

Discussion Document Towards a White Paper on Integrated Pollution Control and Waste Management

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Department of Environmental Affairs and Tourism

Department of Water Affairs and Forestry

PREFACE

The purpose of this document is to provide a basis for developing a policy which will lead us along the path of integrated pollution control and waste management to ensure that all South Africans, both now and in the future, will have an environment which always caters for their well being. The participation of every resident of this country - through all levels of government, business, industry, labour, community based organisations and non-governmental organisations - is central to the effective development of policy and its implementation. All South Africans have a role to play in the national efforts to achieve a cleaner environment.

In the process of transforming South African society, one of the priorities stated is that the government "must ensure that all South African citizens, present and future, have the right to a clean and healthy environment". An important area of concern as regards impact on the biophysical and social environment, is pollution and waste.

Ever increasing urban and industrial development throughout the world is leading to levels of pollution which seriously threaten the natural environmental media (water, air and land/soil) upon which mankind depends for its survival. The Reconstruction and Development Programme (RDP base document), also states that existing environmental policies in South Africa allow, in some cases, for sub-optimal use of natural resources, and unacceptably high levels of air and water pollution. South Africa has extensive environmental legislation regarding pollution control and waste management. However, responsibility for the implementation is scattered over a number of departments such as Environmental Affairs and Tourism and Water Affairs and Forestry, amongst others.

The Departments of Environmental Affairs and Tourism and Water Affairs and Forestry have therefore jointly undertaken to develop an Integrated Pollution Control and Waste Management policy for South Africa. This policy will set the framework within which a regulatory framework consisting of institutions, functions and legislation can be developed for integrated pollution control and waste management.

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The Consultative National Environmental Policy Process (CONNEPP) will produce a framework for environmental management within which the Integrated Pollution Control and Waste Management (IPC & WM) regulatory approach will operate.

All interested and affected parties are encouraged to take part in the process and contribute to the development of a policy on integrated pollution control and waste management.

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Minister of Environmental Affairs and Tourism

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PUBLIC PARTICIPATION

The formulation of an Integrated Pollution Control and Waste Management (IPC & WM) system was commissioned during 1994 by the Ministry of Environmental Affairs and Tourism. Since waste management is the responsibility of the Department of Water Affairs and Forestry, the Department decided to join the Department of Environmental Affairs and Tourism in the development of the policy.

This discussion document is a further step in the consultative process to ensure that all stakeholders are given the opportunity to participate in the process. The MECs for Environment in the provinces have undertaken to workshop this document within the provinces. The inputs received will be used to draft the White Paper.

You are therefore requested to participate in the development of the White Paper for Integrated Pollution Control and Waste Management by raising your views at the workshops or through direct submissions to the Department of Environmental Affairs and Tourism (DEAT). When commenting please state the specific chapter and section in the discussion document you are referring to. Comments should reach the Department no later than 25 July 1997.

Activity	Dates
Provincial Workshops on Discussion Document	June and July 1997
Direct comment DEAT (Deadline 25 July 1997)	June and July 1997
Parliamentary Committee discussion of White Paper	September & October 1997
Public comment on White Paper to DEAT	September & October 1997

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EXECUTIVE SUMMARY

This Discussion Document introduces the topic of integrated pollution control and waste management and highlights the reasons for and significance of developing a holistic policy in this regard.

The three cornerstones used in the development of the policy are:

- constitutional rights
- a shift to sustainable development,
- meaningful involvement of civil society.

The approach is based on receiving media (water, air and soil / land), and cross-media integration.

A situation analysis of the status quo in terms of current pollution control and waste management in South Africa is presented. Key pollution and waste management issues are discussed. The current legal framework for pollution control and waste management is reviewed. International trends are briefly touched on. Institutional and administrative issues are highlighted, as well as the inadequacies in existing information and the limited access to this information.

A vision has been formulated and principles, goals, objectives and key issues for integrated pollution control and waste management are proposed.

To facilitate discussion on a new policy for integrated pollution control and waste management a number of proposals are presented for discussion.

The proposals include:

- an overall approach
- various generic functional institutional models/mechanisms
- regulatory instruments
- environmental information
- possible legislative changes.

A way forward is suggested considering both short and medium term issues.

To assist the reader a bibliography of references used in the compilation of this discussion document is given, as well as a glossary of terms and the CONNEPP principles as set out in the draft White Paper on Environmental Policy.

Finally, the proposed vision is:

To ensure sustainable and equitable use of air, water, and soil/land by empowering all South Africans to participate through a holistic approach to the creation, maintenance and management of a clean and healthy environment as

envisaged by the Constitution

ACKNOWLEDGEMENTS

The contents of this Discussion Document are the product of a team effort of the Integrated Pollution Control and Waste Management Project Committee representing government, non-governmental organisations, community based organisations, COSATU, SANCO, mining, business and industry, and the Drafting Team.

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INTRODUCTION TO POLLUTION CONTROL AND WASTE MANAGEMENT IN SOUTH AFRICA

1.1 BACKGROUND TO THE INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT PROJECT

Concern with both the detrimental health effects and environmental impacts of sub-optimal management of waste and increasing levels of pollution in South Africa has escalated recently. Although other countries at comparable levels of economic and social development are experiencing similar problems the situation in South Africa, exacerbated by the apartheid legacy, has to be rectified. In particular the inequitable proportion of the pollution burden borne by previously disempowered communities has to be redressed.

The challenge is, therefore, to revise and rearrange the previous haphazard and fragmented laws and uncoordinated institutions to achieve integrated pollution control in South Africa.

Concern about the existing and projected pollution of South African natural resources led the Department of Environment Affairs and Tourism and the Department of Water Affairs and Forestry to initiate a project to:

- review the existing pollution control and waste management system, and
- propose an improved system

This project is intended to assist the above two departments in the development of a White Paper on Integrated Pollution Control and Waste Management.

1.2 APPROACH TO THE PROJECT

A multi-sectoral Project Committee under the chairmanship of Deputy Minister Peter Mokaba was formed to direct the drafting of a Discussion Document by a Drafting Team. The Drafting Team was charged with producing a Discussion Document which would be subjected to public comment and which would use documents already generated by the Integrated Pollution Control and Waste Management Project and discussions with relevant government departments.

The review of the status quo is divided into two sections, namely a legal review which is available as a separate document entitled "Integrated Pollution Control and Waste Management: Legal Review" and this Discussion Document. The results of the legal review will be used to develop more concrete proposals on legislative and administrative reform as part of the White Paper which will be drafted after completion of the public consultation process.

A vision for Integrated Pollution Control and Waste Management was formulated which is underpinned by the relevant principles from the Draft White Paper on Environmental Policy and additional principles specific to pollution control and waste management. The status quo analysis was then used as a basis to formulate proposals for an improved management system which will take all role-players into account.

1.3 THE NEED FOR AN INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT POLICY

1.3.1 Constitutional rights

Section 24 of the Bill of Rights in the Constitution of the Republic of South Africa guarantees environmental rights for the people of South Africa.

Section 24 states 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. *prevent pollution and ecological degradation;*
 - ii. *promote conservation; and*
 - iii. *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."*

In order to give effect to this constitutional right, pollution and waste must be more effectively managed than in the past. To this end, all pollution and waste issues must be managed in an integrated manner. This policy provides proposals for an integrated pollution control and waste management system.

The constitutional right concerning access to information is also central with respect to integrated pollution control.

Section 32 states that

- a. *"Everyone has the right of access to-*
 - i. *any information held by the state; and*
 - ii. *any information that is held by another person and that is required for the exercise or protection of any rights*
- b. *National legislation must be enacted to give effect to this right, and may provide for reasonable measures to alleviate the administrative and financial burden on the state."*

It is suggested that consideration be given to the drafting of legislation to give effect to the right of access to pollution and waste information. Furthermore, it is suggested that consideration be given to a means of establishing an administration system for environmental information, without creating too large an administrative or financial burden on the state or the private sector. To satisfactorily meet the spirit of the Constitution such legislation must ensure both that the appropriate information is collected and that it is accessible.

1.3.2 Shift to sustainable development

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

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

Pollution prevention calls for a change, amongst others, in the way:

- mines, manufacturing plants, refineries, and other industrial operations are designed
- transport systems are planned
- authorities and private individuals manage their waste generation and disposal
- farmers use fertilisers and pesticides.

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

1.4 CIVIL SOCIETY INVOLVEMENT IN INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT

1.4.1 Introduction

Public participation is stressed in every facet of governance. However, there is a lack of implementation mechanisms to facilitate this participation. This policy proposes measures to ensure public participation in general environmental processes, and in specific areas, such as integrated pollution control and waste management.

The proposals in this policy are intended to address the historical lack of emphasis on public participation, particularly at the level of poorer communities. For many years communities have campaigned, especially at the local level, for the right to be recognised and involved in decision-making processes affecting their daily lives. During the CONNEPP process it was agreed that in the area of environmental management the government needed to be a prime facilitator to ensure public participation from all levels of society. With respect to local communities this participation was seen as a two-way process, with government making information available to communities and communities providing government with information on their local needs and priorities as well as participating in community action to improve the environment.

Civil society needs be given its rightful role in the decision making process on issues relating to integrated pollution control and waste management. Civil society has to take up its responsibilities in addition to vigilantly monitoring government. However, in order to make the former possible, capacity building and training will need to form an integral part of a new approach to integrated pollution control and waste management.

1.4.2 The role of civil society

The "watchdog" and activist roles that civil society have played in the past have been valuable in furthering environmental management and in placing pollution control and waste management high on the public and political agenda. This function of civil society and especially of community based organisations, labour unions, and non-governmental organisations will be promoted within an integrated pollution control policy.

An integrated policy will not only integrate pollution control across media and across government departments, it will also integrate pollution control across the full spectrum of society. Harnessing the energy of civil society in addressing environmental problems will be promoted. In so doing an integrated pollution control policy should encourage voluntary activist actions, such as community environmental policing (for example, stopping illegal dumping); whistle-blowing (for example, reporting environmental transgressions); and informing communities, land-owners and other role-players about environmental problems in their areas. In the process of encouraging such activism the particular constraints of civil society organisations must be recognised and addressed. These constraints include such practical issues as appropriate times and venues for meetings, the provision of information in suitable languages or formats, and other mechanisms to facilitate public participation.

A further role for civil society is to become part of the decision-making process. However, in order to make this role possible, a process of awareness creation coupled with education and training should take place. In addition, civil society should not only look at government to address problems on pollution and waste, but it should also address this problem itself from grassroots level up.

Specific sections of civil society will have particular roles to play in pollution control and waste management, for example:

1.4.2.1 Labour

Pollution affects workers, communities and the physical environment alike, albeit in different ways and to differing degrees. Workers were fighting workplace pollution long before environmental pollution became the public issue it is today, since workers tend to be at the front-line of pollution problems, and the first exposed to hazardous production processes. For these reasons workers must be integrally involved in the solutions to pollution control problems. In particular, labour must:

- participate in plant level environmental management and environmental audits (when these are required)
- have the right to divulge information to the public, media or government which concerns illegal pollution on the part of an employer, (so-called whistle-blower protection). This right should be specifically protected by law.
- have the right to refuse to pollute in the case of illegal or deliberate pollution, as an extension of the legal right to refuse dangerous work.
- have the right to full knowledge about the nature and extent of pollution of their place of work
- be involved in national and international processes setting broad pollution control policy, especially where this policy may have an effect on the economy and on employment.

1.4.2.2 Community based organisations

Community based organisations which are involved at the grassroots level of communities and have intimate knowledge of the impacts, and often the sources, of pollutants on their communities and surrounding environment. For this reason, they are a part of civil society that must have access to pollution control decision-making and to local environmental information. In this regard they must:

- have particular access to decision-making processes affecting their communities

- be assisted via capacity building and information dissemination to enable them to participate from a base of knowledge and expertise
- be assisted via practical means (such as access to municipal meeting venues and appropriate meeting times) to participate in pollution control decisions.

1.4.2.3 Non-governmental organisations

Non-governmental organisations encompass a range of civil society groupings that have a role to play in pollution control. These organisations range from national environmental organisations to locally based groupings, and from organisations covering a wide range of issues to single focus groupings. They thus have particular expertise, and form the major representative of civil society's views within their particular area of concern. It is for this reason that non-governmental organisations have been so instrumental in driving the growth of environmental awareness and in advancing environmental policy. As is the case with community based organisations, non-governmental organisations must be supported in their roles by:

- having access to decision-making processes within their area of interest and activity
- having full access to information to enable them to participate from a base of knowledge and expertise
- practical means, such as appropriate meeting times, or financial support for attending key international meetings
- recognition of their status as stakeholders in pollution control and waste management issues.

1.4.2.4 Business and industry

Generally improved environmental performance beyond the level of minimum compliance with statutory requirements is managed and promoted by business and industry associations. Their role in enhancing environmental performance will be recognised by this policy and their continued activities in this regard will be supported by:

- having full access to information so as to enable them to participate from a base of knowledge and expertise
- recognition of their status as stakeholders in pollution control and waste management issues
- having access to decision making processes within their area of interest and activity
- encouragement for voluntary initiatives.

1.5 MEDIA-BASED APPROACH TO THE SCOPE OF THE DISCUSSION DOCUMENT

A criticism of the current pollution control and waste management system is that different approaches and levels of management are afforded the different media. In order to address this criticism, it is deemed necessary to identify the media and the components of each medium which will be addressed by this discussion document in order that none is omitted, and that they are all afforded the same degree of attention.

In addition to dealing with the three fundamental receiving media, consideration is also given to the integration of media. Approaches to integration, as in the case for pollution control, may be divided into philosophical, functional and organisational. These approaches

need to be dealt with separately in order to provide resolution. They are, however, inter-related and can thus not be developed in isolation.

