mine, mine practices had been evaluated on an ongoing basis to ensure that management strategies reflected industry best practice and the sensitivities of the receiving environment. Key environmental programs that had been (and continue to be) ongoing included:

- progressive rehabilitation and annual assessment;
- erosion control and sediment monitoring;
- flora and fauna management;
- process waste management;
- solid waste management;
- liquid waste management;
- surface and ground water quality monitoring;
- meteorology monitoring;
- recycling;
- greenhouse gas emission minimisation; and
- internal technical auditing.

Initiation processes

Argyle's commitment to continued best practice in environmental management at the mine site underpinned the implementation of an EMS. In terms of Argyle's overall objectives, it was critical that the system should be focused on the actual or potential risks to the business and should provide a framework for mine closure while also being cost effective.

The ISO14001 Standard was chosen to provide the basis for EMS development as it provided a framework for a systematic and structured approach to environmental management. Existing environmental staff undertook the development of the EMS.

The decision to implement an ISO14001-based EMS was made by Argyle in late 1995. By late 1996, corporate required all sites to implement an EMS and, in late 1997, Rio Tinto required that all site EMSs be verified by a third party.

Implementation process

The initial environmental review was undertaken in late 1996 and implementation of the system commenced in earnest in January 1997. The EMS incorporated the entire operations division, namely, mining, process, logistics, alluvials, health and safety and environment. Two existing environmental team members were allocated to the implementation on a part-time basis. Argyle's environmental team, in collaboration with EMS representatives in each department, ensured the successful implementation of the system by utilising the mine's existing management systems. This approach enabled the EMS to be readily accepted and used by line management, mine employees and contractors working at the site.

Argyle's EMS was developed without the use of customised software. This provided the flexibility to completely integrate the EMS into existing documentation systems and maximise ownership and user-friendliness while minimising costs.

Communicating the business benefits of the EMS to the organisation and gaining organisational support were key steps in the implementation process. While this was time-consuming, as it required a significant amount of one-on-one communication, it was critical that the system was not built on a single individual's energy but on organisational demand and support.

Implementation of the system

Implementation team

Following senior management approval to proceed with the implementation of the EMS, responsibilities were assigned to nominated personnel for EMS development and implementation and EMS tasks were absorbed into these individuals' day-to-day role descriptions. The key positions for EMS development and implementation were the EMS manager, the EMS facilitator, the EMS administrator and EMS representatives from each area of the operation.

The EMS manager was selected from mining to facilitate integrated implementation of the system and carried ultimate accountability for the development, implementation, operation and review of the EMS. The EMS manager was responsible for:

- advising the general manager that the necessary systems were in place to achieve legal compliance;
- triggering the environmental implications of the planning and approval of new projects, upgrades and operational changes through management team meetings;
- forwarding copies of environmental audits to relevant personnel for review and comment on content and accuracy;
- tracking site performance against objectives, targets and resource plans as part of management review of the EMS;
- ensuring that components of the EMS such as the environmental policy were communicated to the site managers and general manager;
- ensuring that appropriate environmental emergency preparedness and response manuals/instructions were developed, implemented, tested, reviewed and improved;
- ensuring the management review of the EMS was undertaken; and

- convening/attending EMS quarterly meetings and preparing/endorsing subsequent reports to senior management.

The EMS facilitator was accountable for the facilitation of continual improvement of the EMS and was responsible for:

- ensuring that the environmental legislation manual continued to meet the needs of the departments;
- ensuring significant environmental issues and impacts were identified, documented and reviewed;
- providing assistance to EMS representatives within departments;
- managing the preparation and submission of reports on environmental performance to corporate and regulatory authorities;
- facilitating and assisting with technical and system audits;
- facilitating and providing specialist environmental awareness training to relevant personnel;
- facilitating the collection, storage, analysis and interpretation of relevant environmental data;
- ensuring that awareness training modules were developed, maintained and approved, commensurate with business needs;
- compiling a quarterly report to senior management;
- managing incoming and outgoing correspondence with regulatory bodies;
- responding to questions from regulatory authorities or members of the general public in relation to environmental matters;
- reporting environmental incidents in accordance with regulatory requirements, community obligations, reporting methods and accountabilities; and
- seeking environmental approval for new or proposed activities from relevant statutory authorities.

The role of the EMS administrator was filled by existing administrative support staff, who were responsible for ensuring that the current versions of documents were available on the intranet, preparing minutes from quarterly EMS team meetings, assisting with the compilation of quarterly reports and providing support to the EMS manager and EMS facilitator as required.

EMS representatives were nominated by the managers in each department and were accountable for ensuring their department was working in accordance with the requirements of the EMS. The EMS representatives were responsible for:

- ensuring that the coordination, identification and ongoing review of the training needs of their department were undertaken;

- assisting the superintendent with the development, management, implementation and monitoring of objectives and targets and associated resource plans within the department;
- reporting monthly to the departmental manager and quarterly to the EMS team on department progress against targets;
- ensuring new documentation or amendments to existing documentation were actioned within an agreed timeframe and to a quality standard;
- identifying the need for additional standard operating procedures and communicating such needs to the department; and
- ensuring the objectives, targets and resource plans were communicated to relevant employees.

This implementation team was responsible for the development of the system and ensuring that the system developed was transparent to the core process and aligned to the business.

Environmental policy

In the development of an environmental policy it was important that the policy honestly reflected the business philosophy and practices. To achieve this aim it was agreed that the policy needed to be prepared by the senior management team in collaboration with the EMS implementation team. When the policy was finalised, it was made available to all staff on the intranet and communicated to all staff at section meetings.

Argyle's environmental policy states: 'Argyle Diamonds will meet Rio Tinto's HSE policy requirements by seeking continual improvement in HSE management, through the setting and reviewing of objectives and targets, assessing and reporting HSE performance, and using best available practices appropriate to the business and local situation.' The context of the policy states: 'Rio Tinto recognises that excellence in managing HSE responsibilities is essential to short and long term business success. Through effective management practices, the Group aims to ensure the health and safety of its employees and to minimise any adverse impacts its activities may have on the environment.'

Based on this policy, the principal objective of the environmental management program at Argyle is to minimise the impact of mining and associated activities on the environment.

Initial environmental review

The first step in the implementation process involved undertaking an initial environmental review (IER), to determine a baseline in relation

to environmental performance. This process involved assessing the environmental issues and impacts that were associated with past and present activities. The IER considered existing documentation such as internal/external audit reports, consultant reports (particularly conclusions and recommendations), annual environmental reports and codes of practice. The IER process also involved numerous interviews with managers, superintendents, supervisors and employees to clarify and further identify potential environmental issues and impacts associated with the operation's activities.

The IER resulted in Argyle having an understanding of the following:

- previous environmental incidents or nonconformances;
- existing policies and procedures dealing with procurement, disposal and contracting activities;
- existing environmental management practices and procedures;
- performance against relevant internal performance criteria, external standards, regulations, codes of practice and guidelines;
- environmental issues associated with its activities, products or services to determine those that have or potentially have significant environmental impacts and liabilities;
- legislative and regulatory requirements;
- perceptions of management and employees;
- stakeholder views; and
- functions or activities of other operational systems that could facilitate or impede environmental performance.

The IER was undertaken prior to the development of an environmental policy in order to develop a platform from which a policy that accurately reflected the current status of the business could be drafted. The IER process also enabled the senior management team to assess the current business performance.

The IER was completed by one of Argyle's environmental staff, with the assistance of an environmental employee from another Rio Tinto site. The use of internal staff helped to maximise inputs to the process, as employees were more likely to reveal past and present practices that had potential and/or actual impacts on the environment and to offer solutions. Furthermore, the IER process facilitated ownership of the EMS by site employees as there was active participation from a range of employees from the shop floor to senior management. An additional benefit of using internal personnel to undertake this part of the EMS process was their prior understanding of the culture of the organisation, both from a corporate and site perspective. Each organisation has a unique culture and understanding that culture is fundamental

to the successful development of a system, if the system is to be relevant to the employees. External personnel may not as readily adapt to the organisational culture and, therefore, are less likely to understand why certain things are done the way they are.

The IER was also used as an awareness training opportunity by introducing the basic concepts of an EMS to each interviewee. This enabled the interviewees to ask questions on a one-on-one basis.

Aspects and impacts

The environmental aspects (issues) identified during the IER process were ranked and categorised according to the perceived risk to the business. To ensure the EMS remained cost effective and relevant to the business, existing tools, systems and procedures were utilised, or built on, wherever possible. In the ranking of issues, the corporate Rio Tinto risk-ranking criteria table, which had been used for auditing, was used. It was not considered appropriate or necessary to spend time and resources developing a new risk-ranking criteria table when one, albeit used for other purposes, already existed. All information from this first stage was recorded in a spreadsheet format (the Aspects (Issues) Register).

Legal and other requirements

As it was important for all employees to understand the legislative and other statutory requirements applicable to the operation, a legal consultant was engaged to prepare an environmental legislation manual. The legislation manual included a review of all state and commonwealth legislation affecting the operation, a review of the State Agreement Act, an overview of legal issues such as employee liability and vicarious liability and the identification of future environmental law developments likely to impact the operation.

The legislation manual was written in plain English and was made available to all site personnel on the intranet. Where legal requirements were not being met (that is, nonconformances), they were recorded as issues in the Aspects (Issues) Register and risk ranked accordingly. Other legal requirements that were being met were not initially included on the Aspects (Issues) Register, as the register was focused on identifying those issues that had a current significant risk to the business. The issues were allocated to the department where the issue was occurring, to ensure that the responsibilities were equally shared by the department and the environmental section.

Table 7.1 An exmple of environmental objectives and targets

Policy	Issue	Objective	Target
Provide training to all employees on environmental issues which may arise as they are carrying out their duties.	Poor handling and management of industrial waste in mining department.	Improve workforce awareness of waste disposal practices.	Train 100% of mining workforce in waste disposal practices using training module, by February 1998.

Objectives and targets

The next step was to develop an objective and a target for each of the issues identified in the Aspects (Issues) Register. The objectives were aimed at broad level improvements in environmental performance such as 'Develop and implement a general environmental induction program'. Objectives were, in turn, supported by specific performance targets such as 'General environmental inductions delivered to 80 per cent of workforce by June 1998'.

The objectives were checked to ensure they were in line with the organisation's environmental policy. One example is provided in Table 7.1. In developing objectives and targets and deciding on priorities, consideration was also given to issues such as legislation and regulations, corporate policies and objectives, environmental impacts, business requirements, operating conditions, financial and technological options and employee/stakeholder views.

Targets were qualified wherever practicable in the following terms:

- attributes (that is, the specific issue to be measured and the units in which performance is to be recorded, such as hydrocarbon incidents or the number of bunded tanks);
- scale (against which the attribute can be ranked, such as 1998 oil spill statistics or licence compliance deviations);
- goal (describing what is to be achieved, such as 5 per cent reduction or the percentage tested); and
- timeframe (that is, when is the target to be achieved, such as by the end of 1998).

The objectives and targets were developed by the EMS representative in consultation with their relevant department to ensure that there was a shared understanding of the issues and associated strategies. The objectives and targets for each issue were added to the Aspects (Issues) Register.

Resource plans and environmental management program

A resource plan was then developed for each objective and target. This plan identified the actions and resources required to achieve a particular target. Resource plans were prepared by the department EMS representatives, with assistance from the environmental section where required. As a minimum the resource plans articulated timeframes for the achievement of targets, accountabilities for achieving objectives and targets, and resources required (money, people, materials, etc.).

The departments each managed their resource plans internally. The environmental section was informed as to where these records were kept so that this information could be referenced in the environmental management program (EMP). The EMP was simply a compilation of departmental resource plans. The EMP was provided for senior management as an overview tool to monitor progress against targets.

Structure and responsibility

The next phase of EMS development was assigning structure and responsibility for the operation of the system. For many organisations, position descriptions are the most logical place to insert descriptions of environmental roles and responsibilities. However, Argyle had over 650 employees, with a high percentage of personnel who had been with the operation since 1985. Position descriptions were not widely used and the development of role descriptions for the sole purpose of including environmental responsibilities was considered inappropriate and overly bureaucratic for the organisation. It was more effective to create a document with generic environmental role descriptions for each level (for example, general manager, manager, senior specialist, technician) that could be posted on the intranet and relevant sections relayed to all employees by supervisors. For example, the managers who carried ultimate accountability for environmental management and performance within their department were responsible for:

- the development of departmental specific objectives and targets;
- communicating and assigning legal and other environmental accountabilities and tasks to relevant department members, as defined by the EMS;
- ensuring all department team leaders were aware of objectives and targets and of the significant or potentially significant environmental impacts relevant to their work;
- ensuring adequate resources and operational procedures were available to meet departmental environmental commitments;

- reviewing and reporting ongoing performance of their department in monthly reports to the general manager;
- reviewing EMS outputs within their department for continual effectiveness and making recommendations for changes as required;
- ensuring nonconformances were assigned, actioned and monitored for the required remedial/corrective actions; and
- attending the annual management review on behalf of the department, and presenting an overview of performance against objectives and targets.

Training, awareness and competence

The development of environmental awareness training guidelines was a critical component of Argyle's EMS. These guidelines were intended to ensure that personnel had the specific skills, knowledge and competency levels to achieve the goals of the environmental policy and that appropriate training was provided where gaps in skills, knowledge and/or competency were identified.

At Argyle three levels of awareness training were already in place prior to the implementation of the EMS: general site induction (including a site orientation and outline of the main environmental issues), area specific awareness training (where area specific environmental issues were highlighted) and communications (or toolbox) meetings (where presentations are given on specific issues such as hydrocarbon, feral animal and chemical management). These were modified to incorporate environmental requirements. As a minimum, the environmental awareness training provided a general level of environmental awareness, an overview of the EMS, an understanding of the business benefits arising from understanding and conforming with Argyle's environmental policy and the requirements of the EMS, and specific responsibilities in relation to environmental management.

The training schedules and programs were updated to cover the issues identified in the Aspects (Issues) Register and were modified when new issues were identified.

Awareness training packages were available on the intranet to all company personnel. Providing training packages electronically assisted the departments to take ownership of environmental management by enabling training material to be accessed without needing the environmental section to deliver the training.

Communication

It was important to ensure that there was clear communication on environmental issues throughout the organisation, and that there was a clear

system for receiving, documenting and responding to relevant communication from external stakeholders. Rather than develop new mechanisms for internal communication, the EMS utilised existing systems such as:

- HSE meetings;
- the site induction program;
- communication meetings;
- daily contact with supervisors and handover meetings;
- project and information meetings;
- the health and safety accident reporting system;
- electronic bulletin boards and mail systems;
- EMS team meetings;
- leaflets/brochures/fact sheets; and
- environmental talks/seminars.

As a minimum the issues communicated to the workforce included the environmental policy, objectives and targets, performance of the department against targets, legal and reporting requirements and results of audits and reviews. It was also recognised that the success of Argyle's EMS would ultimately depend on effective two-way communication between managers and employees. If this were not to occur the system would become out of date and no longer relevant to the business.

Procedures were developed to ensure that there were clear responsibilities and procedures for external communications during normal, abnormal and emergency situations. Responsibilities were assigned from the shop floor to senior management to ensure that all relevant external parties were informed of operational changes that impacted or had the potential to impact the environment. It was particularly important to establish these procedures for emergency situations where external bodies such as the media needed to be contacted.

Environmental management system documentation

Document control was seen as an essential component of the EMS, but it needed to be simple so that everyone could readily access the required information. Most importantly, the environmental section (as a minimum) needed to have a central filing system. To ensure that the environmental section was working in accordance with the model chosen for the EMS (that is, ISO14001), Argyle chose to modify the existing filing system to the format of ISO14001 as follows:

001 Environmental Policy
002 Environmental Aspects
003 Legal and Other Requirements etc.

Subdirectories were then developed under these main headings. For example, under Section 003 Legal and Other Requirements, the subdirectories developed were:

003.1 Legislation Manual
003.2 Legal correspondence
003.3 Government Approvals
003.4 Licences

Establishing a filing system that reflected the structure of the EMS was pivotal to the implementation of Argyle's EMS as it provided a formal structure for environmental management activities and also forced each of the sections to work within the framework of the EMS. The simplified document filing and retrieval procedure also assisted in streamlining auditing processes, especially for the external system certification audits.

Operational control

The next phase in the implementation process was to ensure operational control adequately defined the potential or actual environmental impact of a work practice. While this is often covered by way of a standard operating procedure (SOP), Argyle had hundreds of procedures that did not include an environmental component. In addition, many of these procedures were either out of date or simply not used by employees, due to very low rates of staff turnover. In this instance, updating the SOPs was seen as an expensive and time-consuming step that would add little value to the business.

In an attempt to keep costs to a minimum, a series of 'fact sheets' was developed for each department (such as a mining fact sheet) to raise awareness of issues relating to the environment in a specific area. The fact sheets were very simple and highlighted the activities within each department that had actual or potential environmental impacts, for example, waste management and minimisation, refuelling, general housekeeping, product purchasing, spill response and chemical disposal. The fact sheets were in a format that could be readily updated and were made available on the intranet.

Emergency preparedness and response

The next step in the implementation process was to ensure that there would be an appropriate response to an unexpected or accidental environmental incident. All existing emergency preparedness and

response manuals were updated to incorporate an environmental component that included:

- requirements for the coordination of resources to ensure effective control and clean up after an accident or emergency situation;
- establishing a framework to be used for the coordination of personnel, state government departments and other appropriate organisations during and after an emergency situation;
- providing defined accountabilities for emergency response; and
- establishing mechanisms to ensure periodic testing, reviewing, revision and improvement of response plans was undertaken regularly.

Monitoring and measurement

Monitoring had been undertaken at the site since the start of operations. However, a process to regularly review the appropriateness of the monitoring programs or the data collected was not in place. A procedure was developed to ensure that data were collected on a regular basis for activities that may have a significant environmental impact, and that these data were objective, verifiable and appropriate to the business.

In addition, monitoring programs were rationalised and established to enable the organisation to assess compliance with regulatory standards or licence conditions and to provide data to enable the organisation to meet EMS objectives and targets.

Nonconformance, corrective and preventative action

A procedure to record technical environmental nonconformances was developed that highlighted that nonconformances could be identified through environmental incident records, environmental monitoring, technical environmental audits, consultant reports and deviations from the environmental policy and/or objectives and targets. Nonconformances in the management system itself were identified through system audits, management reviews and quarterly EMS meetings.

At Argyle, appropriate actions were taken to re-establish compliance as soon as practicable. The first step in achieving this was to determine the significance of the actual or potential environmental impact according to the risk-ranking criteria. When this was established, the issue was included on the Aspects (Issues) Register and assigned to a department for the development of an objective, target and resource plan. The solution may have involved changes to SOPs, emergency preparedness and response procedures and other EMS documentation or the identification and implementation of specific training.

Records

Activities within Argyle that are controlled under the EMS needed to be recorded to provide the basis for control, correction, traceability, analysis and audit. These records also provided evidence that the required level of environmental performance had been achieved. The development of a records register was a simple way of providing evidence of the ongoing operation of an EMS. Register details included the following:

- record title (title or description of records, that is, training, equipment calibration, licences, landfill inspections);
- person responsible (that is, responsible for the collection, maintenance and storage of record);
- hard copy or electronic;
- filing system location;
- department (such as process, mining);
- retention time (that is, the minimum retention period for records); and
- comments.

Guidelines for record identification and storage methods were also developed, covering specific issues such as file names in document footers and the daily backup of electronic documents.

Environmental management system audits

As internal environmental audits were already being conducted on a regular basis at the mine site, it was important to differentiate between EMS audits and environmental technical audits. EMS audits reviewed the EMS and identified system issues rather than technical issues. This delineation was also critical for the external EMS auditing process as there was a temptation for auditors to delve into technical issues rather than concentrating on the system and the manner in which the system was operating.

The purpose of the system audits was to determine whether or not the EMS conformed to planned arrangements for environmental management for the organisation, including the requirements of ISO14001, and to ensure the ongoing business relevance of the EMS.

