Draft White Paper on Integrated Pollution and Waste Management for South Africa

A policy on Pollution Prevention, Waste Minimisation, Impact control and Remediation

August 1998

Department of Environmental Affairs and Tourism
Department of Water Affairs and Forestry

Please note that comments on this document should be made in writing by or before 21 September 1998 to the following address:

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The Ministries and Departments of Environmental Affairs and Tourism and of Water Affairs and Forestry acknowledge the contribution that South Africans have made in developing a Draft White Paper on Integrated Pollution and Waste Management for South Africa. The role played by the Project Committee, which steered the process, and the contribution of the drafters of the Discussion Document and this Draft White Paper are also acknowledged.

A complete list of people who contributed to the process appears in Appendix 4 at the end of this Draft White Paper.

Below is a short list of officials, government departments and organisations which have played a key role in developing this Integrated Pollution and Waste Management policy.

Ministry
Minister Z Pallo Jordan
Minister Kader Asmal
Deputy Minister Peter R Mokaba, who chaired the Project Committee

Department of Environmental Affairs and Tourism
Department of Water Affairs and Forestry
Provincial Environmental Departments

Mpumalanga Department of Environmental Affairs and Tourism
Eastern Cape Department of Economic Affairs and Environment
Free State Department of Environmental Affairs and Tourism
KwaZulu Natal KwaZulu Department of Nature Conservation
KwaZulu Natal Department of Traditional and Environmental Affairs
Northern Province Department of Agriculture, Land and Environment
North West Parks Board Environmental Affairs
North West Department of Environmental Affairs
Gauteng Department of Agriculture, Conservation and Environment
Western Cape Department of Environmental and Cultural Affairs
Northern Cape Department of Health, Welfare and Environmental Affairs

for arranging and overseeing the provincial public participation process.

MINMEC: Environment and Nature Conservation

A full list of MINMEC members appears in Appendix 4.

The Danish Cooperation for Environment and Development (DANCED) who financially supported the process of compiling this Draft White Paper.

Mr. Einar Jensen - Environmental Attaché
Mr. Peter Lukey - Programme Officer

PUBLIC PARTICIPATION

The formulation of an integrated pollution and waste management system was commissioned during 1994 by the Department of Environmental Affairs and Tourism and the Department of Water Affairs and Forestry.

A multi-sectoral stakeholder Project Committee was formed in January 1997 to assist Government in driving the process and to ensure that sectoral concerns were addressed.

A Discussion Document was released for public comment in May 1997.

The proceedings of Provincial Workshops and comments from individuals and organisations on this Discussion Document were used as a basis for the compilation of this Draft White Paper on Integrated Pollution and Waste Management for South Africa.

The Draft White Paper will be submitted to Cabinet and Parliament in October 1997 and published in the Government Gazette for public comment.

This Draft White Paper will be submitted to Parliament for debate by the National Portfolio Committee on Environmental Affairs and Tourism and will then be debated by the National Council of Provinces. There will be opportunities for comment and public hearings during this Parliamentary Phase.

This Draft White Paper will be amended to incorporate comments from the aforegoing phases before final approval by Parliament and Cabinet.

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1. INTRODUCTION

This chapter defines the concept of Integrated Pollution and Waste Management that government will use in its envisaged national policy on pollution prevention, waste minimisation, impact control and remediation, describes the scope and purpose of this Integrated Pollution and Waste Management policy and delineates the consultative process used in developing this policy.

The government's national policy on Integrated Pollution and Waste Management sets out the vision, principles, strategic goals and objectives that government will use for integrated pollution and waste management in South Africa.

This Draft White Paper on Integrated Pollution and Waste Management for South Africa serves the following two purposes:

- to inform the public of the government's objectives, and how the government intends to achieve these objectives, and
- to inform government agencies and State organs of these objectives, and what must be done to achieve these objectives.

1.1 Definition of Integrated Pollution and Waste Management

Pollution is the introduction into the environment of any substance property (including radiation, heat, noise and light) that has or results in direct harmful effects to humanity or the environment, or that makes the environment less fit for its intended use.

Environment is defined as the following. The biosphere in which people and other organisms live. It consist of:

- renewable and non-renewable natural resources such as air, water (fresh & marine), land and all forms of life.
- natural ecosystems and habitats, and
- ecosystems, habitats and spatial surroundings modified or constructed by people, including urbanised areas, agricultural and rural landscapes, places of cultural significance and the qualities that contribute to their value.

Integrated pollution and waste management is a holistic and integrated system and process of management aimed at pollution prevention and minimisation at source, managing the impact of pollution and waste on the receiving environment and remediating damaged environments.

This Draft White Paper on Integrated Pollution and Waste Management for South Africa represents a paradigm shift towards:

- pollution prevention,
- waste minimisation,
- cross-media integration,
- institutional horizontal and vertical integration of departments and spheres of government, and
- involvement of all sectors of society in pollution and waste management.

1.2 Scope and Purpose of the Draft White Paper

This Draft White Paper sets out the government's Integrated Pollution and Waste Management policy for South Africa and describes the context in which it has been developed. This Draft White Paper comprises the following sections:

- an **introduction** that describes the concept of integrated pollution and waste management used in this policy, the scope, purpose and vision of this policy and the consultative process used in developing this policy,
- **setting the context** of the Integrated Pollution and Waste Management policy globally and nationally,
- **key issues** relating to pollution and waste management identified through the stakeholders and based on the public participation process,
- the **shift to prevention** that sets out the reasons for changing the emphasis from control to prevention,
- **approaches to development of this policy** describing the environmental media approach,
- **policy principles and criteria** affecting governance, and accepted for developing this policy and subsequent planned actions, including decision making, legislation and regulation,
- the government's **strategic goals and supporting objectives** for addressing the major issues regarding pollution and waste, as well as for measuring the success of policy implementation,
- the government's approach to **governance**, detailing the powers and responsibilities of the different spheres and agencies of government and the regulatory approach to integrated pollution and waste management, and
- **the way forward** which outlines the government's priorities and provides a framework for implementing the Integrated Pollution and Waste Management policy, emphasising the development of a National Waste Management Strategy.

Appendix 1 lists **international conventions, agreements, treaties and protocols** relating to integrated pollution and waste management.

Appendix 2 contains the **principles** from the Draft White Paper on Environmental Management for South Africa.

Appendix 3 contains a **glossary** of key terms used in this policy.

Appendix 4 contains **acknowledgements** of all those who contributed to the development of the government's Integrated Pollution and Waste Management policy.

1.3 Vision for the Policy

The vision of the government is to develop, implement and maintain an integrated pollution and waste management system which contributes to sustainable development and a measurable improvement in the quality of life through harnessing the energy and commitment of all South Africans for the effective prevention, minimisation and control of pollution and waste.

1.4 Purpose of the Policy

The Integrated Pollution and Waste Management policy is a subsidiary policy of the overarching environmental management policy as set out in the Draft White Paper on Environmental Management Policy for South Africa. This Integrated Pollution and Waste Management policy subscribes to the vision, principles, goals and regulatory approach set out in the draft environmental management policy and details the government's specific policy for pollution and waste management.

This Integrated Pollution and Waste Management policy applies to all government institutions and to society at large and to all activities that impact on pollution and waste management. One of the fundamental approaches to this policy is the prevention of pollution, minimisation of waste, control of impacts and remediation. The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from cradle to grave, including the generation, storage, collection, transportation, treatment, and final disposal of waste.

This Draft White Paper on Integrated Pollution and Waste Management for South Africa acts as a statement of intent by the government on how to manage and minimise South Africa's diverse pollution and waste streams, in a manner which is environmentally, socially and politically acceptable as well as economically sustainable.

The government aims to:

- promote the prevention and minimisation of waste generation and hence pollution at source,
- promote the management and minimisation of the impact of unavoidable waste from its generation to its final disposal,
- ensure the integrity and sustained "fitness for use" of all environmental media i.e. air, water and land,
- ensure the remediation of any pollution of the environment by holding the responsible parties accountable, and
- ensure environmental justice by integrating environmental considerations with the social, political and development needs and rights of all sectors, communities and individuals.

1.5 Why is There a Need for an Integrated Pollution and Waste Management Policy?

South Africa is emerging from a period of unsustainable and inequitable development that not only threatened the livelihoods and degraded the quality of life of a large proportion of the population, but which was also responsible for environmental degradation. In order to move towards development that is economically, socially and environmentally sustainable, all sectors of society will have to undergo a number of important transitions.

Some of the important transitions will be:

- A move to equitable sharing of development opportunities and benefits and an equitable provision of services. This priority transition must be aimed at significantly improving the situation of the impoverished majority.
- A move towards efficient use of energy with a priority on the development of renewable and affordable resources.
- A transition towards accelerated industrial development while using cleaner technologies and production methodologies.
- An institutional transition towards new structures at national, provincial and local government levels with a priority to integrating economic, equity and environmental imperatives in planning and decision making within and between different ministries and between provinces.
- A governance transition towards greater public accountability and participation with a priority to initiate and maintain sustainable development partnerships between government and civil society.
- A capacity building transition towards greater national and regional self-reliance with a priority to accelerate development and promote the use of local knowledge, technology and expertise.
- A move from reliance on foreign aid to economic self sufficiency.

To effect the transformation to development that is economically, socially and environmentally sustainable, the government has met the challenge of redefining the way in which pollution and waste will be managed in South Africa.

The much needed economic growth for the upliftment and enhancement of the South African population, and in particular for the generation of jobs, can be achieved through more appropriate and efficient use of natural resources, within a framework of integrated pollution and waste management to protect both the people of South Africa and the environment without a continuous degradation of natural resources.

Over the past years, the government has passed legislation to address environmental and human health threats. Regulations aimed at controlling some of the major and most obvious risks have been promulgated.

However, a number of limitations have become clear:

- limits of impact management,
- limited civil society involvement,
- inadequate integration of environmental media,
- inadequate integration across government departments,
- lack of capacity to implement, and
- inadequate consideration of global environmental issues.

1.6 The Integrated Pollution and Waste Management Policy Development Process

After earlier investigations and initiatives by the Department of Environmental Affairs and Tourism and the Department of Water Affairs and Forestry, the consultative process followed in the drafting of this Draft White Paper on Integrated Pollution and Waste Management for South Africa, involved:

- The constitution of a multi-sectoral Project Committee under the chairmanship of the Deputy Minister of Environmental Affairs and Tourism, Peter Mokaba, which guided the consultative process.
- The compilation of a Discussion Document towards a White Paper on Integrated Pollution and Waste Management.
- Discussion of and comment on this Discussion Document through a process of public participation in the provinces, as well as through direct comments from labour, non-governmental organisations, community based organisations, business and industry, mining and individual members of civil society.
- Consideration of these comments for the compilation of draft policy statements and objectives.
- Compilation of this Draft White Paper on Integrated Pollution and Waste Management for South Africa.

2. SETTING THE CONTEXT

2.1. The International Context

2.1.1. *Global concern about pollution*

The report of the World Commission on Environment and Development showed that measures to reduce, control and prevent pollution needed to be greatly strengthened in both developed and developing countries. In the decade subsequent to that report, significant international efforts have been directed at promoting development that produces less waste and pollution.

Many of these efforts have concentrated on those pollutants of global concern, *i.e.* those pollutants generated in one country that may affect another country or the planet's ecological balance. Other international efforts have focused on the protection of less developed countries against environmental exploitation. In 1992, the United Nations Conference on Environment and Development established an agenda (*Agenda 21*) for world action on the environment and increased international efforts towards sustainable development. These international decisions form the broad context for pollution prevention and waste minimisation in South Africa, and this Integrated Pollution and Waste Management policy is part of the South African government's efforts to meet the goals of *Agenda 21*.

Certain international agreements, such as the Framework Convention on Climate Change dealing with greenhouse gases, and the Basel Convention, which addresses trans-boundary movements of hazardous waste, impose specific requirements on South Africa. These requirements are being addressed as part of this Integrated Pollution and Waste Management policy process.

2.1.2. *South Africa as part of the world economy*

South Africa's re-integration into the global economy and the international political arena necessitates an improved pollution and waste management system. With the advent of democracy, South Africa's role and responsibility in the Southern African Development Community and the Southern African Region, has increased. The country's economic and industrial policy has also turned towards export promotion as a pillar of South Africa's economic development. This globalisation of the economy has been spurred on by the expanded role of the World Trade Organisation in developing open international markets. South Africa has growing obligations to meet international commitments and to be a globally responsible country.

In response to these political and socio-economic factors, the government will promote an integrated approach to pollution and waste management as a key factor in achieving sustainable development by ensuring that:

- South Africa meets all its international environmental obligations as rapidly as possible;
- exporters are assisted in meeting internationally expected standards of environmental management;
- international pollution control efforts are not used as unfair trade barriers against South Africa's exports; and
- South Africa's pollution and waste management interests are adequately represented in international forums.

2.1.3 *International obligations and agreements*

Global governance is a dynamic, complex process of interactive decision-making that is evolving and responding to changing circumstances. Although it responds to the specific requirements of different issue areas, governance takes an integrated approach to the question of human survival and prosperity. Effective global decision-making, mainly through international obligations and agreements, builds upon

and influences decisions taken locally, regionally and nationally, and draws on the skills and resources of a diversity of people and institutions at many levels. It builds partnerships that enable global actors to pool information, knowledge, and capacities and develops joint policies and practices on issues of concern, such as integrated pollution and waste management. South Africa, therefore, has a moral obligation as a global actor to take cognisance of and become involved in international obligations, agreements and processes.

Some of the international treaties to which South Africa is a party impact specifically on pollution of the water, air and land environments; others are of a cross-cutting nature and impact on all three media. The obligations imposed under these international treaties and their implications for integrated pollution and waste management are given in Appendix 1.

There are 26 international agreements (17 conventions, 4 protocols, 3 treaties, 2 agreements) which pertain to integrated pollution and waste management. Of these 26 agreements, 19 have been acceded to or ratified by South Africa.

The following South African legislation fully or partially covers 12 of these international agreements:

- Prevention and Combating of Pollution of the Sea by Oil Act (6 of 1981) and regulations;
- International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties Act (64 of 1987);
- Dumping at Sea Control Act (73 of 1980);
- Prevention of Pollution from Ships Act (2 of 1986) and regulations;
- Conservation of Agricultural Resources Act (43 of 1983)
- Nature Conservation Ordinances of the various provinces;
- Antarctic Treaty Act (60 of 1996); and
- Nuclear Energy Act (113 of 1994).

2.2 The National Context

2.2.1 *The Constitution*

The adoption of a democratic Constitution has made the government accountable to the people. The Constitution sets out the legislative and executive authority of different spheres of government within a framework of co-operative governance.

The Constitution (Act 108 of 1996) is relevant to pollution and waste management for two reasons. Firstly the Bill of Rights (Chapter Two of the Constitution) contains a number of rights relevant to integrated pollution and waste management. To the extent that an act or particular statutory provision does not uphold these rights, it is unconstitutional.

Secondly, the Constitution provides the legal basis for allocating powers to different spheres of government, and is thus relevant to the institutional regulation of integrated pollution and waste management.

Sovereignty

The Constitution states that South Africa is a sovereign, democratic State based on the values of human dignity, equality, non-discrimination, the rule of law and universal suffrage. In terms of environmental management, it is important to recognise that sovereignty includes the ability to limit sovereign powers by entering into international agreements where the need arises.

The Bill of Rights

The most pertinent fundamental right in the context of integrated pollution and waste management is the Environmental Right (s 24) which provides that:

"Everyone has the right

a. *to an environment that is not harmful to their health or well-being; and*
b. *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that -*

(i) prevente conservation; and
(iii) secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and sociat pollution and ecological degradation;
(ii) promol development".

This section of the Bill of Rights guarantees the people of South Africa the right to an environment not detrimental to human health or well-being, and specifically imposes a duty on the State to promulgate legislation and take other steps to ensure that the right is upheld and that, among other things, pollution and ecological degradation is prevented.

Health Care, Food, Water and Social Security (s 27)

This provision in the Constitution upholds the right to water, amongst other things. It essentially envisages an equitable allocation of resources and, by implication, resources of an acceptable quality.