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 the development and land use planning processes and structures. This requires the 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

overall integration of government environmental functions affecting:

- institutional arrangements
- legislation
- all policies in all spheres of government

Three basic media are identified namely: water, air, land /soil with waste being specifically included as a pollution source.

1.5.1 Water

Pollution control in this medium will cover:

- inland water
- ground water
- estuaries
- marine waters.

1.5.1.1 *Water quality management*

Issues to be considered in relation to policy implementation include:

- management of storm water from industrial and urban areas
- polluted base flow originating from industrial effluent discharges and seepage from waste disposal sites
- leakage from sewage systems
- non-point and diffuse sources of pollution from agriculture, industry, atmospheric deposition and mining
- the origins and impact of toxic substances in water
- groundwater classification and management
- recycling and disposal of sludges arising from waste water and water treatment plants

- water quality requirements supporting aquatic life systems
- land uses affecting catchment water quality.

In relation to integration, the following technical issues are also of concern with regard to water quality management:

- soil erosion resulting in siltation of reservoirs and high silt loads in rivers
- atmospheric deposition on land and indirect impact on surface and ground water
- windblown dust and solids from tailings deposits and the impact on water quality
- the domestic use of herbicides, pesticides and poisons, and their contribution to contamination of storm water.

1.5.2 Air

Air pollution control will consider pollution at the local, regional and global scales. The policy will include atmospheric odour generation and control and indoor air pollution apart from occupational health exposures.

1.5.2.1 Air quality management

Air pollution sources include:

- smoke arising from coal and fuel burning
- vehicle emissions
- dust arising from mining and industrial activities
- incinerator emissions
- various sources of greenhouse gases.

In relation to integration, the main issues relate to:

- the pollution of water when scrubbing air
- the disposal of solid waste from air pollution abatement
- the deposition of residual air pollution after abatement
- the formation of secondary air pollution particulates and deposition.

1.5.3 Land/soil

Only soil pollution/ contamination will be covered under the ambit of this medium. The loss of arable land through compaction and alien invasion will not be addressed. Soil erosion will not be covered *per se* except under water when it is regarded as a pollutant.

1.5.3.1 Land/soil quality management

In addition to the current emphasis, on the one hand, on the control of herbicides and pesticides, and, on the other hand on, the protection of land for agricultural use, a number of technical issues relating to integration should be considered:

- the impact of agricultural chemicals such as pesticides, herbicides, and fertilizers on surface and ground 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
- soil pollution from liquid effluent disposal via irrigation
- land application of sewage sludge
- the impact of industrial activity on ground and surface water quality

In relation to integration the main issues to be considered are:

- the impact of soil pollution on water quality
- the relationship between the Department of Agriculture and pollution control authorities.

1.5.4 Waste

The policy on waste management will cover the following categories:

- domestic waste
- commercial waste
- agricultural waste
- mining waste
- industrial waste
- nuclear waste
- medical waste.

1.5.4.1 Waste management

Although all pollution can be considered waste, the solid waste which eventually ends up in landfills and tailings dams is considered separately.

The most important technical consideration is defining:

- the scope of waste management
- the relationship between hazardous waste management, the control of hazardous substances, integrated waste management and integrated pollution control
- an appropriate classification system which not only distinguishes between hazardous and non-hazardous waste, but which classifies waste by sector and type and provides for appropriate control
- an approval system for land-based disposal of all waste classes
- appropriate levels of regulation for all types of waste applicable to waste generators, transporters, disposal sites, importation and exportation, and treatment and incineration.

The policy on waste management will facilitate implementation of the following hierarchy of objectives which serve to minimise the adverse impacts of the inevitable process of waste generation:-

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

Although three media are recognised in this discussion document, true integration requires that they be addressed as interactive systems. To this end, the cross linkages between the media will be detailed as well as the implications these linkages have to management and control of polluting substances and activities. Furthermore, both diffuse and point sources of pollution will be considered.

SITUATION ANALYSIS

2.1 KEY POLLUTION ISSUES IN SOUTH AFRICA

South Africa today is a developing country faced by a by range of pollution and waste problems. The key pollution issues which need to be addressed are outlined for the different media.

2.1.1 Water Quality Problems

Water quality is determined by chemical and microbiological constituents, and the physical attributes (*e.g.* temperature) of the water. With increased development in South Africa, the country's water resources are becoming increasingly polluted. The main problem areas, all of which ultimately have economic as well as environmental impacts, are discussed below.

2.1.1.1 *Salinisation*

Salinity refers to the total dissolved inorganic compounds in the water. The salinity of the fresh waters of South Africa varies substantially depending on background geology and atmospheric deposition. Anthropogenic effects on salinity include: discharge of municipal and industrial effluents; irrigation return water; urban storm water runoff; surface mobilisation of pollutants from mining and industrial operations; and seepage from waste disposal sites, mining and industrial operations. Increasing salinity is a problem in several catchments, but particularly in the Vaal River catchment.

Little information is available on the direct impact of salinity on freshwater ecosystems and biota. Increased salinity affects most of the water users, with the impacts including salinisation of irrigation soils; reduction in crop yields; increased scale formation and corrosion in domestic and industrial water conveyance systems; and increased requirement of pre-treatment of selected industrial water uses (such as boiler feed water).

2.1.1.2 *Enrichment by plant nutrients*

Aquatic biota and plants require certain nutrients for normal growth and reproduction. The most essential macro nutrients include nitrogen and phosphorus in various forms. The accumulation of nutrient compounds in excess of the natural requirements results in nutrient enrichment (eutrophication) and may impact on the composition and functioning of the natural aquatic biota. The excessive growth of certain selected species (*e.g.* algae), modifies the physical and chemical properties of water resulting in direct and indirect impacts on users. Eutrophication impacts relate mainly to the attractiveness for recreation

and sporting activities; the presence of toxic metabolites; the presence of taste- and odour-causing compounds; and difficulty in treating the water for potable and industrial use.

The aquatic biota may not be sensitive to the plant nutrients as such, but may be affected by the consequences of eutrophication. The natural biotic system may be disturbed by the modification of the water's physical characteristics (such as lower light penetration) and modification to the natural water chemistry (*e.g.* lower oxygen stress, elevated pH). Chronic to acute toxicity at elevated concentrations of trace metals in sensitive aquatic biota is also a consequence. Some aquatic organisms may be more sensitive than others to the presence of trace metals.

Anthropogenic sources of trace metals may include industrial discharges (*e.g.* metal finishing and plating industries), mine drainage and atmospheric deposition (lead from vehicle emissions).

2.1.1.3 Microbiological quality

Microbiological quality, in terms of the presence of disease-causing micro-organisms and parasites, is a matter of concern. Recreational and potable users of water rely on access to safe water. There is a major concern in the national drive to provide reliable and safe sources of water to all.

Human settlements are the major source of deteriorating microbiological water quality. Micro-organisms and parasites may enter the water environment as partially treated sewage effluents, seepage and wash-off from inadequate sanitation and waste disposal.

2.1.1.4 Sediment and silt migration

The sediment and silt load carried by streams and rivers typically reflects the natural geophysical and hydrological characteristics of the upstream catchment. Many South African rivers carry a naturally high suspended solids load, reflected by high turbidity. In the past, this has not been considered a significant water quality problem, although additional silt loads due to excessive soil erosion are becoming an increasing problem.

High suspended solids and silt loads impact on the light penetration of water, change natural productivity and affect the natural balance of predators and prey in biotic communities. They can also smother natural habitats and disturb specific types of organisms. Siltation of streams and rivers can change the viability of riverine vegetation. Additionally, high sediment loads are captured in impoundments and the storage capacity of these impoundments is constantly reduced. Release of silt-laden water from an impoundment can also place a high stress on downstream biotic communities due to abrasion and low dissolved oxygen conditions.

Apart from the natural sources, there are many anthropogenic 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.

2.1.1.5 Harmful inorganic and organic compounds

Natural waters typically contain very low concentrations of trace metals. Elevated concentrations of some trace metals, such as aluminium and iron may arise where mining activities, accidental spillage or contamination lead to the presence of radio nuclides in the water resources. Radiation is regarded as harmful in water, even in small quantities, especially for human consumption and livestock watering.

A large number of synthetic organic compounds are manufactured, some of which are toxic in various forms. The toxicity effects on the aquatic biota can range from chronic to acute and many of these compounds can be classified as carcinogenic, terranogenic and mutagenic. Persistent organic compounds, which may not be biodegradable or are slowly biodegradable, can accumulate in organisms and move up the food chain. Concern is not only for the potable use of water (these compounds typically are not amenable to removal by conventional water treatment technology), but 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.

2.1.1.6 Oxygen-consuming compounds

Compounds which consume oxygen in natural water bodies include organic compounds, reduced nitrogen forms (ammonia) and reduced sulphur forms (sulphide). These compounds are mainly associated with discharges of partially-treated domestic sewage and industrial effluents as well as urban runoff. The accumulation of degradable organic compounds (such as decaying plant matter) in impoundments can also depress the oxygen content. Low dissolved oxygen levels impact on natural aquatic biota, may liberate offensive taste- and odour generating compounds, requiring pre-treatment for water purification and in general reducing the aesthetic quality of water resources.

2.1.1.7 Thermal pollution

The introduction of warm effluents (including industrial effluent discharges, cooling water blow-down from power stations and mine water discharges) to a natural water body results in thermal pollution. Thermal pollution changes the natural ambient water temperature to above natural levels. The elevated water temperatures affect oxygen solubility and may also increase the biotic toxicity of certain chemicals, both of which increase stress on the environment. Natural aquatic biota may also be sensitive to the influence of temperature on cycles of hibernation and breeding. Unnatural temperature profiles/cycles may therefore disturb and even threaten the survival of aquatic biota.

2.1.1.8 Acidity

The pH of natural waters is determined largely by geological and atmospheric influences. Most fresh waters are relatively well buffered against a change in pH and are more or less neutral with pH ranges around 7-8. pH determines the form and mobility of many chemical compounds and thus, the potential toxicity of water resources (*e.g.* aluminium is mobilised by acidification). Human-induced acidification in fresh waters is normally the result of industrial effluents, mine drainage and acid precipitation. The metals that are most likely to have negative impacts on users as a result of lowered pH are iron, aluminium, cadmium, cobalt, copper, mercury, manganese, nickel, lead and zinc. Studies on the changes in the

acidity of rivers have indicated that fluctuations in pH have a severe effect on freshwater biota. Fluctuations in pH also affect domestic users, industry, mining and agriculture.

2.1.1.9 Other forms of water pollution

Point and non-point pollution as a result of a variety of land use and other activities include - infrastructure development, industrial/mining/manufacturing, human settlements, agriculture, recreation and tourism.

2.1.1.10 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, result in marine pollution. Off-shore, the air-lifting operations result in underwater sediment plumes which allegedly have a detrimental affect on marine organisms. In the near shore area there is increasing concern due to the extensive relocation of dunes sands. These possibly negative effects are being investigated but have not been categorically proven to date.

Oil and gas installations and operations require particular caution, due to the devastating environmental damage which could result should an oil spill occur - as graphically illustrated in the past. Oil tankers continue to navigate around our coastline with fairly frequent oil spills, requiring the contingency plan developed by the Sea Fisheries Research Institute to be invoked. Oil transfers (bunker oil) in harbours periodically result in spills. South Africa is required under marine pollution conventions to which it is a party (see legal section) to provide reception facilities for used oil as well as for garbage from vessels. The question arises currently who and how is the government going to pay for these expensive reception facilities.

Non-point source pollution through the seepage of sewage into coastal waters, partly as a result of increasing urbanisation in many coastal cities, is an increasing source of concern. Point source pollution is also an increasing concern as exemplified by the SAICCOR industrial effluent discharge pipeline off the KwaZulu Natal coast.

2.1.2 Air

2.1.2.1 Air pollutants

The South African environment suffers from air pollution of the following compounds: sulphur dioxide, nitrogen oxides, volatile hydrocarbons, carbon monoxide, carbon dioxide and chlorinated fluoro-hydrocarbons, as well as particulates.

2.1.2.2 The worst areas for air pollution

The highest levels of air pollution at ground level are found in townships without electricity. The use of coal stoves for cooking and heating in these areas causes air pollution well above safety levels. The Highveld areas of Mpumalanga Province are most affected by the electricity industry with about 64% of Eskom's total generating capacity concentrated in this area. Eskom has committed itself to electrifying the townships as part of the RDP. This electrification will help to improve air quality in these areas but will require increased generating capacity, increasing the pressure on human health and the environment.

2.1.2.3 Air pollution hot spots

Merebank is a residential area located 16 km south of Durban. This suburb is bounded by the airport and a complex range of chemical process industries in close proximity to the community of about 4000 persons. The main pollutants are particulates, sulphur dioxide, chromium vapours and toxic chromium, toxic waste dumps, heavy traffic flow, obnoxious odours and noise.

Cape Town experiences seasonal episodes of brown haze during the autumn and winter months from April to August. There are concerns that the brown haze may be intensifying. The primary emissions in the greater Cape Town area range from nitrous oxides, sulphur dioxides, hydrocarbon particulates and the pollution sources are primarily from petrol, diesel, coal and oil combustion.

The Vaal triangle, known as the industrial heart of South Africa, is one of the most diverse for industrial processes in the land. This region is notorious for its atmospheric stability during winter resulting in poor dispersion and dilution of air pollution. Apart from major industrial activities ranging from chemical, petrochemical, power generation (coal-fired power stations) and metallurgical processes, there are approximately 700 000 people using coal as a primary domestic energy source. Soweto, the largest black township in South Africa, is subjected to a severe pollution crisis as a result of domestic coal burning

2.1.2.4 Industrial and domestic fuel combustion

Larger local authorities have made significant progress in the city centres and the more affluent residential areas as demonstrated by the smoke and sulphur dioxide monitoring program in operation since 1958. The increasing number of sources of pollution and rapid urbanisation is however making further progress very difficult. New difficulties like informal settlements and trader fires are developing, while mutual encroachment by industry on residential areas remain general problems. The most pressing problem in air pollution in South Africa at present is the products of combustion in less affluent residential areas, where past attempts at realising a solution have failed. The main reasons for the failure are: 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 of air pollution.

