The Development of A Framework for Sustainable Waste Management Policy and Strategy for Malaysia

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List of Abbreviations Used

BATNEEC	Best Available Technology Not entailing Excessive Cost
BEO	Best Environmental Option
BOD	Biological Oxygen Demand
BPEO	Best Practical Environmental Option
CC	County Council
COD	Chemical Oxygen Demand
COPA 74	Control of Pollution Act 1974
COTC	Certificates of Technical Competence
CQE	Certificate of Qualifying Experience
DBKL	*Dewan Bandaraya Kuala Lumpur* (Kuala Lumpur City Council)
DOE	Department of Environment
EA	Environmental Agency
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
EPA 90	Environmental Protection Act 1990
EPU	Economic Planning Unit
EU	European Union
GDP	Gross Domestic Product
GMWDA	Greater Manchester Waste Disposal Authority
GNP	Gross National Product
HMIP	Her Majesty Inspectorate of Pollution
HMSO	Her Majesty Stationary Office
IEI	Integrated Environmental Index
IPC	Integrated Pollution Control
IWM	Institute of Waste Management
IWS	Industrial Waste Survey
LA/s	Local Authority/Authorities
LAP	Local Area Plan
LAWDC	Local Authority Waste Disposal Companies
LGA	Local Government Act 1976
MARA	*Majlis Amanah Rakyat* (People Trustee Council)
MDP	*Majlis Daerah Petaling* (Petaling District Council)
MOF	Ministry of Finance, Malaysia
MOH	Ministry of Health, Malaysia
MOHLG	Ministry of Housing and Local Government, Malaysia
MOLRD	Ministry of Land and Regional Development, Malaysia
MOSTE	Ministry of Science, Technology and Environment Malaysia
MOW	Ministry of Works, Malaysia
MPAJ	*Majlis Perbandaran Ampang Jaya* (Ampang Jaya Municipal Council)
MPK	*Majlis Perbandaran Klang*(Klang Municipal Council)
MPPJ	*Majlis Perbandaran Petaling Jaya* (Petaling Jaya Municipal Council)
MPSA	*Majlis Perbandaran Shah Alam* (Shah Alam Municipal Council)
MSW	Municipal Solid Waste
NAWDC	National Association of Waste Disposal Contractors
NESP	National Environmental Sanitation Programme
NFFO	Non-Fossil Fuel Obligation
NIMBY	Not-in-my-back-yard
NRA	National Rivers Authority
NRF	National Resource Foundation

NST	News Straits Times
OECD	Organisation for Economic Co-operation and Development
PCOTC	Provisional Certificate of Technical Competence
RCEP	Royal Commission on Environmental Pollution
SEDC	State Economic Development Corporation
SEPU	State Economic Planning Unit
SMHSD	State Medical and Health Service Department
SPWD	State Public Works Department
SQG	Small Quantity Generators
STCPD	State Town and Country Planning Department
SWOT	Strength, Weaknesses, Opportunity, Threat
TFS	Transfrontier Shipment
UK	United Kingdom
WAMITAB	Waste Management Industry Training and Advisory Board
WDA	Waste Disposal Authority
WDF	Waste Derived Fuel
WLP	Waste Local Plan
WMP	Waste Management Plan
WRA	Waste Regulatory Authority
WRF	World Resource Foundation
WS	Waste Strategy

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Abstract

This thesis is an analysis and a comparative study of current trends in Waste Management in the UK and Malaysia. The focus is on identifying the policy and strategy framework of Sustainable Waste Management as adopted in the UK and its application for future waste planning and management in Malaysia.

The research on the UK waste management practices was done through analyses of official waste policy documents from 35 English counties. Analyses of the 615 policy statements revealed 52 issues and repetitions of terms or terminologies which were labelled in the analyses as 'variables'. These variables were grouped into five categories which were further analysed by; category, county and source of documents.

It was discovered that solid waste management in the UK is well institutionalised and legislated. The UK legislative framework provides policy makers with accessible information so as to identify the objectives and to construct necessary measures for sustainable waste management policies. It also established, that the waste management industry needs active participation both from the public and private sectors

A case study on Malaysian waste management indicated a total contrast with those discovered in the UK studies. The present Malaysian waste management systems have to be improved with the introduction of specific legislation on waste and the formation of the correct institutions to overlook the Country's waste activities.

The research enabled the author to produce a concise set of recommendations for the improved handling of waste in Malaysia.

CHAPTER 1: GENERAL CONSIDERATION

1.1 Introduction

This dissertation is an analysis and a discussion of the current trend and issues on Waste Management in Malaysia. Its aims are focused on the aspect of identifying the policy and strategy framework for a Sustainable Waste Management adopted by the UK is applicable for use by developing countries such as Malaysia. Although at one time the UK was labelled as the 'Dirty Man of Europe', this labelling can now be refuted by the presence of stringent laws and enforcement to keep Britain clean. The UK can now be taken as a model of a developed nation that is successful in managing its waste.

The research is limited to the solid waste or municipal waste, which the UK EPA 1990 has classified as 'Controlled Waste.' Toxic waste, which is another component of waste which needs different laws and management system, is only briefly mentioned to relate it with certain facts related to the management of the solid waste.

This research was done between the period August 1994 and August 1997. Within this period there were significant changes in the laws and regulations on the management of waste both in the UK and Malaysia. The speed of change has led the researcher to make several changes in some facts and figures. Thus the researcher has to limit the discussion on waste management issues within this period of time.

1.2 Research Aims and Objectives

1.2.1. Objectives

The purpose of this study is to:

- identify existing strategies and policies on waste,
- characterise the prerequisites, parameters or elements that contribute to the formulation for a framework on Sustainable Waste Management,
- ascertain any affiliation between each prerequisite and how those prerequisites will enhance the objective of Sustainable Waste Management.

1.2.2. Aims

This dissertation aims at:

- establishing a basic understanding of waste management practices and technologies,
- examining the methodology and the approaches used in each waste disposal activity,
- reviewing current environmental protection measures: the laws, rules and regulations, and environmental standards and guidelines on waste activities,
- correlating the prerequisites of a Sustainable Waste Management Strategy with other established waste strategies.

1.2.3. Scope

The data collected for official documentation came from various published sources. Most of these published facts were from the literature and government documents. This study identified waste management strategies applied within Central and Local Government bodies in both the UK and as well as in Malaysia.

In Malaysia, the data gathered were from a structured survey conducted in various municipalities in the Klang Valley, the hub of the Malaysian economic growth area. The survey also included some governmental organisation such as the Department of Environment (DOE), Ministry of Science, Technology and Environment and the Division of Local Government (DLG), Ministry of Housing and Local Government.

Any resemblance and differences in the waste management approach between the UK and Malaysia are of significant importance. This is so since the main focus of this study was to make a comparative analysis of the waste management systems practised in the two countries. Some common historical background that co-exists between Malaysia and the UK, mainly in the application of laws and regulations, provided this study with some insight into a possible common application of waste management strategy and approaches.

1.2.4. Research Proposition and Questions

In the light of rapid industrialisation, high population growth, increasing urbanisation, growing scarcity of land and other resources, the Malaysian Government has embarked on greater emphasis for sustainable development (Malaysia, 1991). The increase in the pace of development calls for greater efforts to maintain environmental cleanliness and ecological balance through more effective environmental management.

The problem of waste is identified by the Malaysian Government as one of the six major national issues and concerns which require effective management (Malaysia, 1991). The six issues are:

- the increasing air and noise pollution in the urban areas as a result of the expansion of automobile ownership and vehicular traffic,
- constraints on the supply of affordable housing and efficient sewerage and sanitation facilities in major towns,
- the lack of adequate and efficient on-site or off-site waste disposal facilities,
- pollution caused by unorganised disposal of consumer products,
- the encroachment of economic activities on vegetation, forest cover and catchment areas which have serious repercussion on sustained water supply,
- soil-related pollution caused by unplanned construction activities.

In view of the current inadequate disposal and waste treatment facilities in Malaysia, future approval and investment proposals need to consider the use

of the latest technology in waste management to minimise the negative impact on the environment. Two of the six major programmes related to waste management which will be implemented by the Malaysian Government in the Sixth Malaysia Plan include:

- promoting the development of waste disposal facilities for industries and the adoption of environmentally sound technologies and processes,
- fully enforcing the environmental impact assessment (EIA) requirement for projects which have the potential of damaging the environment.

This study focuses on the use of sustainable waste management policy and strategy as practised in the UK, a model of a developed nation, as one of the environmental tools for an effective environmental management. The key research question adopted as a guide for this study is, 'can waste management strategies in a developed country be applicable to a developing country to help achieve a Sustainable Waste Management?'.

The UK has accomplished its privatisation programme for waste industries and is now moving forward for sustainable waste management. Five years after the introduction of the Environmental Protection Act (EPA) in 1990, the UK Government has produced a draft 'A Waste Strategy for England and Wales' as part of it Sustainable Development Strategy. What prompted the UK Government to produce this draft on sustainable waste management is of interest to this study.

The confidence of the UK Government in introducing such a strategy within a short period of time relates to the successes in waste privatisation projects. If so, then what are the elements and prerequisites that a developing country like Malaysia can learn, adopt and adjust to the needs and requirements of achieving sustainable waste management?.

In most developed countries, waste management is governed by legislation. The basic legislative tools fall into two main categories. White *et. al.* (1995) acknowledged that the end-of-pipe regulations and strategic targets legislation's are the two basic approaches used in regulating the waste management activities.

This study investigates whether waste management with elaborate supervision by legislation and regulation, provides the means of achieving Sustainable Waste Management better than waste management without clear and definitive regulations for waste disposal industries and activities.

The above proposition is based upon the condition that some similarities do exist between the two systems in particularly the practices of the laws and regulations between the UK and Malaysia. The set-up of the federal, state and local government in Malaysia has some resemblance to that of the county, district and borough in the UK. Based on these governmental frameworks' resemblance, this study has identified the differences and similarities in the prerequisites and the ingredients for a successful Sustainable Waste

Management for Malaysia.

1.3 Research Methodology

The direction of this study is designed according to steps and stages set below. Figure 1.1 shows the guidelines used to achieve the dissertation aims and objectives. This research begins with collecting, reviewing and analysing background information obtained from:

- literature reviews representing various disciplines, including environmental science, health, engineering and business management: journals, periodicals, handbooks, manuals, conference and proceedings' articles,

TASK		ACTIONS
Select topics and subject of research, identify case study and study sites	→	Literature reviews
↓		
Identify main characteristics and types of waste strategies, policies and activities	→	Identify existing documented and published records and establish their importance, identify trend in sustainable waste management
↓		
Evaluate and assess published documentation and records with case studies	→	Establish common criteria and identify factors and the constraints by the case study
↓		
Identify possible alternatives to improve waste policies and management and formulate suggestions	→	Identify and verify with environmental management standards
↓		
Recommend and establish applicability of alternatives with reference to case study		

Figure 1.1: Direction of study

- current publications and reports from waste disposal authorities,
- discussion with various people, institutions and establishments involved in disposal activities,
- interviews with practitioners,
- questionnaire surveys.

1.3.1. Research Design

Immediately after research and review of the literature, the researcher made a thorough investigation and analysis of waste management systems from the Annual Reports and Waste Management Plans obtained from various counties in England. A statistical package was used to analyse important parameters or variables that identified the kind of waste management system adopted by these counties.

By considering the statistical results, a structure questionnaire is designed for the use of a survey in Malaysia. The steps chart for the research design is illustrated as in Figure 1.2. It is through both of these surveys that the researcher has been able to verify and confirm some important variables or parameters that probably conform to the prerequisites of a Sustainable Waste Management.

1.3.2. The Survey

The survey is based on information gathering as well as data generation. The data is based on the amount of information on the parameter or variables from

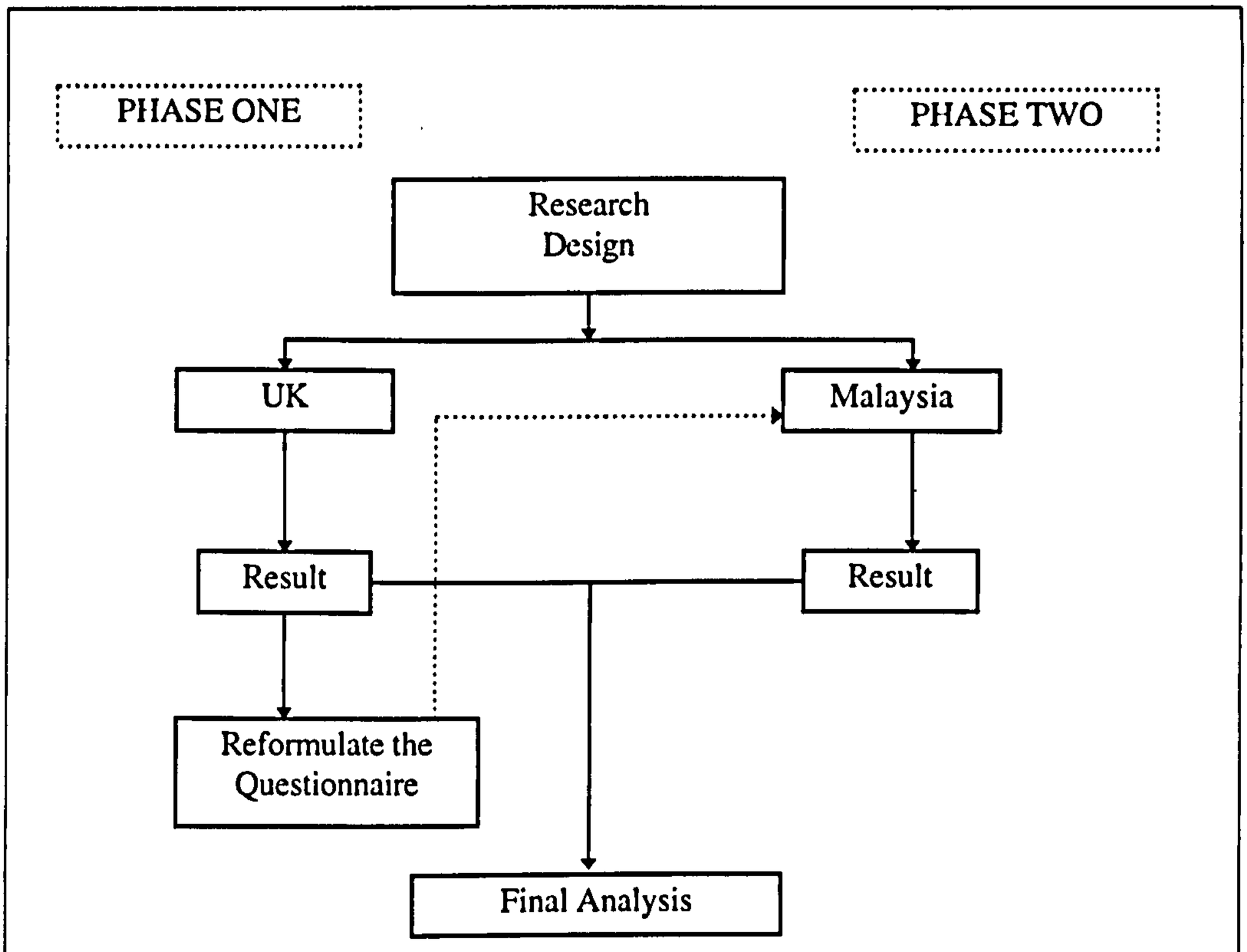


Figure 1.2: Steps chart of the study

the existing Waste Management strategy in the UK. Basically it has been grouped into the following categories:

a. Waste management policy and strategy

- to identify waste strategies and choice of disposal options and hierarchy.

b. The characteristics of waste and waste disposal activities

- an attempt to understand the actual practice of disposal and treatment of wastes,

  the nature of the waste produced and the amount of waste which would bear economic and environmental implications if managed unsystematically,

c. Waste as an environmental issue

- an identification of common environmental issues related to waste disposal

activities such as contamination of land, air and water pollution.

d. Waste legislation and enforcement

- to list the nature of the laws, the role of various Governments and Waste Authorities and the role and scope of enforcement.

e. Management and administration

- identify the scope of training of personnel and waste education.

In achieving these tasks, a significant amount of times has been allocated in order to survey, observe and investigate various waste disposal activities. The researcher has visited various disposal and treatment sites or facilities located in Manchester and Merseyside. The researcher has spent three days in the Apply Landfill Site, Warrington, one of the largest landfill site in the Merseyside area courtesy of the 3C Waste Company. Three days were also spent at the Salford Pulveriser Plant, a transfer station that is operated by the Greater Manchester Waste Limited.

Day case study visit to the Bolton Incinerator and the UK Waste Landfill sites at Riskly have been made. These visits have been designed as a method to learn the basic daily operation on the kind of waste disposal activities and disposal options. Beside visiting the operational sites, a visit has also been made to the office of the Greater Manchester Waste Regulatory Authority (GMWDA) and Greater Manchester Waste Limited Office to gather first hand information from officers in both offices.

1.3.3. Schedule

The data gathering period commences immediately after receiving the candidacy status. Data collection in Malaysia has been carried out in a one month period due to the constraint given by the sponsor. All scheduled visits to the various authorities in Malaysia have been organised from the UK. Various means of communication have been utilised in accessing the documents while in Malaysia. More time was spent in the UK since most of the information for the studies are available here.

1.3.4. Limitations and Anticipation

The anticipated problems have been in relation to the availability of data from Malaysia. Since the management of waste in Malaysia has not yet been institutionalised as in the UK, bureaucratic barriers have to be anticipated. It has also ben anticipated that difficulties may arise in making appointments and arrangement for the self-assisted questionnaire session with the right authoritative officer or person. However the researcher has made his effort to identify the correct person who is given the responsibility on matters related to the management of waste.

The problems of timing for interviews were of great concern during the survey in Malaysia. Each interview conducted lasted an average of two hours excluding the time used by the researcher to browse the departmental documents and meeting other personnel in their department.

It is the responsibility of the researcher to ensure enough funding before committing himself to this task. The funding and resources needed for travelling and lodging during the data collection in Malaysia were on 'tight-budget' situation. As such, the researcher has limited the survey to only municipalities in the Klang Valley of Malaysia.

1.3.5. Research Contributions

It is hoped that this study will contribute an in-depth knowledge on the mechanism of the latest waste management policies and strategies on sustainable development packages. Changes in laws and regulations are essential to transform policies or strategies into practical and manageable means. It is through this legislative mechanism that many environmental issues may be addressed to the public and thus stimulate better understanding of environmental preservation and conservation.

With the availability of all facts on waste policies and strategies, the opportunities to assert greater accountability and responsibility among officers and various organisations that manage the waste will be made possible. This study reveals the role of any individual or organisation and the part they have to play in preserving their own environment. By understanding the basic requirement in a successful UK Waste Management Industry, new ideas may be forwarded to the local authorities in Malaysia to improve the existing waste management practices.

Through this research finding, a paradigm shift towards better management of waste in a fast developing environment could be laid as a foundation to achieve sustainable management among the citizens of Malaysia. The findings will become a basis and reference point to demonstrate that the management of waste is a duty of all individuals, the community and related organisations.

Some of the results will be used as a guide for proposals to the proper authority in Malaysia in producing policies and management strategies on waste. It should also help to provide an insight into how to make improvements and adjustments to the existing mechanism of waste management in their respective areas.

This study will also be the basis for recommendations to improve the current syllabus on environment in the national curriculum. A proposal to upgrade the teacher training syllabus will be based on this study. Some of the relevant information will be distributed to the environmental NGOs as an update to their educational activities.

The study will be used as a process to identify various academic areas within the waste management. It is the intention of the MARA Institute of Technology where the researcher is employed, to introduce waste management into some of the diploma courses in the School of Engineering and Applied Sciences. The long term objective of the Institute is to establish a diploma course in

waste management. By the end of the study, the researcher intends to produce a complete proposal for the Institute on the formation of a diploma course in waste management.

1.4 Outline of Chapters

This dissertation is written in seven chapters. The outline is as follows:

Chapter One details the general consideration which the researcher had to consider while conducting this research. It introduces the reader to the aims and objectives of the research and the research methodology. It provides some basis for consideration on the manner of conducting this research. It details some of the contribution this research may provide by utilising its research findings and information.

Historical and current practices in solid waste disposal and management are discussed in **Chapter Two**. This chapter provides information on the present state of the environment in Malaysia, which requires policies and strategies on disposal and management of its solid waste arising. Current waste management practice in the UK is briefly summarised. Some environmental implications from waste disposal activities are briefly listed so as to inform readers on its adverse impact on health and safety to the public and the environment.

Chapter Three discloses technical component and activities related to waste management as adopted by most developed countries. The methodologies of waste collection for solid wastes are identified and listed. The type of disposal options based on the Waste Hierarchy are explained and the new technology used in solid waste disposal are briefly mentioned.

Chapter Four, contains the findings and results of the tools and mechanisms of waste management in the UK. It identifies the framework on Waste Management Policy and Strategy adopted by the UK Government and the Counties. It also summarises the usage of Waste Management Plans, legislation and regulations in designing waste policies and strategies. The roles of Waste Authorities (WRA, WDA, WCA), Waste Management Licensing, Enforcement, Duty of Care and Registration of Waste Carriers are identified.

The results from the surveys conducted in Malaysia are presented in **Chapter Five**. It details the present practices of waste management and the current problems associated with the disposal of solid waste. The weaknesses of the current practices are analysed and discussed.

Chapter Six provides a comparative analysis and discussion on the advantages and disadvantages of the waste management policies and strategies practised in the UK. The researcher attempts to identify which of these policies or strategies are relevant and the possibility of adoption in a developing country. It summarises the prerequisites and characteristics

needed prior to the adoption of any waste policy and strategy.

The recommendations and suggestions for a developing country in identifying the background and basis to developing a waste management policy or strategy framework are listed in **Chapter Seven.** It also provides some SWOT analysis for a developing country to consider before embarking on the idea of a Sustainable Waste Management.

CHAPTER 2: ISSUES IN WASTE MANAGEMENT

2.1 Introduction

This chapter details the historical and the current solid waste management development with reference to Malaysia and the UK. It is a compilation of literature research materials on the subject. It details information on the present state of the environment in Malaysia that requires policies and strategies on disposal and management of its solid waste arising. It summarises the environmental implications as well as the adverse impact on health and safety to the public from waste disposal activities.

2.1.1 Historical Development on Waste Management

Virtually everything we do will create waste. People in the early years disposed of their waste in holes dug behind their houses or on their farmland. This practice may help reduce waste and improve the quality of the crops but as populations increased and towns were established, waste disposal became a concern for all.

Dumping in ready dug holes may sound reasonable in the country-side but not in towns. Historically, according to Harris and Bickerstaffe (1990), people in the towns tended to dump their waste on to the streets and 'street dumping' became common practice throughout the world. To try to curb this ill-practice of household and street dumping, the authorities introduced laws and regulations. In 1297 a law was brought in to ensure that householders kept

the frontage of their houses clean but it produced little effect. It was not until 1354 assistants to the Beadle of each London ward also called 'rakers', were given the job of raking the rubbish together, loading it into carts and removing it once a week. By 1407 Londoners were ordered to keep their rubbish indoors until the rakers called for it. However it was reported that not everyone obeyed this regulation and Beadles had to pay informers to report on people seen dumping rubbish carelessly. It is recorded that in 1515 Shakespeare's father was fined for depositing filth in public street.

At the height of the industrial revolution there was minimal consideration on the likely health and environmental impact caused by industrial, commercial or hazardous wastes. By 1875 a Public Health Act was passed to regulate the disposal of household wastes in the UK requesting each householder to keep their rubbish in a 'movable receptacle' or commonly called today as dustbin. The Clean Air Act introduced in 1956 recorded an increase in the amount of putrescible waste when this waste was no longer burned together with fuel in the open coal fires for heating homes. The increase in 'fly-tipping' of hazardous waste lead Parliament to introduce the Deposit of Poisons Waste Act in 1972.

By 1989 the EC produced a Waste Management Strategy that provides guidelines on waste disposal methods. In January 1995, a consultation draft paper on a Waste Strategy for England and Wales was produced by the UK Government as part of Sustainable Development Strategy (DOE, 1995).

Waste cannot be made to disappear but it can be managed so that it minimises harm to people and to the environment.

2.1.2 The Present Situation

After the 1990 UN Conference on Environment and Development in Rio de Janeiro, Brazil, the industrialised nations produced an agenda on strategies of how to reduce the production of wastes at the point source of its generation. Many local authorities have now to review and identify their waste management strategies. When preparing their waste management strategies, local authorities have three basic questions to take into consideration (John, 1995b);

- what is the environmental effect arising from waste management activities?
- are there interruptions and changes to the present waste services?
- what is the cost implication for each type of waste activities?

Jorgensen and Jakobsen's (1994) study on municipal solid waste in the Mediterranean region concluded that any waste strategy adopted by any authority must include the provision of an appropriate and an effective waste collection service. It must provide an effective and economical transportation system to the disposal facilities. The most important part of this strategy is that all waste related services are environmentally safe and running at practicable low-cost for the waste disposal system over the long-term.

It is also a common phenomenon today, that many countries are experiencing

waste disposal problems stemming from shortage of landfill space. The increase in public concern on the environmental impacts and the appearance of these landfills has long been debated. The change in approach and methods in waste disposal world-wide is due to increasing concerns regarding the impact of solid waste on health, safety and the environment. The disposal methods have not only changed over time but have improved with the application of the latest technology in waste disposal.

Despite all the remedial plans to combat an increase in the production of waste, the industrialised nations are still facing the major issue of finding and adopting environmentally sound disposal means for waste. The main concern for many nations is waste originating from the municipalities, hospitals and clinics and in particular the industrial hazardous wastes from industries. The amount of these wastes generated has grown annually over the past decades and improper disposal may result in numerous and serious environmental problems.

Incineration, at one time was a popular alternative to landfill to solve these problems. However it is now facing more stringent emissions regulations since many of the old installations are producing poor environmental records such as air pollution and had no additional benefits besides the disposal of waste (Donnelley 1991). A properly designed incinerator will, however, meet the emission standard requirement and it should produce a very high degree of destruction to this waste. Nevertheless, records have shown that incineration

of municipal and hazardous waste has the potential for increasing air pollution as well as causing ground water contamination due to the leaching of ash residue (Donnelley 1991; Hill, et al. 1991, Morselli, et al. 1992).

Although landfill is still the cheapest method of disposal, the cost is rising due to the implementation of environmentally acceptable landfill techniques. Thus, cost-competitive alternative methods such as recycling and conversion of waste to other products such as fuel has recently gained in attraction. Such conversion is now feasible due to the recent advances in waste disposal techniques and methodologies (Sharp and Ness 1991). It has also been reported that landfilling of unprocessed MSW is or is soon to be banned in countries such as Denmark, France, Germany and the Netherlands (Palin, 1995).

2.1.3 Integrated Waste Management

Solid waste management systems in many developed countries are changing and evolving rapidly. Most of these countries strive towards the total goal of sustainable development. One way of achieving this objective is to manage solid waste more efficiently so that there is less of it and so that the waste that is inevitably created has usefulness or value restored to it where possible

According to Anderson and Burham (1992), the objective of an Integrated Waste Management programme is to balance the environmental quality of a waste management system and its economic cost. It is a new discipline dealing with the technological innovation in solving problems of solid waste

disposal. White et al (1995), defined an integrated waste management programme as a system for waste management that deals with 'all types of solid waste materials and all sources of solid waste.' They also include waste collection and sorting as part of an integrated system which should include these options: recovery of secondary materials (recycling), biological treatment of organic materials, thermal treatment and landfill.

