CREDIBLE "CLEAN AND GREEN"

Investigation of the international framework and critical design features of a credible EMS for Australian agriculture

K.E. Heinze

DISCUSSION PAPER

Credible EMS = f (s + w + a + b + P + E + I)
S=soil; w=water; a=air; b=biodiversity; P=policy; S=social; E=economic; I=institutional
CREDIBLE ‘CLEAN AND GREEN’:
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PREFACE

This report is the result of a preliminary study of international market and policy drivers for developing an environmental management system (EMS) for agricultural production.

The report has been principally prepared for CSIRO use but is available as briefing information for industry and government. The study was conducted through a combination of desk-top study, literature review, and interview using national and international sources.

The report is also a first step to identifying a possible framework for a credible and feasible EMS for Australian agricultural production systems, and how best CSIRO can contribute to the challenge.

CSIRO acknowledges the wealth of information already available on Best Management Practice (BMP) and EMS, much of which is referred to in this paper and the solid attempts already underway by Australian agricultural producers to demonstrate sustainable management practices. The proceedings of the recent RIRDC/LWRRDC sponsored workshop to scope industry interest in designing a certification scheme for Australian agriculture provide a good coverage of the main issues for debate in determining the need or otherwise for an Australian EMS for agriculture. CSIRO also acknowledges contributions provided by officers of Australian government agencies, the EU, the World Bank, and Dames and Moore (London and Australia offices).

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1. EXECUTIVE SUMMARY

Environmental Management Systems (EMS) are systematic approaches to organising the planning, implementation and review of an organisation’s attempts to responsibly manage its environmental impacts within an auditable framework and which is certified by an independent third party.

Best Management Practice (BMP) is an approach to managing key issues at the grower level within a process-based framework.

The issue globally
- Industries and public authorities worldwide are increasingly implementing various voluntary BMPs/EMS which aim to demonstrate sound environmental management, improve market access and provide auditable evidence of public accountability and responsible management. The move to voluntary EMS is a means of demonstrating industry self-regulation as opposed to compliance with a government-regulated EMS. A requirement for agricultural production to demonstrate compliance with certified EMS falls into the middle of the international trade/environment debate.
- Consumers are increasingly expecting food to be produced in a responsible or ethical manner, encompassing concerns such as environmental stewardship, fair trade and animal welfare.
- The globalisation of major retail chains will also impact on the ability of Australian producers to remain in or enter markets and comply with value chain specifications. Increasingly retailers are responding to consumer concerns regarding food production processes. This is translating to the development of retailer driven production protocols for fresh produce.
- The finance and insurance sectors have broadened their approach to risk assessment in lending, investment and insurance policy development. They are increasingly being exposed to long-term liability issues, especially regarding environmental impacts. Both sectors now require their corporate clients to demonstrate evidence of effective environmental management procedures.

The issue for Australia
- Australia is a young agricultural country with old soils. Our practices have not been well adapted to suit the landscape and hence our agricultural systems are currently a long way from environmental equilibrium.
- Australian agriculture trades on being ‘clean and green’ in the marketplace and yet our trading partners do not always necessarily support our view. In addition to environmental aspects this view is also influenced by trade negotiation positions adopted between nations.
- The growing trend to BMPs/EMS in the major markets of the EU, US and increasingly Japan suggests that failure to adopt EMS may disadvantage Australia’s agricultural export opportunities in the longer term, and that taking the lead may even enhance our market position. In support of this view, the Minister for Agriculture, Fisheries and Forestry is now encouraging the agricultural sector to adopt EMS as a way of linking trade and the environment.
- However some products are likely to be more vulnerable than others in terms of market access. For example viticulture is likely to be more vulnerable than cotton.
- Domestic water reform policy may require demonstration of BMP/EMS as a prerequisite to licensing of water rights for irrigation.

International initiatives
- The Eco-Management and Audit System (EMAS), initially designed in Germany for the manufacturing and chemical sectors, is now accepted EU-regulated EMS for the European Union.

2 Senator Troeth, Parliamentary Secretary to the Minister, has recently raised the issue of sustainability and trade as being among the key government priorities for research with the Chairs of the R&D Corporations, October 1999.
ISO14001 (International Standard - Environmental Management) is now becoming the preferred international standard and EMAS will be incorporated into the ISO framework to facilitate complementarity.

The USEPA recently conducted a project to assess the uptake, status and impact of EMS in American industry.

To date, no ISO14001 consistent system has been designed for generic application to agricultural production systems, though a number of individual farmers or consortia have achieved ISO14001 status. Some farm systems however are moving towards this goal. Examples include the UK’s LEAF program (Linking Environment and Farming), with Canada also moving towards an EMS which integrates farm planning, hazard assessment and control, and third party certification.

Many producers of high value products have designed product-specific Best Management Practices (BMP). Australian organic producers have developed their own standard which is recognised by the industry as the highest in the world, and the Australian cotton industry’s Best Management Practice Manual is a major step towards certification. ‘Sensitive’ industries such as forestry, livestock and poultry have also adopted this course.

Individual farmers are also implementing integrated whole farm planning, and a number of Australian farmers have achieved ISO14001 status. In Europe seven countries have formed a regional alliance to promote integrated farm planning and also use this as a marketing tool through eco-labeling.

EURAP, a large European retailer consortium, has developed a code of Good Agricultural Practice (GAP) for fresh produce. All suppliers to the consortium members are now required to comply with GAP specifications.

Empirical response to EMS
In recent times a number of European studies have been conducted to attempt to identify the validity of EMS, quantify its impacts and identify further implications for EMS as a management tool. A recent study by Steger evaluates most empirical and comprehensive studies of EMS conducted for the German and Austrian Environmental Ministries. His study identifies a number of key weaknesses in EMS design to date, which undermine its credibility and long-term effectiveness. Of greatest significance are:

- The lack of a micro-macro link in the context of ecological-driven limits, making it difficult for companies and regulators to set meaningful targets and measure outcomes
- The need for long-term environmental public environmental policy priorities, based on science and political evolution to help establish the micro-macro link
- The lack of value-chain integration, creating tensions and bottlenecks in EMS implementation.

Opportunities for Australia
- Australia is currently conducting a significant environmental management R&D program, some of which can readily be applied to the development of an EMS for agriculture.
- The pressure to identify a micro-macro link in setting environmental targets lends the design of EMS to best be developed in the context of ecological-driven limits at regional scale. This aspect is ideally conducted as a collaborative approach at regional level.
- An optimal approach would be for industry and government to jointly fund an EMS program to develop a prototype EMS for a particular product within the framework of regionally based environmental indicators, measures, thresholds and targets.
- The report describes a possible approach to developing a prototype EMS for Australian agriculture within a context of regional environmental thresholds and targets. Possible outcomes include the development of credible eco-labels in the international marketplace.

2. INTRODUCTION

This report was initiated as a result of a CSIRO Land and Water Sector marketing initiative which identified opportunities for CSIRO to service the development of ISO14000. During May 1999 CSIRO was also invited to assist the MDBC explore the feasibility of introducing a Basin-wide EMS for irrigated agricultural production. This report provides background briefing material to this study.

Before responding to requests to investigate the need for EMS, CSIRO felt a need to conduct its own preliminary study to clarify what is generally understood by EMS, the current status of EMS internationally, and how best CSIRO could contribute to the process.

This report does not attempt to answer the question: ‘Should Australian agriculture adopt EMS?’ This is the role of industry and government. Rather we aim to clarify the context in which EMS is evolving, identify possible critical design features of a credible EMS should industry/governments require such a tool, and identify an initial strategy to assist industry move this forward within the framework of current initiatives. However the report provides evidence that the need for an EMS approach for Australian agriculture does exist, especially for those commodities reliant on high-value export markets.

This report attempts to provide scientists and commercial managers in CSIRO with an appreciation of the complex trade, market, policy and public drivers associated with EMS design so that science can respond to the need and guide the outcome to achieve a robust EMS based on sound sustainability criteria, and which is understood and accepted by all stakeholders. The report is available as briefing information for industry.

The report provides an overview of:

- current US and European views on the use of EMS
- the potential for EMS to become a technical trade barrier (WTO)
- the structure of EMS and examples of major systems in place
- strengths and weaknesses of current systems
- are they regulated or voluntary systems?
- influence of consumers and markets.

During the study it became increasingly evident that, although there is huge amount of literature on the ‘system design’, there is little evidence of systems being linked to meaningful regional-scale environmental standards which support environmentally sustainable development in the longer term.

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DAMES AND MOORE – NRM ‘Opportunities for CSIRO to service ISO14000’, 1999

K Heinze, February 2000
3. ENVIRONMENTAL MANAGEMENT SYSTEMS

3.1 WHAT IS EMS?

An Environmental Management System (EMS) is a systematic approach to organising the planning, implementation and review of an organisation’s attempts to responsibly manage its environmental impacts and demonstrate accountability to regulators, shareholders and the community. EMS, in its current state, is a management tool for identifying and managing the day to day environmental hazards that are actually or may potentially occur and may be subject to independent certification and audit. EMS builds on the concepts of adaptive environmental assessment and management and the common business management concept of ‘continuous improvement’.

An EMS is expected to be corporately driven and typically consists of:
- a policy and commitment to prevention of pollution
- a procedure to identify actual or potential environmental hazards
- a process to develop management and employee commitment to protecting the environment including clear responsibilities and accountabilities
- environmental planning throughout the organisation’s full range of activities, from purchasing of raw materials to product distribution
- a disciplined management approach for achieving improvement targets
- a process for identifying and providing adequate resources, including training, to achieve the targets
- an emergency and response program that has been trialed and fine-tuned
- a system of standard operating procedures and maintenance of the program to ensure continued high levels of environmental performance
- a process to review and audit the EMS to identify opportunities for improvement
- a process of communication with internal and external interested parties
- an improved control of subcontractors with regard to their environmental impacts on the company.

In addition to regulatory requirements there are numerous models of EMS, Best Management Practice (BMP) and Codes of Good Practice, which apply to many industry sectors or have been adapted by individual companies. Increasingly they are being designed to the ISO 14001 format, providing international market and regulatory acceptance and thereby providing firms with a competitive advantage. EMS is now supported by a growing ‘industry’ of regulators, policy makers, standards consultants and software package designers.

However, adoption of EMS in its current state does not necessarily guarantee either market advantage or long-term environmental sustainability. Most EMS focus on process not performance, though there is generally a requirement for compliance with relevant environmental legislation. Certification is based on compliance with (ie. ‘performance against’) the process rather than performance measurement against sustainability criteria, and the process to outcome correlation is not known. This is a subtle but fundamental point that must be addressed in the specific EMS design to ensure credibility. It is important to specify a suite of sustainability indicators, targets and thresholds in the EMS in order to provide a measure of performance.

By adopting a responsible hazard and risk management approach to their activities an individual or company would expect to have a positive influence on the environmental aspects of their business and, providing meaningful indicators, measures and environmental standards are in place, should be able to

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5 Software packages provide electronic frameworks supported by look-up files to assist the user complete their EMS documentation. A few examples include LEAF, Eco-Balance, and OUTRAGE.
demonstrate positive impacts to their stakeholders. However various aspects of environmental management tend to be dealt with marginally or not at all, for example biodiversity, water use efficiency, groundwater use and recharge, energy and greenhouse gas emissions. These are major issues impacting longer-term sustainability at larger scale.

3.2 WHAT IS BMP?

Best Management Practice (BMP) is an extension of the traditional management approach of providing information and setting guidelines and rules for implementation at the grower level. BMPs identify key issues (environmental, occupational health & safety, etc) which can be managed at the grower level and provides information (on risk identification and solutions) within a process-based framework which better enables the grower to confidently manage these issues in a way which leads to continuous performance improvement. The development of BMP is a logical first step to ‘systemising’ a grower’s approach to managing a wide range of issues at farm level, and provides a sound platform for integrating into a regionally based ecological-limits driven EMS.

The diagram above illustrates the progression of BMP/EMS from grower to national impacts and the overlaps between these levels. It is at these overlap points that gaps can occur in current system design, creating confusion for growers, catchment managers, policy makers and markets. To facilitate an orderly progression from BMP to a rigorous EMS, additional work to identify the key biophysical processes essential to sustainable agricultural production and developing appropriate regional level environmental thresholds and targets is required. To facilitate a meaningful linkage between catchment and regional ‘benchmarks’ and national policy development and implementation, additional work is required in identifying the economic, social, policy and institutional issues associated with EMS development and implementation.

3.3 THE ENVIRONMENTAL ‘SYSTEMS’ CHALLENGE FOR AGRICULTURE

Anecdotal evidence in Europe and the US suggests that the recent proliferation of accreditation and labeling schemes is only serving to confuse and, in the eyes of the consumer, devalue the credibility of EMS.
A recent study by Steger\(^6\) evaluates most empirical and comprehensive studies of EMS conducted for the German and Austrian Environmental Ministries. His study identifies a number of key weaknesses in EMS design to date, which undermine its credibility and long-term effectiveness. Of greatest significance are:

- The lack of a micro-macro link in the context of ecological-driven limits, making it difficult for companies and regulators to set meaningful targets and measure outcomes
- The need for long-term environmental public environmental policy priorities, based on science and political evolution to help establish the micro-macro link
- The lack of value-chain integration, creating tensions and bottlenecks in EMS implementation.

To support credible, long-term environmental sustainability, EMS ideally should be designed to link to scientifically rigorous biogeophysical indicators, measurement systems and environmental thresholds supported by a predictive modeling capability demonstrating outcomes of various production practices on the landscape. In this way EMS will demonstrate a level of risk management which is credible and will be acceptable to consumers, the financial and legal sectors, regulators, and industry itself in the longer-term. This is especially important in the agricultural sector where negative impacts are often diffuse and not immediately evident. Impacts need to be measured against a range of meaningful indicators at various temporal and spatial scales, taking into account the biogeophysical features of a region and the specific features of the production system.

### 3.4 EMS TRENDS

Industries and public authorities worldwide are increasingly implementing various voluntary BMPs and EMS which aim to demonstrate sound environmental management, improve market access and provide auditable evidence of public accountability and responsible management.

Major international companies are adopting the concept of ‘triple bottom line’ (economic, social and environmental) performance or ‘sustainable value creation’. These concepts build on industry’s primary focus of creating wealth by extending the time-horizon over which the full range of a company’s - and its shareholders’ - interests should be assessed. At the heart of these concepts is recognition that for a company or industry to prosper over the longer-term it must continuously meet society’s needs for goods and services without destroying natural and social capital. UNEP/SustainAbility conduct periodic benchmark surveys which assess the triple bottom line reporting of major international companies and provide support and guidance to companies endeavouring to enhance their business principles.\(^7\) International companies, for example, Royal Dutch Shell are introducing new systems such as ‘Product Stewardship’ which have an ISO14001/EMAS ‘look’ to demonstrate commitment to their stakeholders. The Body Shop has created a strong international market by demonstrating its commitment to triple bottom line in a pioneering way.

A number of high profile NGO’s such as World Wide Fund for Nature (WWFN) and Greenpeace are having a major impact on industry practices through acting as powerful lobby groups forming community opinion and, more recently, working directly with industry to change corporate philosophy, production practices and decision-making processes. For example, in the UK, the WWFN has created ‘95 Plus’ which is a retailing group controlling over $1 billion trade per annum. This group has agreed to purchase forestry

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\(^7\) SustainAbility/UNEP, ‘Engaging stakeholders: The 1997 Benchmark Survey’; the third international progress report on company environmental reporting

\(^8\) Royal Dutch/ Shell Group of Companies, Profits and principles – does there have to be a choice? The Shell report 1998
products only from producers demonstrating compliance with the international Forestry Stewardship Council’s Principles of Forest Management and accreditation system.

EMS originated in the manufacturing sectors, especially those having significant emissions or hazards associated with production processes, e.g. petrochemicals, foundries. Germany was and remains a world leader in the uptake and promotion of EMS and designed the Eco-Management and Audit System (EMAS) which has now become the EU-regulated EMS for the European Union.

ISO14001 (*International Standard – Environmental Management*) is now becoming the preferred international standard and EMAS will be incorporated into the ISO framework to facilitate complementarity. To date, ISO14001 has not been extensively applied to general agricultural production systems. However some programs are moving towards this goal. The UK’s LEAF (*Linking Environment and Farming*) program, which is suitable for mono and mixed farming systems, is seeking ISO 14001 certification. Canada’s Best Management Practices Program has the aim of presenting affordable options for protecting soil and water resources on the farm, supporting individual farm planning and decision-making in the short and long term, and harmonising productivity, business objectives and the environment. It is moving towards an EMS, which integrates farm planning, hazard assessment and control, and third party certification. The US National Farmstead Assessment System, Farm*A*Syst is a successful partnership between government and the private sector. The program combines education, self-assessment and action planning to prevent on-farm pollution, and brings together the legal and technical requirements into a work-sheet driven implementation format.

**CODEX Alimentarius - organic foods**

The international **CODEX Alimentarius Commission** has recently adopted guidelines for the production, processing, marketing and labeling of organic foods from plant and plant products - the first ‘farm to fork’ system agreed by the Codex forum. The guidelines also cover measures necessary for consumer protection including inspection, certification and labeling of organic products.

The Codex guidelines provide an internationally agreed framework for organic food moving in international trade. Where a disagreement may occur between countries about the equivalence of organic food the Codex guidelines can be used as a reference in trade disputes at WTO level. However, IFOAM standards can also serve as an international reference as IFOAM has been listed by ISO as an international standard setting body.

The CODEX decision marks the end of seven years of negotiations, led by Australia (AQIS), within the work of the Codex Committee on Food Labeling. Twenty-five countries and fifteen international organisations met consistently each year to agree to benchmark production requirements. It was clear from the beginning that the guidelines should cover all consumer expectations, including ‘no substances that could result in or contribute to harmful effects on the environment’. These guidelines will put pressure on countries already marketing produce as organic to conform to world expectations, especially with regard to the substances that have gone into the soil to produce the products and how the product has been processed, handled and transported. It will also require governments to supervise the industry at a national level, either directly or through third-party providers, to ensure systems are adhered to (AQIS Bulletin August 1999).

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10 The final version of the Codex guidelines on organic food is now available in English, French and Spanish from the Codex homepage on FAO web site www.fao.org.
This development demonstrates strong environment and consumer driven impetus with regulatory backing designed to keep standards high to importing countries in Europe and no doubt some protection for Australia’s more advanced organic industry.