2.1.2.5 Dust control

The control of dust from industries has to date been applied on an *ad hoc* nuisance basis only. Certain local authorities have addressed dust problems through local by-laws and regulations. Particularly problematic are some of the old mine dumps. This problem is being addressed, for example by the mine dumps program on the Reef, implemented by the GME in consultation with CAPCO. This program has now been augmented by the Environmental Management Program requirements, covering a much wider field.

2.1.2.6 Vehicle emissions

Diesel vehicle emissions have been controlled by local authorities with varying degrees of success, but certain technical difficulties in testing remain. Petrol vehicle emissions have not been controlled to date, but the extent and nature of emissions have been monitored

regularly. The introduction of lead-free fuel in 1996 enables consideration of further control strategies.

2.1.2.7 Air pollution control

The following are the main weaknesses perceived in current air pollution control:

- emissions control based on source control without reference to the receiving environment
- control equipment is poorly maintained with resulting high down time
- lack of prosecution as an indicator of strictness of control measures
- air pollution is not considered in planning the placement of industries and residential areas.

A serious weakness, not in the legislation, but in the execution of air pollution control is the lack of transparency in all aspects, ranging from the extent of emissions, through the width of implications of best practicable means (BPM) to the control strategies, planning input and monitoring of implementation. Air pollution control also needs to take account of the growing international concern with the issue of climate change.

2.1.3 Land/soil

Valuable soil resources are being used as a medium for disposing of increasing amounts of solid waste and effluent, which often contain heavy metals and other elements likely to permanently degrade the soil. Waste from local authorities, industries and informal settlements is the major source of such pollutants. Agriculture is both a producer and consumer of pollution. It contributes about 20 million ton per annum to the total stream of solid waste of 320 million ton per annum. Rough estimates suggest that over 31 000 hectare of soil are severely degraded in this way.

2.1.4 Waste

Waste management practice in South Africa is locked into a pattern which was successful in the past in keeping the cost of waste management far below that in developed countries. Although there are indications that these practices will need to evolve to meet growing present and future needs, almost nothing is currently being done to make this evolution possible. Key issues include the following:

2.1.4.1 Sources of pollution.

These could be point sources or diffuse sources and could include:

- badly sited, designed or operated landfills (ground and surface water, air, aesthetics, nuisance)
- mine tailings (ground and surface water, air, aesthetics, nuisance, radio-active)
- metallurgical dumps (ground and surface water, air, aesthetics, nuisance)
- mining/strip mining (the above plus general environmental degradation)
- inefficient incineration (air pollution)
- liquid effluent disposal (ground and surface water pollution)

2.1.4.2 Important polluting substances

These include, *inter alia*, heavy metals, putrescible organic wastes, petroleum products, cyanide, organic solvents, pesticides, landfill leachate and inorganic salts.

2.1.4.3 Affected sectors

All sectors are affected. Poorer communities are, however, more affected because of the apartheid legacy, particularly because of the abuse of municipal landfills by industry and the collapse of services during unrest. The poor also frequently tend to gravitate to waste disposal facilities because they represent a resource base.

2.1.4.4 Waste generation and disposal

The total South African waste stream was estimated in 1991 to be 460 million ton per annum, of which about 374 million ton per annum is generated by the mining industry and is mainly landfilled.

Of the rest, about 22 million tons per annum is industrial waste, the non-hazardous portion being disposed together with urban (*i.e.* domestic and trade) waste and the hazardous portion being co-disposed with domestic waste in specially designed landfills.

The average generation of domestic and trade waste in South Africa is about 15 million tons per annum or 0,4 kg per capita per day, which is a quarter to a half that in developed countries. About 95% is landfilled and 2,54% is recycled, the rest being littered or illegally dumped.

Other wastes including sewage sludge and waste from agriculture and forestry make up the remaining 49 million tons.

The major concern is that waste generation rates could rise with economic growth and rising standards of living, and quickly exceed the capacity of existing and planned waste facilities.

The focus of present waste management regulation is on landfill disposal. There is no regulation contained within a single Act that deals with other aspects of waste management such as generation, treatment and transportation of waste, principally because policy regarding these aspects does not yet exist.

2.1.4.5 Progression

The majority of the waste in South Africa, as elsewhere in the world, is disposed of on land. Although waste minimisation is a goal of this policy document, landfills are likely to remain the major means of disposal for the foreseeable future. Landfills in South Africa have historically been badly sited, designed or operated, which has led to adverse impacts on the environment, quality of life and even public health. They therefore represent the logical focus of efforts to control pollution and upgrade the environment.

Prior to 1980 there were some 36 Acts affecting waste disposal, but none, with the possible exception of the Water Act, were able to effectively protect the environment. The Environmental Conservation Act of 1980, however, made provision for registering and permitting of landfill sites, thus ensuring maintenance of standards, although it was only in

1989, with the revision of the Environmental Conservation Act that permitting was actually implemented. In order to implement and enforce the permitting of landfills, however, it was found that consistent standards were required. A series of Minimum Requirements, incorporated in three volumes was consequently commissioned in 1991 and published for comment in 1994 by the Department of Water Affairs and Forestry. The recent publication of an SABS Code of Practice for Mine Residue Deposits has the same objectives as the Minimum Requirements and is expected to have a similar positive impact.

With the evolution of a democratic South African political environment, an increase in environmental awareness, public scoping and participation became important issues in waste management.

On account of the above factors and others, such as the Occupational Health and Safety Act, the standard of landfilling in South Africa has improved significantly in certain areas, specifically in the areas of new landfills and the closure of existing landfills. In other areas, however, (e.g. in existing operating dumps) little real improvement is evident. Waste disposal is consequently in a state of transition, with the legislation in place to improve the situation, but with certain factors and issues requiring consideration in order to progress.

Against the background of progressive development, certain issues emerge that need to be addressed. These are identified and discussed as follows:

2.1.4.6 Thermal Treatment Technology

Incineration of infectious waste has been the main treatment technology in South Africa for many years. It is estimated there are 900 incinerators, most of them small ($\pm 50\text{kg/hr}$), but there are some larger ($\pm 250\text{kg/hr}$) commercial units in operation. Recently, in 1995, medical waste incineration was designated as a scheduled process under the Atmospheric Pollution Control Act. This designation has led to the upgrading of a few incinerators, but currently most still do not conform to the Act, operate at low temperatures (600°C) and are poorly operated.

Incineration and other thermal technologies, such as plasma arc and molten metal technology are well proven technologies for the treatment of chemical and infectious waste, e.g. in Europe and North America. Controlled and well managed incineration with appropriate environmental controls could play an important role in South Africa in the future and many Extreme and High Hazard Wastes could be excluded from landfilling.

2.1.4.7 Lack of waste minimisation and avoidance initiative

Of concern is the current lack of regulatory initiatives to drive waste minimisation, which offers enormous potential for reducing the hazardous waste problem.

Waste minimisation initiatives, in addition to reducing the potential for pollution from the waste, will reduce the volume of waste which must be landfilled, and in so doing conserve valuable resources and airspace.

2.1.4.8 Opposition to landfilling

There is a low level of public trust in waste management decisions taken by industry, waste companies and the regulatory authorities. Most waste sites are perceived to have been

badly located, inadequately designed and poorly operated and controlled. Until public opposition recently started to pose a real threat to waste operations, there was effectively no public consultation.

The legacy from the above mentioned aspects will remain for a long time. Unnecessary waste generation and dangerous practices will continue until some kind of agreement can be reached on satisfactory measures to address the underlying issues.

2.1.4.9 Inadequate waste management technology and practice

Waste management practice in South Africa is locked into a pattern which was successful in the past in keeping the cost of waste management far below that in developed countries. Although there are indications that these practices will need to evolve to meet growing present and future needs, almost nothing is currently being done to make this evolution possible. The following are a few examples of what could be done:

- The composting or digesting of as much as 50% of conventional waste that can be so treated, reducing the volume of waste requiring disposal and perhaps producing a useful product in the process
- Reducing the heavy metals and other toxic pollutants potentially present in sewage sludge, thus making a useful product rather than a waste to be landfilled
- Shared treatment plants for the detoxification or economic recovery of valuable metals from the waste of metals finishing and other small industries
- The separation at source of key toxic or recyclable materials
- The environmentally friendly recovery of or conversion into replacement fuels of organic liquids and other waste materials which are currently being inappropriately landfilled
- The destruction of hazardous organic waste materials that persist in the environment and accumulate in biological food chains, to which inappropriate disposal technology is currently being applied
- Alternatives to the co-disposal of hazardous waste, which use scarce hazardous waste airspace at ten times the rate of dry landfilling, is wasteful of water and causes a hazardous leachate threat.

2.1.4.10 Lack of long term planning

There is a lack of structure within which long term planning can be done to predict and change waste generation patterns, to encourage useful waste recovery, to foresee needs, to reserve sites for waste processing and disposal, and to establish links with physical land use decision making. Without such planning, the current debate as to whether or not the present situation represents a "crisis" will need to be repeated on an annual basis.

Co-operation between the three spheres of government in national planning needs improvement and planning structures must be put in place to facilitate the required co-ordination.

2.1.4.11 Uncontrolled diffuse waste sources

While there is partial regulation at present of the public sector, the waste industry and the major generators, diffuse waste sources are still effectively unregulated.

2.1.4.12 Poor standards of servicing and facilities

The poor standard of waste collection and disposal services has led to a high level of public disenchantment with the performance of local authorities and waste contractors as well as to a culture of non payment. The circumstances leading to the development of this culture are understandable, but local authorities are left in an untenable situation where they must provide services but have no means of recovering costs.

As a first step to improving environmental quality, methods to continuously reduce waste need to be found. These methods require a regulatory environment that encourages waste reduction, provides incentives to develop cleaner technologies and drives implementation of cleaner production techniques when they become available.

2.1.5 General

In addition to the specific situation sketched for water, air, land and waste, current pollution control and waste management is characterised by the general constraints set out below.

2.1.5.1 Inconsistent approach to pollution control

Different regulatory authorities address pollution control using different philosophical and management approaches. As a result they have been accused of taking an inconsistent approach to pollution control. It is contended that controls tend to be exerted more on operators who comply voluntarily or because they have to, than on operators who do not comply. It is suggested that a more consistent approach be followed to achieving pollution control in future policy.

2.1.5.2 Lack of appropriate ambient standards

Although both the Department of Water Affairs and Forestry's "Minimum Requirements for Waste Management" and the SABS's "Code of Practice for Mine Residue Deposits", address the current lack of appropriate standards for waste disposal, these now have to be adequately enforced. Only limited specific measures exist, e.g. in the case of hazardous waste generation, collection and transportation, legislation is currently being drafted by the Department of Transport. As far as quality is concerned, appropriate ambient standards need to be formulated.

2.1.5.3 Lack of the use of Risk Base Approach

The Minimum Requirements for Waste Management provide for consistent standards to be applied as a rule. In the case of exceptions, however, there is provision for defensible deviation, based on documented research of site specific factors and a consequent motivation. This basically amounts to a risk assessment, which is an internationally accepted procedure. (e.g. A Risk Based Corrective Action (RBCA) approach by the American Society for Testing of Materials (ASTM)). In South Africa, however, this process requires refinement and formalisation. Out of this process should come a clear requirement of environmental quality objectives and an appreciation of risks involved by all concerned. This approach needs to be extended to other areas.

2.1.5.4 Inadequate current re-cycling levels and clean production technology initiatives.

Clean technology and recycling represent the first two steps in integrated waste management. It is true, however, that inadequate attention has hitherto been paid to these steps in South Africa. The improvement of standards in waste disposal has, however, resulted in a substantial increase in disposal costs in some cases. This has, in turn, resulted in waste generators looking for alternatives to costly waste disposal, which include waste minimisation and resource recovery. The trends described are happening at present, however it is believed that, with the right policy directives, they can be enhanced.

2.1.5.5 Inadequate enforcement

It is believed that the single most important factor resulting in lack of progress in waste management and pollution control is inadequate enforcement. The spheres of government responsible simply do not have the capacity to enforce the policy and legislation already available to them. Until such time that the Departments can be empowered, significant progress cannot be expected.

2.1.5.6 Fragmentation of administrative and legislative systems

As evidenced from the Legal Review, South Africa's legislation pertaining to waste management and pollution control covers a wide range. This fragmentation must be seen both horizontally, that is, across about ten national (and nine provincial) government departments and countless local authorities ranging from the Department of Agriculture to the Department of Transport (Marine Division). In the vertical context, these laws must be seen in the context of the various rights and responsibilities regulating the relationship between national, provincial and local government authorities.

The problem of administration of these laws is compounded by the new Constitution which sets out the functional areas of concurrent and exclusive national and provincial legislative competence. It appears that these schedules were not compiled with the co-ordination or systematic organisation of environmental management in mind. The designation of "environment" as being a concurrent national and provincial legislative competence is problematic, even though there is an override provision giving national government the power to impose national standards and controls when necessary.

2.1.5.7 Lack of capacity

Many of the government departments tasked with implementing integrated pollution control and waste management suffer from a personnel shortage.

Effective enforcement of legislation requires a multi-skilled approach, which includes:

- inspectors to undertake field investigations and monitoring,
- scientists and technicians to analyse samples to determine the presence of pollutants or non compliance with a standard and,
- lawyers to prepare cases of non compliance for prosecution.

Inspection and analytical support is equally insufficient for the task, and recent budget cuts do not allow departments to employ the required number of inspectors to monitor even

limited areas in a comprehensive manner. It is clear that if more comprehensive inspection is to be implemented, effort and resources will need to be invested in training sufficient numbers of skilled and motivated inspectors.