EMS audit scheduling (annually or biannually), planning (internal or external) and preparation (audit team and audit checklist) were required to ensure that the audits accurately reflected business practices and caused minimal interruption to operational processes. The audit process (that is, opening/closing meetings, audit schedule, identification

of nonconformances) was clearly defined to ensure that the audit report was comprehensive and accurately reflected audit findings. It was important for Argyle to develop a pro forma for the audit report to ensure that the audit report was easily integrated with the site EMS. Of prime importance was the documentation of the scope of the audit, personnel involved and references cited (such as consultant reports and findings). This process helped ensure that future audits reflected changes in personnel, scope and references. A procedure for actioning and documenting audit nonconformances was also developed.

Management review

To ensure the ongoing effectiveness of Argyle's EMS it was critical for the organisation's senior management, in collaboration with the EMS manager and the EMS facilitator, to undertake periodic reviews of the system. The aims of these reviews were to identify system deficiencies and changes required (to ensure the ongoing suitability, adequacy and effectiveness of the system), to assess the appropriateness of objectives and targets and to review the environmental aspects of the operation's activities, products or services that affected financial performance or competitive position.

At Argyle, these management reviews were undertaken after the receipt of external auditor reports and after quarterly team meetings in which the departments reported on progress against objectives and targets. Typically the review would be undertaken in accordance with a set agenda that included, but was not limited to, a review of environmental policy, departmental performance against objectives and targets, internal audit results, external audit results and the ongoing suitability of the EMS. Management reviews led to modifications of the environmental policy and the identification of issues affecting the implementation of objectives and targets. Additionally, new issues were identified for inclusion on the Aspects (Issues) Register.

Costs and benefits of environmental management

Argyle's EMS was implemented within a ten-month timeframe during 1997. Two internal part-time positions were allocated, with external auditors' assistance at nominated stages throughout the implementation. The total cost of implementation, including all direct consultant and staff salaries, was $140 000.

At the time of implementation, a number of cost reduction strategies (such as reviewing supply contracts) were being investigated across the

operation. The identification of corresponding issues, such as the absence of environmental clauses in contractor agreements, and the subsequent allocation of the issue to the relevant department, namely logistics, enabled these issues to be addressed at minimal expense and interruption to the business.

In this way, the EMS assisted in positioning the organisation to achieve long term financial and environmental goals. While short term financial gains could be achieved during the operational life of the mine, it was realised that the true value of the EMS would be at the time of mine closure. A significant reduction in the final cost of closure would be achieved if environmental issues were addressed during operations when income was being generated and resources were available.

In December 1997, Argyle was the second Rio Tinto business unit in Australia to be certified to ISO14001.

Lessons learned

The implementation process described above documents the successful outcomes for each component of the standard. However, there were also a number of mistakes made along the way and a number of key lessons learned during the implementation process. These lessons are discussed below.

First of all, the system was initially based on the framework of Hamersley Iron's EMS. While this provided a framework for the EMS, it was quickly realised that the model would not be suitable for Argyle's culture. This highlighted that every EMS is different as the system responds to the organisation's culture and to existing processes and systems on site. It is unlikely that an EMS designed for one organisation will be appropriate to another, or that customised software developed for one business will be suitable for another. However, having said that, another system or software package may provide a valuable starting point from which to build and, therefore, may be cost effective for the business.

Certification was a valuable end point for the implementation process. There were lengthy discussions as to the 'value' of applying for certification. The real value was not realised until after certification, when there was tangible external acknowledgement that the system had moved from its implementation phase to an operational phase. Additionally, certification promoted ownership of the system as operational personnel became more actively involved in the day-to-day operation of the system. Certification also provided the mechanism whereby the

system moved from being the responsibility of the implementation team to being the responsibility of all site employees. It also enabled the EMS team to focus their activities in the areas of system nonconformances rather than tinkering with minor parts of the system *ad infinitum*.

Involvement of all parts of the business from senior management to the shop floor is critical if the system is to work. There is every chance that, if the system had been implemented solely by the environmental team, certification would never have been achieved. The involvement of all parts of the business also ensured that the process remained on track and relevant to the organisation rather than becoming an academic exercise without practical application.

Senior management support is critical to the success of the process. The development of policies, objectives and targets needs the input of senior personnel. Without this input, the system is unlikely to succeed. This was achieved at Argyle by nominating one of the line managers as the EMS manager, to steer the implementation process to allocate responsibility for issues, including the development of objectives and targets, back to line management. Engaging managers in this way ensured that the EMS was relevant to the business and that issues were addressed as part of the operation rather than by the environmental section in isolation.

To ensure that Argyle's system addressed underlying organisational values, attitudes and policies, it was critical that the responsibility for issues identified in the Aspects (Issues) Register be assigned to the department responsible for creating them. In this way, issues became the responsibility of the entire site rather than the environmental section. This enabled the environmental section to fulfil the role of internal consultant to the business and focus on strategic environmental management rather than on 'day-to-day fire fighting'.

The principal lesson learned was that communication is the key to implementation and that communication across the operation was a critical factor in the success of the system. Implementation of an EMS cannot occur behind the closed doors of an environmental section, and it needs to involve all aspects of the business.

Another key lesson was that implementation needs to continue at a pace that sustains the organisation's interest in the process. A long drawn out process is likely to result in a system that is owned by a couple of people who are patient enough to wait for results, whereas a system implemented in a shorter amount of time is likely to maintain the interest of a broader group.

Current status

In December 1997, the world's largest diamond-producing mine was certified to ISO14001 by NCS International. At this time, Argyle proposed to actively use the EMS for the continuing day-to-day management of environmental issues for the life of the operation. The EMS was also to be used to assist in the planning phases leading up to eventual mine closure and post closure. Significant environmental and financial benefits were anticipated with the continued development of the EMS over the forthcoming years.

The system has maintained its certification status, despite significant organisational changes. This not only highlights the importance of developing a system that is sufficiently flexible to adapt to changing circumstances, but also that the ownership of the system by a diverse range of employees is critical to ensuring that the system is not adversely impacted by major organisational change. Without personnel committed to the system and engaging others, the system is unlikely to develop and maintain its relevance to the business.

At the time of writing, the recent fall in the value of the Australian dollar has meant that commodity prices are less of a threat to the business and a decision has been made to expand the operation and, thereby, extend the mine life. The economic factors that influenced the development of the system have been replaced by organisational change factors, which will require a different set of approaches to manage.

Recently, discussions have taken place on how best to merge the current safety system with the EMS to more adequately integrate the two systems with the business. A suggested first stage in this process will be to merge the procedures for both systems to create a central set of procedures covering health, safety and environment.

Conclusions

In conclusion, it was important for Argyle to stand back from the ISO14001 Standard and the growing collection of EMS courses, software and texts to objectively evaluate how an EMS would have most relevance to the business. At Argyle, the business climate and the inherent culture of the organisation were the core determinants of the system design.

At Argyle, internal company personnel developed a simple and effective EMS with some assistance from external consultants for specific components. The system conformed to the requirements of the

ISO14001 Standard, as well as meeting the economic needs of the business. This approach ensured that the system had relevance to the business and ownership by employees. Simple, innovative solutions such as fact sheets were sought to overcome potentially expensive and/or bureaucratic outcomes. These effective solutions were only made possible by incorporating representatives from all sectors of the business in the implementation team.

Having now accomplished development, implementation and certification of the system, the future challenge for Argyle will be to ensure that the EMS can remain relevant to the business in a climate of organisational change. Argyle's EMS is still in its formative years, but it will mature as personnel demonstrate that the framework is sufficiently flexible to reflect the current business direction and future business needs.

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8 Redland Shire Council

Gary Photinos and Ross McKim

Introduction

Redland Shire covers 539 square kilometres of mainland and islands on Moreton Bay in south-east Queensland. The islands include uninhabited mangrove habitats, the Tranquil Bay Islands of Russell, Lamb, Karragarra, Macleay and Perulpa and the major holiday destination of North Stradbroke Island. The Redland area offers its residents and visitors an environment that has a special character and atmosphere. This special environment is created by the combination of natural and cultural features in a relatively compact geographical area. The shire's population of approximately 105 000 people makes it one of south-east Queensland's fastest growing regions. The shire comprises the area between the south-eastern edge of Brisbane City and the shores of Moreton Bay from Tingalpa Creek to the Logan River. It also includes the inhabited islands of southern Moreton Bay and North Stradbroke Island.

Redland Shire Council (hereafter referred to as the 'Council') is primarily a service organisation, providing infrastructure and essential services to the community. Local government in Queensland, unlike any other type of organisation, has been subject to change on both a voluntary and statutory basis. The National Competition Policy has had profound changes in the operations of the Council, resulting in new accounting standards, full cost accounting, competitive neutrality applying to areas of monopoly activity and the restructure of the organisation to meet the objectives of this policy. The public benefits analysis of corporatising major services has commenced as a result of the National Competition Policy. A review of business activities has also commenced as a result of changes to the Trade Practices Act.

The Council has restructured into the four distinct divisions of community planning, corporate governance, corporate management and client services. Each division manages a multitude of activities that have

environmental implications. Council is responsible for water supply and sewerage treatment, solid waste and landfill management, quarry operations, motor vehicle and plant workshop, dredging and even camping ground management.

An overview of environmental management systems

An environmental management system (EMS) provides a structured approach for organisational efforts to address environmental concerns through the allocation of resources, the assignment of responsibilities and the ongoing evaluation of practices, procedures and processes. Council is using the ISO14001 Standard to provide guidance on the development and implementation of its EMS and the integration of this system with other management systems.

The Council began the process of developing an EMS by undertaking a scoping study, which provided some preliminary results and allowed the organisation to begin the development and implementation phase. An environmental audit of all facilities together with the preparation of all necessary documentation to comply with the Environmental Protection Act were subsequently completed. The development of a corporate environmental training and awareness program and the establishment of environment responsibilities were commenced with staff at various sites. To date, attempts to fully integrate environment with health and safety programs have not been successful. However, integration efforts in those parts of the organisation that have developed and implemented quality assurance systems have proved much more successful. Due to the organisational restructuring associated with local government reforms, the integration of environmental management, occupational health and safety and quality assurance has been achieved by creating a new position within the organisation titled management systems facilitator. The new role will pull together existing roles and will be required to ensure the integration of all systems at the client services provision end of the organisation.

The entire process of developing, implementing and continuously improving the EMS has been managed by a multidisciplinary task group involving officers from every division of Council. This group reports to the senior management group on a bimonthly basis.

The EMS in its early stages of implementation was outsourced due to time constraints. Environmental consultants were used to complete and implement various components of the system such as environmental auditing, preparation of management plans and staff training. Hindsight

shows that, although the outsourcing allowed the organisation to acquire new knowledge and competencies in a short time period, Council employees did not fully embrace the concepts of environmental management and, as a consequence, there were no changes in staff behaviour.

Starting the process is a daunting and massive undertaking of time and resources. The advantage of adopting an incremental approach to implementation is that, as long as the framework has been established or identified, any component of the EMS can be implemented on an as needed basis to suit the needs of the organisation. As the business needs of the organisation evolve, in particular as a result of local government reforms, the certification of part of the system relevant to a particular activity may be considered.

Legislative framework

The Queensland *Environmental Protection Act 1994* placed responsibility for the administration of the Act on both the State Department of Environment (now the Environmental Protection Agency or EPA, formerly the Department of Environment and Heritage or DEH and, hereafter, for convenience referred to as the Department) and local government. The division of responsibility between the administering authorities was defined by the licensing of environmentally relevant activities (ERAs). The state would deal with all high to medium risk activities and local government would deal with all licensing of low risk activities. As Redland Shire Council operates both high and low risk activities, the state is responsible for licensing the Council's activities.

The introduction of the Act was very contentious with small business, many of whom saw the introduction of licensing as just an additional regulatory burden and an additional source of revenue through annual licence fees. As a consequence, Council needed to be able to demonstrate its compliance or above compliance status for all its activities if it were to require these standards from its licencees. The Council saw that the implementation of an EMS could help Council demonstrate its compliance status and provide credibility to Council as an administering authority.

In the period before the commencement of operation of the Environmental Protection Act and during the public consultation phase, Queensland local government expressed concern regarding the cost of implementation of the Act. As local governments operate many activities (in the case of Redland Shire Council, some 33 activities on 19 different

sites) and each individual activity had to be licensed (with a corresponding licence fee), the annual licence fees for individual councils could be in the order of $100 000 per year. The concept of a single environmental authority or licence was, therefore, developed, modelled on the ISO14001 Standard. This led to the inclusion of the concept of the integrated environmental management system (IEMS) in legislation, with the *Environmental Protection Regulation 1995*. Under this legislation, should a Council or any other business wish to integrate all its activities into a single licence, it can do so by developing an IEMS. That is, where an operation carries out more than one environmentally relevant activity at one or more sites, an applicant may apply for a single environmental authority but this application must be accompanied by a proposal to prepare an IEMS. This hasty amendment, although providing a legislative provision for EMSs, failed to provide a framework for the recognition of the benefits of having an IEMS or EMS in place. As a consequence, these systems were treated in the same manner as a licence, which then demanded copious conditions to be applied. When the Council finally received its IEMS approval, the approval contained over 166 pages of prescriptive conditions.

The Department's environmental guidelines for IEMSs state that:

> An IEMS details how an organisation proposes to manage all the environmental impacts of the activities concerned with the running of that organisation. It is a quality assurance system for the management of environmental harm based on the principles of total quality management. An IEMS aims to develop a reliable system, which will enable compliance with all environmental standards. In addition, an IEMS emphasises prevention of adverse environmental impacts rather than providing for detection and restoration after the event.

It is important to recognise that the interpretation by the Department of the meaning of IEMS (and how this was to be applied in practice) was critical to the development of the Redland EMS. Although the definition of IEMS in the legislation was intended to complement other definitions (see further below), the legal interpretation by Department officers created an unworkable framework once the system was developed and implemented.

Due to the lack of clarity provided by the Act, Council still needed to seek clarity for its IEMS/EMS development from other sources. Several other definitions of EMS were also available at this time. For example, the Draft Standard ISO14004 for EMSs defined an EMS as 'Organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing,

achieving, reviewing and maintaining the environmental policy' (ISO, 1995). Another definition, proposed by the National Management Education Centre (NMEC, 1995) at a training course relating to EMS implementation, was that an EMS is a 'Framework, namely the organisational structure, procedures, processes and resources, by which objectives established in response to social, economic and competitive pressures can be achieved'. Council finally decided to adopt the definition of EMS provided by the draft ISO Standard, as the Standard provided clear direction for development and implementation of a system. In addition, it was recognised that modelling the EMS on the ISO14001 Standard would also allow Council the opportunity to pursue certification should this be required in the future.

The Environmental Protection Act imposes severe restrictions on the operation of an EMS if the EMS is to be considered as part of the environmental authority (or licence). First of all, the Department failed to acknowledge the development of the IEMS/EMS by Council and issued a 166-page licence. As a result of not acknowledging Council's existing system, Council was required to develop a second 'parallel' system to explicitly manage the prescriptive requirements of the single environmental authority. From Council's perspective, the Department displayed a singular lack of trust in Council's ability to manage its own environmental affairs (which was a key objective of the legislation) as well as a lack of understanding of operators pursuing beyond compliance objectives such as ISO14001 certification. Second, due to the changing community and business needs of Council, there is an ongoing need to change and improve its operations. This inevitably means that the IEMS/EMS needs to be regularly updated to reflect these changes. Because the Council's IEMS/EMS was viewed from the Department's perspective as a licence, there was a corresponding need to amend the environmental authority to reflect the changes in the Council's activities.

Council lodged a Section 49 application to amend its licence to reflect changes in legislation and the need to update the licence to reflect current operations. The Department refused Council's request for amendments, arguing that it only had authority to either accept the requested amendments in full or reject them in full. The Department stated there were no provisions in the act to negotiate with Council and amend the application. Council was then advised that it needed to lodge separate licence applications for the changes, which would then sit outside the IEMS/EMS. As a result of this advice Council, in November 1998, lodged three individual applications to licence its additional activities. These applications were subsequently returned to Council due to the Department's failure to process them within the

required timeframe. Further correspondence with the Department has revealed that the legislation does not allow for new activities to be added into an existing single environmental authority (IEMS/EMS) and that Council would need to surrender its existing licence to achieve this goal.

The issue is complicated further by the subsequent introduction of the Integrated Planning Act (IPA) in Queensland. New activities that are covered by the IPA cannot be incorporated into an existing environmental authority because the IPA considers changes to activities as representing development applications that would need to be approved under the IPA, with the Environmental Protection Act dealing with the application on a concurrent basis.

The consequence of this regulatory tangle is that Council may end up with the original single environmental authority (IEMS/EMS), a series of individual licences, a series of individual approvals and a series of IPA approval conditions. This outcome will make responsible corporate environmental management extremely difficult and represents a continuation of the command and control philosophy of the Department, at the expense of beyond compliance initiatives.

Why develop an environmental management system?

There are many perceived benefits in developing an EMS. At the time of developing the Council's EMS, it was considered essential for the organisation to have the ability to anticipate and meet growing environmental performance expectations and to ensure ongoing compliance with national and/or international requirements. Some of the more specific reasons for developing an EMS were:

- Regulatory requirements under the Environmental Protection Act. In particular, as an administering authority, Council must demonstrate that its environment performance is of a sufficient standard to avoid the embarrassment and financial cost of failing to comply with legislative requirements.
- Growing public demand for environmental protection. Specifically, the public has consistently identified the protection of the environment as the most significant long term issue for government.
- The liability of corporate officers for pollution offences. The Environmental Protection Act states that if a corporation commits an offence against the provision of this Act, each of the executive officers of the corporation are also considered to have committed an offence.

- The need to retain environmental knowledge. Without a system of environmental management, critical information on Council's environmental effects, goals and programs can be lost when key employees leave the Council.
- Meeting environmental goals and visions. Council has undertaken an extensive community consultation process (called Vision 2005) and, as a result, has produced a corporate plan that incorporates a commitment to protect environmental values and to produce an environmental ethic.
- Meeting international agreements such as Local Agenda 21. Local governments have become signatories through their peak councils to international and national conventions for initiating local action to improve global environmental conditions.

Developing and implementing the environmental management system

The general approach followed for the development and implementation of the EMS at Redland Shire Council, including the key dates and activities, is provided in Table 8.1. Some of the key actions and decisions involved in this process and the lessons learned are discussed further below.

Organisational issues

Redland Shire Council is experiencing change like every other government at this time and is redefining and reorienting the delivery of goods and services to become more accountable, more businesslike, more competitive. As a result of a corporate restructuring, Council has moved to a purchaser–provider model for its activities and services.

It is probably fair to say that, prior to the implementation of the EMS, environmental management within the organisation was piecemeal, unorganised and reactive to changes that occurred. The development and implementation of the EMS has removed traditional barriers between departments and allowed a formal structure for environmental management within the organisation to emerge.