A waste management system can be designed to be environmentally and economically sustainable. According to White et al. (1995), an environmentally sustainable solid waste management systems is able to reduce as much as possible the environmental impact of waste disposal, including energy consumption, pollution of land, air and water and loss of amenity. On the other hand an economically sustainable solid waste management systems should also be operating at a cost acceptable to the community. This according to Heasman can be attained through assessment and balancing the benefits of various disposal options in the waste hierarchy.

According to White et al. (1995), there are two fundamental requirements in dealing with waste. The first is the requirement of producing less waste. This is clearly stated in the Bruntland report of the United Nations 'Our Common Future' (WCED, 1987) that sustainable development can be achieved only when the society and industries produced 'more with less' goods: more goods and services with less use of the world's resources and less pollution and waste.

The second basic requirement is there should be an effective system for managing the waste. White et al. (1995) acknowledge that an economically and environmentally sustainable waste management system is likely to be integrated, market-oriented and flexible. The primary aim for any waste management system is to ensure human health and safety. Apart from this basic requirement, the management system must be both environmentally and economically sustainable. However, to reduce the environmental and economic cost simultaneously is easier said than done. One way of achieving this is by having an integrated system of managing the waste.

2.1.4 Principles of Waste Management Strategy

The draft of Waste Strategy for England and Wales (DOE 1995) laid out important principles for consideration for planning and setting goals in waste management. These were principles adopted from numerous meeting and conference and which have gained attention by various environmental managers, legislators and practitioners. These principles are applicable for all fields of environmental management and are summarised in Figure 2.1.

2.2 Trends of development and Waste Management in Malaysia

Malaysia is located in South East Asia. It consists of 13 States with two Federal Territories. Twelve of these states are in the Peninsula of Malaya and two others are in the western part of the Borneo island (Figure 2.2).

1. Principle of Sustainable Development
Definition: "development that meets the needs of the present without compromising the ability future generations to meet their own needs"
Sustainable development meets two key objectives of modern societies;

- Economic development to secure higher standards of living; and
- Protection and enhancement of the environment

2. Polluter Pays Principle
This principle was adopted by OECD in 1972. This requires, when production process threaten or cause damage to the environment, the cost of necessary environmental measures should be borne by the producer, and not by society a large, giving incentives to reduce the pollution

3. Precautionary Principle
To protect the environment even where knowledge about risks to the environment is not conclusive. The Rio Declaration sets out the 'Precautionary Approach'; "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'

4. The Hierarchy of Waste Management Options
This is based on three key objectives for sustainable waste management;

- To reduce the amount of waste that society produces;
- To make best use of the waste that is produced; and
- To choose waste management practices which minimise the risks of immediate and future environmental pollution and harm to human health and on occasion, detriment to the amenity.

5. Best Practical Environmental Option (BPEO)
The application of BPEO may lead to a different order of priorities for waste streams, depending on the environmental, economic or other facts involved. It is important to recognise that all waste hierarchy options have a place in a sustainable waste strategy, and that landfill, although at the bottom of the hierarchy, is not necessarily an unsuitable waste management option. Disposal to landfill represents the BPEO for certain wastes, especially where it results in the effective restoration of some types of mineral workings.

6. Proximity Principle
To dispose or deal with waste close to the place where it arises. Waste should be managed closely to the point of production. This creates a more responsible and sustainable, approach to waste arising, and also limits pollution form transport. Where waste cannot be managed reasonably closed to its source, then priority should be given to the use of rail and water transport where it would reduce the overall environmental impact, and is economically feasible.

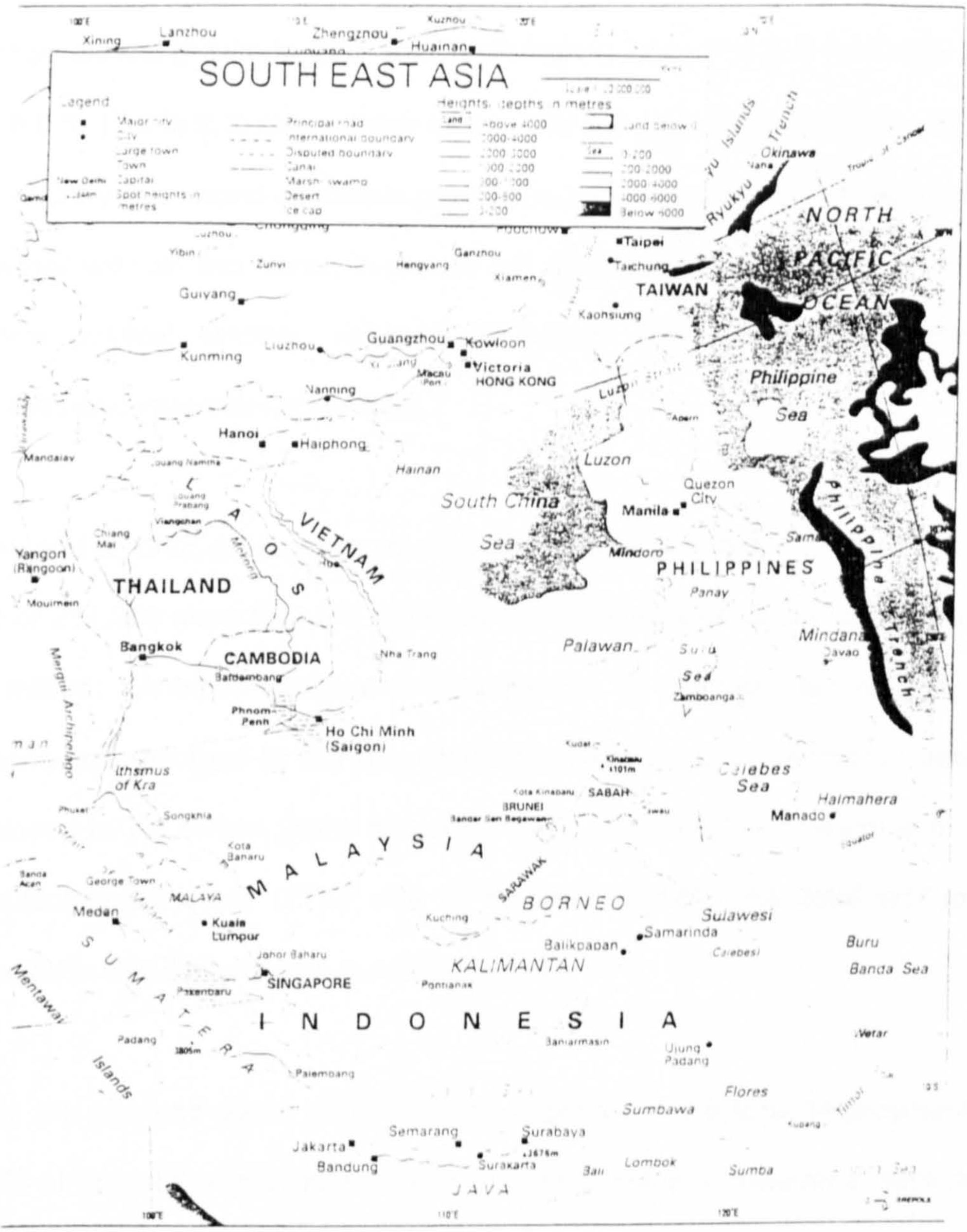
7. National and Regional Self-sufficiency
UK and its regions accept responsibility for the ate arising within them.

8. Proportionality
The expected benefit to the environment of any action taken under the precautionary principle should be proportionate to the cost of the action. It should not;

- Serve as an end itself
- be over-prescriptive; and
- impose an unsuitable or disproportionate burden on those regulated especially small business

9. Integrated Waste Management
The central concept of Integrated Waste Management is the ability to recover optimum value from waste, so minimising costs, reducing volumes for disposal and protecting the environment.

Figure 2.1 : Principle of Waste Management Strategy
Source: Adapted from Draft Consultation for Waste Strategy for England and Wales (DOE 1995)



Fgure 2.2: Location map of Malaysia and South East Asia

2.2.1 Development Trend

Malaysia is a nation of over 22 million people and is expanding at a rate of 2.5% per annum. Through rapid industrialisation, Malaysia is experiencing an average annual growth in GDP and GNP figures of around 8.5 % (Table 2.1) and 8.0 % (Table 2.2) respectively in the past six years (Bank Negara, 1994). The country has sound economic policies to maintain this rapid development. Together with tax incentives, investors are attracted yearly to Malaysia by its relative political stability, richness of natural resources and expanding domestic and international markets.

At the end of 1992, an increase in employment was recorded of around 3.1 per cent or 211,300 more than the previous year making total people employed to 7.1 million. Another increase in employment of 2.9 per cent or 205,000 persons was recorded by the end of 1993 making the total number of people employed to 7.3 million (Bank Negara, 1994). Most of the increase is in the manufacturing sectors (21%) and at the end of 1993 the total workforce engaged in this sector was 1.5 million persons.

While the services sector shows an improvement in the total employment to 46.3% of the total employment (46.2% in 1992), there is however a decline in the agriculture sectors. Further job decline in this sector is due to the continued weak demand and poor prices for major commodities in the world

Table. 2.1: Gross Domestic Product[1] By Expenditure Category, 1985-95

Expenditure	1991	1992	1993*p*	1994*f*
	% Contribution			
Private sector demand	11.6	2.8	4.1	5.8
Consumption	5.8	1.2	1.9	3.4
Investment	5.8	1.6	2.2	2.4
Public sector demand	2.9	1.9	2.6	4.1
Consumption	1.8	0.6	1.1	2.0
Investment	1.1	1.3	1.5	2.1
Change in stocks	2.8	2.1	-.05	2.0
Net exports	-8.6	5.2	2.5	-3.5
Exports of goods and services[2]	12.2	4.3	9.7	9.3
Import of goods and services[2]	20.8	0.9	7.2	12.8
Gross Domestic Product	8.7	7.8	8.5	8.4

[1] At constant 1978 prices
[2] Trade in services refers to non-factor services only
p Preliminary
f Forecast
(Adapted from Table 1.6 Bank Negara Malaysia Annual Report 1993)

Table. 2.2: Gross National Product[1] By Expenditure Category, 1985-95

Expenditure Category	Average Annual Growth Rate (%)						
	Achieved 5MP[1]	Target 6MP[1]	1980-1990[2]	1991[2]	1992[2]	1993*p*[2]	1994 *f*[2]
Consumption	5.9	6.4					
Private	6.4	6.4	5.9	11.6	2.4	3.8	7.3
Public	4.0	6.4	6.1	12.4	4.0	7.4	13.7
Investment	7.7	7.0					
Private	12.9	8.6	8.6	27.7	6.6	9.2	9.9
Public	0.2	3.0	14.1	9.2	11.1	12.9	16.6
Export of Goods and Non-factor Services[3]	14.6	6.4	10.3	15.3	5.0	11.8	11.0
Import of Goods and Non-factor Services[3]	15.2	5.2	11.2	27.6	-1.0	8.8	15.7
Gross National Product at Purchaser's Value	7.5	7.6	6.2	8.2	7.2	8.8	9.1

[1] Adapted from Table 1-1 (Malaysia Sixth Plan, 1985 -1990): MP = Malaysia Plan
[2] From Table 1.2 Bank Negara Malaysia Annual Report 1993
[3] Trade in services refers to non-factor services only
p = Preliminary, *f* = Forecast

market plus unattractive working condition. The influx of foreign workers is mainly due to the shortage of labours in the construction sector. By the end of 1993 the total the percentage rate of unemployed workforce was 3% and this could mean that Malaysia may achieve total employment by year 1996.

The expansion of the industrial and manufacturing sectors has really stimulated the growth of the Malaysian economy. The manufacturing of electrical and electronic equipments and of textiles and apparel has shown a remarkable increase in output (Table 2.3) (Malaysia, 1991). These two sectors have now become important in the growth of the export orientated industries besides the agricultural commodity products such as the timber, wood products, rubber and palm oil. The investment influx by foreign companies into the Country has lead to an increase in the number of approved projects by five folds between 1985 - 1995 (Table 2.4) (Malaysia, 1991). Much of this investment is due to the relocation of industries from industrialised countries such Japan, South Korea and Taiwan.

Although the Malaysian Government has placed high priority on sound economic strategies and policies and in sustaining growth and development, much more has to be done to educate the public on environmental awareness. The very economic consequences and negligence by the public in protecting their environment would be the loss of the natural environment. The likely and most common threat that would also be very close to them will be the nuisance caused by poor management of the waste produced by households, commerce

Table 2.3: Growth in Manufacturing Production (1988=100)

	1991	1992	1993
	Change in %		
Electrical Machinery, Apparatus, Appliances & Supplies:	31.2	13.6	13.6
Radio and television sets	62.1	32.4	16.6
Semiconductors	17.6	3.7	15.7
Cables and wires	51.1	10.5	14.8
Manuf. of office, computing and accounting machinery	54.2	387.5	-52.9
Manuf. of refrigerating, exhaust, ventilating and air-conditioning machinery	64.9	26.8	-2.6
Food products	13.3	10.5	5.7
Beverages	1.8	4.7	-12.0
Tobacco products	1.1	-5.1	-7.3
Textile and wearing apparel	3.7	11.5	19.3
Wood and wood products	5.2	10.9	20.3
Chemicals and chemical products	14.1	7.1	7.1
Petroleum products	6.3	3.7	8.4
Rubber Products	19.8	15.5	26.0
Non-metallic mineral products	18.7	43.3	57.3
Iron & Steel & ferrous metal	10.6	18.8	11.2
Fabricated Metal Products	18.7	443.3	57.3
Transport Equipment	17.0	-6.2	3.4
Total	**13.9**	**10.5**	**12.8**

Adapted from Table 7-8 (Bank Negara Malaysia Annual Report 1993)

Table 2.4: Approved Manufacturing Projects, 1985-95

Industry	Number of Approvals			
	1985	1990	5MP	%
Food Manufacturing	57	36	200	6.2
Beverages and Tobacco	5	3	16	0.5
Textile & Textile Products	50	124	372	11.6
Leather & Leather Products	1	8	15	0.5
Wood & Wood Products	28	85	239	7.4
Furniture & Fixtures	7	47	114	3.6
Paper, Printing & Publishing	35	40	97	3.0
Chemical & Chemical Products	39	45	141	4.4
Petroleum and Coal	11	3	14	0.4
Rubber Products	24	34	492	15.3
Plastic Products	42	49	140	4.4
Non-metallic Mineral Products	84	53	133	4.1
Basic Metal Products	32	26	108	3.4
Fabricated Metal Products	53	52	156	4.9
Machinery Manufacturing	41	36	99	3.1
Electrical & Electronic Products	62	13	609	19.0
Transport Equipment	33	23	170	5.3
Scientific & Measuring Equipment	5	4	16	0.5
Miscellaneous	16	25	79	2.5
Total	**625**	**906**	**3,210**	**100.0**

Adapted from Table 4-4 (Malaysia Sixth Plan, 1985 -1990)

and industry.

2.2.2 The State of the Environment: Waste Related Problems

Throughout the 1980s public anxiety about waste disposal continued to grow. In a developing country like Malaysia, which is experiencing a construction boom in housing, industries and commercial buildings, the problems of waste arising associated with it has escalated to huge proportions. This correspond to the common understanding that generation of waste increases as economic activities and population increase.

The obvious consequences from this rapid growth and development through the diversified economic programmes are the impacts on the environment. The ceaseless opening of new land for industrial parks and the introduction of various chemicals, technological and biochemical industry has increased the potential of environmental hazards. The pollution load from sewage continues to increase due to greater urbanisation (Khan, 1991) and inadequate sewerage facilities as only five per cent of the urban population benefited from centralised sewerage facilities (Malaysia, 1991).

Malaysia has been confronted with indiscriminate dumping of industrial wastes for more than a decade (Gurmit, 1992). A study on the treatment and disposal of hazardous wastes indicated that not less than 380,00 m^3 of toxic and hazardous wastes was being generated annually from 1,000 sources (Malaysia, 1991). The practice of dumping waste into the rivers, discharging

untreated wastewater into drains and burying toxic waste in dumping sites is still a common practice. The quality of major river waters in terms of biochemical oxygen demand, suspended solids and ammoniacal-nitrogen is deteriorating (Khan, 1991; Malaysia, 1991). Industrial and domestic discharges accounted for major components of the organic load while land clearing, unregulated development, mining and logging activities in the catchment areas are responsible for sedimentation and siltation problems.

Untreated domestic sewage and animal wastes in particular from the unorganised pig farm industries continued to pose a major problem (Lim and Kiu, 1995). The increases of heavy metal concentration were more common in rivers on the west coast of the Peninsular. This was due to extensive land use and industrialisation resulting in increased waste water discharges containing heavy metals (Abdullah, 1995; Lim and Kiu, 1995). Sometimes oil waste and used lubricants mixed with toxic or hazardous waste were set on fire on vacant plots to avoid detection from local authorities (NST, 1995a). Indiscriminate dumping of hydraulic oils and varnish used in the painting industries posed potential threats to the water system. Waste generated by small quantity generators (SQG) such as those produced in automobile repair centres, painting contractors and those involve in electroplating are widespread and of great importance (NST, 1995b).

The nature of machinery that produces pollution and the nature of the industrial wastes generated from it has and continues to pose significant

threats to the environment. Reports and complaints of unpleasant odours, noise, poor air and water quality and public nuisance arising from industrial activities are on the increase (Malaysia, 1991). Although there are efforts to curb air and water polluters not much have been done to overcome the threat that may arise from waste produced by the industries. Open burning of industrial waste, particularly wood-based and rubber based factories, remains a major problem (Abdullah, 1995). The open burning of waste at local authority dumping grounds also contributes to the elevating air pollution problems. It seems there is an absence of a holistic approach for improving the environmental quality for the public.

2.3 Trend and Development of Waste Management in the United Kingdom

According to Peter (1995) waste management in the UK saw some radical changes in 1980s. The introduction of Control of Pollution Act 1974 (COPA 74) and followed by the Environmental Protection Act 1990 (EPA 90) transformed the ways in which waste is managed in the UK. Wilcock (1994) reported than the Government of Northern Ireland adopted EPA 90 as a means to upgrade its waste management practices. These changes not only increased the quality of the environment but indirectly created a multi-billion Sterling Pound waste management industry that benefits all.

2.3.1 Definition of Waste

The kind of waste materials generated from all social and economic activities needs clear definition and classification. A simple definition of solid waste may

include litter, sludge, and refuse collected from streets and residential and commercial premises. It also includes pharmaceutical and surgical waste from medical and dental clinics, hospitals, nursing homes and processed wastes from industrial and manufacturing facilities. Henstock (1983) identifies municipal solid waste as the aggregated detritus of households, with the exception of bulky wastes such as old refrigerators and car tyres.

The Concise English Dictionary (NOE, 1992) describes waste as desolate, dreary, untilled, superfluous, left over as useless or valueless, to wear away gradually, gradual diminution of substance or strength or value. Wilson (1981), defines wastes as 'any unwanted residual materials that cannot be discharged, directly or after suitable treatment, to the atmosphere or to a receiving water.' White et al. (1995) simply states it as materials which are commonly found in useful products but differs from useful production by its lack of values. Legal waste is given a much clearer definition as described under Section. 75 of the EPA 90 that defines 'Waste' as;

> (a) any given substance which constitutes a scrap metal or effluent or other unwanted surplus substances arising from the application of any process, and
>
> (b) any substance or article which requires to be disposed of as being broken, worn out, contaminated or otherwise spoiled.

The amended Community Directive on Waste defined waste as, 'any substance or object in the categories set out in Annex I in which the holder

discards or intends or is required to discard' (Croner's 1994).

2.3.2 Classification

Waste can be classified by a multitude of parameters. It has been classified on its physical state; solid, liquid or gaseous. Sometimes it is classified by materials that forms the waste: glass, paper, etc. Waste is also classified according to it physical properties (combustible, compostable, recyclable) or by origin (domestic, commercial, agriculture, industrials, etc.) and by safety level (hazardous, non-hazardous). The common term of municipal solid waste (MSW) usually refers to the combination of the household and commercial waste. Industrial waste is separated from inclusion with MSW since most of it disposal pathway are unique to the type and nature of the waste. In the UK, regulated wastes are grouped into categories; controlled waste and 'non-controlled waste'.

2.3.2a Controlled Waste

Controlled waste is defined in section 30(1) of COPA 74 and section 74(4) of the EPA 90. It is described as household, industrial and commercial waste or any such waste. Agricultural waste, explosive waste, mining and quarrying waste, radioactive waste, sewage and sewage deposited on land are regulated within various other Acts and legislation and thus are grouped together in this thesis as non-controlled waste (Bates, 1992).

2.3.1a. Household waste

Section 75(5) of the EPA 90 defines household waste to include the 'domestic property'. This may include a building or self-contained part of a building that is used wholly for the purposes of living accommodation. It can also be from a caravan that is situated on a caravan site. It may also come from residential homes or from premises forming part of educational establishments, hospitals or nursing homes. The Collection and Disposal of Waste Regulations 1988 and Controlled Waste Regulations 1992 (SI 1992/588) further defined the household waste and includes waste produced from; rooms let singly for residential purposes, a garage or store used wholly in connection with a private dwelling, premises occupied by a religious community and used wholly for the purpose of human habitation, churches and other places of worship, premises occupied by a charity, camp sites, residential hotels, prisons and other penal institutions, hall or other premises mainly used for public meetings and as royal palaces.

2.3.1b. Commercial waste

These are waste materials collected from trade premises (shops, restaurants, offices, etc.). Under the COPA 74 'commercial waste' includes all wastes from premises used wholly or mainly for the purposes of trade business or for the purposes of sport, recreation or entertainment. This definition is similar to section 75(7) of the EPA 90. In England and Wales certain types of wastes are to be treated as 'commercial' for licensing purposes. Examples of such waste are those from an office or showroom, from an occupied premise of

clubs, society or association and passenger facilities such as railways, airports or bus stations.

2.3.1c. Industrial Waste

Industrial wastes can easily be identified and classified by it states or physical form; solid, liquid or sludge, and by its state of chemical properties; inert, non-flammable, potentially combustible and/or biodegradable and which requires special care in handling and disposal. Another method of categorising this waste is subdividing it by the chemical composition or by specific source.

i. Non-hazardous industrial wastes;

It is commonly classified into two main groups, i.e. biodegradable or combustible and inert or non-flammable. The waste contractors group this type of material as the `dry waste'.

ii. Hazardous industrial waste

There are many terms used to described these wastes. Some examples of the common terms are as dangerous, hazardous, toxic, notifiable and special wastes. There are two main groups of waste from this category;

iia. organic solids or liquids or sludge, e.g. aqueous organic mixtures, spent solvents and oil, heavy residues from distillation processes and biological sludge,

iib. Inorganic solids and liquids or sludge, for example pickling acids, heavy metal sludge from waste water treatment, salt

solutions and solids from metal manufacturing and refining.

2.3.1d. Sewage

Sewage is only 'controlled waste' as far as regulation made under section 30(4) of the COPA 74 or section 75(8) of the EPA 90 provides. Sewage and sewage sludge are considered as industrial waste if deposited on land according to the Collection and Disposal of Waste Regulation 1988. But sewage sludge deposited directly on to land for agricultural purposes is not termed 'industrial waste'.

2.3.1e. Special Wastes

In the UK, these are materials that are considered toxic and contain some other dangerous properties. The E.C term this 'toxic and dangerous waste', whereas the Basel Convention classified it as 'hazardous waste'. This waste has to be documented and arrangements for consignments to be disposed of are made through the local Waste Regulatory Authority (WRA). Some of this waste is incinerated at special treatment facilities, while the rest is disposed to landfill where it is still a favoured route and the cheapest option of disposal for this waste.

The Directive on Toxic and Dangerous Waste was adopted by the EC Directive under Articles 100 and 235 of the E.E.C Treaty. It defined 'toxic and dangerous waste' as any waste containing or contaminated by those substances and material listed in the Annex to the Directive. These wastes

require special disposal and handling methods without with it will constitute a risk to health or to the environment. The Annex listed 27 substances or materials such as lead and lead components, ethers, asbestos and organic solvents.

In the UK, The Control of Pollution (Special Waste) Regulation 1980 controls and regulates the disposal of this waste. The term `special waste' is defined in Regulation 2. The lists contain many similar items of waste but with an additional to the list of waste contained in the Annex of the Community Directive. This includes things such as asbestos, acids and alkalis, laboratory chemicals and pharmaceutical and veterinary compounds. Waste Management Paper (No. 23) provides a guide to the assessment of whether a particular waste is special or not. The criteria used in listing these wastes as being special is whether it could inflict and cause danger to life, is carcinogenic, corrosive to tissue or is toxic.

2.3.1f. Clinical waste

Clinical waste is defined in section 2(1) of The Collection and Disposal of Waste 1988 Regulations as including;

a. any waste which consists wholly or partly of human or animal tissue, blood or either any other body fluids, excretions, drugs or other pharmaceutical products, swabs, or dressings, or syringes, needles, or other sharp instruments, being waste which unless rendered safe may prove hazardous to any

person coming into contact with it; and

b. any other waste arising from medical, dental, veterinary, pharmaceutical or similar practice, investigation treatment, care, teaching, or research, or the collection of blood for transfusion, being waste which may cause infection to any person coming across it.

2.3.1g. Litter and Refuse

Litter is waste that is left lying around and easily visible. Section 96(2) of the EPA 90 gives the Secretary of State power to make regulations classifying litter and refuse as controlled waste. Under regulation 8(a) of the Controlled Waste Regulations 1992, litter and refuse is further classified based on the way in which the matter is collected. Litter and refuse collected by a local authority from highways is classified as household waste.

2.3.2 Non-controlled waste

2.3.2a. Agriculture waste

Waste from premises used for agriculture is not considered as a commercial waste or as a controlled waste.

2.3.2b. Explosive waste

Section 75(2) of the EPA 90 does define waste that excludes a substance that is an explosive within the meaning of the Explosive Act 1875. Section 3 of the Explosives Act 1875 defined explosives as 'gunpowder, nitro-glycerine,

dynamite, gun-cotton, blasting powders, fulminate of mercury or of other metals, coloured fires and every other subsonic, whether similar to those above mentioned or not, used or manufactured with a view to produce a particle effect by explosion or pyrotechnic effect'. Explosive waste can be disposed or destroyed by burning, detonation, dissolution or dilution by solvent, chemical destruction or drowning.

2.3.2c. Mining and Quarrying Waste

Under section (75) of the Environment Protection Act 1990, waste from mining and quarrying is not a controlled waste.

2.3.2d. Radioactive Waste

Under the Radioactive Substance Act 1960, Radioactive waste is defined as 'waste consisting wholly or partly of a substance or article which, if it were not waste, would be radioactive material, or a substance or article that has become contaminated by radioactive material or waste so as to make it radioactive or to increase the radioactivity it already possesses.' Waste for these purposes, includes waste such as scrap material, an effluent or unwanted surplus substances such as gases, arising from the application of any process and also includes any substances or article that must be disposed of as being broken, worn out, contaminated or other wise spoilt.

2.3.3 Production and Source of Wastes

According to Kharbanda (1990), the main sources of waste are from the

domestic, agriculture and industrial refuse. The nature of domestic and agricultural waste is relatively similar between most regions of the world but varies widely for industrial waste. Bellamy (1993) states that litter and toxic waste are nothing new since they were produced on a vast scale long before industrial people came on the scene. He estimated that 44 million tonnes of wastes are produced every day with the proportion of each group of waste as in Table 2.5.