2.1.5.8 Re-arrangement of national and provincial government relationships

Prior to the inception of the new government structure there was often confusion about the responsibilities of the different levels of government and even, in certain cases, between departments of government on the same level. This situation has been exacerbated since the inception of the new structure. Any recommended alternative will need to clarify roles and responsibilities particularly between the provincial and local spheres of government.

2.1.5.9 Lack of cross-media integration

The institutional fragmentation has created a situation where pollution is not managed in a manner that takes into account possible movements of pollutants between media.

2.2 LEGAL FRAMEWORK FOR POLLUTION CONTROL

2.2.1 Introduction

A legislative audit and review of international and national legislation concerning integrated pollution control and waste management was undertaken as part of this project. The objectives of this legal review were to:

- provide a status quo analysis which could be used to make clear recommendations for legislative reform in the White Paper to be drafted after the public participation process,
- provide existing provincial environmental departments with a clear basis for action in the interim.

The complete legal review is to be published as a separate document and will be available as a source document for the public. A summary of the existing legal situation is provided below.

2.2.2 Current legislation

International law: South Africa is party to a number of international treaties and conventions, some of which impact on pollution of the air, land and marine environment. The obligations imposed under these and their implications for integrated pollution control are assessed in the Legal Review.

The Constitution: The Constitution is relevant to pollution control and waste management for two broad reasons. Firstly, the Bill of Rights contains a number of rights relevant to the subject. Relevant constitutional rights include, for example, the right to an environment not detrimental to human health or well-being; the right that pollution acid ecological degradation is prevented; access to information; and, just administrative action. Secondly, the Constitution provides the legal basis for dividing national and provincial powers and is thus relevant to the institutional regulation of pollution control and waste management. The Constitution creates concurrent national, provincial and, in some instances, local

government legislative competence. It makes provision for the administration of different pollution control laws at various different levels of government.

Legislative competence: The National Government is empowered to pass legislation on any matter listed in Schedule Four of the Constitution, a competence which is held concurrently with provincial parliaments. The most important functional areas are environment, nature conservation, pollution control and soil conservation. Provincial authorities are empowered to pass legislation on functional areas listed in Schedule 4 and 5, which includes provincial planning. In the event of a conflict of national and provincial legislation, national legislation applies uniformly in the country as a whole, as well as dealing with a matter which cannot be effectively regulated by provincial legislation. For example, the establishment of norms and standards for the protection of the environment requires a national uniform report. Local governments are empowered to legislate on matters listed in Part B of Schedules 4 and 5. Functional areas include air pollution, stormwater management, water and sanitation services, domestic wastewater and sewage disposal systems, refuse removal, refuse dumps, solid waste disposal, and noise pollution control as a public nuisance. By-laws which conflict with national or provincial legislation are invalid unless the conflicting legislation compromises a municipality's right or ability to exercise its powers or perform its functions.

Institutional aspects: Aside from the legislative problems, the aforementioned constitutional arrangements have important institutional difficulties. For example, a waste disposal site which has been approved in terms of provincial planning legislation and which is creating a public nuisance and contaminating ground water may be contravening laws promulgated by each of the three levels of government. The national government may have promulgated water quality standards, the provincial government is responsible for enforcing the conditions for approval granted under provincial planning legislation and the local government is obliged to make and enforce legislation to control a public nuisance. From civil society's perspective it is difficult to know whom it must complain to in order to remedy the problem and there are clearly problems of overlapping jurisdiction.

Domestic Statutory Laws: An extensive analysis of the national, provincial and, in some instances, local legislation which governs pollution control and waste management has been carried out. The method adopted was to critically consider these laws in the categories of water (fresh and marine), air, solid waste and hazardous waste under the following headings: existing legal situation, institutional arrangements, and administration. The more important findings are summarised below.

2.2.2.1 Water Pollution: Fresh water

Existing legal situation: The control of fresh water pollution is governed by some thirty-one pieces of national legislation, at least three provincial ordinances and by countless by-laws. The most important national legislation is the Water Act of which Sections 21 and 22 are particularly relevant to pollution control. Section 21 requires that water used for industrial purposes be purified in accordance with gazetted standards and returned to the point from which it was abstracted. However, it is competent for the user to be exempted from these provisions, subject to the conditions that the minister may impose. Section 22 empowers the Minister to direct that a person who has control over land take steps to prevent water pollution.

Institutional arrangements: With regard to national ministries responsible, only the Department of Water Affairs and Forestry has any significant control over fresh water pollution activities.

Administration: Most of the legislation dealing with the control of fresh water pollution deals with water used in a particular area, and generally speaking does not require the issuing of permits. The main exception is the Water Act which specifies the issuing of a permit for the use of a quantity of water exceeding 150 cubic metres for industrial purposes. A second category of exemptions is the bylaws of some local authorities which will not accept trade effluent in the absence of a duly authorised permit.

2.2.2.2 Marine Pollution: Marine and coastal waters

Existing legislation: The categorisation of marine pollution laws is largely determined by a system of international marine pollution conventions to which South Africa is party. The general classification is as follows: the type of pollutant, with a strong emphasis on oil; the setting of internationally formulated standards; certain marine polluting activities or threats; the consequences of marine pollution, for example clean-up costs and general liability; and, the source of pollution.

Institutional arrangements: The administration of marine pollution laws is by and large the responsibility of three national departments: The Department of Transport is responsible for the implementation of standards; the Department of Environmental Affairs and Tourism is responsible for marine pollution; and the Department of Water Affairs and Forestry is responsible for water quality generally and thus for pollution of the marine environment by pollution from land-based sources. Coastal local authorities also play an important role in the administration and monitoring of marine pollution.

Administration: The administration of marine pollution from land-based sources is fundamentally the same as for fresh water, and is administered by the Department of Water Affairs and Forestry. The administration of foreign and South African vessel standards is the responsibility of the Harbour Authorities under the Department of Transport.

2.2.2.3 Gas, smoke and dust

Existing legislation: Atmospheric pollution by gas, smoke and dust is governed by the Atmospheric Pollution Prevention Act 45 of 1965. In respect of noxious gasses it operates by scheduling 69 processes in respect of which a registration certificate for the premises upon which the activity is carried out is required. Dust, smoke and vehicle emissions are also dealt with by the Atmospheric Pollution Prevention Act but, generally speaking, these aspects of the Act are administered at local authority level. Aside from the Atmospheric Pollution Prevention Act, there are several Provincial Ordinances, in particular local government ordinances, which prohibit the generation of atmospheric pollution in the form of burning, offensive or unpleasant smells, and empower a municipality to promulgate by-laws concerning atmospheric pollution prevention.

Institutional arrangements: The diversity of institutions in the control of atmospheric pollution prevention is principally horizontal, namely it is sub-divided between the national government (in the form of the Ministry of Environment Affairs and Tourism) and provincial government. It is competent for the Chief Air Pollution Officer (Chief Officer) to delegate some or all of his powers to a specified person in a local authority. The Act also provides for the administration of smoke, dust and noise regulations by local authorities where areas have been declared smoke or dust control areas or where the noise regulations have specifically been made applicable in those areas.

Administration: In respect of noxious gasses which are listed in schedule 2 of the Atmospheric Pollution Prevention Act, administration takes place by way of the issuing of a registration certificate in terms of Section 9 and 10 of the Act. Dust is controlled by empowering the Chief Officer to prescribe steps which must be taken to reduce dust generated by industrial processes if such dust is causing a nuisance to persons in a vicinity of which exceeds 20 000 cubic metres in volume. In special circumstances these steps may be taken and paid for by the State. The Minister is also empowered to make regulations concerning dust and these regulations may be delegated for administration to any person so authorised by the Minister.

2.2.2.4 Noise

Existing legislation: Air pollution in the form of noise is controlled by regulations regarding noise, vibration and shock, promulgated under Section 25 of the Environment Conservation Act. However, noise is also controlled by the Aviation Act 74 of 1962 (Section 22(1)), Section 341 read with Schedule 3 paragraph e of the Criminal Procedure Act 51 of 1977, the Road Traffic Act 29 of 1989 in terms of which no person is allowed to operate a vehicle causing excessive noise or noise on a public road (Section 103). Provincial legislation, mostly in the form of local government ordinances, which empower the promulgation of by-laws controlling noise also govern this source of pollution. Similarly, the Hospital Ordinance 14 of 1958 (Gauteng) prohibits riotous, violent or unseemly behaviour. (Section 3(D)) of the Schedule to the Act, the Natal Nature Conservation Ordinance 12 of 1983 prohibits the use of various kinds of noise (Section 44(2)(j & k)). Local authorities have promulgated by-laws controlling noise either in terms of the local government ordinance controlling their province or in terms of the Environment Conservation Act.

Institutional arrangements: Noise pollution control is generally controlled by local authorities. However, it may also be regulated by the Department of Transport.

Administration: There are no provisions in the Environment Conservation Act for exemption permits in respect of noise generation.

2.2.2.5 Solid Waste

Existing legislation: Solid waste is principally governed by the Environment Conservation Act 73 of 1989, and in particular Section 20 of that Act. However, solid waste is also dealt with in a wide range of other legislation, including the advertising on Roads and Ribbon Development Act 21 of 1940 (which prohibits the deposition of waste near specified roads). In the National Building Regulations and Building Standards Act 103 of 1977 which empowers a local authority to prohibit the erection of a building which is to be built on land covered with refuse, the first Act 122 of 1984 which prohibits the dumping or scattering of litter in a forest, the Rural Areas Act (House of Representatives) 9 of 87 which allows the Minister (of Housing) to plan for a town commonage for the dumping of rubbish soil and the like, The Minerals Act 50 of 1991 which governs solid waste generated by the Mining Sector, the Local Government Transitions Act 209 of 1993 which prescribes the powers and duties of Metropolitan Councils in relation, among other things, to waste disposal facilities. There are also various pieces of Provincial legislation dealing with waste.

Institutional arrangements: Although the Environment Conservation Act is administered by the Department of Environment Affairs and Tourism, application for the establishment of a waste disposal site have to be made to the Minister of Water Affairs.

Administration: Solid waste management is administered both in terms of the Environment Conservation Act (and the various other pieces of legislation referred to above) and in terms of directives and regulations issued by the Department of Water Affairs and Forestry, not all of which have the force of law. A permit is issued in terms of Section 20 and, in administering the Act, the Minister of Water Affairs is obliged to maintain a register in which details of all waste disposal sites for which permits have been issued are recorded. However, many of the waste disposal sites which operate in South Africa are not duly permitted.

2.2.2.6 Hazardous waste (and hazardous substances)

Existing Legislation: The most relevant statutes are: the Hazardous Substances Act (15 of 1973), the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (36 of 1947) and the Environment Conservation Act (73 of 1989) (the "ECA") Part 4 (ss, 19-20) which is headed "Control of Environmental Pollution". Current legislation regarding hazardous waste is fragmented, and lacks clear identification of responsibilities. In addition there is an obligation under the Basel Convention to establish a central focal point and notifying authority.

Institutional arrangements: As the existing hazardous waste laws are fragmented, so too are the institutions which administer them although the Department of Environment Affairs and Tourism has in practise taken upon itself to administer certain aspects of waste management. The Department of Water Affairs and Forestry plays a key role as regards waste disposal sites.

Administration: The Department of Water Affairs and Forestry administers a key section of the Environmental Conservation Act dealing with waste management (Section 20). It imposes permit requirements for the operation of waste disposal sites. Local authorities are included under the purview of this provision and are required to comply with it like any private operator. This section is complimented by regulations for waste disposal (GN R1196 GG15832 dated 8/7/1994). In practise the "Minimum Guidelines" are also used, although these are not referred to in the legislation.

2.3 INTERNATIONAL TRENDS

A review of international trends in integrated pollution control and waste management was undertaken by L & W Environmental for the Department of Environmental Affairs and Tourism during the period 1994 and 1996. The authors of the review concluded that most of the countries studied have systems that fall into one of the two following categories.

The classical approach: a well organised and functioning system based on traditional media and / or sectoral approaches, based largely on direct government intervention and control

Such systems are characterised by complex, often fragmented, institutional, legal and administrative structures and unclear jurisdictions which overlap between different institutions. A major role of the government is in implementation of the environmental and pollution control policy characterised by significant government investment in research and technological development, and almost complete government responsibility for remediation and monitoring. Integration is typically limited and signs of the problems resulting from the lack of integration are beginning to appear in all of these countries (*e.g.* change in the objectives and mission emphasis of the USA EPA *etc.*).

Transitory systems: countries characterised by a major transition towards integrated environmental policy and new approaches to administrative, organisational and legislative systems, mostly in line with the identified need for integration at all levels and in all aspects of environmental protection

Administrative, organisational and legal systems in these countries are characterised by continuous change and restructuring in a search for optimal solutions. It is interesting to note that many institutions in these countries have relatively short life spans until an agency-type institution given a mandate to manage the environment in an integrated manner evolves (e.g. NRA in UKA etc.).

Of special interest is the characteristic of systems in these countries which emphasises public involvement and participation, as well as framework type environmental legislation in the form of general all-encompassing environmental acts. Implementation of policy and regulation typically take place at the lower levels of government while research, development and information management are kept at a national level through specialised administrative and institutional structures.

Integrated environmental management is typically the driving force behind systems in these countries and government intervention appears to be less direct.

Some countries, however, have systems that cannot be easily classified in one of these two systems, e.g. because their systems seem to be characterised by administrative, organisational and legal approaches which are highly fragmented, and often not fully functional.

Administrative, organisational and legal systems in these countries are characterised by periodic change associated with political changes in the country. They are often uncoordinated efforts and activities of different government departments. Also, other elements occur, e.g. in the form of countries that place much emphasis on the planning process in all sectors of environmental management and protection. This approach is of special interest for South Africa in that the unique opportunity created by the new situation in South Africa can result in the country developing advanced administrative, organisational and legal approaches to environmental protection and pollution control.