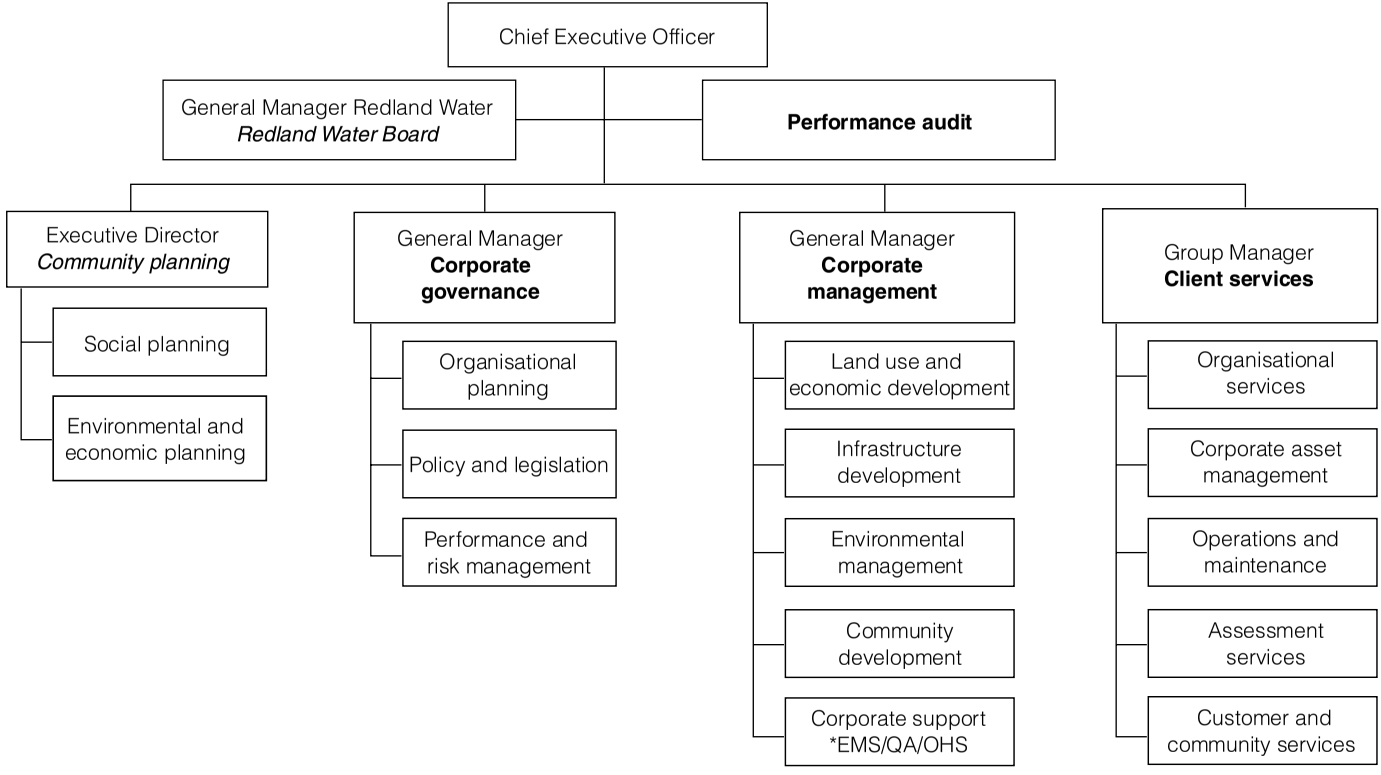
The environmental management structure that has evolved has the CEO accepting all responsibility for the organisation's environmental performance. Although not having a statutory role within the organisation, strategic leadership is the responsibility of the senior management group (SMG), which includes the CEO and all directors. Elected

Table 8.1 Redland Shire Council: EMS development and implementation chronology

Date	Event
January 1995	Senior management approval to develop an EMS.
March 1995	Formation of the technical reference group (TRG) to oversee the EMS. TRG consists of a representative cross-section of program managers from all the relevant areas of Council.
May 1995	Consultants completed a scoping study on the development of an Environmental Management System. The study identified Council's environmentally relevant activities (ERAs) and the advantages of implementing an EMS.
November 1995	Consultants commissioned to undertake the first environmental audit of Council's operations and prepare site management plans, which form the basis of the EMS documentation.
March 1996	Application to the Department of Environment for an environmental authority to conduct Council's 26 ERAs.
June 1996	Preparation and delivery of an extensive training program. The training program comprised ten modules, covering the various aspects of the EMS. Staff completed the appropriate modules depending on their position in Council.
February 1997	Appointment of the EMS facilitator on 12-month contract basis.
May–June 1997	Second environmental audit of Council operations undertaken by environmental consultants.
July 1997	Received environmental authority from the Department of Environment.
July 1997	Monthly environmental site meetings commenced at marina, depots and quarry.
August 1997	Engineering Directorate received third party certification to ISO9000 (making Redland Shire Council the first local government body to achieve this certification for its entire Engineering Directorate).
March 1998	Legal register produced.
April 1998	Quarry received ISO14001 certification (DNV).
June 1998	EMS facilitator's position upgraded to full-time position.
July 1998	Annual return and progress report on EMS implementation submitted to Queensland Department of Environment.
October 1998	Corporate EMS gap analysis to identify any gaps between implementation and the requirements of ISO14001.
January–March 1999	Third environmental audit of Council operations undertaken by EMS facilitator and panel of internal qualified environmental auditors.
May 1999	Review of environmental policy, objectives and targets. Action plan developed to complete outstanding matters.

representatives are not directly involved in environmental management issues. An environmental advisory group of middle managers provides technical and operational support to the development and implementation of the EMS. This group is referred to as the technical reference group (TRG). The TRG reports to the SMG every two months.

Figure 8.1 Organisational structure



Starting the process

The Environmental Protection Act initiated the process of developing an EMS within Council. Under the Act, Council needed to function as an administering authority as well as itself being an operator of major industrial activities (or ERAs) as defined under the Act. The environmental protection program within Council has the responsibility of administering the Act. Community expectations and corporate culture would not allow for Council to determine licences for ERAs by one program and, unknowingly or knowingly, commit an offence through the operation of one of its ERAs.

Although Council had defined several environmental goals and objectives in its corporate plan, Council did not have an environmental policy clearly outlining the direction it wanted to take regarding the management of the environment. It was clear from the outset of the process that Council would need to develop its credibility in environmental management for it to function effectively as an administering authority, as well as the operator of major industrial activities.

In December 1994 a proposal was presented to the SMG outlining the need for an EMS. The benefits of establishing an EMS (as described earlier in this chapter) were acknowledged and accepted by the SMG and the proposal was approved. Before the end of January 1995, the proposal was submitted to the elected representatives and program managers and gained approval from both of these parties. The proposal advocated that Council should seek more than just compliance with existing legislation. Specifically, it was recommended that Council, through the EMS, should attempt to meet national and international obligations regarding the environment (such as Local Agenda 21).

The SMG retained strategic control of the project, with operational control of the project being handled by a multidisciplinary task group or TRG. The manager, environmental protection, chairs this group which consists of the principal environmental health officer (pollution prevention), manager sewerage, manager health protection, manager performance audit, EMS facilitator, manager conservation and the manager planning and environment. The Department has demonstrated an interest in developing the Redland EMS into the state model for local government EMSs and has been invited to sit on the TRG. The SMG receives bimonthly progress reports from the TRG.

Scoping the environmental management system

The TRG decided to outsource the initial component of the EMS. Proposals for an EMS scoping study (or preparatory environmental

review) were evaluated by the TRG and assessed through a peer review process. The scoping study commenced in May 1995. Cost estimates were prepared as part of this study to allow for the preparation of an EMS budget, which was accepted and approved by Council in July 1995. A specialist environmental consultancy, in association with an environmental law firm, was selected from a preselected panel of providers.

The methodology undertaken by the consultants was to have one of their project consultants work from Council's office while developing the scoping document over a four-week period. Key Council officers were distributed a questionnaire prior to an interview to enable them to consider the issues to be addressed in the interview and to collect any relevant documentation. The same questionnaire was distributed to all elected representatives prior to a short workshop session where all the elected representatives had an opportunity to contribute to the study. The methodology also included an observation component as the most effective and efficient method to appreciate the environmental features of the shire, particularly the natural and cultural features. Two days were spent by the project consultant, accompanied by the principal environmental health officer (pollution prevention), visiting all environmentally relevant activities on the mainland and North Stradbroke Island.

The key conclusion of the scoping study was that Council adopt the then draft, ISO14001 'Environmental Management Systems—General Guidelines on Principles, Systems and Supporting Techniques' Standard as a model for Council's EMS. It was proposed to integrate existing management systems with the EMS development to enable smooth implementation. In addition, the EMS will also incorporate the principles of Local Agenda 21, which is a long term strategic program of achieving sustainability in the 21st century.

Integrated environmental management system

The scoping study identified that the IEMS is one component of the EMS. The IEMS is primarily concerned with the grouping of multiple ERAs under a single licence, thereby allowing Council to reduce its licence fees under Queensland legislation. Therefore the tasks of identifying, auditing, preparing and submitting environmental authorities to the Department were completed initially. Discussions with the Department's officers suggested that the details that would be incorporated in the overall EMS for Council would be superfluous information for the regional offices.

Environmental audit

The environmental audit was the starting point for the EMS development process. Council engaged different environmental consultants to those who undertook the scoping study to undertake the audit.

The audit identified several breaches of the Environmental Protection Act. Council responded by commissioning environmental management programs (EMPs) for the activities that were in breach. EMP is a statutory term under the Queensland Environmental Protection Act that allows an organisation to rectify a breach of legislation over a period of time, subject to the approval of the Department. The EMP, in effect, forms a binding contract with the Department, with significant penalties applying for any nonconformance with the EMP. The audit also identified significant deficiencies in Council's due diligence systems, which are currently being addressed. In considering the audit process, and the actions taken as a result of the audit, it is important to recognise that obtaining funding for environmental compliance initiatives requires competing with other Council priorities for funding in the budget process. In this context, it should also be recognised that the primary motivation for elevating environmental priorities is legislation and not policy.

A different environmental consultant was commissioned in 1997 to conduct the second environmental audit of the Council. This work included auditing field activities, the collation and interpretation of audit results and the development of a site rating system to facilitate between year comparisons for individual sites. The scope of the project also included a cleaner production audit and an energy audit. The major finding of the audit process was that Council was in a position to demonstrate that it had implemented management approaches and operational procedures that were environmentally responsible and sensitive to the needs of the communities and ecosystems fringing Moreton Bay. The report also found that a substantial number of the previous audit recommendations had been implemented and completed.

The third environmental audit of Council commenced in January 1999. This audit was the first undertaken by internal staff, rather than external consultants. Council staff had acquired the necessary skills to conduct such an audit through internal and external training programs. Conducting the audits internally has resulted in a high quality product for a greatly reduced cost. The previous audit had cost Council approximately $100 000 in consultancy fees, while it is estimated that the internal audit cost Council approximately $15 000 in staff wages.

The sites audited displayed a high level of environmental performance, and improvements of some kind were observed on every site.

Table 8.2 Site rating system: descriptors for probability and consequence

Risk of incident occurring	Likely impact if event occurred
A = low probability	1 = low impact
B = medium probability	2 = moderate impact
C = high probability	3 = very significant impact

The criteria against which sites were audited (or the audit protocol) were the same as those developed by the previous external auditors. A separate protocol was developed internally to measure the effectiveness of Council's management procedures. A special mention should be given to the German Church Road Quarry. The Quarry has attained certification to ISO14001 and received a very favourable report from the external auditors during a recent surveillance audit.

Site rating system

A site rating system has been developed to measure improvement on individual sites over time. The rating system will enable Council to more effectively assess whether the sites are achieving continuous improvement and the degree to which recommendations are being implemented. The rating system is a qualitative rather than quantitative system. Table 8.2 illustrates the descriptors applied to the probability of an event occurring and the likely consequences of such an event.

For each issue, a rating is derived from the level of risk and the severity of impact if the event occurred. Thus, a high probability event with a low impact would be classed as C3. The various combinations of risk and impact have been quantified as shown in Table 8.3, with the scores increasing as the outcome severity decreases.

Therefore, the higher the final rating, the better the site/activity is performing from an environmental point of view. Though it may appear desirable to compare scores between sites/activities, the rating system has not been designed with this in mind. The key objective is to prioritise issues at each individual site.

Environmental policy review task group

Before the EMS process began, Council had several environmental objectives specified in its corporate plan and in other documents. However, Council did not have a clearly identifiable environmental policy. Due to time constraints associated with preparing the environmental authority (licence) applications for the Department, it was critical that an environmental

Table 8.3 Site rating system: issue ranking

Rating	Score
C3	1
C2	2
C1	3
B3	4
B2	5
B1	6
A3	7
A2	8
A1	10

policy be developed. However, it was also acknowledged that, to produce a quality document, extensive consultation would be required. To overcome this hurdle, an interim environmental policy was prepared and an environmental policy task group was formed as a subcommittee of the TRG.

The task group prepared a draft environmental policy, coordinated the consultation process and identified the most suitable instruments for ongoing consultation with the community. Council has now approved its environmental policy. The policy clearly outlines environmental objectives and targets, which will provide the framework for the measurement of Council's environmental performance. Prior to the development of the environmental policy, Council had completed an extensive community consultation process to develop a community vision statement entitled Vision 2005. This process involved consultation on an extensive range of issues, including the environment. The environmental policy reflected the outcomes of this consultation process.

The environmental policy task group, following the preparation of the environmental policy, prepared a series of objectives, targets and performance indicators for each policy statement. Table 8.4 provides an example of one environmental policy statement and its associated objectives, performance indicators and current status. In May 1999, a policy action plan was prepared, based on a review of the Council's performance against its objectives, and performance indicators were reviewed. The purpose of the action plan was to determine the current status of the Council against its environmental policy commitments and to identify any outstanding matters as actions to be completed.

Corporate training and awareness program

The implementation of an EMS to ISO14001 standards is a mammoth undertaking for the organisation. It involves significant culture change

Table 8.4 Environmental policy statement and associated objectives, targets and performance indicators

Policy statement 1: Continue to improve environmental performance and encourage research that strives to achieve best practice environmental management

Objectives	Targets	Indicators/performance measures	Comments on implementation
1. Manage environmental impacts through an IEMS in accordance with the Environmental Protection (Interim) Regulations 1995 and DOE guidelines.	(a) Obtain approval for IEMS from DOE by 30 December 1997. (b) Obtain certification for EMS in appropriate programs by 30 June 1999. (c) Reduction in complaints relating to environmental matters at Council activities and sites to less than 1995 numbers with ongoing reductions each year.	(a) Approval is obtained. (b) Certification is obtained. (c) Number of complaints recorded.	(a) IEMS environmental authority obtained in July 1997. (b) German Church Road Quarry certified to ISO14001. Certification of other sites now a business decision of the provider units. (c) Environmental complaints against Council operational sites minimal.
2. Obtain a reputation for excellence in environmental management.	(a) Redland Shire Council (RSC) IEMS to be considered as a model for local government in Queensland by December 1997.	(a) Number of requests for access to expertise/materials. (b) Number of requests to do papers.	(a) Regular requests for information on Council's EMS from other councils and organisations (BCC, Adelaide CC, Melbourne CC, Port of Brisbane). (b) Papers on EMS presented at IIR conference in Sydney, QELA, IE Aust. Environmental Conference, CEOs gathering, Environmental Accounting Conference.

and paradigm shifts to incorporate environmental criteria into all decisions the organisation makes. Change of this magnitude will always be resisted, however good the intentions involved. The corporate training and awareness program will assist with changing the culture within Council. It is anticipated that this program will be implemented in parallel with other components of the EMS, with one of the key considerations being the organisation's capacity to accommodate change.

The training and awareness program was jointly developed with environmental consultants. The training program consists of ten modules that target councillors, staff, directors, managers and new staff. The course content covers every aspect of the EMS, including the development of site-based management plans and general awareness training modules that can be delivered by managers.

The training program, although successful, did not achieve one of its desired outcomes, namely to provide operational staff with operational guidelines (which were to be developed through workshop sessions). The training program has, subsequently, been modified to provide training at the site level, which is more relevant to the staff operating the facilities. It is now the responsibility of the EMS facilitator to arrange delivery of environmental training and to conduct ongoing assessment of training needs.

Appointment of an environmental management systems facilitator

An EMS facilitator, initially appointed on a twelve-month contract basis, was responsible for the implementation and facilitation of the EMS. The EMS facilitator developed site-specific implementation plans for activities and established compliance task lists for individual staff. This position was, subsequently, upgraded to a permanent position. As a result of the latest organisational restructure, the functions of occupational health and safety and quality assurance (QA) have been integrated into the position, to be known as the management systems facilitator.

Initially, the decision to appoint an EMS facilitator led to staff expectations that all environmental management responsibilities would rest with the EMS facilitator. Although all environmental issues were communicated to the EMS facilitator from across the organisation, strategies were developed to ensure that operational management and staff were provided with an appropriate framework (and responsibility) for dealing with environmental management issues within their workplaces. One example of how this worked was in the Council's works operations area, which had achieved QA certification. The QA procedures in this area were rewritten to incorporate environmental aspects,

specific training programs were developed and delivered at the worksites and monthly meetings to discuss environmental issues with management were facilitated. The role of the EMS facilitator was to assist in these activities and provide the specialist support (such as training, facilitation of discussions) necessary for the management and staff in this area to take responsibility for the ongoing management of their environmental issues.

Code of conduct

Environmental responsibility is also encouraged through the implementation of Council's code of conduct, which is intended to supplement the environmental policy. Redland Shire Council has developed this code of conduct, in consultation with councillors, directors, program managers, staff, unions and community and industry groups, to provide guidance to Council employees on what does and does not constitute ethical behaviour. While the Council has always operated within certain standards and within the spirit of legislation, the *Public Sector Ethics Act 1994* has provided an opportunity to document what this Council believes in and expects. This code is an essential component of maintaining an ethical work environment and applies to all employees from the CEO to the newest recruit, irrespective of whether they are engaged on a contractual, permanent, temporary or part-time basis. Two extracts from the code that relate to the environment are:

- Council has legal responsibilities to protect and manage the environment. In addition to these legal obligations, Council is committed to leading the community by example by ensuring that all services and activities are conducted in an environmentally responsible manner.
- Staff (including contract staff) must not carry out any activity that causes, or is likely to cause, environmental harm unless the staff (including contract staff) take all reasonable and practicable measures to prevent or minimise the harm. Supervisors must be notified if environmental harm has been caused or has been threatened by someone else's act or omission.

Multidisciplinary task groups

The different components of the EMS and due diligence program are being developed by multidisciplinary teams. The teams consist of staff members from across different departments to ensure corporate and employee ownership of the EMS project. The TRG, with the approval of the SMG, has established teams to undertake the following tasks:

- the preparation of environmental policy, objectives and targets;
- participation in the Greenhouse Challenge;
- preparation of an environmental code of tendering and purchasing;
- scoping and developing state of environment reporting; and
- development of a shire stormwater management plan.

The use of a team approach achieved better communications between various sections of Council, which were divided along functional aspects. This resulted in the integration of environmental management aspects into the many aspects of Council operations.

Conclusions

The changing definition of the word 'environment' over recent years to include the issue of 'quality of life' has been brought about by several international developments, in particular the Brundtland Report 1987 and the Rio Earth Summit 1992. The Australian response to these conventions has included The National Strategy for Ecologically Sustainable Development and Local Agenda 21. At the level of local government, environmental management has become increasingly more complex than just implementing pollution control measures or administering those controls. Local Agenda 21, a local government guide produced in response to the outcomes of the Rio Summit, describes environmental management as the reconciliation process between economic development, environmental protection and a more equitable society. The principles of ecologically sustainable development provide the framework for the new Queensland Environmental Protection Act. The object of the Act is to protect the environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends or ecologically sustainable development. However, without a full and complete understanding of the principles of ecologically sustainable development and the trade-offs necessary for ecologically sustainable development to be achieved, environmental management will not be achieved over the long term.

The implementation of an EMS is a daunting assignment for Council and is expected to take many years before being completed. Accreditation of the EMS is currently an objective of Council. However, whether to proceed down this path will be highly contingent on the incentives provided by the Department. The Department has the mindset of 'command and control' which, if it persists, will provide no incentive for Council to proceed with accreditation. Accreditation

represents true self-regulation and best practice environmental management but will only be viable where no licence fees are associated with the preparation of a fully accredited EMS. In addition, as highlighted from dealings with the Department and their interpretation of the legislation, the legislation is inflexible and prevents commonsense from prevailing. Business is becoming frustrated and discouraged. The key objectives of the legislation (to encourage business to operate in an environmentally sensitive manner and to minimise harm to the environment through responsible self-management) appear to have been lost in the overly rigid and prescriptive interpretation of the legislation. It would also appear that the licensing group within the Department of Environment is not sufficiently resourced to meet the demands placed upon it by the legislation and that some of the Department's officers have insufficient experience in business to understand the hindrances being generated. The legislation does not offer enough incentives to those trying to achieve best practice environmental management. In fact the prescriptive licences are creating barriers to those desiring to go beyond mere compliance.

Local government is now playing a critical role in the administration of the Environmental Protection Act and achieving the global goals set at international conventions. The guide to Local Agenda 21 by the Municipal Conservation Association describes local government as the level of government closest to the people and, therefore, as having a vital role to play in educating, mobilising and responding to the public to promote sustainable development. The EMS can provide the tool to achieve this objective. However, the full potential of any EMS will be contingent upon resource allocation, organisational culture and the political will or lack thereof of individual councillors. Constraints will also occur at the Department of Environment and in the lack of cooperation and integration between government departments.

Redland Shire Council may now have an EMS, but this does not immediately equate to sound environmental performance. However, the commitment that is required with the adoption of the EMS will certainly result in improvement of environmental performance in the years to come.