Access to Information (s 32)

The Bill of Rights enshrines the right of access to information held by the State, or any other person which is required for the exercise of any right. The section imposes a duty on the State to enact legislation to give effect to the right. This Integrated Pollution and Waste Management policy includes provisions concerning access to information insofar as it relates to future integrated pollution and waste management legislation.

Just Administrative Action (s 33)

The Constitution protects the right to fair, lawful, reasonable and procedurally fair administrative action and provides that where administrative action has adversely affected rights, written reasons must be given. This right is important, for example, where permits authorised in terms of integrated pollution and waste management legislation are refused. However, in terms of Section 23 of Schedule 6 of the Constitution, this clause has not yet come into operation.

2.2.2 *Draft White Paper on Environmental Management Policy for South Africa*

The Draft White Paper on Environmental Management Policy for South Africa is an overarching framework policy. Through the Draft White Paper on Environmental Management Policy the government undertakes to give effect to the many rights in the Constitution that relate to the environment, as well as those relating to governance, such as the legal standing of parties, administrative justice, accountability and public participation. Furthermore, the Draft White Paper on Environmental Management Policy for South Africa defines the essential nature of sustainable development as a combination of social, economic and environmental factors. It takes ownership of sustainable development as the accepted approach to resource management and utilisation, thus entrenching environmental sustainability in policy and practice.

The vision of the Draft White Paper on Environmental Management Policy for South Africa is one of a society in harmony with its environment. The policy seeks to unite the people of South Africa in working towards a society where all people have sufficient food, clean air and water, decent homes and green spaces in their neighbourhoods, enabling them to live in spiritual, cultural and physical harmony with their natural surroundings.

The Draft White Paper on Environmental Management Policy for South Africa sets a number of objectives for integrated pollution and waste management which will be addressed in this Draft White Paper on Integrated Pollution and Waste Management for South Africa. These objectives are:

- "To prevent, reduce and manage pollution of any part of the environment due to all forms of human activity, and in particular from radioactive, toxic and other hazardous substances.
- To set targets to minimise waste generation and pollution at source and promote a hierarchy of waste management practices, namely reduction of waste at source, re-use, recycling and safe disposal as the last resort.
- To regulate and monitor waste production, enforce waste control measures, and coordinate administration of integrated pollution and waste management through a single government department.
- To set up information systems on chemical hazards and toxic releases and ensure the introduction of a system to track the transport of hazardous materials.
- To ensure the protection and proactive management of human health problems related to the environment in all forms of economic activity.
- To promote cleaner production and establish mechanisms to ensure continuous improvements in best practice in all areas of environmental management."

This Integrated Pollution and Waste Management policy is driven by a vision of environmentally sustainable economic development. This vision promotes a clean, healthy environment, and a strong, stable economy. By preventing, minimising, controlling and remediating pollution and waste, the environment is protected from degradation. By increasing the use of cleaner production technologies, avoiding accidental and operational releases and reducing the non-productive costs of treatment, disposal and clean-up, a more efficient and competitive economy and a healthier environment will be established.

The South African government is committed to a programme of sustainable development that will deliver basic environmental, social and economic services to all, without threatening the viability of natural, built and social systems upon which these services depend.

2.2.3 *Reconstruction and Development Programme*

The Reconstruction and Development Programme articulates the need to follow a path towards sustainable development. It affirms the need to manage economic development and human growth in such a way that the earth's life support systems are not damaged or destroyed.

In addressing environmental issues, the Reconstruction and Development Programme recognises the need for government to work towards:

- equitable access to natural resources,
- provision of safe and healthy living and working environments, and
- a participatory decision-making process around environmental issues which empowers communities to manage their natural environment.

The approach to environmental protection has been broadened to reflect the value that must be placed on the country’s natural resources and a wide range of instruments is being developed to assist in

achieving the objectives of sustainable development. The government in its move to sustainable development, is investigating the use of measures additional to legal and regulatory mechanisms.

2.2.4 *Growth, Employment and Redistribution Macroeconomic Strategy*

The key principles of the Reconstruction and Development Programme are re-emphasised in the Growth, Employment and Redistribution Macroeconomic Strategy, which guides economic actions in South Africa.

The long term view of the Growth, Employment and Redistribution Macroeconomic Strategy is:

- a competitive fast-growing economy which creates sufficient jobs for all work-seekers,
- a redistribution of income and opportunities in favour of the poor,
- a society in which sound health, education and other services are available to all, and
- an environment in which homes are secure and places of work are productive.

The macro-economic strategy for rebuilding and restructuring the economy is in line with the goals set in the Reconstruction and Development Programme. In the context of this integrated economic strategy, South Africa can successfully meet the related challenges of satisfying basic needs, developing human resources, increasing participation in the democratic institutions of civil society and implementing the Reconstruction and Development Programme in all its facets.

The Growth, Employment and Redistribution Strategy aims to boost economic growth by lowering protective barriers in a number of industrial sectors, promoting small and medium size industry and greater integration with the countries in the Southern African Development Community, as well as by creating an internationally competitive manufacturing industry. The strategy also emphasises that the South African economy cannot grow merely through exploitation of crude natural resources.

The Growth, Employment and Redistribution Strategy also states that the provision of basic household services is a relatively low-cost and effective form of public intervention in favour of the poor and consistent with the reduction of income inequalities. The universal provision of basic household waste removal services, as outlined in this Integrated Pollution and Waste Management policy, is therefore in accordance with the Growth, Employment and Redistribution Strategy and provides an area of synergy between macro-economic policy, waste management, health protection, and the redistribution of resources.

2.2.5 *Legislation*

The Deputy Minister of Environmental Affairs and Tourism has initiated a legal review of all legislation pertaining to environmental management. This review will include recommendations regarding the legislative reforms required to give effect to this Draft White Paper on Integrated Pollution and Waste Management for South Africa.

3. KEY ISSUES

The participative process conducted in the development of this Integrated Pollution and Waste Management policy identified a number of issues relevant to the three receiving media, i.e. water, air and land, as well as waste as a major source of pollution. This Integrated Pollution and Waste Management policy was developed to address these issues.

3.1 Water Pollution

The key water pollution issues are set out below.

Salinisation of fresh waters

The salinity (the salt in the water) of the fresh waters of South Africa varies substantially depending on background geology and atmospheric deposition. Man-made salinity impacts include: discharge of municipal and industrial effluents; urban storm water runoff; surface mobilisation of pollutants from mining and industrial operations; seepage from waste disposal sites, mining and industrial operations; and irrigation return water. Increasing salinity is a problem in several catchments. The impacts of salinisation include reduction in crop yields; increased scale formation and corrosion in domestic and industrial water conveyance systems; and increased requirement for pre-treatment of selected industrial water uses (such as boiler feed water).

Enrichment of fresh water bodies by plant nutrients

The accumulation of nutrients (e.g. phosphate and nitrates) in water bodies, in excess of the natural requirements, results in nutrient enrichment (eutrophication). Nutrient enrichment impacts on the water environment as follows: the composition and functioning of the natural aquatic biota, as well as the attractiveness for recreation and sporting activities; the presence of toxic metabolites; the presence of taste- and odour-causing compounds; and difficulty in treating polluted water for potable and industrial purposes. Sources of the nutrients that cause eutrophication include indiscriminate use of agricultural fertilizers and the discharge of sewage effluent into water bodies.

Microbiological quality of water

Human settlements are the major source of deteriorating microbiological water quality. Disease-causing micro-organisms and parasites enter the water environment as partially treated sewage effluents, seepage and wash-off from inadequate sanitation, and leachate from waste disposal systems. In rural areas and poorly serviced urban areas, water resources are inadequately protected from sources of pollution including, but not limited to, dumping of wastes into water bodies; animals defecating in the catchment of rivers; and poor sanitation practices. Water sources particularly badly impacted are rivers downstream of large cities.

Sediment and silt migration

Many South African rivers carry a naturally high suspended solids load, reflected by high turbidity. Apart from the natural sources, there are many man-made sources of sediment and silt. These include: construction activities; poor agriculture and silviculture practices (such as non-contour ploughing); over-grazing; destruction of the riparian vegetation; and the physical disturbance of land by mining, industry and urban development. A high load of suspended solids impacts on the light penetration of water, changes natural productivity and affects the natural balance of predators and prey in biotic communities.

Harmful inorganic and organic compounds

South Africa is highly industrialised and hence at times carries the burden of industrial pollution. Examples are: elevated concentrations in water of trace metals, such as aluminium, iron manganese, lead, copper, cadmium as well as radio nuclides. In addition to these inorganic pollutants, there are also a large number of synthetic organic pollutants. These compounds can be classified as carcinogenic, teratogenic and mutagenic. Concern is not only for the potable use of water (these compounds typically are not amenable to removal by conventional water treatment technology), but also for the aquatic biota and the organisms indirectly dependent on aquatic life, such as water fowl. Toxic organic compounds enter the water environment through agricultural, horticultural and silvicultural application of biocides, and from atmospheric depositions.

Diffuse water pollution

Sources of serious diffuse water pollution include: pit latrines; industrial seepage; agro-chemicals in soil fertilizers and insecticides; run-off from farm lands; and contamination from animal wastes, informal settlements, and leaking sewage pipes.

Marine pollution

Off-shore exploitation of marine resources, particularly oil and gas exploration and exploitation of diamonds both in the coastal and deep sea regions, results in marine pollution. Off-shore, air-lifting operations result in underwater sediment plumes which have a detrimental affect on marine organisms. In the near shore area there is increasing concern over the extensive relocation of sand dunes. Oil tankers continue to navigate around South Africa's coastline with oil spills which cause devastating environmental damage. Oil transfers (bunker oil) in harbours periodically result in spills. Diffuse source pollution through the seepage of sewage into coastal waters, partly as a result of increasing urbanisation in many coastal cities, is a source of concern, as is point source pollution, exemplified by sewage and industrial effluent discharge pipelines off the South African coast.

3.2 Air Pollution

Air pollution sources include: pollution from mines, agriculture, domestic waste, industries, internally confined areas, non-electrified areas, vehicle emissions, crop spraying, smokers, low grade coal, domestic cooking, the burning of garden refuse, burning sugar cane, veld fires and veld burning, dust from roads and uncontrolled industrial emissions.

South Africans generally suffer from air pollution caused by the following compounds: particulates, sulphur oxides, nitrogen oxides, volatile hydrocarbons, carbon monoxide and dioxide, as well as obnoxious odours.

Asbestos air pollution has been recorded in a number of provinces. This form of pollution results from existing as well as decommissioned installations. The presence of asbestos in the environment to which the public is exposed, can result in incurable ailments such as asbestosis and mesothelioma.

Industrial and domestic fuel combustion

The highest levels of air pollution at ground level are found in black townships. The use of coal stoves for cooking and heating in these areas causes air pollution well above safety levels. Attempts to solve this problem have failed for a number of reasons, viz. the origin, location and structure of the townships; inadequate planning for energy and transport requirements; socio-economic factors; coal as primary energy source; and a lack of education regarding the dangers and mitigation of air pollution, as well as the use of alternative mechanisms and technologies. Larger local authorities have made significant progress in reducing air pollution in the city centres and the more affluent residential areas. Unfortunately, the increasing number of sources of pollution and rapid urbanisation is making further progress difficult.

New difficulties like informal settlements and trader fires are developing, while encroachment by industry on residential areas remains a problem.

Dust problems

Sources of dust include construction, agricultural and industrial activities. Dust from untarred roads in a large number of rural villages is a significant air pollution problem.

Vehicle emissions

Vehicle emissions from transport trucks using diesel fuel and domestic vehicles contribute significantly to air pollution. Increasing dependence on private vehicle ownership and use has exacerbated the problem.

Air pollution control

The following are the significant deficiencies perceived in current air pollution control:

- air pollution is not considered adequately in planning the placement of industries and residential areas,
- control equipment is poorly maintained, and often non-operational,
- emissions control, based on source control without reference to the receiving environment, and
- lack of prosecution of offenders.

In addition, there is a lack of transparency in all aspects of air pollution control, ranging from the extent of emissions, through the width of implications of best practicable means, to the control strategies, planning input and monitoring of implementation. Air pollution control must also take account of the growing international concern with the issue of climate change.

Noise pollution

Noise pollution is viewed as an escalating problem and there is little practical means of remedying the situation in terms of current regulatory structures. Examples of noise pollution sources include traffic, construction, mining and industrial activities.

3.3 Land Pollution

Waste disposal sites, especially those containing hazardous, medical, and veterinarian waste, may result in land pollution problems. Other problem areas include the siting of waste disposal sites, leachate, a lack of proper management of waste disposal sites, waste disposal sites located too close to residential areas, illegal waste disposal sites, a lack of suitable hazardous waste disposal sites and poor town planning. Cemeteries in unplanned settlements also create problems, such as water seepage from graves. Furthermore, land is contaminated by industrial pollution, pesticides, ash disposal, mining and sludge disposal. Other issues include spillages, incompatible land uses exposing sensitive environments to hazards and the pressure of overpopulation on land resources.

Major sources of land pollution include:

- environmentally detrimental agricultural practices,
- the wood processing industry,
- waste treatment and disposal,
- repair shops and scrap yards,
- service stations, and

- the metal industry.

Mining related activities also cause soil pollution and contribute to contamination of land: the seepage of acid water from gold mine dumps, which result in increases in sulphates and a lowering of the soil pH; leachate of acid water from oxidising shales of coal mine tailings; mining effluent as a significant source of land salinisation; uranium dumps in a number of provinces; and radioactivity in mine dumps.

3.4 Pollution and Waste

Key issues relating to pollution and waste are detailed below.

Lack of priority hitherto afforded to waste management

In the past, waste management was not afforded the priority it warrants as an essential function required to prevent pollution and protect the environment and public health. Consequently, insufficient funds and human resources were allocated to this function. In many instances this neglect has resulted in a lack of long term planning, a lack of information, a lack of appropriate legislation and a lack of capacity to manage the waste stream. An example of the lack of long term waste planning is the failure to make provision for waste processing and disposal sites in physical land use and development decision-making. The lack of information is manifested in insufficient data on waste generators, waste generation and waste disposal sites which makes waste management difficult.

Fragmented legislation and ineffective enforcement

Waste management legislation is currently fragmented, unfocussed and ineffective. There is a resultant lack of control in all aspects of waste management: for example, there are no national minimum standards for the provision of waste collection services. In addition, on account of a lack of capacity on the part of the government, the enforcement of existing legislation is frequently unfocussed, especially with regard to waste disposal. Another area of concern is the importation and exportation of hazardous and radioactive waste. Whether overseas or Southern African Development Community countries are involved, the necessary policy and legislation on integrated waste management are currently lacking and urgently required.

Unacceptable safety, health and environmental standards for pollution and waste management

Environmentally and socially unacceptable standards currently characterise many aspects of waste management, particularly in rural areas, where services are often non-existent. In many urban communities which have always had poor quality services, these services have collapsed as a result of non-payment and poor budgeting and financial planning.

Examples of environmentally and socially unacceptable standards include:

- Substandard, ineffective or non-existent waste collection and street cleaning systems.
- Illegal dumping and littering.
- Waste disposal sites which are poorly sited, designed and operated, and thus impact negatively on both the environment and quality of life. Furthermore, there is often little or no control over their use, and general waste disposal sites are frequently used for the illegal disposal of hazardous waste.
- Pickers at landfill sites are a controversial issue. While picking does provide a meagre sustenance, pickers disrupt operations and are exposed to hazardous wastes, including chemicals, medical and veterinary waste and dead animals, all of which could affect their health.

The absence of integrated waste management options

The focus to date has been on waste disposal and impact control. Concerns expressed in this regard include:

- The lack of waste avoidance, minimisation and cleaner production technology initiatives. Of concern is the current lack of regulatory initiatives to manage waste minimisation, with the potential for reducing the hazardous waste problem. Furthermore, there are no incentives for waste reduction and industries are not required to submit plans for waste disposal when they apply for permission to establish new enterprises.
- Inadequate resource recovery and a general lack of commitment towards recycling. There is no legislation, policy or waste management culture which promotes resource recovery or makes it financially viable. Consequently, resource recovery initiatives have not become popular in South Africa to any significant degree.
- The lack of a variety of appropriate waste treatment methods.