Codex Alimentarius, or the food code, is the global uniform reference point for consumers, food producers and processors, national food control agencies and international food trade. The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) is a product of the Uruguay round of multinational trade negotiations and it cites Codex standards, guidelines and recommendations as the preferred international measures for facilitating international trade in food. As such, Codex standards have become the benchmarks against which international food measures and regulations are evaluated within the legal parameters of the Uruguay Round Agreements.

The Codex Alimentarius Commission is comprised of members of the member nations of the FAO and WHO (163 countries, representing 97% of the world’s population).

**Product specific initiatives**

An increasing number of producer groups have also designed product-specific EMS or BMP. The National Association for Sustainable Agriculture Australia (NASAA) has developed the world’s highest level standard for organic farming against which other countries are compared (refer S.3.3 for further discussion. The Living Wine Group, a consortia of New Zealand wine producers, has gained ISO14001 certification. The Australian cotton industry has designed its own BMP Manual as a significant step towards ISO certification, and the Australian wine industry is designing its own BMP/EMS. Worldwide a number of individual pioneering farmers have achieved ISO14001 certification at farm level, and in Europe seven countries have formed a regional alliance to promote integrated farm planning.

As previously mentioned, in secondary industry and the tertiary sector, the major ‘accepted’ BMPs/EMS tend to be process focussed rather than performance based. They are also self-directed, often do not require independent verification, and may permit organisations to ‘self-select’ the risks, measures and targets unless these are strongly linked to regulatory requirements. Any credible EMS must require compliance with relevant environmental legislation as minimum essential criteria for accreditation. These are potentially serious weaknesses within some current EMS, undermining both the credibility and defensibility of the systems. This provides a challenge for designers of EMS in Australia to ensure that appropriate linkages are made to regulatory requirements and that selected performance indicators, measures and standards can demonstrate scientifically rigorous evidence of long-term sustainability. This provides CSIRO with an opportunity to support the design of a credible system that is acceptable to producers, consumers, the banking and legal sectors, governments and policy developers, and the scientific community.

This is discussed in more detail in Section 8.

**3.5 CURRENT AUSTRALIAN EMS INITIATIVES**

Policy support to assist individual farmers achieve their economic objectives in an environmentally and socially responsible way is provided through a range of national farm policy initiatives aiming to increase international competitiveness, encourage sustainable agricultural production practices and promote social and economic opportunities for rural communities.
The Agriculture - Advancing Australia (Triple A) package addresses these concerns using a variety of measures including social welfare and targeted rural adjustment for environmental policies. The ‘FarmBis’ program focuses on education and training for agriculture. The ‘Rural Communities’ program provides grants to small communities for business enhancement, community development and expanded information and technology applications. The ‘National Landcare Program’ (NLP) focuses on maintaining and improving the environment, although not necessarily focussing on agricultural production systems. NLP is now looking to ways to strengthen its linkage with the agricultural sector.

In response to community and market pressure a number of agricultural industries such as cotton and organic produce have introduced standards or best management practices (BMPs) to demonstrate a responsible approach to quality and environmental risk management to markets and consumers. The cotton growing industry is a major consumer of water and a major user of pesticides both of which impact on community perception of the industry. The Australian Cotton Industry Council (ACIC) has recognised its responsibility to manage its negative environmental impacts by developing and implementing best management practices (BMPs). BMPs enable the grower to manage impacts in a practical way at the farm level. IPM strategies have been developed to incorporate both chemical and non-chemical methods of insect control. The ACIC is now moving towards certification of its BMP program so that the program will be fully recognised by Australian regulatory authorities and individual farmers will benefit.

ARMCANZ has produced a series of model codes of practice and national guidelines, initially focusing on the most ‘sensitive’ industries, e.g. beef cattle feedlots, dairy industry, and poultry. The Australian Golf Union has prepared a comprehensive ‘Environmental Strategy for Australian Golf Courses’. The design of such codes of practice embrace the legal ‘duty of care’ approach, reinforcing the duty of the landowner to take all reasonable steps to prevent degradation of the land.

A number of feasibility studies and design projects are also being undertaken to identify possible EMS approaches at farm level for grower implementation. Most agricultural Research and Development Corporations have EMS as a strategic objective using the development of Quality Assurance schemes or BMPs as a first step. A recent national workshop ‘Environmental management systems in agriculture’ (RIRDC, May 1999) provided an opportunity for a wide range of stakeholders to share information on current views and EMS practices in agriculture and to determine a way forward. A recommendation from the workshop is the development of a national strategy to develop and implement environmental management system approaches throughout Australian agriculture.

Organic farming systems - AQIS and NASAA

Standards and certification systems for the production of organic and biodynamic produce have been in existence for around 15 years in Australia and longer internationally (Europe, USA). These systems are voluntary and usually independent. IFOAM (International Federation of Organic Agricultural Movements) is an international audit body for those organic certification organisations that want to be accredited.

11 The EU’s Common Agricultural Policy (CAP) similarly aims to improve the efficiency of agricultural production systems within a context of trade liberalisation and integrated rural development. Along similar lines to Australia’s Triple A package, the revised CAP has introduced a range of accompanying measures covering agriculture, afforestation and early retirement.
12 Cotton RDC – Best Management Practice Manual
13 National Association for Sustainable Agriculture, Australia Ltd ‘Standards for organic agricultural production’, 1998
14 For example Carruthers, G. - GRDC project NSWAG DAN390.
15 Input provided by Stephanie Goldfinch, Dames and Moore NRM, Australia
16 IFOAM web site: http://www.ifoam.org
Certification to the **Australian National Standard for Organic and Biodynamic Produce (AQIS 1998)** is mandatory for all agricultural export produce labeled organic from Australia to the EU and is covered by the AQIS Export Control (Organic Produce Certification) Orders regulation. Organic food and fibre production and processing standards and certification must be accredited by AQIS for export purposes. This came about in order to meet consumer driven EU regulations in the early 1990’s.

The national organic standard aims to:

- harmonise national provisions for the production, certification, identification and labeling of organically and bio-dynamically grown produce
- to ensure that all stages of production, processing and marketing are subject to inspection and meet the minimum requirements
- to raise awareness of ecological requirements in nature and the farm environment.

These Standards were developed by practising organic farmers, with input from some consumer organisations, environmental organisations and certifiers. Certification is voluntary except for export markets. Compliance is mandatory for the achievement of full certification to the Standard. As with other types of certification and audit systems there are invariably other spin-offs such as improved efficiencies and other unforeseen improvements resulting from the scrutiny of production systems.

However the National Standard is not currently mandatory within Australia due to problems with interpretation of the ANZFA regulations with respect to labeling. The industry has tried unsuccessfully for a number of years to have these standards adopted but ANZFA are currently unable to label organic foods as their regulations do not allow for labeling of production systems. This may change as a result of the current GMO debate.

Environmental sustainability has been a feature of the organic industry since inception. Emphasis is placed on the use of renewable resources, the need for conservation of energy, soil and water resources and the maintenance of environmental quality. Assessment is conducted on a case by case basis by independent parties, each case being assessed on its merits and researched if necessary to determine compliance with the sustainability criteria.

Organic certifiers all certify to their own standards, which must meet the Australian National Standards as a minimum. Some, such as NASAA certify to a ‘higher’ standard, ie, have more stringent environmental requirements. In the free market system, since NASAA Standards are considered to be the highest in the world and NASAA was the first organisation to be accredited by IFOAM, large European, Japanese and North American buyers would only purchase NASAA certified produce for many lines.

NASAA Standards can be met at a basic level with ongoing annual review and continual improvements providing the producer/processor stays certified. This includes the implementation of improvements to comply with environmental sustainability factors, which may take years to fulfil. This also includes upgrading of the Standards themselves after review. Growers are given time to comply to new changes to the Standard.
4. ECONOMIC CONTEXT FOR EMS

Any assessment of the need for and feasibility of introducing EMS must take into account the complexities, dynamics and subtleties of national and international environmental, economic and social policy development and the consideration of market forces and prices.

Industry is unlikely to ‘voluntarily’ embrace EMS on purely environmental grounds. The profit motive will require evidence of market impact (advantage/disadvantage) through either adopting or failing to adopt EMS. ‘Triple bottom line’ reporting (financial, environmental, social) is driven by market and shareholder pressure. It is significant that Dow Jones have just introduced an environmental index for the biggest firms in the world.

Industries in developed countries or those operating in ‘sensitive’ sectors, and which are being ‘compelled’ to adopt EMS, quite reasonably ask why they should be disadvantaged in the marketplace by lower-cost producers who fail to demonstrate environmental or social responsibility or accountability. This is leading governments to examine the link between trade and the environment and their import/export policies. Member nations of large trading blocks are looking to achieve policy consistency where possible. It is reasonable to expect that importing governments may expect producers and manufacturers of trading partners to demonstrate the same ‘compliance’ as that required of their nation’s domestic and export markets. Certainly consumers and retailers are leading the charge in this area and governments are generally electing to let the market dictate what is acceptable or unacceptable.

In order to better inform and position itself in the world trade debate, the EU is currently conducting a research project to identify the interactions between trade and environmental policy in competitor trading countries.

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\text{Credible EMS} = f (s + w + a + b + P + S + E + I)
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\begin{itemize}
  \item S=soil
  \item w=water
  \item a=air
  \item b=biodiversity
  \item P=policy
  \item S=social
  \item E=economic
  \item I=institutional
\end{itemize}

4.1 LINKING THE ECONOMY AND THE ENVIRONMENT

4.1.1 ‘Multifunctionality’ of Agriculture

Agricultural markets operate in a global economy and governments which are members of the World Trade Organisation (WTO) are endeavouring to develop global economic policies which take into account negative externalities associated with agricultural production. WTO discussion recognises that to successfully develop and implement these policies, governments need to create better linkages between trade and environmental policy, and industries develop mechanisms to demonstrate that their production practices are compatible with environmental and trade policy.

The recognition that the agricultural sector also supports other national objectives such as the vitality of rural communities, the environment, and food security, is referred to in WTO Article 20 as ‘multifunctionality’ or ‘non-trade concerns’ (NTCs). This underscores the belief that meeting important national policy objectives need not be inconsistent with liberalising world trade in agriculture. Agricultural trade negotiations commencing in late 1999 will also consider the requirements and effects of NTCs such as the environment.
Annex 2 of the WTO Agreement on Agriculture - referred to as the ‘Green Box’ - provides for exemptions from the domestic support reduction commitments for certain NTC-related measures, such as payments under environmental programs, providing they have no, or at most, minimal trade distorting effects on production.

In the context of international trade negotiations, a requirement for agricultural production to demonstrate compliance with accredited EMS falls into the middle of the trade/environment debate. On the one hand it can be viewed as a reasonable expectation that agreements with trade partners be based on consistent approaches to managing NTCs. On the other hand the requirement to demonstrate compliance with EMS can be viewed as a non-tariff trade barrier. For example, Australia has recently had to stop prohibiting imports of frozen salmon as its scientific arguments with respect to increased risk of disease to the domestic salmon industry were not supported by the WTO which ruled the prohibition to be a non-tariff trade barrier. Governments have to consider that amendments to trade measures designed to satisfy domestic environmental concerns may jeopardise the multilateral trading system established by the WTO.

An informal WTO stand-off has resulted from discussions of the WTO General Exceptions Article XX, with developing countries opposed to US proposals to allow unilateral trade measures to be used to support extraterritorial application of environmental policies, and the US opposed to EU amendments to cover exceptions included in global environmental treaties.

It remains to be seen if the WTO CTE will reach consensus on the issue of NTCs in future trade negotiations.

4.1.2 Pricing and Externalities

The environment forms the basis of the ‘non trade values’ of important and very active sectors of society. Current economic theory advocates the implementation of trade liberalisation policies that use market and price signals to make the appropriate allocation of resources as the best means of improving environmental management. Appendix 4 provides a short discussion on the economic principles guiding current approaches to pricing of environmental resources.

The OECD has defined a number of significant negative externalities associated with agricultural production in Europe. These are being addressed either through EU regulation or EMAS with reference to a number of OECD-developed agri-environmental indicators:

- pesticide use
- nitrogen and phosphorus in water
- loss of biological diversity.

Other negative environmental effects to be monitored include:
- soil erosion
- water use – salinisation
- energy consumption.

17 The WTO has a number of agreements establishing rules for what is acceptable as a non-tariff trade barrier. These include the Agreement of Technical Barriers to Trade (TBT), the Agreement of the Application of Sanitary and Phytosanitary Measures (SPS) and the TRIPS Agreement on intellectual property rights.
19 Note that EMAS requires compliance with regulation.
Certification to ISO14000 would also require application of relevant regulated agri-environmental indicators.

5. GLOBAL DRIVERS FOR EMS

The following section outlines the principle global drivers for implementing EMS.

5.1 POLICY

5.1.1 Food Safety

There are two main policy and regulatory areas driving the growth of EMS. Although the issue of food safety is quite distinct from that of EMS increasing consumer, retailer and regulatory requirements for traceability back to the production process are creating a stronger link between environmental and safety aspects of the food production system. Some requirements are regulated, for example demonstration of food safety management through systems such as ANZFA food regulations, maximum residue limits (MRLs), permit systems for use of agricultural chemicals, planning and emissions regulations, and requirements for producers to identify the use of GMOs in their production system.

5.1.2 Environment

The other aspect is a growing consumer and policy requirement for evidence of long-term environmental sustainability in agricultural production systems. Australia, with many other countries is a signatory to a number of international conventions and agreements on global environmental issues. These include conventions to address and manage global climate change, degradation of the oceans, freshwater degradation, degradation of the ozone layer, protecting biological diversity, combating desertification, and addressing deforestation and forest degradation. Australia has developed a number of policy responses to both its international obligations and national environmental imperatives. Appendix 1 lists Australia’s obligations and policy responses.

Principle 11 of the Rio Declaration, for example, affirms that member States shall enact effective environmental legislation, recognising that standards applied by some countries may be inappropriate and have unwarranted economic and social costs to other countries, in particular developing countries. The right of WTO members to advocate a high level of environmental protection was clarified under the Uruguay Round of talks. It is also recognised that differences in prioritisation of national or regional environmental imperatives and hence selection of environmental indicators and measures can arise for a variety of legitimate reasons, including differences in the capacity of absorption of regional ecosystems and the characteristics of regional agricultural production systems. However wherever possible it is desirable that the scientific approach to the design of environmental indicators, measurement systems and standards is consistent to assist comparability.

5.1.3 International Trade

It is important that any EMS feasibility and design study takes into account trade concerns at national and international policy level so that we understand the negotiating principles of policy makers and can speak a common language. Otherwise EMS designers may inadvertently find themselves at odds with trade policy. The following section outlines the trade policy positions of Australia, US and Europe with respect to linking trade and the environment.
Australian trade policy

Australia’s policy position on the issue of trade and the environment is stated in Australia’s submission to the WTO CTE in preparation for the November 1999 round of WTO negotiations. Australia's trade policy recognises the complexity of issues involved in the relationship between trade liberalisation and the environment, and that there are many areas where the linkages between economic activities, trade and the environment are still not adequately understood. The seriousness and severity of many environmental, social and economic problems point to the urgent need for early action to begin reforms to help ensure more positive synergies between economic activities, the trading system and environmental protection.

Australian policy supports the removal of subsidy support which is ‘coupled’ to input and output levels and which may have adverse environmental consequences through stimulating high levels of resource use, promoting inefficient production processes and generating higher levels of pollution and waste than in the absence of support. Australia’s position is also based on the belief that such subsidies may have pervasive and far-reaching effects on prices and incomes throughout the economy, particularly subsidies on products and services used in many sectors, eg. energy, materials and transport.

While there has been some reduction in levels of agricultural support in OECD countries in recent years, agriculture remains the sector with the highest level of support and improvements in market-orientation have been small. Total transfers to agriculture in OECD countries have continued to be over US$300 billion per year. While there has been some shift away from commodity-based market price support policies and towards direct payments and other support policies, market price support remains high and there is evidence that it may even increase further. Commodities which currently enjoy high levels of support include rice, wheat, feed grains, sugar and milk in Japan; wheat, feed grains, oilseeds, sugar, milk, beef and sheep meat in the EU; and sugar and milk in the US. In addition, many agricultural products in countries such as Republic of Korea, Iceland, Norway, Switzerland and Turkey receive high levels of support.

Australia supports the OECD statement: ‘Environmental measures in agriculture should be transparent, targeted to the objective and tailored to the environmental situation, and subject to regular monitoring and evaluation to ensure that they are effective and cost-efficient, and do not distort production and trade’ (OECD 1998). Production limiting arrangements, as currently applied, lock in production capacity and are not decoupled, and US producers also receive other forms of support including loan rates, marketing loans and cotton competitiveness subsidies.

Australia believes that the WTO and Multilateral Environmental Agreements (MEAs) should be able to constructively co-exist and point to a need for better policy coordination at a national level to achieve this.

Australia’s trade policy, as for other countries, is silent on the specific issue of EMS as a potential trade barrier. However Australia supports the development of rules governing 'multifunctionality' to ensure that WTO members cannot use non-trade concerns as a reason for maintaining or introducing barriers to agricultural trade.

A separate WTO agreement on food safety and animal and plant health standards (Sanitary and Phytosanitary Measures) explains the basic rules for countries to set standards for food safety and protection of domestic animal and plant species. It allows countries to set their own standards but requires that these standards be based on science. Member countries are encouraged to use international standards, guidelines and recommendations where they exist, but may use higher standards if there is scientific justification or are based on an appropriate assessment of risks so long as the...
approach is consistent and not arbitrary. This position is used as the basis for current bans of GMOs in EU markets.

Australia is a member of the Cairns Group comprising countries which support the liberalisation of trade but which are not part of the OECD and NAFTA trading blocs. The combined weight of the members of the Cairns Group aims to counter the power of the US and EU, and influence the negotiating agenda.

Australian agricultural policy recognises the close linkage between trade and the environment with respect to market access and position. It emphasises the need to demonstrate strong environmental credentials if we seek to maintain and improve our position in world markets.

‘Environmental sustainability is obviously an important issue for everyone and one we have to continue to strive to achieve. However it should not be used as a trade barrier to distort world trade. When countries are increasingly imposing trade barriers for environmental reasons, higher expectations are placed on the environment or ‘clean and green’ aspects of food and fibre production. It is imperative that we have sound natural resource management practices in place.’ (Senator Troeth, Oct 1999)

The Opposition’s policy position on trade and the environment equally recognises the linkage between trade and the environment. However it adopts a broader appreciation of the ‘multifunctional’ aspects of the agricultural sector but still emphasises the need to de-couple support from production outputs.