Table 2.5: Proportion of world waste by group produced each day.

Agricultural Waste	17 million tonnes
Waste from extractive industries	12 million tonnes
Waste from manufacturing industry	9 million tonnes
Municipal Wastes	2 million tonnes
Faeces	4 million tonnes
TOTAL	44 million tonnes

Source : Belamy (1993)

Most of domestic waste is composed of not only reusable waste but account for an increase in the amount of hazardous waste. This could include items such as batteries, cadmium, pesticides, bleaches, PCBs and other toxic chemicals such as solvents, disinfectants and wood preservatives (Rich 1986). Waste from the agriculture industry arises at various stages in the process of producing the product. These include waste produced at stages of harvesting, processing and usage.

It is difficult to determine the actual amount of waste generated and most of the figures and data recorded are estimates and assumptions. The composition of solid waste varies from country to country and culture to culture. Solid waste can contain putrescible organic matter (e.g. kitchen and market wastes, faecal

matter, leachate); combustible organic matter (e.g. paper, textile, and bone); plastics, metal, glass, oil and grease, and inert (e.g. soil and ash). Solid waste can also contain pathogenic micro-organisms and toxic chemicals such as pesticides, heavy metals, volatile organic and solvents (DOE, 1991b). Table 2.6 illustrated the typical waste composition in UK.

Table 2.6: The typical UK waste composition (1983)

Component	Household		Collected
	kg/wk	(%)	(%)
Screenings	1.25	12	19
Vegetables and Putrescible	2.95	28	21
Paper and board	2.95	28	30
Metals	0.75	7	9
Textiles	0.35	3	3
Glass	0.90	9	9
Plastics	0.50	5	3
Unclassified	0.80	8	6
Total	10.45	100	100

Source: Adapted from Crawford and Paul, 1985.

Table 2.7 gives an example of the variation in the analysis of samples taken from properties in different seasons in 1982. The substantial increase in the total weight per house in summer is largely due to collection of householders' garden waste; it amounts to about 8.7 kg per house (a 70% increase).

Table 2.7: Seasonal variations in waste (1982)

	Winter	Wt/house	Summer	Wt/House
Density kg/m^3	114 kg/m^3		139 kg/m^3	
Vegetable and Putrescible	24.2%	3	55.1%	11.67
Screenings	15.2%	1.9	8.9%	1.82
Paper	25.8%	3.2	16.6%	3.5
Glass	12.7%	1.6	6.4%	1.35
Metal	8.0%	1.0	3.7%	0.85
Textiles	1.5%	0.2	1.9%	0.40
Plastics	10.9%	1.4	4.0%	0.85
Unclassified	1.7%	0.2	3.6%	0.76
	100.00	12.5 kg	100.00	21.2 kg

Source: Adapted from Crawford and Smith, 1985

There are also wide variations between UK municipal waste and that found in

other countries. It varies not only geographically but also seasonally. Table 2.8 compares the component of municipal wastes in the UK and an Asian city and Middle East City. Factors such as the climate, economy, diet, religious practices, social welfare and general standards of public health protection all influence the nature and quantity of materials that arise as municipal wastes (Wilson 1981, Crawford 1985, White et. al. 1995).

Table 2.8: Component of municipal wastes in the UK, an Asian and Middle East city

	United Kingdom	Asian City	Middle East City
Density kg/m^3	132	570	211
Vegetable and Putrescible	28	75	50
Paper	37	2	16
Glass	7	0.2	2
Metal	9	0.1	5
Textiles	3	3	3
Plastics	2	1	1
Unclassified	12	12.7	23
Weight/person/day	0.845 kg	0.415 kg	1.060 kg

Source: Adapted from Holmes, 1981

2.4 Environmental Implications from Waste Disposal Activities

Environmental change is actually a manifestation of the interaction between human demands and needs which exist in various forms of systems. The causes and consequences of environmental change are the results of five important elements as illustrated in Figure 2.3 (Dunlap and Catton, 1979).

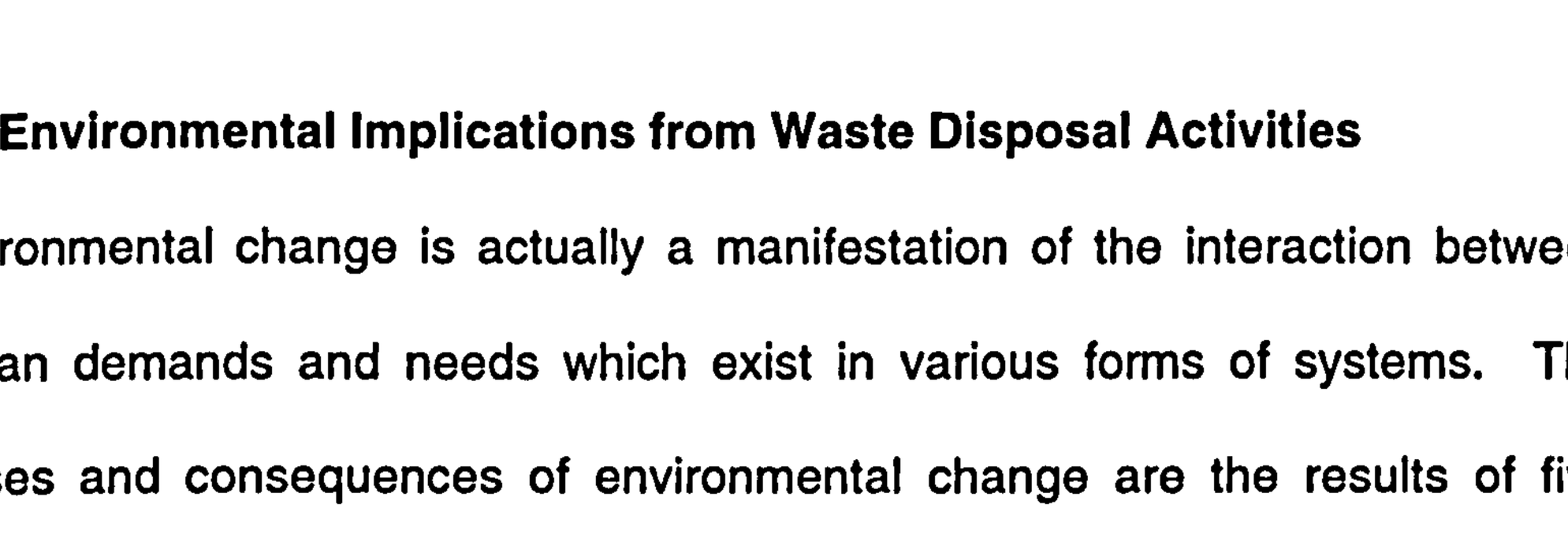


Figure. 2.3. Causes and consequences of environmental change (Source: Dunlap and Catton, 1979)

2.4.1 Biological Environment

Municipal waste may be contaminated with a variety of materials which may inadvertently be a hazard to the environment. Damages from solid waste disposal include contamination of soil, groundwater, surface and air quality. Adverse impacts on health and safety of the public frequently resulted from the improper siting and inadequate design of waste dumping facilities. Crawford (1985) asserted that this problem is commonly associated to the lack of finance and expertise in waste management which may cause more environmental problems.

Wastes also differ in their potential to cause environmental problems. In some cases the waste can easily be degraded by the natural process in the environment and indeed the waste may well supplement the natural supply of nutrients through the food chain. In other cases the waste is recalcitrant and slow to break down and may well be toxic to the natural processes that exist in a specific ecosystem (IChem, 1993). Seepage from solid waste contains fine particulate and micro-organisms which can be filtered by soil matrices. Seepage also contains dissolved solids which can be attenuated by soil though precipitation, adsorption or ion exchange mechanisms. Under some conditions, contaminated seepage (also called leachate) from solid waste can pass through the unsaturated soil beneath the solid deposited and enter ground water.

Wilson (1981), listed the factors that affects the chemistry and composition of leachate formation in landfill. The process of leachate formation may be affected by solubility, biodegradation, chemical precipitation, acid-base reactions, complex ion formation, chemical oxidation-reduction, volatilisation and absorption and adsorption of the waste materials. Example of composition of a landfill leachate is a shown in Table 2.9.

Table 2.9: Composition of Landfill Leachate.

Species	Concentration range (mg/l)
Metal ions:	
Iron	60-200
Sodium	600-900
Potassium	600-900
Other cations:	
Ammonium	400-700
Anions:	
Chloride	900-1100
Sulphate	1700-1900
Nitrate	<0.1-1.0
General organics:	
Total organic carbon	5000-10 000
Biological oxygen demand	10 000-20 000
Chemical oxygen demand	20 000-40 000
Organic acids:	
Acetic	2200-3700
Propionic	1300-2500
n-butric	2400-5100
i-butric	200-300
pH	(pH units not mg/l) 5.6-5.7

Source: Adapted from ICHEM (1994)

2.4.2 Physical Environment

Soil underlying solid waste deposited within an open dump or sanitary landfill is typically contaminated by pathogenic micro-organisms, heavy metals, salts and chlorinated hydrocarbons contained in seepage from the waste. The extent to which the soil attenuates such contaminants will depend on its porosity, ion exchange capacity, and ability to absorb and precipitate dissolved solids. Furthermore, not all contaminants can be attenuated by soil. For

example, anions, such as chloride and nitrate, pass readily through most soils without attenuation.

Soil consisting of clay and organic matter is more likely to attenuate contaminants than soils consisting of sand, silt and gravel. If seepage continues after underlying soils have reached their full capacity to attenuate contaminants, contaminants my released to groundwater. Kivell (1992), examined the problems faced by landfilling practices based on the impact posed by the contaminant as listed in Table 2.10.

When solid waste is processed by composting, the resulting compost product may be applied to agriculture land, wooded areas, and/or home gardens. Depending on the concentration of potential hazardous chemicals within the compost and the land application rate used, soil can be contaminated and plants can subsequently uptake toxic chemicals. Some chemicals stay within the soil matrix and build up to phytotoxic levels after repeated applications of compost.

Table 2.10: Contaminants and the problems posed for land reclamation

Type of Contaminant	Likely Occurrence	Hazards
Toxic and other metals (Leads, cadmium, mercury, arsenic, copper etc.)	Metal mines, engineering work, electroplating works, industrial waste	Harmful, to humans, animals and plants
Combustibles (coal, coke-dust)	gas works, power stations, railway land	Underground fires
Flammable gas (e.g. methane)	Landfill sites, domestic waste	Explosions within or beneath buildings
Aggressive substances (sulphate, chlorides, acids)	Landfill sites, industrial-waste-made ground, slag heaps	Attacks building materials
Oil, tars, phenols	Chemical works, tar distilleries	Contamination of water
Asbestos	Industrial buildings and waste sites	Harmful if inhaled

Source: Based on Table 1, Interdepartmental Committee on Redevelopment of Contaminated land (1987).

Through biodegradation and chemical oxidation/reduction mechanisms on deposited solid wastes, dissolved by-products of decomposition are added to the interstitial waters within the solid waste mass. Over time, the solid waste decomposes into smaller particles and the waste consolidates under its weight, thus releasing the polluted interstitial waters.

Surface water can be polluted when it receives groundwater or surface runoff which has been contaminated with leachate from landfill areas. In the event that solid waste is placed in a sanitary landfill designed to enable leachate collection and leachate treatment, there may be a water quality impact attributable to the discharge of treated leachate into a receiving surface water. Potential impact may arise due to inadequacy in the design of the leachate treatment or failures from the operational design.

The most obvious air quality problems associated with solid waste collection and disposals are dust, odours, and smoke. Less obvious air quality problem may arise when the biodegradation of hazardous materials in the solid waste leads to release of potentially toxic volatile organics. For the most part, following good design and operating practices can minimise these impacts (DoE, 1991b).

The air quality problems most associated with solid waste collection is dust created during loading and unloading operations. Dust is also produced during the spreading and grading operations at a land disposal site. The level

of dust created depends largely on the method of collection selected. Dust is primarily a nuisance and an eye irritant; however, it may also carry pathogenic micro-organisms which may be inhaled when airborne.

There is typically a putrid smell from hydrogen sulphide gas and other gases created by anaerobic biodegradation of wastes within an open dump or sanitary landfill. By contrast, at a compost facility where biodegradation is designed to occur by aerobic mechanisms, the odour is typically an inoffensive earthly smell. If the compost facility is not properly operated and aerobic condition develops, however, a foul odour could result (DoE, 1991b).

Burning at a disposal site may occur underground and on the surface. Once an open dump begins to burn underground, it can last for decades, or until sanitary landfill methods (including gas collection and venting) are implemented.

2.4.3 Sociological/social cultural issue

Uncollected waste is a public nuisance. It can clog sewers and open drains, encroach on roadways, diminish landscape aesthetics, and cause unpleasant odours and irritating dusts.

In order to maximise public co-operation and thus minimise cost in solid waste disposal systems, the public should be provided with appropriate containers and the distances and direction in which the public may have to walk to

discharge solid waste into a communal or private container should be designed to fit with their normal routine. The physical size and shape of the container should be given the consideration for the type of person who is assigned to dispose the waste. Poorly located communal containers create wasted time and effort for residents. When there is a high density of population and limited space available for storage of waste, waste collection frequency may need to be daily instead of every two or three days or weekly. When the climate is hot and humid, collection frequency needs to be daily or every two days because fly reproduction and waste decomposition rates are accelerated by heat and humidity.

A high priority needs to be given to educating the public regarding the environmental regulations. This will result in any council or authorities not wasting time and money compensating for the uncooperative behaviour of some residents by providing extra services.

In cities peripheral zones where rural and illegal settlement onto open-land commonly occur, providing refuse collection service is difficult. Road access for refuse collection vehicles is poor and residents may not know how to co-operate with the refuse collection system. Furthermore, where residents settle illegally and do not pay property taxes, there may be less political commitment to providing refuse collection service.

2.4.4 Public Health Impact

Health impacts occur when waste is not disposed of adequately and collected from living and working environments. The adequate protection of the disposal workers should also be given priority in avoiding health problems to them (DOE, 1991b). Public health can also be affected when solid waste is inadequately disposed of within an open dump or from the practice of fly-tipping. Open dumps provide easy access to the waste by both wild and domestic animals such as rats and foxes and, subsequently there is a potential spread of disease and chemical contaminants through the food chain. Windblown dust from an open dump my carry pathogens and hazardous materials. Populations of disease vectors (e.g. flies, rats, cockroaches) increase where refuse is either uncollected or open dumped. Smoke generated from burning wastes at open dumps is a significant respiratory irritant and can cause affected populations to have a much increased susceptibility to respiratory illness. Gatrell and Lovett (1992) identified the implications on human health caused by incineration of hazardous waste. Table 2.11 shows the potential threat to human and environment with large amount of hazardous waste incinerated on land in selected OECD countries.

Table 2.11: Amount of hazardous waste incinerated in selected OECD countries

Country	Amount (tonnes)
Denmark	32,000
France	400,000
West Germany	675,000
Netherlands	66,000
Switzerland	120,000
United Kingdom	80,000
United State	2,700,000

Source: World Resources (1987)

Lee and Huffman (1991) reported that issues arise from improper disposal of medical or clinical wastes are of great interest by the public. Most of these wastes are disposed through incineration. Medical waste contains toxic metals such as lead, cadmium, and mercury. These metals will only change form (chemical and physical state) but will not be destroyed during incineration. They can be emitted from incinerators as small particles which may penetrate deep into human lungs. Thus, the emission of trace amounts of heavy metals from medical waste incinerators is one of the major concerns to those who are involved in medical waste management. The incineration of medical waste may result in the emissions of trace metals into the environment, if incinerators are not properly designed and operated.

2.4.5 Mitigating Waste Impact

A waste collection project should consider the economic costs of waste containment and worker protection relative to the potential health impacts in order to derive an appropriate level of design (DOE, 1991b). In the UK comparative disposal costs between landfill and incineration differs significantly (Table 2.12). It can, therefore, be concluded that landfill disposal will be the main disposal option for many years to come; unless new legislation specifically regulates against landfill for certain types of waste (ICE, 1974).

The site of facilities for waste disposal systems must take consideration the social and cultural issues of the population. The facility needs to conform to land-use plans. The site should provide for enough land area for a buffer zone

to minimise aesthetics impacts. Consideration should be given to proximity and to residential developments (because of noise and truck traffic impacts, as well as gas migration), prevailing wind direction (because of dust, odour, and smoke), and groundwater flow (because of water supply wells and receiving surface waters). A sanitary disposal alternative should be given priority in reducing the environmental impact.

Table 2.12: In the UK comparative disposal cost are as follows:

For Landfill:	**£ per tonne**
Non-hazardous waste	1-5
Dry wastes	5-10
Difficult wastes	10-15
Special waste	20-25
Difficult and special waste	25-35
For Incineration:	
Non-hazardous wastes	100-200
Difficult special wastes Polychlorinated biphenyls (PCBs)	100-1000 1500-2000

Adapted from ICHEM, 1993

2.5 Conclusion

Much has been said and discussed about the Country's situation on municipal solid waste (MSW) management. As the Country maintains the rate of development, the social and economic status of its peoples show changes in their lifestyle and purchasing power. The power to consume endless products which contain numerous unbiodegradable materials or which degenerates into hazardous and toxic materials when disposed pose continuous threats to the health and safety of the public and the environment. The Government has attempted to find a solution and to try to curb the increasing waste quantities and their impact on the environment but in reality seems to be making little progress. Action plans, studies, amendments to existing laws, the

promulgation of new legislation, national campaigns, departmental and local government recommendations, and seminars have been put forward to explore all possible remedies yet the problem still exists.

A sound waste strategy and waste policy must complement development and economic growth if Malaysia wishes to maintain and improve the current state of the environment. A new and more comprehensive waste management policy and strategy must be formulated and adopted by the Country.

The UK experience, in managing it waste, is a successful story of a developed country that should be reckoned. From the UK experience much can be learned and understood on how waste is managed, administered and enforced. The tools and mechanisms of a sustainable waste management could be acquired and mastered through the policy statements contained in several documents produced from various counties in the UK. Only by comprehending these waste policies and strategies, can one ascertain the issues underlying the success of the UK waste management.

CHAPTER 3: METHODS OF WASTE COLLECTION AND DISPOSAL OPTIONS

3.1 Introduction

This chapter is an attempt by the researcher to disclose some fundamental activities involved in waste collection and waste disposal in most developed countries. The understanding of these activities and their options is critical before any strategy or policy on waste is adopted by any authorities or government. Both, collection and disposal of wastes, involve cost and financial commitments which will determine the system of waste management of a particular authority or country.

3.2 Collection and Transport

Waste collection and disposal involves a complex chain of operations. Each stage must be solved as appropriate for the situation and must be compatible with the other stages of the chain. A system for the collection of household waste for example requires two stages: precollection and collection, of which both are directly related to the type of collection equipment. This equipment includes the types of receptacles which have to be designed to suit the types of collection vehicles.

This means several factors have to be taken into consideration before any particular receptacle or collection vehicle is selected. These include: i) the type of housing, population density and town planning scheme, ii) the volume and type of waste, and any seasonal variations, iii) the frequency and rapidity of

collection needed, iv) the distance from the treatment and disposal sites, v) requirements concerning hygiene, aesthetics and working conditions for workers and vi) the level of investment and operation costs.

3.2.1 Receptacles

Traditionally, the precollection system for the collection at source was the use of dustbins, usually made of plastics or galvanised steel and with a removable lid. They came in various sizes. The dustbin collection system has several disadvantages since it involves many handling operations and danger of spillage. Another common collection receptacle is the use of paper or plastics disposable bags. It provides several advantages which include easy maintenance and use of unlimited of bags that can be marked for various types of wastes by households..

The latest form of collection system is the use of receptacle carts fitted with wheels. These ' wheeled bins' typically of 240 litres capacity, usually made of plastic, come in various designs and capacities. These containers offer clear advantages such as weather-proof, reduced time for disposal, easily fitted with a hook-on system and hygienic. Bigger carts of higher capacity of more than 240 -1100 litres usually have four wheels and are commonly distributed to commercial and industrial sectors. Containers, skips or compactors are types of receptacles made of steel with sizes varying from 5 to 30 m^3 and are commonly used for bulky wastes from factories and constructions sites. There are also special receptacles which are designed for particular types of refuse

such as bottle and glass bank, newspaper and clothing or aluminium and tin cans collected for recycling purposes.

3.2.2 Vehicles

Dumper trucks, usually with open or partly covered body, were the common vehicles used to collect small quantities of waste since they could only accommodate about 0.5 to 3.5 ton of waste. These trucks were commonly used in rural situation whereas in the town areas packer trucks fitted with a hooper for reception of waste were a common sight. In large cities these packer trucks were fitted with a lift system suitable to use with carts or wheely bins receptacles. Lift-off or roll-on-roll-off trucks which were equipped with jack levers were commonly used for containers, skip or compactors.

3.3 Disposal Methods and Options

In the UK, the Consultation Draft for Sustainable Waste Management (1995) has identified and classified waste disposal methods as a 'waste hierarchy'. The objective of establishing this hierarchy is to achieve sustainable waste management (Petts and Eduljee 1994, Gummer 1995). Each of the disposal options will provide a broad indication of their relative environmental benefits and disbenefits. The hierarchy of options are: i) waste reduction at source, ii) waste recycling, reuse and recovery, iii) treatment of wastes and iv) disposal of the residues from treatment and of other unavoidable waste.

Wilson (1981) acknowledges that waste management technology progressed rapidly between 1970-1980, with new inventions and innovation in waste disposal technology. Today, it is difficult to find a balanced judgement for the best technology for a particular group of waste. An overview of the major disposal options and a summary of each option's advantages and disadvantages is simplified in Table 3.1 and explanation for other options are detailed below.

3.3.1 Waste Reduction at Source or Elimination and Minimisation

This is a scheme introduced by industrial sectors as a strategy to reduce the amount of waste produced in all the industries' activities. Waste minimisation does not simply mean attempting to reduce the output of solid wastes but rather reducing pollution to all environmental media: air, water and land, and by an approached defined as integrated pollution control (IPC) (Croner's 1994).

It is a target that is consistent with economic sustainability. Priority should be given to minimising the hazardous components of waste, and certain hazardous materials may need to be eliminated entirely from the waste stream (Gummer 1995). By having this option, companies may reduce the cost of off site disposal or the cost of on site treatment.

Table 3.3.1: Advantages and Disadvantages of Disposal Options

Disposal Options	Advantages	Disadvantages
Landfill	• low cost • body of experience and expertise available • allows reclamation of derelict land	• availability of suitable void space is declining • Potential pollution from landfill gas and leachate if not adequately engineered. Landfill gas is a significant green-house gas
Waste Minimisation	• reduces quantities of waste requiring disposal • reduces disposal costs for producer • reduces usage of raw materials if waste can be reintroduces into manufacturing process.	• May involve initial capital outlay to invest in new plant
Transfer Stations	• reduces transport costs • reduces traffic movements to landfills site • allows waste sorting and recycling	• requires suitable siting, near urban areas but not residential. • Results in double waste handling
Baling	• reduces volumes of waste requiring landfilling • allows easier placing in landfill	• expensive plant/operation costs • high energy demand form plant • slow decomposition rates due to compaction
Pulverisation	• produces a more manageable and uniform waste for disposal • reduces volume of waste requiring landfilling	• expensive plant/operational costs • high energy demand form plant • slow decomposition rates due to compaction
Incineration	• Reduces volumes of waste by up to 90% • may be send to generate power • destroys putrescible component of the waste and reduces emissions of greenhouse gases • destroys potential hazardous organic waste	• potential air pollution if not adequately engineered/operated • requires expensive plant • difficult to find acceptable location • pollutants concentrated in residue require further disposal
Composting	• removes gas/leachate generating waste from landfill • creates a usable product (compost) reducing reliance on peat based products • biogas generated may be utilised	• costly to instigate and operate schemes • relies on segregation of waste by producer • final product may be difficult to market
Physical/ Chemical Treatment	• converts hazardous waste into less toxic material • may convert waste into a reusable product	• requires expensive plant • may result in toxic residues requiring further treatment or disposal
Sea Disposal	• simple technology • low cost	• potential to pollute marine environment • to be phased out for industrial waste by 1993 and sewage sludge by 1998
Refuse Derived Fuel	• generates fuel pellets • reduces volume of waste requiring landfill	• high plant/operational costs • limited market for initial product.

3.3.2 Waste Recycling, Reuse and Recovery

3.3.2a Recycling

Recycling involves the processing of waste materials to produce a useable raw material or product that can in certain circumstances be re-used many times. The European Recycling and Recovery Association (ERRA) defined recycling and recovery as:

- Recycling means to compost or regenerate materials for the original purpose or for other purposes, but excluding energy recovery
- Recovery means to recycle, compost, regenerate or to extract the energy to be used as an energy source

Recovering, waste to energy, is an option that is gaining attention by many disposal authorities. Materials recycled and reused include- discarded paper and board, steel and non-ferrous metal, plastics and glass. The UK Government has adopted the European Union (EU) target to recycle 25% of the household waste by the year 2000 (John, 1995b).

In Germany manufacturers and suppliers are obligated by the Packing Ordinance to reclaim all used shipping containers. These materials should either be reused or sent for recycling rather than disposed of through the public waste collection and disposal system. All products that undergo recycling are required to show a RESY symbol, a licence that is produced by an independent body. This symbol stands for recycleable transport packaging

made of paper and board which will be 100 percent recycled. The details of how the scheme works are illustrated in Figure 3.1.