Integrated waste management is recognised internationally as addressing these criticisms by focusing on four internationally recognised steps, i.e. waste avoidance (prevention and minimisation), resource recovery (recycling and re-use), waste treatment, and waste disposal.

Insufficient involvement of and empowerment of people

A major concern is the health and safety of workers, especially the vulnerability of contract workers/temporary workers, exposed to general pollution, hazardous substances and waste in the workplace.

Education and communication channels between sectors, especially government and civil society, are considered to be inefficient and inadequate. Ignorance of the importance of integrated pollution and waste management has resulted in communities being apathetic about combating the effects of pollution and waste, as they are not aware of the connection between poor pollution and waste management and disease. A lack of a right to know, secrecy and misinformation have also been major contributory factors to these issues not being taken up vigorously.

Identifying and consulting with interested and affected parties and stakeholders, and involving them in pollution and waste management related decision-making is difficult. Issues to be addressed should include stakeholder representation and the allocation of the responsibility for finding solutions to pollution problems, since there are no appropriate guidelines for public participation by authorities and communities.

There is also a general lack of capacity building and empowerment with regard to integrated pollution and waste management, i.e. from generation, through collection and transportation to final disposal. There is thus a need for capacity building at all levels and in all sectors.

4. APPROACHES TO INTEGRATED POLLUTION AND WASTE MANAGEMENT

4.1 Shift to Prevention

The government believes that pollution prevention is one of the most effective means of protecting South Africa's people and environment. Pollution prevention eliminates costly and unnecessary waste and promotes sustainable development. It focuses on avoiding the creation of pollutants rather than trying to manage pollution after it has been created.

This Integrated Pollution and Waste Management policy stresses the need to make pollution prevention a part of everyday activities and decisions, whether as government agencies, business or industry, labour, communities, or individuals. This policy shows how the focus of environmental protection can be shifted from reacting to pollution towards the prevention of pollution at source.

4.1.1 *Achieving prevention and minimisation*

Historically, pollution control focused primarily on pollution impact management and remediation. In order to achieve sustainable development, this focus should shift to a management approach combining pollution and waste prevention and minimisation at source, impact management, and, as a last resort, remediation.

Pollution prevention aims at reducing risks to human health and the environment by seeking to eliminate the causes of pollution, rather than by treating the symptoms of pollution. This objective reflects a major shift in emphasis from '*control*' to '*prevention*'.

It is clear that effective pollution prevention is not only focused on the installation of pollution abatement equipment in industry, but reflects an understanding of the shared responsibility of all sectors of society in protecting South Africa's natural resources. In order to promote pollution prevention initiatives throughout the country, an Integrated Pollution and Waste Management policy is required.

While the implementation of pollution prevention will differ amongst sectors, the general techniques will include the following: policy and regulation; technical assistance and compliance monitoring; prioritising substances of concern; efficient use and conservation of natural resources; reuse and recycling; operating efficiencies; economic incentives and disincentives; integration of environmental concerns into land-use planning and urban development; training; household waste minimisation and recycling; product design; process changes; cleaner production; creating efficient information systems; life cycle analysis; partnerships; and awareness raising, capacity building and development of strategies and tools to enable people to follow sustainable lifestyles.

Pollution prevention is about expanding the range of options for environmental decision making. It is about innovation in product design and production. It encourages cost savings through efficiencies and conservation. It insists on sound management of persistent, bio-accumulative and toxic substances and on eliminating their use where necessary. It offers South Africans an opportunity to achieve their environmental goals in ways that are more effective than the traditional means of environmental protection and that stimulate innovation and the ability to compete.

Changes in behaviour are paramount to the pollution prevention approach to environmental protection. There are a number of ways to help organisations and individuals realise the benefits of pollution prevention and incorporate pollution prevention strategies into the way they go about their business and their lives. Government guidance and regulation is needed to improve pollution prevention measures by means of enabling legislation that sets the framework for responsive pollution prevention programs.

4.1.2 *Benefits of the shift to prevention*

The shift to prevention will:

- minimise and/or avoid the creation of pollutants and waste,
- minimise and/or avoid the transfer of pollutants from one medium to another,
- accelerate the reduction and/or the elimination of pollutants,
- minimise health risks,
- promote the development of pollution prevention technologies,
- use energy, materials and resources more efficiently,
- minimise the need for costly enforcement,
- limit future liability with greater certainty,
- avoid costly clean-up practices,
- promote a more competitive economy,
- reduce human impact on the environment,
- enhance the quality of life, and
- ensure intergenerational equity.

4.1.3 *Implications of the shift*

The course of action that this Draft White Paper proposes will have a significant influence on how South Africa's pollution and waste management goals and objectives are pursued in the future. The government will establish an integrated pollution and waste management system which will offer greater protection to people and the environment.

The integrated pollution and waste management system will:

- assist the government in attaining its sustainable development goals,
- ensure that quality, quantity and accessibility of information is improved,
- allow for greater public access to information,
- facilitate strong partnerships between the government sector, private sector, labour, non-governmental organisations and communities,
- facilitate compliance with environmental laws and reduce the amount of bureaucratic delays, and
- build capacity and awareness.

4.2 Approach to the Development of the Policy

The approach to identify pollution and waste issues and address them in a practical manner includes the following:

- adopting a media based approach focusing on the primary receiving media, i.e. water, air and land,
- recognition of waste as a primary source of pollution,
- an integrated and phased approach dealing firstly with source control, secondly with impact management and lastly with remediation (see Figure 1),
- training, education and capacity building of all sectors,
- public participation, and
- ensuring a holistic approach by integrated pollution prevention and waste minimisation.

Specific aspects of pollution prevention and waste minimisation which will be considered for each of the media are set out below.

4.2.1 *Water pollution*

The policy on water pollution management covers inland waters, both surface and ground water, as well as estuarine and marine waters.

Issues which will be considered in relation to policy implementation are:

- river catchments as basic management units,
- land uses affecting catchment water quality,
- water quality requirements as specified by the catchment water users,
- management of stormwater from industrial and urban areas,
- point sources of pollution, e.g. sewage treatment works and industrial wastewater treatment works, and
- diffuse source pollution, e.g.:
    - polluted base flow originating from industrial areas (including marine outfalls),
    - leachate from waste disposal sites, and
    - leakage from sewage reticulation systems and sewage works.

With regard to integration, the following issues will be considered:

- the regulation of water pollution by the Department of Water Affairs and Forestry,
- the agricultural and domestic use of herbicides, pesticides and poisons, and their contribution to the contamination of storm water run-off,
- soil erosion resulting in siltation of reservoirs and high silt loads in rivers,
- atmospheric deposition on land and the indirect impact on surface and ground water, and
- windblown dust and solids from tailings deposits and its impact on water quality.

4.2.2 *Air pollution*

The policy on air pollution management considers pollution on a local, regional, national and global scale. Atmospheric pollution, malodour generation and control, as well as indoor air pollution will be covered.

Issues which will be considered in relation to policy implementation are:

- smoke (particulates) arising from coal and fuel burning (including particulates from power generation),
- vehicle emissions,
- emissions from industrial activities,
- dust arising from mining and industrial activities,
- various sources of greenhouse gases,
- waste disposal sites,
- incinerator emissions,
- acid rain, and
- noise.

With regard to integration, the following issues will be considered:

- the regulation of air pollution by the Department of Environmental Affairs and Tourism, the provinces and local authorities,
- the pollution of water used for scrubbing air, and
- air pollution arising from the disposal of solid waste.

4.2.3 *Land pollution*

The policy on land pollution considers the following: urban, industrial, mining, rural and agricultural land. The loss of arable land through compaction and alien invasion will not be discussed in this document. Soil erosion will also not be covered *per se*, except under the water medium, where it is regarded as a pollutant (see section 4.2.1).

Issues and land pollution sources which will be considered in relation to policy implementation are:

- injudicious/over-use of fertilisers,
- inappropriate utilisation of agricultural chemicals,
- unsustainable farming practises,
- irrigation with sewage sludge,
- over irrigation, and
- the impact of agricultural chemicals such as pesticides, herbicides, and fertilizers on surface water and groundwater quality.

With regard to integration, the following issues will be considered:

- the regulation of land pollution by the Department of Agriculture, the Department of Water Affairs and Forestry, the Department of Minerals and Energy and other pollution control authorities,
- the impact of land pollution on water quality,
- the impact of organic agricultural wastes on ground and surface water quality,
- the impact of soil erosion and agricultural management practices on water quality,
- land pollution from liquid effluent disposal via irrigation,
- the impact of industrial activity on ground and surface water quality,
- the impact of sewage treatment works,
- the impact of residential development,
- land application of sewage sludge, and
- the impact of waste and hazardous waste disposal sites.

4.2.4 *Waste*

The policy on waste management considers domestic, commercial, agricultural, mining, industrial, metallurgical, power generation, nuclear, medical, and hazardous waste, as well as litter. Since waste is considered as a source of pollution, so that this policy will address the management of the entire waste handling process, that is from generation to final disposal

Issues which will be considered in relation to this Integrated Pollution and Waste Management policy implementation are:

- waste avoidance, minimisation and prevention,
- recycling and reuse,
- treatment and handling, and
- storage and final disposal.

With regard to integration, the following issue will be considered:

- regulation of waste by the Department of Environmental Affairs and Tourism.

4.2.5 *Integration*

The government will adopt the functional approach to integrated pollution and waste management (see Figure 1).

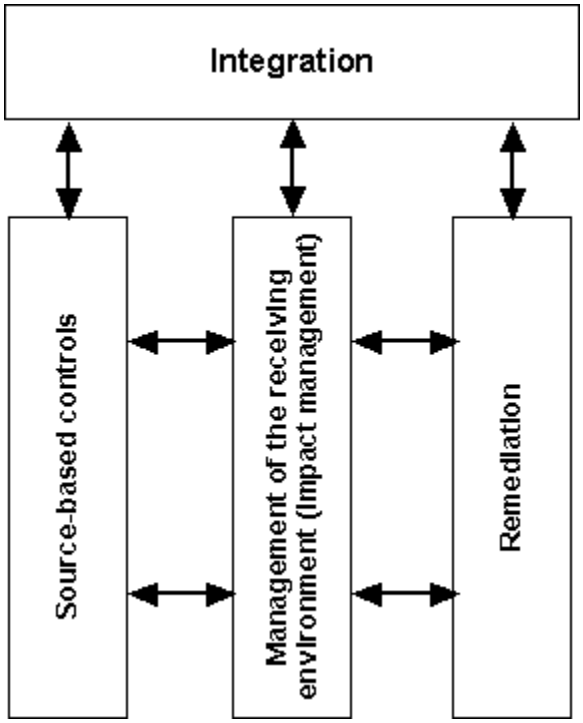


Figure 1: A functional approach to integration of pollution and waste management

Source-based controls are used to control waste generation and discharge. By controlling waste discharges at source, this type of control supports management of the receiving environment. In some instances, source-based controls can be extended to prevent waste production altogether.

Management of the receiving environment (impact management) entails anticipating threats to the environmental media and ensuring that source-based controls are put in place to control such threats. It includes setting ambient quality standards.

Remediation entails retroactive intervention to achieve reversal of environmental damage. Source based controls and remediation actions are used to achieve or monitor a specific ambient quality as required by impact management.

4.2.6 *Education and training*

The government will promote the education and empowerment of South Africa's people with regards to integrated pollution and waste management by increasing their awareness of and concern for pollution and waste, and assisting in the developing of the knowledge, skills, values and commitment necessary for successful integrated management.

4.2.7 *Public participation*

Public participation is considered a cornerstone for the development of this policy. The government's approach in this policy is to establish mechanisms and processes to ensure effective public participation and capacity building in integrated pollution and waste management.

4.3 Policy Principles

Policy principles are the fundamental premises government will use to apply, develop and test policy and subsequent actions, including: decision making, legislation, regulation and enforcement.

The overarching principles of this Draft White Paper on Integrated Pollution and Waste Management for South Africa are those of the constitution and Bill of Rights, as well as those adopted in the Draft White Paper on Environmental Management Policy for South Africa (see Appendix 2).

In addition to these general constitutional and environmental principles, the following specific principles for pollution and hazardous waste management have been adopted:

- **Transboundary Movement**
  Potential trans-boundary effects on human health and the environment will be taken into account.
- **Duty of Care Principle**
  Any institution which generates hazardous waste and which decides not to manage its waste, is always accountable for the management and disposal of this waste.
- **Universal Applicability of Regulatory Instruments**
  All industrial operations in South Africa will be subject to the same integrated pollution and waste management regulatory system.

4.4 Policy Criteria

Policy criteria are norms for evaluating the implementation of the policy principles. The following criteria will be used to evaluate the implementation of Integrated Pollution and Waste Management policy principles:

- **Accessibility**
  Management systems and information must be accessible to all sectors of civil society. In addition there will be access to authorities for complaints, especially at local level.
- **Clarity**
  Legislation regarding the management of pollution and waste, including regulatory instruments (such as standards, technology, incentives and effective policing and monitoring) will be drafted in an unambiguous manner and be understandable and accessible to all sectors of society.
- **Consistency**
  All elements of this policy will be interconnected and interrelated to ensure that there is no contradiction between different elements, and that policy will be formulated and implemented on an ongoing basis and consistently through all sectors of society.
- **Effectiveness**
  All elements of this policy should work together to ensure that the results of the management process enhance the quality of the environment.
- **Enforceability**
  Policy will be backed by effective legislation with mechanisms to enforce it.
- **Role of Women**
  Recognition of the role women can play in transforming society and building capacity will be recognised as regards integrated pollution and waste management.

- **Timeousness**
  Subject to this criterion, decision making procedures should take place within reasonable time frames, but not be used to restrict public participation.
- **Transparency**
  All reasons for decisions will be recorded and be available for public scrutiny.
- **Providing capacity-building**
  Resources must be provided to build capacity in both government and civil society.
- **Recognition of the different status of developed and developing countries**
  Where South Africa is involved in international negotiations on Integrated Pollution and Waste Management, it will promote a position that recognises the different status of developed and developing countries. In this regard, it will promote the concept of common but differentiated responsibility.

5. STRATEGIC GOALS AND OBJECTIVES

This chapter sets out, in the form of broad strategic goals and supporting objectives, the priorities for achieving the vision of Integrated Pollution and Waste Management over the next five to ten years. These goals chart the direction the government will follow in meeting its commitment to integrated pollution and waste management. The chapter also introduces the concept of the National Waste Management Strategy which will form one of the bases for translating the goals and objectives into practice.

5.1 Achieving Policy Goals and Objectives

The overarching goal is integrated pollution and waste management .

The intention is to move from a previous situation of fragmented and uncoordinated pollution control and waste management to integrated pollution and waste management and waste minimisation.

In order to ensure that this Integrated Pollution and Waste Management policy is translated into practice, the national Departments of Environmental Affairs and Tourism and of Water Affairs and Forestry will develop a National Waste Management Strategy. This national strategy will deal with the problems of waste and associated pollution. It will detail strategies and action plans and set time frames and targets. However, many aspects of this Integrated Pollution and Waste Management policy can be implemented without delay and it will not be necessary to wait for the completion of the National Waste Management Strategy. These aspects will be dealt with through existing administration routes.

5.2 Strategic Goals

Within the framework of the overarching goal of integrated pollution and waste management, the government has identified seven strategic goals for achieving integrated pollution and waste management. These goals are interdependent and implementation must address all of them to be effective. It is vital to recognise that environmental concerns and issues cut across various sectors and functions. Therefore, integrated pollution and waste management depends on cooperation and initiatives from all sectors of society. The supporting objectives address functions of Department of Environmental Affairs and Tourism and Department of Water Affairs and Forestry, as well as functions of other government departments that impact on pollution and waste management and will require their cooperation and commitment for effective implementation.

The strategic goals and their supporting objectives, listed under the headings of Administrative Actions and/or the National Waste Management Strategy, address the major issues the government faces in its drive to achieve and ensure integrated pollution and waste management.