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9 Pacific Power

Paul Flanagan

Introduction and description of the organisation

Pacific Power is an integrated energy services business based in New South Wales but working throughout Australia and Asia. Pacific Power's core business is electricity generation, and its $2.1 billion in assets include power stations based on coal, hydro, gas turbines, wind and solar energy. Its largest single asset is Eraring Power Station, a 2640 MegaWatt (MW) coal-fired plant on the New South Wales Central Coast which currently holds the world record for the longest period of continuous operation of a large generating unit (674 days set in 1996 and acknowledged by *The Guinness Book of Records*). In the next few years, an increasing proportion of Pacific Power's output will come from environmentally advanced and renewable energy sources such as natural gas, solar and wind. However, coal is likely to be the dominant fuel source for many years to come.

Other Pacific Power businesses include Pacific Power International, Pacific Solar, Pacific Western and Powercoal. Pacific Power International (PPI) supplies engineering, technical and environmental services to international and domestic markets. Through delivery of these services, PPI is able to generate a commercial return and assist other organisations to meet their business requirements in an environmentally sound manner. Pacific Solar is commercialising thin film solar photovoltaic cells, which it aims to have on the rooftops of the world in the coming decade. Pacific Western has been established to operate the Collie Power Station in Western Australia. Powercoal is a substantial mining company that operates eight collieries in New South Wales. Powercoal has its own separate environmental management system (EMS), and therefore is not discussed further.

Pacific Power is owned by the New South Wales state government

and competes in the national electricity market against both public and private electricity generators.

In the context of this discussion of the evolution of Pacific Power's EMS, it is relevant to note that a major restructure of the New South Wales electricity industry took place in 1996. Prior to the restructure, Pacific Power was Australia's largest electricity-generating authority, operating seven modern coal-fired power stations, with a total capacity of 13 000 MW, in three geographic regions of New South Wales, together with a number of smaller hydro and gas turbine stations. As part of the restructure of the industry, six of the coal-fired power stations were transferred to newly established state-owned corporations, leaving Pacific Power with what is substantially its current asset base and a generating capacity in the vicinity of 3000 MW.

Due to the nature of its operations, Pacific Power, both past and present, has a significant potential to impact on the environment. The organisation also has a strong and long-standing commitment to manage these impacts carefully. Accordingly, over the years Pacific Power has developed and implemented a comprehensive environmental management program to manage its environmental responsibilities, ensuring both regulatory compliance and continual improvement. The detailed workings of the program have evolved with time and underwent significant modification in the aftermath of the restructuring of the New South Wales electricity industry. Nevertheless, the fundamentals remain the same. This chapter reviews the development of the environmental management program and goes on to make observations on environmental management within Pacific Power and, more generally, in the context of the ISO14000 series of standards.

Driving forces

The driving forces behind the development of a formal EMS have evolved over time, reflecting changing community and organisational priorities and changing organisational needs.

It is fair to say that, throughout its 50-year history, Pacific Power (and its predecessor, the Electricity Commission of New South Wales) has always recognised its responsibilities in respect of environmental stewardship. However, the emergence of environmentalism as a community priority in the 1970s and 1980s and the progressive development of environmental regulation were the initial driving forces in the move towards a formal and systematic approach to environmental management.

By about 1992, Pacific Power's formal EMS had been developed

to a point where regulatory compliance was relatively assured and the intrinsic worth of 'championing the environment' became a powerful driver in its own right. By the late 1990s, it was recognised that the environment could be a source of competitive advantage in the marketplace. This element has become a powerful driver for the organisation and is reflected in Pacific Power's overall corporate vision: 'to lead the transition to a sustainable energy future'. The strength of the environment as an overall driver of Pacific Power's business is evidenced in the following extract from Pacific Power's 1997 Annual Report:

> In 2020, Pacific Power's leadership of the transition to a sustainable energy future will be evident to all. The commitment to environmentally responsible and commercial outcomes will result in a dramatically different make-up of the Pacific Power generation portfolio. Eraring Power Station and other coal-based generators, although still important, will be a minor part of the generation portfolio, while energy from the sun, wind or natural gas will form a major part of the organisation's energy output. Biomass, geothermal hot rocks, solar thermal dishes and ceramic fuel cells may also account for a significant percentage of generation, which will be many times 1997 levels. However, emissions proportionate to energy output will be dramatically reduced.

The development of a management system

While protection of the environment has always been seen as an important element of its operations, Pacific Power's current systematic approach to environmental management dates from the mid to late 1980s.

In 1987, an environmental audit of all operational power station sites was commissioned. This was a major step at the time and the strength of the management commitment driving it was a significant factor in ensuring, first of all, that the audit happened at all and, second, that the resources were made available to ensure that the audit recommendations would be implemented. The initial round of audits proved so valuable that it was decided to repeat this process. Since then, the audit program has continued on a rotational basis to the present day and the process has been progressively strengthened along the way. Whereas the first series of audits focused primarily on physical systems and statutory compliance, issues such as culture, awareness and management systems and processes have been progressively introduced into the audit process. From its earliest days, the audit process has served as a key focal point in Pacific Power's drive for improvement, serving a

valuable role both in educating managers and in identifying improvement opportunities and following these opportunities through to completion.

In 1990, in order to strengthen further its environmental management, Pacific Power brought all of its environmental activities together under the umbrella of a single environmental group, with direct access to executive management. At about the same time, an executive environment committee was established to have oversight of the environmental aspects of all of Pacific Power's operations and review environmental performance across the organisation. Chaired by the chief executive, the committee's membership included the general managers of all the operational business units. This resulted in a collective executive focus on the environment as an issue in its own right and established an environmental accountability trail to the highest levels of the organisation. The establishment and subsequent operation of the executive environment committee sent a powerful message to all staff as to the importance of environmental management to the organisation.

In 1991, Pacific Power's environmental activities were broken down into five regional groupings. Three of these were geographically based and generally centred in the power generation areas of the Upper Hunter Valley, the Central Coast and the Western Coalfields. The fourth covered transmission grid activities for the whole of the state, and the fifth embraced the ten decommissioned power stations then owned by Pacific Power. Within each of these regions, there was a requirement for five-year environmental plans to be developed and all regional environmental issues to be managed. Quarterly meetings were held to address issues of a regional nature and review progress against five-year plans.

As corporate environmental objectives and regional environmental plans began to emerge from the deliberations of the executive and regional environment committees, the need for significant financial and human resources to be devoted to environmental matters become apparent. To ensure that the necessary resources would be available to undertake environmental projects, environmental planning was formally integrated into the organisation's overall resource planning process in 1991.

The creation of an executive environment committee, regional environment committees, the development of environmental plans and objectives, the adoption of a structured approach to the resourcing of environmental activities and the implementation of an audit process formed the basis upon which today's comprehensive environmental management program was built.

In 1992, the program was set out in a single document that contained both Pacific Power's environmental policy and its environ-

mental management procedures (Pacific Power, 1992). The document, which was formally adopted by the board, reflected a strong commitment to the environment, assigned responsibility for key functions and established a formal reporting process. In 1993, a series of corporate environmental indicators were adopted and an annual environmental report was published in 1994.

The integration of a comprehensive EMS into a very large organisation was not painless and could not have been achieved without absolute commitment from the board, the chief executive and the general managers of the major business units. This commitment to championing the environment became a strong driver for both organisational and cultural change. The level of executive commitment was continually reinforced through a range of actions including the adoption and promotion of the environment as a core organisational value, recognition of environmental improvements within the organisation's annual quality awards, the production of environmental awareness brochures and regular environmental stories in Pacific Power's internal newspaper.

Although further refinements continue to be made to the overall EMS and despite a number of modifications being required in the aftermath of the restructuring of the electricity industry, the basic elements of the system as documented in 1992 remain intact. In more detail, the system consists of a series of processes as follows:

- an executive oversight process;
- a planning and coordination process;
- a resource allocation and implementation process; and
- a monitoring, reporting and audit process.

These are shown diagrammatically in Figure 9.1.

The executive oversight process operates through the executive environment committee. This committee meets quarterly and is responsible for the strategic direction and executive oversight of all environmental aspects of Pacific Power's activities. At its quarterly meetings, the committee reviews environmental issues of corporate significance, major environmental initiatives and progress against audit recommendations. From the executive environment committee, the responsibility for environmental planning and coordination of the major activities of the business units is assigned to the relevant general managers. Responsibility for day-to-day issues and activities at each site is assigned to the relevant site manager. Accountability for environmental matters is discharged through regular reporting from site managers to general managers and from general managers to the chief executive and/or the executive environment committee.

Figure 9.1 Pacific Power's environmental management processes

The planning and coordination process originates from the executive environment committee but operates mainly at a business unit level. At the corporate level, a series of performance indicators, broad goals and detailed objectives and targets have been adopted and these are binding on all relevant business units. The six broad goals are discussed further below. Within the operational business units, regular meetings are held to review environmental issues, projects and incidents of significance to the particular business unit, as well as coordinating and reviewing environmental monitoring relevant to the business unit's operations. Other key business unit responsibilities include the identification of environmental risks and obligations and the development and implementation of environmental plans, land management plans and emergency response plans.

The resource allocation process is driven by three key documents: the annual planning guidance document which sets out the corporate environmental targets; business unit environmental plans; and environmental action plans for individual sites. These key inputs to the annual business plans are required to be produced by all Pacific Power businesses. Business plans are then reviewed at various levels for alignment with corporate directions and priorities and, once sanctioned by the chief executive, appropriate resources allocated for their implementation. This overall process ensures that adequate resources are directed to environmental issues within Pacific Power's overall resource planning process.

The monitoring, reporting and audit process is both comprehensive and extensive. Pacific Power's extensive environmental monitoring

program, which has been in place for over 30 years, leads to a detailed and ongoing understanding of the environment surrounding each of its major facilities and is a key element in enabling the environment to be cared for. The monitoring program includes background studies of the general environment including air, water and land as well as specific studies around the sites of existing and future installations. More recently, in recognition of the importance of biodiversity issues, flora and fauna studies have been built into this overall program. Through the monitoring program, impacts and issues are identified and quantified and the effectiveness of improvement programs is tracked. The manner in which improvement programs are tracked varies with the nature of the program and, in some cases, can involve detailed scientific measurement. At an organisational level, progress towards corporate environmental objectives is tracked quarterly and is reported publicly in the annual environmental report.

Environmental performance and incidents are routinely reported on a monthly basis to the chief executive. The more significant issues are reported on to the board on a quarterly basis. Major issues or incidents are, of course, reported and acted on immediately.

Every Pacific Power site is audited thoroughly every two years. Audit findings are reported to the site management and to the executive environment committee. Action plans are required to be developed to implement audit recommendations and progress against these plans is followed up quarterly and reported both to the executive environment committee and to the board.

The net result of the overall process is that issues and impacts are identified, directions are set, action plans are developed, resources are allocated and performance and implementation are monitored and reported on. Although these four basic processes were developed in-house over a number of years in response to the needs of the organisation, it can readily be seen that they have much in common with the elements of the more recently developed EMS standards.

The costs and benefits of environmental management

There is little doubt that the development and implementation of a comprehensive EMS in a large and diverse organisation is a costly exercise, both in terms of administrative costs and expenditure on the improvement activities that are an inevitable consequence of such a system. Many of the benefits such as risk reduction, community support

and enhanced reputation are somewhat intangible, and Pacific Power has not attempted to place a financial value on them. On the other hand, many of the improvement projects that have resulted from a total environmental management approach have delivered measurable financial benefits. These projects have included plant efficiency improvements, waste reduction, ash utilisation and water conservation.

Case study: Eraring Power Station fresh water supply

Eraring Power Station was constructed to use fresh water for boiler make-up, auxiliary cooling, fire services, wash down and ash plant purposes. During the course of a waste audit some years ago, fresh water was identified as a major waste stream, with the facility having a usage of some 8.5 Megalitres (ML) per day. In order to reduce fresh water consumption, a water utilisation improvement program was developed. This program saw fresh water consumption progressively reduced to some 4 ML per day. At that stage, it became known that the local municipal water supply and sewerage authority was constructing an urban sewage treatment plant a few kilometres away and proposed constructing an underground pipeline to a deep ocean outfall to dispose of treated effluent. Pacific Power entered negotiations with the local water and sewerage authority and subsequently agreed to take effluent from the sewage treatment works and further purify the effluent for use within the power station. The system, which is described in more detail below, is now in service and operating successfully; it produces water of higher quality than the existing domestic water supply system through the unique combination of two filtration processes, namely membrane filtration and reverse osmosis systems.

The state of the art membrane technology filters out all bacteria and solids greater than 0.2 microns in size, as well as 99 per cent of viruses. The backwash product from this process is treated at the power station sewage treatment plant and the water recycled. After passing through the membrane filters, the water is treated with chlorine and acid. The chlorine ensures no bacterial re-infection and the acid conditions the water for reverse osmosis. This phase removes 100 per cent of remaining viruses and 98 per cent of dissolved salts, resulting in water that is purer than the fresh water supply. The saline reject water from the filtration system is used in the station's salt water ash sluicing system. Both the membrane filtration and reverse osmosis are proven, reliable systems. Their modular design allows for rapid isolation and replacement of membrane cells without disrupting plant operation. This modular con-

struction also allows for capacity enlargement to cope with the increases in treated effluent supply that are planned for the years ahead.

The use of treated effluent instead of fresh water is resulting in cost savings for the power station that are expected to grow year by year. These savings result from the purity of the water (reducing the need to purchase chemicals and thereby reducing operating costs) and the reductions in the amount of fresh water purchased.

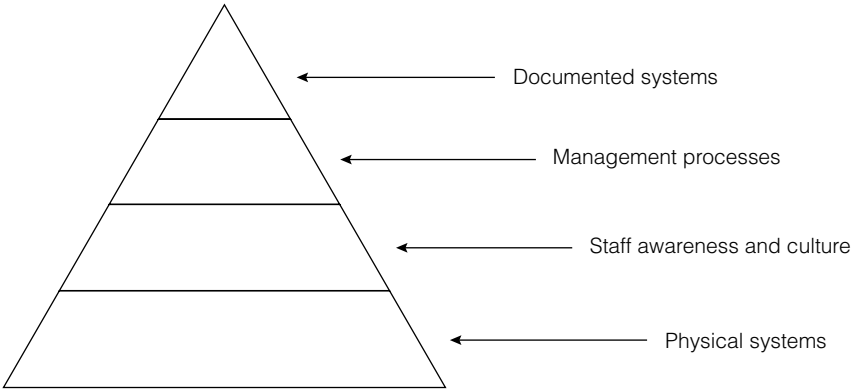
As well as savings to the power station, the scheme has delivered savings to the community through deferring indefinitely the construction of the pipeline to transfer treated effluent from the sewage treatment plant for ocean disposal. Other major capital expenditure for the augmentation of water supply infrastructure has also been able to be deferred. In conclusion, the project has provided benefits to the environment, benefits to the community and financial benefits to Pacific Power.

Key success factors

Without a doubt, the three most significant contributing factors to Pacific Power's success in establishing the system have been the level of support provided by top management, the pivotal role played by the environmental audit process and the manner in which environmental management has been integrated into the overall management of the business.

The successful implementation of any EMS requires that executive management recognises environmental management as one of the most important corporate priorities. From its earliest stage, Pacific Power's corporate EMS has had the strong support of successive chief executives. This support has been critical for a number of reasons. First of all, it enabled a core group of environmental specialists to be consolidated into a single team, to progressively audit the whole organisation. Second, it facilitated the provision of the necessary human and financial resources to implement environmental improvements and the recommendations of environmental audits. Third, it created a high-level follow-up system that ensured that, once an improvement opportunity was identified and agreed, an action plan had to be developed and regular reports provided to executive management until the action plan was complete. Another area of vital importance in respect of executive commitment is the messages and signals that are sent from executive management to the organisation as a whole regarding the importance of environmental issues to the organisation. In this regard, Pacific Power's executive management has been highly supportive from the outset and

Figure 9.2 The role of audits in strengthening environmental management capability



this, above all other factors, is considered to have underpinned the successful establishment and maintenance of the system of environmental management.

In the early stages of establishing an EMS it is important to have a clear activity around which environmental improvement programs can be built. In Pacific Power's case, the development of an environment audit process provided this focus. The way in which the thrust of environmental audits evolved as the system developed is illustrated in Figure 9.2.

The first round of environmental audits focused primarily on the organisation's physical systems, particularly in the oldest power stations which, as a consequence of their basic design, posed significant environmental risks. As these physical risks diminished in importance (due to the implementation of improvement works), it became apparent that people were becoming potentially the weakest link in the chain. Accordingly, issues such as staff awareness and work practices became important targets for the audit team. The targeting of the human element resulted in, among other things, a major staff awareness program that saw all staff and contractors receiving basic environmental awareness training with additional training being given to team leaders and other key staff. This awareness program was supported by the production of two environmental awareness booklets, one focusing on day-to-day activities ('Stop, Look, Think') and the other ('Championing the Environment') highlighting the overall priority the organisation placed on the environment. Although the impact of these awareness measures has not been measured scientifically, there is little doubt that the overall level of staff environmental awareness has improved pro-

gressively as the management system has evolved. There is also little doubt that every employee knows that the environment is a high priority for Pacific Power. Once the physical systems had been upgraded and the level of staff awareness lifted, management processes emerged as being vital to ensuring continual environmental improvement. On this basis, specific attention was directed to management processes in subsequent audits. Of particular interest was the need to have true systems rather than merely relying on the knowledge and dedication of experienced staff members. With the emergence of EMS standards, the level of documentation in place to support environmental management was incorporated into the environmental audit agenda.

While it is fair to say that, in its early stages, environmental management was something of an 'add-on' to the existing management systems, environmental management has been progressively integrated with the overall management of the business. This integration is regarded as one of the major success factors in Pacific Power's successful implementation of an EMS. The integration basically involved adding the environmental dimension to the technical, financial and personnel dimensions of all managers' responsibilities. Making the environment a normal accountability of all managers gave them a personal ownership that cascaded down to their staff. To be successful, an EMS should not be an appendage to other business activities. Rather, the environment should be integrated into the normal management processes of the enterprise such that full and careful consideration of environmental issues becomes the normal way of doing work. In this regard, for those organisations that already have a quality management system in place, environmental management should be built into this system rather than creating another layer of bureaucracy, duplicating effort and, potentially, dividing responsibility.

In the context of integrating environmental management into the overall management of a business, it is relevant to note the emergence in recent times of the notion of managing a business in respect of the triple bottom line, that is, financial performance, environmental performance and social performance. While this notion is in its infancy and extends beyond environmental management, it too is founded on the concept of an integrated approach to management.

Environmental management system standards

Having been in operation for some time now, Pacific Power's overall EMS is well developed and running both smoothly and effectively.

Nevertheless, with the emergence of EMS standards, first the British Standard for Environmental Management Systems (BS7750) and, more recently, the ISO14000 series, attention has been directed towards aligning Pacific Power's internally developed system with the specific requirements of these standards. Such alignment is considered worthwhile for the purposes of auditing, communication and benchmarking, whether or not certification is sought.

In 1995, Pacific Power's EMS was reconfigured to more closely mirror the ISO14001 Standard. Over the following two years, the Corporate Environmental Management Manual and the various site and business unit manuals were revised to a format based on the Standard. In undertaking this task, the size of the organisation, the comprehensive nature of the existing system and the degree to which environmental management had been built on to existing internal processes turned out to be disadvantages when it came to tailoring the system towards strict compliance with the Standard. Indeed, it could be argued that this is one of the deficiencies of the Standard. That is, because the Standard does not set a uniform level of performance, it is much easier for a simple and relatively superficial EMS to achieve compliance with the Standard than it is for a comprehensive integrated EMS, even though the latter may be far superior in terms of environmental outcomes. One might legitimately ask whether it is more important to have a fully comprehensive system or a less comprehensive one for which it is easier to maintain certification. In the author's opinion, ISO14001 should not be seen as an end in itself, but rather as a tool to aid in improving environmental performance. In this context, the Standard is undoubtedly a useful tool or framework within which to structure an EMS.