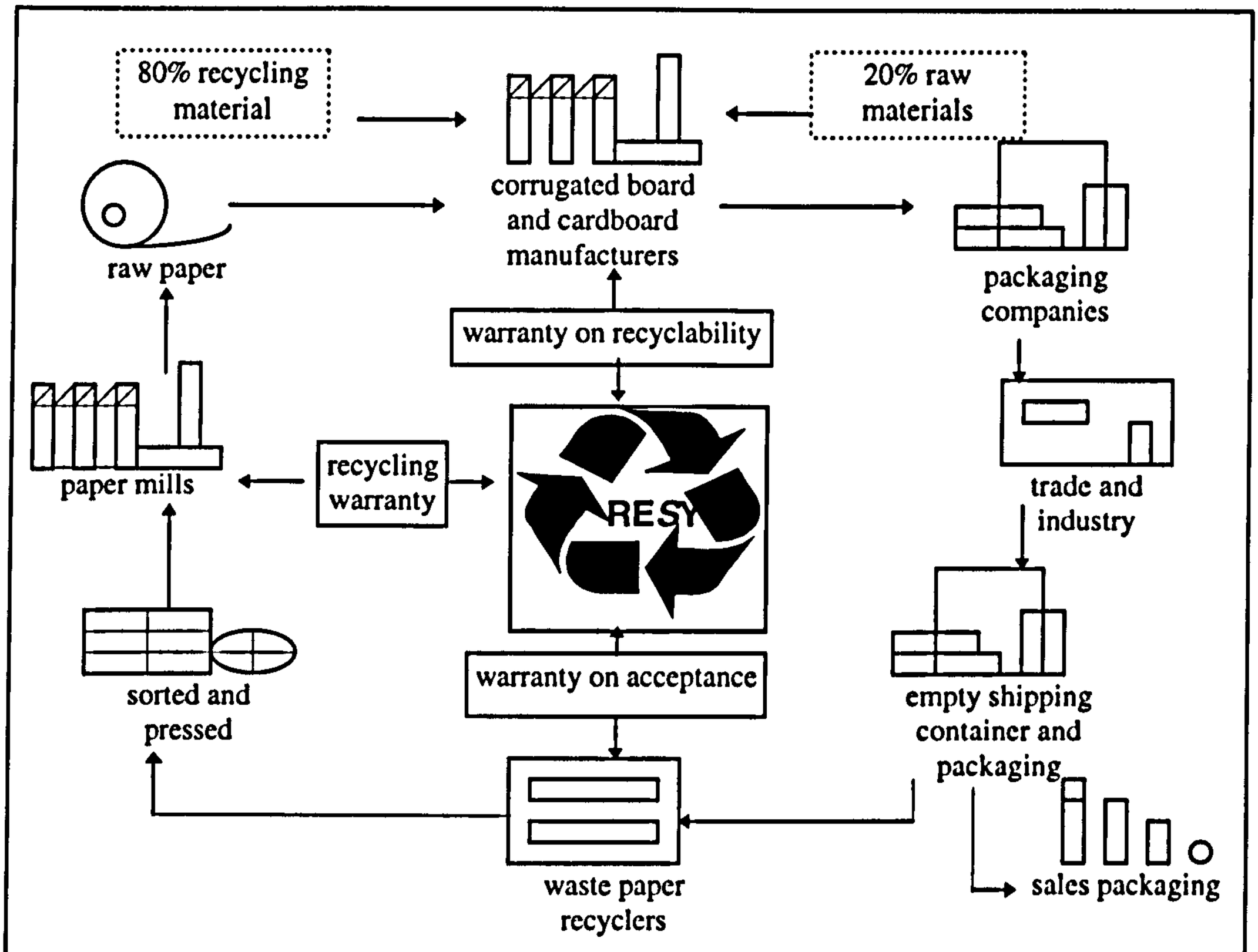


Figure 3.1: The cycle from waste material to raw material
Adapted from: Bmann, (1995)

Wastes are also recycled into pellets as a waste derived fuel which is burned to produce energy. The burning of Waste Derived Fuel (WDF) to produced energy is now a viable option. The wastes used to produced WDF consist of combustible fraction of domestic waste, commercial and trade waste plus other wastes that, because of their nature or composition, are similar to domestic wastes. Wastes may simply be shredded after some pre-treatment to remove metals and other unsuitable materials and then fed into a furnace to generate energy (HMSO, 1992f).

The recycling of glass, metals, plastics and paper reduces the quantity of materials to be landfilled by about 60 percent (Gandy, 1994). Most states have decided that recycling offers the best solution to the environmental concerns associated with solid waste disposal and many have implemented regulations for curbside segregation of recycleable components. Markets for recycled aluminium and steel are well established but not for recycled paper, glass and plastics.

3.3.2b Composting

Composting involves the processing of organic wastes to produce a product that can be used as a soil conditioner or a growing medium. The biodegradable product of the putrescible wastes may act as a soil improvers or growing media in horticulture industries. At present many disposal authorities have set up schemes to compost park and garden waste (DOE, 1995). In the future, composting might be developed as a pre-treatment method for landfill. Composting is among the possible methods being investigate to treat sewage sludge.

3.3.2c Incineration

The incineration of wastes appeared to be a very convenient and safe means of disposal. Energy from waste schemes has become more popular, supported by UK Government subsidies through the Non-Fossil Fuel Obligation (NFFO). Recent recommendations from a variety of credible sources, including the RCEP, are driving the policy towards the incineration of hazardous wastes. At present, installed incineration capacity is limited and is restricted to a few

specialist operators and dedicated in-plant facilities at specific process sites (IChem, 1993).

Rolfes (1972) identified two main purposes of incineration. The first is to reduce the volume of the refuse such that a minimum space is necessary for subsequent disposal and second is to sterilise the material that remains after the combustion process.

c.1 Types of incineration

c.1.1 Municipal Incinerators

A municipal waste incinerator is defined as a piece of technical equipment that is used for incinerating municipal wastes. It excludes plant used for the incineration of sewage sludge, toxic, chemical or dangerous wastes or clinical or other types of special wastes. The operating temperatures are between 800-1100 ^{0}C and the exhaust gases are quenched to about 300 ^{0}C before emission.

The incineration process includes the reception, handling, treatment, storage and the burning of wastes in the furnaces. It also includes the removal and treatment of ash or clinker from the furnaces. It also involves processes for the treatment of exhaust gases and all liquid effluent or sludge. It also includes the segregation of wastes, heat recovery, and the storage of fuels and treatment chemicals but not the activities of a separate waste transfer station (HMSO, 1992b).

A municipal waste incinerator is designed to completely oxidise all combustible components in the wastes. To achieve this, all wastes and intermediate decomposition products should be able to mix intimately with oxygen at a sufficiently high temperature. A longer residence time will allow the oxidation reaction to reach completion. To achieve complete combustion of the waste, it must be agitated either by providing air, mechanical means or by rotation of the incinerator. To assist the reaction, controlled excess air is introduced into the combustion chamber. Products of incomplete combustion, including dioxin and furans, are formed usually in small quantities. To achieve combustion of these products, there must be good turbulence and the gases must be maintained at or above 850°C for a few seconds (HMSO, 1992b). The municipal incinerators are regulated to ensure that municipal wastes is burnt under strictly controlled conditions with minimal effect on human health and the general environment (HMSO, 1992b). An example of a municipal incinerator is shown in Figure 3.2.

A new EC Directives on the Incineration of Municipal Wastes requires that all existing plant reduce the amount of air pollution and should install acid scrubbing (cleaning) equipment to control the acidic emissions. The qualities of emission depend on the control of the system and the types of wastes incinerated.

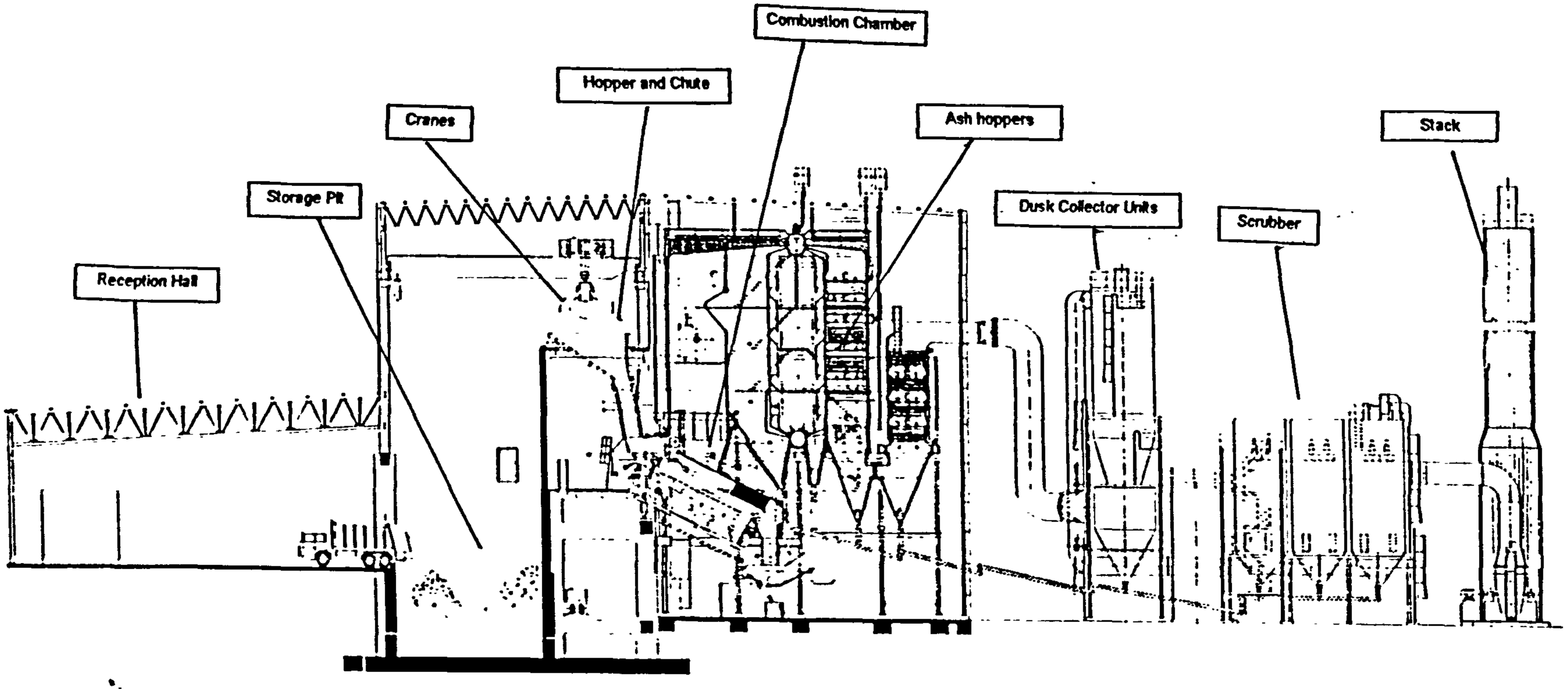


Figure 3.2: A Schematic diagram of a Municipal Incinerators

c1.2 Marine Incineration

Most of the waste incinerated is of organic liquid hazardous wastes and mainly of those with highly chlorinated content or the residues with high quantity of bromine and iodine which are difficult to dispose of on land (Donnelley 1991, Croner, 1995). In a UK context , marine incineration no longer exists as the Government agreed at the Second International Conference on the Protection of the North Sea in November 1987 to terminate marine incineration of wastes by 31 December 1994.

c.1.3 Sewage Sludge Incinerators (HMSO, 1992d)

Sewage sludge arises from two principal sources:

a. The removal of solids from the raw sewage. This primary sludge has a solid content of about 5 percent and consists of both organic and inorganic substances.

b. The removal by settlement of solids produced during biological treatment processes i.e. surplus activated sludge and human sludge. This is known as secondary sludge.

The operation of a sewage sludge incinerator is dependent upon consistent and adequate sludge de-watering processes. This is to ensure that the sludge cake has a low moisture content and is easily incinerated without the use of supplementary fuel. This is referred to as autogenous or autothermic combustion. The incineration is carried out in the presence of excess air. In an alternative destruction process called pyrolysis, sludge may be incinerated

in an oxygen-deficient atmosphere.

c.1.4 Clinical/Hospital Incinerators (Cross and Robinson, 1989))

Incineration is the principal option for disposal of clinical wastes. A clinical waste incinerator is designed to burn as completely as possible all combustible components in the wastes. The majority of the incinerators used by hospitals are controlled-air units although some use the rotary-kiln system. This latter choice is due to the economic favourability between two types of incinerator where the former requires relatively low capital cost and produce low emissions. The rotary-kiln despite its high capital costs, has high emission output and normally creates maintenance problem from the seals at the end of the drums.

c.1.5 Chemical Waste Incineration (HMSO, 1992c)

As for any other incinerators, a chemical waste incinerator is designed to burn completely all combustible components in the wastes. For this to happen, all wastes and their intermediate decomposition products should be able to mix intimately with oxygen at a sufficiently high temperature. Enough time should be allowed for the oxidation reaction to reach completion. To assist the reaction, a controlled excess of air is introduced into the combustion chamber.

c.1.6. Animal Carcass Incinerators (HMSO, 1992e).

The techniques and design of this type of incinerator are similar to those of Clinical and Chemical Waste incinerators.

c.1.7 Pyrolysis: high & low temperatures

This method of waste decomposition through heating is slightly different from incineration. The heating is done in an oxygen-deficient environment with a high temperature, thus resulting in both physical and chemical decomposition. Its end product is described as a 'coke' that could later be used to recover the energy.

Kharbanda (1990) listed the advantages of waste reduction by pyrolysis as:

- it is a resource recovery process without any major release of heat,
- the volume of gases produced is considerably reduced, thus bringing large savings in power and gas cleaning requirements, whilst pollution is minimised,
- the residue is an innocuous, sterile, and friable form,
- the products can be easily handled and transported,
- a convenient and refined fuel is produced which can be burnt in conventional boilers,

A pyrolysis plant is more compact and cheaper in terms of capital cost than an incinerator capable of dealing with the same volume of wastes. Clennell (1983) stated that the idea of pyrolysis is to produce a gas that could be stored and reused. Thus the volume of gas emission needed for treatment in the gas cleaning plant will be reduced. Shah et al. (1989) explained that the application of pyrolysis to hazardous waste treatment involves a two-step process (Figure 3.3).

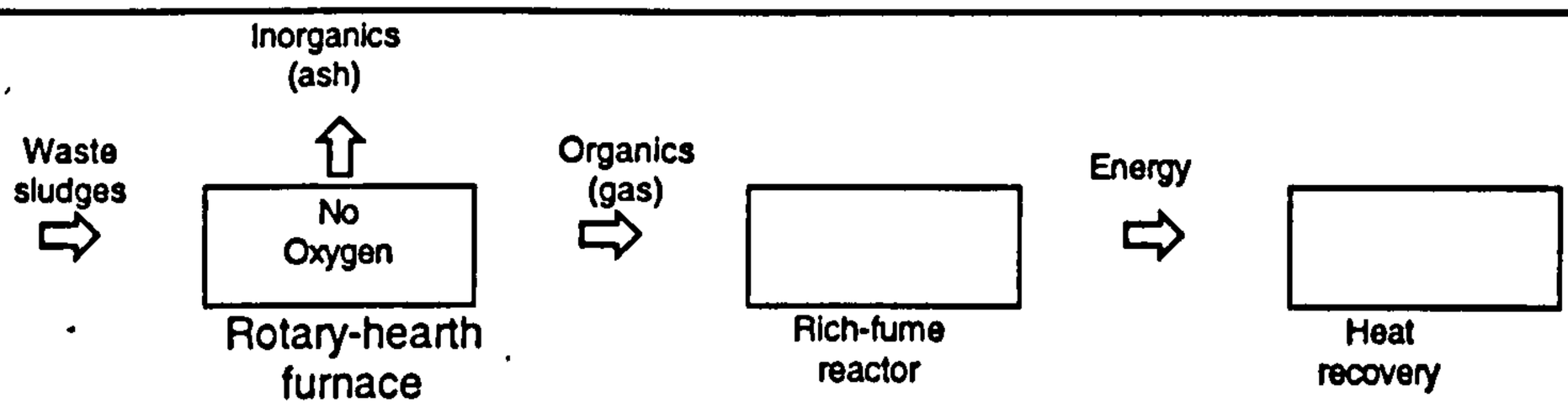


FIGURE 3.3 . Pyrolytic incineration - a two step process
Adapted from: Shah et., al. (1989)

In the first step, wastes are heated endothermically between 425°C to 760°C in the pyrolyzer, the heating chamber, separating the volatile components in the wastes such as the combustible gas and water vapour from non-volatile char and ash. In the second step, volatile components are burned in a fume incinerator under the proper conditions to assure incineration of all hazardous components. An example of a laboratory facility for pyrolysis of waste is illustrated in Figure 3.4.

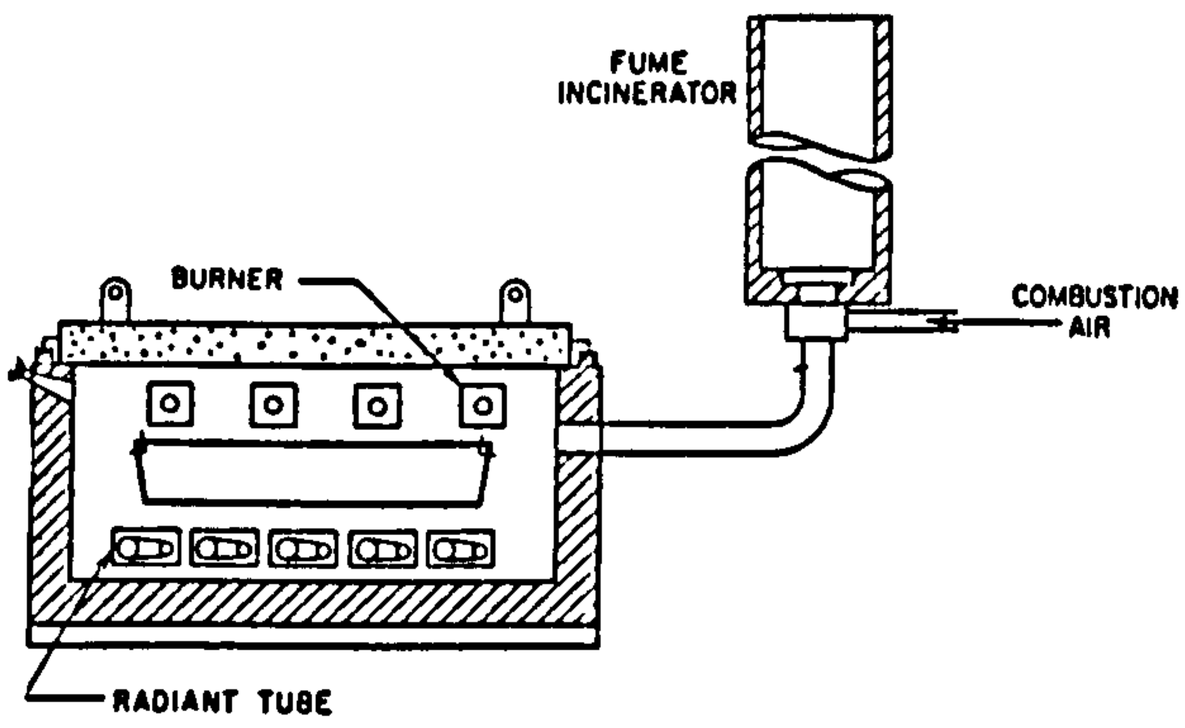


Figure 3.4: Laboratory facility for pyrolysis of solid waste
Adapted from: Shah et., al., 1989

3.3.3 Types of Waste Treatment

There are three common methods for waste treatment:

3.3.3a Chemical Treatment (Fochtman , 1989)

The chemical treatment technology is commonly associated to hazardous wastes which include processing the wastes through several methods and techniques such as: neutralisation of waste acids to alkalis; precipitation process such as removal of acid metals from aqueous hazardous waste; ion exchange process such as detoxification of large flows of waste water containing relatively low levels of heavy-metal contaminants; and oxidation or reduction of metal-bearing wastes or inorganic toxic wastes such as sulphides, cyanides and chromium. In treatment of organic wastes, oxidation and reduction processes could treat pesticides and sulphur-containing compounds. Through these treatments the chemical toxicity in wastes become less hazardous.

3.3.3b Physical Treatment

The are many physical treatment methods for wastes. The methods commonly used in wastewater treatment are screening and sedimentation techniques. Flotation methods are commonly used in food processing or paper milling industries. Other physical treatment techniques such as the filtration, centrifugation and reverse osmosis techniques are commonly found in the drinking water and dewatering treatment plants. The ultra-filtration, distillation or steam stripping and adsorption techniques are more commonly associated with the chemical industries.

3.3.3c Biological Treatment

This treatment normally uses live micro-organisms as decomposing agents. The techniques used include treatment processes in activated sludge, aerated lagoons, composting and anaerobic digestion.

3.3.4 Disposal

3.3.4a Landfill

Undoubtedly, landfill will continue to be a principal option for the medium term in many countries and in these cases, improvements to landfill management are the key to minimising the environmental effects. Crawford (1985), identified the various titles used for this practice as: tips (UK); sanitary landfill (USA); coup (Scotland); controlled tipping (UK); dumps (world-wide). This practice is by far the most commonly used method for waste disposal by both the municipalities and industrial communities. Landfill sites include areas such as wetlands, peat bogs, idle mining and quarrying sites, and low grade agriculture or farming land.

Typically in the UK, there are about 1000 disposal sites or facilities operated by WRAs of which 78 percent are landfills. About 100 sites are licensed to take only asbestos and non-special wastes and 500 sites are able to take special wastes on a co-disposal basis. Co-disposal, where MSW and hazardous waste are disposed of at the same site, can only be operated at specially designed sites. However, there is pressure to substitute the policy of co-disposal with an arrangement where hazardous and non-hazardous wastes

are managed separately (IChem, 1993).

Today, it is difficult to obtain planning permission for new landfill sites. This is due to increased environmental awareness by the public. The NIMBY (Not-in-my-back-yard) syndrome has changed peoples' attitude in searching for an ideal living environment.

Ackerson (1991) stated that recent environmental concern over ground water pollution, leaching into waterways, and even air pollution, as well as increasing costs, have resulted in this technology becoming unacceptable in most areas. Few new landfills are being approved, and the average remaining life of operating landfills is only about five years. However, modern designed landfill sites minimise the impact on the environment and local communities.

Modern sanitised landfill construction involves extensive civil engineering including the preparation and formation of the site's base and sides. Groundwater protection is provided by natural presynthetic liners. Internal bunds are formed to divide the site into working areas called cells. Drainage and gas collection systems are installed to manage leachate and gas production.

The cells are filled with wastes and covered with inert material before the next layer is laid and becomes compact. The top and flanks of the working surface are also sealed progressively with an intermediate covering layer of inert

material. As each cell is completed, the wastes is sealed in with a synthetic liner, or compacted impermeable material. Subsoils and top soils are then placed onto this seal. Pictures and explanations on some of the engineering works taken during a visit to the 3Cs Waste and the UK Waste landfill sites are shown in Plate 1.

3.3.4b Sea disposal

Dumping at sea is now under international regulation. Most of the countries which practise sea disposal have passed laws and regulation on sea dumping. The UK has pledged to cease the practice of sea disposal by the end of 1998. All sea disposal now has been stopped (refer to section Marine Incineration).

3.3.4c Disposal to foul sewer

Most sewage is pumped to treatment works where it is filtered and decomposed by bacteria in big tanks that are open to air. Organic materials is turned into carbon dioxide, methane, water and sludge. Sludge that fulfils health standards is sometimes spread on farm land as fertiliser.

3.3.5 Other Disposal Means or Facilities

3.3.5a Pulverisation

Pulverisation is a process by which the wastes is milled, shredded or crushed to reduce the particulate size of the wastes and produced as a material that is more homogenous and easier to handle. The most commonly used pulverisers are the dry pulverisation plants that use a hammermill or flail mill or impact

Plate 1-1: Earthwork preparation

Plate 1-2: Layering of aggregates and leachate drainage pipe

Plate 1-3: Layering of High Density Polyethylene Liner (HDPE)

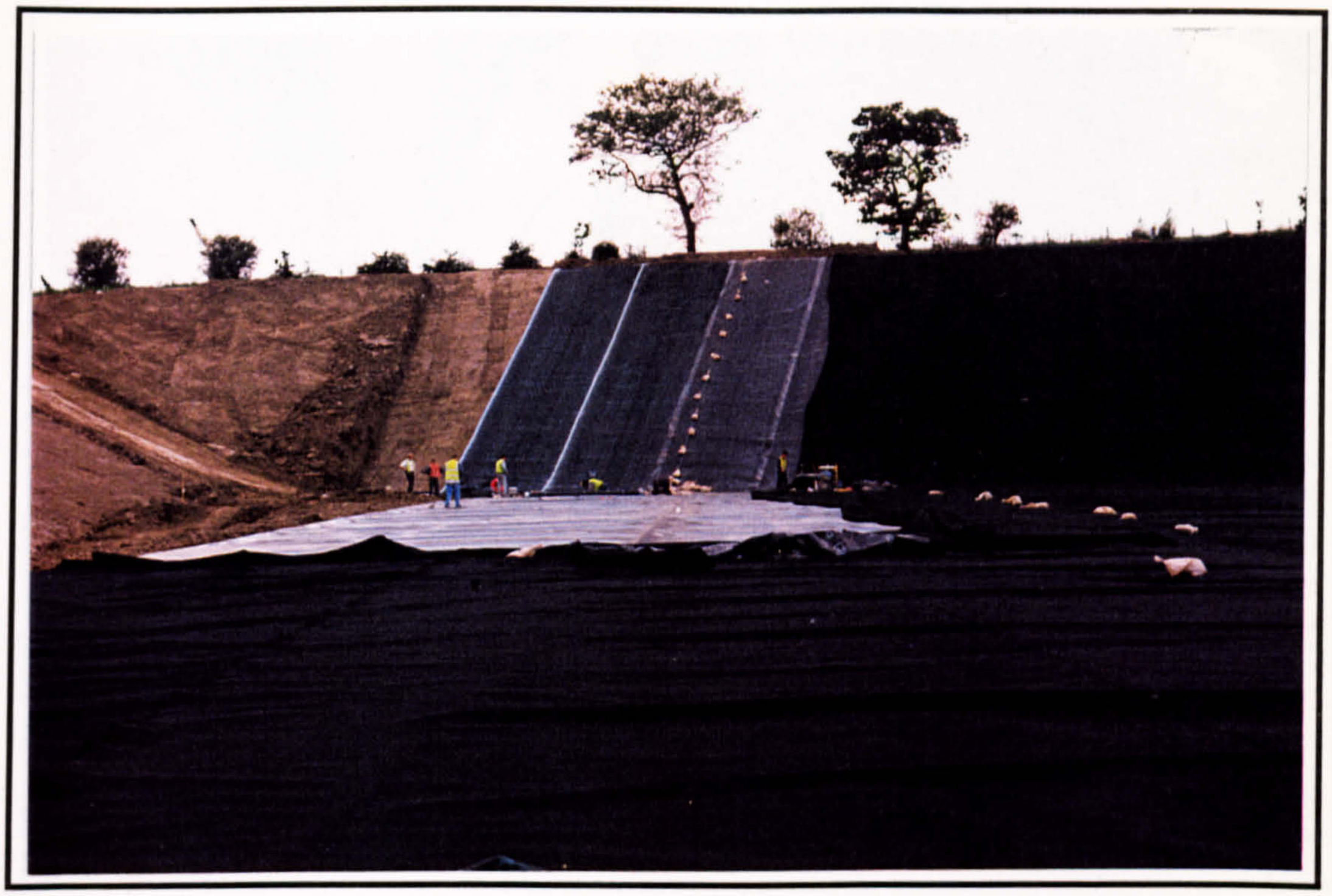


Plate 1-4: Joining work on the High Density Polyethylene Liner (HDPE)

Plate 1-5: Sealing special wire in between the HDPE liner joints

Plate 1-6: Joining the HDPE liners after the wire is properly sealed around the joints