The Australian Conservation Foundation's policy on trade and the environment supports the development of trade policies, regulations and activities within a framework that enhances social and environmental wellbeing.

**European Union policy**

The EU’s agricultural policy is articulated under the Common Agricultural Policy (CAP). European trade policy supports the ‘multifunctionality’ of agriculture and is keen to involve such issues as the environment, labour standards, social issues, the quality of life, food safety, animal welfare issues and ‘culture’ in negotiations. The EU, along with Japan and Korea are keen to protect their cultural fabrics in any WTO negotiations.

The EU has proposed that the new round of trade negotiations address the following issues:

- Greater legal clarity in the relationship between the WTO rules and trade measures taken pursuant to multilateral environmental agreements (MEAs)
- Clarification of the relationship between the WTO rules and non-product related process and production method (PPM) requirements, particularly in relation to eco-labeling schemes based on life cycle approach
- Review of whether a clarification is needed of the relationship between the WTO rules and core environmental principles, notably the precautionary principle
- Encouragement of cooperation between the WTO and relevant international bodies, including UNEP, the World Bank, UNCTAD and the secretariats of MEAs.

The EU, Canada and the US intend to conduct environmental reviews of the negotiations’ potential environmental effects.

In the European Parliament the Greens view the environmental aspects of trade policy as being non-negotiable in WTO negotiations. The EU emphasis on achieving consensus with due regard to cultural,

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social and environmental issues is based on the belief that this is the only way to avoid conflict in the future. However trade debate in the EU still tends to national lines in ensuring equality in treatment amongst member states. The EU’s Agenda 2000 document discusses policy approaches to develop the CAP beyond the year 2000 but has not yet determined if and how the CAP will apply to prospective new EU members.

**United States policy**

The US has made progress towards reforming its agricultural policy with the implementation of the Federal Agricultural Improvement and Reform Act, 1996. This phases in replacement of deficiency payments for farm program crops (wheat, feed grains, rice and cotton) with production flexibility contract payments which decline over a seven year period, thus de-coupling support from production. However the Export Enhancement Program continues to operate.

The US position regarding ‘multifunctionality’ is in direct opposition to that of the EU and Japan. The US supports equivalent standards, elimination of technical barriers to trade, removal of subsidies, maintaining anti-dumping rules and customs procedures, and standardising rules of origin. However this position needs to be measured against recent domestic decisions on imports and the moves within NAFTA to link regional trade to improved environmental protection. Section 5.1.5 – Standards, provides further evidence of ‘inconsistencies’ in the US approach.

5.1.4 **Voluntary EMS versus Regulation**

Many sectors have implemented voluntary EMS as a means of avoiding or reducing regulatory control by government. Hence there exists both a political and industry preference that EMS remain voluntary in nature. This empowers industry and has the mantel of self-regulation, being more palatable to the economies of developed countries. However, that said, both the US and EU do not rule out the possibility of EMS becoming a regulatory requirement in some sectors at some time in the future should there be insufficient voluntary uptake of EMS by industry.

5.1.5 **Standards**

**Environmental regulations and standards**

VOGEL describes how a number of subnational governments in the US, Europe and other federal systems, including Canada and Australia, have enacted environmental regulations stricter than those of their central governments. This has resulted in the drafters of the WTO Agreement on Technical Barriers to Trade including a provision recognising central government responsibility for the regulatory standards of subnational political units which might impact on trade. Likewise an ongoing source of conflict within the EU comes from efforts of the EU’s greener member states to impose stricter environmental standards than those required by the EU.

Environmental standards are primarily determined by domestic political preferences and interests. They tend to be stronger and better enforced in affluent nations with influential green pressure groups. They also tend to be strengthened during periods of economic prosperity and stabilized or weakened during periods of slower growth. In all but a handful of industries, the costs of compliance with stricter regulatory standards have not been sufficient enough to force relatively affluent nations or sub-national governments to choose between competitiveness and environmental protection.

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**VOGEL, David**  Environmental regulation and economic integration.  Univ California, October 1999
Product standards
Vogel asserts that in some respects, economic openness and capital mobility have actually encouraged nations to enact higher environmental standards than they would have in the absence of increased economic interdependency. Some regulations create a competitive advantage for domestic producers by making it more difficult for foreign producers to sell their products. Examples of ‘alliances’ between environmentalists and domestic producers benefiting both groups include recycling requirements, automotive emission control requirements in Germany, automotive fuel economy standards in US, and the US ban on exporting of logs from government-owned forests, which reduced the cutting of old-growth forests in the Pacific northwest. The ‘California effect’ is the phenomenon of upward ratcheting of regulatory standards through market mechanisms. Political jurisdictions that have developed stricter product standards often force foreign producers in nations with weaker domestic standards to design products that meet those standards, otherwise they will be denied access to markets. This is particularly obvious in the automobile industry. EU and US pesticide and residue standards have similarly caused exporting countries to adopt those standards. A German ban on leather and leather products containing pentachlorophenol has forced Indian firms to modify their own production processes.

Production standards
In some cases ‘greener’ nations have used similar restrictions, or threat of restriction, on access to their markets to force their trading partners to change their production processes – notwithstanding the fact that such practices may violate WTO rules.

The EU’s eco-labeling program, because it is based on ‘life-cycle’ analysis, explicitly covers the way imported products are made. Many of its provisions are intended to force EU’s trading partners to change the way forestry products, leather and footwear, and marine life are produced. For much of southern Europe, EU requirements are the most important cause of any additional resources devoted to environmental protection in the region. In 1994, the EU approved a proposal to modify its ‘Generalised System of Preferences’ (GSP) to extend additional tariff benefits to ‘recipient countries which are able to prove a commitment to international standards of social progress and environmental protection.

Thirteen American laws authorise the use of unilateral sanctions to force America’s trading partners to adopt US environmental production standards. All involve efforts to protect animals and marine life outside the legal jurisdiction of the US. An American threat to impose ‘environmental countervailing duties’ on goods from nations whose pollution control standards were lower than those of the US played a critical role in encouraging Korean policy-makers to upgrade their environmental standards. The provisions of NAFTA and the EU have also encouraged potential members to improve their environmental standards.

The centralisation of product standards has been critical to the creation and maintenance of a single market within the EU while the coordination of standards and approval procedures for a variety of products have facilitated trade between Europe and the US. The use of market leverage has also been used by environmental activists in rich countries who frequently target products produced in environmentally harmful ways. A number of these pressures have been particularly successful, particularly in the areas of forest and wildlife conservation. To date the use of economic leverage has been confined to the US and EU. Japan has been reluctant to use access to its large domestic market to pressure other Asian countries to improve their environmental practices, even though Japan imports considerable quantities of raw materials and, more recently, manufactured goods from this region. The WTO discourages rich countries from using production standards to restrict imports from less developed ones on environmental grounds. Regional environmental agreements are virtually non-existent in Asia, Latin America or Africa – the regions in the world where environmental problems are most serious. Their current level of economic development has made them unwilling to trade off economic growth for environmental quality.
5.2 MARKET AND COMMUNITY – BEYOND POLICY

5.2.1 Consumer Purchasing Preferences

Modern consumer preferences and demands are widely diverse and increasingly exacting, encompassing a range of concerns ranging from the quality of agricultural produce to methods of production.

The perception of risk by consumers, and concern about the influence of environmental aspects on consumer choice is one of the broader issues related to societal trends and their interactions with consumer and market conditions. Consumers are increasingly expecting food to be produced in a responsible or ethical manner, encompassing concerns such as environmental stewardship, fair trade and animal welfare.

Consumers in developed countries are becoming increasingly aware and educated about the potential human health and environmental risks associated with what they eat and how it was produced, and they also have the money to make choices. This is resulting in consumer demand for product labeling to enable choices to be made. In Australia and overseas ‘green’ consumers tend to be seen as a marginal niche market. However, from marketing and policy perspectives, industry and governments must decide if they are a vanguard for wider social and attitudinal change fostered by an improved education system and the media, or merely a ‘fad’ that will go away. This will assist Australian industry and government in determining if initiatives such as EMS are ‘optional’ or essential for future economic survival, regardless of environmental imperatives. Recent experience in Europe indicates that the impetus of these ‘fads’ is strengthening.

CSIRO’s Project Cassandra (1998) was a market research project undertaken on behalf of the Food Processing Sector to identify R&D opportunities which may address challenges currently facing, or likely to face, Australia’s food processing industry over the next 5-15 years. The research activities included:
- Six focus groups involving over 70 food processing industry participants;
- Interviews with Australian and international food industry experts;
- Consumer attitude research;
- Desk research.

The research results have provided ‘evidence’ of consumer trends towards a desire for food which is produced or processed using environmentally sustainable methods. Various text references also support the research outcomes. Dalzell 1994 (pp41-43) states ‘It is not unlikely that consumers will wish to have some insights into production issues such as animal welfare, organic and non-organic agricultural production methods, use of genetic engineering techniques, management of pesticides, nitrates, wildlife, soil erosion, non-renewable energy and other resources. Other issues that may become market (dis-) advantages include: energy conservation in processing; noise and air pollution in processing; and water pollution, among others.’

Nottingham (1998) states that to achieve success in the uptake of biotechnology it is important that the general public’s concerns on a wide range of health, biodiversity, and ethical issues can be addressed.

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24 Nottingham, S ‘Eat your genes: how genetically modified food is entering our diet’, Lond., Zed Books, 1998
R&D Opportunities

The implementation of Audits of production processes which eliminate some environmental hazards and provide information about techniques used in production are likely to offer at least significant public relations benefits to food processors - and in all probability eventually be required by national regulatory bodies.

Fundamental to the credibility of these Audits will be the identification of key natural processes, sensitivities and thresholds; development of appropriate indicators and monitoring methodologies; linkage with and complementarity to related regulatory, planning and 'standards' pathways; and consideration of economic and policy impacts of implementation.

Specific research results from the food processing sector which support a 'need' for EMS in agriculture include:

**Strategic issue - Raw materials and ingredients**
- An identified business strategy to enhance efficiency through more effective business systems was the implementation of input quality and variability assessment systems.

**Strategic issue - Manufacturing, distribution and supply**
- An identified business strategy to increase commercial success of new value-added products and services was provision of transparent and consumer credible food safety and quality control standards.
- An identified business strategy to improve process, input and final product quality was the implementation of audit-ready environmentally sustainable production processes and production risk assessment and management methods.

Innovations associated with health and/or food safety and quality were often perceived as a mandatory service that vendors or a food authority should be obliged to provide.

5.2.2 Retailers

The globalisation of major retail chains will also impact on the ability of Australian producers to remain in or enter markets. Increasingly retailers are responding to consumer concerns regarding food production processes. For example, in response to consumer concerns about the effects of pesticides on human health and biodiversity, Sainsbury’s is working with its suppliers of fruit, vegetables, meat and dairy products to address concerns about the environment. Sainsbury’s now requires conventional farmers to practice Integrated Crop Management (ICM) and develop a Farm Biodiversity Action Plan, and is also actively encouraging UK producers to move to organic production to combat a shortage in supply. Currently some 70% organic fruit and vegetables sold at Sainsbury’s are imported. Sainsbury’s is also a member of EUREP and the WWF ’95 Plus Group.

Growers contracted to Heinz Wattie Frozen Foods Ltd in New Zealand are required to meet specified quality standards linking back to the production system. With respect to GM ingredients, where suppliers have not been able to give a guarantee that their product is GM-free, Heinz Wattie’s has sourced alternate supplies. Sanitarium is also pushing the responsibility for guarantee back to the grower.
EUREP GAP

A significant development in the area of retailer driven standards for agricultural production is the EUREP GAP Verification 2000 Program. EUREP is the Euro-Retailer Produce Working Group and is made up of leading European food-retailers. Member of EUREP include Safeway, Tesco's, Waitrose and Sainsbury's (UK); ICA Handlarna, Kooperativa Forbundet, and KESKO (Scandinavia); Delhaize, GB CABBAC and DRC (Belgium); Continent, Groupe Promodes (France); Coop Italia (Italy); Spar Osterreich (Austria); Albert Heijn (NL).

The aim of EUREP is to raise standards in the production of fresh fruit and vegetables and in November 1997 a first draft protocol for Good Agricultural Practice was agreed. In September 1998 a pilot project to review the transfer of EUREP-GAP into the field was initiated with advanced producers in Spain and Italy. EUREP-GAP 2000 was officially launched in Paris on 17 November 1999.

The EUREP GAP protocol and its framework for independent verification is a response to the increasing consumer interest in food safety and environmental issues. It defines essential elements for the development of best-practice for the global production of horticultural products (fresh fruits, vegetable, flowers and nursery stock) and defines a minimum standard acceptable to the leading retail groups in Europe. It is expected that by January 2000 the majority of the key suppliers to EUREP retailers will have given their commitment to become a EUREP GAP approved grower by the end of the year 2000. EUREP has advised CSIRO that, although the pilot program is initially concentrating on fresh agricultural produce, it sees great potential to extend the concept to other market sensitive products.

EUREP GAP is principally a records-based checklist system prescribing a series of criteria and activities against which a standard (Must/Should) is prescribed. The level of grower compliance (Yes/Partial/No/NA) is recorded against each criteria. The GAP also requires compliance with specific country legislative and regulatory requirements (eg MRLs, GMOs). The principal areas for management are:

- varieties and rootstock
- site history and site management
- soil and substrate management
- fertiliser usage
- irrigation
- crop protection
- harvesting
- post-harvest treatments
- waste and pollution management, recycling and reuse
- worker health, safety and welfare
- environmental issues.

The EUREP GAP encourages growers to achieve best practice without determining what this is. It does not attempt to prescribe environmental standards, indicators or thresholds but does require the grower to establish a wildlife Conservation Management Plan or to operate within a regional CMP.

The principle features of EUREP GAP are:
1. The integration of Integrated Pest Management (IPM) and Integrated Crop Management (ICM) within a framework of commercial agricultural production.
2. It supports the principles of and encourages the use of HACCP.
3. Requirement for retention of GAP prescribed documentation and records for a minimum of 5 years.

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25 http://www.ehi.org/
4. Independent verification from a EUREP approved verification body. EUREP is currently designing the requirements for independent inspection and certification bodies, and is seeking Expressions of interest from verification agencies. An issue still to be overcome is ‘Who pays?’

5. Grower registration with EUREP stating products applied for and number of farms in which region/country.

Refer Appendix 3 for draft sample EUREP GAP checklist.

The danger of duplication of standards by different retailers in the UK has also brought about the development of the ‘Assured Produce Partnership’, involving seven retailers, the National Farmers Union and growers. This group has produced crop protocols for all the major crops in the UK. The Partnership’s next step will be to implement independent and credible verification which they consider to be essential if the customer is to know that protocols and standards are being implemented.

5.3 FINANCIAL AND LEGAL RISK MANAGEMENT

The finance and insurance sectors have broadened their approach to risk assessment in their lending, investment and insurance policy development. As they are increasingly being exposed to long-term liability issues, especially regarding environmental impacts, both sectors are starting to require their corporate clients to demonstrate evidence of effective environmental management procedures. Dow Jones has instituted a system of environmental risk ratings and we can expect to see a more direct relationship between these and credit ratings in the not too distant future. UNEP has produced a formal statement on Banks and the Environment, which over 90 banks have signed. Sharemarket activities demonstrate the real relationship between a company’s environmental performance and shareholder value (e.g. BHP, Exxon).

If industries, especially in those sectors which are considered ‘higher risk’, do not adequately manage the risks associated with doing business they will increasingly have difficulty obtaining adequate insurance coverage and will be faced with higher premiums. ‘Industrial Special Risk’ coverage can be a significant cost in some sectors. Insurance to cover loss of earnings also requires the producer to demonstrate appropriate levels of risk management. Sustainable land management is likely to become a significant factor in the agricultural sector, ranging from on-farm management of chemicals to off-site impacts of the production system.

The finance sector takes into account a number of disclosures in the determination of investment risk and credit ratings. These include financial disclosures, non-financial disclosures relating to the operations of the company, disclosures relating to corporate accountability for environmental and social impacts, and eco-efficiency – the business response to sustainable development.

In determining risk, the finance sector wants to know:
1. What effects do a business’s practices have on the asset value?
2. What threats do its practices have on its earning capacity?

However, if they are unable to demonstrate a strong process to outcome correlation, EMS may be unable to guarantee a satisfactory environmental performance over the longer term. The finance sector is seeking evidence that EMS is being implemented and is effective based on performance against rigorous criteria. The legal system will apply an even more rigorous evaluation of the process to outcome correlation.
World Bank

The World Bank's Global Environmental Fund (GEF) is a multilateral funding mechanism, with a $2 billion portfolio of projects, dedicated to promoting global environmental protection within a framework of sustainable development. The GEF provides funding to support the objectives of agreed global environmental conventions and protocols with its major programs currently focusing on biodiversity loss, global climate change, degradation of international waters, and depletion of the ozone layer. In order to better manage its investment risk, the World Bank is also developing longer-term sustainability indicators for economic, environmental and social aspects of their investment programs. The impression gained from discussions with World Bank representatives is that they recognize the benefits of adopting an internationally accepted EMS standard, and methodology for defining regional environmental standards.

5.4 BIOTECHNOLOGY – SOME COMMENTS

The use of biotechnology (genetically modified organisms – GMOs) in food production and associated concerns about health and environmental impacts has captured the attention of consumers, especially in Europe and increasingly in the US and other developed countries. We know this better as genetically modified (GM) foods. Interestingly, the WTO refers to them as genetically enhanced products (GEPs).

As a consequence of retailer/consumer boycotts of GM foods and concerns expressed by governments, biotechnology and trade is now high on the agenda of the WTO CTE. Governments are being pressured by their constituents to decide which applications of GMOs are acceptable within their own boundaries and which are not, how this is translated to import market requirements (eg. demonstration of traceability), and how then to approach their export markets and react to competitor challenges. For example, the UK government has placed a moratorium on further use and approvals of GMOs for the next 2 years, and a number of major UK retail chains removed GM foods from their label product and are requiring suppliers to guarantee that their foods are GM free. The debate is escalating and is most definitely being driven by the consumer. For this reason, government and WTO policy responses seeking to remove restrictions may be irrelevant, at least in the short term. The trade argument polarizes between those who insist that distinctions by governments in how products are treated must be based on scientific facts about the product, and those who allow for differences in treatment on the basis of the political or social acceptability of the Production and Processing Method (PPM).