- Goal 1: Effective Institutional Framework and Legislation
- Goal 2: Waste Minimisation, Impact Management and Remediation
- Goal 3: Holistic and Integrated Planning
- Goal 4: Participation and Partnerships in Integrated Pollution and Waste Management Governance
- Goal 5: Empowerment and Environmental Education
- Goal 6: Information Management
- Goal 7: International Cooperation

Government has initiated a process of formulating a National Waste Management Strategy which will include implementation strategies to give effect to this Integrated Pollution and Waste Management policy and a number of action plans. The strategies and action plans are set out in terms of the seven strategic goals listed above. Action plans will be incorporated in the programme of the Department of

Environmental Affairs and Tourism which will guide the reallocation of resources. Clear management responsibilities for the achievement of programme targets will be assigned.

5.2.1 *Goal 1: Effective institutional framework and legislation*

To create an effective, adequately resourced and harmonised institutional framework, an integrated legislative system and build institutional capacity.

Institutional Framework

Administrative actions

- establish mechanisms to give effect to the institutional arrangements for all spheres of government as set out in Chapter 6; and
- conduct an audit and review of existing skills, capacities, functions and the deployment of resources in the national Department of Environmental Affairs and Tourism and the Department of Water Affairs and Forestry and realign them to achieve implementation of this Integrated Pollution and Waste Management policy.

National Waste Management Strategy

- establish mechanisms to set national minimum ambient or environmental quality criteria which consider both concentration and load of pollution;
- develop uniform procedures for the setting and enforcing of environmental criteria throughout the country;
- develop a comprehensive information system which is easily accessible to all users and interested parties;
- develop mechanisms to encourage reductions in pollution through a system of economic incentives, e.g. by low- and non-waste technologies;
- establish mechanisms to develop a system of incentives to supplement the existing command and control approach;
- develop mechanisms to internalise the costs associated with waste; and
- develop mechanisms to ensure that every effort is made to identify the parties responsible for the damage to the environment and make them responsible for the costs of remediation.

Standards and enforcement

National Waste Management Strategy

- establish, attain and maintain ambient standards which are conducive to good human health and safety and which allow for sustained ecosystem maintenance;
- develop mechanisms to set up appropriate regulations, quotas and standards to regulate waste generation in order to promote waste minimisation;
- develop mechanisms to encourage wider involvement by all stakeholders in agreements and partnerships, with the aim of improving pollution prevention and waste management performance and developing and adopting best practice standards that exceed minimum requirements;
- develop mechanisms to ensure the safe transportation of raw materials, products and wastes to prevent accidents and spills which could adversely affect the environment and public health;
- develop mechanisms to encourage the use of voluntary agreements; and
- develop mechanisms to involve affected parties, environmental groups, labour, community based organisations, non-governmental organisations, business and industry, monitoring committees, and particularly local, regional and provincial authorities as appropriate in the enforcement of environmental standards.

5.2.2 ***Goal 2: Pollution and waste minimisation, impact management and remediation***

To promote holistic and integrated pollution and waste management through pollution prevention, minimisation at source, impact management and remediation.

Integrated pollution and waste management

National Waste Management Strategy

- develop mechanisms to set targets to minimise waste and pollution at source;
- develop mechanisms to prioritise pollutants requiring prevention control by utilising a risk based approach to assess the impact on the environment;
- develop mechanisms to set up information systems on chemical hazards and pollution releases and the introduction of a system to track the transportation and disposal of waste materials; and
- develop mechanisms to promote cleaner production technologies.

Media specific subsidiary objectives to be addressed through legislative means and administrative actions:

- Water pollution management
- to manage, prevent, reduce, control and remediate surface water pollution: including salinisation; enrichment by plant nutrients; microbiological deterioration; sediment and silt migration; pollution due to harmful inorganic and organic compounds; thermal pollution; acidity and various point and non-point pollution from a variety of different land uses including infrastructure development, industrial/mining/manufacturing, human settlements, agriculture, recreation and tourism; and the disposal of wastes resulting from all forms of human activity;
- to manage, prevent, reduce, control and remediate groundwater pollution: including pollutants due to the introduction of both organic and inorganic substances; as the result of leachate from waste disposal facilities, leaking underground storage tanks; surface impoundment; and groundwater recharge with polluted surface water;
- to manage, prevent, reduce, control and remediate marine pollution: including oil spills; illegal dumping at sea; land-based pollution through ocean discharge of polluted rivers, streams and sea outfalls; activities such as off-shore exploitation of marine resources; oil gas exploration; and diamond exploitation in coastal and deep sea regions; and
- to ensure that the quality of water required to maintain ecological functions is protected, so that the human use of water does not individually or cumulatively compromise the long term sustainability of aquatic and associated ecosystems.
- **Air pollution management**
- to manage, prevent, reduce and control air pollution: including emissions of sulphur oxides, nitrogen oxides, volatile hydrocarbons, carbon monoxide and dioxide as well as particulates, to maintain human health and ecological functions at an acceptable level; and
- to manage, prevent, reduce and control air pollution from the following specific key pollution sources: industrial and domestic fuel combustion, and vehicle emissions.
- **Land/soil pollution management**
- to manage, prevent, reduce and control agricultural soil pollution resulting from *inter alia*: the injudicious/over-use of fertilisers; over-irrigation; irrigation with sewage sludge; unsustainable farming practices; and inappropriate land use of agricultural chemicals;
- to manage, prevent, reduce and control soil pollution linked to water quality management: including salinisation by agricultural return water and the concomitant salinisation of irrigation soils which reduces crop yields;
- to adopt an integrated approach to soil quality management;
- to develop an appropriate policy which deals with pesticides in an integrated manner, by taking into account the economic and development imperatives underpinning pest control and the impact of pesticides on human health and the environment; and

- to manage, prevent, reduce and control soil pollution problems arising from other sources: such as the wood processing industry and wood impregnation; waste treatment and disposal; repair shops and scrap yards; service stations; the metal industry, and pollution from mining related activities.

Waste specific subsidiary objectives to be addressed through the National Waste Management Strategy

Pollution and waste avoidance, prevention and minimisation to be achieved by:

- adhering to mechanisms to ensure appropriate design parameters, optimising operating procedures and good housekeeping for all waste generating processes; and
- identifying mechanisms by means of risk assessment for situations where accidents and spills can cause unscheduled waste emissions, whether it be at a facility or during transport.

Resource recovery, recycling and re-use mechanisms for:

- reduction in the waste stream by ensuring an economic environment which favours recycled materials;
- subsidising recycling campaigns in order to make them economically viable;
- separation and recovery of resources as early as possible in waste generating processes in both the commercial and domestic sectors;
- resource recovery at waste transfer stations, waste treatment facilities and waste disposal sites;
- organised and controlled waste reclamation, as opposed to uncontrolled picking at waste disposal sites;
- extraction and utilisation of landfill gas; and
- ensuring that all South Africans have adequate and sufficient waste and refuse collection services.

Waste collection, treatment and processing mechanisms for:

- encouraging waste reduction and resource recovery by local authorities;
- ensuring that wastes are appropriately treated and processed prior to their disposal in accordance with relevant laws, regulations, standards and guidelines; and
- rendering harmless any pollutants which may be released during waste treatment processes.

Final waste disposal mechanisms for:

- timeous identification, investigation and development of environmentally and socially acceptable waste disposal facilities, in a manner which promotes the regionalisation or sharing of waste disposal sites to reduce their number;
- compliance with the relevant laws, regulations, standards and guidelines;
- permitting waste disposal sites in terms of the Environment Conservation Act (No 73 of 1989), Section 20(1); and
- by developing, operating and/or closing all other waste disposal facilities, including tailings dams, metallurgical slag dumps, whether proposed, existing or closed, in terms of the appropriate guidelines and pollution control legislation.

Pollution remediation mechanisms

- in instances where the environment has been impaired through accidental, insidious or intentional pollution or unacceptable waste management practices, it must be remediated and returned as close as possible to its original state.

Hazardous waste importation

- giving effect to the requirements of the Basel, including decision 3.1 (amendment to the Basel Convention) and Lome Conventions, and
- investigating the benefits of becoming a signatory to the Bamako Convention.

5.2.3 *Goal 3: Holistic and integrated planning*

To develop mechanisms to ensure that integrated pollution and waste management considerations are effectively integrated into the development of government policies, strategies and programmes, all spatial and economic development planning processes, and all economic activity.

Integrated environmental management mechanisms

National Waste Management Strategy

- to incorporate integrated environmental management principles and methodologies in spatial development planning, as it affects aspects related to pollution and waste management;
- to make timeous and appropriate provision for adequate waste disposal facilities;
- to develop management instruments and mechanisms for the integration of pollution and waste management concerns in development planning and land allocation;
- to develop standards for pollution and waste management systems, environmental impact assessments, monitoring and audit procedures for and reporting of all activities including government activities that impact on pollution and waste management; and
- to develop agreed, appropriate indicators to measure performance in all areas of national, provincial and local pollution and waste policies.

5.2.4 *Goal 4: Participation and partnerships in integrated pollution and waste management governance*

To establish mechanisms and processes to ensure effective public participation in integrated pollution and waste management governance.

Administrative actions

- ensure that communication strategies in all spheres of government address public participation needs; and
- allocate government resources (financial and human) to build institutional capacity in national, provincial and local government spheres for effective management of public participation in integrated pollution and waste management governance.

National Waste Management Strategy

- encourage strategic alliances between government and interested and affected parties to ensure integrated pollution and waste management and achieve sustainable development;

- develop mechanisms to ensure public participation and community involvement in processes relevant to Integrated Pollution and Waste Management;
- make the involvement of the public mandatory in waste management decisions, where people will be or can be affected; and
- investigate extending the use of environmental monitoring committees, which involve representation and participation of the public, to monitor all waste disposal sites and other sensitive waste management projects. This strategy will also encourage continued *ad hoc* monitoring by involving interested and affected parties.

5.2.5 ***Goal 5: Empowerment and pollution and waste management education***

To promote the education and empowerment of South Africa's people to increase their awareness of, and concern for, pollution and waste issues, and assist in developing the knowledge, skills, values, and commitment necessary to achieve integrated pollution and waste management .

Administrative actions

- integrate pollution and waste management education in all education programmes, at all levels, in all curricula and disciplines of formal and non-formal education in the National Qualification Framework;
- enhance integrated pollution and waste management literacy through the use of all forms of communication media;
- promote "outreach programmes" aimed at people in rural areas and the education of decision makers;
- ensure that integrated pollution and waste management education programmes and projects foster a clear understanding of the inter-relationship between pollution and waste, and of the economic, social, cultural, environmental and political issues in local, regional, national and global spheres; and
- develop a culture amongst all South Africans to discourage pollution and waste generation.

National Waste Management Strategy

- promote capacity building programmes and projects that assist people, particularly those from disadvantaged sectors of society, in developing social and organisational skills to employ local and other knowledge in assessing and addressing their pollution and waste management concerns;
- assist small, micro and medium enterprises in developing appropriate integrated pollution and waste management procedures;
- encourage and support the involvement of women, workers, the unemployed, the disabled, traditional healers, the elderly and other special interest groups in the design, planning and implementation of integrated pollution and waste management education and capacity building programmes and projects; and
- build capacity for effective implementation of government's national policy on Integrated Pollution and Waste Management.

5.2.6 ***Goal 6: Information management***

To develop and maintain databases and information management systems to provide accessible information to interested and affected parties that will support effective integrated pollution and waste management.

National Waste Management Strategy

- establish effective and efficient information systems, including the development of appropriate pollution indicators, to ensure informed decision making, measure progress in policy implementation and enable public participation in integrated pollution and waste management governance;
- strengthen and build the capacity of government to collect, analyse and use relevant information and knowledge for integrated pollution and waste management from all sources including formal, non-formal and traditional sources;
- disseminate information through formal and informal channels including communication media in an accessible format;
- develop a register of pollution releases from point and diffuse sources;
- develop a register for all waste handlers; and
- register all waste disposal sites.

5.2.7 *Goal 7: International cooperation*

To develop mechanisms to deal effectively and in the national interest with international issues affecting pollution and waste.

Administrative Actions

- adopt a uniform approach to the handling of international agreements and obligations;
- consider conventions or other instruments which are being negotiated by an international body, as well as conventions which have been adopted internationally, by giving due attention to:
- recognising the interest of stakeholders in formulating an official national position to be submitted to the relevant international negotiating forum;
- arranging the formation of a multi-sectoral committee which will be responsible for formulating a national point of view;
- constituting national delegations which comprise government officials, as well as all sectors of society; and
- making a recommendation to Parliament as to the accession to an international obligation, and in the process taking the following issues into account:
    - available resources to ensure implementation,
    - views of stakeholders,
    - benefits to the nation, and
    - disadvantages to the nation.
- ratification of a convention must be followed by ensuring that the necessary domestic legislation complies with the international obligation, as well as promulgating the legislation prior to the entry into force of the convention where applicable, including:
- designation of the responsible national authority or focal point,
- publication of the full text of the convention, and
- publication of the legislation to give effect to the convention;
- ensure South Africa acts in accordance with this Integrated Pollution and Waste Management policy in dealing with international treaties and agreements and that pollution and waste management considerations are included in all relevant international negotiations;
- ensure adequate opportunity for consultation with all relevant interested and affected parties before negotiating, entering into and implementing international agreements;
- meet all requirements arising from international agreements and obligations dealing with pollution and waste management; and
- cooperate internationally on common pollution and waste management concerns, giving priority to the Southern African Region.

6. GOVERNANCE

This chapter deals with:

- the role of government,
- the roles that all other stakeholders play, and
- the mechanisms used for enforcement of integrated pollution and waste management

6.1 Constitutional Setting

The starting point for developing an Integrated Pollution and Waste Management policy for South Africa is the Constitution. According to the Constitution, the legislative and executive authority of different spheres of government is set out within a framework of cooperative governance, and national and provincial governments have some concurrent and some exclusive powers in terms of the management of the environment. The Constitution also sets out how national and provincial government regulate certain functions of local government in this regard.

Functional areas of concurrent national and provincial legislative competence regarding integrated pollution and waste management are:

- disaster management,
- education at all levels, excluding tertiary education,
- environment,
- industrial promotion,
- nature conservation, excluding national parks, national botanical gardens and marine resources,
- pollution control,
- regional planning and development,
- soil conservation,
- urban and rural development,

as well as the regulation of the following local government matters:

- air pollution,
- municipal planning,
- harbours, excluding the regulation of international and national shipping,
- stormwater management systems in built-up areas, and
- water and sanitation services limited to potable water supply systems and domestic wastewater and sewage disposal systems.

The functional area of exclusive provincial legislative competence regarding integrated pollution and waste management is provincial planning, as well as the regulation of the following local government matters:

- cleansing,
- control of public nuisances,
- noise pollution, and
- refuse removal, refuse dumps and solid waste disposal.

6.2 Draft White Paper on Environmental Management Policy for South Africa

The White Paper on Environmental Management Policy for South Africa delineates Government's policy on environmental management. The Integrated Pollution and Waste Management policy forms a

subsidiary and supporting policy to this environmental management policy. The latter policy identifies Government as the custodian of the nation's environment and the Department as the lead agent responsible for ensuring integrated and co-ordinated implementation of Government's policy on environmental management.

All sectors of South African society have a role to play in integrated pollution and waste management. In its move to establish a more effective and efficient system for protecting human health and the environment, the Departments of Environmental Affairs and Tourism and of Water Affairs and Forestry cannot act in isolation. Therefore, it is the policy of the Department of Environmental Affairs and Tourism as environmental lead agent to encourage all stakeholders, i.e. other government departments, business and industry, labour, environmental and public interest groups, communities and other members of civil society to participate in the discussion, design and implementation of new policies and programmes.

6.3 Integrated Environmental Media Approach

The functional approach that will be adopted for pollution and waste management is an integrated receiving environmental media approach. There are three main functional areas which will be covered by media management, viz. source-based controls, impact management and remediation.

For the purposes of this Integrated Pollution and Waste Management policy, the need to manage water quantity and water quality as an indivisible natural asset is recognised. The Department of Water Affairs and Forestry, as the lead agent for water, is responsible for water quantity and water quality management, the latter including water pollution control and wastewater discharge to the environment, within an overall integrated system.

6.4 Role of Government

6.4.1 *National Government*

National government is structured in such a way that certain departments are media-specific (such as the Department of Environmental Affairs and Tourism and the Department of Water Affairs and Forestry) and others are sector-specific (such as the Department of Agriculture and the Department of Minerals and Energy). Each department has been charged with specific functions and powers.