Plate 1-7:
Main leachate drainage and collection pipe

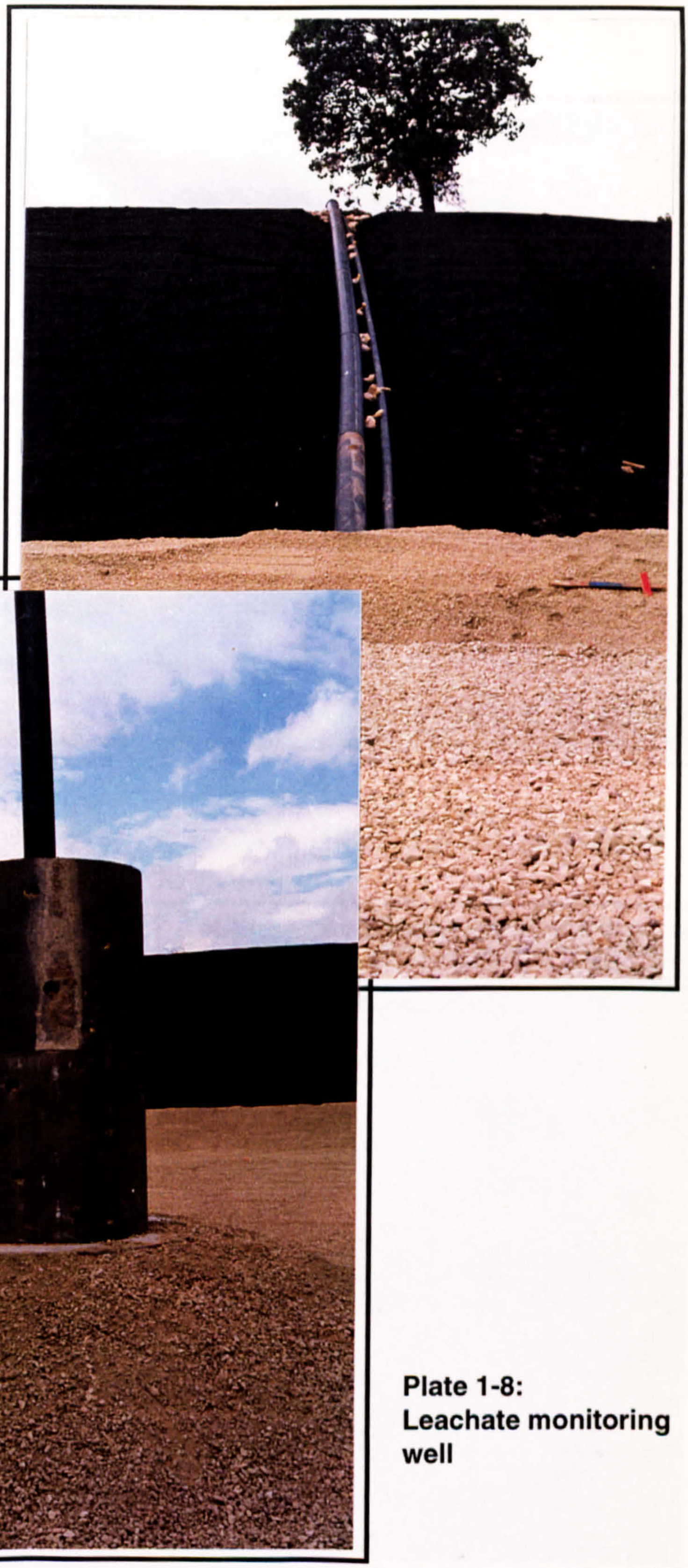


Plate 1-8:
Leachate monitoring well

Plate 1-9: Two completed cells with bund

Plate 1-10: Ready cells with security fences

Plate 1-11: Filling of wastes in progress and encroaching towards the co-disposal pits

Plate 1-12: Tankers taking position to unload and discharge sludge and liquid wastes in the co-disposal pits

Plate 1-13: Sludge or liquid wastes is drained into the pits

Plate 1-14: The sludge or liquid wastes is distributed to other area in the pit by interconnecting drains

Plate 1-15: Fore view shows inert materials are used to cover the upper most layer of the filled waste

Plate 1-16: Recapping of the wastes with the HDPE liner and the top soil

Plate 1-17:
System of interconnecting pipes collecting methane

Plate 1-18:
Flaring of methane gas and methane pump station

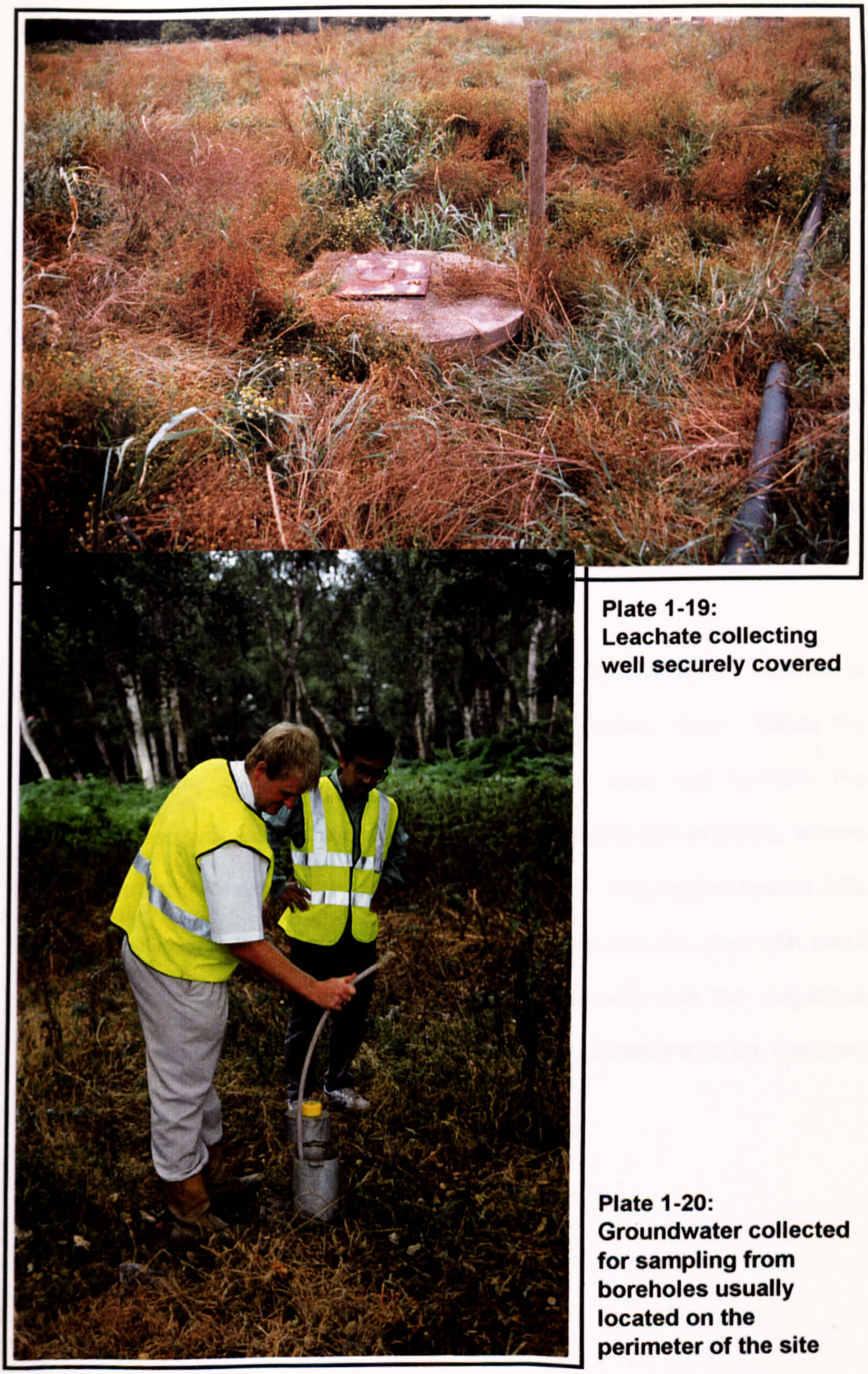


Plate 1-19:
Leachate collecting well securely covered

Plate 1-20:
Groundwater collected for sampling from boreholes usually located on the perimeter of the site

crusher, and the wet pulverisation that uses a rotary drum (Wilson, 1981). A layout example of the Salford Pulverisation plant visited during the Summer Attachment Programme is as shown in Figure 3.5. Plate 2 shows some of the sites within the plant.

The dry pulveriser consists of a revolving rotor that carries a series of swing hammers. The wastes that is introduced is broken up by the initial impact of these hammers and later passed through the grounding rotors against grids or wear bars. The pulverised waste is later collected into containers for landfill disposal.

Wet pulverisation begins with waste that is tipped at a reception hall and is manoeuvred onto a conveyor that feeds the pulverising drum. Inside the rotating drum, water is added to the waste to ease and facilitate the pulverisation process. Attrition quickly disintegrates the soft and bulky wastes with the harder materials assisting in the process. The treated wastes falls onto a cylinder with two screens, one with big holes and the other with small holes. Material passes through the screens and falls onto the respective collecting conveyor that are then transferred into containers to be disposed later in the landfills.

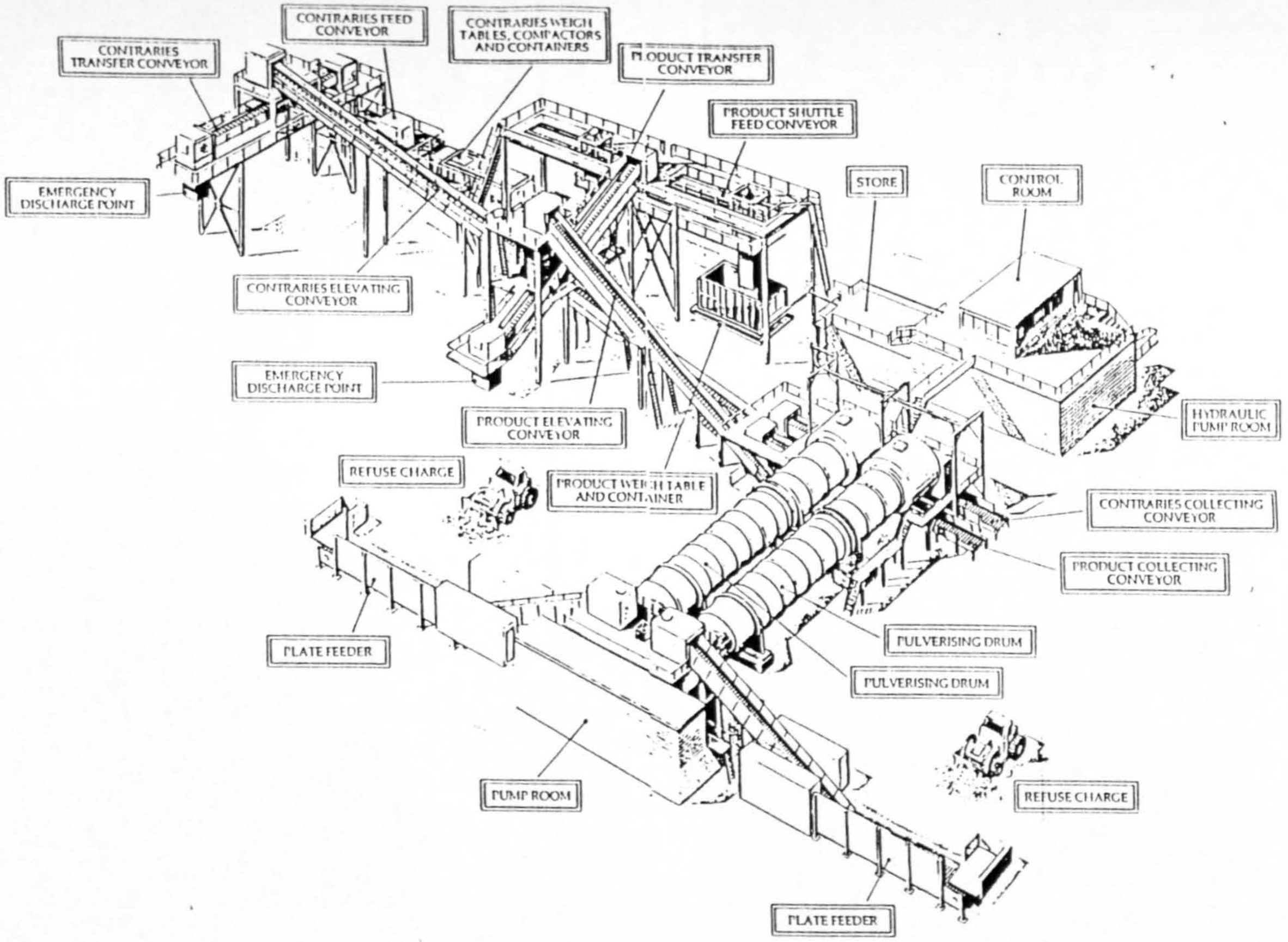
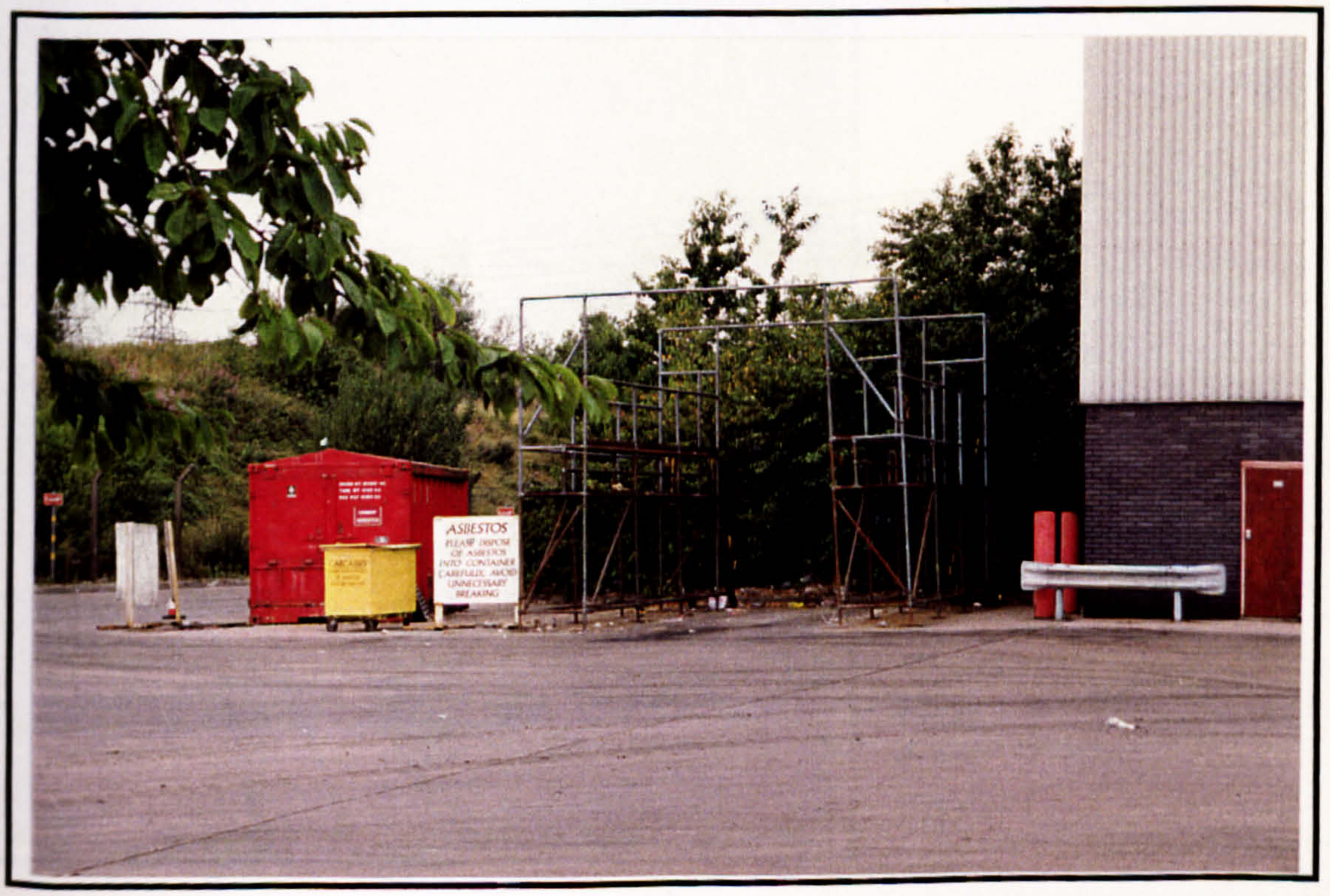


Figure 3.2: A Schematic diagram of a pulverisation process

Plate 2-1: Main entrance to the reception hall

Plate 2-2: Asbestos unloading bay



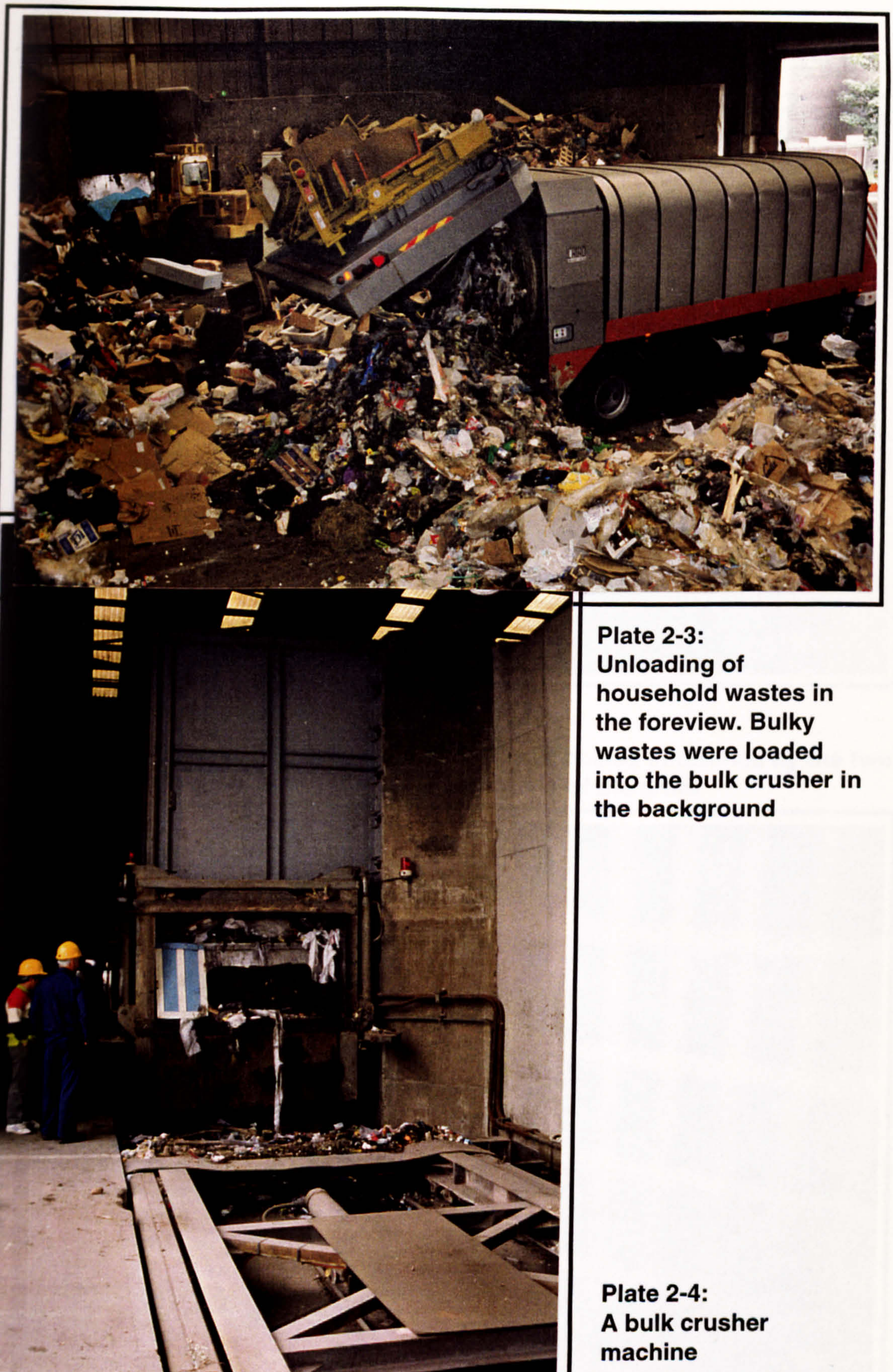


Plate 2-3:
Unloading of household wastes in the foreview. Bulky wastes were loaded into the bulk crusher in the background

Plate 2-4:
A bulk crusher machine

Plate 2-5: The rotating drums

Plate 2-6: The wastes is separated into fine and coarse contraries by the two different size of sieve plate at the end of the drum

Plate 2-7:
The fine and coarse contraries conveyor belt from the drum up to the metal separating unit at the top.

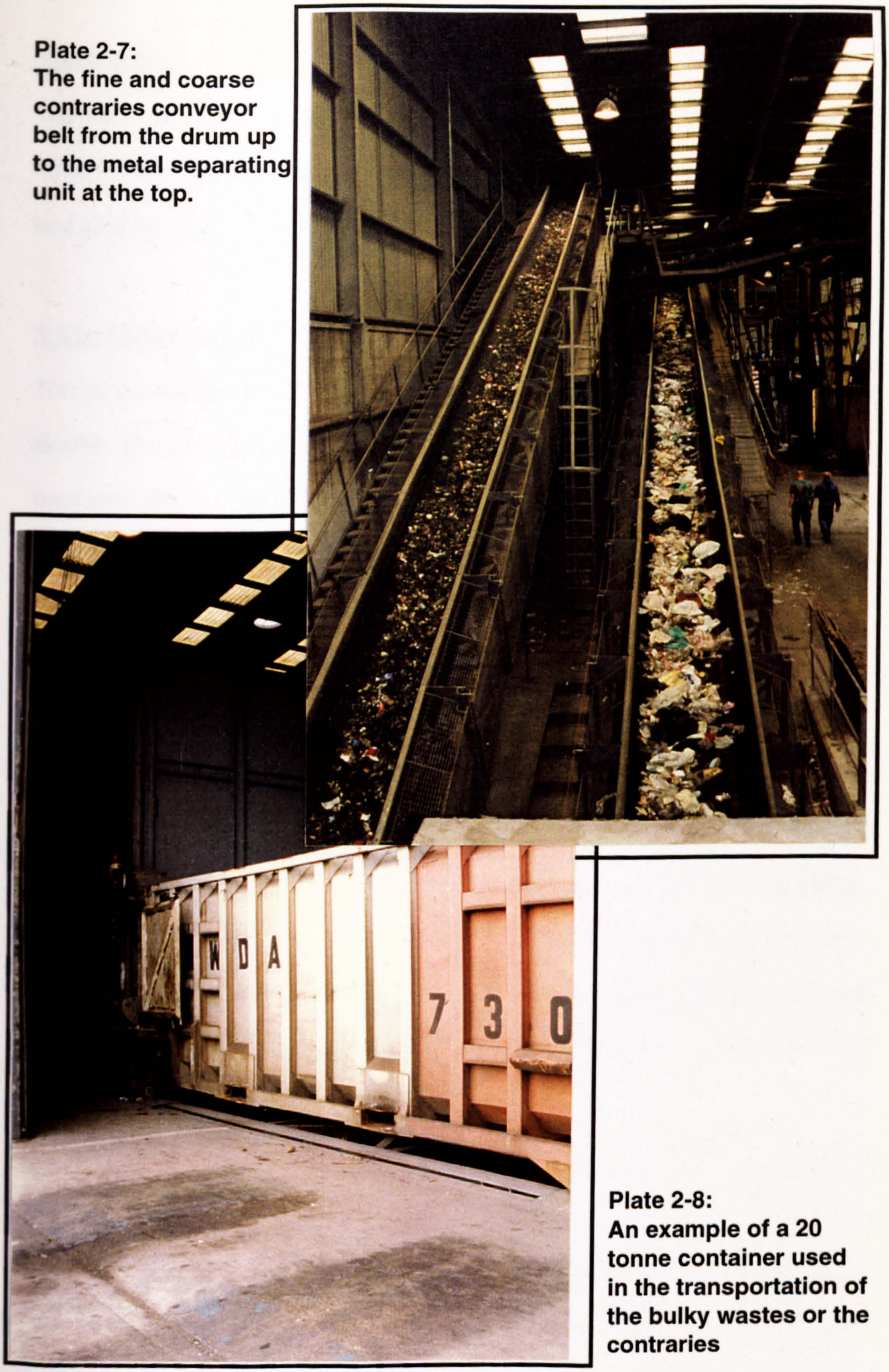


Plate 2-8:
An example of a 20 tonne container used in the transportation of the bulky wastes or the contraries

3.3.5b Baling

The basic principle is that the wastes is compressed by hydraulic rams into bales. These bales are later stacked in landfills, thus simplifying the operation and eliminating any nuisance.

3.3.5c Transfer station

This is a centralised collection point of wastes for areas that do not have a landfill site or are at an uneconomical distance away from the nearest treatment plant. At this station, the wastes could be treated, baled or pulverised prior to being transport in bulks to a landfill site.

3.4 Conclusion

The operating costs of a collection system vary considerably depending on types of receptacle and collection vehicles. Waste disposal technologies adopted by developed countries as detailed in this chapter require not only expertise but high financial investment in the infrastructures and machinery. Each disposal option, besides providing benefits pose different environmental threats and pollution such that they require sound waste management systems which includes waste policies, legislation and institutions. These will be detailed in the following chapters.

CHAPTER 4: WASTE MANAGEMENT IN THE UNITED KINGDOM

4.1 Introduction

This chapter presents the survey results of official waste documents produced from 35 Counties in England. Only 27 counties provided documents which contained waste policy statements which were sampled and analysed. This chapter is arranged beginning with the presentation of basic statistical information on the current waste facilities and wastes arising from all County documents used in this research. It is followed by analyses and summaries of policy statements. The chapter also outlines the findings on; the legislative and the institutional framework, education and matters related to waste management as practised in the United Kingdom. These findings are later discussed in Chapter Six.

4.2 The Survey

The methodology adopted in compiling the information in this section was done by writing to all the local authorities in the English Counties requesting for policy documents on waste. Welsh and Scottish counties were excluded from this investigation not only because language differences but earlier literature research indicated that their waste management policies and laws differ from those of the English Counties. A total of 35 counties, which is more than half the total number of English Counties, responded with 27 counties producing documents containing policy statements on waste and 24 counties statistically listed information on waste arisings and disposal facilities. A total of 615

policy statements were extracted and analysed and tables of waste arisings and disposal facilities were generated and are explained in the following section.

4.2.1 Basic Statistical Information on Waste

4.2.1a Waste Arising.

A summary of waste arisings from 24 counties (Table 4.1) suggests that most counties produce large quantities of waste. On average, each county generally produced 400 thousand tonnes of domestic waste and one million tonnes of commercial and industrial waste per year. All counties recorded more than a million tonnes of waste managed annually. Some of the figures on the total of waste arising in a few counties , however, were found not to tally with the sum of all the types of waste recorded. The likely explanation for these imbalances could be due to some of the waste figures being only an estimation of the actual amount of waste generated.

The amounts of commercial and industrial waste produced in most of the counties was far greater than other types of wastes indicating the possibility of the presence of high economic activity. Most counties with high populations generated higher quantities of domestic, commercial and industrial wastes. This finding agrees with the hypothesis that the amount of waste generation increases exponentially with an increase in economic activity and population rise in a particular area. The figures on special and difficult wastes are not as accurate as it should be and the statistics, in particular for Somerset, have

Table 4.1: Type and Amount of Waste Arising in Some of the UK Counties (In tonnes).