Existing trade rules generally reflect traditional concepts of economics, under which the main objective of increasing economic welfare is to provide individuals with goods they demand. The benefit of consuming these goods is assumed, and the role of government is generally to ensure that consumers are either protected from, or provided with information about, goods that may be detrimental to human safety. Non-market issues such as social and ethical judgements about a given product are generally assumed to fall within the discretion of the individual consumer, who may make buying decisions at least in part on the basis of such judgements. However in a modern food economy the social and ethical choices embedded in a particular product may not always be obvious to a consumer.

Agricultural producers therefore need to consider their use of GM seed, and introducing GM yield increasing organisms or GM combatants against disease or pests into their production systems. Until consumers in these major markets can be convinced through sound and convincing argument that GMOs do not have longer-term detrimental effects on health or the environment they may resist foods associated with their use.
6. DOES AUSTRALIAN AGRICULTURE NEED EMS?

International market trends suggest that in some markets failure to adopt internationally accepted BMPs or EMS may disadvantage Australia's agricultural export opportunities in the longer term, and that taking the lead may even enhance our market position. Although adopting EMS does not necessarily guarantee greater market access or higher prices, it may mean the difference between retaining and losing market access. It is important that Australian producers appreciate this fundamental difference.

The strength of market drivers for implementing EMS differs for different agricultural products will probably be determined by the extent that exports of these products are reliant on high-value, discerning markets which are controlled by strong retailer groups, and by governments demanding a high level of environmental performance from domestic producers.

Australian producers should also be cognisant of Australia's status in the international trade arena. Our contribution to world production is comparatively small and we are not a member of a major trading block, therefore we currently have little power to influence the decisions of our major trading partners (eg. the recent quotas imposed on Australian exports of lamb to US). The major trading blocks such as EU and NAFTA are currently debating how to link regional trade with national environmental protection laws or regulations.

Australian agriculture trades on being 'clean and green' and yet our trading partners do not necessarily support our view. The EU is aware of Australia's salinity problems and over-use of water for irrigation. It also claims our treatment of livestock is less humane than their own. Australia may need to defend its trade position by:

- clearly articulating to the rest of the world the unique biogeophysical characteristics of the Australian continent which are not experienced in the EU and USA
- demonstrating our growing understanding of these characteristics and how agricultural production affects and is affected by these characteristics
- developing a set of environmental indicators and standards which are relevant to Australian conditions
- demonstrating that Australia is taking positive steps to manage its environmental problems.

Australia could aim to set rules that are relevant to Australian conditions and aim for an internationally agreed process for developing environmental standards. A good example is the NASAA initiative on organic food production. Careful selection of processes for inclusion in an Australian EMS can increase the likelihood of desirable outcomes being achieved if the processes have strong correlation with known environmental outcomes.

Markets could aim to define and quantify ‘clean and green’ at the product level or, alternatively, proceed to introduce regional standards. Current QA and BMP initiatives at the product level provide a good basis, however further study will be required to quantify what this means in terms of environmental processes within a regional context. Should all Australian agriculture adopt EMS to a standard meeting the most stringent demands of our export markets? How do we balance the 'market pull' with 'environmental push' in determining needs and benchmarks? How much will access to such things as water rights drive the implementation of EMS at the domestic level?

Market issues for a few major Australian irrigated agricultural industries are provided below as a starting point for discussion.
6.1 COTTON

The major market issue for the global cotton industry is the competitive position of cotton as a percentage of total fabric sales against synthetic, wool, etc., currently accounting for about 45% of fibre production.

Consumers identify quality (comfort, durability, styling), cleaning and fabric care, and colour properties as the main attributes they seek when purchasing cotton products. Therefore within the cotton industry the major competitive advantages are gained by matching the product with these customer preferences. Quality cotton products are marketed against global brands and labels, (e.g. the COTTON USA label and the COTTON AUSTRALIA mark) supported by marketing efforts emphasising the quality aspects of the fabrics. The COTTON USA international marketing campaign has capitalised on the ‘natural’ appeal of cotton through its ‘get real’ advertisements.

Quality standards do exist for cotton against which it is graded at the gin. These standards enable mills to ensure the quality of the final product. Standards cover attributes such as length of staple, colour grade, leaf grade, fibre fineness, and maturity. In the US, ‘origin’ is an attribute that provides cotton merchants with an idea of quality and production characteristics that relate to production in that region. ‘Origin’ therefore is a feature of the US cotton marketing platform.

Organic cotton - niche market

There is a market niche market for organically grown and processed cotton - principally relating to products for babies, people who are sensitive to chemicals, or consumers who have a preference for organically grown products. Organic production of cotton started from 1990/91 in Argentina, Australia, Turkey and USA and has since extended many other countries. Typically producers of organic cotton expected:

• lower cost of production mainly due to the elimination of pesticides
• lower yields
• higher income due to premium price.

However interest in growing organic cotton has been decreasing since 1995/96 when it peaked at 12,833 tons. The ICAC concludes that this is as a result of:
1. No research was undertaken to support organic cotton production.
2. Elimination of pesticides did not reduce costs.
3. Conventional cotton varieties have been developed for high input conditions.
4. High insects pressures resulted in greater than expected yield losses.
5. Organic production requires a change in production system which affects cropping intensity and consequently farm income.
6. Price premium was not according to expectations.

Because there is not a direct link between cotton and food products there is no current evidence of market drivers for introducing EMS in the cotton industry. However that statement is qualified to the extend that there may be an indirect link to food products through off-site impacts, and through the consumption of cotton seed by beef cattle at feed-lots (chemical residues). Ironically the use of the cotton by-product may prove to be the strongest market driver for an EMS.

Environmental drivers

The cotton growing industry is a major consumer of water and a major user of pesticides both of which impact on community perception of the industry. The Australian Cotton Industry Council (ACIC) has recognised its responsibility to manage its negative environmental impacts by developing and

20 CHAUDHRY, M Rafiq  ‘Overview of worldwide cotton production’, Washington, ICAC, 1999
implementing best management practices (BMPs). BMPs enable the grower to manage impacts in a practical way at the farm level. IPM strategies have been developed to incorporate both chemical and non-chemical methods of insect control. The ACIC is now moving towards accreditation of its BMP program so that the program will be fully recognised by Australian regulatory authorities and individual farmers will benefit. This approach appears to be environmentally-driven to avoid greater regulation by government rather than market-driven, though an additional benefit may be the ability to use certification as an eco-label in international markets. The need to ensure future access to water rights is a significant driver for BMP/EMS in the cotton and other irrigated industries.

The major benefits of BMP identified through the implementation pilot program mainly relate to improved operational efficiency, improved farm safety, and improved community perception. There does not appear to have been any market impact as a result.

A complicating aspect for the Australian cotton industry is that much of the product is exported either as raw or processed cotton to overseas markets for processing and/or ‘assembling’, and may then be imported back into Australia as a finished product. Therefore the consumer demand for EMS may eventually come from both the Australian market and international markets. However our research has not revealed any evidence of market-driven EMS for cotton at this time or in the foreseeable future.

**Cotton and EMS**
- Increasing intolerance by consumers of chemicals in food and fibres may eventually drive cotton to a more organic approach to production.
- Cotton growers supplying cottonseed to feedlots may need to demonstrate compliance with EMS.
- The main driver for EMS in the Australian cotton industry appears to be continued access to water in the future.
6.2 RICE

The NSW Ricegrowers’ Cooperative Limited (RCL) undertakes sales and marketing activities for the majority of Australian rice growers. It has focused on niche marketing, whereby it develops markets where there is a natural competitive advantage or where the quality of rice, packaging and delivery have developed reliable markets. RCL exports about 85% of its total packaged rice product to over 40 destinations under its quality brand, Sunrice Australia. PNG is currently the major export market. A trend to increasing per capita consumption of rice in Western countries has created an increasing market for quality rice in domestic and overseas markets. The opening of the major markets in Japan and South Korea to international trade in rice has created new opportunities. Interestingly Australia was able to capitalise on Japan’s strong cultural system to market Australian rice into Japan, being able to trace the origins of the Australian rice industry to early Japanese settlers in Australia.

The Australian rice industry has identified a ‘clean and green’ production environment essentially free from pests and disease as one of its major strengths, and a number of farmers are producing organically. This translates to a market opportunity to further develop niche markets and differentiate into a larger range of value added products such as breakfast cereals, baby foods, convenience products and health foods.

The Australian rice growing industry is also acknowledged to be one of the most productive and efficient in the world, however it faces competition from highly subsidised products from other countries and is prohibited from entry to many markets under domestic trade policy rules. In recognition of the unique ability of rice as an agricultural crop to provide wildlife habitat, the Rice Growers’ Association of Australia (RGA) has recently endorsed the development of a biodiversity education program. Internationally a number of major rice growers market their product using a ‘partnership with nature’ platform, using a mix of conventional and organic practices.

NSW Agriculture has developed RICECHECK, which contains elements of property management, quality assurance and environmental assurance, but does not contain a procedure for independent audit. Compliance with RICECHECK is a mandatory requirement for grower licensing.

The Rural Industries Research and Development Corporations’s rice research program has a sustainable farming systems program. One of the programs’ targets is to achieve sustainability benchmarks in regional Land and Water Management Plans (LWMP), with a focus on water and chemical usage and management of salinity and acidification of irrigated soils. LWMPs incorporate environmental policy for rice growing which is determined by the Rice Environmental Policy Advisory Group and is endorsed by the State and Federal governments as well as the regional community. The program also aims to develop world best practice in the areas of quality management and milling operations and to minimise effluent and waste generation.

US RICE FARMING

California is a major US rice growing region and home to the CALROSE brand family of products. California ricelands provide over 500,000 acres of wetland-like habitat annually. The Californian Rice Promotion Board has adopted a ‘balance sheet’ approach to assessing the net worth of the Californian rice industry to document the level of environmental and conservation stewardship associated with rice farming and to help identify opportunities for the industry to benefit the environment. The key areas of water use and quality, soil health, wildlife, air quality, energy use, fisheries, and recreation are assessed and a performance rating ascribed.

Louisiana is another major rice growing state in the US. As a result of studies indicating that up to 75% of the State’s rivers, lakes and other water bodies were affected in some way by Nonpoint Source (NPS)
pollution, the Department of Environmental Quality implemented the Nonpoint Source Pollution Program. Statewide implementation focuses on various categories of land use contributing to NPS pollution. The watershed implementation strategy utilises demonstration projects in which specific activity is addressed through specific NPS control technology. Agricultural best management practices have been produced and Farm*A*Syst has been adopted.

**RICE and EMS**

- The Australian rice growing industry should seriously consider the need for developing a verifiable BMP system if not a formal EMS if it is to seek access to currently closed markets in the future when it can be expected that these markets will open under strict access rules.
- Demonstration of quality and ‘clean and green’ criteria is expected to be a requirement under these conditions. The major rice markets of Europe and Japan are expected to increasingly require evidence to support the marketing message. Given that rice is a major component of many processed foods, major processors and retail brands will also increasingly require this confirmation.
- As for cotton, the implementation of BMP/EMS is likely to be a requirement to ensure future access to water.

### 6.3 VI TICULTURE

The Australian wine industry has grown to be the highest-value agricultural export, relying heavily on the discerning European markets. The driver for introducing BMP/EMS in response to market pressures is therefore strong. The main driver should be a market premium for EMS-labeled wine sold along side unlabeled wine. The other driver will be simply access to markets in countries where all products must be EMS labeled or access to supply chains that require all products to be EMS labeled. The following EMS-type initiatives have already been implemented by the Australian viticulture industry.

**VITICARE Program**

The CRC Viticulture has initiated the development of an EMS through its Viticare program. The project has recently commenced and will seek to develop BMP as a first step towards EMS through focusing on benchmarking and implementation of BMP at grower level through the identification of appropriate audit systems (internal and external).

**Organic viticulture – what does ‘certified organic’ mean?**

In Australia, to be able to produce and sell a wine bearing a certified label stating it is fully organic, vineyards and wineries must meet standards. This certification is required to come from an approved body such as the National Association for Sustainable Agriculture Australia (NASAA), Organic Retailers & Growers Association of Australia (ORGAA), Organic Vignerons Association of Australia (OVAA), or Biological Framers of Australia (BFA). Similar requirements for certification in order to use the label ‘organic’ also exist in the US (ATF Certificate of Label Approval) and Europe (EU order number 2092/91). The label may apply only to the grapes (wine made using organically grown grapes), or it may apply to the whole process (organic red wine), however the latter certification is much harder to obtain.

In the marketplace, ‘organic’ is presented with a stress on the negatives - no synthetic pesticides, herbicides, or fertilisers. Organic farmers tend to stress the positive – conserve and build healthy soils, create and maintain biodiversity, and cycle and recycle of nutrients through the farming system.
In Europe integrated production has progressed to a more ecological form of viticulture, the so-called 'controlled environmentally protecting viticulture', which is similar to organic viticulture except for the permitted use of organic fungicides. Europe also recognises a transition phase of (generally) 3 years for converting from conventional to organic production and permits marketing with the label reference 'in conversion to organic production'.

Organic viticulture tends to experience lower yields and higher input costs including labour, which makes it less attractive despite a 20% price premium.

**IPM Viticulture**
This program has been developed to improve practical implementation of IPM to assist grape growers meet increasing demands for greater quantities and higher quality wine grapes. Similar to initiatives in US.

**MRLs**
Maximum Residue Limits for fungicides, herbicides and insecticides - Australian Wine Research Institute recommendations on application have been developed to satisfy the lowest MRL for any of Australia’s major wine markets after considering available data on the persistence of the chemical, both on grapes and through winemaking.

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27 WHITE, G B ‘The economics of growing grapes organically’, Paper presented at Organic Viticulture Symposium, Cornell University, 1999
28 For example the Lake Erie Region IPM

K Heinze, February 2000
7. CURRENT MAJOR EMS PRACTICES

This section provides an outline of major EMS processes currently in use.

7.1 ISO14001: ENVIRONMENTAL MANAGEMENT SYSTEMS – SPECIFICATIONS WITH GUIDANCE FOR USE

The International Standards Organisation (ISO) series have been developed to bring consistency to the standard design process in a global marketplace. The ISO 14000 series have been designed to bring consistency to the design of environmental management systems for industry to ensure comparability, transparency and common understanding of the process.

There are five environmental management system principles within the ISO14000 model.

<table>
<thead>
<tr>
<th>PRINCIPLE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>A. Commitment and Policy</td>
<td>An organisation should focus on what needs to be done - it should ensure commitment to the environmental management system and define its policy.</td>
</tr>
<tr>
<td>B. Planning</td>
<td>An organisation should formulate a plan to fulfill its environmental policy</td>
</tr>
<tr>
<td>C. Implementation and Operation</td>
<td>For effective implementation an organisation should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets. For example training, communications, documentation, and reporting.</td>
</tr>
<tr>
<td>D. Checking, Measurement and Corrective Action</td>
<td>An organisation should measure, monitor, and evaluate its environmental performance.</td>
</tr>
<tr>
<td>E. Management Review and Improvement</td>
<td>An organisation should review and continually improve its environmental management system, with the objective of improving its overall environmental performance</td>
</tr>
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Continual Improvement

A. Environment Policy

B. Planning

- Environmental aspects
- Legal & other requirements
- Objectives & targets
- Environmental & management programs

C. Implementation & Operation

- Structure and responsibility
- Training, awareness & competence
- EMS documentation
- Document control
- Operational control
- Emergency preparedness & response
A. ISO 14001 - ENVIRONMENTAL POLICY

The organisation’s environmental policy should:-

• Be appropriate to the nature, scale and environmental impacts of its activities, products or services;
• Include a commitment to continual improvement and prevention of pollution;
• Include a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organisation subscribes;
• Provide the framework for setting and reviewing environmental objectives and targets;
• Be documented, implemented and maintained and communicated to all employees;
• Be available to the public.

B. ISO 14001 - PLANNING

The organisation shall establish and maintain:-

• A procedure to identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence in order to determine those which have or can have significant impacts on the environment. These aspects must be considered in setting environmental objectives;
• A procedure to identify and have access to legal and other requirements to which the organisation subscribes directly applicable to the environmental aspects of its activities, products or services;
• Documented environmental objectives and targets at each relevant function and level within the organisation;
• A program or programs for achieving its objectives and targets, including designation of responsibility, and the means and timeframe by which they are to be achieved.

C. ISO 14001 - IMPLEMENTATION AND OPERATION

During implementation and operation the organisation shall consider:-

• Structure and responsibility. Roles and responsibilities shall be defined, documented and communicated; management shall provide resources essential to the implementation and control of the environmental management system; the organisation’s top management shall appoint specific management representative(s) who have defined roles, responsibilities and authority.
• Training, awareness and competence. The organisation shall identify training needs and require that all personnel whose work may create a significant impact on the environment to have appropriate training.
• Communication. The organisation shall establish and maintain procedures for internal communication between the various levels and functions of the organisation and for receiving, documenting and responding to relevant communication from interested external parties regarding its environmental aspects and environmental management system.
• Environmental management system documentation. The organisation shall establish and maintain information to describe the core elements of the management systems and their interaction, and provide direction to related documentation.
• Document control. The organisation shall establish and maintain procedures for controlling all documents required by the standard.
• Operational control. The organisation shall identify those operations that are associated with the identified significant environmental aspects in line with its policy, objectives and targets. The organisation shall plan these activities, including maintenance, in order to endure that they are carried out under specified conditions.
CREDIBLE ‘CLEAN AND GREEN’:
Investigation of the international framework and critical design features
of a credible EMS for Australian agriculture

- Emergency preparedness and response. The organisation shall establish and maintain procedures to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the environmental impacts that may be associated with them.

D. ISO 14001 - CHECKING AND CORRECTIVE ACTION
The organisation shall establish and maintain:
- Documented procedures to monitor and measure on a regular basis the key characteristics of its operations and activities that can have a significant impact on the environment.
- Procedures for defining responsibility and authority for handling and investigating non-conformance, taking action to mitigate any impacts caused and for initiating and completing corrective and preventive action.
- Procedures for the identification, maintenance and disposition of environmental records.
- A program and procedures for periodic environmental management system audits to be carried out.

E. ISO 14001 - MANAGEMENT REVIEW
The organisation’s top management shall, at intervals it determines, review the environmental management system, to ensure its continuing suitability, adequacy and effectiveness.

In terms of specific environmental impacts, ISO14001 prescribes a number of impacts that should be considered by an organisation:
- emissions to air
- releases to water
- waste management
- contamination of land
- impact on commodities
- use of raw materials and natural resources
- other local environmental issues.