2.4 INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT INFORMATION

2.4.1 Inadequate integrated pollution control information

A basic problem with the current pollution control system is its inability to collect, manage and release data on pollution effectively. The problems with the information capacity of the current system can be divided into three areas:

- inadequate pollution and waste generation and release information
- inadequate ambient environmental quality information
- lack of access to information and inadequate dissemination

2.4.2 Inadequate pollution release information

There is little knowledge of types, quantities, or location of a wide range of polluting substances released into the environment. This lack of knowledge applies to the generators of the waste as much as it does to the regulators. A 1992 Department of Environmental Affairs and Tourism study found that in the private sector very few industries have waste management strategies or plan their waste management before starting up. From the side of waste facility operators and the public sector, no annual statistics or databases are available. Only a few operators of waste facilities and transporters of waste have detailed knowledge of the waste they handle.

As early as 1992 the Department of Environmental Affairs and Tourism report noted that,

"at present there is a severe shortage of information for planning, decision making and public information. For all facets of environmental management to be effective, a database is urgently needed. It will be needed to aid regulation, both legislation and its implementation, research and strategic planning, commercial enterprises..... It will also be needed to provide data for reporting to the Basel Convention and other international bodies."

As yet, however, no such pollution database has been established. At present the Department of Environmental Affairs and Tourism and the Department of Water Affairs and Forestry are the two main repositories of available information on pollutant releases.

Due to the method of collection this pollutant release information is neither complete nor in a very useful format. The air pollution data is only for so-called "scheduled processes" under the Atmospheric Pollution Prevention Act 45 of 1965 and thus covers only permitted establishments and those substances permitted. At present there are about 2 000 permits in operation covering about 1 200 industrial sites. Similarly only effluent from releasers subject to a permit, and only those substances or parameters listed in that permit, are recorded by the Department of Water Affairs and Forestry. Furthermore the format of this data is inconsistent and is not suitable for year to year monitoring of nation-wide pollution releases nor for analysing pollution data geographically.

2.4.3 Inadequate ambient quality information

There is generally inadequate collection and collation of ambient environmental quality information. This inadequacy is a problem across the environmental media. In some instances, such as surface water, monitoring is better than the average, but in others, such as air quality and groundwater, ambient monitoring is highly inadequate.

For example, in a recent study of air pollution stations monitoring vehicular air pollution around South Africa's six major metropolitan areas, it was found that the air quality data was inadequate to use for a motor vehicle pollution control policy. There are too few monitoring stations, the pollutants monitored are not consistent nor necessarily the priority pollutants, and of the stations assessed only four in the whole country could be said to have valid data.

Similarly, a limited amount of information on groundwater pollution is collected by the Department of Water Affairs and Forestry from licensed landfills. The state of this water quality monitoring, a minimum requirement for the effective environmental management of

such sites, is an example of the highly unsatisfactory state of environmental pollution monitoring. Figures from a Department of Water Affairs and Forestry Report on such monitoring is shown in Table 1 below to indicate the poor performance of this aspect of integrated pollution control.

Table 1: Statistics on sites adequately equipped with water quality monitoring facilities

Environment	Sites equipped	Routinely Monitored
Mines - reactive env.	5%	3%
Mines - inert env.	0.5%	<0.1%
Coal fired power stations	90%	90%
General waste	0.5%	0.3%
Sewage - maturation ponds	<0.1%	<0.1%
Hazardous waste	50%	50%
Radioactive waste	100%	100%
Waste irrigation	5%	3%
Agricultural -feed lots	1%	<0.1%
Agricultural - diffuse	3%	<0.1%
On-site sanitation	1%	<0.1%
Urban development	1%	<0.1%

2.4.4 Limited access to and limited availability of information

Information which is held by government authorities is not readily available to the public. Under the Atmospheric Pollution Prevention Act there is a blanket secrecy provision (Section 41) which provides that no information can be disclosed without the consent of the person carrying on the undertaking or for the purposes of legal proceedings arising out of the Act. The Water Act 54 of 1956 has no direct statements of confidentiality, but it is the general practice of the Department of Water Affairs and Forestry not to release permit details without the consent of the pollution discharger. There are currently no general rights of public access to information on pollutant releases.

A culture of secrecy has developed amongst South African industries with many loathe to divulge environmental information - especially that which may reflect badly upon the company. This is partly due to the legal protection they enjoy, partly due to mind sets developed during the apartheid era, and partly due to inexperience with public interaction.

There are also no active government programmes of information dissemination providing information to stakeholders or the public on pollution releases and levels. There are no requirements for national, provincial or local government to inform citizens of pollutant levels or of the major sources of hazardous pollutants in their area.

This difficulty in accessing information seriously inhibits civil society and private sector action to improve environmental quality. Furthermore, it makes it difficult for interested organisations or individuals to pressurise polluters to reduce their emissions, and also makes it difficult for the public to assess and evaluate the impacts that pollution may have on them or their environment, while it allows polluters the protection of a veil of secrecy.

PRINCIPLES, OBJECTIVES AND KEY ISSUES FOR INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT SYSTEMS

3.1 VISION

3.2 PRINCIPLES

Principles are the fundamental premises used to apply, develop and test policy and subsequent actions, including decision making, legislation and regulation. This policy is underpinned by the principles set out in the White Paper on the Environment which are reproduced in Chapter 8.

The approach to integrated pollution control and waste management is essentially a management system based one and as such will be underpinned by a set of subordinate principles in addition to the overarching principles set out in the White Paper on the Environment. The following management principles will be considered.

- **Accessibility**

The system must be accessible to all sectors of civil society

- **Credibility**

Civil society must have confidence in the system and believe that its implementation will achieve the goals of integrated pollution control and waste management.

- **Clarity**

Legislation must be drafted in an unambiguous manner understandable to all sectors of civil society.

- **Consistency**

All elements of the system must be interconnected and interrelated to ensure that there is no contradiction between different elements.

- **Effectiveness**

All elements of the system must work together to ensure that the results produced enhance the quality of the environment.

- **Efficiency**

All elements of the system must work together to ensure that resources are used optimally.

- **Robustness**

The system must promote the achievement of objectives through the application of sustainable technologies.

- **Timeousness**

Decision making procedures must take place within reasonable time frames so as not to delay development.

- **Transparency**

All reasons for decisions must be recorded and available for public scrutiny.

3.3 INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT GOALS AND OBJECTIVES

In order to give practical effect to the principles outlined in the previous section, three strategic goals have been identified for the achievement of an integrated approach to pollution control and waste management. In addition, a number of objectives have been suggested for each of these goals. When developing implementation strategies, these objectives can be used as a benchmark for evaluations. Strategies that are considered for the achievement of these objectives will be evaluated against the principles.

3.4 KEY ISSUES TO BE ADDRESSED BY THE INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT PROCESS

As a first step in improving environmental quality, methods to continuously reduce waste and pollution need to be found. This requires a regulatory environment that encourages waste reduction, provides incentives to develop cleaner technologies and drives implementation of cleaner production techniques when they become available.

Pollution control, in practice, is driven for the industrial and commercial sectors through the use of conventional instruments, such as authorisations and regulations prescribing some form of best management practice. These instruments do not, however, drive continuous improvement. Other regulatory instruments such as mandatory reporting of waste statistics and sectoral quotas may thus be required to drive aggregate waste production downward.

A culture of waste avoidance must be adopted by all citizens of South Africa in order to create the context within which waste reduction can be achieved. The perceived will of some sectors to strive for real reductions in waste is, however, very limited. In these instances education and capacity-building will first be required to create a context within which waste reduction can be promoted.

Remediation entails the restoration of environmental quality in those instances where activities have resulted in a degradation of a natural resource or resources to the extent that they are no longer fit for use. Regulatory intervention is necessary where no party can be found to take responsibility for the degraded resource and for the costs of remedial action.

The current approach to remediation is that national departments implement remedial actions to restore a particular resource to an acceptable quality without necessarily taking other environmental media into consideration. Integration will be required in future in order to ensure that all environmental needs are taken into account.

Remediation can only be initiated on a case-by-case basis. The approach is thus needs or problem based. Environmental objectives are thus set to satisfy site specific requirements.

PROPOSALS FOR INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT

4.1 THE APPROACH TO POLLUTION CONTROL

The analysis of the current situation revealed a range of pollution and waste management problems in South Africa. The legal and institutional analysis demonstrated that present systems and approaches are inadequate or inappropriate for true integrated pollution control and waste management. This is evidenced, for example, in inconsistency in the approach to pollution control and waste management, from permitting through to enforcement. This section presents possible solutions to this lack of administrative integration.

A number of institutional models have been proposed in previous Integrated Pollution Control and Waste Management working group documents as well as the Draft White Paper on the Environment. Each model has positive and negative points. Rather than present each proposed model and any that have been suggested by the international analysis, a more appropriate approach for discussion purposes was considered to be to describe the required elements and then to present the various options as to achieve the elements for debate. This section does not, therefore, propose a definitive model as a solution, but rather identifies the problems and raises a suite of solutions for debate. It should also be noted that the final White Paper on the Environment has not yet been officially released. Certain positions regarding administration and governance of environmental issues have been taken in that document, but until it has been released they cannot be incorporated into this discussion. These positions will, however be incorporated into the White Paper on Integrated Pollution Control and Waste Management.

The discussion is focused around five key requirements. These are:

- a generic approach to integrating administration of pollution control, both vertically and horizontally
- an increased suite of regulatory tools, all based on the same general approach to pollution control which will enable the appropriate instruments to be used to effectively control pollution while promoting pollution prevention at source and clean technology. These tools would include supportive instruments of government, such as tax incentives for clean technology or similar measures
- improved access to pollution and environmental information by civil society so as to harness their energies in pollution reduction initiatives, supported by improved information collection methods for government, improved information sources and technical advice on clean technology be facilitated by government
- the adoption of a set of strategic priorities for action that will need to be addressed by government, the private sector and civil society; these priorities could include hazardous waste, key pollution problems caused by apartheid which continue to affect the poor, motor-vehicle pollution, and other diffuse and unregulated activities
- mechanisms to ensure the involvement of all sectors of civil society in all facets of pollution prevention and control.

The results of the debate will be used to formulate a mechanism for integrated pollution control and waste management that:

- encourages continuous improvement in pollution reduction in South Africa
- is transparent and responsive to the needs of civil society
- is based on sound environmental principles
- has equity at its core
- and is flexible enough to adapt to the changing needs of a fast developing country.

4.2 INTEGRATED POLLUTION CONTROL AND WASTE MANAGEMENT FUNCTIONAL MODEL/MECHANISM

The institutional and administrative arrangements that are presented for discussion below are intended to stimulate debate on the various elements of an integrated management system. They have not been tested against any proposals that are made in the soon to be released White Paper on National Environmental Policy as the final draft was not available at the time of writing. The requirements of the White Paper will be taken into account during the drafting of the White Paper on Integrated Pollution Control and Waste Management.

4.2.1 Introduction

The approach adopted in this section is to present the various items to existing National Departments which are or could be involved in pollution control and overlay requirements for integration. Various solutions to achieve these requirements are highlighted in boxes for debate. The diagram and discussion are not intended to represent an administrative or institutional model, but the debate points present a number of possible solutions which require institutional reorganisation. These possible solutions have been drawn from past Integrated Pollution Control working group documents, the CONNEPP Green Paper and the review of international trends (section 2.3).

4.2.2 General functions of an Integrated Pollution Control and Waste Management co-ordinating mechanism

The review of existing problems with and needs for integrated pollution control and waste management identified a number of functions required of any integrating structure, system, mechanism or procedure. These functions are presented as a background to the debate on the various possible solutions presented in the debate boxes:

- establishing and maintaining an effective system of integrated pollution control and waste management
- ensuring that all sections of the system use the same approach to pollution management incorporating source based minimisation and control, environmental media impact management and remediation
- establishing and maintaining a system of clearly defined points of entry for permit and/ or authorisation applicants.

Note: Permits and Authorisation

In the context of this discussion, the terms permit and/ or authorisation are used to indicate a set of conditions which result from negotiations between the issuing authority, the applicant and any relevant specialists. While it is, therefore, possible and even desirable that certain quantified limits to such aspects as emissions and discharges may be included in the permit or authorisation, it will also include specifications of what monitoring will be

conducted, by whom, with what frequency and where the results must be sent and with what frequency.

- establishing and maintaining a system of permit and/ or authorisation application evaluation
- establishing and maintaining a nation-wide system of standards and procedures for setting standards
- establishing and maintaining a system of nation-wide monitoring
- establishing and maintaining a nation-wide system of permit and/ or authorisation enforcement
- establishing and maintaining a system of interdepartmental interaction at permit and/ or authorisation evaluation, monitoring and enforcement stages
- establishing and maintaining a system of information collection, management and dissemination to all relevant sectors of the South African population
- establishing capacity building and awareness raising programmes and ensuring proper public participation and integration into decision making processes.

4.2.3 Essential generic elements of an institutional approach to integration

In essence, any suite of solutions to the existing lack of integration should focus on four main elements:

1. a mechanism/ system or structure to ensure interdepartmental co-operation. [This structure will ensure that national guidelines and standards are set for the purposes of the discussion this body is called the National Integrated Pollution Control Body/Mechanism, this name is not, however, an essential part of the proposal]
2. the National Departments who are legally responsible for various environmental media and industrial sectors, within which the relevant executive powers reside (and which may include inspectorates)
3. a permit/authorisation application receipt, processing and permitting or authorisation issuing agency/body or mechanism coupled with an inspectorate at national and/or provincial level where capacity and/ or need exists (For the purposes of discussion, these bodies are grouped together under the name Integrated Pollution Management Mechanism/Bodies)
4. a mechanism or system to ensure the facilitation of capacity building and public participation in all aspects of pollution control.

The following is a more detailed discussion of the above four elements.