COUNTY	POPULATION (individual)	DOMESTIC	COMMERCIAL/ INDUSTRIAL	SPECIAL /DIFFICULT	INERT	CLINICAL	SLUDGE	TOTAL
AVON	952,900	385,000	1,360,380	N/A	965,950	N/A	27,000	**3,117,411**
BEDFORDSHIRE	531,200	190,054	951,701	N/A	95,218	30,498	N/A	**1,307,203**
BERKSHIRE	748,500	376,000	291,000	67,000	1,154,00	N/A	N/A	**N/A**
CLEVELAND	552,800	326,000	1,015,000	631,000	N/A	N/A	N/A	**N/A**
CUMBRIA	491,600	N/A	1,006,870	7,944	N/A	1,762	7,640	**1,415,400**
DEVON	1,029,900	467,000	1,849,000	723	N/A	N/A	N/A	**N/A**
DORSET	656,800	210,809	354,116	3909	613,507	N/A	N/A	**N/A**
EAST SUSSEX	711,800	278,000	197,000	9,000	655,000	N/A	N/A	**N/A**
G. MANCHESTER	2,271,700	1,192,000	8,017,516	216,478	850,000	N/A	N/A	**2,726,005**
HAMPSHIRE	1,546,000	718,537	420,423	188,740	2,646,237	N/A	N/A	**3,973,937**
KENT	1,523,700	494,000	N/A	584	N/A	N/A	N/A	**N/A**
LANCASHIRE	1,390,800	480,000	1,210,000	N/A	2.390,000	29,322	N/A	**4,080,000**
LEICESTERSHIRE	891,900	420,009	1,021,592	18,281	700,000	5,000	N/A	**2,164,982**
LINCOLNSHIRE	586,900	198,408	4,049,928	3,024	739,569	452	5,476	**4,996,957**
NORFOLK	748,500	344,531	1,407,330	9,967	177,723	11,000	N/A	**1,940,551**
NORTHUMBERLAND	303,600	136,570	315,232	16,470	421,955	1,350	210,370	**1,303,947**
SHROPSHIRE	403,300	185,700	1,505,280	N/A	572,200	1,385	11,760	**2,409,230**
SOMERSET	460,900	N/A	350,000	4,751,600	N/A	N/A	N/A	**N/A**
STAFFORDSHIRE	1,039,000	464,920	3,407,678	42,041	N/A	25,000	58,428	**N/A**
SUFFOLK	641,000	280,879	25,682	988,217	N/A	167,481	N/A	**N/A**
SURREY	1,000,000	332,858	301,190	N/A	N/A	8,000	293,000	**N/A**
WEST MIDLAND	2,920,500	1,000	1,450,000	1,500,000	N/A	N/A	N/A	**7,000,000**
WEST YORKSHIRE	2,533,700	768,000	4,300,000	168,700	N/A	9,300	74,500	**N/A**
WILTSHIRE COUNTY	558,400	235,000	54,600	923,000	N/A	N/A	N/A	**1,239,000**

Source; WRA Annual Report of respective Counties for the period of 1993/94 and 1994/9

N/A = Not Available

probably included other types of waste.

4.2.1b Waste Disposal Facilities.

Table 4.2 reveals important information on the type of waste disposal facilities available within the UK counties. Most counties have several types of disposal facilities to accommodate the amount and type of waste arising. The data confirm the researcher's assumptions that almost all counties practise landfilling as their main method of waste disposal. The number of inert landfills was almost a third of the total landfills counted from all counties. In some counties the number of inert landfills was more than normal landfills.

Almost all counties provide transfer stations. The West Midlands and London both recorded high numbers of transfer stations. The numbers of transfer stations in certain counties were more than the number of landfills. The availability of civic amenity facilities differs between counties with the largest number recorded was 35 in West Yorkshire. The same figure also suggests that some counties probably do not provide civic amenity facilities to the public.

Storage and treatment facilities vary in numbers and were limited to certain counties. Incineration facilities were only found in a few counties and in low numbers. The total number of scrapyards was as large as the number of landfills and suggest that these facilities were more associated with counties with large cities or with large connubations.

Table 4.2; Summary of Disposal Facilities In Some Counties In The UK*

COUNTY	IN L.FILL	L.FILL	T.S	C.A	STORE	TREATM	INCI/STO	SCRAPY	0THER	TOTAL
AVON	1	40	18	N/A	12	N/A	N/A	45	N/A	116
BEDFORDSHIRE	14	8	19	6	N/A	5	3	16	N/A	71
BERKSHIRE	8	9	6	6	1	7	2	3	N/A	42
BUCKINGHAMSHIRE	12	11	23	12	2	3	N/A	12	N/A	75
CAMBRIDGESHIRE	N/A	38	53	N/A	N/A	5	N/A	28	N/A	124
CHESHIRE	N/A	37	36	20	19	5	2	46	16	181
CLEVELAND	N/A	38	12	1	10	5	N/A	13	N/A	79
CORNWALL	N/A	39	31	10	N/A	N/A	1	N/A	N/A	81
CUMBRIA	67	88	31	16	N/A	2	1	N/A	N/A	205
DERBYSHIRE	N/A	59	20	N/A	N/A	N/A	N/A	45	N/A	124
DEVON	49	26	36	20	N/A	N/A	1	10	N/A	142
DORSET	N/A	44	25	10	N/A	2	6	41	7	135
DURHAM	23	30	23	18	N/A	5	N/A	N/A	N/A	99
EAST SUSSEX	N/A	15	41	N/A	N/A	N/A	N/A	27	N/A	83
HERTFORDSHIRE	20	14	26	19	9	4	4	16	2	114
HUMBERSIDE	N/A	64	50	21	N/A	2	N/A	37	N/A	174
ISLE OF WIGHT	10	4	3	N/A	N/A	2	2	2	3	26
LANCASHIRE	44	34	78	26	3	3	3	45	N/A	236
LEICESTERSHIRE	N/A	47	42	14	1	4	4	3	N/A	115
LINCOLNSHIRE	32	16	44	N/A	7	N/A	3	45	N/A	147
LONDON	N/A	34	167	22	N/A	N/A	17	76	7	323
MERSEYSIDE	19	N/A	61	14	N/A	1	1	65	2	163
NORFOLK	21	18	2	21	N/A	N/A	N/A	26	N/A	88
NORTHAMPTONSHIRE	2	1	N/A	N/A	N/A	N/A	N/A	7	N/A	10
NORTHUMBERLAND	N/A	28	17	15	1	1	N/A	15	N/A	77
SHROPSHIRE	9	8	29	N/A	N/A	3	2	15	N/A	66
SOMERSET	27	13	22	N/A	3	3	1	15	N/A	84
SOUTH YORKSHIRE	N/A	5	13	13	N/A	N/A	N/A	14	3	48
STAFFORDSHIRE	32	40	51	15	N/A	7	2	37	N/A	184
SUFFOLK	N/A	49	30	N/A	N/A	4	N/A	26	10	119
SURREY	23	13	40	15	1	2	1	11	N/A	106
WARWICKSHIRE	8	24	8	8	N/A	3	2	7	N/A	60
WEST MIDLAND	N/A	33	128	2	9	25	4	N/A	8	209
WEST YORKSHIRE	74	57	74	35	N/A	13	6	136	N/A	395
WILTSHIRE COUNTY	N/A	39	18	3	N/A	3	N/A	26	5	94
TOTAL	**495**	**1023**	**1277**	**362**	**78**	**119**	**68**	**910**	**63**	**4395**

SOURCE: *Figures based on the various counties WRA Annual Reports for the period of 1993/94 and 1994/95 **IN L.FILL** = Inert Landfill; **L.FILL** = Landfill; **T.S** = Transfer Stations; **C.A** = Civic Amenities; **STORE** = Storage; **TREATM**= Treatment Center; **INCI/STO** =Incinerator & Storage; **SCRAPY** = Scrapyards **N/A** = Not Available

4.2.2 Result of Survey on Policy Statements

4.2.2a. Descriptive Analyses

A request to all counties in England for the County's official documents on waste resulted in 35 counties responding with 27 counties producing documents containing policy statements on waste. These policy statements are listed in Appendix 4.1. The policies were produced in various forms of documents as shown in Figure 4.1. A third (32%) of these policy statements were from the Waste Management Plan (WMP) documents. The Waste Regulatory Authority (WRA) and the Waste Disposal Authority (WDA) documents each provide almost a quarter (26 % and 23% respectively) of the 615 total number of policy statements sampled. The balances were from the Waste Local Plan (WLP) (7%), the County Councils (CC) (6%) and the Waste Strategies (WS) and Policy Statements (7%).

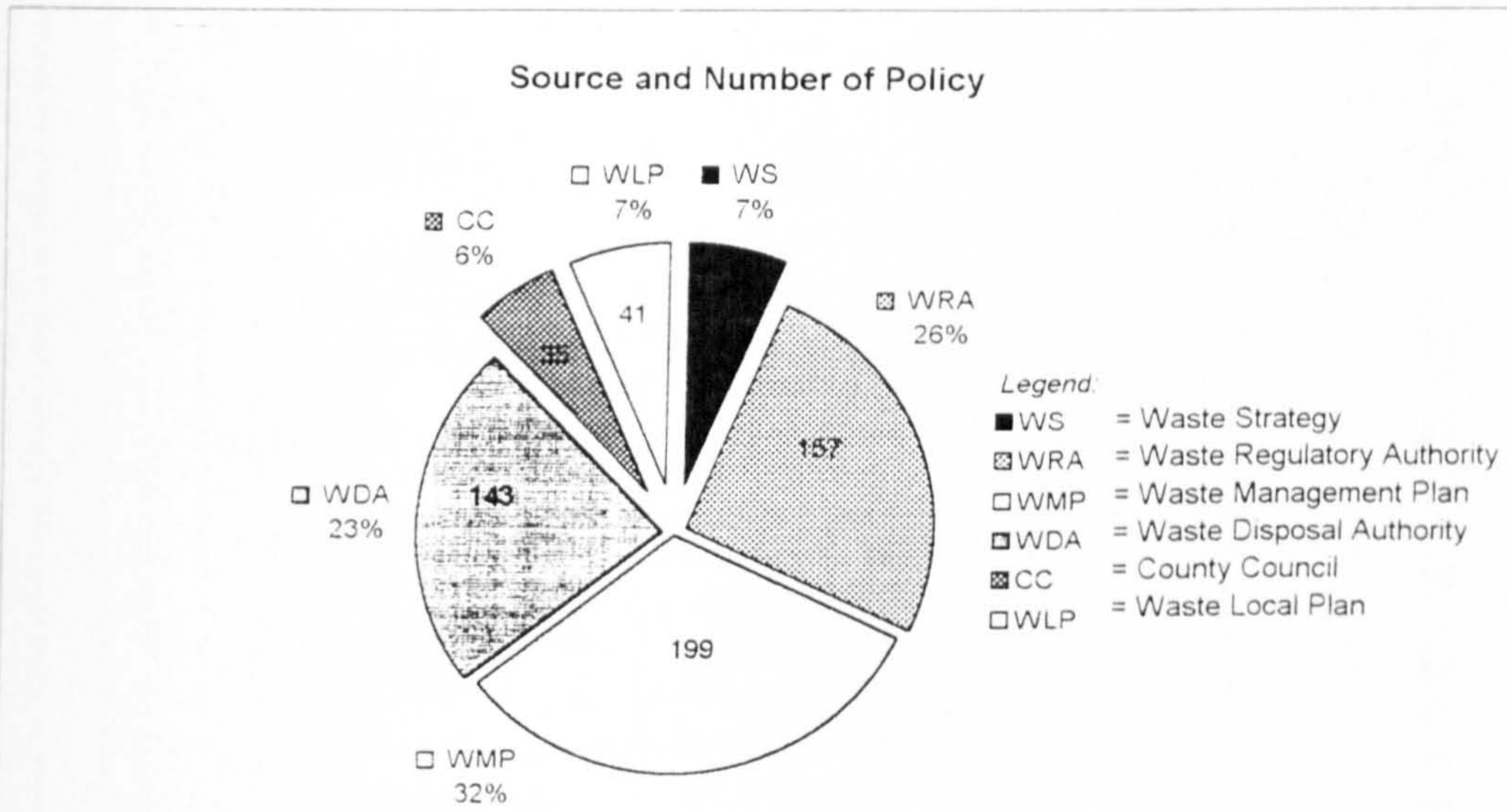


Figure 4.1 Descriptive Analyses of Policy Statements

Table 4.3 shows that each county produced a different number of policy statements. The maximum number of policy statements recorded was 81 and was produced by Lancashire CC. The low counts of policy statements for the WLPs and especially the CCs were attributed to the fact that these were waste related policies excerpted from the main document: the County Structure Plan. The WLPs were produced by the County Planning Department and it has to incorporate waste provision into this document for the county's strategic and development planning.

Table 4.3: Source and Number of Policy Statements Used for Analyses

NO.	COUNTY	WS	WRA	WMP	WDA	CC	WLP	TOTAL
1	AVON		22					22
2	BEDFORDSHIRE					7	6	13
3	BERKSHIRE			32			33	65
4	BUCKINGHAMSHIRE			7	24			31
5	CAMBRIDGESHIRE		13					13
6	CLEVELAND					5		5
7	CUMBRIA		9		6			15
8	DORSET		15					15
9	ESSEX					7		7
10	EAST SUSSEX	21						21
11	G. MANCHESTER				40			40
12	HERTFORDSHIRE		16				2	18
13	KENT			21				21
14	LANCASHIRE			81				81
15	LEICESTERSHIRE			8				8
16	LINCOLNSHIRE				14			14
17	LONDON			11				11
18	MERSEYSIDE				43			43
19	NORFOLK					13		13
20	NORTHUMBERLAND			17				17
21	SHROPSHIRE		18					18
22	SOUTH YORKSHIRE		11					11
23	STAFFORDSHIRE	10	30			3		43
24	SUFFOLK			14				14
25	SURREY			8				8
26	WEST YORKSHIRE		23		16			39
27	WILTSHIRE	9						9
	TOTAL	**40**	**157**	**199**	**143**	**35**	**41**	**615**

NOTE; WC = Waste Strategy; **WRA** = Waste Regulatory Authority; **WMP** = Waste Management Plan; **WDA** = Waste Disposal Authority; **CC** = County Council; **WLP** = Waste Local Plan **Source:** Author

Analyses of the 615 policy statements reveal 52 issues or repetitions of terms or terminologies. To achieve the task of identifying these issues, individual policy statements were carefully studied and identified for the key issues or terms which form the basis for that particular policy statement. Each key issue or term is labelled in the analyses as 'variables'. As the number of analysed policy statements increased the number of 'variables' expanded indicating the diversity of 'issues' or 'subject areas' which are important in the area of waste management. Thus the use of the term 'issues' and 'variables' in the analyses is synonymous. These variables were listed and categorised into five groups as shown in Table 4.4 and is explained below:-.

i. **The Method of Disposal Category** includes all the disposal methods as listed in the waste hierarchy (refer Section 3.3). Variable 'Waste Hierarchy or Disposal Options' was included in this category and it refers to policy statements which emphasise the best use and selection of a disposal option. Variable 'Disposal Sites or Facilities' correspond to policy statements which are concern with the sites and facilities utilised for waste disposal and treatment.

ii. **The Type of Waste Category** refers to all types of waste that fall within the definition of controlled and 'non-controlled' waste. Clinical, Mineral or Chemical Waste were grouped together as one variable based on the assumption that these wastes were commonly disposed through similar methods. Sludge and Farm Wastes were paired as a variable based on the similar nature of these wastes and on the possibility of re-usability for agricultural purposes.

Table 4.4: Category and List of Variables and Variable Codes

Category I: Method of Waste Disposal

Code	Variable
V1	Minimisation of Waste
V2	Re-use of Waste
V3	Recovery and Recycle of Waste
V4	Incineration
V5	Treatment / Storage/ Transfer of Waste
V6	Public Amenities
V7	Composting
V8	Landfill / Landfilling
V9	Waste Hierarchy / Disposal Options
V10	Disposal Sites / Facilities
V11	Co-disposal

Category II: Type of Waste

Code	Variable
V12	Household Waste
V13	Commercial Waste
V14	Industrial Waste
V15	Special / Difficult Waste
V16	Hazardous Waste
V17	Inert Waste
V18	Radioactive Waste
V19	Clinical / Mineral / Chemical Waste
V20	Sludge / Farm Waste

Category III: Environmental Issues

Code	Variable
V21	Fly-tipping
V22	Leachate
V23	Landfill Gas
V24	Environmental Auditing / Monitoring
V25	Cost / Financial
V26	Duty of Care
V27	Landspreading
V28	Former Landfill Sites
V29	Scrapyard and Metal Facilities

Category IV: Management Issues

Code	Variable
V30	Public Register
V31	Environmental Impact
V32	Legislation / Waste Management Papers
V33	Waste Management Licences
V34	Transfrontier Movement of Waste
V35	Enforcement
V36	Education / Research
V37	Joint Committee / Advisory / Consultancy
V38	Carrier Registration
V39	Waste Disposal / Management Plan

Category V: Other Related Matters

Code	Variable
V40	Waste Survey
V41	Waste Exemption
V42	Others
V43	Annual Report
V44	Waste Management Strategy
V45	Planning Authorities
V46	Transportation of Wastes
V47	Keeping of Waste
V48	Treatment of Waste
V49	Disposal of Waste
V50	BPEO
V51	BATNEEC
V52	Proximity Principle

iii. **The Environmental Issues Category** composed of issues and terms associated with the potential of creating nuisance and threat to health and safety to the public and the environment. The 'Duty of Care' was included in this category and it refers to policy statements that interpret it as an element which if not fully enforced may result in adverse environmental effects. The researcher could have placed this variable in another category, however after careful review on each of the policy statements most were found to be associated or refer to its potential of creating nuisance and impacts on to humans and the environment.

iv. **The Management Issues Category** refers to the variable which are tools used in managing waste disposal activities. Most of these tools are derivation of the laws and regulations stipulated in various Acts and Directives. The Public Register variable refers to documents containing information on waste operations and waste site licences. This category includes records of Waste Disposal Licences, resolutions, modifications and licence transfers. It also contains the detail of applications for Waste Carrier Registration. The 'Joint Committee, Advisory and Consultancy' variable refers to the role of the LA participating in various local and regional waste committees, groups and forum for the resolution of problems, the promotion of joint initiatives and the exchange of ideas as well as providing advice and consultancy services to businesses and waste industries.

v. **The Other Issue Category** includes variables which are related to other variables in the first four categories. Although it appears sparsely scattered within the whole of the policy statements analysed, its' presence indicates how important it is in waste management.

4.2.2b. Analyses by Document Types

b1. WRA Policy Statements

The WRA policy statements indicated the emphasis placed by the WRA on management issues as shown by the high percentage occurrence of Management Variables such as controlling environmental impacts, licensing of waste related activities and enforcing the laws and regulation (Table 4.5). This observation corresponds particularly to all waste activities and disposal sites that require high supervision and controls by the WRA as shown by high number of occurrence for landfills sites, landfilling activities and disposal sites or facilities. It also shows how important is the use of Environmental Auditing or Monitoring as one of the tools in managing a county's waste arising.

b2. Waste Management Plan Policy Statements

The WMP policy statements also show the emphasis on the use of management tools and the concern of environmental impacts as indicated by a high occurrence of the variable Environmental Impacts from waste disposal activities (Table 4.5). The table shows that landfills, disposal sites and facilities were the source of environmental concern. The WMP identifies that the application of Environmental Auditing or Monitoring procedures, the issuing

Table 4. 5: Percentage of Occurrence by Source of Documents

Code	Variable	Source of Documents					
		WRA	WMP	WDA	CC	WS	WLP
	DISPOSAL METHOD CATEGORY						
V1	Minimisation of Waste	4.9	4.5	3.5	2.9	12.9	9.8
V2	Re-use of Waste	2.1	6.8	3.5	2.9	6.5	2.4
V3	Recovery and Recycle of Waste	6.3	11.3	11.2	22.9	16.1	22
V4	Incineration	2.8	2.7	1.4	8.6	3.2	4.9
V5	Treatment / Storage/ Transfer of Waste	0.7	5	6.3	5.7		7.3
V6	Public Amenities	0.1	2.3	3.5	2.9		7.3
V7	Composting		1.8	0.7	2.9	3.2	4.9
V8	Landfill / Landfilling	9.1	17.1	16.1	2	12.9	14.6
V9	Waste Hierarchy / Disposal Options	3.5	4.5	1.4		22.6	4.9
V10	Disposal Sites / Facilities	11.2	17.1	24.5	14.3		7.3
V11	Co-disposal		1.8	0.7			
	WASTE TYPES CATEGORY						
V12	Household Waste	4.2	4.5	6.3	2.9	6.5	4.9
V13	Commercial Waste	1.4	3.2	4.2		6.5	9.8
V14	Industrial Waste	2.1	4.1	4.9		22.6	9.8
V15	Special / Difficult Waste	6.3	5.4	7.0		3.2	2.4
V16	Hazardous Waste	0.7	3.2	2.8			0
V17	Inert Waste		4.1		2.9		4.9
V18	Radioactive Waste	1.4	1.4	0.7			
V19	Clinical / Mineral / Chemical Waste	2.8	5.0	2.8		6.5	
V20	Sludge / Farm Waste		2.7	2.1		9.7	
	ENVIRONMENTAL ISSUES CATEGORY						
V21	Fly-tipping	2.8	0.5	1.4	2.9		
V22	Leachate	2.1	4.5	0.7	5.7		
V23	Landfill Gas	5.6	2.7	7.7	8.6		4.9
V24	Environmental Auditing / Monitoring	9.1	11.3	5.6	11.4	3.2	2.4
V25	Cost / Financial	2.8	0.5	6.3	2.9	16.1	2.4
V26	Duty of Care	2.8	1.8	2.1	2.9		
V27	Landspreading	0.7	0.5	0.7		3.2	4.9
V28	Former Landfill Sites	4.2	2.3	2.8	2.9		4.9
V29	Scrapyard and Metal Facilities	1.4	1.4	1.4			
	MANAGEMENT ISSUES CATEGORY						
V30	Public Register	4.2	2.7	1.4	5.7		2.4
V31	Environmental Impact	14	21.6	22.4	20	9.7	17.1
V32	Legislation / Waste Management Papers	6.3	3.2	4.2	2.9	6.5	9.8
V33	Waste Management Licences	17.5	17.6	11.2	5.7		12.2
V34	Transfrontier Movement of Waste	4.2	7.2	3.5			
V35	Enforcement	16.8	11.7	2.8	14.3		4.9
V36	Education / Research	16.1	9	4.9		6.5	2.4
V37	Joint Committee / Advisory / Consultancy	9.1	4.5	9.1	5.7	16.1	2.4
V38	Carrier Registration	2.8	1.8	0.7	5.7		2.4
V39	Waste Disposal / Management Plan	4.9	1.8	4.2			2.4
	OTHER ISSUES CATEGORY						
V40	Waste Survey	2.1	0.5				
V41	Waste Exemption	2.8	0.5				2.4
V42	Others	0.7	1.4	4.2	2.9		
V43	Annual Report	2.8	0.9	0	5.7		2.4
V44	Waste Management Strategy		0.5	0.7		19.4	
V45	Planning Authorities	4.9	1.8	3.5	22.9	6.5	
V46	Transportation of Wastes	4.2	7.7	2.8	2.9		
V47	Keeping of Waste	2.1	0.5	1.4			
V48	Treatment of Waste	2.1	0.5	0.7		3.2	
V49	Disposal of Waste	3.5	0.5	0.7	2.9	3.2	
V50	BPEO	1.4	1.8			6.5	
V51	BATNEEC	1.4	0.5				
V52	Proximity Principle	3.5				3.2	

of Waste Management Licences and the use of Enforcement notices are important tools in managing the waste disposal facilities.

b3. WDA Policy Statements

The WDA policy statements show a similar trend of issues as identified in the WMP (Table 4.5). It also shows a high relationship between the concern about environmental impacts from landfills and the disposal facilities.

b4. CC Policy Statements

The CC policy statements show the same type of repeating pattern as the WMP and WDA policy statements but emphasis is on the recovery and recycling of waste as another important component in waste management (Table 4.5). It also identifies the use of enforcement, waste transportation and the role of the Planning Authorities as important elements in managing the waste.

b5. Waste Strategy and Waste Local Plan Policy Statements

The WS and WLP policy statements provide a different insight from the previous documents. Table 4.5 also indicates that in devising a waste management strategy, emphasis should also be given to the recovery and recycling of waste. Both documents place the use of a Waste Hierarchy and the choice of Disposal Options as important in planing waste strategy. Other variables identified as important in the devising the strategy and planning of waste include the concern for industrial waste, cost and financial commitments

and the role of LA in Joint Committees, acting as advisors and consultants to business and waste management industries

4.2.2c. Analyses by County

c1. Disposal Method Category

Table 4.6 shows that more than 70% of the counties addressed their issues of concern to the effort needed to increase the practice of recovery and recycling and to reduce the impacts from landfills and disposal sites. These were followed by almost 50% of the counties that identified the need for the re-use of waste and to adhere to the principle of waste hierarchy in waste planning and strategy. Only 22% of the counties mention the need for an increase in waste composting while the another 15% identified the practice of co-disposal as an alternative method to solve the problem of disposing of difficult waste.

c2. Waste Type Category

Table 4.6 also indicates concerns by almost 70 % of the counties with special and difficult waste from business and industries. Household waste was place second and was addressed by 60% of the counties. Other types of waste mentioned by almost 50% of the counties included commercial, industrial, clinical, mineral or chemical waste and sludge or farm waste.

c3. Environmental Issues Category

Table 4.6 also shows that almost 60% of the counties addressed landfill gas emissions and in particular methane, as issues of most concern. About 63% of

Table 4. 6: Percentage of Occurrence of Issues (Variables) Addressed by Counties

DISPOSAL METHOD CATEGORY		
Code	***Variable***	***%***
V1	Minimisation of Waste	67
V2	Re-use of Waste	52
V3	Recovery and Recycle of Waste	81
V4	Incineration	40
V5	Treatment / Storage/ Transfer of Waste	37
V6	Public Amenities	41
V7	Composting	22
V8	Landfill / Landfilling	70
V9	Waste Hierarchy / Disposal Options	52
V10	Disposal Sites / Facilities	78
V11	Co-disposal	15
WASTE TYPES CATEGORY		
V12	Household Waste	60
V13	Commercial Waste	33
V14	Industrial Waste	44
V15	Special / Difficult Waste	70
V16	Hazardous Waste	22
V17	Inert Waste	22
V18	Radioactive Waste	22
V19	Clinical / Mineral / Chemical Waste	41
V20	Sludge / Farm Waste	30
ENVIRONMENTAL ISSUES CATEGORY		
V21	Fly-tipping	30
V22	Leachate	33
V23	Landfill Gas	60
V24	Environmental Auditing / Monitoring	63
V25	Cost / Financial	44
V26	Duty of Care	37
V27	Landspreading	19
V28	Former Landfill Sites	41
V29	Scrapyard and Metal Facilities	11
MANAGEMENT ISSUES CATEGORY		
V30	Public Register	48
V31	Environmental Impact	67
V32	Legislation / Waste Management Papers	56
V33	Waste Management Licences	70
V34	Transfrontier Movement of Waste	48
V35	Enforcement	67
V36	Education / Research	78
V37	Joint Committee / Advisory / Consultancy	52
V38	Carrier Registration	33
V39	Waste Disposal / Management Plan	26
OTHER ISSUES CATEGORY		
V40	Waste Survey	15
V41	Waste Exemption	15
V42	Others	26
V43	Annual Report	22
V44	Waste Management Strategy	11
V45	Planning Authorities	41
V46	Transportation of Wastes	33
V47	Keeping of Waste	15
V48	Treatment of Waste	19
V49	Disposal of Waste	19
V50	BPEO	22
V51	BATNEEC	11
V52	Proximity Principle	11

the counties mentioned the need to enforce the use of environmental auditing and monitoring on all waste disposal activities before and after licences to operate the disposal sites were issued. A third of the counties surveyed indicated the concern over the practice of fly-tipping, the escape of leachate to other media, the high cost and financial obligations, the Duty of Care and the problems posed by old landfill sites. It is a requirement of the WRA to inspect closed landfills and to ensure that appropriate action is taken on those sites that are likely to cause pollution of the environment and harm to human health.

c4. Management Issues Category

Table 4.6 also shows that the majority of the counties acknowledge education and research activities as important tools in waste management to raise awareness and inform the public of the need to minimise and recycle of waste and to explain the complexities and environmental benefits of such activities. These were followed by the management of environmental impacts, the issuing of waste management licences and the role of enforcement. About half of the counties identified the use of Public Registers to record all waste activities and condition of licences as a prime management tool. Other management issues that received high management concern were the transfrontier movement of waste, and the role of the LA in collaboration with other LAs regionally or nationally in the form of Joint Committees or as advisory and consultancy bodies.

c5. Other Issues Category

Table 4.6 also shows that about half of the counties believe that LA Planning Authorities are important players in determining the strategy and direction for waste management in each county. Other significant matters of importance include the use of Annual Reports which detail the manner making the decision taken by the appropriate authority; WRA, WDA, or WCA on how waste is managed in a fiscal year. These reports normally included the number of waste disposal licences applied for, issued, in force, modified, revoked, suspended, surrendered and transferred. They also contained details of appeals against WRA decisions in respect of licences. They listed the number of inspections of licensed facilities and details regarding the management of special waste. They also show the implementation of the county Waste Disposal Plans are updated. They detail the number and description of prosecutions undertaken. They show that the application of BPEO in waste management has gained the attention in some of the county waste policies.