Legal requirements should consider:
- industry codes of practice
- agreements with public authorities
- non regulatory guidelines.

The standard provides guidance on all other aspects of the environmental management process, including the audit and certification.
ISO 14000 cites the following potential benefits associated with an effective EMS:

- assuring customers of commitment to demonstrate environmental management
- maintaining good public/community relations
- satisfying investor criteria and improving access to capital
- obtaining insurance at a reasonable cost
- enhancing image and market share
- meeting vendor certification criteria
- improving cost control
- reducing incidents that result in liability
- demonstrating reasonable care
- conserving input materials and energy
- facilitate obtaining permits and authorisations
- fostering development and sharing environmental solutions
- improving industry-government relations.

Legislators, particularly in the UK and USA, are assessing the value of certification in improving their effectiveness in monitoring industries (Goodman, 1998). An increasing number of powerful international firms have decided the type of cultural realignment brought about by the implementation of ISO14000 is fundamental to their success.

Goodman (1998) lists a number of benefits to organisations for adopting ISO14000, including:

- managing environmental liability
- reduced costs/increased benefits
- management of change in supply
- improved image
- employee motivation.

Eco-Labeling

Under the ISO14003 standard, the sole basis for all eco-labeling will become Life Cycle Assessment under ISO14040. The WTO stresses international standards as the only legitimate basis for environmental preferred purchasing arrangements by governments (US and EU particularly). This means that eco-labeling under this standard will become increasingly important in competitiveness. The TBT Agreement urges governments to make the utmost use of international standards in order to prevent unnecessary trade barriers.

Environmental labeling is critically important in markets where environmental credentials are important to sales. Pulp and paper markets in Europe, USA and Japan are likely to feel the effects in the short to medium term. All products marketed to achieve value as ‘clean and green’ or environmentally friendly will be brought under this requirement.
7.2 EUROPEAN UNION - EMAS (ECO-MANAGEMENT AND AUDIT SYSTEM)

The current EU approach to environmental policy in relation to industry is composed of 3 strands:
(a) continuous upgrading of the legislative framework
(b) further development of voluntary, incentive-based instruments
(c) an intensification of efforts to formulate an integrated product policy.

The EU has implemented the EMAS Regulation – Community eco-management and audit system, as its recognised EMS for those companies seeking to voluntarily implement an EMS. The system is described more fully in Appendix 2.

The aim of EMAS is to give more confidence to stakeholders, in particular the general public and regulators, with regard to the environmental performance of participating companies. This can only be achieved if the scheme is perceived by those stakeholders to be both rigorous and credible, via:
(a) provision of reports on environmental performance, thoroughly and independently checked
(b) rigorous independent verification of an environmental management system
(c) credible accreditation of the environmental verifiers.

If the EMAS is not seen as credible or adding value for regulators or the public there will be no benefit for participating organisations.

EMAS has traditionally concentrated on direct environmental impacts such as emissions and waste. However the regulation recognises that indirect impacts such as purchasing policy or product use and disposal are significant and would benefit from being brought under the control of the EMAS to reflect the extent to which good environmental management applies both up-stream and down-stream.

Currently approximately 75% of EMAS registrations are in Germany, reflecting the highly industrialised nature of the economy and high level of community concern about the environment. Many companies are initially concerned about the cost implications of signing on to EMAS, however studies demonstrate an average pay-back time, in waste and raw material reduction, of 18 months.

7.2.1 Review of EMAS Regulations, June 1999

The EU has recently reviewed the EMAS Regulation – Community eco-management and audit system and an amended Proposal is currently before the European Parliament for endorsement.

The objectives of the review are to increase the potential of EMAS and rationalise the relationship between EMAS and the international standards in the field of environmental management. The amendments seek to enhance the involvement of employees, increase the visibility of participation in EMAS for business, and increase the consistency of the implementation of EMAS across Member States. It is expected that the amended Proposal will be accepted in the near future.

The Proposal maintains the voluntary nature of the scheme but extends its scope to cover all organisations with significant environmental impacts. One of the main obstacles to doing more to protect the environment is the fear that competitors may get away with doing much less.

A number of initiatives are proposed to make EMAS more attractive to industry and thereby increase uptake. The introduction of new logo will enhance visibility, a promotion strategy will be implemented, and EMAS will be made consistent with ISO14001. At present EMAS goes further than ISO14001 in its requirements for performance improvement, employee involvement, legal compliance, and communication with stakeholders, including performance reporting.
7.3 FORESTRY INDUSTRY

7.3.1 International Forest Stewardship Council (FSC)

There is no single internationally agreed definition of sustainable forest management. However the Forest Stewardship Council (FSC), an independent body with an international mandate to accredit forest certification programs, has defined a set of 10 principles and criteria for forest management which are intended to provide a consistent framework for the development of locally determined forest management standards.

FSC Principles and Criteria
1. Compliance with laws and FSC Principles
2. Tenure and Use Rights and Responsibilities
3. Indigenous Peoples Rights
4. Community Relations and Workers Rights
5. Benefits from the Forest
6. Environmental Impact
7. Management Plan
8. Monitoring and Assessment
9. Maintenance of Natural Forests

The FSC’s guidelines provide more of a performance standards approach, including compliance with local regulatory frameworks.

The Canadian forestry industry and identified the following sustainability criteria and indicators: 29
1. Conservation of biological diversity
2. Maintenance and enhancement of forest ecosystem condition and productivity
3. Conservation of soil and water resources
4. Forest ecosystem contribution to global ecological cycles
5. Multiple benefits of forests to society
6. Accepting society’s responsibility for sustainable development.

Under the World Bank’s GEF Biodiversity Program the World Bank and WWFN have developed a joint initiative to achieve FSC certification of 1 million square kms of temperate and boreal forests—mainly from Russia and Eastern Europe—by 2005.

In the UK the WWFN has created ‘95 Plus’ which is a buyers group controlling over $1 billion trade per annum. This group has agreed to purchase forestry products only from producers demonstrating compliance with the international Forestry Stewardship Council’s Principles of Forest Management and accreditation system.

29 WT/CTE/W/82 - Forestry Sector and Ecolabeling, Submission by Canada
7.4 FOOD SAFETY

HCCAP

HACCP (Hazard Analysis Critical Control Point) was developed as a food safety system in the US in the 1960s, was taken up by Australian food manufacturing and processing industries in the 1980s, and is to be extended to retail outlets in the new food standards codes and legislation. HACCP is a process which requires development of a food safety plan based on the following 7 principles:

1. Analyse hazards – identification of potential hazards and control measures
2. Identify critical control points – points at which hazards can be identified and eliminated
3. Establish preventative measures with critical limits for each control point
4. Establish procedures to monitor the critical control points
5. Establish corrective actions to be taken when monitoring shows that the critical limit has not been met
6. Establish procedures to verify that the system is working properly
7. Establish effective record keeping to document the HACCP process.

Identified hazards may include those relating to the production of the food itself, eg. pesticide residues. In order to ‘control’ this hazard the processor could either determine a means of removing the residues if possible, or alternatively require the producer/supplier to demonstrate that the agricultural production system ‘controls’ the hazard (e.g. via an accredited EMS).

It is therefore important that an EMS for agricultural production link meaningfully to the requirements of other accreditation systems, legislation and systems (such as HCCAP) in the supply chain.

7.5 AGRICULTURE

UK - LEAF (Linking Environment and Farming)

- LEAF was established in the UK in 1991 to develop and promote Integrated Crop Management as a whole farm approach which assesses all the decisions made on the farm, and ensures that the best option is adopted within the constraints of the farm site, resources and climatic factors.
- The LEAF audit is a management tool that analyses the whole farm addressing: the site, crop rotation, variety choice, crop husbandry, organisation and planning, management of wildlife habitat and landscape features, animal husbandry energy efficiency, crop nutrition, and crop protection. A software package has been developed to support this process. LEAF’s main weakness is its subjectivity and lack of external verification. LEAF is currently seeking ISO14000 accreditation.
- A network of LEAF accredited demonstration farms provides allows industry and government agencies to see the benefits of ICM for themselves. This is especially important in winning and retaining market access. Major food processors and retailers such as Heinz, Sainsburys, Quaker, Bayer, Tesco, and Safeway support the LEAF program.
- LEAF are looking to expand the concept beyond ICM to Integrated Farm Management on order to take into account the needs of mixed farming systems.

In Europe 7 countries have formed a regional alliance to promote ICM. The European Initiative for Integrated Farming (EIF) is an alliance of non-government organisations in France (FARRE), Germany (FIP), Luxembourg (FILL), Spain (Asociacion Agrofuturo), Sweden (Odling i Balans), Italy (L’Agricoltura Che Vogliamo) and UK (LEAF). This is a farmer-led initiative, which may be a good way of avoiding regulated EMS by demonstrating EMS ‘self-regulation’.

30 ‘European industry gets behind ICM’, Farm Chemicals International, May 1999
7.6 LIFE CYCLE ANALYSIS AND MATERIALS ACCOUNTING

Throughout the world, particularly in North American countries, Japan and the EU, government and industry are responding to community calls to improve the environmental sustainability of products and services. Australian efforts have been reflected in such initiatives as load based licensing of pollutants, trading of emission licenses, and state of the environment reporting. Efforts to optimise the use of industrial materials are being increasingly embodied in international standards such as ISO14000 and in the use of materials accounting methodologies. To provide maximum benefits to industry and the community the methodologies applied also need to be relevant to the characteristics of the region in which goods and services are made and provided.

Materials accounting methodologies are relatively new tools for analysing, from ‘cradle to grave’, the use of materials in products and/or processes:
1. They consider the life cycle of the product from cradle to grave
2. Inputs and outcomes are converted to objective physical measures
3. The interactions of outcomes are calculated using algorithms which reflect processes in nature
4. The evaluation of impacts brings together the results of these algorithms, knowledge of the environment, and a stated set of values to create a preferences ‘weighting’ for different outcomes.

Materials accounting has taken on international prominence because it is embedded in international standards such as ISO 14000 which are becoming pivotal to industry operating standards, trade negotiations, preferred purchasing and eco-efficiency. A key element is the implementation of an EMS by corporations seeking accreditation to the ISO14000 standard. Life Cycle Assessment (LCA) is the methodology for materials accounting within ISO14000. It is specified in ISO14040. It is crucial for industry and government wishing to implement the ISO14020 series on environmental labeling which is the capstone for most marketing and consumer-oriented programs.

The potential for materials accounting focused barriers to trade come from two sources:
1. Corporations which have adopted EMS.
2. Countries, or blocks of countries, which have introduced purchasing preferences akin to ISO14000 principles. Already EO eco-labeling and other eco-labeling schemes are altering patterns of consumer and government procurement practices. In addition, government procurement practices are being increasingly guided by data provided by LCAs.

Materials Accounting
Materials accounting techniques use a scientific methodology to objectively evaluate the physical resource effects of alternative courses of action. Thus it is possible to compare ‘apples and oranges’ by measuring quantities of prime components (materials) embedded in their creation and consumption.

1. ‘Cradle to grave’ assessment. Objective materials accounting considers the entire life cycle, from the original extraction of the physical resources, until the eventual return of physical resources to nature (whether in a beneficial or harmful form). All processes, including extraction, processing, consumption and return to nature, and all by-product activities, are encompassed.
2. Quantification of physical inputs and outputs: Selected inputs and outcomes of the various processes are converted to objective physical measures. This is the ‘inventory’ of the materials.

31 MARTIN, P & VERBEEK, M ‘A national materials accounting strategy: a path to competitive advantage for Australian industry.’ Aust., Profit Foundation, 1999
3. Scientific assessment of the interactions and outcomes. The interactions between these outcomes are calculated using algorithms that reflect processes of nature. Environmental processes, and the environmental consequences, vary from environment to environment. To be reliable for decision-making the algorithms should properly reflect the local context.

4. Specification of values in impact assessment. The evaluation of impacts brings together the results of these algorithms, knowledge of the environment, and a stated set of values to create a preferences ‘weighting’ for different outcomes.

An LCA applied without thought to the issue of regional diversity or differential environmental pressures will provide inappropriate answers.

**Data And Methodology**

As methodology and data reliability become more significant in competition between enterprises and in trade negotiations, there will be significant increase in technical disputation over data and methodologies. Meeting the data requirements for a credible LCA requires cooperation vertically in industry supply chains; and horizontally across an industry. Without high levels of trust and cooperation within industries, the capacity to properly harness ISO14000 for competitive advantage will be seriously hampered.

There is a growing realisation in Nordic countries, Germany, Britain, Japan, US and China that there is a need for a pool of regional data from which to make appropriate materials accounting assessments. If the ‘objective’ tools of comparative assessment reflect a fundamentally different set of ecological values to those which are important in our environment the results of the application of these tools must provide misleading conclusions on environmental impacts. Unless Australia is able to develop the inventories, the algorithms and models, and the impact assessment techniques, appropriate to its unique environment, it will be forced into an increasingly defensive stance.
8. CRITICAL SUCCESS FACTORS FOR EMS

8.1 NEED FOR ‘VALUE CHAIN’ INTEGRATION

One of the critical success factors for EMS design is close ‘fit’ with the other, market, regulatory or code of practice requirements in the supply chain.

In designing an EMS, producers, manufacturers and processors will need to identify those impacts over which they have direct control and those over which they have no direct control, but may be able to influence (indirect control) via their purchasing/procurement policies – the ‘knock-on’ effect.
8.2 NEED FOR LINKAGE OF ALL ELEMENTS IN EMS DESIGN

Another critical success factor is the successful identification of all the key factors impacting on all key stakeholder groups. It is therefore essential to engage all key stakeholders in the EMS design process and ensure all necessary technical and communication linkages are developed.
9. **EMS R&D**

9.1 **EUROPE**

The DLO Agricultural Economics Research Institute (LEI-DLO) recently reported on the status of European agri-environmental research (1999). It found that the research effort on agri-environmental research is flourishing though still in its infancy and is not yet systematic in its coverage. The partiality of the existing European research effort can be characterised as follows:

1. There is a northern European bias, reflecting the strength of northern European concerns versus those of southern Europe in geographic coverage, sectors and systems studied, and the problems and issues addressed.
2. Little work is being done on the environmental effects of certain commodity regimes, horizontal socio-structural measures, regional and rural policy, and other measures such as incentives for alternative crops, EMS, farm diversification.
3. The style of research tends to focus on single country studies with a lack of comparative studies, lack of integrated studies focusing on a region or farming system or a rural community, and a lack of linkage between agricultural economic analysis and farming systems/agri-ecology analysis.

A recent comprehensive study in the UK has identified the full cost of agriculture to the community (including externalities) and concludes that conservatively the costs almost equal the industry’s income. The results are to be published in Agricultural Systems in 2000. The report is likely to generate considerable interest and activity in policy development, pricing and access rights, who pays?, and development of BMPs/EMS.

9.2 **UNITED STATES**

The USEPA recently conducted a project to assess the uptake, status and impact of EMS in American industry. The report is summarised as follows:

- USA supports a policy of voluntary standards plus compliance with legal requirements plus accreditation and registration systems plus 3rd party conformity assessment.
- However the US recognises that voluntary standards currently don’t operate to any particular specification, don’t include emissions control, and don’t always specify targets, objectives or management systems.
- It also recognises that there is the possibility of a real disjuncture between ISO14001 and regulations as it claims the requirement for regulatory compliance is not explicit within ISO14001.
- The USEPA is currently sponsoring 10 pilot projects across government and industry to test the utility of ISO14001 as a recommended EMS:- prisons, local governments, NY City Transit Systems, Arizona City + State level pilot projects. The need to understand variables that contribute to the facility’s decision to reduce its environmental impact, both regulated and non-regulated, is critically important to future environmental initiatives at both the state and federal levels, both voluntary and mandated. The need to identify the opportunities and constraints to environmental performance and compliance improvement within the integrated context of an ISO14001 EMS is also required.
- As part of this project the USEPA is collecting data on the environmental impacts of industry and adoption of EMS but little analysis has yet been done. However logic dictates that improvements should be evident. However recognises that current EMS design is site specific and does not consider catchment or regional scale linkages. This is a shortcoming.

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32 BROUWER, F ‘CAP and the environment in the European Union: the research agenda’, August 1999
33 ‘Crops without profit’. New Scientist, 18 December 1999, p10
34 USEPA, Effects of ISO14001 environmental management systems on the environmental and economic performance of organisations, Project Summary 1, March 1999
• The USEPA has developed a generic EMS for smaller, fragmented components of the manufacturing sector which do not have the capacity to generate on an individual basis, eg. metal plating, screen printers, paper printers.
• The USEPA is not aware of any integrated approach to EMS design and implementation in this area in agricultural sector. Like Australia, US agricultural trade organisations are taking a product specific approach to their market requirements.
• It is not yet clear if regulation is the best way for enforcement of an ISO14001 system. Agricultural legislative requirements include USDA legislation on use of pesticides and toxic substances, FDA requirements for food safety, and US water quality standards.

9.3 AUSTRALIAN R&D RESPONSE

A recent paper states that R&D and innovation which enhances specific characteristics of Australian agricultural products will increase demand and reduce competition from alternative suppliers. Such innovations may relate to offering unique, better or more consistent product qualities; a better, cleaner or more fashionable image; more reliable delivery; better packaging; better preserving qualities; better food safety guarantees; or use of environmentally friendlier production systems. R&D which changes agricultural products from commodities to differentiated products and increases demand, is likely to increase price and provide positive returns to producers.

Australia is currently conducting a significant environmental management R&D program, some of which can be readily applied to the development of an EMS for agriculture. The following provides some examples of relevant R&D at the national level.

• **Natural attenuation capacity of the environment**
  (System knowledge and understanding)
  • National Land and Water Resources Audit - to establish a baseline to enable Australia fulfilling its international State of the Environment reporting obligations
  • National Greenhouse Gas Initiative
  • National Dryland Salinity Program
  • Murray Darling Basin Commission
  • Murray Darling Basin Audit  Information Strategy (MDBSIS) - developed with CSIRO;
  • IFF model. Irrigation Futures Framework developed by BRS for MDBC to model biophysical, agricultural production and socio-economic futures in irrigation area over a 230-year profile;
  • The Murray-Darling Basin Commission is currently investigating the feasibility of introducing an appropriate audit and certification model to foster better natural resource management practices in the irrigation regions across the Murray-Darling Basin.

• **Australian Collaborative Land Evaluation Program (ACLEP)**
  Collaborative Commonwealth/State project to develop common land resource assessment methodologies and data sets.