There is also no doubt that a system complying with the Standard will lead to continuous improvement, but the Standard by itself will not necessarily deliver rapid improvement in environmental performance, nor will it guarantee superior environmental performance. These outcomes will only be achieved with the total commitment of top management, supported by an aware workforce who are given the resources and support to achieve.

At this stage, although Pacific Power's EMS substantially complies with ISO14001, there is no intention to seek third-party certification.

External reporting

Pacific Power published its first annual environmental report in 1994. This report briefly outlined the corporate EMS and reported progress

against four key performance indicators that had been formally adopted about a year before: carbon dioxide emissions; environmental research; emission performance (in terms of emissions of oxides of sulphur (SO_x), oxides of nitrogen (NO_x) and particulates); and ash utilisation. The report also highlighted the year's major achievements and outlined initiatives directed towards the achievement of an environmentally sustainable future.

The 1995 and 1996 annual environmental reports built on the 1994 model and reported against the same set of performance indicators. In 1997, it was decided to review the organisation's key environmental performance indicators and, as a result of a comprehensive evaluation process involving representatives of all major business units, a revised set of corporate environmental indicators, goals and targets was adopted. The six corporate environmental goals adopted were:

- sustainable energy (to diversify the generation mix to include significant contributions from gas-fired, renewable and other low energy sources);
- emission reduction (to reduce its emissions of pollutants per unit of output and to meet all licence conditions, as a minimum);
- resource conservation (to reduce waste and conserve resources for future generations);
- environmental performance (to eliminate environmental incidents);
- biodiversity and land management (to conserve biodiversity for the benefit of future generations and to manage the land holdings wisely); and
- Greenhouse Challenge (to achieve the targets set out in the Greenhouse Challenge Agreement).

Each of the six corporate environmental goals is broken down into a series of specific objectives and targets. Progress against these targets is tracked quarterly by the executive environment committee.

The corporate environmental objectives and targets also form the key environmental component of the annual business planning guidance that forms the basis of the business plans which all Pacific Power business units are required to produce annually. While the development of environmental objectives and targets should form an integral part of any corporate EMS, whether or not the organisation reports publicly, the discipline of public reporting has imposed a degree of diligence and rigour that has proven to be a beneficial driver for Pacific Power in developing and articulating its corporate environmental objectives both internally and externally.

Conclusions

Pacific Power has a comprehensive environmental management program in place. The cornerstone of the program is the total commitment of executive management, which has provided both the drive and the resources to establish and subsequently implement the program. Audits have also played an important role in the development of the system. Environmental awareness is a key priority and the overall aim is to ensure ongoing improvement and superior performance.

Having been developed in-house to meet the specific needs of the organisation, the system integrates readily into Pacific Power's overall management processes. Tailoring the management system to be aligned with ISO14001 has also been seen as being worthwhile and adding value. However, the ISO14001 Standard is seen very much as being a tool rather than an end in itself.

Pacific Power's success in making the environment a core business issue was recognised publicly in May 1999 when it won the Banksia Foundation's award for Environmental Business Practice.

Reference

Pacific Power 1992 Environmental Policy, unpublished

10 Abigroup

David Jenkinson

Introduction

The 'construction industry' and 'environmentally sustainable development' are two terms which, when put together, are often described as contradictory. The construction industry has been described as a 'rape pillage and burn' industry and has been held responsible, both directly and indirectly, for many major environmental disasters, including the pollution of many of our natural resources and the decimation of many of our rainforests. The truth, however, as is always the case, is much more complex. The activities of the construction industry reflect the laws of supply and demand. The public has wanted infrastructure such as roads, railways, hospitals, schools and other developments such as buildings to live and work in. In the past, the public did not want to (and this is still generally the case) take responsibility for the environmental consequences of development. It has been a classic case of 'not my responsibility'.

The construction industry itself has taken major steps to rectify past misconceived, although well-meaning, deeds and has approached environmentally sustainable development (ESD) in a practical way. Renewable timber plantation harvesting, water-based paints and wool-based insulation have all been directly developed with the aim of achieving (or, at least, moving towards) ESD. Environmental management systems (EMSs) are the new trend within progressive construction companies such as Abigroup Limited, and these systems are assisting companies achieve the goals of ESD.

Environmental management in the construction industry is unique, in that an EMS has to be planned, documented, implemented, monitored and closed out on each project. The construction industry works on a 'project start–project finish' basis. Predeveloped generic plans and documentation are only aids, as each project has its own unique

requirements and specifications. Therefore, project-specific plans have to be developed. To illustrate the diversity of the projects Abigroup is involved with, its current projects vary from a green-field site constructed on the banks of a pristine river to the renovation of an old disused warehouse previously contaminated by chemicals in a town's industrial area.

It is, therefore, important to remember that no two construction sites are the same, there are no two buildings the same and there are no two EMSs the same. Each project has its own range of unique issues, constraints and challenges. This, in turn, means that each project requires its own specific, tailored system for environmental management.

The purpose of this chapter is to show how a diverse industry, over an enormous geographical area with differing geographical problems, can manage diverse environmental aspects in a simple manner and at a low cost while achieving the altruistic ideal of ESD.

Company description

Abigroup Limited is a major wholly-owned and operated Australian engineering and construction company. It specialises in building, civil engineering, mining and industrial engineering and the financial packaging of infrastructure projects. Abigroup operates generally in the eastern and southern states of Australia and is involved in projects in both the private and government sectors. It is a major sponsor of privately funded infrastructure including the M2 Hills Motorway in Sydney's north-west where it has pioneered electronic traffic management and electronic tolling. Abigroup has extended the scope of its activities into tollway operation and maintenance. Sydney's Super Dome (the multi-use arena at Homebush Bay for the Sydney 2000 Olympics and Paralympics) is another Abigroup infrastructure package project that involves design, finance and construction. Following the completion of the facility, Abigroup will take ownership of the project and operate the facility for 30 years.

Abigroup is split into three regions: Central, Southern and Northern Regions. Central Region covers New South Wales and is also where Abigroup's registered head office is located. Southern Region covers Victoria, Tasmania and South Australia, while the Northern Region covers Queensland and the Northern Territory. For the purposes of this chapter, the focus of the discussion will be on the Northern Region but most of the issues raised are common to all three of the regions.

Abigroup Northern Region is an autonomous operating region with

its own management system and roles and responsibilities. The Northern Region has a general manager and a relatively flat senior management structure. The services manager reports directly to the general manager on all aspects of quality, safety and environment. Each project has a representative of the services manager with a functional responsibility to the project manager but also a line responsibility to the services manager. This effectively means that there is an independent person on each site to review the three service disciplines of quality, safety and environment.

Abigroup Northern Region is extremely diverse both in terms of its projects and its geographic range. Recent projects undertaken by Abigroup Northern Region include:

- Airstrips and roads for the Department of Defence, west of Townsville, and the upgrade for the 51st Battalion Far North Queensland Regiment.
- A major section of the Pacific motorway upgrade from Brisbane to the Gold Coast.
- Redcliffe Hospital and Brisbane Royal Children's Hospital extensions and upgrades.
- A prestigious 850-seat live theatre at the Queensland Cultural Centre.
- A 5000-seat upgrade of the Cairns Convention Centre.
- Mining infrastructure at Ernest Henry Mine Cloncurry, Pasminco Century Zinc Mine and Moranbah North Coal Project.
- The 51st Battalion Far North Queensland Regiment Project.

To enable work of this nature to be completed Abigroup owns a number of items of major plant, including concrete batching plant, a fleet of earth-moving vehicles and the necessary mobile maintenance operations. These items play a key role in the operation of a construction company and also create specific environmental issues that have to be dealt with. Abigroup is also the principal contractor on most of the projects it undertakes and, as a consequence, is legally and morally responsible for environmental and safety issues.

Abigroup's key environmental aspects, which are common to virtually every project undertaken by Abigroup, are:

- water quality;
- soil conservation;
- air quality;
- noise and vibration;
- flora and fauna protection;
- landscaping and rehabilitation;

- archaeology and heritage;
- hazardous substances and dangerous goods;
- waste management;
- contaminated material;
- traffic management;
- community consultation; and
- licence and approval documentation.

These aspects have been analysed carefully to fully encompass the requirements of Abigroup. All the major environmental problems on any project can easily fit into this list. Each project does a risk analysis on each of these aspects prior to starting. A number of risk controls are then put into place to manage the risk and sometimes turn the risk into an opportunity.

Driving forces

The Queensland *Environmental Protection Act 1994*, the Queensland Environmental Regulation 1995 and the issue of the ISO14001 Standard for EMSs were the main driving forces behind Abigroup's decision to have its system of environmental management certified. Apart from the legislative drivers, commercial effectiveness in the marketplace and the need to stay ahead of the competition were also major considerations. The final driving force for gaining certification was the altruistic motivation of being able to put in place effective procedures to assist employees recognise that they can help protect the environment in order to be able to hand over to our children a better place to live that is as free from degradation as possible.

The decision to implement an EMS should not be a sudden decision by senior management. Rather, it should be a well-informed decision, taken without haste, informed by all of the available data. In the case of Abigroup, the key issues (and benefits) discussed with senior management were:

- compliance with legislative and regulatory requirements;
- cost savings on environmental licences;
- reductions in liabilities, risks and exposures;
- business marketing tool;
- improved internal management methods and systems;
- pressure from senior management and shareholder groups; and
- the need to be able to demonstrate reasonable care, improve industry–government relations and improve business processes.

These topics were the major inputs to the decision-making process on environmental management. They were also critical in deciding the shape, form and content of the management system. Each of these factors is considered in more detail below.

Improving compliance with legislative and regulatory requirements

The concept of self-regulation has always had the potential for abuse by unscrupulous operators. As a consequence, a stringent regulatory framework for environmental compliance was introduced in Queensland in the mid-1990s with the Queensland *Environmental Protection Act 1994* and the Queensland Environmental Regulation 1995. It should be noted that, at the time of writing, detailed specifications or regulations for the construction industry have yet to be introduced. However, with the introduction of this legislation, it was clear that compliance could no longer be considered an optional extra for Abigroup. This was recognised by Abigroup's senior management, and the need for the company to be able to assure itself of compliance became a key driver for implementation of the system of environmental management.

Cost savings on environmental licences

The Queensland Environmental Regulation, Section 48(1) states that: 'If an administering authority issues 1 licence for 2 or more environmentally relevant activities, the annual licence fee is the higher or highest of the fees for the activities under the licence.' As a consequence, an effective EMS, especially one that has been certified, can save money on the environmentally relevant activity licences (as all of the organisation's environmentally relevant activities will only require a single licence). A construction company with a number of projects all with environmentally relevant activities, could have licence fees in the tens of thousands of dollars. Having a certified EMS will reduce this cost dramatically.

Reduction in liability and risk

Due diligence is a well-recognised defence for anyone who is brought before a court for committing an infringement. An effectively operating EMS should provide a due diligence defence, especially when only minor infringements have taken place. Theoretically, an EMS should prevent any such infringements occurring in the first place, thereby

enabling an organisation to become more pro-active in the management of its environmental risks.

Marketing benefits

When Abigroup applied for certification, there were only two other construction companies in Australia and only one in Queensland that had achieved certification. Construction companies have to present themselves as environmentally responsible. Clients need to know that when they engage a company to do work, especially in an environmentally sensitive area or where there are environmental sensitivities, the company can perform in an environmentally responsible manner. One of the best ways to demonstrate environmental responsibility is to have a management system certified to a recognisable standard, such as ISO14001.

The public perception of construction companies has not been good; they have always been seen as the ones that 'cut down the trees'. To enable Abigroup to become 'The Constructor of First Choice', senior management made a commitment to operating the company in an environmentally responsible manner. This commitment, in part, was demonstrated by gaining environmental certification.

Improved internal management methods

Abigroup's internal management systems had been reviewed prior to certification. It was decided that it should streamline its management system and introduce a fully integrated management system to encompass the three disciplines of quality, safety and environment. This integration of management systems streamlined the system and encouraged better use of the system by projects.

Pressure from senior management and shareholder groups

The Queensland legislation makes it very clear that senior management is responsible for all environmental infringements. An efficient operating EMS ensures that environmental management is occurring. Furthermore, through correct operational, monitoring and reporting mechanisms, senior management should be kept informed of all of the environmental issues associated with the organisation's activities and, consequently, should be in a position to demonstrate due diligence and to demonstrate that shareholder interests are being protected.

Improving business processes and utilising employees' skills and knowledge

The employees of most organisations are more than happy to do the right thing in environmental protection. However, they frequently need guidance and leadership to convert these good intentions into positive action. Employees are an enormous source of information; they are the public and they are the ones who generally want to protect the environment. Effective environmental management does not have to cost money—it is about changing the way things are done, to save money and the environment. Employees are a great resource of environmental information. They travel from project to project, company to company, on a project start–project finish basis, and bring with them ideas and solutions to problems. It was this resource that was tapped to complete many of the environmental protection ideas that are used today.

System development

Prior to implementing a formal system of environmental management, Abigroup had a certified (to ISO9002) quality management system in place. However, by the mid-1990s this system needed to be upgraded. The *Workplace Health and Safety Act 1995* had been gazetted, and the Queensland *Environmental Protection Act 1994* was being staged into operation. A management review was undertaken to assess how Abigroup could update its management systems to address the relevant legislative requirements. The services managers from each region met in November 1996 to resolve this situation. A very clear decision was made to integrate the three disciplines. The existing quality system procedures were adopted and the pre-existing safety and environmental procedures were also integrated into the system. The modified system was presented to Abigroup's (JAS-ANZ accredited) certification body, DLIQ, the quality arm of Davis Langdon. The documentation underwent a detailed review and, following some minor alterations, was acceptable. Abigroup then successfully underwent the process of certification to ISO9001. The next step was certification to ISO14001.

Abigroup started towards environmental certification in July 1997, with the formal system first being available for use on projects in January 1998. The third-party document review audit was completed by early July 1998, the certification audit was completed by the end of July 1998 and certification to ISO14001 was granted in August 1998. Abigroup's first surveillance audit was completed in February 1999.

Abigroup's approach to environmental management is based on a

generic management system framework that is then tailored to the specific needs and issues of each individual project. Each project, when it starts, has to go through a risk assessment to identify all risks, including risks relating to environment, safety, cost and time. For each identified environmental risk (or environmental 'aspect'), a procedure is implemented to deal with that aspect and minimise the risk. The same aspects may be major on some sites and minor on others.

A series of training sessions were held for staff and employees on the EMS and on environmental protection generally. The response was very positive, with environmental protection ideas coming from the staff and employees. The system was not introduced across the whole company structure in Queensland but was only introduced as new projects started, which made the implementation process easier to control. In addition, it was easier to train employees as this training could be staged across the organisation. Abigroup's experience with training was that one-on-one training is ideal and that one-on-one project team training, when the project team comprises a maximum of five or six employees, is also good.

As each project started more and more staff became committed to the system, senior management supported the system with enthusiasm and reports began to flow. Weekly detailed reports and then monthly reports have now become the normal activity. The ease of the introduction of the EMS can be attributed to the commitment of senior management and the encouragement of staff.

Abigroup now has a fully integrated management system that includes environmental safety and quality. This integrated system enables employees to accept and use the system readily without fuss. The manager in charge is the services manager, who has an autonomous role independent of all project management teams.

Managing environmental issues

Basic requirements and needs of the system

Abigroup is a construction company and, as a consequence, the focus of its management efforts is project based. This means that all issues, including the environment, must be dealt with in the context of 'project start–project finish'. Although there are regional offices that support and advise projects, each project is a separate entity, each project has its own management processes for construction and completion and, therefore, each project must have its own specific management control

systems. Predeveloped generic project plans are provided for each project; they have been developed from a range of industry experience and regulatory requirements and are released from a controlled library. From these generic plans, project-specific plans are written to encompass project-specific needs, specification requirements, geographical requirements and client requirements. This is done through a unique risk management process at the start of each project. All aspects are identified, discussed and weighted and, if required, specific project procedures are put in place.

In the past, project quality plans (PQPs), project environmental management implementation plans (EMIPs) and project safety plans (PSPs) all had to be written. This, effectively, was the same task being repeated three times.

Abigroup had an accredited quality assurance system in place to ISO9002 (Model for Quality Assurance in Final Production, Installation and Servicing). While this system had been working effectively for a number of years, the management review process had identified that the system required upgrading. The upgrade and review had to include ISO9001 (Model for Quality Assurance in Design, Development and Production) to cover the inclusion of design requirements on its projects. At this time, both the ISO14000 environmental series and the AS4800 safety series were being developed. These two new series are more versatile and suitable for the construction industry than ISO9001, which is much more manufacturing oriented.

By 1995, the Queensland Environmental Protection Act had come into place and, although there was no 'environmentally relevant activity' (ERA) yet in place for the construction industry, contractors were left wide open for litigation in the event of an environmental incident. These actions could come from the private sector, other industry groups or government agencies. For industry, operating without a licence effectively meant operating without permission, with all that entails for the legal status of the organisation. Having a licence, in effect, provides official permission for activities to proceed without fear of litigation so long as the activity complies with the conditions specified in the licence. This is of particular importance to the construction industry, where it is virtually impossible to conduct core activities without some, even if minor, environmental impact. For example, a licence for an ERA such as rock excavation (which produces dust) will generally specify a limit for the amount of dust that is allowed to escape to the atmosphere. If no limits are given, there is the potential for a neighbour to claim that the dust is affecting his/her person or livelihood and to move to have the operation ceased or to seek compensation.

If the protection of a licence was not available, then the only protection (and basis for a defence to environmental harm through demonstrating due diligence) to an organisation such as Abigroup was through an operating EMS. In this context, the best type of EMS is one that has been audited to an industry standard or, more effectively, one that has been certified to the ISO14001 Standard. As discussed previously, the Environmental Protection Act is also clear in the fact that when there are a number of ERAs and an operating EMS is in place, only a single licence fee has to be paid rather than fees for each individual ERA. This provided a financial incentive to implement a system of environmental management prior to ERAs being established.

The construction industry is credited with having the worst safety record of all industries so it is therefore important to minimise the chance of incidents occurring. The best way to do this is by preplanning, by creating a safety plan. A good safety plan includes a great deal of risk assessment as a basis for the effective management of risk. Effective risk assessment and risk management processes are the key to good planning, irrespective of whether it is safety or environmental issues that are the concern.

System design

The factors outlined above were the basic driving forces for establishing an integrated management system (IMS) and for defining the scope and requirements of the system. The IMS encompasses quality, safety and environmental issues and generally follows the ISO14000 and AS4800 series of standards. The system that Abigroup uses has five standard tiers, namely:

1 A manual: The manual is based on the management system models presented in the ISO14000 and AS4800 series and covers the core management elements of commitment and policy, planning, implementation and operation, checking and corrective action, management review and improvement, and continual improvement.
2 System procedures: The system procedures are generic procedures that cover all systems and disciplines. These procedures are to be used as the basis for the project-specific procedures.
3 A project management plan: The project management plan is derived from the manual and the generic system procedures but is tailored to include project-specific requirements and the outcomes of the risk assessment process on all aspects of safety, quality and the environment.

4 Control measures: The control measures include project-specific inspection and test plans (ITPs), technical procedures, environmental control plans, sedimentation and erosion control plans and any other control plans that are deemed necessary.
5 Records: It is critical for any system that a system of records and filing be established to provide objective evidence (such as for due diligence purposes) of all activities that have been undertaken.

These five tiers have the benefits of being acceptable to accreditation bodies and suiting the legal requirements that Abigroup has to meet. They can be readily adapted to suit most clients' specific needs and expectations.

Implementation

The IMS was introduced in a structured, gradual manner. As each new project commenced the IMS was implemented on that project. Senior management and staff accepted the IMS immediately; it was obvious to everyone that one integrated system replacing three distinct systems was economical in many ways. The key to the integration of the management systems was the risk assessment and risk management process, which brings safety, quality and environment issues together into a single evaluation and management process. This process identifies all problems relating to safety, quality and environment early in the project, thereby ensuring that everyone is aware of potential problems and how these are to be addressed. In some cases, this process can turn risks into opportunities for the organisation.