The Department of Environmental Affairs and Tourism has been appointed as the lead agent for the environment and the Department of Water Affairs and Forestry, as the lead agent for water, is responsible for water quantity and quality management. As such it will provide leadership and guidance to enable other national departments, provincial environmental departments and local authorities to meet their executive obligations in respect of the environment, including integrated pollution and waste management. In performing these functions the lead agent will act in accordance with the requirements of cooperative government. The lead agent will take overall responsibility for integrated pollution and waste management in South Africa. The Department of Environmental Affairs and Tourism will execute its responsibilities by concentration and extension. Furthermore, it will establish guidelines, mechanisms and structures which ensure that activities undertaken by other media and sector managers are coordinated, uniform and effective.

It is the intention to strengthen the Department of Environmental Affairs and Tourism's capability in the field of integrated pollution and waste management and to undertake the line functions associated with the implementation of this Integrated Pollution and Waste Management policy. To ensure coordination between the Department of Environmental Affairs and Tourism and Departments and agencies in different spheres of government exercising pollution and waste management functions, it may be appropriate to establish Interim working arrangements. These will be formulated as Memoranda of Understanding (MOU's) to ensure that functions are exercised efficiently, without duplication and in a cooperative and mutually supportive manner. In this way it will promote institutional integration and

harness the existing skills and expertise in national departments active in the field of integrated pollution and waste management.

An underlying principle in the allocation of governance functions is the devolution of responsibility to the most appropriate sphere of government. Where the allocated sphere of government does not have the resources or capability, the next sphere of government will execute the function. Furthermore, the Department of Environmental Affairs and Tourism will assist where resources and capability are lacking, as well as assist in building capacity.

Functions of the lead agent

As the lead agent the Department of Environmental Affairs and Tourism will ensure that the following integrated pollution and waste management related functions are undertaken:

- policy, strategy and legislation,
- coordination,
- enforcement,
- dissemination and reporting of information,
- participation and appeals,
- monitoring, auditing and review, and
- capacity building.

Powers of the lead agent

In order to fulfil its responsibilities as lead agent, the Department of Environmental Affairs and Tourism will:

- enforce compliance with national policy on integrated pollution and waste management, and legislation, norms and standards;
- bind all spheres of government and organs of State to comply with and give effect to national integrated pollution and waste management legislation, norms, standards and guidelines in performing their integrated pollution and waste management functions;
- review the environmental impacts of all government policies, strategies, plans, programmes and actions and ensure that they conform with national policy on integrated pollution and waste management, legislation, norms and standards;
- enact legislation giving the national Department of Environmental Affairs and Tourism the power of intervention to protect the environment in cases of conflict between national and provincial law as provided for in section 146 of the Constitution;
- intervene in instances where provincial or local governments fail to fulfill an executive obligation in respect of integrated pollution and waste management as provided for in section 100 of the Constitution.

Functions of the media/sector manager

The media/sector manager will ensure that the following integrated pollution and waste management related functions are undertaken regarding its medium or sector:

- policy, strategy and legislation,
- coordination,
- enforcement,
- dissemination and reporting of information,
- participation and appeals,
- monitoring and review, and

- capacity building.

Powers of the media/sector manager

In order to fulfil its responsibilities as the media/sector manager, the relevant departments will:

- participate in the National Integrated Pollution and Waste Management Coordinating Committee,
- enforce compliance with media/sectoral policy, legislation, norms and standards,
- determine the impact on its particular media or sector and set impact criteria,
- manage its media/sector through source control, impact management and remediation,
- build institutional capacity, and
- ensure public participation.

National Integrated Pollution and Waste Management Coordinating Committee

The Department of Environmental Affairs and Tourism will interface with the relevant national departments through a National Integrated Pollution and Waste Management Coordinating Committee. This committee will be established to deal with all relevant pollution and waste issues.

Permanent members of this committee will be:

- Department of Environmental Affairs and Tourism;
- Department of Water Affairs and Forestry;
- Department of Agriculture; and
- Department of Minerals and Energy.

It should be noted that as far as land is concerned, a number of national departments are involved in the management of this medium, i.e. the Department of Agriculture, the Department of Environmental Affairs and Tourism, the Department of Water Affairs and Forestry, and the Department of Minerals and Energy.

In addition to the permanent members of the Coordinating Committee, other departments that also deal with pollution and waste issues from time to time, will be co-opted as and when appropriate. Departments falling into this category include, the Department of Labour, the Department of Health, the Department of Trade and Industry and the Department of Transport.

6.4.2 *Provincial government*

Provincial governments have a responsibility to implement integrated pollution and waste management programmes, conduct compliance and enforcement programmes and monitor environmental conditions. Provincial performance is fundamental to the achievement of the goals and objectives of this Draft White Paper on Integrated Pollution and Waste Management for South Africa.

In order to effect integrated pollution and waste management within the provinces, a Provincial Integrated Pollution and Waste Management Coordinating Committee will be established for each province.

Representation on this Committee may include:

- the relevant provincial Departments,
- local government,
- the national Department of Environmental Affairs and Tourism,
- the Department of Water Affairs and Forestry, and
- the regional Office of Minerals and Energy.

In accordance with constitutional provisions, it is an underlying approach of this policy that certain integrated pollution and waste management functions must be shared with provincial Governments in order to develop effective capacity to deal with such functions.

6.4.3 *Local government*

Where capacity exists, certain integrated pollution and waste management functions, such as implementation, enforcement and inspection, will be delegated to local government by the Department of Environmental Affairs and Tourism. Where this capacity does not exist, the lead agent and the provinces will assist in the development of such capacity. It will also be the task of the lead agent to provide guidelines for local government to ensure a uniform approach to integrated pollution and waste regulation and enforcement.

6.4.4 *Authorisation mechanisms*

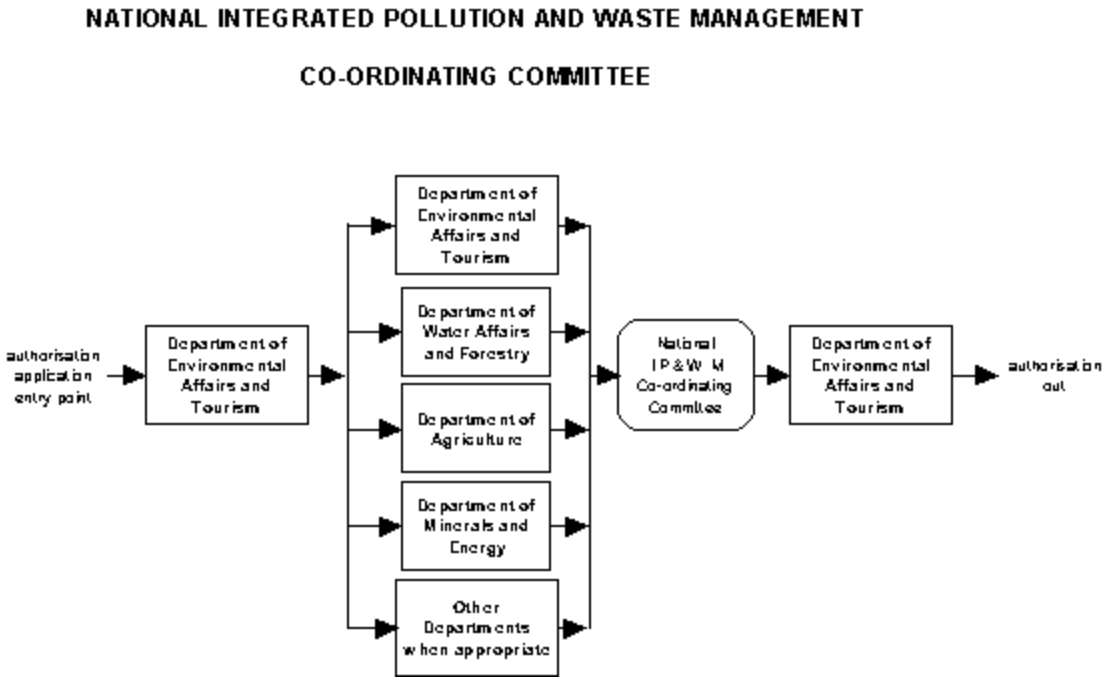
The current practice of issuing individual medium or activity permits will be altered to a system of multimedia authorisations, which will result in a single permit covering all aspects of integrated pollution and waste management.

Mechanisms to give effect to this change in approach will be developed jointly by the relevant authorities. In order to expedite the evaluation of applications, a consolidated set of requirements for applications, including impact assessments, will be prepared jointly by the relevant authorities. A Coordinating Committee comprising representatives of the media/sector managing departments, either at national or provincial level as appropriate, will be established to ensure overall coordination. This Committee will be convened and administered by the Department of Environmental Affairs and Tourism, which is identified as the entry and exit point for the multimedia authorisations. Coordinating Committees will be established at provincial level in a similar manner.

In order to expedite evaluation of applications, a consolidated set of requirements for applications including impact assessments will be prepared jointly by the relevant authorities. These requirements will be incorporated in guidelines which will guide both government and applicants in the process. Impact assessments will be undertaken in accordance with relevant laws, regulations, standards and guidelines.

Evaluation of the different elements of the authorisation application against the predetermined consolidated set of requirements will take place at the appropriate level of government, depending on the department involved. National or Provincial Integrated Pollution and Waste Management Coordinating Committees will be the forums for final evaluation of authorisation applications to ensure that all environmental impacts and mitigation requirements have been covered; however, the component of the authorisation relating to the individual media remains the responsibility of the media manager (see Figure 2). The authorisation will not only include standards, but could also include, without being limited to, details of voluntary agreements, economic instruments and any other clauses and details of the frequency and method of regular review and update, or any other conditions.

The Department of Environmental Affairs and Tourism shall set standards for ambient environmental quality (except for water quality and wastewater discharges to the environment which will remain the responsibility of the Department of Water Affairs and Forestry), after consultation with media and sector managers through a National Integrated Pollution and Waste Management Coordinating Committee. The setting of source control and remediation standards, will remain the responsibility of the media/sector managers, but will be coordinated by the coordinating committees at national and provincial level. In managing water resources, the catchment area is recognised as the basis for management. Once Catchment Management Agencies have been established as envisaged in the National Water Policy, they will have to be represented on the relevant coordinating committees.



6.4.5 ***Impact management through ambient standards***

Ambient standards define targets for integrated pollution and waste management and establish the permissible amount or concentration of a particular substance in or property of discharges to water, air and land.

In order to determine what source control standards (typically emission or discharge standards) are required in a given area, the intended receiving environmental quality will be determined. The characterisation of this intended quality will be reflected in ambient standards which will vary according to the nature of the receiving environment. Ambient standards will define the maximum pollution and waste levels that a particular receiving environment can tolerate without significant deterioration. The source control standards will form part of a suite of source control measures and will be geared towards impact prevention and management. Similarly, ambient standards will be defined for sites requiring remediation.

In order to provide quantifiable limits against which integrated pollution and waste management results can be measured, performance standards will aim at achieving agreed ambient environmental quality. These standards will be achieved by introducing the following measures:

- Performance based standards to achieve agreed environmental quality.
- The process by which the various standards are set will be applied universally and will be consultative, taking into account the needs of and information possessed by the discharger, government departments, the scientific community and civil society. Guidelines for the development of the approach to and the setting of integrated pollution and waste management standards will be developed in collaboration with all relevant parties through the National Waste Management Strategy.
- The process for setting of standards and the standards themselves will be made accessible to civil society in accordance with the commitment to more readily available integrated pollution and waste management information.
- Where new standards are set for existing dischargers and waste managers, a negotiated phased approach using measurable short, medium and long-term targets towards achieving the new standards will be established.

The relevant laws, regulations, standards and guidelines will be used as mechanisms to obtain information on media impacts used to evaluate predicted impacts against the ambient standards. Coordination of standard setting and agreement on a consolidated set of requirements against which applications for authorisation will be evaluated, will be developed as part of the National Waste Management Strategy.

6.4.6 *Monitoring*

Monitoring will be media/sector based. Two areas will be addressed, *viz*. ambient environmental quality and compliance monitoring.

Ambient environmental quality monitoring

The achievement and maintenance of appropriate ambient environmental standards is a goal of this Integrated Pollution and Waste Management policy and will be realised through the collection of adequate information on ambient levels of pollution. Supporting information on the nature and effects of pollutants and their pathways through the environment will be needed to ensure proper management. To this end the government will:

- conduct regular monitoring of all pollutants for which there are minimum standards, implemented in a phased approach with priority pollutants and areas being tackled first, in all areas of the country where they may have a negative health or environmental impact,
- collect ambient environmental quality information - various departments and spheres of government will be tasked with ensuring that adequate monitoring occurs to enable the functioning of an effective integrated pollution and waste management system,
- establish consistent and standardised databases between different government departments and spheres of government so that data can be easily collated and consolidated,
- standardise operating procedures for environmental quality monitoring, as well as standardised procedures for the format of data capture, and
- regularly publish statistics on ambient environmental quality.

Monitoring a specific media or a specific sector will be the responsibility of the media/sector managers with coordination being the responsibility of the lead agent.

The National Waste Management Strategy will investigate the role of civil society in pollution and waste monitoring.

Compliance monitoring

Compliance monitoring is the responsibility of the permit holder, with the government undertaking regular inspections and/or audits to ensure that the permit holder is undertaking the necessary compliance monitoring.

The National Waste Management Strategy will develop systems for:

- effective ambient pollution and waste monitoring,
- effective monitoring of environmental impacts,
- ensuring that the results of the various monitoring programmes are collated and analysed to identify cumulative trends which can be used in decision making,
- ensuring that both the sources of pollution and the receiving environment are monitored and that the latter is used to assess the effectiveness of source control measures,
- ensuring only those analyses obtained through accredited laboratories will be accepted for inclusion in the register, and

- developing ambient quality standards, emission or discharge limits in a consultative manner that are based on sound scientific and management principles as well as local knowledge.

Responsibilities of lead agent and media/sector managers

The overarching auditing function to ensure adequate ambient and compliance monitoring is the responsibility of the Lead Agent, the Department of Environmental Affairs and Tourism.

Ambient quality monitoring is the government's responsibility. The division of responsibilities between the departmental media/sector managers is the following:

- Water - Department of Water Affairs and Forestry,
- Air - Department of Environmental Affairs and Tourism, and
- Land - Department of Environmental Affairs and Tourism.

Furthermore, permit holders authorised by government have to ensure that they comply with regulatory requirements through regular compliance monitoring. Multi-skilled inspectors will be employed at national or the most appropriate level, to check compliance with regulatory requirements. Monitoring will take the form of external audits conducted by the inspectors or checking of monitoring records and audit reports.

6.4.7 *Management instruments*

A wide range of management instruments can be used for integrated pollution and waste management. This policy is not intended to be prescriptive as to which tools will be used in which instances, but rather outlines the range of instruments available and their associated advantages and disadvantages. Those management instruments which best promote the principles, goals and objectives of this policy will be used.

The criteria for selecting a particular instrument or package of instruments are the following:

- effectiveness in ensuring environmental sustainability;
- ability to secure participation by interested and affected parties in integrated pollution and waste management governance;
- giving effect to the constitutional rights and principles of both the Draft White Paper on Environmental Management Policy for South Africa and this Draft White Paper on Integrated Pollution and Waste Management for South Africa;
- equity considerations;
- economic efficiency and impact;
- administrative feasibility; and
- acceptability by civil society.

The final regulatory range of instruments will draw on direct controls and permits, economic instruments, land-use planning and controls, and voluntary agreements. These instruments will be used in an integrated manner to maximise effective integrated pollution and waste management. A thorough survey of available instruments for integrated pollution and waste management will be conducted as part of the National Waste Management Strategy.

Command-and-control instruments

Command-and-control instruments involve direct regulation and rely primarily on the application of regulatory instruments such as standards, permits, and land use controls.

Standards define environmental targets and establish the permissible amount or concentration of particular substances in discharges into air, water and on land. Standards may also include technological specifications for the performance or design of equipment and facilities and the standardisation of samples and analysis methods. Each of the various types of standards are used to provide a reference for evaluation or a target for legislative action or control.