• **Toolkit**
  GIS, remote sensing, predictive models, process software

• **Research and Development Corporations**
  All of Australia’s rural RDC’s have identified sustainable management of the natural resource basis as a major industry requirement with associated research programs to support its objectives. The need

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for an EMS is now being recognised by some sectors, especially those which are ‘high-value’ or ‘vulnerable’. Due to the ‘generic’ nature of significant aspects of EMS, industry should explore the feasibility of jointly funding an EMS design program to develop a prototype generic EMS which could then be customised to the specific requirements of individual ‘products’.

The cotton industry has developed its Best Management Practice Manual and is moving to accreditation.

Grains RDC has commissioned a 3-year pilot project to develop generic EMS guidelines, incorporating best management practice that will enable grain growers to customise and implement an EMS for individual farms.

Grape and Wine RDC has commissioned the design of BMP/EMS under its Viticare Program.

- **Redesign of Australian Plant Production Systems (RAPPS)**
  Joint LWRRDC/CSIRO program which aims to develop capacity to design new environmentally-benign agricultural production systems which produce high quality products and maintain farm incomes.

- **National Dryland Salinity Program (NDSP)**
  A joint program to research, develop and extend practical approaches to manage dryland salinity effectively in Australia.

- **National Program for Irrigation R&D (NPI RD)**
  Joint R&D program for irrigated agriculture

- **National Landcare Program**
  NLP is exploring options for greater integration of NLP initiatives into agricultural farming practices.

- **Land Management Society, Western Australia**
  This state-wide, voluntary group with membership from the rural sector, industry, research and academic fields is involved in the development of procedures and solutions at grower level. They have published the ‘LMS Farm Monitoring Kit’.

### 9.4 Australian Policy Response

**Natural Resource Management Policy** – The government has recently issued a discussion paper outlining a possible overarching national strategic policy framework for the long-term management of natural resources in rural Australia. The paper makes a number of references to the adoption of EMS and best management practice, and the development of regional environmental management strategies. It seems logical for industry to explore the design of EMS for agriculture in the context of national policy development. In addition, the Standing Committee of Agriculture and Resource Management (SCARM) is seeking to develop a policy position on EMS by December 2000.

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36 CARRUTHERS, GF *On-farm environmental management systems for grain growers: an upper Murray-Darling pilot project*, commissioned by Grains RDC, January 1999
10. CSI RO R&D RESPONSE

10.1 CURRENT CSI RO RESEARCH WHICH HAS THE POTENTIAL TO CONTRIBUTE TO EMS DESIGN

CSIRO conducts R&D for all major sectors of the Australian economy. Each of these sectors contains a component dealing with environmental sustainability. CSIRO therefore has the unique capacity to draw on the expertise and experience of all industry sectors relating to EM R&D. Following are some examples of current R&D which have strong potential to contribute to a credible EMS outcome for Australian agriculture.

10.1.1 Market access and protection
- Basis of consumer food preference – Project Cassandra;
- Minimisation of damage to international and national trade in livestock and livestock products;
- Livestock health issues with potential trade and welfare implications;
- Intensive livestock – enhanced nutrition, management, health and welfare (pigs and poultry);

10.1.2 Socio-economic aspects and policy development
- Development of tools and methods for improved stakeholder participation; modeling regional economies and demographics; design and evaluation of innovative alternative economic and social instruments, alternative institutional arrangements and alternative options for natural resource policy.

10.1.3 Environmental thresholds - the natural attenuation capacity of the environment
- Knowledge and understanding of physical systems
  - Port Phillip Bay Environmental Study
    Developed leading edge ecosystem modeling capability for complex ecosystems.
  - The ‘Heartlands’ project
    A proposal to achieve, track and adaptively manage large scale land use change in the Murray Darling Basin, with the long term goal of arresting and even reversing landscape decline.
  - Forestry – Site management for sustained productivity and indicators of sustainability
  - Forestry – Sustainable management program
  - Biodiversity – Integrating production and conservation of natural resources;
  - Biodiversity – Systems analysis and policy evaluation for sustainable natural resource management;
  - Agriculture – Sustainable resource management
    - Integrated farm management
    - Strategic cropping options
    - Pesticides (PIRI)
    - Irrigated agriculture and water conservation
    - Biological approaches to management of plants, insects and animals
    - Plant/pasture improvement and system management (cattle and sheep)
    - RAPPS
    - Contaminant uptake by crops
  - Greenhouse gas emissions – quantification of soil carbon pools, quantification of changes resulting from land use change, and enhancement of sequestration process.
CREDIBLE ‘CLEAN AND GREEN’:
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- National Land and Water Resources Audit
  - CSIRO - Valuing the resource base and costs of degradation
  - BRS/CSIRO - Australian Soil Resource Information System (ASRIS)
  - BRS/CSIRO – Catchment water balance and land use impacts
  - CSIRO - Sediment and nutrient delivery
  - CSIRO - Nutrient Balance in regional farming systems and soil nutrient status
  - CSIRO - Coastal and estuarine.

- Other
  - Project management of ACLEP

10.2 INDICATORS AND MEASURES – THE ‘TOOLKIT’

- CSIRO A Guidebook to environmental indicators,1998
- SWAGMAN Destiny
- APSIM
- SWIM
- PIRI (Pesticide Impact Rating Index) – predictive modeling package;
- Wetting Front Detector – water management for irrigation;
- Hyperspectral Remote sensing – quantitative land evaluation to explain spatial variation in land properties at paddock, catchment and regional scale;
- Various models that predict waterlogging, salinisation, sediment and nutrient mobility - upscaling soil and water processes;
- Infrared spectroscopy – measure and predict soil properties;
- Precision agriculture and quantitative land evaluation

10.3 WHERE TO FROM HERE? – A SUGGESTED PROJECT DESIGN

It is essential that the design of an EMS for Australian agriculture be industry driven, link closely to
ternational and international trade and environmental policy trends and obligations, and be underpinned by
rigorous catchment/region based environmental thresholds and targets.

RESEARCH PROGRAM DEVELOPMENT

In partnership with Dames and Moore, CSIRO has commenced a MDBC project to investigate the feasibility of
introducing a Basin-wide EMS for agricultural production systems within the Murray-Darling Basin.

Expanding on the methodology adopted in the MDBC project, CSIRO proposes an approach incorporating the
following components:

- Conduct a literature search and desktop analysis to identify the current status of ISO14001, EMAS and other
  EMS approaches and identify key environmental/trade/consumer aspects for principal Australian agricultural
  producers ;
- Using a catchment case study approach representing a range of agro-ecological zones (including different
  geological and climatic aspects), and incorporating a mix of land-use pressures ranging from other agricultural
  production systems to agriculture/ urbanisation/industry pressures, identify key physical processes and
  thresholds essential for environmental sustainability within an integrated production/catchment/regional
  context;
- The case studies would follow the existing regulatory, planning and ‘standards’ pathways that currently apply to
  a selected industry, identify areas of inconsistency or duplication of effort, and identify opportunities to create
  consistency and complementarity within a total process. This includes aspects relating to EPA regulatory
requirements, catchment management, local government planning and approvals including EIS, food production and safety requirements (regulatory, HACCP and market driven), national and international trade policy, eco-labeling requirements, consumer preferences, etc. This approach also lays the foundation for developing a life-cycle analysis (ISO14040) framework for the industry should this be required for market access in the future. The analysis will include an assessment of market opportunities as well as environmental implications.

- The case studies would also look at the upstream and downstream effects of the various co-existing activities and assess the relevant interactions and impacts affecting the viticulture industry.
- The project would identify the essential biophysical processes that are important to monitor regardless of the BMP, EMS or catchment management framework selected.
- Sensitivities relating to the particular physical characteristics and land-use pressures currently existing in these catchments and tolerance thresholds above which intervention is required would be identified.
- With reference to appropriate experts in key areas (such as groundwater, surface water, viticulture, chemical pathways, contaminants and residues) the project would identify the critical processes that should be monitored, specify relevant indicators, and identify current best practice monitoring methodology. The project will identify what is to be monitored, how it should be monitored, and timing and frequency of monitoring.
- A monitoring program will be designed within an auditable framework that demonstrates the essential features of repeatability, identification of changes or movement in levels, and overall sensitivity of the system as a whole to identify when intervention is required.
- The project will propose a set of environmental thresholds relevant to these key processes and which are appropriate for monitoring at the farm scale (e.g. residue levels in fruit, noise levels, soil nutrient and carbon levels) and the catchment scale (soil-water movement, groundwater nutrient levels, atmospheric dispersion of chemicals, etc).
- The project will explore options for implementing and enforcing of standards.
- The project will propose a scientific process for justification of the selected thresholds, should these be challenged in any forum. The process will recognise that thresholds may need to change by region and over time, depending upon the biophysical and land-use pressures that exist at a particular time.
- The project will explore the economic and policy implications of introducing EMS, including costs and externalities (who benefits and who pays?)
- The project will assess the market implications of process versus outcome based systems.
- The project will identify the policy implications of adopting a regulatory approach versus industry self-regulation and how this fits within the requirements and constraints of other existing processes.
- The project will identify policy options to facilitate the implementation and enforcement of EMS within the parameters of current trade and environmental policy.

PROJECT OBJECTIVES

The project objectives will:

- Identify the biophysical practices and/or outcomes which should underpin a catchment or regional based EMS.
- Identify the existing planning, regulatory, standards and market-based ‘pathways’ that create opportunities for an EMS.
- Propose a fully operational prototype EMS for a selected industry that will be
  - acceptable to producers because it will create new market opportunities for them,
  - valued by wholesalers, retailers and consumers
  - respected by environmentalists.
- Identify policy options to facilitate the implementation and enforcement of EMS.
- Identify the financial and economic implications of EMS implementation for the industry.
EXPECTED PROJECT OUTCOMES

- Identification of the key physical processes which should underpin EMS for agriculture and which form the basis for development of regional environmental thresholds. Specific production systems will then have a meaningful set of environmental targets and thresholds against which to measure performance.
- Design of a prototype EMS for Australian agriculture, including specification for development of environmental standards methodology, which has the potential for international adoption.
- Greatly improved capability of Australian agricultural industries to identify, manage and mitigate environmental risk in the longer term.
- Improved capacity for Australian agricultural producers to retain/gain market access via a meaningful, rigorous and auditable EMS framework.

CSIRO’s role would be to focus on the quantitative aspects of natural processes and cumulative effects, and the economic and policy implications of introducing BMP and EMS, thus providing a basis for justifying the environmental thresholds adopted in the certification process.

PROJECT MANAGEMENT STRUCTURE

A suggested project management structure, which promotes consultation and stakeholder ownership, includes:

1. Stakeholder Reference Group
   The Stakeholder Reference Group would act as the steering committee for the program. Suggested composition of the Reference Group includes representatives from:
   - Commonwealth agriculture, trade and environment policy developers -- AFFA, DFAT and EA
   - Major producer groups, eg. viticulture, cotton, rice, grain, meat
   - NFF
   - State agencies such as environment and agriculture
   - Consumer groups
   - Retailer groups
   - Standards industry
   - Indigenous groups – indigenous pastoralists and food producers
   - Conservation groups, eg. WWFN
   - Murray-Darling Basin Commission

   The Stakeholder Reference Group would assist project design; advise on all aspects of policy, trade, marketplace, R&D, and implementation; assess progress against milestones; facilitate communication with producers and stakeholders.

2. A Design Task Force to be responsible for the technical design aspects of the EMS
   Suggested composition of the Design Task Force includes representatives from:
   - RIRDC/LWRRDC - project manager
   - State Agriculture Depts – eg. Genevieve Carruthers, NSWAg
   - State EPAs
   - Other identified EMS ‘experts’ – perhaps from other industry sectors.

3. Project facilitation through a Project Leader And Coordinator
   This is similar to the approach taken for other major national R&D initiatives such as National Dryland Salinity Program, National Irrigation Program for R&D. Due to the national cross-sectoral nature of the project it will be necessary to dedicate a full-time resource to the role of project leader and facilitator. It is therefore recommended that CSIRO view this proposal as a ‘CEO proposal’ and fund a new ‘priority position’ to take the project forward with industry.
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Investigation of the international framework and critical design features of a credible EMS for Australian agriculture

EMS SYSTEM STRUCTURE – STARTING POINT

- EMS Documentation
  - Technical tool-kit
    - [CSIRO and others]
  - Biodiversity & conservation practices
    - Farming systems
    - Farm practices
    - BMPs
  - Biogeophysical regional characteristics look-ups
  - Regulatory look-ups
    - General industry & environment
    - Product specific
  - Indicators
    - Measures
    - Targets
  - Policy aspects

ISO 14001 process
Appendix 1

INTERNATIONAL CONVENTIONS ON GLOBAL ENVIRONMENTAL ISSUES WHICH IMPACT ON AGRI CULTURE

<table>
<thead>
<tr>
<th>Convention</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>UN Framework Convention on Climate Change (1992);</td>
<td>Stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system....within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, to ensure food production is not threatened, and to enable economic development to proceed in a sustainable manner.</td>
</tr>
<tr>
<td>Kyoto Protocol (1997)</td>
<td>Establishes greenhouse gas emission reduction targets to be achieved during the commitment period 2008-2012, relative to 1990.</td>
</tr>
<tr>
<td>UN Convention of Biological Diversity (1992)</td>
<td>Conserve biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including appropriate access to genetic resources and by appropriate transfer of relevant technologies.</td>
</tr>
<tr>
<td>UN Convention to Combat Desertification (1994)</td>
<td>Combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, in a framework that contributes to sustainable development.</td>
</tr>
<tr>
<td>Global Action Program for the Protection of the Marine Environment from Land-based Activities (1995)</td>
<td>Developed under UNEP's auspices, sets forth an approach by which nations can cooperate and build institutional capacity to achieve the aims of specific international marine agreements. Offers guidance for nations to establish targets to address a host of marine pollution issues.</td>
</tr>
<tr>
<td>UNGASS Decision on Forests (1997)</td>
<td>Establishes 12 programs to implement the Statement on Forest Principles</td>
</tr>
<tr>
<td>AGENDA 21</td>
<td>Adopted by the UN Conference on Environmentally Sustainable Development (UNCED) at Rio de Janiero, 13 August 1992</td>
</tr>
<tr>
<td>World Heritage Convention (1975)</td>
<td>For the protection of natural and cultural heritage.</td>
</tr>
<tr>
<td>RAMSAR Convention 1971</td>
<td>For the protection of significant wetland systems.</td>
</tr>
<tr>
<td>General Agreement on Tariffs and Trade (GATT) - 1948</td>
<td>The World Trade Organisation (WTO) is developing global economic policies which establish a mandate for the continuation of the international reform process in agricultural trade, with the aim of eliminating trade distorting tariffs and subsidies and taking into account negative externalities associated with agricultural production.</td>
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The Coalition for Environmentally Responsible Economies (CERES) is a US based nonprofit organisation comprised of leading social investment professionals, environmental groups, religious

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37 WORLD BANK/GEF ‘Protecting our planet – securing our future’, 1998
organisations, public pension trustees, and public interest groups. The CERES Principles represent a comprehensive 10-point environmental ethic devised to encourage the development of positive programs to prevent environmental degradation, assist corporations set policy, and enable investors to make informed decisions regarding environmental issues.

The Washington-based World Resources Institute (WRI) is conducting a project to develop indicators that capture a picture of material flows through industrial economies – material flow indicators. Indicators are being developed for industrial materials such as industrial minerals, construction materials, metals, chemicals, infrastructure, fossil fuels, renewables, semi-manufactures, finished products, and the hidden flows. How such indicators may be incorporated into USEPA policy-making will also be considered.

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EUROPEAN UNION - ECO-MANAGEMENT AND AUDIT SYSTEM (EMAS)

The main components of EMAS include:

ANNEX III - Environmental Statement

The environmental statement is a tool for communication and dialogue with interested parties regarding environmental performance. The organisation shall consider the information needs of the public and other interested parties when writing and designing the environmental statement. The minimum requirements for this information shall be as follows:

(a) A clear and unambiguous description of the organisation registering to EMAS and a summary of its activities, products and services and its relationship to any parent organisations as appropriate
(b) The environmental policy of the organisation
(c) A description of all the significant environmental impacts of the organisation and an explanation of the nature of that impact
(d) A description of the environmental objectives and targets in relation to the significant environmental impacts
(e) A summary of the data available on the performance of the organisation against its environmental objectives and targets with respect to its significant environmental impacts
(f) Other factors regarding environmental performance
(g) The name and accreditation number of the environmental verifier and the date of validation.

The EU Commission shall lay down guidelines concerning the form and minimum content of the environmental statements in order to improve their clarity and uniformity. Organisations are encouraged to use environmental performance indicators where appropriate. Selected indicators must:

(a) Give an accurate appraisal of the organisation’s performance
(b) Are understandable and unambiguous
(c) Allow for year on year comparison of an organisation’s performance
(d) Allow for comparison with sector, national or regional benchmarks as appropriate
(e) Allow for comparison with regulatory requirements as appropriate.

ANNEX VI - Environmental aspects

General

In order to decide on its significant environmental impacts an organisation shall consider all environmental aspects of its activities, products and services and decide on the basis of criteria, defined by the organisation, which of its environmental aspects have significant impact. An organisation shall consider both direct and indirect environmental aspects of its activities, products and services.

Direct environmental aspects

These cover the activities of an organisation over which it has management control and are local to the organisation and may include but not be limited to:

(a) Emissions to air
(b) Releases to water
(c) Waste management
(d) Contamination of land
(e) Use of natural resources and raw materials (including energy)
(f) Local issues (noise, vibration, odour, visual appearance, etc)
(g) Transport issues (both for goods and services and employees)

Also taking into account start-up, shut-down and emergency conditions.
Indirect environmental aspects
As a result of the activities, products and services of an organisation there may be significant environmental impacts over which it does not have management control or occur at a distance from the organisation. These may include but are not limited to:
(a) Product related issues (design, packaging, transportation, use and waste recovery/disposal)
(b) Capital investments, granting loans and insurance services
(c) New markets
(d) Choice and composition of services (e.g. transport or the catering trade)
(e) Product range compositions.
In addition, organisations must be able to demonstrate that the significant environmental aspects associated with their procurement procedures have been identified and that significant impacts associated with these aspects are addressed within the management system.