4.2.4 National Integrated Pollution Control Body/Mechanism

4.2.4.1 Responsibilities

This body is responsible to Cabinet for effective environmental protection through integrated pollution control and waste management. Its initial responsibility would, therefore, be to facilitate interdepartmental integration in the spheres of pollution control and waste management through the establishment of the necessary structures, procedures and legislation.

DEBATE POINT 4.1

There are a number of alternative structures and functional responsibilities which this body could assume:

- the body could be one government department which acts as the lead agency in all pollution and waste management issues
- it could be a number of government departments acting as the lead agency depending on the medium or sector (current situation)
- it could be a secretariat which presents a single face to the public and ensures co-ordination between responsible departments and spheres of government. The role of this secretariat could be extended to include an evaluation panel drawn from relevant departments.

Another alternative is that the body is an independent organisation outside any government department and responsible only to Cabinet.

It could also be responsible for ensuring that all South Africa's international obligations with respect to pollution control are met; in other words it could provide the focal point normally required in terms of international conventions, or different line departments could be designated to fulfil this role as is currently the case.

The policies, structures and procedures will be formulated through an effective public participation process in which the needs and views of all sectors of South African civil society as well as the government departments are represented.

This body will be responsible for ensuring that the systems and procedures are adhered to and that they achieve the stated environmental objectives. The progress and success of all and any of the initiatives should be reported regularly to Cabinet.

DEBATE POINT 4.2

Two distinct functions are required of this body or mechanism: that of setting objectives and guidelines, and that of "policing". These functions could either be fulfilled by a single body or mechanism or the "policing" function could be performed by a separate, independent body.

This body or mechanism would only be involved in evaluating permit and/or authorisation applications and setting attendant conditions in cases where the application is of national importance or where the functional responsibility is vested in a national department.

DEBATE POINT 4.3

The criteria for determining which applications are of national importance will have to be established. Such criteria may include, those applications which:

- traverse provincial boundaries
- traverse international boundaries
- arise from national departments
- have significance in terms of South Africa's international obligations
- involve disposal of hazardous waste.

In the event of a deadlock, a mechanism for conflict resolution will be established.

This body/mechanism could develop its own ongoing technical and scientific support in the setting of standards and in basic research or make use of existing specialised organisations for this purpose.

This body could be responsible for obtaining, collating, processing and disseminating information on the state of the environment, particularly with respect to pollution and waste issues, to the South African public at large. This information dissemination would serve the purpose of keeping affected parties informed, as well as playing an education function to the whole of the South African society.

DEBATE POINT 4.4

For pollution control to be fully integrated, a national data base is essential. The centralised management of national environmental data is a task of significant proportions. This data base could be developed and maintained through:

- establishing an independent body
- establishing an efficient mechanism of information sharing and management between existing national departments
- or using existing bodies such as Central Statistical Services.

This National body or mechanism could also serve as one of the receiving points for complaints or queries from members of civil society regarding pollution or waste issues. This body would, therefore, be responsible for managing incoming complaints/ queries, initiating appropriate action and reporting the results of the action to the complainant and any other party with a need to know the results.

DEBATE POINT 4.5

The function of receiving and acting upon complaints and/or queries from members of civil society could be fulfilled by:

- a member in the National Body/Mechanism
- an environmental ombudsman or
- the Public Protector.

A more detailed breakdown of the proposed functions of this body are:

Policy formulation

- formulation of national policies for integrated pollution control and waste management (including policies regarding interdepartmental co-operation)
- formulation of national policies for the capacity building and integration of civil society in all aspects of integrated pollution control and waste management.

DEBATE POINT 4.6

The formulation of national policies for integrated pollution control and waste management could be a function of this body or of the relevant line departments for co-ordination by the National Body/Mechanism.

Promulgation of Legislation

- identification of legislation required for integrated pollution control and waste management (these functions would include both enabling legislation *i.e.* to enable departments to work together, and enforcing legislation)
- identification of legislation which will define which activities, sectors or users of particular substances will be required to apply for integrated pollution control permits or authorisation, and at what governmental level

DEBATE POINT 4.7

The mechanisms needed when legislation required to effect integrated pollution control which may influence the jurisdiction of more than one national department could include:

- the composition and structure of the National Integrated Pollution Control Body/Mechanism is such that it is empowered to promulgate such legislation
- or, a mechanism whereby the responsibility for promulgating such legislation is shared between affected departments or allocated to a single department is established.

Establishment of procedures

- establishment or causing the establishment of methods of ensuring environmental protection and pollution control at a national level
- establishment or causing the establishment of procedures for the setting of national, regional and local standards
- establishment or causing the establishment of methods and routes of permit and/or authorisation application at all three levels of government
- establishment or causing the establishment of procedures of permit and/or authorisation application evaluation and approval at all three levels of government.

DEBATE POINT 4.8

One of the requirements for the integration of pollution control and waste management is that the same method be used in permit/authorisation application, evaluation and issue irrespective of the sector applying or the lead department involved. Options for achieving this requirement include:

- that the National Body/Mechanism is sufficiently mandated or has sufficient authority to establish procedures and methods which can be applied across all relevant government departments
- or, the National Body/Mechanism serve a co-ordinating function to which all national departments present their own approaches and procedures for joint standardisation.

Technical

In terms of the requirements of the National Body/Mechanism based upon the review in preceding chapters, certain functions may need to be performed by this body in addition to policy setting and co-ordination between national departments. Including:

- ensuring the formulation of national environmental standards (*e.g.* receiving water quality guidelines)
- evaluation and approval of permit and/or authorisation applications which have national significance
- issue of permits and/or authorisations with specific conditions for those activities which have national significance
- initiation of research projects required for integrated pollution control and waste management at a national level
- gathering, processing and dissemination of pollution data in the national interest
- formulation of measures to identify pollution sources which cannot be controlled by permits or authorisations *e.g.* air pollution in informal settlements and identifying measures which can be used in these instances to control pollution

DEBATE POINT 4.9

The above technical functions could be carried out either by the national integrated pollution body or the line department or a combination of both.

DEBATE POINT 4.10

In the discussion thus far, various functions have been proposed for the National Body. These functions have implications in the composition for this body or mechanism.

The Body or Mechanism could be composed of Ministers, Directors-General, environmental specialists, representatives of civil society or any combination of these.

The above functions could be achieved through:

- one combined National Body composed of members with both technical expertise and political authority
- or, two bodies or mechanisms between which the technical and political responsibilities are split.

Auditing and review

- ensure protection of environment from pollution at a national level
- ensure that the established procedures are followed at provincial and local levels, and that these procedures are reviewed and modified as required
- check compliance with permit and/or authorisation conditions for those activities which have national significance
- ensure that South Africa is meeting its obligations in terms of international pollution control conventions.

DEBATE POINT 4.11

The two functions of auditing and review could be fulfilled by the same National Body or split between the National Body and an independent body as already noted above.

4.2.5 National Departments

No specific changes in departmental structure or functions are proposed in this model. Participation in a number of fora are, however, proposed and the following responsibilities are highlighted.

4.2.5.1 Responsibilities

In addition to the other responsibilities already assigned to the various government departments, within the context of integrated pollution control and waste management, the functions of the various departments at national level could be:

- monitoring or causing monitoring to occur of their own specific medium in the national interest, *i.e.* at the highest resolution at regional level, but more likely at national level towards a state of the environment report
- providing suitably skilled staff committee or National Integrated Pollution Control Body/Mechanism
- reviewing monitoring and other records received from the Integrated Pollution Management Committee or National Integrated Pollution Control Body/Mechanism to ensure the required level of protection for their specific medium is being afforded by the permits and other measures being implemented by these bodies
- funding medium-specific research to provide information to aid in medium-specific management *e.g.* to assist in setting emission standards, or technology for emission abatement.

4.2.6 Integrated Pollution Management Body/Mechanism

4.2.6.1 Responsibilities

In general, it could be the responsibility of the Integrated Pollution Management Body/Mechanism to ensure that the directives of integrated pollution control and waste management are carried out from provincial through to local levels of government. It is, therefore, proposed, that there be one Integrated Pollution Management Committee in each province which will operate at provincial level in similar fashion to the national body.

It could be the responsibility of this committee to receive and process permit and/or authorisation applications and issue permits and/or authorisations.

DEBATE POINT 4.12

The term permits and/or authorisations has been used for convenience in this discussion document. Various options to the standard practice of issuing permits are presented in section 4.3.

This committee could be responsible for monitoring compliance with the permit or authorisation conditions and for reporting on both non-compliance and compliance either to the National Departments and/or the Integrated Pollution Control Body.

A further responsibility could be to obtain, collate and process pollution and waste management information for incorporation into a national data base.

DEBATE POINT 4.13

This data base could be managed by the National Body which would need to define the nature and format of the information required of the Integrated Pollution Management Committees or it could be contracted out to the private sector.

The responsibility for obtaining the information required as envisaged in 4.5 could lie at the provincial level, with the Integrated Pollution Management Committees or with the National body depending on functional responsibility.

It could be the responsibility of this Committee to receive notifications from members of civil society or National Departments of pollution risks or incidents and to resolve the most appropriate method of controlling the activity and resultant pollution. There could also be the need to establish a method of receiving and dealing with complaints from civil society.

DEBATE POINT 4.14

The complaints from civil society could be managed by:

- a central national receiving body
- provincial bodies
- individual departments depending on the medium involved in the complaint
- or, an independent body.

In pursuance of the above responsibility, and also in fulfilment of its capacity building role, the Integrated Pollution Management Body(ies) or Mechanisms, would be responsible for regular reporting on the state of the environment at provincial level to all members of society.

DEBATE POINT 4.15

The proposed model makes the Integrated Pollution Management Body responsible to the National Departments for the effective management of activities which could have an impact on any of the three media, as well as to Cabinet via the National Departments. This Body could be:

- a permanent committee of representatives of National Departments
- a permanent independent body composed of seconded members of the National Departments
- or, a committee of representatives of the National Departments which meets as required.

This Body could be responsible for the three legs of pollution control and management:

- source based control to eliminate or reduce emissions
- impact management
- remediation

DEBATE POINT 4.16

This Body could require a large staff complement and combination of skills to fulfil these functions for all three media, given the complexity of the media and their interactions and current technologies used in their management. It is, however, essential that the media be managed in a combined manner to ensure true integration. These functions could be fulfilled by:

- resources housed within a single department
- resources drawn from the various responsible departments
- a combination of resources within departments and external expertise.

In presenting the range of responsibilities which could be rest with this Management Body, it is convenient to present them in three categories:

- permit/authorisation receipt
- permit/authorisation evaluation and issue
- inspection.

Permitting/authorisation application

The following responsibilities could be carried out by a component of the Integrated Pollution Management Body or by line departments at one of the levels of government or a combination of both:

- receiving applications for permits and/or authorisations
- ensuring that all necessary information is contained in the application (this could be based on a protocol (pro-forma) or an EIA report)
- forwarding the information to the Evaluation Panel for processing

DEBATE POINT 4.17

The need for an applicant to be able to approach a single body for all relevant pollution permits has been expressed. This could be achieved by:

- the development of a procedure where a single National Department is assigned responsibility for liaison with other national departments for a specific sector (as in the case of The Department of Minerals and Energy and EMPRs) or a specific activity (such as catchment management) where specific expertise is required
- a single National Department is assigned the responsibility for processing all applications and liaising with other National Departments irrespective of the sector or activity for which the application is being sought
- or, an independent body is formed which is then responsible for liaison with the National Departments.

Permit/ authorisation evaluation

The following responsibilities could be carried out by a component of the Integrated Pollution Management Body or by line departments at one of the levels of government or a combination of both:

- receiving complete information required for the permit and/or authorisation application
- debating the impacts of the various operations specified in the application
- setting permit and/or authorisation conditions which would ensure adequate protection for all media taking particular cognisance of the potential for cross-media pollution (such conditions could include: emission limits, frequency of monitoring, frequency of external audits, accreditation requirements for laboratories undertaking analyses, frequency of permit/authorisation reviews and conditions for the reviews)
- issuing the permit and/or authorisation
- forwarding copies of the permit and/or authorisation conditions to the Inspectorate
- obtaining reports from the Inspectorate regarding conformance or non-conformance with permit or authorisation conditions
- initiating remedial or punitive action in the case of non-compliance with permit or authorisation conditions
- obtaining inputs for permit/authorisation from civil society based upon their needs
- responding to complaints regarding pollution or waste management issues from the general public
- obtaining technical and scientific support for the issue of permit and/or authorisation conditions and for remediation.

DEBATE POINT 4.18

The issue of permit/authorisations requires that input from a number of national departments are obtained. This could be achieved by:

- creating a combined forum at which each permit/authorisation is debated by representatives of each National Department to ensure that the conditions are representative
- or, developing a mechanism in which the lead agent obtains comments and inputs from the national departments.

Inspection

- visiting permit and/or authorisation applicants' premises at the frequency specified in the permit and/or authorisation and ensuring that all specified conditions have been satisfied
- reporting on compliance with permit conditions to the Integrated Pollution Management Committee
- in the event of non-compliance penalties or other actions will be taken in consultation with the evaluation panel and/or the National Department responsible for the environmental medium affected (depending on the nature of the non-compliance)
- investigating environmental incidents involving any of the three media
- investigating complaints from the public.

DEBATE POINT 4.19

The functions of inspection could be fulfilled by:

- members of the National Departments, each member inspecting compliance with permit conditions applicable to a specific medium or sector
- multi-skilled inspectors from the National Departments or the Management Body or
- independent multi-skilled inspectors.

Appeal mechanisms

Regardless of the management arrangements which are eventually introduced to achieve integration, access to an appeal process at every level will be established. The appeal process will be characterised by accessibility to all members of civil society.

Mechanisms to ensure capacity building and public participation

Although the discussion above includes references to public participation and the involvement of civil society in pollution control and waste management, specific mechanisms have not been spelt out. Some alternatives are provided for debate below.