4.2.2d. Overall Analyses of Variables

When the 615 policy statements were analysed as a group, several variables provide important insights into how waste is managed in the UK. Table 4.7 shows that the management of environmental impacts appeared most frequently followed by concern on disposal sites and facilities, landfill practices, issues in relation to the recovery and recycling of wastes, the issuing of Waste Management Licences and the role of enforcement. It also reveals that variables in the Management Issues Category scores higher than

Table 4. 7: Overall Analysis of Policies

Code	Variable	Number of Occurence	Percent of Occurence		
			WRA	WMP	WDA
	DISPOSAL METHOD CATEGORY				
V1	Minimisation of Waste	30	23.3	33.3	16.7
V2	Re-use of Waste	27	11.1	55.6	18.5
V3	Recovery and Recycle of Waste	72	13.6	34.7	22.2
V4	Incineration	18	22.2	33.3	11.1
V5	Treatment / Storage/ Transfer of Waste	26	3.8	42.3	34.6
V6	Public Amenities	15	6.7	33.3	33.3
V7	Composting	9	0	44.4	11.1
V8	Landfill / Landfilling	92	14.1	41.3	25
V9	Waste Hierarchy / Disposal Options	26	19.2	38.5	7.7
V10	Disposal Sites / Facilities	97	16.5	39.2	36.1
V11	Co-disposal	5	0	80	20
	WASTE TYPES CATEGORY				
V12	Household Waste	30	20	33.3	30
V13	Commercial Waste	21	9.5	33.3	28.6
V14	Industrial Waste	30	10	30	23.3
V15	Special / Difficult Waste	34	26.5	35.3	29.4
V16	Hazardous Waste	12	8.3	58.3	33.3
V17	Inert Waste	12	0	75	0
V18	Radioactive Waste	6	33.3	50	16.7
V19	Clinical / Mineral / Chemical Waste	21	19	52.4	19
V20	Sludge / Farm Waste	12	0	15	30
	ENVIRONMENTAL ISSUES CATEGORY				
V21	Fly-tipping	8	50	12.5	25
V22	Leachate	16	18.8	62.5	6.3
V23	Landfill Gas	30	26.7	20	36.7
V24	Environmental Auditing / Monitoring	52	25	48.1	15.4
V25	Cost / Financial	21	19	4.8	42.9
V26	Duty of Care	12	33.3	33.3	25
V27	Landspreading	6	16.7	14.3	14.3
V28	Former Landfill Sites	18	33.3	27.8	22.2
V29	Scrapyard and Metal Facilities	7	28.6	42.9	28.6
	MANAGEMENT ISSUES CATEGORY				
V30	Public Register	17	35.3	35.3	11.8
V31	Environmental Impact	118	16.9	40.7	27.1
V32	Legislation / Waste Management Papers	29	31	24.1	20.7
V33	Waste Management Licences	87	28.7	44.8	18.4
V34	Transfrontier Movement of Waste	27	22.2	59.3	18.5
V35	Enforcement	61	39.3	4.26	6.6
V36	Education / Research	54	42.6	37	13
V37	Joint Committee / Advisory / Consultancy	44	29.5	22.7	29.5
V38	Carrier Registration	12	33.3	33.3	8.3
V39	Waste Disposal / Management Plan	18	38.9	22.2	33.3
	OTHER ISSUES CATEGORY				
V40	Waste Survey	4	75	25	0
V41	Waste Exemption	6	66.7	16.7	0
V42	Others	11	9.1	27.3	54.5
V43	Annual Report	9	44.4	22.2	0
V44	Waste Management Strategy	8	0	12.5	12.5
V45	Planning Authorities	26	26.9	15.4	19.2
V46	Transportation of Wastes	28	21.4	60.7	14.3
V47	Keeping of Waste	6	50	16.7	66.7
V48	Treatment of Waste	6	50	16.7	16.7
V49	Disposal of Waste	9	55.6	11.1	11.1
V50	BPEO	8	25	50	0
V51	BATNEEC	3	66.7	33.3	0
V52	Proximity Principle	6	83.3	0	0

most variables in the other four categories which indicated that these are the main tools in providing sound waste management systems.

Further analyses of 14 variables was undertaken for those that scored the top two or top three ranks in each category. This work was undertaken to understand the relationship between variables. In this analysis, the Percentage of Occurrence of the variable was used to indicate the 'weightage' within a particular variable. The use of this Percentage of Occurrence gives a meaningful relationship between the total number of variables that appear within a selected variable. For example in the analyses of the selected variable for Recovery and Recycle of Waste (V3) in Table 4.8, it was shown that the number of occurrence of V8 that appears together with V3 is 12 out of the total 72 and hence the Percentage of Occurrence is only 18.06% as compare to V17, the number of occurrence is 7 out of 12 and the Percent of Occurrence is 58%. This is translated as more than half of V17 as mentioned together with V3 whereas V8 cited 18% despite the graph showing its' high number of occurrence. Thus V17 is more highly associated with V3 then V8. The formula used to calculate the Percent of Occurrence in this analyses was;

$$\frac{\text{Number of Occurrence of } V_x \text{ with variable } V_y}{\text{Total Number of Occurrence of } V_x} \times 100\ \%$$

where;
V_x = Variable associated with V_y
V_y = Variable to be analysed

Table 4. 8: Overall Analysis of Individual Issues In Disposal Method Category

N = Number of Occurrence P = Percent of Occurrence

Code	Variable	V3		V8		V10	
		N	P(%)	N	P(%)	N	P(%)
	DISPOSAL METHOD CATEGORY						
V1	Minimisation of Waste	16	53.3	7	23.3	4	13.3
V2	Re-use of Waste	17	63	5	18.5	3	11.1
V3	Recovery and Recycle of Waste			13	18.1	7	9.7
V4	Incineration	4	22.2	8	44.4		
V5	Treatment / Storage/ Transfer of Waste	6	23.1	6	23.1	5	19.2
V6	Public Amenities	4	26.7	1	6.7		
V7	Composting	4	44.4	3	33.3	1	11.1
V8	Landfill / Landfilling	13	14.1			4	4.3
V9	Waste Hierarchy / Disposal Options	4	15.4	1	38	2	7.7
V10	Disposal Sites / Facilities	7	7.2	4	4.1		
	WASTE TYPES CATEGORY						
V12	Household Waste	6	20	9	30	7	23.3
V13	Commercial Waste	6	28.6	3	14.3	5	23.8
V14	Industrial Waste	9	30	7	23.3	3	1
V15	Special / Difficult Waste	1	2.9	3	8.8	4	11.8
V16	Hazardous Waste					2	16.7
V17	Inert Waste	7	58.3	5	41.7		
V18	Radioactive Waste	0	0	1	16.7	1	16.7
V19	Clinical / Mineral / Chemical Waste	4	19.0	8	38.1		
V20	Sludge / Farm Waste			2	16.7	1	8.3
	ENVIRONMENTAL ISSUES CAT.						
V21	Fly-tipping					2	25
V22	Leachate			9	56.3		
V23	Landfill Gas	2	6.7	12	40	1	3.3
V24	Environmental Auditing / Monitoring			17	32.7	9	17.3
V25	Cost / Financial	1	3.3	3	4.9	5	23.8
V26	Duty of Care					4	33.3
V27	Landspreading					1	16.7
V28	Former Landfill Sites			4	22.2	1	5.6
V29	Scrapyard and Metal Facilities					1	14.3
	MANAGEMENT ISSUES CAT.						
V30	Public Register			1	5.9	2	11.8
V31	Environmental Impact	5	4.2	19	16.1	27	22.9
V32	Legislation / Waste Management Papers	1	3.4	3	10.3	1	3.4
V33	Waste Management Licences	3	3.6	4	4.6	15	17.2
V34	Transfrontier Movement of Waste			4	14.8	2	7.4
V35	Enforcement	2	3.3	2	3.3	9	14.8
V36	Education / Research	5	9.3	1	1.9	2	3.7
V37	Joint Committee / Advisory / Consultancy	1	2.3	2	4.5	37	9.1
V38	Carrier Registration			1	8.3		
V39	Waste Disposal / Management Plan	2	11.1	2	11.1	3	16.7
	OTHER ISSUES CATEGORY						
V41	Waste Exemption					2	33.3
V42	Others	1	9.1	1	9.1	1	9.1
V43	Annual Report	1	11.1				
V44	Waste Management Strategy					2	25
V45	Planning Authorities	1	3.8	1	3.8	5	19.2
V46	Transportation of Wastes	2	7.1			2	7.1
V47	Keeping of Waste	1	16.7				
V48	Treatment of Waste	1	16.7				
V49	Disposal of Waste	2	22.2	2	22.2		
V50	BPEO			2	25	1	12.5
V51	BATNEEC			1	33.3	1	33.3
V52	Proximity Principle					1	16.7

d1. Disposal Method Category

Table 4.8 shows that the recovery and recycling of waste (V3) was highly associated with the minimisation and re-use of waste. The high association of these three method of waste disposal corresponds to their position at the top waste hierarchy. Disposal of industrial and inert waste has significant weightage of importance since most policies statements related to recovery and recycling of waste involve the consideration of recycling the industrial and inert waste instead of disposing them to landfills.

Table 4.8 also shows a significant relationship between disposal to landfill or the activities of landfilling to other variables. It shows that incineration and composting are closely associated as alternatives for the disposal of household, inert, clinical, mineral and chemical wastes. In term of environmental impact, landfills are associated with leachate production and the escape of methane gas. It was also revealed that landfill disposal was associated with the need for the use of environmental auditing or monitoring.

Table 4.8 also exhibits the affiliation of disposal sites and facilities to causing the environmental impacts and the need of Waste Management Licences in managing these facilities. It also shows that managing disposal sites and facilities involves consultation and advise seeking in the form of co-operation between Joint Committee from various waste authorities.

d2. Waste Type Category

Analyses of household waste (Table 4.9) discloses its association with main disposal through landfills or other disposal sites and the facilities utilised for such purposes. It is also associated with commercial and industrial waste since these are the three waste types which are defined as controlled waste.

In Table 4.9, industrial waste together with household and commercial waste were found closely associated with the activity of recovery and recycling. Industrial waste was also identified as the main type of waste which could be disposed through the co-disposal method.

Table 4.9 also shows that special and difficult waste is strongly affiliated to commercial, industrial and hazardous waste. As such, this variable appears most frequently with the issues of transfrontier movement of waste since most of the concern were associated with the impact of transporting these waste to the disposal sites. The main disposal methods for these waste and hazardous waste were associated with co-disposal as shown by high percent of its occurrence.

d3. Environmental Issues Category

Table 4.10 shows landfill gas is closely associated to leachate production in landfill. Both of these variables appear as the main environmental issues since both were produced at source as by products of biodegradation of the organic component of waste particularly in landfills. It is also used frequently to

Table 4. 9: Overall Analysis of Individual Issues In Waste Type Category

N = Number of Occurrence P = Percent of Occurence

Code	Variable	V12		V14		V15	
		N	P(%)	N	P(%)	N	P(%)
	DISPOSAL METHOD CATEGORY						
V1	Minimisation of Waste	2	6.7	3	10	1	3.3
V2	Re-use of Waste	6	8.3	2	7.4	2	7.4
V3	Recovery and Recycle of Waste			9	12.5	1	1.4
V4	Incineration	2	11.1	1	5.6	2	11.1
V5	Treatment / Storage/ Transfer of Waste	5	19.2	2	7.7	3	11.5
V6	Public Amenities	3	20	2	13.3	3	20
V7	Composting	1	11.1	1	11.1	2	22.2
V8	Landfill / Landfilling	9	9.8	7	7.6	2	3.3
V9	Waste Hierarchy / Disposal Options	2	7.7	6	23.1	3	11.5
V10	Disposal Sites / Facilities	7	7.2	3	3.1	4	4.1
V11	Co-disposal	1	20	2	40	2	40
	WASTE TYPES CATEGORY						
V12	Household Waste			9	30	2	6.7
V13	Commercial Waste	10	47.6	18	85.7	5	23.8
V14	Industrial Waste	9	30			6	20
V15	Special / Difficult Waste	2	5.9	6	17.6		
V16	Hazardous Waste	1	8.3	2	16.7	5	41.7
V17	Inert Waste	1	8.3	1	8.3	1	8.3
V18	Radioactive Waste			1	16.7	1	16.7
V19	Clinical / Mineral / Chemical Waste			2	9.5	2	9.5
	ENVIRONMENTAL ISSUES CAT.						
V22	Leachate	1	6.3	1	3.4	1	6.3
V23	Landfill Gas	2	6.7				
V24	Environmental Auditing / Monitoring	2	40	1	1.9	2	3.8
V25	Cost / Financial	1	4.8	1	4.8		
V26	Duty of Care	1	8.3	1		1	8.3
V27	Landspreading					1	16.7
V29	Scrapyard and Metal Facilities			1	14.3	1	14.3
	MANAGEMENT ISSUES CAT.						
V31	Environmental Impact	1	0.8			3	2.5
V32	Legislation / Waste Management Papers	1	3.4	2	6.9		
V33	Waste Management Licences	1	1.1	2	2.3	5	5.7
V34	Transfrontier Movement of Waste	1	3.7	1	3.7	8	29.6
V35	Enforcement	2	3.3				
V36	Education / Research	1	1.8	2	3.7	2	3.6
V37	Joint Committee / Advisory / Consultancy	1	2.3	3	6.8	1	2.3
	OTHER ISSUES CATEGORY						
V45	Planning Authorities	1	3.8	3	11.5		
V46	Transportation of Wastes			1	3.6	4	14.3
V49	Disposal of Waste					1	11.1
V50	BPEO					1	12.5

Table 4. 10: Overall Analysis of Individual Issues In Environmental Issues Category (V23 and V24) and Management Issues Category (V31)

N = Number of Occurrence P = Percent of Occurence

Code	Variable	V23		V24		V31	
		N	P(%)	N	P(%)	N	P(%)
	DISPOSAL METHOD CATEGORY						
V1	Minimisation of Waste					1	3.3
V2	Re-use of Waste					5	18.5
V3	Recovery and Recycle of Waste	2	2			5	6.9
V4	Incineration			1	5.6	2	11.1
V5	Treatment / Storage/ Transfer of Waste					3	11.5
V6	Public Amenities					1	6.7
V8	Landfill / Landfilling	12	2.8	17	18.9	1	20.7
V9	Waste Hierarchy / Disposal Options	1	13	1	3.8	19	11.5
V10	Disposal Sites / Facilities	2	3.8	9	9.3	27	27.8
V11	Co-disposal					1	20
	WASTE TYPES CATEGORY						
V12	Household Waste	2	1	2	6.7	1	3.3
V13	Commercial Waste			1	4.8		
V14	Industrial Waste			1	3.3		
V15	Special / Difficult Waste			2	5.9	3	8.8
V16	Hazardous Waste					1	3.3
V17	Inert Waste					2	16.7
V18	Radioactive Waste			1	16.7		
V19	Clinical / Mineral / Chemical Waste	1	6.7	3	14.3	2	9.5
V20	Sludge / Farm Waste	1	4.8			5	41.7
	ENVIRONMENTAL ISSUES CAT.						
V21	Fly-tipping	1	8.3			1	12.5
V22	Leachate	92	56.3	8	50	3	18.8
V23	Landfill Gas	0	0	12	40	8	26.7
V24	Environmental Auditing / Monitoring	12	23.1			13	25
V25	Cost / Financial					6	28.6
V26	Duty of Care			1	8.3	1	8.3
V27	Landspreading					2	33.3
V28	Former Landfill Sites	2	11.1	4	22.2	5	27.8
V29	Scrapyard and Metal Facilities					1	14.3
	MANAGEMENT ISSUES CAT.						
V31	Environmental Impact	8	6.8	13	11		
V32	Legislation / Waste Management Papers					3	10.3
V33	Waste Management Licences	3	3.4	14	16.1	28	32.2
V34	Transfrontier Movement of Waste			1	3.7		
V35	Enforcement	1	1.6	13	21.3	15	24.6
V36	Education / Research			1	1.9	1	9.3
V37	Joint Committee / Advisory / Consultancy	1	2.3	2	4.5	1	23
V38	Carrier Registration	1	8.3	1	8.3	1	8.3
V39	Waste Disposal / Management Plan					1	52
	OTHER ISSUES CATEGORY						
V41	Waste Exemption					1	16.7
V42	Others					1	9.1
V43	Annual Report	1	11.1				
V44	Waste Management Strategy					2	25
V45	Planning Authorities	3	11.5	2	7.7	6	23.1
V46	Transportation of Wastes			1	3.6	6	21.4
V47	Keeping of Waste					2	33.3
V48	Treatment of Waste					2	32.3
V49	Disposal of Waste					3	33.3
V50	BPEO					1	12.5
V52	Proximity Principle					1	16.7

identify the correct distance of old landfill sites producing methane to any residential or development sites. However in some cases landfill gas when it is commercially viable is harvested for industrial utilisation.

Analyses of environmental auditing or monitoring (Table 4.10) shows that it is associated with the need to control activities on landfills, disposal sites and facilities from environmental impacts such as the escape of leachate and landfill gas to other media. Environmental auditing and monitoring are also highly associated with the conditions imposed before issuing a Waste Management Licence. Another aspect which shows a similar association is the role of enforcement in ensuring that all waste disposal activities are audited and monitored. In some counties, the WRA requires the licence holders to sample and monitors the waste, landfill gas, leachate and ground and surface waters as appropriately beside a compliance monitoring undertaken the WRA to check the licence holder results. These three elements, control of environmental impacts, issuing of Waste Management Licence and enforcement appear significantly in the Management Issues Category indicating that these are variables which are considered to be priority concerns by waste managers. The rationale for the importance of these three variables can be observed from their strong affiliation to the need of auditing and monitoring of landfills leachate and the emission of landfill gas.

d4. Management Issues Category

Analyses of environmental impacts (Table 4.10) shows that it has strong associations with variable landfill, disposal sites or facilities, waste management licences and enforcement. This suggests that the importance of licensing and enforcement as tools to control the various activities in all disposal sites with particular attention to landfills. The high percent of occurrence of seven variables, landfills, sludge and farm waste, landspreading, waste management licences and the keeping, treatment and disposal of waste, indicated the importance of the use of these variables as indicators to identify and control environmental impact from waste activities.

Table 4.11 shows that waste management licences have a high occurrence with disposal sites or facilities, environmental auditing or monitoring, environmental impacts and enforcement. Waste Management Licences were identified as the most important tools as a means to regulate the activities associated with any waste disposal activities. In certain cases, a Waste Management Licences applicant is given a 'Fast Track Application' priority if the proposal contains a significant recycling element in its waste disposal activities. It is also highly associated with disposal sites or facilities dealing with special, difficult, hazardous and radioactive waste. Hence, it was noted that all Waste Management Licences are kept under constant review and revised and updated as necessary to take account of higher standards and operational practices. It also shows a high percent of occurrence with other issues such as environmental auditing or monitoring, environmental impacts,

Table 4. 11: Overall Analysis of Individual Issues in Management Issues Category

N = Number of Occurrence P = Percent of Occurrence

Code	Variable	V33		V35		V36	
		N	P(%)	N	P(%)	N	P(%)
	DISPOSAL METHOD CATEGORY						
V1	Minimisation of Waste					6	20
V2	Re-use of Waste					2	7.4
V3	Recovery and Recycle of Waste	3	4.2	2	2.8	5	6.9
V4	Incineration	1	5.6			1	5.6
V5	Treatment / Storage/ Transfer of Waste	1	3.8				
V6	Public Amenities	1	6.7	1	6.7		
V8	Landfill / Landfilling	4	4.3	2	7.2	1	1.1
V9	Waste Hierarchy / Disposal Options					2	7.7
V10	Disposal Sites / Facilities	15	17.5	9	9.3	2	2.1
	WASTE TYPES CATEGORY						
V12	Household Waste	1	5.3	2	6.7	1	3.3
V13	Commercial Waste	2	9.5			1	4.8
V14	Industrial Waste	2	6.7			2	6.7
V15	Special / Difficult Waste	5	14.7			2	5.9
V16	Hazardous Waste	2	16.7			2	8.3
V18	Radioactive Waste	1	16.7				
V19	Clinical / Mineral / Chemical Waste	2	9.5				
V20	Sludge / Farm Waste	1	8.3	1	8.3		
	ENVIRONMENTAL ISSUES CAT.						
V21	Fly-tipping			6	75		
V22	Leachate	2	12.5				
V23	Landfill Gas	3	10	1	3.3		
V24	Environmental Auditing / Monitoring	14	26.9	13	25	1	1.9
V25	Cost / Financial	0	0	0	0	1	4.8
V26	Duty of Care	0	0	4	33.3	1	8.3
V28	Former Landfill Sites	1	5.6	1	5.6	1	5.6
V29	Scrapyard and Metal Facilities	1	14.3			1	14.3
	MANAGEMENT ISSUES CAT.						
V30	Public Register			2	11.8	2	11.8
V31	Environmental Impact	25	23.7	15	12.7	5	4.2
V32	Legislation / Waste Management Papers	5	17.2	2	6.9	3	10.3
V33	Waste Management Licences	0	0	12	13.8	7	8.0
V34	Transfrontier Movement of Waste	1	3.7			2	7.4
V35	Enforcement	12	19.7			2	3.3
V36	Education / Research	7	13	21	3.7		
V37	Joint Committee / Advisory / Consultancy	0	0	2	6.5	7	15.9
V38	Carrier Registration	2	16.7	2	16.7	1	8.3
V39	Waste Disposal / Management Plan	2	11.1				
	OTHER ISSUES CATEGORY						
V41	Waste Exemption	2	33.3	2	11.1		
V43	Annual Report					3	33.3
V45	Planning Authorities	3	11.5	2	7.7		
V46	Transportation of Wastes	3	10.7				
V47	Keeping of Waste	2	33.3				
V48	Treatment of Waste	2	33.3				
V49	Disposal of Waste	2	22.2				
V51	BATNEEC	0	0	1	33.3		

enforcement, waste exemption keeping and treatment of waste, since most of these issues are related to one another and are taken into consideration in any application for a Waste Management Licence.

Analyses of variable "Enforcement" (Table 4.11) shows the same trend as the previous analyses in that it is highly related to the four main variables: waste management licences, environmental impacts, environmental auditing or monitoring and disposal sites or facilities but with the an addition of education and research. This information justifies most of the policy statements which cited that the need to increase environmental awareness and to reduce the risk of penalties is by providing information and education to all waste practitioners. It shows significant association to fly-tipping besides hazardous waste which both of these element posing significant impacts on the environment.

Table 4.11 also shows that variable education or research score high occurrence in relation to variables minimisation, recovery and recycling of wastes. The high score for these variables indicates that they are tools used in disseminating the consequence of environmental impacts from waste disposal activities. The use of Waste Management Licences, the role of the LAs participating in regional or national Joint Committees or performing as an advisory and consultancy body, all form an integral element of UK waste management. It indicates that education and research are important management tools used to improve waste minimisation and recycling as stipulated in the Waste Strategy for England and Wales. Variable, Annual

Report was identified as having the strongest association with Education and Research since most of the county waste activities were published and reported as tools to educate and inform the public.

d5. Other Issues Category

Table 4.12 shows that variable "County Planning Authority" is strongly associated with the allocation of disposal sites or facilities and the concern for awareness of environmental impacts from waste disposal activities. Under the Town and County Planning General Development Order 1988 (GDO), the WRA is consulted by the District or Local Planning Authority on all proposed developments within 250 meters of land which is or has been used for the deposit of waste in the last 30 years. The purpose of this formal process is to give the WRA the opportunity to express its views on the nature of the possible hazards presented by old and current landfills to any new development. It shows how important the Planning Authorities is in relation to making considerations on the siting of waste disposal sites and the risk associated to environmental impacts arising from such sites. A high percentage and number of occurrences of variable environmental impacts indicated that it is the Planning Authority responsibility to safeguard the environment.

Table 4.12 also shows that the variable "Transportation of Wastes" is closely associated with environmental impacts and the need of Waste Management Licences to the waste transporters. It also shows a similar association to the keeping, treatment, and disposal of waste. It indicates that transportation of

Table 4. 12: Overall Analysis of Individual Issues in Other Issues Category
N = Number of Occurrence P = Percent of Occurrence

Code	Variable	V45		V46	
		N	P(%)	N	P(%)
	DISPOSAL METHOD CATEGORY				
V2	Re-use of Waste			2	7.4
V3	Recovery and Recycle of Waste	1	1.4	2	2.8
V4	Incineration			1	5.6
V5	Treatment / Storage/ Transfer of Waste			2	7.7
V8	Landfill / Landfilling	1	1.1		
V9	Waste Hierarchy / Disposal Options	1	3.8	1	3.8
V10	Disposal Sites / Facilities	5	5.2	2	2.1
	WASTE TYPES CATEGORY				
V12	Household Waste	1	3.3		
V13	Commercial Waste	1	4.8		
V14	Industrial Waste	3	10	1	3.3
V15	Special / Difficult Waste			4	11.8
V16	Hazardous Waste			2	16.7
V18	Radioactive Waste			1	16.7
V19	Clinical / Mineral / Chemical Waste	1	4.8	2	9.5
	ENVIRONMENTAL ISSUES CAT.				
V21	Fly-tipping	1	12.5		
V22	Leachate	1	6.3		
V23	Landfill Gas	3	10		
V24	Environmental Auditing / Monitoring	2	7.4	1	1.9
V25	Cost / Financial			1	4.8
V28	Former Landfill Sites	4	22.2		
	MANAGEMENT ISSUES CAT.				
V30	Public Register	1	5.9		
V31	Environmental Impact	6	7.5	6	51
V32	Legislation / Waste Management Papers			2	6.9
V33	Waste Management Licences	3	3.4	9	3.4
V34	Transfrontier Movement of Waste	1	3.7	2	33.3
V35	Enforcement	2	3.3		
V37	Joint Committee / Advisory / Consultancy	3	6.8	1	5.5
V38	Carrier Registration	1	8.3		
	OTHER ISSUES CATEGORY				
V41	Waste Exemption			1	16.7
V45	Planning Authorities			1	4
V46	Transportation of Wastes	1	3.6		
V47	Keeping of Waste			6	100
V48	Treatment of Waste			5	83.3
V49	Disposal of Waste			4	44.4
V50	BPEO			1	12.5

waste creates concern in relation to environmental impacts from activities such as keeping, treatment and disposal of waste require licences.