Permits are tied to standards and are also subject to the fulfillment of specific conditions. They facilitate the enforcement of integrated pollution and waste management by including in one authorisation all pollution and waste management obligations. Permits can be withdrawn in cases of non-compliance, or changed as environmental or economic circumstances change. Similarly, should the permit holder not meet permit conditions, the permit holder can be fined or prosecuted.

Land use controls: In terms of the Development Facilitation Act, provincial and local authorities are required to formulate land development plans, which must include encouraging environmentally sustainable land development practices. The lead agent will evaluate and address these and other land use controls and guidelines relevant to integrated pollution and waste management. These controls and guidelines will be developed in collaboration with civil society and the national, provincial and local governments. Issues to be addressed include: domestic waste collection and disposal, vehicle emissions and the use of fossil fuel appliances.

Economic instruments

A shift towards a sustainable economy implies fundamental changes throughout the economy in which the close cooperation and involvement of all sectors of the economy is regarded as a crucial factor for success.

The objective of economic instruments is to change behaviour by promoting specific innovations which lead to improved environmental performance. In considering economic instruments it is important to understand the difference between a "charge" and a "tax". The main purpose of a tax is to generate revenue, while a charge is meant to recover cost, including environmental costs.

The generation of revenue is the responsibility of the Department of Finance and it is not the intention to propose a change to this arrangement. A prerequisite for the recovery of environmental costs is the ability to calculate these costs. Mechanisms to achieve this recovery of costs will be investigated as part of the National Waste Management Strategy. Other issues to be considered in determining environmental charges is the elasticity of demand as well as the supply of environmentally damaging products or services, since these influence the effectiveness of all control instruments, including economic instruments.

The primary objective of environmental resource economics is to "get prices right". Environmental assets are often not priced correctly because of one or combination of the following reasons:

- policy or institutional failure,
- market failure,
- information failure, and
- the non-existence of a market.

Different economic instruments are designed to correct different situations. It is, therefore, important to know the cause of an environmental problem before a choice of economic instruments is made.

The types of instruments that may be considered in this category include:

- resource charges,

- pollution charges,
- input charges, and
- deposit refund systems.

Another form of economic instrument is based on the incentive approach, through which investment for example in cleaner production technologies, is promoted. This type of instrument will be investigated in collaboration with the Department of Trade and Industry and may include:

- investment credits,
- accelerated depreciation,
- product/service subsidies, and
- basic needs subsidies (already in place in the form of a lifeline tariff for water services).

Voluntary instruments

Voluntary instruments adopted by industry have been used in many countries as an important complementary approach to pollution reduction, but seldom as a replacement for direct government control. These voluntary instruments can be used to achieve performance in excess of compliance with minimum standards and can include setting pollution reduction targets and penalties for non-compliance. An extension of the use of voluntary instruments is to use them as the basis for contracts being entered into by industry and government and civil society. Voluntary programmes which promote pollution reduction, open access to information, and the involvement of local communities in integrated pollution and waste management will be encouraged.

The introduction of mechanisms to promote and administer voluntary agreements will be investigated as part of the National Waste Management Strategy. Issues to be considered will include:

- promotion of environmental management systems to improve environmental performance as a complementary mechanism;
- achievement of specific reduction targets with an agreed time-frame;
- promotion of the involvement of communities, labour, and environmental non-governmental organisations in pollution reduction initiatives; and
- mechanisms to handle non-compliance.

6.4.8 *Capacity building*

Government and civil society will be capacitated through training in integrated pollution and waste management. Emphasis will be given to the training and skills development of members of disadvantaged groups.

The government will assist people to act in an informed manner by:

- promoting sound scientific research and monitoring and recognition of local knowledge and information;
- ensuring a wide dissemination of the results of research and other pollution and waste management data;
- ensuring access to information and to legislation;
- encouraging individuals and the communication media to act on the basis of sound information; and
- giving attention to the environment at all levels of the formalised education system to ensure that all members of society obtain an understanding of the sources, the prevention and the minimisation of pollution and waste.

Human resource development programme

The human resource development programme of the Department of Environmental Affairs and Tourism will be adjusted to focus on the new policy priorities, with a particular focus on the development of staff from disadvantaged communities.

The Department of Environmental Affairs and Tourism will establish links with tertiary education and other training institutions in order to ensure that training of pollution and waste managers, inspectors, educators and information officers, both for the Department and generally, is appropriate to the new direction contained in this Draft White Paper on Integrated Pollution and Waste Management for South Africa.

Sectoral capacity building

Integrated pollution and waste management will only be successful if personnel at all levels in the Department of Environmental Affairs and Tourism and in the provincial environmental departments, as well as in all other relevant organisations, agencies and sectors are developed. For an integrated approach to pollution and waste management to be successful, capacity will have to be built in marginalised and disadvantaged groups and in small, micro and medium enterprises. Technical expertise will also have to be promoted. Especially in rural areas, women are an important group who should be targeted by capacity building programmes.

The lead agent and all other players will be involved in partnership activities for capacity building at national, provincial and local level.

Pollution, waste management and gender

The development of women in relation to integrated pollution and waste management is important for a number of reasons. Since women are the traditional custodians of natural resources in the rural areas, they are also the people who suffer most from degradation of the natural resource base, and their wisdom in this regard should be acknowledged and utilised by government. It is through education of and communication with women that basic attitudes to integrated pollution and waste management will change.

This Integrated Pollution and Waste Management policy promotes representation by women at all levels and in all spheres of integrated pollution and waste management activities in political, technical and managerial positions.

The Convention on the Elimination of Discrimination Against Women, which has been ratified by South Africa, obliges the State to take into account the particular problems faced by rural women and the important roles they play in the economic survival of their families. It further places a duty on the State to take appropriate steps to make sure that women participate in and benefit from rural development, including the planning and implementation of development at all levels. The State must also make sure that rural women have equal access to economic opportunities and enjoy adequate and safe living conditions in relation to water supply and sanitation. The lead agent will investigate means of building the capacity of this sector of South African society in integrated pollution and waste management.

6.4.9 *Information systems*

A central component of the integrated pollution and waste management information system is that it will allow public access to information, based on the constitutional right to be informed. Through the National Waste Management Strategy, the government will establish:

- an adequate national ambient environmental quality monitoring network with a consistent approach to monitoring,
- a register of pollution and waste releases and transfers (including the estimation of non-point sources of pollution), and a register of waste handlers and waste disposal sites,
- the right of access to the information collected, with a system of storing and disseminating this information regularly and on request,
- consistent and standardised databases between different government departments and spheres of government so that data can be easily collated and consolidated,
- standardised procedures for the format of data capture,
- a process for the regular publishing of statistics on ambient environmental quality, and
- a role for civil society in pollution and waste monitoring.

Pollution emission information

A cornerstone of this Draft White Paper on Integrated Pollution and Waste Management for South Africa is pollution prevention and waste minimisation. In addition, the pollution management strategy rests on source controls to meet ambient environmental standards. Both these elements of this policy require sufficient information on pollution and waste releases to be carried out effectively.

In order to provide sufficient data for waste minimisation and source based pollution control, a register of pollutant releases or transfers from a variety of sources will be established. The register will include information about releases or transfers to air, water and soil. All waste handlers (collection/transport/disposal contractors) will be required to register. Mechanisms to facilitate public access to the register will be introduced.

One of the components of the National Waste Management Strategy will be the establishment of a pollutant release and waste register. This register will not be restricted to point source releases, but will also cover non-point diffuse pollution sources such as agriculture and transport. The relevant national, provincial and local authorities will also be required to publish regular statistics based on the register. Compilation and holding of this register will be a function of the lead agent, i.e. the Department of Environmental Affairs and Tourism.

There is a difference between amounts of pollutants emitted and the impacts, on health or the environment, of the emissions. Because there are so many intervening stages between the source and effects of pollution there is often uncertainty about the final impact of a pollutant. Therefore, the register, especially in its early stages, will not be expected to provide information on the impacts of pollution. The data gathered by the register will, however, provide crucial information to government regulators and to civil society which can be used to analyse pollution sources according to impact and prioritise pollution reduction activities.

In designing the register the following issues will be taken into account:

- the precise goals and objectives of the register;
- the pollutants of concern to be included;
- the scope of the register;
- the responsible government authority;
- reporting methods;
- financing;
- methods of ensuring access to the information collected;
- criteria for including pollutants on the list; and
- methods of collecting data.

Registration of waste disposal sites

The Environment Conservation Act (No 73 of 1989) makes provision for the registration of all waste disposal sites and waste deposits; however, this Act has not been fully implemented. Although a recent survey by the Department of Water Affairs and Forestry identified the majority of waste disposal sites in the country, a register of waste disposal sites is essential if control is to be implemented. It is a requirement of this Integrated Pollution and Waste Management policy that all waste disposal site operators and owners register their waste disposal sites with the Department of Environmental Affairs and Tourism, and that a legally responsible person be appointed to be in control of the waste disposal site.

Constitutional rights to information

The constitutional right concerning access to information is central to integrated pollution and waste management. This right states that everyone has the right of access to any information held by the State and any information held by another person which is required for the exercise or protection of any rights. The Open Democracy Bill, which will give effect to this right, is in the process of being drafted and will be used as the basis for access to information in terms of this Integrated Pollution and Waste Management policy.

The Constitution recognises that the provision of information may be a financial and administrative burden on the State and that reasonable measures can be provided to relieve this burden. Mechanisms will be investigated to ensure how access to environmental information is dealt with in the Open Democracy Bill and how the administration of an information system can be established without creating too large an administrative or financial burden on the State or the private sector.

Making information accessible

In line with the management philosophy of this Integrated Pollution and Waste Management policy, the types of information that will be made available by government are:

- pollution levels in the ambient environment,
- the amounts and types of pollution generated and released into the various media from point sources, and
- estimates of the total release of non-point source pollutants of concern.

Data will be transformed into usable information by being made readily understandable to those without technical backgrounds and without sophisticated information technology. Mechanisms to give effect to this approach will be investigated as part of the National Waste Management Strategy.

In addition to pollution release and concentration data, there is a need for technological and other information to support pollution reduction efforts. The collection of information on cleaner technology, best available technologies for pollution control and other information that can assist in pollution and waste management minimisation will be undertaken by the Department of Environmental Affairs and Tourism. In light of this need, the establishment of a pollution, waste and cleaner technology information "clearing-house", or a network of such information sources, will be investigated. Models of similar bodies will be considered, as well as the financing of the structure.

6.4.10 ***Research and development***

Policy development and decision-making on pollution and waste management need to be supported by research. This research should be directed to the development of appropriate technologies and methodologies to ensure sustainable resource use, manage impacts and achieve cleaner production. Research and development should make use of all sources of information, forms of knowledge and

research methodologies, including participatory research. The government will encourage civil society to establish and participate in research programmes aimed at informing their membership on important pollution and waste management issues.

The government will support both applied and basic research to identify and prioritise issues confronting policy development and pollution and waste management. It will give particular attention to addressing environmental justice concerns, environmental sustainability and administrative efficiency in terms of integrated pollution management.

Areas requiring research include:

- the state of pollution and waste management in South Africa,
- cleaner production,
- best practice,
- monitoring pollution and waste management,
- determining pollution indicators,
- risk assessment,
- economic instruments,
- ambient standards,
- social aspects relating to pollution and waste management issues, and
- non-point source pollution.

6.5 Role of Civil Society

All members of society contribute to waste generation and should therefore be part of the solution to the problem of pollution and waste. Mechanisms to increase both the awareness and role of individuals and groups to manage waste and pollution will be explored as part of the National Waste Management Strategy. All sectors of civil society and in particular the following organised sectors have a role to play in integrated pollution and waste management:

- labour,
- community based organisations,
- non-governmental organisations, and
- business, industry and mining.

The Minister of Environmental Affairs and Tourism will establish a specific advisory body to deal with integrated pollution and waste management to advise him. This advisory body will be established as a subordinate body to the proposed National Advisory Committee for Environmental Management (Figure 3). Similar structures will be established to advise the Members of the Executive Council (MECs) at provincial level.

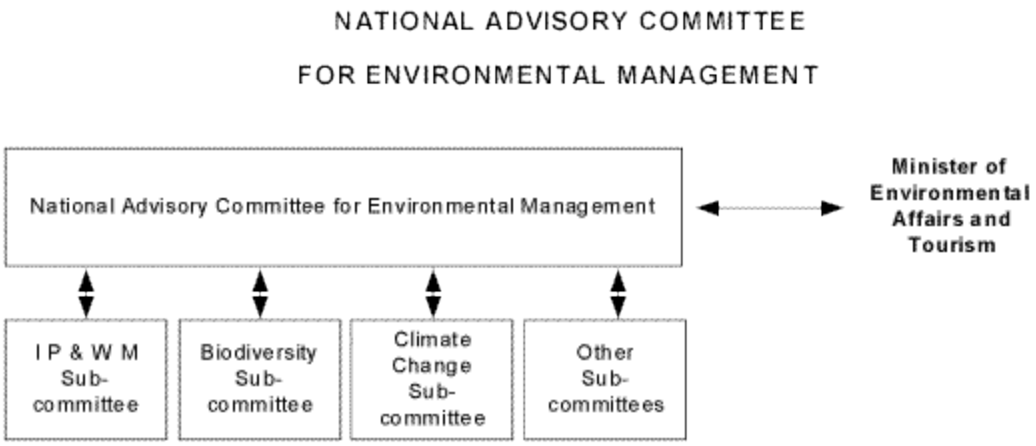


Figure 3: National Advisory Committee for Environmental Management

6.5.1 *Business and industry*

Various levels of environmental performance and commitment will be recognised by the Department of Environmental Affairs and Tourism and incentives will be developed in consultation with other relevant departments for companies that are willing and capable of exceeding minimum standards.

Government will support the role that business and industry will play in enhancing integrated pollution and waste management performance will by:

- facilitating full access to information so as to enable them to participate from a base of knowledge and expertise,
- recognising their status as stakeholders in integrated pollution and waste management issues,
- recognising the particular needs of small, micro and medium enterprises,
- facilitating access to influencing decisions of government,
- providing encouragement for voluntary initiatives and commitments to continually improving performance in integrated pollution and waste management, and
- facilitating their involvement in national and international processes regarding integrated pollution and waste management.

The lead agent will establish mechanisms to facilitate this involvement and ensure that the role of business to run internationally competitive enterprises, to exercise management responsibilities and judgements and to discharge their duties as corporate citizens in a clear legal framework is protected, so as to promote sustainable economic development.

6.5.2 *Labour*

Workers tend to be in the front-line of pollution problems and exposure to hazardous environments. Therefore, government will support the role of labour by:

- facilitating full access to information so as to enable them to participate from a base of knowledge and expertise,
- recognising their status as stakeholders in integrated pollution and waste management issues,
- facilitating their involvement in national and international processes regarding integrated pollution and waste management,
- participating in plant level integrated pollution and waste management, monitoring and auditing,

- ensuring access to mechanisms to lay complaints (the so-called whistle-blower protection right) which will be protected in law, and
- having the right to full knowledge about the nature and extent of pollution of their place of work.

The lead agent will ensure that the rights of workers to divulge information to the public and to refuse to perform operations that could result in pollution, are protected. The lead agent will also provide guidelines, developed in collaboration with labour representatives, for the participation in integrated pollution and waste management issues with industry and business and other stakeholders. In addition, measures will be implemented to facilitate participation in integrated pollution and waste management decision making and enforcement, especially where it affects employment.

6.5.3 Community Based Organisations

Community based organisations must have access to integrated pollution and waste management decision-making and local information, since many communities live adjacent to polluting industries.

Mechanisms and capacity building to address grievances to ensure their participation will be developed by the lead agent.

Government will support the role of communities by:

- facilitating full access to information to enable them to participate from a base of knowledge and expertise,
- recognising their status as stakeholders in integrated pollution and waste management issues,
- facilitating access to decision making processes of government, and
- facilitating their involvement in national and international processes regarding integrated pollution and waste management.