An example of system integration is emergency preparedness. On a construction project there should only be one 'emergency controller' for all emergencies or catastrophic events. This person should take control of the situation and determine what and when anything has to be done. The procedures for such events are the same for safety issues or for environmental issues. The investigation of an event or incident is the same whether it is safety or environment. The reporting of a non-compliance is the same for the three disciplines; only one procedure is required and only one form should be required. In essence, while the issues (that is, safety, quality, environment) are, in many ways, very different, the critical issue for the organisation is that the systems for managing these are essentially the same. Cutting down on duplication and paperwork made it easier for everyone involved to accept the system, eliminating many of the potential barriers to system implementation.

The Abigroup IMS underwent a very comprehensive document

review (of about a week's duration) for compliance to ISO14001 and for compliance to ISO9001. Apart from some minor observations, the design of the integrated system was accepted by the JAS-ANZ accredited auditors. The next big step was to audit the projects. The purpose of the audit was not only to assess the organisation's compliance to the system, but also to take a detailed look at the practical way in which Abigroup goes about its operations. The audit included a detailed review of Abigroup's environmental aspects, the risk assessment of these aspects and the manner in which this risk assessment informed the organisation's decisions on the procedures required to control the potential for environmental harm.

Risk assessment and risk management

Abigroup's risk management process for projects involves looking at a host of aspects. Abigroup has identified its environmental risks and categorised them into the thirteen generic categories (or aspects) described above (that is, water quality, soil conservation etc.). Once each of the aspects has been assessed and a risk management strategy has been identified, a project-specific procedure is written (generally based on the predeveloped generic procedures). This procedure is issued to a responsible person to be enforced on the site.

The risk assessment is completed at the start of a project. It usually involves the estimator, the construction manager, the project manager and the services manager or his representative. Risks are calculated on a predetermined system and are categorised as low, medium and high. Procedures are then implemented to ensure that all risks are as low as possible. A typical example of a project 'risk calculator' is shown in Table 10.1. The risk calculator is very simple to use and can be adapted for most situations.

As an example of the application of the risk calculator, consider a small construction site on the banks of a creek. The issue of concern is whether or not a heavy rain storm (and the associated consequences) will present a significant risk in the context of the project. To use the calculator, first look in the left horizontal column and choose a probability. In this case, let us assume that the probability of occurrence can be considered as 'has happened'. It is likely that the consequences will be either 'moderate' or 'minor'. By joining the vertical and horizontal we end up with a calculated risk of either 8 or 12, both of which are classed as medium risks. This information can then be included in the overall risk prioritisation process and will form the basis for the procedures (and costs) necessary to address this specific risk.

Table 10.1 Abigroup project risk calculator

		Consequences				
		Catastrophic	**Major**	**Moderate**	**Minor**	**Insignificant**
Probability	common	1	2	4	7	11
	has happened	3	5	8	12	16
	could happen	6	9	13	17	20
	not likely	10	14	18	21	23
	practically impossible	15	19	22	24	25

Level of risk — high: 1–6 medium: 7–15 low: 16–25

Practical examples and solutions

The following are some practical examples of how some specific environmental aspects have been dealt with in the context of specific projects. Some of the examples presented have been developed from the workers' description of how they actually deal with situations, as the workers on the sites are often more in touch with the true aspects and risks of a specific project and time should always be afforded to listen to their ideas. Abigroup has a consultative process that emphasises communication from all sources. Regular site meetings, toolbox talks and pre-start meetings are all used to enable this consultative process to work.

Water quality

Concrete batch plants require the use of a great deal of water, both in the mixing process and in the wash down every day of the plant and trucks. The use of water can be a significant cost for a project, given that there is generally a need to purchase water and to pay for the treatment and disposal of dirty water. As a consequence, a system for water collection and re-use has been developed to minimise these costs. Essentially, the concrete batch plant is bunded and all water falls into a catch drain and then into a settlement tank. The trucks use the water from the settlement tank for wash down, with the waste water from wash down flowing back into the tank. The excess water from the tank is pumped into water tankers for dust suppression around the batch plant. To assist in maintaining the available supply of water, the site drainage system is generally set up to drain into a sedimentation pond adjacent to the batch plant. This water is then tapped into as an extra resource. The drainage of the sedimentation basin ensures that it can always operate at its capacity. This is a practical example of the re-use

and conservation of a valuable resource, which can also provide a significant economic benefit.

Hazardous substances and dangerous goods

Dangerous goods such as petrols and oils must be stored in bunded areas and must be secured from vandals and theft. This has historically been a significant cost issue for the construction industry as it has necessitated the provision of locked storage areas with a large bund capacity (to contain spills). This does not have to be a major problem and, if planned correctly, can save money.

For example, oils can be stored in shipping containers. The shipping container is sealed on the floor and the walls and, when set in position, has a fall to the back of about 5 degrees, thereby making the container a bunded area in itself. Should there be a spill, the spill will be contained within the shipping container and is easily manageable. This is an easy and effective way of providing security and a bunded zone without resorting to the use of fences and graded windrows for bunds. The idea of using a sealed shipping container came from the mechanics and fitters on the Pacific Motorway Project. It is an idea that is now widely used on Abigroup's projects.

Waste management

There have been significant developments in the painting and protective-coating industry with the move from solvent-based products to acrylic-based products. The production of solvent-based products was, and still is, the focus of scrutiny by environmentally concerned organisations. The construction industry has not come under the same degree of scrutiny as other users or producers of paint. However, the construction industry is a major user of paint. After the product is applied, the paint applicators need to wash themselves and their equipment. Historically, a common problem was the absence of suitable wash down facilities on construction sites and it was common to find that the water and chemicals used to clean brushes, rollers and spray gear were sent directly to the stormwater system. Therefore, special wash down facilities should be provided on projects, with separator tanks to allow the wash down sludge to be removed from site easily and in an environmentally safe manner. This equipment is readily available to most sites for a small charge. The need for this type of equipment is explicitly identified as part of Abigroup's risk management process.

Earth-moving equipment has vast amounts of oil in its reservoirs and this oil has to be changed frequently. Vacuum suction devices are now commonly used to evacuate the old oils. It is no longer necessary, or acceptable, to simply remove a plug and allow the reservoir to drain, as was historically the case on many sites. On all of Abigroup's sites, old oils are packaged into transportable drums and collected for recycling by licensed operators.

Noise management

Construction equipment can be very noisy. There are increasingly stringent legislative requirements relating to occupational noise exposures; in particular, workers cannot be exposed to loud noise for long periods of time. Abigroup's approach to noise control has moved away simply from the provision of hearing protection (although this is still an integral approach of noise management) towards the designing out of noise from equipment, thereby protecting workers' hearing as well as minimising offsite nuisance noise issues. Examples of the types of noise reduction measures that are increasingly used in the industry include: the increasing use of electric-driven machinery instead of diesel- or petrol-operated engines; hydraulic machinery, in some cases replacing noisy petrol equipment; and reducing noise from saw cutting by placing two saw blades together to reduce vibration, and hence noise.

Erosion and sedimentation control

Erosion and sedimentation control has, historically, been the domain of agricultural and soils scientists. However, with the growing community awareness that soil erosion and land degradation are not restricted to agricultural areas, contractors are increasingly expected to minimise soil erosion from their sites. Projects must plan their erosion and sedimentation controls from the start of the project to many months past the completion date. Vegetation and growth are the best stabilisation methods to adopt. When an area is cleared of topsoil, the topsoil should be stockpiled close by for re-use. The stockpile should be seeded and watered to encourage a protective growth to cover it. This protective growth will assist in minimising dust events in times of high wind and will also stop rain events from washing the topsoil down the drains. Such stockpiles can also provide aesthetic benefits by concealing certain construction activities from view. The Institute of Engineers produces a set of guidelines ('Soil Erosion and Sedimentation Control') that are widely accepted and used throughout the construction industry.

Summary

The purpose of the examples cited above is to illustrate the important practical steps being taken by Abigroup to minimise the environmental impacts associated with its operations. The risk assessment and risk management process provides Abigroup with the framework for identifying and addressing risks on specific projects and enables the lessons learned on one project to be transferred to other projects.

Costs and benefits of environmental management

The costs or benefits attained from implementing an EMS should be split in two distinct areas: the cost of setting up and running the system, and the cost or benefits attained from implementing the system.

Abigroup underwent a management review of its quality, environment and safety systems and made the decision to implement an IMS. The costs of this review and of establishing the integrated system were absorbed into the services provisions. No extra monies were expended on implementing this management system as it was the existing management staff who carried out the necessary work.

In the workplace, environment, safety and quality are all part of everyone's duties; there is no differentiation between disciplines. For example, a plant operator cannot refuse to grade an area of land so that it drains to a sedimentation pond, neither can he refuse to barricade an excavation to stop some person falling into the hole. Environmental management is part of everyday duties—it should not be a cost. Abigroup's view is that the adoption of a formal EMS should simply be seen as formalising documentation rather than imposing new responsibilities on employees.

There are costs associated with having an EMS certified, including costs for the application for accreditation, the costs of the external auditor and the costs associated with the time required of internal personnel (which takes them away from other duties). These costs can be minimised by having an integrated system and arranging for one surveillance audit to all three disciplines (that is, quality, safety, environment).

There are benefits from having an EMS certified. The most obvious is being placed on government tender lists, where only certified contractors are allowed to tender. This type of advantage can stretch for many years, enabling the contractor to create a client base and form relationships before many other contractors gain certification. There are, of course, other intangible benefits that cannot be measured, such as the reduced risk of infringement notices.

Having certification is extremely helpful when it comes to dealing with regulatory bodies and is of particular importance when events do occur (which is inevitable given the nature of the construction industry). Even when such events occur, regulatory bodies are more than willing to work constructively with Abigroup to resolve the issue and ensure the environment is protected. Abigroup's commitment to the environment means that when an incident occurs and there is a need to deal with regulatory authorities, Abigroup's credibility and environmental commitment ensures solutions are found that are both practical and effective. It can, of course, sometimes be a disadvantage when something is done wrong and the response is 'you should have known better'. For example, on a recent project on a construction site in North Queensland, Abigroup had commenced piling and during the course of the work uncovered a 30-year-old fuel tank. Rather than ignoring the issue, the site manager immediately notified the Environmental Protection Agency and implemented emergency response procedures to immediately deal with the situation and minimise the effects on the environment, without any detrimental effect on the project. The EPA assisted with resolving the issue and was pleased to see the efforts being made by Abigroup and its staff to protect the environment.

The construction industry is attempting to integrate cost–benefit assessment into construction waste management. The recycling of offcuts and new waste is slowly becoming part of the industry. Many suppliers are now accepting this waste selectively. For example, plasterboard and gyprock board manufacturers will accept waste return but the waste has to be free of contamination. Similarly, brick manufacturers, concrete suppliers and other kiln-fired clay product manufacturers will also accept waste returns, so long as the waste is free of contamination. What this effectively means is that contractors on building sites need to have a number of different recycling waste bins and these bins have to be policed to ensure that the correct waste is placed in each bin. This means areas have to be set aside for waste collection and arrangements have to be made for periodic collection of the waste. This is impossible on some inner city projects where space is at a premium, but is possible on some sites in rural areas. Many landfill sites actually reduce their landfill tip costs for building waste. For as long as this is part of landfill operations and it continues to be cheaper to send waste to landfill, the recycling of most building products will not occur. In other words, the economic incentives for the industry to reduce waste generation are not generally in place at present.

Erosion and sedimentation control devices can cost money. It is fully recognised that these costs are not solely borne by the construction

industry, but are ultimately passed onto the community. Sedimentation ponds are now a standard part of any drainage management system and are explicitly designed into projects. An alert contractor will construct these ponds first so that they can then be an asset during construction as they pick up not only sediment but also construction debris. At the end of construction and after the vegetation has grown, these sedimentation ponds can become wildlife sanctuaries.

It is fair to say that all costs for environmental controls are eventually passed on to the consumer. It is unrealistic to expect or think that industry will bear the cost for environmental management. The issue is that the construction industry is driven by customer requirements and by external factors such as waste disposal costs. The construction industry is taking great steps to control its specific aspects and improve its environmental performance (for example, by minimising waste and managing erosion and run-off). However, it is also constrained in what it can do in that its area of influence relates primarily to site management aspects rather than broader issues associated with project scoping and design, the availability of funding for environmental improvements and the regulatory system that provides the framework for all of its activities.

Lessons learned

EMS certification is undertaken for various reasons. In the case of Abigroup, the primary reasons were the needs to demonstrate environmental commitment, to satisfy regulatory requirements and to benchmark its environmental program. EMS certification is not simply about ensuring that the necessary documents are in place, nor is it simply about making sure that the previous internal audits have been completed or about checking to see if the roles and responsibilities have been correctly filled in on a chart. While certification is about these things, more importantly it is about the practical issues and ensuring that what is planned in the documents is actually done in the field.

Quality management system certification has been in industry for many years. This certification has been backed by government purchasing departments and has forced many smaller companies to spend many dollars in achieving certification. A system of environmental management certified to ISO14001 need not cost similar amounts of money. A system designed to meet the requirements of ISO14001 can be built on existing quality systems. It is important to recognise that there is generally far less opposition to EMS development than was the case for quality management systems. The workforce and many unions back

companies in their endeavours to gain EMS certification. It is very important to keep the workforce informed of what is happening, as the workforce can and will assist with identifying innovative, cost-effective and environmentally pro-active solutions. In the case of Abigroup, this commitment from its stakeholders resulted in a range of significant environmental improvements being adopted and implemented.

The implementation of an EMS is a transferable cost. Of course, the question for the industry is knowing how much to charge. Most clients have now accepted the fact that they are ultimately responsible for the environmental issues on their projects and that an open and transparent risk management process (involving the client) can lead to responsibilities for environmental management being allocated on a project. This, in turn, means that the costs of environmental management can be transferred to the client. Of course, it should be stressed that these costs must be negotiated and agreed at the start of a project, rather than just sending the client a bill at the end of the project.

Erosion and sedimentation control devices cost money to establish. There has been a tendency, on many construction projects, to erect these devices and then not to maintain them. These devices need constant care, and must be inspected after every rain event and at regular intervals to ensure they have not been damaged or dismantled. Construction sites frequently become playgrounds when they are shut down and it is often impossible to completely fence an entire project. For example, children playing or trail bike riders can damage silt fences. However, the contractor is still responsible for keeping these fences maintained. An effective EMS means that these control devices are checked daily and repaired. It is then easy to transfer these costs back to whoever is responsible.

The most important issue in creating an EMS is to ensure that it is profitable. Senior management will always endorse money making or money saving enterprises. If the EMS can identify cost savings (or costs that can be recovered), then the system will succeed. This is of particular relevance to the construction industry, which requires that each individual project provides a return and unnecessary costs cannot be accepted. Environmental management can provide these financial benefits.

Current status

The most important fact of environmental system certification is not what is planned on paper but rather what the staff understands as their responsibilities and duties, and whether those responsibilities and duties

are being carried out. As a consequence, Abigroup has created a training system within the company to explain what is required of employees and how to do it. 'One-on-One' training has been successful in explaining company policy and procedure, and this type of training will continue. It is very clear that most people want to do something to protect the environment. However, most of the time they do not know how. This willingness and enthusiasm has to be harnessed before it goes stale and employees think that the organisation does not care about the environment.

Abigroup's integrated system has been accepted and has now gone to second revision. Suggestions have been made through the internal consultative processes and many of these suggestions have been adopted. As Abigroup progresses and new employees enter the organisation with new experiences and new perspectives, it hopes to continually tap into that experience and use it to review and upgrade its system over time.

It is important to note that it is difficult to implement an EMS when there is no obvious requirement to do so. While in time the specifications on all construction sites will refer to environmental protection, the reality is that, at present, only a small number do so. These projects are driving companies into accepting responsibility for environmental protection, and those companies with certification will be recognised ahead of the others. At present, Abigroup is recognised as constructor of first choice on environmental grounds. In time, it is likely that the requirement for certification or for a demonstrated record of environmental performance will become the basic entry requirement for projects rather than a competitive advantage as at present.

Conclusions

ISO14001 certification has been good for Abigroup. It has educated staff and made them more aware of their surroundings and of their environmental responsibilities. It has ensured Abigroup is still one of the major contractors in the industry and is recognised as being environmentally friendly. The intangible benefits from certification are unknown and the number of tenders Abigroup has been asked to complete because of certification is unknown. Other construction companies have now started the process of certification—clearly, no construction company wishes to be left behind on this issue.

It is important to remember that the activities of the construction industry are only part of the overall issue. While it is important that contractors manage their own environmental aspects, this will only

address some of the more obvious pollution issues. Broader issues such as eliminating activities that are pollution-generating and integrating sustainability issues into design are equally important. Costing waste disposal versus recycling will involve a much broader range of stakeholders, including community, government and business. It will take commitment from all these stakeholders to create an environment where real sustainability is enjoyed. The construction industry must continue to set an example for other industries to follow.

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11 Bonlac Foods

Wayne Stoll

Introduction

Bonlac Foods is one of Australia's leading food groups. It is owned and controlled by its 3400 Victorian and Tasmanian dairy farmers and generates over one billion dollars in revenue annually. A significant feature of its business is the manner in which it manages its environmental issues, through the effective integration of environmental issues into quality assurance and health and safety programs and the continuous improvement of its environmental and business performance. To enable it to maximise the benefits of its environmental management efforts, Bonlac was one of the first companies in Australia to achieve certification to the ISO14001 Standard in 1996. Achieving certification was the culmination of a number of years of effort in adopting a structured and pro-active approach to environmental management.

The purpose of this chapter is twofold. The first is to provide an overview of the manner in which Bonlac manages its environmental issues. The second, and perhaps more important, is to discuss the benefits that good environmental management have brought to Bonlac. This is illustrated through the recent project undertaken by Bonlac at Darnum Park, where it has established a state of the art milk processing facility. The Darnum Park facility is not only a showcase of technological excellence in the food processing industry, but it also represents an excellent example of the manner in which the integration of environmental issues into business decision-making processes is enabling Bonlac to deliver the goals of social, environmental and economic sustainability. The Darnum Park facility represents the culmination of the lessons learned to date by Bonlac in developing and implementing its system of environmental management. It is an example of the benefits that can result from sophisticated, well-designed systems of environmental management.

Company description

Bonlac Foods employs 2400 permanent staff, many of whom are rural based. Its people and the way it operates are the ingredients of its success. Bonlac's philosophy is that to excel in the future, it must endeavour to excel in every area of its business. This involves 'running and building at the same time', displaying creative flexibility and pursuing closer partnerships with its employees, customers, suppliers and stakeholders.

Bonlac's 3400 suppliers produce over 2 billion litres of milk annually, from 300 000 hectares of land and 450 000 milking cows. Its philosophy at the farm level is to create more from less and to deliver, through the supply chain, the highest quality product capable of adding maximum value.

Bonlac's sixteen manufacturing facilities produce a full complement of dairy products including fresh and UHT milk, specialty milk powders, a variety of cheese types (natural and processed), spreads, fruit juice, sport drinks and yoghurts. In servicing its 600 retail and food service customers within Australia and overseas, Bonlac Foods transports almost nine million cartons through individual truck movements per annum. The Bonlac Distribution Centre at Altona, Melbourne is the single largest distribution centre in Australia.

In the domestic dairy retail market, Bonlac Foods brands command either the number one or number two position in most markets. For example, it holds a 42 per cent share of the butter market and an 18 per cent share of the total cheese market. Bonlac Foods is the second largest exporter of food from Australia, exporting in excess of 170 000 tonnes of dairy product each year including full cream and skim milk powders, butter, cheese, ghee and butter oils to over 50 countries throughout the world. The value of these exports is around $500 million per annum.

Environmental management within Bonlac

Background and driving forces

Bonlac decided to develop and formalise an environmental management system (EMS) in 1992–93. The management system was implemented on a site by site basis. At the time of writing, eight of its nine dairy producing plants have been certified to ISO14001. Recent acquisitions such as the Spring Valley beverages plant, Murrumbidgee Dairy Products

in New South Wales and United Milk in Tasmania will necessitate further EMS certification processes.

The main driving forces for Bonlac to implement formal EMSs and to have these systems certified were the need to:

- demonstrate compliance with legislative requirements;
- demonstrate best practice in the industry;
- integrate environmental issues into overall performance management systems; and
- demonstrate to key international customers that it has a formal management system in place to monitor and manage environmental impacts.

The implementation of the EMS subsequently led to substantial cost benefits for Bonlac, in particular as a consequence of waste minimisation which, in turn, added value to its customers and shareholders.