DEBATE POINT 4.20

Involvement of civil society in pollution control and waste management could be effected by a variety of mechanisms which should all incorporate some form of capacity building, including:

- membership of the structures envisaged in this section
- opportunity to participate in policy formulation
- unimpeded access to a complaints mechanism
- access to an appeal procedure
- participation in waste management initiatives at community level
- participation in monitoring programme

4.3 REGULATORY INSTRUMENTS

The system and institutional model of pollution control outlined above is proposed as a means of ensuring the integration of pollution control, consistent national mechanisms, and a system of stakeholder participation. They do not specify the particular regulatory instruments that will be used to tackle different pollution problems.

There is a wide range of possible regulatory tools that can be used to control pollution. This document is not intended to provide a prescriptive list of which tools will be used in which instance, but rather outlines the set of tools available and some of the possible advantages and disadvantages of each of them. The regulatory tools used do, however, relate to the broad approach taken to pollution control. In this respect it is intended that those regulatory instruments which best promote the principles, goals and objectives of integrated pollution control and the national environmental policy be used.

As industrial development is the major contributor to pollution and hazardous waste, this section focuses on mechanisms to secure compliance with policy of this sector.

There will need to be certain minimum requirements for the effective functioning of regulatory instruments whatever the final mix of tools decided. These minimum requirements include:

- appropriate ambient environmental quality standards (objectives of the instruments)
- effective monitoring capacity (to assess improvement or deterioration and compliance)
- adequate enforcement capacity (to ensure compliance)

The criteria for choosing amongst particular instruments should follow those outlined in the White Paper on the Environment, alongside the more technical pollution control requirements of the instruments. These criteria include:

- their effectiveness in ensuring environmental sustainability
- the ability to secure participation by interested and affected parties (in environmental governance)
- giving effect to the constitutional rights and principles of both the national environmental policy and the integrated pollution control and waste management policy
- the existing government capacity and the potential for developing capacity in the future
- their effectiveness in promoting the integrated pollution control objectives of waste minimisation and clean technology
- their effectiveness in promoting civil society involvement in pollution control.

For example, the polluter-pays principle and the internalisation of costs may be better addressed through the use of economic instruments, such as pollution charges, than through direct control measures. On the other hand, the principle of the avoidance of the creation of toxic and hazardous waste at source may be better addressed through a process standard (such as the mandatory replacement of mercury cells by diaphragm cells to prevent mercury emissions from chlor-alkali manufacture) than through economic instruments. Therefore although this discussion document does not prescribe particular regulatory instruments it provides considerations to be used by the regulator in the choice of instrument. The regulator must consider whether the regulatory approach used is the most appropriate for securing the integrated pollution control objectives.

The two principle approaches to pollution control and waste management are the command-and-control approach and economic strategies. These principles are briefly outlined below.

4.3.1 Command-and-control approach

This is by far the predominantly used system of control in South Africa, and in most other countries at present. This approach involves direct regulation, along with monitoring and enforcement systems, and relies primarily on the application of regulatory instruments such as standards, permits, and land or water use controls. The command-and-control approach allows the regulator:

- a reasonable degree of predictability about the levels of pollution and pollution reduction
- a relatively straightforward system to administer.

On the other hand command-and-control strategies have been criticised for:

- not being particularly flexible
- not necessarily encouraging pollution reduction below the level of the defined standard, nor encouraging continuous improvement
- being economically inefficient.

One of the requirements for an effective command-and control system is the presence of sufficiently severe sanctions for not meeting permit requirements, and for operating in the absence of a permit. As discussed in the legal review section of the discussion document this is not always the case in South Africa at present.

The three types of command-and-control instruments, standards, permits, and land or water use controls are briefly outlined below:

4.3.1.1 Standards

Standards are the predominant means for direct regulation of environmental quality in developed countries. They define environmental targets and establish the permissible amount or concentration of particular substances in discharges into air, water, land or specific products.

Standards may also include technological specifications for the performance or design of equipment and facilities, and the standardisation of sampling or 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 (see definitions below.). **Definitions of types of environmental standards**

Ambient environmental quality standard - establishes the maximum concentration of specified pollutants allowed in the ambient air, water and soil/land.

Effluent or emission discharge standard - establishes the legal limit on the total quantity or concentration of a pollutant that can be discharged from a particular pollution source. Effluent standards may include maximum effluent concentrations for a certain period *e.g.* maximum for 24hrs, and may include monitoring requirements and standards.

Technology-based standard - this is a type of emission standard that specifies a technology that an industry/business must use to comply with environmental laws, *e.g.* a power station may be required to add sulphur scrubbers to control its emissions

Performance standard - this is a type of emission standard that defines a performance measure (*e.g.* the percent of pollution removal to be achieved) and allows dischargers the flexibility to select the best means to meet this measure, *e.g.* car manufacturers may be required to produce cars that limit exhaust emissions to specified levels.

Product standard - establishes a legal limit on the total quantity or concentration of pollutants that can be emitted into the environment per unit of output, *e.g.* an amount of chlorine per kilogram of paper pulp produced. Product standards can also prohibit the addition of certain substances to products, *e.g.* the addition of lead can be prohibited in paint to protect children from lead exposure.

Process standard - limits the emission of pollutants associated with a specific manufacturing process by determining processes to be used, *e.g.* the mandatory replacement of mercury cells by diaphragm cells prevent mercury releases from chlor-alkali manufacture.

Recent work by the Department of Environmental Affairs and Tourism in their resource economics process has shown that there is an absence of clear environmental standards in South Africa. This means that in many instances problems have been identified but no specific goals, for example in the form of ambient air quality standards, have been established.

One or more of these standards can be set to promote achievement of specific environmental quality goals, such as receiving water quality objectives.

4.3.1.2 Permits and licenses

Permits are generally tied to a particular standard or set of standards, such as an air quality standard, and may also be subject to the fulfilment of specific conditions, such as compliance with a code of practice, or the installation of specific treatment technologies or pollution control equipment.

An advantage of permits is that they can facilitate the enforcement of integrated pollution control by including in one authorisation all of a facility's pollution control obligations. They can also be withdrawn in cases of non-compliance, or changed as environmental or economic circumstances change. Similarly, if a polluter is not meeting permit conditions (or is operating without a necessary permit) they can be fined or prosecuted.

Permits are essentially a mechanism for introducing other regulatory controls to a specific polluter and thus form a key element in the integrated pollution control model proposed in this policy. They should be seen in this light - as a means of enforcing the application of other instruments (be they standards, or economic instruments) to specific polluters.

4.3.1.3 Land and water use controls

These are regulations that limit the use of land or water in order to minimise pollution or the impacts of that pollution. In the case of land this would include zoning regulations, such as ensuring that polluting industries or hazardous waste sites are at a sufficient distance from residential areas so as to minimise pollution or hazard impacts. Other controls for specific activities are also possible, such as limitations on on-site sanitation systems in areas where there is the chance of polluting sensitive groundwater resources.

Controls on certain uses of water can be used to limit pollution or degradation of specific areas. For example, a prohibition on the use of motorised marine craft in sensitive marine environments or coastal zones so as to limit oil pollution of the environment.

Land and water use controls are an important regulatory tool, especially at the local level, where zoning and other controls can be effectively applied using detailed planning knowledge of local circumstances. They can also be applied to protect especially sensitive environments, such as marine sanctuaries or limited habitats of endangered species.

4.3.2 Economic instruments

Recently some countries have adopted economic instruments to introduce more flexibility, efficiency and cost-effectiveness into pollution control measures. These instruments act as incentives to polluters to choose their own means of pollution control. An example of the successful implementation of economic instruments is the levy raised on the production and importation of chloro-fluoro carbons to meet reduction targets set by the Montreal Protocol. They rely on setting appropriate costs to polluting and thereby encouraging the reduction of pollution. When properly implemented economic instruments can:

- promote cost effective means for achieving acceptable levels of pollution
- stimulate the development of pollution control technology and expertise
- provide government with a source of revenue to support pollution control programmes
- provide flexibility in pollution control and in the ways to achieve it
- eliminate the government's need for large amounts of detailed information on each production process
- act on non-point or diffuse sources of pollution - *e.g.* adding a "pollution tax" to environmentally harmful pesticides to encourage a reduction in their use
- act not only on producers but also on consumers who will be affected by higher prices for polluting products and will thus tend to choose products which have a smaller built in pollution cost

However, despite their seeming benefits, economic instruments have certain problems:

- they have not eliminated the need for standards, environmental monitoring, enforcement and other forms of government regulation, and thus do not solve government capacity problems
- the effects of economic instruments are not as predictable as command-and-control measures
- they require, in some instances, more sophisticated institutions to implement and enforce them than under command-and-control systems

Thus although they may be highly effective and efficient in many instances, they do not remove the need for the bulk of government capacity in pollution control and should not be seen, especially in the short term, as a replacement for these other aspects of pollution control. In developed countries there is increasing use of these instruments, but they mainly supplement direct regulation and do not replace it.

The Department of Environmental Affairs and Tourism has recently carried out an extensive process of looking at the potential for the use of economic instruments and has concluded that the introduction of these instruments would assist in improving the effectiveness of environmental management in South Africa. There are few legal barriers to their implementation and in fact the Environment Conservation Act specifically allows for the use of economic measures to internalise external environmental costs, to promote the reduction of the waste stream and pollution to levels that can be naturally absorbed without deleterious effect, and to promote the use of clean technology.

4.3.3 Voluntary agreements or contracts

The use of voluntary agreements between individual polluters or polluting sectors has been used in many countries as an important complementary approach to pollution reduction - but seldom as a replacement of direct government control. For example voluntary pollution reduction programmes, such as the USA's 33/50 Programme, have led to large reductions in toxic substance releases. The 33/50 Programme has been one of the USA Environmental Protection Agency's (EPA) most successful initiatives at reducing the emissions of toxic substances. This Program operates on an entirely voluntary basis with companies setting their own reduction targets in consultation with the EPA. Companies that meet these targets receive beneficial publicity from the EPA. The Programme does not replace any other pollution controls, but has nevertheless encouraged significant reductions.

Other types of voluntary agreements include actual contracts being entered into between industry and government. These can include set pollution reduction targets and penalties for non-compliance, as well as agreements from the side of government. Locally, such initiatives as the *Responsible Care* programme of the chemical industry provides an example of a voluntary programme which encourages pollution reduction, open access to information, and the involvement of local communities in environmental management.

Voluntary agreements will be explored by pollution control authorities and by polluters interested in demonstrating their commitment to improved environmental performance. Such agreements allow for the harnessing of private sector energy in pollution control and waste management, and will be used to facilitate the involvement of communities, labour, and environmental Non-Governmental Organisations in pollution reduction initiatives.

Environmental management systems, such as the ISO 14 000 series, can also be an important aspect of improving environmental performance of industry and should be encouraged, but should not be seen as regulatory instruments or compliance measures.

4.3.4 Additional measures for pollution control

A range of other measures will be used by government to promote pollution reduction. These include:

- technical assistance, education and capacity building programmes to encourage private sector and Non-Governmental Organisation activity in pollution control
- the use of independent third party auditing as a mechanism of improving compliance to address the problem of insufficient government inspection capacity
- supporting the research and development of cleaner technology, and facilitating the establishment of a cleaner technology network or centre
- supporting civil society (including Community Based Organisations, Non-Governmental Organisations and Labour) in actions aimed at pollution reduction or at specific polluters - such as through the open provision of information
- trade-related instruments for the control of specific pollutants.

4.3.5 Conclusion

The full range of these tools will be explored by government in addressing specific pollution and waste management problems. In short, government will move to using a broader and more flexible range of regulatory instruments. Changes from relying solely on rigid

command and control measures to using economic instruments, voluntary agreements, and civil society support will lead to a wider and more effective assault on pollution.

4.4 ENVIRONMENTAL INFORMATION - A CORNERSTONE OF INTEGRATED POLLUTION CONTROL

The problem of environmental information was considered at the United Nations Conference on Environment and Development (UNCED). The document arising from the United Nations Conference on Environment and Development, *Agenda 21*, recognised both the need for reliable environmental information and a more general right to information. In this regard it recommended that all countries establish pollution tracking and inventory systems. One of the key principles of *Agenda 21* is that environmental issues are best handled with the participation of all concerned citizens and that each individual shall have the appropriate access to information to make this participation meaningful. *Agenda 21* makes specific reference about the need to provide information to Non-Governmental Organisations and civil society about accidental and routine pollution releases, and the state of the environment.

The policy suggestions below are thus based on the problems seen under the situation analysis previously outlined, on the CONNEPP principles, the Constitutional rights, and on current international thought. The policy suggestions attempt to address the information-related problems through

- a pollution and waste release and transfer inventory, including non-point sources of pollution
- a consistent approach to ambient environmental quality monitoring (certain defined pollutants should be measured on a regular basis; for example, sulphur dioxide, ozone, lead, etc., in air, for which there should be minimum standards)
- the right of access to this information, with a system of storing and disseminating this information regularly and on request, (such as a quarterly hard-copy report available in all libraries and a constantly up-dated web-site).

4.4.1 Pollution emission information

A catalogue or register of potentially harmful 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 as well as about wastes transported to disposal sites.

The register will be compiled from data gathered through a mandatory system of reporting from point source polluters. The polluters will be expected to report, on a regular basis, the quantities of their releases of chemicals from a pre-determined list, plus other information useful in the control of hazardous pollution. To be maximally useful, such a register would require reports about specific species such as benzene, methane or mercury as contrasted with broad categories of pollution such as "volatile organic compounds", "greenhouse gases" or "heavy metals".

The government department or departments tasked with compiling and holding the register will calculate non-point releases by means of estimates using monitoring data, statistical data, and emission factors. These diffuse sources could include substantial polluters such as agriculture and transport. These authorities will also be required to publish regular statistics based on the register.

It should be understood that 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 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 Non-governmental Organisations, which they can use to analyse pollution sources according to impact - and thus prioritise pollution reduction activities.