Significance
It is the responsibility of the organisation to define criteria for assessing the significance of the environmental aspects of its activities, products and services.
Considerations in establishing the significance of an organisation’s environmental aspects may include but are not limited to:
(a) Identification of activities, products and services of the organisation’s operations, the specific environmental aspects associated with those activities, products and services, and the type of impact related to each environmental aspect
(b) Collection of information about the condition of the environment to identify activities, products and services of the organisation that may have an impact on specific conditions
(c) Assessment of the organisation’s existing data on material and energy inputs, discharges, wastes and emissions data in terms of risk
(d) Identification of the views of stakeholders (interested parties) and the use of this information to help establish the organisation’s significant environmental aspects
(e) Identification of environmental activities of the organisation that are regulated, for which data have likely been collected by the organisation
(f) Identification of procurement activities that are significant in terms of the direct and indirect environmental impacts of the organisation
(g) Consideration of the design, development, manufacturing, distribution, servicing, use, re-use, recycling and disposal of the organisation’s products.

Identification of those activities of the organisation which have the most significant environmental costs, benefits or other financial aspects.
## 1. INTRODUCTION

### Scope

This document sets out a framework for Good Agricultural Practice (GAP) on farms which defines essential elements for the development of best-practice for the global production of horticultural products (e.g. fruits, vegetables, potatoes, salads, cut flowers and nursery stock). It defines the minimum standard acceptable to the leading retail groups in Europe, however, standards for some individual retailers and those adopted by some growers may exceed those described. This document does not set out to provide prescriptive guidance on every method of agricultural production.

EUREP members wish to recognise the significant progress already made by many growers, grower groups, grower organisations, local schemes and national schemes in developing and implementing best-practice agricultural systems with the aim of minimising adverse impact on the environment. EUREP members also wish to encourage further work to improve growers capability in this area, and in this respect this GAP framework, which defines the key elements of current agricultural best-practice, should be used as a benchmark to assess current practice, and provide guidance for further development.

GAP is a means of incorporating Integrated Pest Management (IPM) and Integrated Crop Management (ICM) practices within the framework of commercial agricultural production. Adoption of IPM/ICM is regarded by EUREP members as essential for the long-term improvement and sustainability of agricultural production.

EUREP supports the principles of and encourages the use of HACCP (Hazard Analysis Critical Control Points).

It is essential that all organisations involved in the food production chain accept their share of the tasks and responsibilities to ensure that GAP is fully implemented and supported. If consumer confidence in fresh produce is to be maintained, such standards of good agricultural practice must be adopted, and examples of poor practice must be eliminated from the industry.

All growers must demonstrate their compliance with national or international law.

All growers should be able to demonstrate their commitment to: a) maintaining consumer confidence in food quality and safety; b) minimising detrimental impact on the environment, whilst conserving nature and wildlife; c) reducing the use of agrochemicals; d) improving the efficiency of natural resource use; and e) ensuring a responsible attitude towards worker health and safety.

### Independent Verification:

Growers receive their EUREP GAP approval through independent verification from a verification body that is approved by EUREP. The timing must be agreed with the retailer customer.
## REQUIRED

### 2. RECORD-KEEPING AND INDEPENDENT VERIFICATION

#### 2.a. Record Keeping:

| #1 | Growers must keep up to date records available to demonstrate that all activities of production comply with GAP as outlined in this document and to help trace the history of products from farm to final consumer. Appropriate records must be kept for a minimum of five years, unless required for a longer period. Retrospective records are not required prior to application of approval. |

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## ENcouraged

### 3. VARIETIES AND ROOTSTOCKS

#### 3.a. Choice of Variety or Rootstock:

| #1 | Growers should be aware of the importance of effective crop husbandry in relation to 'mother crops' (e.g. in the production of seed potatoes), where beneficial results (such as a reduction in pesticide use) may be experienced in subsequent crops. |

| #2 | Choice of variety or rootstock must meet the specified requirement as agreed between growers and potential customers with respect to quality standards (e.g. taste, visual appearance, shelf-life, agronomic performance, environmental impact, minimum dependence on agrochemicals). |

#### 3.b. Seed Quality:

| #1 | Seed quality and germination rate should be checked before use and a record of the variety name, batch number and seed vendor should be kept in a crop diary. Where available, seed certification should be retained. |

#### 3.c. Pest and Disease Resistance/Tolerance:

| #1 | Varieties should possess resistance/tolerance to commercially important pests and diseases. |

| #2 | Growers must be aware of the variety's degree of susceptibility to pests and diseases. |

#### 3.d. Seed Treatments and Dressings:

Seed treatments can be an effective method of controlling pests and diseases, reducing the amount of active ingredients applied to growing crops, and as a strategy for crop protection where foliar sprays are ineffective.

| #1 | The use of seed treatments must be justified. Where an option exists to control a pest or disease via the use of both a seed treatment and a foliar spray, the seed treatment should be the preferred option. |
### 3.e. Nursery Stock:

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>ENCOURAGED</th>
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<tbody>
<tr>
<td>#1 Purchased nursery stock must be accompanied by officially recognised</td>
<td>#2 Plants should be free of visible signs of pest and</td>
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<tr>
<td>plant health quality certification, such as Plant Passports which exist</td>
<td>disease.</td>
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<tr>
<td>under the EU Plant Health Directive or similar for countries outside the</td>
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<td>European Union, where available.</td>
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<tr>
<td>#3 Quality guarantees or certified production guarantees must be kept in</td>
<td></td>
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<tr>
<td>the crop diary.</td>
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<tr>
<td>#4 Plant health quality control systems must be operational for private</td>
<td></td>
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<tr>
<td>or in-house nursery propagation.</td>
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<tr>
<td>#5 Pesticide treatments applied during the plant rearing stage must be</td>
<td></td>
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<tr>
<td>recorded.</td>
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</tbody>
</table>

#### 3.f. Genetically Modified Organisms (GMO):

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>ENCOURAGED</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Planting of any GMO must comply with all existing regulations in the</td>
<td></td>
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<tr>
<td>country of production and all existing regulations in the country of the</td>
<td></td>
</tr>
<tr>
<td>final consumer.</td>
<td></td>
</tr>
<tr>
<td>#2 The use of GMO cultivars must be agreed with individual customers</td>
<td></td>
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<tr>
<td>prior to planting.</td>
<td></td>
</tr>
<tr>
<td>#3 Suppliers must inform all potential customers of any developments</td>
<td></td>
</tr>
<tr>
<td>relating to the use or production of products derived from genetic</td>
<td></td>
</tr>
<tr>
<td>modification.</td>
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</tbody>
</table>

### 4. SITE HISTORY AND SITE MANAGEMENT

#### 4.a. Site History:

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>ENCOURAGED</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 A recording system must be established for each field, orchard or</td>
<td></td>
</tr>
<tr>
<td>greenhouse to provide a permanent record of the crops and agronomic</td>
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<tr>
<td>activities undertaken at those locations.</td>
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<tr>
<td>#2 A visual identification or reference system for each field, orchard</td>
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<tr>
<td>or greenhouse must be established.</td>
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<tr>
<td>#3 For all new sites, a risk assessment must be undertaken, taking into</td>
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<tr>
<td>account the prior use of the land and all potential impacts of the</td>
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<tr>
<td>production on adjacent crops and other areas.</td>
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<tr>
<td>#4 A management plan must be developed setting out strategies to</td>
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<tr>
<td>minimise all identified risks, such as spray drift or water table</td>
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<tr>
<td>contamination. The results of this analysis must be recorded and used</td>
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<tr>
<td>to justify that the site in question is suitable for agricultural</td>
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<tr>
<td>production.</td>
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**CREDIBLE ‘CLEAN AND GREEN’:**
Investigation of the international framework and critical design features of a credible EMS for Australian agriculture

<table>
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<tr>
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<tr>
<td><strong>4.b. Rotations:</strong></td>
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</tr>
<tr>
<td>#1 To maintain soil condition, reduce reliance on agrochemicals and to maximise plant health, growers must recognise the value of crop rotations and seek to employ these whenever practicable.</td>
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<tr>
<td>#2 Where rotations are not employed, growers must be able to provide adequate justification.</td>
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**5. SOIL AND SUBSTRATE MANAGEMENT**

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<tr>
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<tbody>
<tr>
<td><strong>5.a. Soil Type Mapping:</strong></td>
<td>#1 Soil maps should be prepared for the farm, which can then be used to plan rotations, planting programmes and growing programmes.</td>
</tr>
<tr>
<td><strong>5.b. Cultivation:</strong></td>
<td>#1 Mechanical cultivation should be used where proven to improve or maintain soil structure, and to avoid soil compaction.</td>
</tr>
<tr>
<td><strong>5.c. Soil Erosion:</strong></td>
<td>#1 Field cultivation techniques that minimise soil erosion must be adopted.</td>
</tr>
<tr>
<td><strong>5.d. Soil Fumigation:</strong></td>
<td>#1 Chemical fumigation of soils must be avoided wherever possible. Alternatives such as crop rotation, planting of break crops, use of disease resistant cultivars, thermal or solar sterilisation, conversion to soil-free cultivation, and similar techniques must be explored before resorting to use of chemical fumigants.</td>
</tr>
<tr>
<td><strong>5.e. Substrates:</strong></td>
<td>#1 For substrates that are not inert, records must demonstrate its suitability.</td>
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<tr>
<td></td>
<td>#2 For inert substrates (PUR, rockwool, etc.), growers should participate in substrate recycling programs where available.</td>
</tr>
<tr>
<td></td>
<td>#3 Where chemicals are used to sterilise substrates for reuse, records of location, date, type of chemical used, method of sterilisation and operator must be kept.</td>
</tr>
<tr>
<td></td>
<td>#4 For substrates reuse, steaming should be the preferred option.</td>
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**6. FERTILISER USAGE**

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<tr>
<th>REQUIRED</th>
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<tbody>
<tr>
<td><strong>6.a. Nutrient Requirement:</strong></td>
<td>#1 A cropping or soil care plan should be developed to ensure that nutrient loss is minimised.</td>
</tr>
<tr>
<td></td>
<td>#2 The application of fertilisers should be based on a calculation of the nutrient requirements of the crop and on appropriate routine analysis of nutrient levels in the soil, the crop or the nutrient solution.</td>
</tr>
<tr>
<td></td>
<td>#3 Fertiliser application, using either mineral or organic fertilisers, must meet the needs of the crops as well as maintaining soil fertility.</td>
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</tr>
<tr>
<td><strong>6.b. Advice on Quantity and Type of Fertiliser:</strong></td>
<td></td>
</tr>
<tr>
<td>#1 Growers or their advisers must be able to demonstrate competence and knowledge.</td>
<td>#2 Recommendations for application of fertilisers should be given by competent, qualified advisers holding appropriate and recognised national certification. Where such advisers are unavailable, adequate training in fertiliser usage and application should be undertaken.</td>
</tr>
<tr>
<td><strong>6.c. Records of Application:</strong></td>
<td></td>
</tr>
<tr>
<td>#1 All applications of soil and foliar fertilisers must be recorded in a crop diary or equivalent. Records must include: location, date of application, type and quantity of fertiliser applied, the method of application, and operator.</td>
<td></td>
</tr>
<tr>
<td><strong>6.d. Timing and Frequency of Application:</strong></td>
<td>#1 The quantity of fertiliser applied and timing of fertiliser application should be carefully considered so as to maximise benefits and minimise losses of fertiliser.</td>
</tr>
<tr>
<td>#2 Any application of fertilisers in excess of national or international limits must be avoided.</td>
<td>#3 Quantities of nitrogen to be applied should be calculated from a nitrogen management plan.</td>
</tr>
<tr>
<td><strong>6.e. Nitrate and Phosphate Levels in Ground Water:</strong></td>
<td></td>
</tr>
<tr>
<td>#1 It is the responsibility of growers or grower organisations to ensure that the usage of fertilisers does not result in nitrate or phosphate enrichment of groundwater in excess of national and international limits.</td>
<td>#2 The effect of mineralisation from the use of organic fertiliser and from organic matter in the soil as well as the potential of surface waters to carry surplus nutrients should be taken into account to minimise nitrate loss into groundwater. Growers should be especially aware of areas that are particularly sensitive to nitrate leaching (such as <code>Nitrate sensitive areas</code>).</td>
</tr>
<tr>
<td><strong>6.f. Application Machinery:</strong></td>
<td></td>
</tr>
<tr>
<td>#1 Fertiliser application machinery must be suitable for use on the land in question and be kept in good condition, with annual calibration to ensure accurate delivery of the required quantity of fertiliser.</td>
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<tr>
<td><strong>6.g. Fertiliser Storage:</strong></td>
<td></td>
</tr>
<tr>
<td>#1 Fertilisers must be stored appropriately.</td>
<td>#2 Fertilisers should not be stored in the same room with pesticides. If that is not possible, then the fertilisers and the pesticides must be physically separated and labelled accordingly.</td>
</tr>
<tr>
<td>#3 Fertilisers must be stored covered in a clean, dry location where there is no risk of contamination of water sources.</td>
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</tr>
<tr>
<td>#4 Fertilisers must not be stored with nursery stock or fresh produce.</td>
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<tr>
<td>#5 All hazard and risk areas must be clearly indicated.</td>
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**6.h. Organic Manure:**

Organic manure or compost can help improve soil fertility by increasing organic matter content, improve nutrient and water retention and reduce erosion.

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<thead>
<tr>
<th>REQUIRED</th>
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<tbody>
<tr>
<td>#1 Organic manure should be stored in an appropriate manner to reduce the risk of contamination of the environment.</td>
<td></td>
</tr>
<tr>
<td>#2 The use of raw untreated human sewage sludge is prohibited. Any use of treated human sewage sludge on land destined for agricultural production must be supported by data and/or recognised codes of practice which demonstrate that any carry-over of pathogenic organisms and other components which may have an adverse effect on human health, the quality of the soil, the groundwater or the wildlife are controlled to maintain risks at the lowest possible level.</td>
<td></td>
</tr>
<tr>
<td>#3 To avoid pollution by heavy metals or by nitrate leaching, analysis of levels of nutrients, heavy metals and other potential pollutants in the manure, should be completed before application. Proper account must also be taken of the nutrient contribution of manures.</td>
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<tr>
<td>#4 Manuring in open field cultivation should be based on nutrient management plans.</td>
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</table>

**7. IRRIGATION**

**7.a. Predicting Irrigation Requirement:**

Incorrect usage of water can have a detrimental effect on product quality. To avoid excessive or insufficient water usage, methods of systematically predicting the crop requirement for water should be utilised. Where possible irrigation should be adjusted based on predicted rainfall, plant water use and evaporation. Daily rainfall records for outdoor production may be used to assist in planning irrigation requirements. Growers are recommended to obtain access to regular meteorological forecasts to aid irrigation planning.

<table>
<thead>
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<tr>
<td>#1 Incorrect usage of water can have a detrimental effect on product quality. To avoid excessive or insufficient water usage, methods of systematically predicting the crop requirement for water should be utilised. Where possible irrigation should be adjusted based on predicted rainfall, plant water use and evaporation. Daily rainfall records for outdoor production may be used to assist in planning irrigation requirements. Growers are recommended to obtain access to regular meteorological forecasts to aid irrigation planning.</td>
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**7.b. Irrigation Method:**

The most efficient and commercially practical water delivery system should be used to ensure the best utilisation of water resources. Flood irrigation systems are discouraged due to excessive wastage of water.

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<td></td>
</tr>
<tr>
<td>#2 Consideration should be given to a water management plan to optimise water usage and reduce waste (e.g. systems for re-use, irrigation at night, maintenance of irrigation equipment to reduce leakage, winter storage, collection of rainwater from glasshouses, etc.).</td>
<td></td>
</tr>
<tr>
<td>#3 All growers should maintain records of irrigation water usage.</td>
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</table>
#7.c. Quality of Irrigation Water:

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<tr>
<th>REQUIRED</th>
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</thead>
<tbody>
<tr>
<td>#1 Sewage water must never be used for irrigation.</td>
<td>#2 Based upon risk assessments, irrigation water sources should be analysed at least once a year for microbial, chemical and mineral pollutants by a suitable laboratory. The analysis results should be compared against accepted standards and adverse results acted upon.</td>
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</table>

#7.d. Supply of Irrigation Water:

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<tbody>
<tr>
<td>#1 To protect the environment, water should not be abstracted from unsustainable sources. Advice on abstraction should be sought from water authorities.</td>
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#8. CROP PROTECTION

#8.a. Basic Elements of Crop Protection:

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<tr>
<th>REQUIRED</th>
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<tbody>
<tr>
<td>#1 Protection of crops against pests, diseases and weeds must be achieved with the appropriate minimum pesticide input and with minimum adverse environmental impact (volume/type of active ingredients) and with the appropriate employment of non-chemical methods (biological and cultural/mechanical).</td>
<td>#2 Wherever possible growers must apply recognised IPM techniques on a curative basis. Non chemical pest treatments are preferred over chemical treatments</td>
</tr>
<tr>
<td>#3 Growers are encouraged to understand and adopt IPM systems to control and preserve their productivity and minimise the potential impact of pest control on the environment. Assistance with implementation of such systems should be obtained through training, or advice through advice obtained from grower organisations, research organisations, qualified extension officers, consultants or chemical distributors.</td>
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</tbody>
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Basic elements of crop protection are:

**Prevention**: indirect measures to reduce pest, disease or weed infestation,
- choice of crop/variety appropriate for the location
- use of crop rotations
- use of disease and pest resistant varieties
- mechanical and physical methods of crop husbandry
- good fertiliser and irrigation practices
- good hygiene practices
- creation of habitats or beneficials
- climatic controls (temperature, humidity, light, etc.)