Bonlac had already developed and implemented a quality system that was certified to ISO9002 for all its operational sites (Stanhope was the first Bonlac site to be certified to ISO9002 in 1991). However, at the time of its decision to implement an EMS, it did not have a formalised EMS in place. Dandenong was the first Bonlac site to be certified to ISO14001 in 1996. In fact, this certification was one of the first thirteen certifications to be granted in Australia (as part of the JAS-ANZ pilot program in 1996). The Darnum Park operation received its ISO14001 certification in 1999.

Environmental policy

Bonlac's environmental policy provides a guiding framework for its activities. The fact that the policy has been signed by its managing director and CEO demonstrates the importance assigned by senior management to the effective management of its environmental issues. The key policy objectives for its environmental management activities are:

- to minimise the impact of its operations on the environment, to protect human health and to conserve resources. This commitment is based on a business culture in which excellence, initiative, personal integrity and ethical behaviour are recognised and rewarded;
- to identify, review and manage the significant environmental aspects of its business and to integrate these activities with its quality assurance and health and safety programs;
- to apply the principles of cleaner production to its entire supply

chain and to continue its efforts to reduce consumption of resources and minimise production of waste;
- to encourage environmental awareness among its stockholders;
- to design products, processes and packaging to prevent pollution and, where possible, to eliminate other adverse environmental impacts across the entire life cycle of its products; and
- to achieve compliance with the standards required by applicable environmental legislation and regulations.

To this end, all employees in the organisation are responsible and accountable for the continuous improvement of the environmental performance of Bonlac's plants and products. This accountability is the cornerstone of its environmental policy and provides the framework within which annual environmental objectives and targets are set and reviewed.

Environmental management system

The Bonlac EMS has been broadly designed to meet the requirements of ISO14001. However, the system has been developed and implemented in a manner that is appropriate to Bonlac's business and existing practices and management systems.

Bonlac's EMS is developed and implemented on an individual site basis. Environmental issues are identified and assessed initially through a formal process of identifying significant aspects and impacts. This information is reviewed, verified and updated as necessary through regular audit surveys of each site. Those environmental impacts that are defined as significant are then priorities for management attention.

The process of continuous improvement is driven at the site level. Each of Bonlac's individual sites prioritises its significant aspects and impacts. For each of these significant aspects and impacts, objectives are set for their management.

Environmental performance is assessed in four main areas: achieving defined objectives, the results of environmental monitoring, the effectiveness of waste minimisation plans and strategies and performance against licence requirements. The majority of Bonlac sites have introduced environment improvement plans that require community consultation and employee input. These provide another area for performance evaluation, although in most cases the improvement plans cover the same areas as the objectives and targets.

The role of senior management is to ensure that the EMS is incorporated into the performance management and evaluation process.

Responsibilities and authorities are incorporated into employee job descriptions as key result areas and key performance indicators. These in turn provide the framework for evaluating the environmental performance of individual employees.

Current status of implementation

It has been some three years since the first Bonlac facility was certified to ISO14001. In that time, its management system has evolved and developed as it has gained more experience in managing environmental issues. Bonlac has used the EMS as a framework for implementing environmental (and business) improvements across the organisation. The EMS has also provided it with the skills and knowledge necessary to maximise the benefits to Bonlac Foods of environmental management.

Some of the key environmental initiatives adopted by Bonlac have included becoming a signatory to the Australian government's Greenhouse Challenge program, becoming an industry leader in environmental issues and recognising the centrality of its employees to effective environmental management. Each of these initiatives is discussed briefly below.

Greenhouse Challenge

The commitment to the Greenhouse Challenge is part of a set of key initiatives undertaken by Bonlac Foods in its environmental management program. Bonlac Foods' participation in the Greenhouse Challenge program focuses on achieving reductions in greenhouse gas emissions through emphasising continuous improvement in areas such as energy efficiency, process efficiency and the effective use of resources. A key element of the program is the use of audited data collated from previous years detailing performance and energy consumption to identify areas where energy savings can be achieved and implemented at plant level.

In 1994–95, Bonlac Foods' total emissions of greenhouse gases were 382 668 tonnes of carbon dioxide (CO_2) equivalent. By 1996–97 emissions had fallen 8.4 per cent to 350 681 tonnes of CO_2 equivalent while the amount of milk received increased by 1.7 per cent. These reductions in emissions have been achieved by the introduction of improved technology and the ongoing drive for continuous improvement. Through its participation in the Greenhouse Challenge, Bonlac Foods expects to achieve a reduction of 77 262 tonnes of CO_2 equivalent per annum, or 16 per cent, compared with the business as usual figure for the year 2000. By the year 2000, greenhouse gas emissions are expected

to reach 395 210 tonnes of CO_2 equivalent while production is expected to have increased by 24 per cent compared with the 1996–97 figures. The production figures are expected to increase by a further 5 per cent by 2002–03. If Bonlac continued its business as usual, without upgrading technology from the period 1994–95, it was forecast that greenhouse gas emissions would have reached 472 473 tonnes of CO_2 equivalent by the year 2000. With the efficiency gains made between 1994–95 and 1996–97 included in the forecast, emissions in the year 2000 would be 430 278 tonnes of CO_2 equivalent. In order to achieve these savings, Bonlac Foods has committed to undertake a number of initiatives, including process and energy efficiency in new plant design, tree planting, reductions in energy wastage, improvements in lighting and improved boiler design. Each of these is discussed in further detail below.

The new Darnum plant site was developed with energy efficiency in mind. The initiatives adopted include the use of baghouse filters for fine powder recovery, the minimisation of storage buffering between process stages to reduce the need for reheating and a plant design that is configured to minimise downtime for cleaning. These initiatives are estimated to save 23 913 tonnes of CO_2 equivalent to the year 2000. Process and energy efficiency initiatives and upgrades are also being implemented in existing plants. These are expected to save 3348 tonnes of CO_2 equivalent annually.

Activities to reduce direct greenhouse gas emissions and sequester carbon are also expected to provide significant benefits. Initiatives in this area include planting some 6000 trees at the Stanhope site, the planting of 28 hectares of trees at the Darnum Park site, the replacement of briquette boilers and the installation of a new pre-treatment waste water plant. These actions are estimated to save 6727 tonnes of CO_2 equivalent per annum.

Energy wastage has been identified as an area of significant cost. Initiatives to reduce energy waste include improving tank installation, improving management of boiler blowdown, the capture and re-use of condensate water and reduced lighting. While individually these initiatives make only incremental changes to total greenhouse gas emissions, the net benefit of these emissions is expected to be an annual saving of 1079 tonnes of CO_2 equivalent.

Reductions in lighting costs and energy used will be achieved by the increased use of natural light, installing of skylights and improved lighting control. It is expected that 79 Gigajoules (GJ) of energy will be saved annually, or 29 tonnes of CO_2 equivalent each year.

The boilers used by Bonlac are in the process of being fitted with economisers, oxygen trim control and automatic blowdown control to increase their efficiency. In addition, the Darnum Park plant has been designed to achieve 80 per cent condensate return to reduce energy consumption. Overall, these measures are expected to save 1261 tonnes of CO_2 equivalent per year.

Bonlac Foods as an industry leader

The delivery of Bonlac's core values—caring and honesty in all dealings, fairness, responsibility for actions and respect for others—is no more evident than in Bonlac's approach to the environment in which it operates. Across the entire life cycle of its products, from 'paddock to plate', Bonlac recognises that its heritage and daily practices and processes will determine the legacy it leaves for tomorrow. Ultimately, its business is intergenerational. By the year 2000, many Bonlac suppliers will be fifth generation suppliers to the company. Ecological and environmental sustainability will ensure that they and their children's children can continue their partnership with the company.

Enhancing stakeholder returns through sustainable competitive practices and processes necessitates a commitment to continuous improvement that is self-generated. Bonlac Foods has assumed a leadership role in industry in its approach to environmental issues. The leadership role has been built on strategies that include:

- benchmarking itself against all industry;
- working in partnership with regulatory authorities in a climate that drives innovation;
- fostering ideas and creative solutions from its people, adopting a try and try again attitude and rewarding success and best endeavours;
- establishing an EMS that fosters initiative and innovation and reflects the principles contained in its environmental policy;
- translating the philosophy of elimination, reduction, recycling, reuse and, only then, disposal into every process and practice;
- bringing to life the concepts of waste minimisation and yield maximisation;
- constantly monitoring and auditing its performance; and
- developing a culture that understands and appreciates waste for what it is, 'an asset in the wrong place'.

An excellent illustration of Bonlac's commitment to a leadership role on environmental issues was provided in 1990 when Managing Director and Chief Executive Officer Phil Scanlan co-founded the

Packaging Environment Foundation of Australia (PEFA). PEFA's charter was to 'develop and promote public, industry and community policies that ensure that all operations and all activities in the production, use, disposal and recycling of packaging materials are carried out in the most ecologically and economically sustainable fashion throughout Australia'.

Bonlac Foods continually evaluates options in conjunction with packaging suppliers to ensure access to the best packaging forms available. It highly values its partnership with companies like Visy Industries, which is a world leader in recycling solutions. The initiatives Bonlac has integrated into its processes include:

- utilising corrugated bulk containers that can be re-used between six and nine times before being discarded for recycling;
- achieving a reduction in bulk cheese bag gauge materials of 17 per cent;
- the elimination of chlorine based product (PVDC) from processed cheese packs;
- using recycled paper in corrugated cartons;
- converting thin wall tubs and lids (used to package butter, for example) from ABS (acrylonitrile butadiene styrene) to PP (polypropylene);
- using tin plated cans at lowest gauge specifications compared with international competitors.

Bonlac's relationships with its packaging suppliers are based on true partnerships and predicated on a shared drive for excellence. These relationships have delivered a high level of collaboration and technical innovation, enabling all parties to meet their respective social, environmental and economic goals.

Employee education and training

To support Bonlac's environmental management strategies for Darnum Park, the staff employed at the facility underwent an extensive education and training program for twelve months prior to the commissioning of the plant. Environmental training was provided to all Bonlac Foods employees and contractors; the subjects covered included yield, waste minimisation and the environment, environmental auditing, membrane plant operation, baghouse operation for the control of air pollutants and solid waste management, to mention just a few. At a special ceremony in early 1998, all staff who participated in the training program were presented with training certificates in association with the State Training Board.

Demonstrated performance

Bonlac's commitment to environmental performance has been recognised by a range of external parties.

The manufacturing plant at Dandenong in Victoria was the first food manufacturing site in Australia to have its EMS certified to ISO14001. All of Bonlac's manufacturing sites are accredited to ISO9002 for quality.

Bonlac was awarded the 1997 Cleaner Production Award from the Environment Protection Authority (EPA) for the Darnum Park facility. In June 1998, Bonlac Foods was awarded the Banksia Foundation's prestigious 'Gold Award for 1998'. The judges recorded that the Darnum Park milk processing plant had incorporated the world's best practice environmental management and processing systems, aimed at maximising energy efficiency in all aspects of the operation of the plant. The judges also acknowledged the strong commitment of the company to improving the environment at its operations at Cobden, Stanhope and the nearby Bakers farm. Bonlac Foods also won the Banksia Environmental Award for 'Resource Conservation and Waste Minimisation' and was one of three finalists for the 'Built Environment Award'.

In October 1997, Bonlac Foods announced its partnership with the Sydney Organising Committee for the Olympic Games (SOCOG). Bonlac Foods was selected to be the exclusive supplier of all dairy products to all official venues of the Sydney 2000 Olympic Games. A key factor in the selection by SOCOG was Bonlac Foods' environmental management performance.

Bonlac Foods and the Victorian Environment Protection Authority have formulated plans and strategies that have been developed into a memorandum of understanding between the organisations. The memorandum of understanding enables both companies to respond to prevailing environmental issues and set new goals for the future while also providing the flexibility necessary to take account of the imperatives of both organisations. The memorandum of understanding was signed by both parties on 11 March 1998 at Darnum Park.

The Darnum Park project

The Darnum Park milk processing facility is an excellent example of how Bonlac is integrating environmental factors into its decision-making processes. The philosophy underlying this type of project is that good environmental performance makes good business sense for Bonlac.

Overview

In June 1997, Bonlac Foods commissioned its state of the art milk processing facility at Darnum in eastern Victoria. The plant is a greenfield project designed to showcase technical excellence and to bring together all of the environmental solutions developed and implemented across Bonlac's other manufacturing sites. The emphasis on environmental management makes good business sense to Bonlac Foods, as such careful attention to environmental issues results in the minimisation of product losses, thereby enabling the attainment of low unit production costs.

Solutions include waste water treatment processes, storage dams for the re-use of treated water for irrigation, the collection and segregation of waste streams for the effective utilisation of waste, control of noise emissions, management of air quality, wetland systems, stormwater management and tree plantation programs. The entire water supply for the facility is self-generated by extraction from milk and refinement. Underlying these processes are objectives such as ensuring that there is no adverse impact on the water table, reducing soil salinity, managing nutrient loading, providing habitat for native birds and animals, and plantings that ensure visual diversity in the landscape and screening.

The Darnum Park concept

Constructed on 270 hectares, the site is set in rolling West Gippsland countryside with limited stands of remnant native vegetation and predominantly open cleared land used mainly for grazing and dairying. The overall landscape design approach encompasses the 'working parts' of the site within a framework of natural indigenous revegetation areas to act as a visual and environmentally sustainable buffer. This creates a pastoral, parkland, woodland character for the site.

The Darnum Park facility

With a capacity to produce 60 000 tonnes of powdered milk per year, the plant will produce 360 Megalitres (ML) of wash water (treatable water). Leading edge technologies within the factory segregate wash water streams, recover product that may otherwise be lost and reclaim cleaning chemicals. The remaining wash water is treated and irrigated on site with no discharge to the environment. With the emphasis on cleaner production and materials recycling and recovery, the volumes of by-products and secondary products from the processes are kept to

a minimum. This makes good business sense as treatment and disposal costs are, therefore, also minimised.

Environmental management

A cleaner production philosophy, fully integrated into every aspect of the facility, is at the core of the environmental excellence achieved at Darnum Park. Water extracted from the milk during the drying process is treated to a high quality, using membrane technology and is used in the plant as process water. Any excess of this purified water is discharged to a local stream or wetland system, helping improve its water quality and flow. This re-use of water results in no external water demand for most of the year.

The milk processing plant is cleaned regularly with caustic and acid chemicals. After use, the cleaning chemicals pass through leading edge membrane equipment to recover much of the chemicals. This assists in reducing the overall processing cost as well as preventing these chemicals from entering the environment. More than 90 per cent of the cleaning chemicals used are recovered in this way.

The wash waters also contain a percentage of milk solids washed from the interior of the driers and other processing equipment. The first flush of wash water, rich in milk solids, is recovered in storage tanks and sent as stock food to local farmers.

Not all wash water streams are the same quality and, therefore, do not require the same degree of treatment. At Darnum Park, careful design and on-line, real-time monitoring of wash water quality in each stream enables each wash water stream to be automatically directed to the appropriate treatment facility. Since not all wash water passes through all of the treatment facility, the size of each piece of treatment equipment is minimised, thus reducing capital and operating costs and contributing to the low production costs being achieved at the plant. Four wash water streams are identified and managed separately at Darnum Park: high solid stream, low solid stream, water suitable for irrigation and storm water. Wash water with high milk solids is held on site, in large tanks, and sold as animal food or as a composting component. Wash water of a quality suitable for irrigation bypasses the pretreatment equipment and is directed to the lagoon system. Stormwater from the factory roofs and surrounding areas is continuously monitored in three separate locations for contamination. If contamination is detected, the stormwater is automatically directed to the treatment facilities. Uncontaminated stormwater is allowed to pass through the wetland system prior to discharge to the local stream.

Domestic sewerage is treated and disposed of on site by a separate dedicated system.

The wash water requiring treatment is initially directed to a balance tank, designed to equalise wash water flow and to modulate composition and temperature. From this tank, the wash water is pumped through to a fat separation plant to remove free fats. The recovered fat is sent to either tallow or compost manufacturers. Following removal of the free fats and oils, the pretreated waste water then passes to two 80 ML aerated, facultative treatment lagoons. These are the heart of the treatment process and use proven, low-cost, low-energy biological processes to reduce the organic loading in the wash water to levels suitable for subsequent irrigation. The retention time in the treatment lagoons is an average of 100 days. Two different technologies are used to introduce oxygen into the water to sustain the biological activity. One lagoon uses traditional floating surface aerators while the other employs a submerged diffused air system for the dairy process industry. Darnum Park is the first application in Australia of the diffused air system for dairy treatment and the technology offers lower energy use than other equivalent technologies for equivalent performance.

The treated wash water, known as irrigation water, is stored in four storage lagoons with a total capacity of 360 ML. The irrigation water is irrigated onto the pastures of the surrounding farm to produce both hay and silage, which not only offsets some of the treatment costs but also helps maintain the nutrient balance on the farm. The irrigation area and the size of the storage lagoons are designed to enable all of the treated waste water to be held on site and irrigated with no discharge to the external environment. The irrigation system is managed by a fully automatic control system. The sophisticated control system can detect wind speed, rainfall, relative humidity, evaporation rate, barometric pressure, temperature and wind direction and can shut down the irrigators should there be a chance of spray drift to neighbouring properties.

Filtering of the air exhausted from the milk drying process at Darnum Park ensures that air released from the site is free of particulate matter. On-going monitoring programs provide effective management of air quality and help guarantee to the immediate neighbours and local community that the process is clean and environmentally friendly. Steam and hot water for the site are produced by natural gas fired boilers. Nitrogen dioxide and carbon monoxide emission levels from these boilers are strictly limited by the Victorian Environment Protection Authority. The installed equipment produces emissions that are far below these limits.

Operational impacts

After over a year of operation, the attention paid to the interaction with the local environment is evident. The low impact philosophy has extended to the architecture, producing buildings that have minimal visual impact. The buildings blend with the surrounding area, with their roof lines curved to match the rolling pattern of the local hills.

Noise levels at the plant are very low for such a major production facility. All significant noise producing equipment has been located within buildings or underground. Ongoing monitoring is undertaken to ensure that these low noise levels are maintained.

Odour from the plant is controlled by designs that minimise spills and good house-keeping practices that ensure rapid clean up should spills happen.

The natural environment of the Darnum Park farm has been enhanced by the planting of over 50 000 trees. These trees will provide visual buffers as well as wildlife corridors for local flora and fauna. The species are native to the area, with many of the plants propagated from locally collected seed.

Performance monitoring

Bonlac Foods' commitment to the environmental systems in place at Darnum Park is maintained by an ongoing monitoring program for all aspects of the natural environment. The environmental management plan is submitted to the Victorian Environment Protection Authority and the Baw Baw Shire in January. The results of these monitoring programs are also presented in an annual environment report that is submitted to these bodies.

Energy conservation

Bonlac Foods recognises that achieving sustainable energy reductions not only results in cost savings, but can also achieve significant reductions in greenhouse gas emissions. The focus in the design phase of Darnum Park has been on energy efficiency in all aspects of the plant, incorporating many state-of-the-art energy efficiency measures such as heat recovery techniques and low energy processes.

Current status of implementation

Bonlac's managing director and CEO has signed and updated a version of the environmental policy that is in alignment with the requirements

of ISO14001. The company's board of directors and senior management have further demonstrated Bonlac's commitment to the environment by the signing of a memorandum of understanding with the Environment Protection Authority. This is a significant corporate commitment that will require Bonlac to continually invest capital into all of its individual sites, to move them to beyond compliance.

Environmental issues are identified and assessed through workshops with management and employees at each site. The workshop process involves both the identification and assessment of significance of environmental issues. The key drivers for this process have been statutory requirements along with Bonlac's efforts to identify cost savings through cleaner production initiatives.

Bonlac Foods identified that a strategic environmental focus was needed to work towards long term sustainability. This can be demonstrated through the company's signing of the memorandum of understanding, the signing of the Greenhouse Challenge and working towards licence accreditation for its major sites, Darnum, Cobden and Stanhope.

Employee environmental training has been incorporated into the induction process with ongoing awareness training being provided on an as needed basis. Six training modules have been developed to provide different levels of expertise for employees. This training program has been developed in alignment with the National Certificate of Food.