6.5.4 Non-Governmental Organisations

Non-governmental organisations have been instrumental in driving the growth of environmental awareness and in advancing Integrated Pollution and Waste Management policy. Therefore, the Government will support their role by:

- recognising their status as stakeholders in integrated pollution and waste management issues,
- ensuring access to decision-making processes within their area of interest and activity,
- ensuring full access to information to enable them to participate from a base of knowledge and expertise,
- facilitating their involvement in national and international processes regarding integrated pollution and waste management,
- capacity building, and
- creating channels to address grievances.

The lead agent will ensure their access to information and establish the mechanisms and ability to address grievances, as well as ensuring their for involvement in integrated pollution and waste management decision-making and enforcement. Particular attention will be paid to the needs of non-governmental organisations and the constraints involved in their participation in integrated pollution and waste management forums. In order to ensure their part, the lead agent will develop mechanisms and capacity building to address their grievances.

6.5.5 The public

South Africans are concerned about integrated pollution and waste management issues. Recognising the value and potential of a well-informed and committed citizenry for effecting positive change, the lead agent, i.e. the Department of Environmental Affairs and Tourism, supports meaningful public involvement in integrated pollution and waste management issues. The lead agent will expand public participation in the regulatory process through consensus-based approaches and negotiated rule-making and establish new ways to make information more directly accessible and relevant to the public to build capacity and raise awareness on integrated pollution and waste management issues.

6.5.6 Appeals and complaints

Appeals and complaints regarding integrated pollution and waste management decisions and/or implementation will be routed initially through the lowest appropriate sphere of government. In the event of this not achieving the result required by the complainant, the next level of government may be approached.

An independent appeal mechanism will be set up to handle cases where an aggrieved party has failed to obtain a satisfactory response from government.

6.6 Legislative Framework

The Minister of Environmental Affairs and Tourism has initiated a legal audit and review process, which will result in recommendations for the necessary legislative changes.

7. THE WAY FORWARD

Once this Draft White Paper on Integrated Pollution and Waste Management for South Africa has been approved by the government, a policy implementation phase will be initiated which will address urgent administrative issues, the development of a National Waste Management Strategy and legislative measures.

7.1 Administrative Actions

- The following administrative actions will be attended to as a matter of urgency:
- Launch the programme for the development of the National Waste Management Strategy.
- Initiate a skills audit to investigate and subsequently develop capacity within the Department of Environmental Affairs and Tourism to undertake the new functions associated with the lead agency for integrated pollution and waste management.
- Appoint the National Integrated Pollution and Waste Management Coordinating Committee.
- Investigate the development of Provincial Integrated Pollution and Waste Management Coordinating Committees.
- Appoint the National Advisory Committee for Environmental Management and the National Integrated Pollution and Waste Management Advisory Sub-Committee.
- Establish Memoranda of Understanding (MOUs) through structured consultations and negotiations, to ensure that the waste management function is exercised efficiently and effectively, without duplication and in the spirit of cooperative Governance; and
- Investigate the administrative, legal and contractual arrangements necessary to give effect to the allocation and sharing of the waste management function and to building capacity of the appropriate authorities.
- Formulate Memoranda of Understanding (MOU's) to ensure that functions are exercised efficiently without duplication and in a cooperative and supportive manner.
- Initiate the process of integrating pollution and waste management related functions within all spheres of government, including functions related to:
    - coordination of authorisations,
    - marine pollution,
    - water pollution,
    - air pollution,
    - domestic and hazardous waste management, including radioactive waste,
    - a uniform approach to international conventions,
    - a uniform approach to standard setting, and
    - a uniform approach to compliance monitoring.
- Promote and give effect to the objectives of Agenda 21 with regards to integrated pollution and waste management issues.
- Launch the programme of pilot projects for the practical implementation of integrated pollution and waste management to improve the quality of life of all South Africans.
- Investigate a remediation fund for marine pollution.
- Review this Integrated Pollution and Waste Management policy on an on-going basis.

7.2 National Waste Management Strategy

The Strategy will focus on and prioritise goals and objectives requiring action by government and other parties within the next five to ten years. Where necessary the National Waste Management Strategy will identify priorities for fast-tracking to address urgent needs. These priorities will form the basis for developing action plans to address the strategic goals set out in this Integrated Pollution and Waste Management policy. The action plans will include clear time-frames and budgetary allocations for realising the accompanying objectives. These action plans will provide for interim updates and take account of new information, new technology, or other factors that may call for revision of standards, mechanisms, or targets. The action plans will also take account of South Africa's international obligations.

The national Departments of Environmental Affairs and Tourism and of Water Affairs and Forestry are currently drawing up an inception phase report through a participatory process of consultation with all interested and affected parties. The inception report will specify the terms of reference and provide a detailed programme and schedule for the development of a National Waste Management Strategy for South Africa. It is anticipated that within two years of this Draft White Paper on Integrated Pollution and Waste Management for South Africa being accepted, the development of the National Waste Management Strategy should be completed.

The National Waste Management Strategy will address the following priority topics:

- education and capacity building,
- waste inventories, reporting and data management,
- pollution prevention, waste minimisation, impact control and remediation,
- cleaner technologies, products and production,
- hazardous waste including radioactive waste, and
- legislative aspects.

7.3 Legislative Amendments and Implementation of Legislation

Once this Draft White Paper on Integrated Pollution and Waste Management for South Africa has been accepted by government, an investigation of the legal requirements of this policy and its implementation will be undertaken.

The government will consider the ratification of outstanding international conventions on integrated pollution and waste management and give specific legislative effect to them.

APPENDIX 1

INTERNATIONAL CONVENTIONS, AGREEMENTS, TREATIES AND PROTOCOLS WHICH PERTAIN TO POLLUTION AND WASTE MANAGEMENT

Below are listed in chronological order the international conventions, agreements, treaties and protocols which pertain to pollution and waste management:

CONVENTION ON THE INTERNATIONAL MARITIME ORGANISATION, 6 March 1948 (Geneva): South Africa was admitted to become a party to this Convention after its transition to democracy in 1994. The International Maritime Organisation is a specialist United Nations agency dealing with maritime matters, including the development of all the marine pollution control conventions. No relevant specific domestic legislation has been promulgated.

THE ANTARCTIC TREATY, 1 December 1959 (Washington): The Antarctic Treaty stipulates that Antarctica may be used for research and only for peaceful purposes. It is complemented by resource protection treaties. The relevant domestic legislation is the Antarctic Treaty Act (60 of 1996).

TREATY BANNING NUCLEAR WEAPON TESTS IN THE ATMOSPHERE, IN OUTER SPACE AND UNDER WATER, 5 August 1963 (Moscow): South Africa acceded to this Convention in 1963. There is no specific legislation giving it domestic effect but, in terms of the Nuclear Energy Act, (113 of 1994), South Africa indirectly complies with its obligations under this Convention.

CONVENTION ON THE CONSERVATION OF THE LIVING RESOURCES OF THE SOUTHEAST ATLANTIC, 23 October 1969 (Rome): This Convention regulates the conservation and exploitation of the resources of the Antarctic waters. It imposes a duty to protect the environment. The relevant domestic legislation is the Antarctic Treaty Act (60 of 1996).

INTERNATIONAL CONVENTION RELATING TO INTERVENTION ON THE HIGH SEAS IN CASES OF OIL POLLUTION CASUALTIES, 29 November 1969 (Brussels): This Convention authorises coastal states to intervene, subject to certain conditions, with regard to pollution damage which may be caused by foreign vessels in the high seas. It is incorporated into South African law in the International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties Act (64 of 1987). No domestic regulations have been promulgated under this Act.

INTERNATIONAL CONVENTION ON CIVIL LIABILITY FOR OIL POLLUTION DAMAGE, 29 November 1969 (Brussels): This Convention provides for a compensation fund for clean-up costs and environmental damage subject to certain conditions and ceilings. It is incorporated into South African law in the Prevention and Combating of Pollution of the Sea by Oil Act (6 of 1981) and General Regulations made under it (GN R1276 of 29 June 1982).

CONVENTION ON THE ESTABLISHMENT OF AN INTERNATIONAL FUND FOR COMPENSATION FOR OIL POLLUTION DAMAGE, 1971: The Convention supplements the International Convention on Civil Liability for Oil Pollution Damage (1969) in that it is applied when certain limits and financial ceilings exclude the Brussels Convention. South Africa has not become a party to this Convention as it necessitates disclosure of its oil imports.

TREATY ON THE PROHIBITION OF THE EMPLACEMENT OF NUCLEAR WEAPONS AND OTHER WEAPONS OF MASS DESTRUCTION ON THE SEA-BED AND THE OCEAN FLOOR AND IN THE SUBSOIL THEREOF, 11 February 1971 (London, Moscow, Washington): This Treaty prohibits environmental pollution from nuclear activities. The relevant legislation is the Nuclear Energy Act (113 of 1994).

CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING WASTES AND OTHER MATTER, 29 December 1972 (London, Mexico City, Moscow): This Convention regulates the dumping at sea of matter scheduled in the Convention. It schedules prohibited substances and substances requiring permits and sets out guidelines in this regard. It is incorporated into South African law by the Dumping at Sea Control Act (73 of 1980).

1NTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973 and PROTOCOL OF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS 1973, 17 February 1978 (London): This Convention and the 1978 Protocol are concerned with setting standards developed by the International Maritime Organisation for tankers and other large vessels. It is incorporated into South African law in the Marine Pollution (Prevention of Pollution from Ships Act (2 of 1986)), and the regulations concerning the Prevention of Pollution by Garbage from Ships Regulations (GN R1490 published in Government Gazette No. 14000 dated 29 May 1992).

CONVENTION FOR THE PREVENTION OF MARINE POLLUTION FROM LAND-BASED SOURCES, 1974: This Convention is relevant to the pollution of coastal waters from land-based sources. South Africa has not acceded to it, but is monitoring developments in this regard and may accede to it in due course.

CONVENTION ON WETLANDS OF INTERNATIONAL IMPORTANCE ESPECIALLY AS WATERFOWL HABITAT, 2 February 1971 (Ramsar) and PROTOCOL TO AMEND CONVENTION ON WETLANDS OF INTERNATIONAL IMPORTANCE ESPECIALLY AS WATERFOWL HABITAT, 3 December 1982 (Paris): South Africa is a party to this Convention and its associated Protocol, whose focus is the protection of wetlands. An obligation is to conserve and protect wetlands and, as such, this Convention is indirectly relevant to integrated pollution and waste management. South Africa has listed about a dozen wetlands, including the St. Lucia Lake area. Relevant domestic legislation includes the respective Nature Conservation Ordinances of the various provinces, as well as the Conservation of Agricultural Resources Act, 43 of 1983.

MULTILATERAL AGREEMENT ON THE CONTROL OF POLLUTION OF WATER RESOURCES IN THE SOUTH AFRICAN REGION, 21 November 1985: This Agreement imposes general obligations on the parties to cooperate with each other as regards access to and pollution of water resources which are common to two or more parties. There is no specific domestic legislation on this treaty.

VIENNA CONVENTION FOR THE PROTECTION OF THE OZONE LAYER, 22 March 1985 (Vienna) and MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER, 16 September 1987 (Montreal): The purpose of this Convention and its Protocol is to protect human beings and the environment from the harmful affect of activities which modify the ozone layer. It requires the parties to cooperate, according to their means, in research and legislative measures and to formulate agreed standards, procedures and measures in the form of protocols and annexes. The 1987 Montreal Protocol sets out a timetable for the reduction of controlled substances which deplete the ozone layer. It establishes a formula for determining calculated levels of consumption and production of controlled substances based on the ozone depleting potential of each substance. Although the Convention has been ratified, no specific domestic legislation or regulation has been passed in this regard.

CONVENTION ON THE CONTROL OF TRANSBOUNDARY MOVEMENTS OF HAZARDOUS WASTES AND THEIR DISPOSAL, 22 March 1989 (Basel): This Convention regulates the importation, exportation and trans-boundary movement of hazardous waste. No domestic legislation has been passed in this regard. This convention has been acceded to.

FOURTH AFRICAN, CARIBBEAN AND PACIFIC-EUROPEAN ECONOMIC COMMUNITY CONVENTION, 15 December 1989 (LOME 4): This Convention, which South Africa has signed but not ratified, is a cooperative agreement of the European Community and its member states on the one hand, and the African, Caribbean and Pacific states on the other. Its purpose is to provide and expedite the

economic, cultural and social development of the African, Caribbean and Pacific states and to consolidate and diversify their relations in a spirit of solidarity and mutual interest. Title 1 (articles 33 to 39) is dedicated to the Environment. Article 39 is dedicated to the control of international movement of hazardous and radioactive waste. The article specifically prohibits all direct and indirect export of such waste by the European Community to the African, Caribbean and Pacific states and provides that the African, Caribbean and Pacific states shall prohibit the import of such waste into their territory. South Africa has not passed domestic legislation or regulations in this regard and will have to do so once it ratifies the convention. South Africa is also considering a bilateral arrangement with the European Community.

CONVENTION ON THE BAN OF IMPORT INTO AFRICA AND THE CONTROL OF TRANSBOUNDARY MOVEMENT AND MANAGEMENT OF HAZARDOUS WASTE WITHIN AFRICA, 29 January 1991 (Bamako): During the negotiation of the Basel Convention, the African states represented by the Organisation for African Unity adopted the Bamako Convention as they were of the view that Basel was not strict enough. The Bamako Convention totally prohibits the importation of hazardous waste into Africa. South Africa has neither signed not acceded to this convention. No domestic legislation is accordingly necessary.

PROTOCOL ON ENVIRONMENTAL PROTECTION TO THE ANTARCTIC TREATY, 4 October 1991: This Protocol was negotiated because of pressure to explore the mineral potential of Antarctica. It imposes duties to protect the environment including integrated pollution and waste management. The relevant domestic legislation is the Antarctic Treaty Act (60 of 1996).

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, 9 May 1992 (New York): The objective of this Convention is the "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Convention requires, *inter alia*, that developed countries formulate and implement programmes which mitigate the adverse effects of climate change and facilitate adaptation to it. South Africa ratified this Convention in August 1997.

CONVENTION ON BIOLOGICAL DIVERSITY, Opened for signature at Rio de Janeiro on 5 June 1992: South Africa is a party to this Convention whose obligations include the duty to protect biodiversity and thus indirectly to promote environmentally sound integrated pollution and waste management practices. A Green Paper on the Conservation and Use of South Africa's Biological Diversity (Department of Environmental Affairs and Tourism, October 1996) has been published and a White Paper is anticipated. No specific legislation to give effect to this Convention has been passed but many legislative enactments, for example, the Nature Conservation ordinances are indirectly relevant.

CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION AND STOCKPILING OF CHEMICAL WEAPONS, AND ON THEIR DESTRUCTION, Opened for signature at Paris - 13 January 1993: This Convention is relevant to this Draft White Paper on Integrated Pollution and Waste Management for South Africa because when chemical weapons are not properly disposed of, they could cause pollution. Their management, particularly their destruction in the context of the "Cradle to Grave" principle, is thus important. South Africa ratified this Convention in September 1995 and has incorporated it into domestic law (Government Gazette, No. 17967 dated 2 May 1997).

CONVENTION ON NUCLEAR SAFETY, 17 June 1994: The objective of this convention is to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international cooperation including safety-related technical cooperation, where appropriate. South Africa ratified this convention in December 1996 and the Council for Nuclear Safety has initiated a process to develop a national policy and domestic legislation in this regard.

UNITED NATIONS LAW OF THE SEA CONVENTION, 1982 and AGREEMENT RELATING TO THE IMPLEMENTATION OF PART XI OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE

SEA of 10 December 1982, adopted on 28 July 1994: Although South Africa has not ratified this Convention, it is relevant because many provisions reflect customary international law which is part of South African law. Part XII headed "Protection and Preservation of the Environment" includes provisions on marine pollution.

APPENDIX 2

PRINCIPLES FROM THE DRAFT WHITE PAPER ON ENVIRONMENTAL MANAGEMENT POLICY FOR SOUTH AFRICA

This appendix sets out the principles for environmental management. Principles are the fundamental premises government will use to apply, develop and test policy and subsequent actions including, decision-making, legislation, regulation and enforcement. In some cases the principles are followed by details on how the principle will be applied.

Accountability
Government is accountable for policy formulation, monitoring and enforcement.

Allocation of Functions
Government will allocate functions within the framework of the Constitution to the institutions and spheres of government that can most effectively achieve the objective of a function within the context of environmental policy.