The register will go beyond the current fragmented and insufficient pollution release data-gathering carried out at present. It will not only gather pollution release data via permitting procedures, nor only for certain restricted media. It will provide consistent national coverage, and it will be open to public scrutiny.

There is wide range of international experience in the establishment and use of similar pollution inventories or registers. They have been shown to be administratively viable, extremely useful sources of information, and relatively inexpensive to operate. They have also been shown to be highly effective in reducing pollution. The Toxics Release Inventory (TRI), the USA's register, is regarded as the most successful tool the Environmental Protection Agency has ever used to reduce emissions of toxic substances. Between 1988 and 1992 there was a 40% decline in releases of 17 priority toxic chemicals, primarily through Toxics Release Inventory linked voluntary reduction programmes established between the Environmental Protection Agency and companies who chose to be involved.

Although the wealth of international experience will be drawn upon in determining the exact nature and extent of the pollution register, certain steps will be necessary for its local establishment. These will have to undertaken by means of an inclusive process overseen by a multi-stakeholder grouping. The steps will include decisions on, amongst others:

- 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
- and, the methods of ensuring access to the information collected.

In broad terms the register will have to be designed to enable it to satisfy three requirements:

- the right for the public to have access to environmental information to enable them to participate in pollution control activity
- comprehensive and accurate pollution release information for environmental management authorities
- encouragement for improved pollution reduction from polluters.

4.4.2 Ambient environmental quality monitoring

Ambient environmental quality data is probably the most comprehensive of the environmental data available to regulators and the public. As shown in Chapter 2, however, even this data is seriously inadequate in South Africa. For example, groundwater is inadequately monitored, urban air quality data has been assessed as insufficient to even

develop a motor-vehicle pollution control strategy, and statistics on soil contamination are very limited. Surface water quality is well monitored in some catchments but is inadequately assessed in others.

To address these problems, government departments responsible for the management of environmental media must ensure that adequate quality monitoring systems are in place. To this end the Integrated Pollution Control system will ensure that:

- there is regular monitoring of all pollutants for which there are minimum standards, in all areas of the country where they may have a negative health or environmental impact
- there are clear responsibilities and requirements on government for the collection of ambient environmental quality information. Various departments and tiers of government will be tasked with ensuring that adequate monitoring occurs to enable the functioning of effective Integrated Pollution Control
- consistent and standardised databases between different government departments and tiers of government are established so that data can be easily collated and consolidated
- standardised operating procedures for environmental quality monitoring are used, as well as standardised procedures for the format of data capture
- statistics on ambient environmental quality (*i.e.* a regular state of the environment report) are published regularly.

4.4.3 Access to environmental information

Suitable information, and open access to this information, is one of the most powerful tools available to enhance civil society involvement in pollution control and responsible waste management. This discussion document aims to ensure that this potential for harnessing the energies of non-governmental actors on pollution reduction is realised. Open-access to the information referred to above will therefore be assured in the new integrated pollution control system

The types of information that should be available will include:

- the amounts and types of pollution generated and released into the various media by point source polluters at the site level; this information would include industrial site specific data
- estimates of the total release of non-point source pollutants of concern, such as from motor vehicles, residential coal fires, and marine craft
- the levels of pollutants of concern in the ambient environment.

However it is not sufficient to merely make "raw-data" available. Data needs to be transformed into usable information by being made readily understandable to those without technical backgrounds. It also needs to be easily accessible to those without sophisticated information technology. The relevant authority will have to ensure that this transformation of the data is carried out and actively made available to all stakeholders. Where appropriate all available information technology will be used, such as the World Wide Web, and other internet-based information technologies to provide up-to-date information - but at the same time simple strategies will also be used, such as making key information available in schools and libraries, and publishing summaries in newspapers.

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 clean technology, best available technologies for pollution control and other information that can assist in pollution reduction should be undertaken. Such information should be centrally gathered and made accessible to interested parties. Much research on pollution control is conducted locally, but there is also a wealth of international data. These need to be brought together and made "user-friendly". The National Integrated Pollution Control Authority will be responsible for ensuring that this process occurs.

Such a "pollution information clearing-house" could also usefully be expanded to eventually include other information. For example, specific hazardous pollutant information (such as material safety data sheets and emergency response data) should be kept centrally, as well as epidemiological data and information on alternative chemicals.

4.4.4 Information requirements of International Conventions

International Conventions dealing with pollution and waste management contain extensive provisions regarding access to and provision of information by parties to it.

THE WAY FORWARD

5.1 INTRODUCTION

After the Provincial public participation processes of discussion and consultation on the basis of this Discussion Document have been completed, a draft White Paper will be drawn up. This draft policy document will itself be open for comment as described in the section entitled "Public Participation". It will subsequently be finalised as a White Paper which will reflect the Government's new policy on Integrated Pollution Control and Waste Management.

Following the adoption of the White Paper by Parliament, implementation strategies and plans of action will be developed to give effect to the new policy. These processes will be managed in a participatory manner with, *inter alia* the same stakeholders who were involved in the policy development process. Although the way forward cannot be described in detail at this stage, a number of issues can already be identified, based on the proposals contained in this Discussion Document. These issues are briefly outlined below and provide an indication of some of the elements of a Program of Action to be followed towards the implementation of this policy. It is clear that implementation of some proposals made in the Discussion Document will take longer than others. In order to show immediate progress issues have been classified into short and medium term. It is hoped that the public participation process will either confirm these proposals, indicate changed priorities or introduce additional proposals.

5.2 SHORT TERM ISSUES

5.2.1 Changes to legislation

As discussed earlier, there are a multiplicity of statutes which deal with pollution control and waste management, involving a range of government departments. In establishing a new approach to pollution control legislative amendments may be required to provide a consistent, adequate and efficient legal basis for the new policy. These issues will then be incorporated in the draft White Paper.

It is envisaged for example that draft regulations will be promulgated to give effect to the following:

- use of economic instruments complementary to existing direct control methods
- minimum requirements for waste disposal
- responsibility for rehabilitation of land or water after an environmental incident.

Draft guidelines will be compiled to facilitate access to authorisations with a view to incorporating them in legislation later.

5.2.2 Mechanisms for civil society involvement of unit

The participation of all aspects of civil society is seen as crucial to the success of the new integrated pollution control and waste management policy. In this regard mechanisms will be developed to ensure that this participation is facilitated. The necessary procedures and structures will have to be established to allow the involvement of civil society in all stages of pollution control. These mechanisms will include capacity building programs as a key element of ensuring that all sectors of civil society can participate.

5.2.3 Establishment of a Pollution and Waste Information Management System

A cornerstone of the proposed policy is an improved information collection and dissemination system, which will be readily accessible to all stakeholders. Such a system may be perceived differently by different government departments and other stakeholders. A process will be established to ensure that an information system is speedily established with full consultation from all stakeholders to ensure that the system serves the variety of needs expressed.

Aspect that will be covered by such an information system are:

- a national monitoring system which will ensure that the implementation of this policy is regularly evaluated
- a pollution and waste release transfer inventory, initiated by the establishment of a multi-sectoral Project Committee
- appropriate ambient environmental quality standards for all media, with air being the most urgent, initiated by establishing a mechanism for formulating these standards.

5.2.4 Identification of strategic issues and priorities and developing standards/guidelines

Although the integrated pollution control and waste management system will address all aspects of pollution control and waste management there may be specific issues that are of particular importance within this broad policy. Such issues need to be identified and given special attention by government. Strategies to deal with these priority issues will be developed and implemented as a special area of work within the pollution control and waste management process. Such priority issues may include, for example, dealing with the current hazardous waste crisis; addressing township air pollution, or addressing the deadly legacy of asbestos mining. The priority issues will be identified through the provincial consultation process and through the different spheres of government. Once strategic issues and priorities have been identified, standards, guidelines, will have to be developed to assist in moving towards a more effective system.

5.2.5 International obligations

South Africa has a number of international obligations (e.g. the Basel Convention) with respect to integrated pollution control and waste management, not all of which are being met. An important element of the way forward is to ensure that the country is meeting its obligations under international law, as well as its obligations to contribute to global sustainable development. Specific strategies in this regard will be developed and implemented. A mechanism will have to be established to finalize the formulation of national positions on international conventions.

5.3 MEDIUM TERM ISSUES

The following issues will require attention in the medium term:

- investigation of ratification of all outstanding international conventions dealing with pollution
- ensuring of implementation of the requirements of Agenda 21 in relation to integrated pollution control and waste management
- instituting of mechanisms to report annually and internationally on progress towards the achievement of the objectives of integrated pollution control and waste management.

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GLOSSARY OF TERMS

This glossary defines the terms used in the Discussion Document. Also refer to the next chapter which lists and defines the CONNEPP principles.

Ambient standards - are quantitative pollutant levels which may not be exceeded, or may only be exceeded for a specific frequency or duration in water, in the air or within soils 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

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

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 long-term and as well as the short-term

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

Biota - living organisms

Carcinogenic - ability to cause cancer

Civil Society - this term is meant to include all members 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 like waste minimisation, pollution prevention, cleaner technology, waste reduction, eco-efficiency, non-waste technologies and source reduction without having a universal consensus of 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 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 reducing the quantity and toxicity of all emissions and wastes at source, 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 the Integrated Pollution Control 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.

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 see 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 is a study of the environmental effects of a decision, place or undertaking (also called environmental assessment). It 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) - every mine must submit an EMP in terms of the Minerals Act 50 (of 1991) to the Department of Mineral and Energy Affairs. It 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 social, cultural and natural resources required to meet present and future needs

Governance - means setting policy to guide an activity and then making sure that the money, people and institutions to do the work are in place. It also means 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

Habitats - the place, characterised by its physical properties and other life forms, where an organism or community occurs

Hazardous waste - any waste, other than radioactive waste, which by reason of its chemical reactivity, eco-toxicity, explosive character, corrosivity, carcinogenic qualities, or other characteristics, may cause significant danger to, or impact adversely on human health or the environment

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

Holistic - term used to convey an approach which is all encompassing

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, as for pollution control, may be divided into philosophical, functional and organisational approaches. These need to be dealt with separately in order to provide resolution. The approaches 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" does the air, water and soil need to be
- how much remediation is necessary.

Intergovernmental - this 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

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

Leachate - the term used to refer to the liquid 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 the 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. This would include any substance which makes the environment less fit in any way for its intended use. Furthermore, pollution is an unacceptable impact on the environment including those impacts that makes the environment less fit for its intended use.

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

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 cancers and genetic mutations.

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

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 of technology; or establishing the probability of an event occurring, the factors that 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 - The 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 can cause skin cancer and excessive exposure can cause mutations in plants and other life forms.

Terratogenic - ability to cause foetal damage

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

Waste - The definition of waste is that used in the Department of Water Affairs and Forestry's Minimum Requirements:

'Waste : An undesirable or superfluous by-product, emission or residue of any process or activity which has been discarded, accumulated or 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, radio-active substances, mining, metallurgical and power generation waste. After definition in Government Gazette No. 12703, August 1990.'

This definition, however, focuses on the wastes dealt with in Section 20 of the Environmental Conservation Act and excludes other wastes. In the Integrated Pollution Control and Waste Management project, additional sources of general and hazardous waste generation, e.g. agriculture, will be considered. In addition, the wastes governed by the Minerals Act, e.g. mining, metallurgical and power generation wastes and the Nuclear Energy Act, e.g. the radio-active waste are included in the scope.

PRINCIPLES FROM THE DRAFT WHITE PAPER ON ENVIRONMENTAL POLICY

· **Accountability**

Government is accountable for policy formulation, monitoring and enforcement.

· **Allocation of Functions**

Functions will be allocated to the institutions and spheres of government that can most effectively achieve the objective of that function within the context of environmental policy.

· **Capacity Building and Education**

All people must have the opportunity to develop the understanding, skills and capacity for effective participation in achieving environmental sustainability (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.

· **Co-ordination**

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 Management of Materials**

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.

· **Demand Management**

In managing resources and environmental impacts, demand management must be considered along with other control measures.

· **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.

· **Duty of care**

Every person or organisation should act with due care according to their capacity to avoid damage to other and/or to the environment.

· **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:

- address 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
- 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 Co-operation and Responsibilities**

Government must recognise its shared responsibility for global and regional environmental issues and act with due regard for the principles contained in this policy and applicable regional and international agreements.

· **Good Governance**

The democratically elected government is the legitimate representative of the people. In governing it must:

- take responsibility for developing and implementing environmental policy
- exercise the authority to take decisions and carry out actions vested in it by the Constitution
- act in accordance with the basic values and principles governing public administration contained in the Constitution
- be accountable to the people
- respond to public needs and encourage public participation in environmental governance
- monitor and regulate actions that impact on the environment and people

Good governance depends on mutual trust and reciprocal relations between government and people. This must be based on the acceptance of authority, responsibility and accountability.

· **Inclusivity**

Environmental management processes must consider the interests, needs and values of all

stakeholders in decision making to secure sustainable development. This includes recognising all forms of knowledge including traditional and ordinary knowledge.

· **Integration**

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
- overall integration of government environmental functions affecting:
- institutional arrangements
- legislation
- all policies in all spheres of government
- overall integration of government environmental functions affecting:
- institutional arrangements
- legislation
- all policies in all spheres of government.

· **Open information**

Everyone must have access to information to enable them to:

- protect their health and well-being
- protect the environment
- participate effectively in environmental policy development
- comply with environmental policy legislation and regulation.

· **Participation**

In environmental governance processes, government must give all interested and affected parties the opportunity to express their views and concerns.

· **Polluter Pays**

Those responsible for environmental damage must pay the repair costs both to the environment and human health, as well as the cost of preventative measures to reduce or prevent further pollution and environmental damage.

· **Precautionary Principle**

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
- the potential risks arising from uncertainty
- alternative development or activity options including, no action.

· **Preventive Principle**

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

· **Waste Management**

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.