Lessons learned

Bonlac has learned a number of important lessons from its experience in developing EMSs. In terms of implementation issues, the key issues were the importance of a team approach to system development, the need to develop a standard implementation process and the need to develop environmental management systems in alignment with quality management systems.

In terms of the importance of a team approach, the initial focus was on the environmental management leadership at corporate and site levels. This was followed by awareness training for all employees and the incorporation of responsibility and accountability into business unit managers' position descriptions. Adopting a team approach to system development and implementation will lead to ownership of the system among employees, thereby maximising the long term success of the system. Employees are now involved in system development through consultation, developing the systems procedures and ongoing awareness

training. Environmental responsibility and accountability is a key issue for Bonlac, and these requirements are incorporated into the job descriptions of all employees and into procedures. Employees are provided with information on the performance of their department and on overall site performance. This information is provided on a daily basis in a graphical format that can be easily understood and can be compared with agreed targets. The overall objective of these initiatives is to develop ownership and commitment among employees for environmental management within Bonlac.

Our original approach to implementing EMSs involved each of the sites developing their own systems. This led to much duplication of effort, in particular in planning implementation processes. Bonlac has now standardised the implementation methodology, thereby making the implementation process more efficient. It paid insufficient attention to the importance of aligning the EMS with its existing quality systems. Paying more attention to this issue would have greatly facilitated the integration of quality and environmental management systems. Bonlac has now commenced the integration of the systems, but full integration will need to wait until it completes the development of an electronic database, which will facilitate the integration process.

Maintaining enthusiasm for environmental management initiatives requires the successful management of change within the organisational culture. This requires that all employees have a stake in the organisation's environmental performance. An important starting point for this is the incorporation of environmental requirements into job descriptions and into the organisation's performance management system. Bonlac has found that integrating the EMS with other performance management systems is the best approach as it means it can optimise management's and employees' time and reduce the amount of auditing required.

Bonlac can demonstrate the financial benefits that can result from waste minimisation. These benefits have been achieved by formalising its management systems to incorporate explicit objectives for waste reduction which, in turn, leads to cost reductions. The costs of environmental management are incorporated into the overall management system costs rather than treating environment as an isolated cost. The Darnum Park facility is a blueprint for the way in which Bonlac will model future projects.

Bonlac issues an annual report that describes the benefits of its environmental strategy. Bonlac has also developed environmental improvement plans in conjunction with its local communities. Bonlac provides its international customers with a monthly newsletter that incorporates a section on environmental reporting. Bonlac also provides

environmental management plans for individual sites in accordance with EPA requirements.

One of the difficulties in the initial stages of the development of the EMS was the absence of suitable electronic databases for building the system. Today, there are electronic database packages that will integrate environmental, quality and occupational health and safety systems. Bonlac is currently in the process of developing such a system as part of the overall integration of its management systems.

Bonlac employs external consultants to work with key personnel in facilitating the development of environmental systems. However, once certification is achieved, Bonlac management is responsible for maintaining these systems. That is, Bonlac values the expertise that consultants can bring but recognises that for the long term success of environmental management within Bonlac it is essential that all of its employees take responsibility for environmental management within their areas.

Conclusions

A key benefit of an EMS is that it enables Bonlac to set its own targets and strengthen accountability through awareness of obligations. It also enshrines the value of community consultation which, in turn, improves ecological and social awareness. For example, the memorandum of understanding commits Bonlac to bringing all operations to a better than compliance standard and the Greenhouse Challenge enables it to set company targets and reduction programs that will allow it to trade surplus carbon credits on the futures market.

Future directions for Bonlac Foods include working towards the completion of the memorandum of understanding with the EPA, maintenance of its certification to ISO14001, working towards full integration with other management systems, the Greenhouse Challenge, seeking licence accreditation through the EPA to be self-managed, working towards developing a model for life cycle analysis and working towards establishing EMSs with all of its dairy farmer supplier-owners.

Ultimately, Bonlac's environmental management system is a tool to enable it to integrate social, environmental and economic factors to ensure the long term sustainability of its business.

Reference

Bonlac Foods, 1998 Bonlac Foods Limited Submission for 1998, Vision for Australia Awards Program, unpublished

12 An evaluation of the case studies

About the case studies

Before reviewing the specific issues raised in the case studies, it is useful to discuss why we selected the companies represented in this text and how we guided the authors in the preparation of their chapters.

Selection of case studies

The organisations represented in this text were selected because of their success in effectively dealing with environmental pressures in the context of their overall activities and objectives. These organisations have developed and implemented robust and effective EMSs. These systems have enabled them to address their environmental risks and opportunities in a structured, systematic manner. The outcomes have been real benefits for the organisation.

In choosing the organisations, we deliberately covered as broad a range of activities (from mining through to service providers) as we could. We invited contributions from public and private sector organisations, local, national and international organisations and organisations at various stages of developing and implementing EMSs. The organisations represented in this book cover activities as diverse as mining, primary production, manufacturing, electricity generation and services such as utilities and local government. Each of the organisations has a range of environmental aspects and impacts; some are even part of the 'environmental industry'. However, for the purposes of this book, the specific activities carried out by the organisations and the specific environmental issues to be managed were of secondary importance (although these obviously affect the structure of and approach to environmental management). The primary issue was how these organisations approached the management of their environmental issues and

succeeded in incorporating these issues into their overall business decision-making processes. The organisations are at very different stages of their EMS development, ranging from those with systems that are fully integrated with overall business management to those that are in the process of implementing a system. The difference in the maturity of the systems enables the differences in emphasis and relative importance of issues between those organisations with well developed and established systems and those that are still grappling with some of the practicalities of actually implementing a system to be discussed and reviewed.

The aim of the case studies was to provide practical examples to illustrate some of the key principles and issues raised in chapters 2, 3 and 4. The case studies provide examples of the very different solutions that can be adopted when developing and implementing an EMS. The case studies are an important counterpoint to the material presented in chapters 2, 3 and 4, in many ways confirming and providing a practical validation of this material.

Guidance to authors

When we commissioned the contributing authors to prepare their chapters, our instructions to them were deliberately quite general. We asked them to describe how they developed and implemented their EMS. We asked them to cover issues such as driving forces, costs and benefits and, in particular, lessons learned. As a consequence, the case studies reflect the actual differences in the approaches adopted to environmental management within the different organisations. Despite the differences, the broad outcomes have been the same: each organisation has successfully established, or is in the process of establishing, EMSs covering their environmental issues and risks.

Issues raised in the case studies

What is abundantly clear from the case studies is that there is no standard or best way of developing and implementing a management system. Each of the organisations represented has described its own approaches and methods for developing a management system. Clearly, there is no such thing as a standard recipe for environmental management or a series of 'one size fits all' procedures. Each organisation is unique, with different aspects and impacts, different management structures, different levels of skill, expertise and resources and very different corporate

cultures. No two organisations are the same and no two organisations have the exact same way of doing things. Organisations evolve and find their own way of doing things, ways that work and are effective in the context of the organisation. And these systems and approaches evolve over time. In environmental management, as in so many other aspects of the way in which organisations operate, there is no single 'right' way of doing things. Rather, in any given situation and for any circumstance, there will be a range of approaches that may be adopted. The approach selected is not necessarily the 'most efficient' or the 'best'; instead, it is defined by factors such as desired outcomes, resources, skills and capabilities.

Chapters 2 and 3 outlined a general approach to the development and implementation of an EMS. Elements such as the required outcomes, environmental policy, setting objectives and targets and performance evaluation were discussed. Despite their many different approaches, each of the case studies refers to some or all of these elements as key aspects of system development, or as a key feature of the overall management system. While each organisation has its own issues and approaches, there is a general agreement that these elements form the basis of any effective EMS. The key issues are discussed further below.

Approaches to management system development and implementation

Significant environmental issues and defining outcomes

The most important feature of all the case studies presented in this book is the emphasis of environmental management efforts on those environmental issues that are of greatest importance to the organisation. In particular, this importance is not necessarily driven by the significance of the environmental issue as measured by the magnitude of the environmental impact involved. Rather, the importance of environmental issues is driven primarily by the importance of the issue to the organisation. Importance can be measured in terms of financial impact, compliance status of the organisation, corporate reputation, external expectations and so on. While in some cases major environmental impacts are the same as major organisational impacts, this is not necessarily the case for all organisations and certainly not in all situations.

It is clear that all of the contributing organisations have a strong commitment to environmental protection. It is also clear that the primary driving force for taking action is the significance of the issue

to the organisation as a whole. Simply defining an environmental impact as being important in itself is not a sufficient precondition for an organisation to take action. This is of particular significance when looking at the future for environmental management and the importance of external drivers on the activities and actions of organisations. Without strong external drivers, there is limited incentive to take action to address environmental issues. In this context, it is interesting to note that most of the contributors cite legislative requirements as providing the main driving force for adopting structured EMSs.

Most of the organisations have a formal process for the assessment and prioritisation of their environmental aspects and impacts. It is worth noting that the emphasis of this risk assessment process has not been on highly quantitative approaches. Rather, the focus has been on practical qualitative or semi-quantitative approaches for the prioritisation of risks and the identification of those risks that require some form of management attention. It is clear that this practical approach also facilitates the communication of the importance of environmental issues to senior management, which is an important part of the process of obtaining resources to address these issues.

Driving forces

For most of the contributors to this book, legislation provided the initial impetus for the adoption of a formal EMS. Concepts such as due diligence and integrated management systems, together with the increasingly important financial dimensions of legislation and licensing, mean that the management of environmental issues is no longer an 'optional extra' or a lower priority than other management issues such as safety and quality. That is not to say that organisations were not managing many or all of their issues prior to these legislative drivers being introduced. Rather, the introduction of legislation provided the impetus for organisations to explicitly manage their environmental issues, to broaden the general focus of environmental management and to adopt a much more strategic approach to environmental management than had historically been the case.

Beyond regulatory requirements a range of other driving forces were identified, including cost reduction or other financial benefits, marketing and PR, shareholder expectations, community expectations and competitive advantage. In the case of those organisations that are part of larger (or multinational) bodies, corporate expectations and driving forces are important pressures on local management. For the public sector organisations and corporatised entities, the driving forces appear

to have been slightly different. Obviously, meeting regulatory requirements was a significant issue. However, community expectations and the need to demonstrate that the principles of sustainable development are being followed also played a key role in the initial decision to adopt a structured approach to environmental management.

Given the emphasis on legislative requirements as a key driving force, it is interesting that none of the contributors see the benefits of environmental management simply in terms of compliance with legislation. Rather, the benefits are seen very much in the context of the overall objectives of the business or organisation. The most widely cited benefit is that of improved financial performance through reduced waste, reduced cost, improved resource efficiency and reduced licence fees. The other benefits mentioned, which are more difficult to measure, include improved reputation, increased access to markets and competitive advantage. While the authors all mention improved environmental performance (as measured by reduced environmental impact), it is interesting that this benefit is presented as secondary (at least in a business sense) to the other identified benefits. This outcome raises another interesting issue—that is, while the initial driving force was legislation, the process of developing and implementing an EMS has led to a range of other benefits, some of which were not identified in the initial stages of establishing the system. Furthermore, it appears that without regulatory drivers, the pressure to implement such systems and thereby achieve these other benefits would not have been as strong.

System development

It is clear that the approaches to system development differ widely. The nature of the organisation, existing management systems and the specific environmental issues to be managed dictate this. However, there are many common features across the case studies.

The first and most basic is that an EMS must be built on existing management systems, practices and processes. Organisations that have structured quality or safety management systems in place have been able to incorporate environmental management into these systems and the process has been shown to be relatively straightforward. Organisations that have kept environment as a separate discipline have been less successful. Most of these organisations, even those with certified EMSs, are now moving towards the integration of environmental management into other management disciplines. Within the case studies, the environment has been seen to be of importance primarily from a business or organisational perspective. Stand-alone EMSs clearly do not enable the

environment to be integrated into business decision-making processes. A common outcome is that environmental issues are perceived as being of less importance than other business issues.

It is interesting that the environmental audit process was identified by many of the authors as being a critical starting point for the development and implementation of an EMS. Environmental auditing is seen as providing an objective assessment of an organisation's position with respect to issues such as legislative compliance and the adequacy of existing EMSs. In addition, the audit process is seen as enabling performance improvement to be measured and tracked and enabling priorities for environmental management to be defined.

Senior management commitment

A common theme running through all of the case studies is the absolute importance of senior management commitment to the process and outcomes of environmental management. Important issues for senior management are the provision of resources for environmental management, the allocation of responsibilities and authorities and the definition of accountabilities for environmental management. In addition, the importance of senior management in communicating and providing active leadership on environmental issues is stressed in the case studies. Communication and leadership are of fundamental importance to the successful implementation of environmental management within an organisation. Furthermore, while management support is obviously important for system development, it is even more important for the ongoing environmental management efforts within organisations.

Performance measurement

There is a lack of emphasis in the case studies on performance measurement as a part of EMSs. This may be thought to be somewhat surprising given the emphasis in the literature and in standards such as ISO14001 on continuous improvement. However, the reasons become clearer when one considers the evolution of environmental management. As discussed in chapter 4, it was only in 1996 that the first EMS certifications were awarded in Australia. Hence, formal EMSs are a relatively new issue in Australia. For most organisations, including those represented in this book, the priorities for environmental management efforts were to (a) achieve compliance and (b) stay there. It is only following the achievement of these objectives that organisations are starting to consider, more broadly, the concept of continuous improvement and how this can be achieved and demonstrated. Therefore, it is likely that

we will see increasing numbers of organisations setting measurable objectives and targets and defining performance indicators that enable these objectives and targets to be tracked over time.

Another characteristic of the systems described in the case studies is that costs and benefits have not, as yet, been fully quantified. It was also surprising that so few of the authors were able to (or perhaps willing to) fully quantify the costs and benefits of environmental management. In terms of system development and implementation, most of the organisations had a reasonable understanding of the external costs such as consultants, certification and auditing costs. However, there was limited data regarding the internal costs, in particular, the time requirements of employees and managers associated with system development, implementation and maintenance.

Similar comments apply to the evaluation of the costs and benefits of environmental management. While some of the organisations represented here claim to have quite detailed information on environmental costs and benefits, it appears that systematic evaluations of these costs and benefits have not been carried out. Much of the information provided has been qualitative rather than quantitative. Having said that, all of the authors have emphasised that environmental management has proved beneficial for their organisations, although the magnitude of the economic benefits is unclear. In this context, it is important to recognise that this is a difficulty with environmental management generally, in that many of the identified benefits such as improved reputation, improved access to markets and being able to demonstrate due diligence are not quantifiable using conventional cost–benefit assessment techniques.

Ongoing system maintenance

An issue associated with the case studies described in this text is the present immaturity of many of the systems that have been developed and implemented. The first certifications in Australia to ISO14001 were in 1996. Therefore, up to this time, the concepts behind formal EMSs have only been in place for some four years (although many of these were recognised for a number of years prior to this and EMS standards such as the EMAS scheme and BS7750 had been available in draft form since the early 1990s). Most of the systems described in the case studies are still being refined.

The Bonlac experience is important from the perspective of system development versus ongoing system maintenance. Bonlac's EMS is well developed. It is interesting to see how Bonlac is exploiting its environmental expertise and lessons learned over some years for commercial

advantage, as evidenced in the Darnum Park project. It is clear that environmental management is a long term proposition for Bonlac. The Bonlac case study demonstrates that environmental management can provide significant long term benefits, resulting from incremental changes that may not, of themselves, appear significant. The Darnum Park project in many ways is the culmination of the lessons learned by Bonlac over a number of years. It is interesting that Darnum Park is not even seen by Bonlac as an end point, more as a 'staging post' towards even more business improvements through the pro-active management and continuous improvement of its environmental aspects and impacts. In a different way, the case study from Abigroup illustrates how organisations can improve their business and environmental performance on a project by project basis, taking lessons and experience from different projects and ensuring these lessons are propogated through other projects and developments. The formal systems of environmental management, in Bonlac's case the corporate emphasis on environmental issues and, in the case of Abigroup, the risk assessment process, have enabled this knowledge to be captured and recorded and transferred.

Certification

There is a divergence of opinion within the case studies regarding the benefits of certification of an EMS to a standard such as ISO14001. Some have seen certification as an integral aspect of the system, providing a tangible demonstration of environmental performance, the discipline of external audits and providing a focus and endpoint for the system development process. Some see certification as providing limited benefits or as not being relevant to their specific business needs. Overall, the decision on certification is an organisation-specific issue. The key issue is that organisations should understand exactly why they wish to achieve certification and should ensure that the certification process is a value-adding process.

13 Conclusions

This chapter is divided into two parts. The first relates to the explicit subject matter of the book, namely how organisations manage their environmental issues. The second relates to the framework within which organisations manage their environmental issues, including issues such as sustainable development and environmental legislation.

The organisational context

It is clear that the organisations represented in this book have achieved significant benefits from adopting a structured systematic approach to environmental management. These benefits have included better management of regulatory compliance issues, improved financial performance and broader, if less tangible, benefits relating to the long term sustainability and viability of the organisation. Each organisation considers that the environment is a core business issue and will increase in importance over time. In this context, the importance placed by the organisations on the complete integration of the environment into their decision-making processes should be emphasised. This move is a clear signal that the environment is a core business issue, similar to financial management or health and safety management. This integration process is critical in ensuring that adequate resources and management support are available for environmental issues.

The broader context

It is apparent that legislation, reflecting, in part, community expectations, has provided the initial impetus for many organisations to explicitly manage their environmental issues. Legislation and, in particular,

the significant penalties that may apply for non-compliance have created the pressure for organisations to manage their environmental issues. The question, now, is where to from here?

A next step may be the adoption of the principles and practice of sustainable development. Defining these terms, identifying desired outcomes and developing and implementing strategies represent substantial challenges. There is a range of opinions on how sustainable development can be defined. Some organisations define sustainable development in narrow terms, relating to legislative compliance and cost minimisation. Others consider much broader interpretations, where social and environmental factors are fully integrated into decision-making. It is important to recognise that none of the organisations represented in the case studies are moving to a position where these environmental and social factors override economic concerns. That is, all of the organisations are acting as economic rationalists required to generate adequate profits and returns where beyond compliance initiatives will be taken only if there are clear returns. For some organisations, these returns are not only related to financial benefits but also to issues such as corporate reputation. However, it is not likely that the emphasis on financial performance will change in the foreseeable future. Most organisations will continue to act in their own and their shareholders' best, or perceived best, interests. Specifically, this means that the environment will be required to be a 'profit centre', where environmental expenditures will be expected to produce a return in a similar manner to other activities.

Without broader pressures to address environmental issues, in particular the issue of sustainable development, this will continue to be the case. In the specific context of Australia, there is the National Strategy on Ecologically Sustainable Development, and many of the states and territories have legislation that refers to the concept of sustainable development. The case studies from ACTEW, Abigroup and Redland Shire Council illustrate this. There is also an increasing use of economic instruments by government, including waste disposal fees, effluent treatment charges, water use charges and, in the case of New South Wales, fees based on the quantities of pollutants released to air and water (the Load Based Licensing Scheme).

There is legislation in place, but either the legislation itself or the lack of enforcement is failing to drive organisations towards adopting the principles and practice of sustainable development. Without an effective driver, organisations will be slow to move towards or to fully adopt the principles and practice of sustainable development. In some ways, this is what is so interesting about the Bonlac case study. Environmental

management within Bonlac is recognised as a profit centre and also as a source of competitive advantage. Bonlac recognises that its future is linked to its ability to perform, both economically and environmentally.

It is possibly through pressures applied by consumers and customers that there will be the greatest pressures for organisations to move beyond a narrow financial performance approach to environmental management. It is interesting that the case study from Abigroup mentioned that the organisation is now looking at the environmental performance of its suppliers and is considering how Abigroup can help these organisations improve their environmental performance. Many of the case studies refer to client expectations as a contributing driving force for implementing an EMS and having it certified, but having an EMS is only the starting point. The organisations represented in the case studies are using initiatives such as their participation in the Greenhouse Challenge to obtain marketing or PR benefits. It is the pressures which directly affect organisations' bottom lines either in terms of cost or in terms of providing market opportunities or reputational benefits, that are likely to be the greatest influence on organisations to further improve their approaches to environmental management and to move towards the adoption of the principles and practices of sustainable development.

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