Alienation of Resources
Renewable and non-renewable natural resources, cultural resources and land are all part of South Africa's environmental heritage. They are public assets belonging to all the nation's people. Government must ensure that the ownership and use of this heritage promotes sustainable development that benefits the public good and maintains the integrity of the environment. Any alienation of these resources and land must respect people's environmental rights and ensure the sustainable use of such resources and land.

In applying this principle government must ensure that its investment policies and programmes do not result in the unchecked transfer of ownership of all the nation's natural and cultural resources and land to private investors, or result in access to these resources and land being denied to the people of this country.

Capacity Building and Education
All people must have the opportunity to develop the understanding, skills and capacity for effective participation in achieving sustainable development and sustainable resource use.

Conflict of Interest
Actual or potential conflicts of interest between responsibilities for resource exploitation, and any responsibilities or powers affecting environmental quality or impact management, must be resolved. Solutions to such conflicts of interest must ensure effective implementation of environmental policy and provide for the role of the lead agent in monitoring and ensuring the maintenance of norms and standards.

Coordination
Environmental concerns affect all aspects of life and must be integrated into the work of all government institutions. This requires intergovernmental harmonisation of policies, legislation, monitoring, regulation and other environmental functions in accordance with the requirements of environmental policy.

Cradle to Grave
Responsibility for the environmental and health and safety consequences of a policy, programme, project,

product, process, service or activity exists throughout its life cycle. It starts with conceptualisation and planning and runs through all stages of implementation to reuse, recycling and ultimate disposal of products and waste or decommissioning of installations.

Custodianship
The government acknowledges that it has a constitutional duty to protect the environment for the benefit of current and future generations of South Africans. Its responsibilities include the duty to act as custodian of the nation's resources; to protect the public interest in, and to ensure equitable access to such resources and generally to ensure that all South Africans enjoy an environment of acceptable quality. In assuming these duties, the government accepts the duties and responsibilities implied by the doctrine of the Public Trust, particularly regarding state owned land and natural resources and will enact legislation to give affect to this principle. The doctrine of Public Trust requires the State to:

- ensure that environmental resources are beneficially used in the public interest
- protect the people's common heritage
- ensure the public's reasonable access to the environment and natural resources
- ensure adherence by all spheres of government to the public trust
- promote and fulfill the Department of Environmental Affairs' commitment as custodian of the nation's environment.

Demand Management
The price of goods and services must include the environmental cost of sustaining the rate of supply over time. Where this is impossible, the price must include the cost of replacing the good or service, as it is depleted by another good or service at a similar rate of supply and value that fulfills the same function.

Due Process
Due process must be applied in all environmental management activities. This includes adherence to the provisions in the Constitution dealing with just administrative action and public participation in environmental governance.

Equity
There should be equitable access to environmental resources, benefits and services to meet basic needs and ensure human well-being. Each generation has a duty to avoid impairing the ability of future generations to ensure its well being.

Environmental Justice
To comply with the requirements of environmental justice, government must integrate environmental considerations with social, political and economic justice and development in addressing the needs and rights of all communities, sectors and individuals.

Policy, legal and institutional frameworks must:

- redress past and present environmental injustice,
- take account of the need to protect and create employment,
- recognise that workers can refuse work that is harmful to human health or the environment,
- ensure that everyone is able to make known environmental or health hazards without fear of the consequences, and
- ensure equitable representation and participation of all with particular concern for marginalised groups.

Full Cost Accounting
Decisions must be based on an assessment of the full social and environmental costs and benefits of policies, plans, programmes, projects and activities that impact on the environment.

Global and International Cooperation and Responsibilities
Government must recognise its shared responsibility for global and regional environmental issues and act with due regard for the principles contained in relevant policies and applicable regional and international agreements.

Good Governance
Good governance depends on mutual trust and reciprocal relations between government and people. This must be based on the fulfillment of constitutional, legislative and executive obligations, and acceptance of authority, responsibility, transparency and accountability.

The democratically elected government is the legitimate representative of the people. In governing it must meet its obligation to give effect to people's environmental rights in section 24 of the Constitution. This includes:

- taking responsibility for developing and implementing environmental policy,
- exercising the authority to take decisions and carry out actions vested in it by the Constitution,
- acting in accordance with the basic values and principles governing public administration contained in the Constitution,
- being accountable to the people,
- responding to public needs and encouraging public participation in environmental governance by providing for the mutual exchange of views and concerns between government and people, and
- monitoring and regulating actions that impact on the environment.

Inclusivity
Environmental management processes must consider the interests, needs and values of all interested and affected parties in decision-making to secure sustainable development. This includes recognising all forms of knowledge including traditional and ordinary knowledge.

Integration
All elements of the environment are linked and management must therefore take account of the connections between them.

The integration of environmental concerns into every area of human activity is central to the achievement of sustainable development. Priority areas for environmental governance include:

- the integration of environmental, social and economic considerations in development and land use planning processes and structures. This requires assessment of environmental impacts at policy, planning, programme and project levels,
- an integrated approach to environmental management addressing:
    - all environmental media,
    - all social, cultural and natural resources,
    - pollution control and waste management,
- an integrated approach to government's environmental functions including:
    - organisational and institutional arrangements,
    - legislation, and
    - all policies in all spheres of government.

Open Information
To give effect to their constitutional rights, everyone must have access to information to enable them to:

- protect their health and well-being,
- protect the environment,
- participate effectively in environmental governance, and

- comply with environmental policy, legislation and regulation.

Participation
Government must encourage the inclusion of all interested and affected parties in environmental governance with the aim of achieving equitable and effective participation.

Precaution
Government will apply a risk averse and cautious approach that recognises the limits of current knowledge about the environmental consequences of decisions or actions.

This approach includes identifying:

- the nature, source and scope of potentially significant impacts on the environment and on people's environmental rights, and
- the potential risks arising from uncertainty.

Where there is uncertainty action should be taken to limit the risk. This should include consideration of the 'no go' option.

Prevention
Government must anticipate problems and prevent negative impacts on the environment and on people's environmental rights.

Polluter Pays
Those responsible for environmental damage must pay the repair costs both to the environment and human health, and the costs of preventive measures to reduce or prevent further pollution and environmental damage.

Waste Avoidance and Minimisation
Waste management must minimise and avoid the creation of waste at source, especially in the case of toxic and hazardous wastes. Government must encourage waste recycling, separation at source and safe disposal of unavoidable waste.

APPENDIX 3

GLOSSARY OF TERMS

This glossary defines the terms used in this Draft White Paper on Integrated Pollution and Waste Management for South Africa. Also refer to the Appendix 2 which lists and defines the principles set out in the Draft White Paper on Environmental Management Policy for South Africa.

Accelerated depreciation - allows equipment to be written off more rapidly than is generally the case within the context of the corporate income tax system.

Ambient standards - are quantitative pollutant levels which may not be exceeded, or may be exceeded only for a specific frequency or duration, in water, in the air or within soil in order to ensure it is fit for a designated use, and to reasonably preserve the environment and not significantly impair human health.

Anthropogenic - generated by human activity.

Basic needs subsidies - allow people access to environmental assets without compensating payment.

Best Practical Environmental Option - BPEO is the outcome of a systematic consultative and decision-making procedure that emphasises the protection of the environment across land, air and water. It establishes, for a given set of objectives, the option that provides the most benefit or least damage to the environment as a whole, at acceptable cost in the short-term and as well as in the long-term.

Best Practical Means - the minimum needed to meet the requirements of present legislation.

Biodiversity - the number and variety of living organisms on Earth. Biodiversity is made up of species richness, ecosystem complexity and genetic variation.

Biota - living organisms.

Arcinogenic - ability to cause cancer.

Civil Society - this term includes all members/sectors of society outside government.

Cleaner Production - The term "cleaner production" describes a comprehensive preventative approach to environmental protection. Many other terms are being used globally, such as waste minimisation, pollution prevention, cleaner technology, waste reduction, eco-efficiency, non-waste technologies and source reduction, without there being a universal consensus on what they mean. All of the terms mentioned above, however, describe a proactive approach which embraces a forward-looking "anticipate and prevent" philosophy. Ensuring cleaner production is now internationally recognised as a crucial means to reconcile the environmental and economic goals involved in the move towards sustainable development.

Cleaner production can provide long-term benefits, such as

- reducing liabilities,
- promoting a positive public image,
- improving industrial housekeeping practices,
- improving the health and safety of employees,
- increasing operating efficiency,
- on-site reuse,
- reducing waste production costs,
- raising profitability, enhancing competitiveness, and
- improving environmental performance.

Cleaner production, therefore, reflects both an interest in savings and avoidance of increasingly stronger environmental regulations. Cleaner production includes measures to conserve, eliminating toxic and dangerous raw materials and product constituents, and to reduce at source the quantity and toxicity of all emissions and wastes being emitted to air, land and water. Furthermore, this approach embraces the cradle-to-grave principle, the precautionary principle and the preventive principle. Because cleaner production attacks the problem at several levels at once, it is a holistic integrated preventative approach to environmental protection. The cleaner production approach is an integral part of this Integrated Pollution and Waste Management policy.

Coastal zone - the area of land and sea along the coast including estuaries, onshore areas and offshore areas, wherever they form an integral part of the coastal system.

Cost benefit analysis - estimates and comparison of short term and long term costs (losses) and benefits (gains); an economic analysis of an undertaking, involving the conversion of all positive and negative aspects into common units (e.g. money) so that the total benefits and the total costs can be compared.

Cultural resources - natural features and features adapted and created by humans in the past and present. These features are the result of continuing human cultural activity and reflect a range of community values.

Deposit refund system - system where a deposit is levied on products with potential to pollute and refunded when product or residue is returned.

Duty of Care Principle - Every person or organisation has a duty to act with due care to avoid damage to others, or to the environment.

Ecosystem - dynamic complex plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Effluent - liquid waste generated by human activity.

Environmental Audit - a regular formal examination to ascertain whether an organisation or facility is operating in terms of its environmental performance requirements or some other measure of performance.

Environmental Impact Assessment (EIA) - a detailed study of the environmental consequences of a proposed course of action. An environmental evaluation (also called environmental assessment) is a study of the environmental effects of a decision, location or undertaking. Environmental evaluation is most often used within an Integrated Environmental Management (IEM) planning process as a decision support tool to compare different options.

Environmental Management Programmes (EMP) - in terms of the Minerals Act 50 (of 1991), every mine must submit an EMP to the Department of Minerals and Energy. An EMP contains elements of environmental assessment (see EIA) plus management plans. Once approved, it has the force of law.

Environmental Management System (EMS) - documented procedures drawn up as described in an SABS Code of Practice to implement the requirements of ISO 14000. Operating, emergency, data collection and documentation procedures are set out, along with procedures for training, the transfer of information and all procedures of a complete management and quality control system.

Environmental Sustainability - the ability of an activity to continue indefinitely, at current and projected levels, without depleting the social, cultural and natural resources required to meet present and future needs.

General Waste - waste that does not pose an immediate threat to man or to the environment, i.e. household waste, builder's rubble, garden waste, dry industrial and commercial waste. It may, however, with decomposition, infiltration and percolation, produce leachate with an unacceptable pollution potential.

Governance - is the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and cooperative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal agreements that people and institutions either have agreed to or perceive to be in their interest. It involves setting policy to guide an activity to ensure that the money, people and institutions required to do the work, are in place. Governance also entails making sure that people are accountable for the work they do, monitoring what happens and making new plans to carry the work forward.

Green-house gases - gases in the Earth's lower atmosphere that trap heat, causing an increase in the Earth's temperature.

Habitat - a place, characterised by its physical properties and other life forms, where an organism or community occurs.

Hazardous waste - waste, including radioactive waste, which is legally defined as "hazardous" in the state in which it is generated. The definition is based on the chemical reactivity or toxic, explosive, corrosive or other characteristics which cause, or are likely to cause, danger to health or to the environment, whether by itself or when in contact with other waste.

Hazardous Waste (alternative definition) - Waste that may, by circumstance of use, quantity, concentration or inherent physical, chemical or infectious characteristic, cause ill-health or increase mortality in humans, fauna and flora, or adversely affect the environment when improperly treated, stored, transported or disposed of.

Heavy metals - term used to describe a class of metals (many of which are toxic) which persist in the environment.

Holistic - term used to describe an approach which is all encompassing.

Input charges - charges levied on inputs to production processes to limit pollution at a later stage in the product life-cycle.

Integrated environmental management (IEM) - a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process in order to achieve a desirable balance between conservation and development.

Integration - approaches to integration, with regard to pollution prevention, may be divided into philosophical, functional and organisational approaches. These approaches need to be dealt with separately in order to provide resolution to these various aspects. They are, however, inter-related and can thus not be developed in isolation.

Functional integration may take place around the source of pollution (such as mining or waste disposal), around the environmental media (air, water and land/soil), around an ecological system (such as a catchment) or around a substance (such as mercury).

Integration, therefore, provides the linkage between:

- how much source based control is necessary
- how clean the air, water and soil needs to be
- how much remediation is necessary.

Intergovernmental - this term refers to relations between spheres of government and to relations between government agencies in the same sphere of government.

Internalisation - the incorporation of externalities into market prices.

Investment credits - incentives to producers and developers to invest in equipment that reduces pollution and or developments that are beneficial to the environment.

Landfill and landfilled - these terms refers to a commonly used method of solid waste disposal which includes placing the waste in a specially designed site and covering it.

Leachate - the term used to refer to the liquid with a high pollution potential which flows through and out of a landfill.

MINMEC - the Committee of Ministers and Members of the Executive Councils: Environment and Nature Conservation.

Mutagenic - ability to cause mutations or changes in living cells.

Non-renewable resource - a resource that either cannot be renewed once it is used or lost or cannot be renewed in historical time.

Ozone - see stratospheric ozone.

Particulates - solid particles of pollution emitted from various processes.

Point and non-point pollution - point pollution refers to that pollution for which the source can be clearly identified, and non-point or diffuse refers to pollution for which the sources cannot be clearly or easily identified.

Pollution - the introduction into the environment of any substance caused by the action of man which has, or results in, significant harmful effects to mankind or the environment. Pollutants include any substances which make the environment less fit in any way for its intended use.

Pollution charges - charges levied on discharges of pollutants to the environment.

Pollution prevention - the avoidance of impacts on the environment through avoidance and minimisation of waste generation.

Product/service subsidies - financial assistance to lower the price of environmentally friendly products or services.

Product stewardship - taking responsibility for a product throughout its entire life cycle, including the responsibility for managing the product as a waste after being discarded.

Radio-active - substances emitting radiation due to the disintegration of unstable atomic nuclei. Radiation can cause various forms of cancer and genetic mutations.

Renewable resource - a resource produced as part of the functioning of natural systems at rates comparable to its rate of consumption. Limits to renewable resources are determined by flow rate and such resources can provide a sustained yield.

Resource charges - charges levied on natural resources during their initial exploitation or extraction.

Risk assessment - a process of gathering data and making assumptions to estimate short- and long-term harmful effects on human health or the environment from exposure to hazards associated with the use of a particular product or technology; or establishing the probability of an event occurring, the factors that could bring about that event, likely exposure levels and the acceptability of impacts resulting from exposure.

SADC - Southern African Development Community.

Silviculture - cultivation of trees.

Stratospheric ozone - an unstable form of oxygen found in the stratosphere, the layer of the atmosphere roughly between 15 and 50 kilometres above the earth. This 'ozone layer' absorbs much of the UV-B radiation from the sun. Exposure to UV-B radiation can cause skin cancer and excessive exposure can cause mutations in plants and other life forms.

Teratogenic - ability to cause foetal damage.

Toxic - poisonous.

Toxic waste - a form of hazardous waste that causes death or serious injury such as burns, respiratory diseases, cancer or genetic mutations.

Waste - an undesirable or superfluous by-product, emission, or residue of any process or activity which has been discarded, accumulated or been stored for the purpose of discarding or processing. It may be gaseous, liquid or solid or any combination thereof and may originate from a residential, commercial or industrial area. This definition excludes industrial waste water, sewage, radioactive substances, mining, metallurgical and power generation waste.

APPENDIX 4

ACKNOWLEDGEMENTS

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