**Observation**: methods to determine when action is required,
- routine crop inspection and pest monitoring
- use of diagnostic and forecasting systems (traps, tests)
- use of decision support systems (e.g. information technologies, literature, radio, television)
- use of consultants where necessary

**Intervention**: direct measures to reduce pests, diseases and weeds to economically acceptable levels:
- cultural and physical controls (e.g. mechanical weeding)
- biological controls (beneficial insects, mites, nematodes, Bt, viruses, preservation of natural enemies)
- chemical controls (insecticides, fungicides, herbicides)
### 8.b. Choice of Chemicals:

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<tr>
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<tbody>
<tr>
<td>#1 The crop protection product utilised must be appropriate for the control required.</td>
<td>#2 Selective products that are specific to the target pest, weed or disease and which have minimal effect on populations of beneficial organisms, aquatic life, workers and consumers and are not detrimental to the ozone layer should be used wherever possible.</td>
</tr>
<tr>
<td>#4 Growers must only use chemicals that are officially registered in the country of use and are registered for use on the crop that is to be protected. A current list of all products that are used and approved for use on crops being grown must be kept. This list must take account of any changes in pesticide legislation. Chemicals that are banned in the European Union must not be used on crops destined for sale in the European Union. In addition, growers must be aware of restrictions on certain chemicals in individual countries.</td>
<td>#3 An anti-resistance strategy should be adopted to avoid reliance on any one chemical.</td>
</tr>
<tr>
<td>#5 Growers should consult their customers to determine if any additional commercial restrictions exist.</td>
<td>#6 The label instructions should be followed to ensure successful application, avoid risks to operators, consumers and the environment. Where appropriate, growers may reduce the application frequency specified in the label instructions.</td>
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### 8.c. Advice on Quantity and Type of Pesticide:

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<tr>
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<tbody>
<tr>
<td>#1 Recommendations for application of pesticides must be given by competent, qualified advisers holding a recognised national certificate or similar.</td>
<td>#2 Where such advisers are unavailable, growers must be able to demonstrate their competence and knowledge (e.g. through adequate training in pesticide usage and pesticide application).</td>
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### 8.d. Records of Application:

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<tbody>
<tr>
<td>#1 All applications of pesticides must be recorded in a crop diary or equivalent. Records must include: crop, location, date of application, reason for application, technical authorisation, trade name, quantity of pesticide used, application machinery used, name of operator and pre-harvest interval.</td>
<td>#2 Each application should be accompanied by clear instructions or symbols detailing the location of application, chemical dosage and required application technique.</td>
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### 8.e. Safety, Training and Instructions:

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<tbody>
<tr>
<td>#1 Workers who handle and apply pesticides must be trained and able to demonstrate appropriate competence and knowledge.</td>
<td>#2 Each application should be accompanied by clear instructions or symbols detailing the location of application, chemical dosage and required application technique.</td>
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### REQUIRED

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<tr>
<th>8.f. Protective Clothing/Equipment:</th>
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<tbody>
<tr>
<td>#1 Workers must be equipped with suitable protective clothing in accordance with label instructions and appropriate to the posed health and safety risks.</td>
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<tr>
<td>#2 Growers must be able to demonstrate that they follow label instructions with regard to protective clothing and equipment.</td>
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<tr>
<td>#3 Protective clothing and equipment must be stored separately from pesticides.</td>
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<tr>
<th>8.g. Pre-harvest Interval:</th>
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<tr>
<td>#1 Pre-Harvest intervals must be observed and under no circumstances should the recommended pre-harvest interval be ignored.</td>
</tr>
<tr>
<td>#2 For crops that are continuously harvested over an extended period of time, there must be a plan for crop protection that does not compromise pre-harvest intervals. Such a plan may involve the use of field markers that clearly distinguish those plants that are ready for harvest from the rest of the crop.</td>
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<tr>
<th>8.h. Spray Equipment:</th>
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<tr>
<td>#1 Spray equipment must be suitable for use on the land in question and be kept in good condition, with annual calibration to ensure accurate delivery of the required quantity of spray.</td>
</tr>
<tr>
<td>#2 Participation in an independent sprayer calibration certification scheme is encouraged.</td>
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<tr>
<td>#3 When mixing chemicals, the correct handling and filling procedures, as stated on label instructions, must be followed. The correct quantity of spray mix for the crop to be treated and the proposed treatment type must be calculated, accurately prepared and recorded.</td>
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<tr>
<th>8.i. Disposal of Surplus Spray Mix:</th>
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<tr>
<td>#1 The quantity of spray mix must be calculated before mixing. This calculation must consider: velocity of application, surface area to be covered, pressure of application system.</td>
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<tr>
<td>#2 If surplus spray mix does occur, or if there are tank washings, these should be sprayed over an untreated part of the crop, as long as the recommended dose is not exceeded, or sprayed onto designated fallow land, where legally allowed, and records kept for future reference.</td>
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<tr>
<th>8.j. Pesticide Residue Analysis:</th>
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<tr>
<td>#1 The frequency of pesticide residue analysis should be based on risk assessment, however, in many cases, pre-harvest sampling and analysis is most effective.</td>
</tr>
<tr>
<td>#2 Residue test results should be traceable to the grower and to the product's production location.</td>
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<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>#3 Growers and/or suppliers must be able to provide evidence of residue testing by laboratories accredited by a competent national authority to good laboratory practice (GLP).</td>
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<tr>
<td>8.k. Pesticide Storage:</td>
</tr>
<tr>
<td>#1 Pesticides must be stored in accordance with local regulations and include the following minimum standards:</td>
</tr>
<tr>
<td>#2 Pesticides must be stored in a sound, secure, frost resistant, fire-resistant, well ventilated (in case of walk-in storage) and well lit location which is located away from other materials.</td>
</tr>
<tr>
<td>#4 The pesticide store must be able to retain spillage (e.g. to prevent contamination of water courses).</td>
</tr>
<tr>
<td>#5 There must be adequate facilities for measuring and mixing pesticides.</td>
</tr>
<tr>
<td>#6 There must be emergency facilities (e.g. eye wash, plenty of clean water, a bucket of sand) to deal with operator contamination and accidental spillage.</td>
</tr>
<tr>
<td>#7 Keys and access to the store must be limited to workers with adequate training in the handling of pesticides.</td>
</tr>
<tr>
<td>#8 An accident procedure, a list of contact telephone numbers and the location of the nearest telephone must be available within the immediate vicinity of in the store and next to the nearest telephone.</td>
</tr>
<tr>
<td>#9 Inventory, stock control and stock rotation documentation must be kept and readily available.</td>
</tr>
<tr>
<td>#10 All pesticides must be stored in their original package.</td>
</tr>
<tr>
<td>#11 Only chemicals approved for use on the crops produced in the crop rotation must be stored on the farm.</td>
</tr>
<tr>
<td>#12 Powders must be stored on shelves above liquids.</td>
</tr>
<tr>
<td>#13 Signs warning of potential dangers must be placed on access doors.</td>
</tr>
<tr>
<td>8.l. Empty Pesticide Containers:</td>
</tr>
<tr>
<td>#1 Empty pesticide containers must not be re-used and disposal of empty pesticide containers must be in a manner that avoids exposure to humans, and contamination of the environment.</td>
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</table>
### REQUIRED

| #3 | Empty containers must be rinsed via the use of an integrated pressure rinsing device on the sprayer, or at least three times with water, and the rinsate returned to the spray tank. |
| #4 | When rinsed, containers must be crushed or pierced to prevent re-use, or adequately labelled according to the rules of a collection system. |
| #5 | Empty containers must be kept secure until disposal is possible. |
| #6 | All local regulations regarding disposal or destruction of containers must be observed. |

### ENCOURAGED

| #1 | Obsolete pesticides must only be disposed of through a certified or approved chemical waste contractor or supplying company, however equipment achieving similarly environmentally sound disposal may be used. |

### 8.m. Obsolete Pesticides:

| #1 | Obsolete pesticides must only be disposed of through a certified or approved chemical waste contractor or supplying company, however equipment achieving similarly environmentally sound disposal may be used. |

### 9. HARVESTING

#### 9.a. Hygiene:

| #1 | A hygiene protocol based on a risk analysis should be used to establish hygiene regulations for personnel to prevent physical, microbiological and chemical contamination of produce. |
| #2 | Workers must have access to clean toilet and washing facilities in the vicinity of their work. |
| #3 | Workers must receive basic instructions in hygiene before handling fresh produce. Workers must also be made aware of the requirement to notify management of any transferable disease which may render them unfit to work in the vicinity of products destined for human consumption. |

#### 9.b. Packaging:

| #1 | Packaging must be stored so as to avoid contamination by pests. Where products are field packed, packaging must be removed from the field overnight where a risk of contamination exists. |
| #2 | Reusable plastic crates must be clean and re-cleaned where necessary to ensure they are free from foreign material which may be detrimental to the product and/or consumers health. |

### 10. POST-HARVEST TREATMENTS

#### 10.a. Post-harvest Chemicals:

| #1 | Post-harvest treatments must be appropriate. |
| #2 | Use of post-harvest treatments should be minimised. |
| #3 | Post-harvest treatments must only be used if no alternative to ensure maintenance of good quality exists. |
**REQUIRED** | **ENCOURAGED**
--- | ---
#4 Post-harvest chemicals must only be used in accordance with product label. |  
#4 Growers must only use chemicals that are officially registered in the country of use, and for use on the crop being protected. Chemicals that are banned in the European Union must not be used on crops destined for sale in the European Union. |  
#5 A current list of all products that are used and approved for use on crops being grown must be kept. This list must take account of any changes in pesticide legislation. In addition, growers must be aware of restrictions on certain chemicals in individual countries. Growers must consult their customers to determine if any additional commercial restrictions exist. |  
#6 Growers must be able to demonstrate their competence and knowledge with regard to the application of post-harvest chemicals. |  
#7 All applications of post-harvest treatments must be recorded in a crop diary or equivalent and include: crop or product, location, date of application, reason for application, trade name, type and quantity of treatment used, application machinery used, and name of operator. |  

**10.b. Post-harvest washing:**

#1 The source of water used for product washing must be potable, and must be filtered if recycled. | #2 Based upon risk assessments, sources of water for post-harvest washing should be analysed by a suitable laboratory for microbial, chemical and mineral pollutants at least once a year. Results of the analysis should be compared to accepted standards and adverse results acted upon. |  

**11. WASTE AND POLLUTION MANAGEMENT, RECYCLING AND RE-USE**

**11.a. Identification of Waste and Pollutants:**

#1 All the possible waste products should be identified in all areas of the farm business (e.g. paper, cardboard, plastic, crop debris, oil, rock wool and other substrates). | #2 All possible sources of pollution should be identified (e.g. chemicals, oil, fuel, noise, light, debris, pack-house effluent, etc.). |  

**11.b. Waste and Pollution Action Plan:**

#1 Having identified waste and pollutants, a plan should be developed and implemented, to avoid or reduce wastage and pollution, and whenever possible, avoid the use of land-fill or burning, by recycling the waste. Organic crop debris can be composted on the farm and, where there is no risk of disease carry-over, reused for soil conditioning. |  |
### 12. Worker Health, Safety and Welfare

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<tr>
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<tr>
<td><strong>12.a. Training</strong></td>
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</tr>
<tr>
<td><strong>#1</strong> Formal training must be given to all appropriate workers handling and using agrochemicals, and all workers operating dangerous or complex equipment.</td>
<td><strong>#1</strong> A risk assessment should be used to develop an action plan to promote safe and healthy working conditions.</td>
</tr>
<tr>
<td><strong>#2</strong> Records of training for each employee should be kept in the interests of operator safety.</td>
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</tr>
<tr>
<td><strong>#3</strong> Workers trained in First Aid should be present in both field and pack-house.</td>
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<tr>
<td><strong>#4</strong> Accident and emergency procedures must exist and instructions must be clearly understood by all workers.</td>
<td><strong>#5</strong> Accident procedures should be visually displayed and in the appropriate language of the workforce.</td>
</tr>
<tr>
<td><strong>12.b. Facilities and Equipment:</strong></td>
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<tr>
<td><strong>#1</strong> First Aid boxes must be present at all permanent sites and in the vicinity of fieldwork.</td>
<td><strong>#2</strong> Hazards should be clearly identified by warning signs where appropriate.</td>
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<tr>
<td><strong>12.c. Pesticide Handling:</strong></td>
<td><strong>#1</strong> Workers undertaking pesticide applications on the farm should receive annual health checks in line with guidelines laid down in local codes of practice.</td>
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<td><strong>12.d. Hygiene:</strong></td>
<td><strong>#2</strong> Workers should receive basic training in hygiene requirements for the handling of fresh produce. The training should outline the need for: hand cleaning, the covering of skin cuts, and the confinement of smoking, eating and drinking to permitted areas, etc.</td>
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<tr>
<td><strong>#3</strong> To avoid establishing a breeding ground for pests and disease, premises should be clear of litter and waste, and have adequate provisions for waste disposal.</td>
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<tr>
<td><strong>12.e. Welfare:</strong></td>
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<tr>
<td><strong>#1</strong> All employment conditions must comply with local and national regulations with regard to wages, workers age, working hours, working conditions, job security, unions, pensions and all other legal and health requirements.</td>
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<tr>
<td><strong>#2</strong> Growers and packers must consult with their customers to ensure compliance with specific company policies regarding worker welfare.</td>
<td></td>
</tr>
<tr>
<td><strong>#3</strong> On site living quarters must be habitable and have the basic services and facilities.</td>
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**CREDIBLE ‘CLEAN AND GREEN’:**  
*Investigation of the international framework and critical design features of a credible EMS for Australian agriculture*

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**13. ENVIRONMENTAL ISSUES**

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<tr>
<th>REQUIRED</th>
<th>ENCOURAGED</th>
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<td><strong>13.a. Impact of Farming on the Environment:</strong></td>
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1. In the light of consumer concern, growers should understand and assess the impact their farming activities have on the environment, and consider how they can enhance the environment for the benefit of the local community and flora and fauna. |

| **13.b. Wildlife and Conservation Policy:** |  

1. A key aim must be the enhancement of environmental biodiversity on the farm through a conservation management plan. This could be a regional activity rather than an individual one.  

2. Each grower should have a management of wildlife and conservation policy plan on their property. This Policy should be compatible with sustainable commercial agricultural production and minimise environmental impact of the agricultural activity. Key elements of this plan should be to:  
   - Conduct a baseline audit to understand existing animal and plant diversity on the farm. Conservation organisations can help conduct surveys to measure biodiversity and identify areas of concern.  
   - Take action to avoid damage and deterioration of habitats.  
   - Create an action plan to enhance habitats and increase biodiversity on the farm |

| **13.c. Unproductive Sites:** |  

1. Consideration should be given to the conversion of unproductive sites (e.g. low lying wet areas, woodlands, headland strip or areas of impoverished soil) to conservation areas for the encouragement of natural flora and fauna. |
Appendix 4

OPPORTUNITIES FOR CSIRO TO SERVICE ISO14000
Report for CSIRO Land and Water sector by Dames and Moore, 1999

Developing Policy Statements
The preparation of an EMS requires that a policy be prepared to guide the procedures used to manage the production process. Policy principles need to be underpinned by sound science that reliably links EMS processes and environmental outcomes. Any gaps identified provide opportunities for future research and development investment. CSIRO’s understanding of biophysical processes and the interaction of management practices and ecosystem function provides a resource which can help industries to:

- prepare environmental guiding principles
- model and represent the interaction between farming systems and ecosystem function
- help producers define points of differentiation involving ecosystem management
- identify key performance indicators
- establish targets for key performance indicators.

Establish Linkages between EMS Processes and Outcomes
ISO14000 establishes and audits environmental management processes. It does not ensure environmental outcomes. However, careful selection of processes for inclusion in an EMS can increase the likelihood of desirable outcomes being achieved if the processes have strong technical linkages with known environmental outcomes. CSIRO can help clients at an industry sector and landscape scale by:

- ensuring that planned objectives are based on scientific experience
- using scientific understanding of ecosystem capacity to establish targets
- preparing detailed specifications of best management practices to underpin processes included in the EMS
- defining externalities and their management.

Prepare Plan Objectives, Targets at Farming System and Landscape Scales
The next step in preparing an EMS is to plan processes for each production pathway. The objectives of these plans need to relate to environmental outcomes, and CSIRO’s understanding of ecosystem function is a resource to industries developing such plans. The establishment of objectively verifiable targets for each plan objective also relies on a sound understanding of ecosystem function, industry impacts, and measurement systems.

Measurement Systems for Farming System and Landscape Scales
ISO14000 relies on effective measurement of processes to demonstrate compliance and continuous improvement. Accredited third party auditors measure compliance. CSIRO has resources and experience to develop measurement systems for use at farming system and landscape scales - to reduce the cost of compliance auditing and efficiently demonstrate linkages between EMS processes and environmental outcomes.

Auditing Implementation of Environmental Management Systems
Industries implementing EMS to ISO14000 require third party auditors in order to maintain accreditation and demonstrate to markets and other stakeholders that their production processes account for the
environment. CSIRO is well positioned to be the accreditation body for these third party auditors. In addition, it can use scientific and mathematical services to develop:

- statistical analysis tools for industry auditing to reduce the cost of compliance auditing
- measurement systems for auditing that reduce the costs at a landscape or industry scale
- remote sensing tools for use in large-scale compliance auditing.

**Supporting Continuous Improvement**

ISO14000 relies on an iterative process of learning from experience to allow continuous improvement
Appendix 5

PRICING AND THE ENVIRONMENT

Environmental resources are typically under-priced in 2 ways:
(1) by subsidies which actually reduce the cost of overexploiting or polluting the environment (policy failure)
(2) by market prices that normally tend to reflect only the private costs of production, ignoring the damages inflicted on others by pollution and the depletion of natural resources (market failure).

Economic theory also states that, in a market driven economy, prices are the arbitration mechanism by which remuneration is defined for each of the different factors involved in the production process (according to their position on the supply and demand curve). Prices determine decisions made by investors, producers and consumers. A distortion in price alters the message sent to all economic players, and this can have a clear environmental impact, particularly when price influences choice of production process and behaviour. There are 3 reasons for this:

(1) commodities form the basis of the production process, so that any change has a knock-on effect for the remainder of the process
(2) primary commodities have a cost structure which is much simpler than that of goods produced by a greater level of manufacturing, which means that incorrect valuation of the natural resource being exploited will have a much more appreciable effect than it would on products with a more complex cost structure
(3) commodities are basically fungible, and can be replaced by another answering to the same definition. The relative scarcity of any one single factor involved in production is obscured and this stands in the way of determining the system’s capacity to sustain a given level or type of production over a period of time (known as sustainable production).

As we move to a global economy, if a policy that affects production process choice were able to alter the international price of an agricultural product, the consequences of this distortion would be felt at the global level.

Strict application of modern economic theory would require that commodity prices also include the costs of environmental protection and sustainable development, meaning that prices should reflect not only the private costs of production but also the environmental externalities caused during their production, distribution, consumption and disposal. This of course would have significant global implications for trade and is therefore likely to be resisted by many producers and governments.

However agricultural policies in some countries subsidise both production and export and so do not even reflect the private cost of production and much of OECD agricultural subsidies are provided through price support policies. This prevents any possibility of implementing environmental policies that would be conducive to incorporating an environmental externality in pricing.

An alternative method is to support NTCs or offset the costs associated with reducing negative externalities via direct payments to farmers which are not production or price based.
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