4.3 The Institutional Framework

4.3.1 The Central Government

At the central government level, the duty to control waste activities lies with the Secretary of State for the Environment. The minister is given the supervisory powers over the local authorities and local government concerning waste management duties.

The DOE is the main UK Government agency that is responsible for policy and the production of guidelines for the management of waste. The Waste Division in this department is responsible for most matters regarding policy, legislation and advice on waste matters. Most of the policy and advice was published as Waste Management Papers (Table 4.13).

Other UK Governmental departments that share some responsibilities in respect of waste management include the Department of Energy (the incineration of waste for energy purposes, exploitation of landfill gas, pipelines under the Pipelines Act 1962), the Ministry of Agriculture, Fisheries and Food (general supervision of the development and restoration of land used for waste management purposes), the Department of Employment (supervision of the Health and Safety Executive with special responsibilities under the Health and Safety at Work Act 1974), the Department of Transport (highways and traffic

Table 4.13: Waste Management Papers issued by the UK DOE

WM Paper No.1.	Reclamation, Treatment & Disposal of Waste (1976) A Review of Options - guidance on options available Second Edition -(1992). ISBN:0-11-752644-4
WM Paper No.2.	Waste Disposal Surveys (1976)
WM Paper No.3.	Guidelines for Preparation of Waste Disposal Plans.
WM Paper No.4.	The Licensing of Waste Disposal Sites (1976) The Licensing of Waste Facilities - a revision (1988) Licensing of Waste Management Facilities - (1994) ISBN: 0-11-752727-0
WM Paper No.4A.	Licensing of Metal Recycling Sites (1995). ISBN: 0-11-753064-6
WM Paper No.5.	The Relationship Between WDA's and Private Industry
WM Paper No.6.	Polychlorinated Biphenyl (PCB) Wastes (1976) Polychlorinated Biphenyls - guidance on the drafting of WM Licences (1994). ISBN: 0-11-752952-4
WM Paper No.7.	Mineral Oil Wastes
WM Paper No.8.	Heat-treatment Cyanide Wastes (1976) Revised 1985.
WM Paper No.9.	Halogenated hydrocarbon Solvent Wastes from Cleaning Processes
WM Paper No.10.	Local Authority Waste Disposal Statistics (1976)
WM Paper No.11.	Metal Finishing Wastes
WM Paper No.12.	Mercury Bearing Wastes
WM Paper No.13.	Tarry and Distillation Wastes and Other Chemical Based Residues
WM Paper No.14.	Solvent Wastes (excluding halogenated carbons)
WM Paper No.15.	Halogenated Organic Wastes
WM Paper No.16.	Wood Preserving Wastes (1980)
WM Paper No.17.	Wastes from tanning, leather dressing and fellmongering.
WM Paper No.18.	Asbestos Waste (1979)
WM Paper No.19.	Wastes from the Manufacture of Pharmaceuticals, Toiletries and Cosmetics
WM Paper No.20.	Arsenic Bearing Wastes
WM Paper No.21.	Pesticide Wastes
WM Paper No.22.	Local Authority Waste Disposal Statistics 1974/75 1977/78
WM Paper No.23.	Special Wastes
WM Paper No.24.	Cadmium Bearing Wastes
WM Paper No.25.	Clinical Wastes
WM Paper No.26	Landfilling Wastes (1986). ISBN: 0-11-751891-3
WM Paper No.26A.	Landfilling Completion (1993). ISBN: 0-11-752807-2
WM Paper No.26B.	Landfill - Design, Construction and Operational Practice (1995) ISBN: 0-11-753185-5
WM Paper No.26F	Landfill Co-disposal
WM Paper No.27.	The control of Landfill Gas (1989) Revised 1991: 2nd Impressions 1992-Landfill Gas ISBN: 0-11-752488-3
WM Paper No.28	Recycling - guidance to Local Authorities on recycling (1992) ISBN: 0-11-752445X

Source: UK DOE

including the regulation of construction and use of vehicles for the transport of waste and rail transport (Garbutt, 1992).

4.3.2 Local Government

In most UK counties, the waste management structure is as shown in Figure 4.2. These arrangements may be slightly different in certain Borough and Metropolitan areas. Nevertheless, the three main components of the institutional framework for waste were the WCA, WDA and WRA.

4.3.2a. Waste Regulation Authorities (WRA)

This authority was designated under section 30(1) of the EPA 90. A survey from 30 counties (Table 4.14) reveals that most of these WRAs were from various departments or sections of County Council. The tasks and activities of the WRA were identified to include the:

- Administering the registration of waste carriers and brokers,
- Designing and installing pollution control systems on completed landfills and sites previously operated by the Authority,
- Enforcing the Duty of Care requirements,
- Issuing of licenses for waste management sites and facilities including the treatment, storage and disposal of wastes,
- Monitoring and inspection of licensed sites and facilities to ensure compliance with the licence conditions,
- Taking of legal action to ensure statutory environmental protection requirements are met,

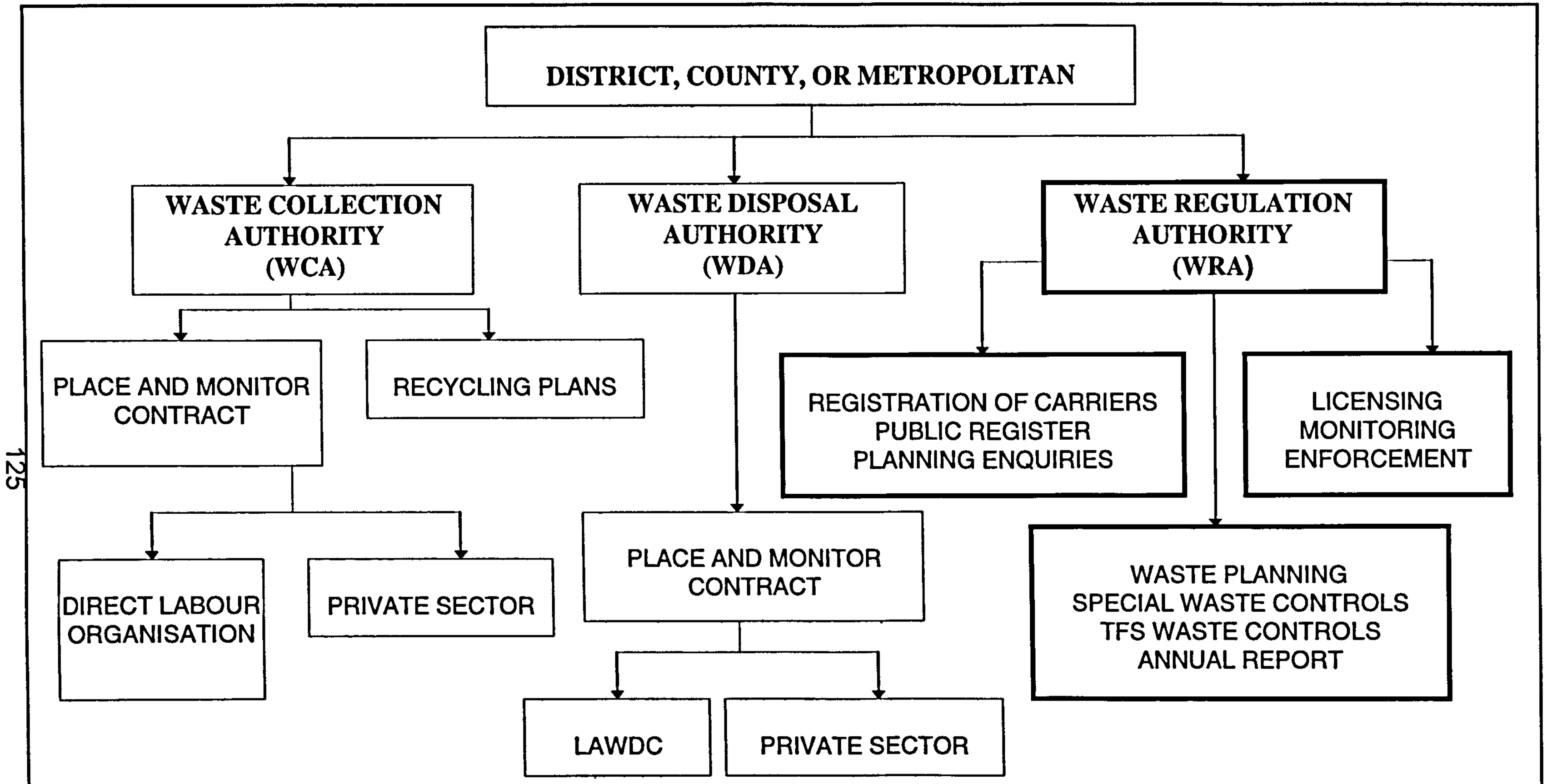


Figure 4.2: Typical Waste Management Structure in most UK Counties (Bold boxes transferred to the Environment Agency)
Source : Author

Table 4.14. : Department within the County Councils related to the WRA

COUNTY	DEPARTMENT
AVON	County Planning Department
BEDFORDSHIRE	County Engineer Department
BERKSHIRE	County Environment Department
BUCKINGHAMSHIRE	Planning and Transport Department
CAMBRIDGESHIRE	Corporate Planning Department
CHESHIRE	Environmental Planning Service
CLEVELAND	Department of Environment
CORNWALL	Transportation and Estate Department
CUMBRIA	Economy and Environment Department
DORSET	Transportation and Engineering Department
DEVON	Environmental Dept. and Accountability Centre
ESSEX	Planning Department
EAST SUSSEX	Environment Committee
HAMPSHIRE	County Planning Department
HERTFORDSHIRE	Planning and Environment Department
HUMBERSIDE	Technical Services
KENT	Highway and Transportation Department
LANCASHIRE	County Surveyor's
LEICESTERSHIRE	Planning and Transportation Department
LINCOLNSHIRE	Highway and Planning Department
NORFOLK	Planning and Transportation Department
SHROPSHIRE	Environment Department
SOMERSET	Environment Department
SOUTH YORKSHIRE	Waste Regulation Joint Committee
STAFFORDSHIRE	Public Protection
SUFFOLK	County Surveyor Department
SURREY	County Planning Department
WEST MIDLAND	Waste Regulation Corporation
WEST YORKSHIRE	Waste Regulation Sub-committee
WILTSHIRE	Environmental Service Department

Source : Author

- Monitoring of land that has previously been used for waste disposal to ensure that it does not represent a pollution risk,
- Monitoring of the application of waste to land for the purposes of

a. fertilising or otherwise beneficially conditioning that land,

b. Maintaining of register of exemptions from the waste management licensing scheme e.g., the spreading of waste on land for agricultural improvement.,

- Maintaining of a public register of specified environmental

information,

- Monitoring the movements of special wastes,
- Providing of specialist advice to Industry,
- Surveying of a county's waste arising and waste management facilities and alternative waste disposal options for inclusion in the Waste Disposal (Management) Plans which will assist in ensuring that future disposal needs of a county are catered for,
- Discharging of the above responsibilities in a professional and proactive manner in order to obtain the most effective use of public resources,
- Ensuring that the transport, keeping, treatment and disposal of waste are undertaken in a manner which does not cause harm to health or cause pollution of the environment,
- Using of emergency powers to avert an imminent risk of serious pollution of the environment or serious harm to human health.

4.3.2b. Waste Disposal Authorities (WDA)

In relation to waste, the Waste Disposal Authority is given the trust and the statutory obligation to protect the environment. In most of England the county council normally performs the role of WDA. Among the WDA duties identified are:

- to carry out an investigation with a view to deciding what arrangements are needed for the purposes of disposing of controlled waste arising within or imported into its area,

- to decide what arrangements are in the opinion of the Authority, needed for that purpose,
- to prepare a statement of the arrangements made and proposed to be made by the Authority and other persons, for disposing of such waste during a specified period,
- to carry out, from time to time, further investigations with a view to deciding what changes in the plan are needed and to carry out any modification of the plan that the Authority thinks appropriate.

4.3.2c. Waste Collection Authorities (WCA)

In England, Waste Collection Authorities are usually controlled by the County or District councils. It is the duty of each WCA to collect most household waste in the area and they may also make arrangements to collect commercial and industrial waste from premises if so requested. They can also give notice to require the removal of unlawfully deposited waste or remove it themselves. They can direct the use of or supply of a particular receptacle for waste collection for commercial or industrial waste. They deliver their waste to the WDA for the area or sent it to recycling plants. They are given the task of making recycling plans work in their areas.

4.3.3 Waste Management Industry

It was found that the Waste Management Industry consists of three important sectors. First the Regulators; WRA, WDA and WCA, as explained in the earlier sections. Second is the Private and Support Sectors and finally, the

third, is the Professional and Expertise sectors.

The Private sectors play an important role in providing better waste management services and activities in the UK. The Waste Management Industry can be divided according to the main waste activities such as collection, recycling , treatment and the disposal of waste. In recent years many County Councils have form their own private company commonly known as Local Authority Waste Disposal Company (LAWDC) to compete and participate in tenders for waste disposal activities with other already established companies.

4.3.3a. Local Authority Waste Disposal Companies (LAWDC)

The LAWDCs were suggested when arguments occurred over on the role of the WDA being the same authority that both regulates and monitors and at the same time operates the waste disposal activities. With the introduction of EPA 90, the local authority regulating and site licensing function was separated from the operations and managing of waste disposal activities (Holmes, 1995). Schedule No. 2 of the EPA 1990 states that all Waste Disposal Authorities (WDAs), being either county or metropolitan councils, must make arrangements with a waste disposal contractor for the disposal of controlled waste collected by waste collection authorities. Part II of Schedule 2, makes provision for WDAs to divers themselves of their operations and to accept tenders for disposal operations from other companies. Table 4.15, Shows the situation of the LAWDC in England and Wales.

Table 4.15: Summary of LAWDC Establishment in England and Wales

	English Counties	English Unitaries	Welsh Unitaries	Metropolitan Boroughs	London Borough's
Wholly owned LAWDCs	19	6	5	20	-
Joint venture LAWDCs	3	4	1	11	7
LAWDCs sold to private sector	2	-	-	1	-
Private contractors	12	4	14	4	25
Decisions awaited	-	-	2	-	-
TOTALS	36	14	22	36	32

Source: Adapted from John Holmes, (1996)

John (1995a), described the three basic forms of LAWDCs based on those which are also registered under the Companies Act 1985. They are;

1. Local Authority Controlled: of which the majority of shares and powers of appointment and dismissal of directors are held by the local authority.
2. Local Authority Influenced: in which they have a minority shareholding but with at least 20% of the voting rights or the right to appoint 20% of the directors or similar 'associated' powers,
3. Free of Local Authority Influence: in which they have a minority shareholding of less than 20% and have similar reductions in the powers to appoint directors.

LAWDCs are free to compete for business in other local authority areas and against private sector contractors.

4.3.3b. Private and Support Service Sector

Most of the waste related activities are operated by Private Companies, Waste

Carriers and Waste Brokers. These companies participate in all waste management activities such as collection, disposal and other services. A survey of advertisements from brochures, journals and newspapers published components of Support and Services related to Waste Management Industries as tabulated in Table 4.16.

Table 4.16: List of business and support Services in waste management industry

BUSINESS	SUPPORT SERVICES;
Transport services	Consultancy and scientific services
Scrap and secondary material	Consumable stores
Demolition services	Fumigation and pest Control
Industrial services	Planing and legal services
Pest control and hygiene	Plant hire
Mining and minerals industry Janitorial and cleaning services	Process Plant manufacturer Vehicle and container manufacturer

Adapted from: Holmes, 1991.

4.3.3c. Professional and Expertise Sector.

Most of the components in this sector were either independent bodies or associations of traders, professional and academics. A review of documents on waste management reveals several groups which are of significant importance in contributing toward professionalism in waste management industries.

i. The National Association of Waste Disposal Contractors (NAWDC)

This is a non-governmental association formed by the waste disposal traders and contractors. It represents the interest of the UK waste management industries and promotes high standards of management of waste through its code of practice.

ii. The Waste Management Industry Training and Advisory Board (WAMITAB)

WAMITAB is another non-governmental body that has significant importance in the training of personnel for the waste industry. It awards the Certificates of Technical Competence (COTC) for waste managers as required under the Waste Management Licensing Regulations 1994 to be 'fit and proper person'. The due date for managers without the COTC to obtained this certificate is on 10 August 1999. It also awarded the Certificates of Qualifying Experience (CQE) and Provisional Certificates of Technical Competence (PCOTC) as the transitional award before each applicant is awarded the COTC.

The concept of 'fit and proper person' was introduced through Waste Management Licensing Regulations. It consists of three parts, all of which the applicants have to satisfy. First, they must be free from relevant convictions and generally of environmental offences. Secondly the person must be technically competent to manage the facility, as certified through WAMITAB. Finally, the person must be financially competent to discharge the obligations of the licence condition such as having adequate funds to deal with the installation of site infrastructure, threats of pollution and any remediation works required.

iii. Royal Commission on Pollution (RCEP)

This is an independent body that acts in an advisory capacity to the UK Government on environmental issues. It produces environmental reports and environmental policies. The members of RCEP are appointed for three or

more years. They are responsible for providing advice on national and international matters concerning the pollution of the environment.

iv. Institute of Waste Management (IWM)

This is a professional body which aims at promoting professionalism and excellence in the waste management industry. The IWM achieves this task through providing expert advice, information and training. The IWM publishes the Wastes Management Journal monthly and the IWM Proceedings every three months. It also produce scientific and technical papers. IWM is the leading body that provides education and training in various fields of waste management. In 1995 the Institute successfully produced the first cohort of students graduating with a Higher National Certificate in Waste Management. It also offers 32 training courses in a year. Educational and training courses offered by IWM are detailed in section 4.5 of this chapter.

v. National Resource Foundation (NRF)

This charitable Foundation was established in 1983 as the World Resource Foundation. The organisation provides access to world-wide information on the management of household waste and its value as a resource and source of material and energy. Its emphasis is on the decimating of information on energy recovery from waste and un-recycleables wastes. The NRF uses three main tools to promote the data and information on waste: the establishment of a library, publication programmes, and establishing network and activities. The library is supported with almost 10,000 publications and an update of

database information system of waste related matters. It has a CD-ROM facility and electronic on-line systems for access to information. The NRF produced the Warmer Bulletin that is published bi-monthly. It also publishes the W.R.F News Brief, a monthly newsletter. Other publications include Technical Brief and Information Sheets. All of these publications deal with a wide range of subjects such as waste minimisation, textile recycling, energy recovery, life cycle analysis and resource conservation. Its activities include organising seminars, conferences and meeting. It has created a close network with other national and international organisation which have similar interests.

4.4 Law and Legal Framework

The survey on the law and legislation on waste in the UK indicates that most of the Acts and Statutory instruments used were very recent (Appendix 4.2). Most of the waste legislation in Section II of the EPA 90 were upgraded from COPA 74. The main components COPA 74 identified as important include; -sub-sections 3-10 (licensing of disposal of controlled waste), -section 16 (removal of waste deposited illegally), -section 17 (dangerous or intractable waste), -section 30 (definitions), -sub-sections 85, 87 (legal proceedings), -section 88 (civil liability for contravention of s3(3)), -and sections 91-94, 96-98 (miscellaneous).

4.4.1. Environment Protection Act 1990

A review of Part II of this Act indicates that waste in the UK is managed through legislation. There were 49 Sections (Appendix 4.3) which were

grouped into important headings relevant to requirements for the controlling and management of waste activities. The main Section Headings identified as significant were: -Part II (ss 29-78) (waste on land), Preliminary : Authorities empowered to managed waste activities, Prohibition, Duty of Care, Collection, Disposal and Treatment, Special waste and non-controlled waste, Publicity, Supervision and Enforcement and the Supplemental section on 'fit and proper person' and meaning of waste.

4.4.2 Waste Regulation

It was observed that there was a considerable increase in the number waste regulations immediately after the introduction of COPA 74. Some of these regulations which are key to successful in controlling waste activities include;

- Control of Pollution (Special Waste) Regulations 1980 (SI 1980/1709),
- Collection and Disposal of Waste Regulations 1988 (SI 1988/819),
- Disposal of Controlled Waste (Exceptions) Regulations 1991 (SI 1991/508),
- Control Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 (SI 1994/1096),
- Transfrontier Shipment of Waste Regulations 1994 (SI 1994/1137),
- Waste Management Licensing Regulations 1994 (SI 1994/1056).

4.4.3 European Union Directives

The introduction of some of the new or revised legislation and regulations in the UK was related to directives passed by the European Union. Appendix 4.4

lists EC directives that are applicable to the UK. A review of these directives indicates that much of UK waste legislation was based on these directives. At the time of writing new directives are under reviewed and being considered by the EU Councils to be operative in the member states. These include the EU Landfill Directive, EU Municipal Waste Directive, Packaging Directive, Landfill Tax and Packaging Levy.

4.5 Education and Training

An investigation, through the mail and telephone communication, to some academic institutions in the UK shows that a few colleges and universities now offer courses in the area of waste management as well as environment (Table 4.17). These courses are available in part-time or full time basis. Most of the course modules provide a solid foundation in relevant subject areas as listed in (Table 4.18). and the modules identified include the social, economic, legal and scientific disciplines. Students specialise in the related field within the waste related areas such as the Waste Management, Safety Management or Environmental Management, etc., in the second or third year of their course. It was also reveal that these courses are now offered in various departments or faculties such as the Applied Sciences, Environmental Resources, Environmental and Public Health. It was also discovered that the duration of these courses varies according to the degrees or certificate. A normal diploma course usually takes 34 weeks whereas for a postgraduate leading to Master degree usually take almost 48 weeks. Besides the formal academic institutions, The Institute of Wastes Management provides regular training

Table 4.17: List of Degrees, Colleges and University offering courses related to Waste Management.

High National Certificate (HNC) in Waste Management:	
Stow College Glasgow	
City of Liverpool Community College	
Cardiff Institute of Higher Education	
New College Durham	
Doncaster College	
Sutton Coldfield College	
Hackney College London	
Degree and Post Graduate courses:	
Nene College Northampton	BSc. Waste Management and the Environment
Greenwich University	BSc. Waste Management
University of Plymouth	BSc. Environmental Science
University of Nottingham	BSc. Environmental Engineering
Open University	BSc. Environmental Management
	Diploma Pollution control
DeMonfort University	BSc. Waste Management (Part-time course)
Post Graduate Courses:	
University of Paisley Scotland	MSc/ PgD in Waste Management
University of Sunderland	MSc in Waste Management
University of Central Lancashire	MSc in Waste Management
University College Salford	MSc in Environment
Loughborough University	MSc in Hazardous Waste Management
University of Luton	MSc in Waste Management
University of Leeds	(Part-time basis)

Source: Author

Table 4.18: List of course topics at various degree and diploma level

Module	HNC	BSc[1]	Diploma[2]	MSc/PgD
Applying Environmental Science to the Management of Waste	*			
Conservation and Utilisation of Natural Resources				*
Earth Science and Resources				*
Environmental Geology & Remote Sensing				*
Environmental Hazards				*
Environmental Risks Management				*
Industrial Environmental Management				*
Industrial Risk Management				*
Land Use and Management				*
Law, Leisure and Public Safety				*
Legal and Economic Framework	*			*
Managing Financial Resources in Waste Industry	*			
Managing Human Resources in Waste Industry	*			
Managing Support Services within the Waste Industry	*			
Managing the Handling and Disposal of Wastes	*			
Occupational Health and Hygiene				*
Planning and Organising Services in the Waste Industry	*			
Safety Technology				*
Utilising Information Technology	*			
Waste Control Technology	*			*

HNC based on the syllabi from the Stow College MSc/PgD based on the University of Paisley

[1] and [2] : Not available after numerous attempts by author. Source: Author

courses throughout the year for all disciplines within the waste management industry. Their courses are in the form of Structured Training. The length of most of these courses varies from a one day non-residential to a five days residential training course. The list of courses as shown in Table 4.19.

Table 4.19: List of Courses offered by the Institute of Waste Management

Course	Day/s
Contaminated Land: Legal and Planning Issues	
Duty of Care	1
Enforcement	4
Environmental Audit and Management Systems	
Geology, Hydrology and Hydrogeology of Landfill	1
Introduction to the Management of Wastes	
Landfill Gas Management (Advanced)	1
Landfill Gas Monitoring (Basic)	1
Landfill Gas Utilisation	2
Landfill Site Licensing	2.5
Landfill Site Selection and Design	2
Leachate Monitoring	1
Licensing and Control of Metals Recycling Facilities	2
Media Strategy	1
Recycling	
Landfill Restoration and Aftercare	2
Risk Assessment	1
Special Waste Regulations	
Waste Legislation (General)	1
WAMITAB - Preparation of A Portfolio (Technical Competence) Waste Processes Under IPC and LAAP: Legal Issues	8

Source: IWM

A further approach used by the researcher to investigate the importance of education and training in the field of waste management was by reviewing the nature of the consultancy works related to this field. A review of the Waste Management and Environmental Register for 1997 produced by the Institute of Waste Management reveals some important information. Table 4.20 which lists the specialist and expertise areas which are related to Waste Management activities. It indicates how important academic institutions are in providing various courses in their institutions in order to produce sufficient

graduates to meet the needs of waste management industry. It can be deduced from this list that waste management is an integrated academic subjects which requires a students to understand a diversified number of other subject areas such as law, science and basic civil engineering. It also denotes that students with a basic degree in sciences and in particular with a basic background in chemistry or chemical engineering will have better opportunities in the scientific and technical areas of waste with the trend and tendency in the area of environmental auditing and monitoring. Students with environmental law, will certainly satisfy the legal and environmental requirements whereas for engineers, the profile areas are ceaseless as indicated in Table 4.20.

4.6 Conclusion

As demonstrated in this survey planning and management for solid waste disposal in the UK is well institutionalised and legislated. Its organisational structure of WRA, WDA and WCA separates regulators, disposal agents and collectors and provides each institution with duties to perform accordingly to stipulation in UK legislations. By doing this, each institution has the capacity for comprehensive and strategic solid waste planning in each County or area It is also clear that the UK legislative frameworks provide policy makers with accessible information so as to identify the objectives and to construct necessary measures for sustainable waste management policies. It also establishes, that the waste management industry needs active participation both from the public and private sectors. The involvement of professional and independent bodies in determining the direction of waste management in the

Table 4.20: Area of Expertise related to Waste Management (58 Companies)

Advice on Current Legislation
Air and Noise Pollution Monitoring
Air Quality and Air Pollution
Auditing and Compliance
Biogas
Chemical Investigations and Analysis
Clinical Waste Management
Computer Aided Site Design
Contaminant and Pollution Modelling
Contaminated Land Appraisal and Remediation
Contaminated Land Assessment, Investigation and Remediation
Contaminated Land Rehabilitation
Contaminated Land Studies
Contamination and Geotechnical Site Investigation and Remediation
Contract Documentation for Collection and Disposal Services
Contract Preparation and Supervision
Contract Quality Assurance
Corporate Environmental Policy
Design of Control Measures
Design of Embankments and Dams, Waste Lagoons and Settling Ponds
Design, Supervision and Quality Assurance of Landfills
Desk Studies, Surveys and Investigations
Developing Regulatory Control Systems
Due Diligence and Compliance Landfill Audits
Dust and Particulates Monitoring and Analysis
Ecological Audits
Ecological Surveys; Habitat Creation and Enhancement
Effluent Treatment
Environmental Assessment
Environmental Assessment and Applications for Planing Permission
Environmental Assessment and Audit
Environmental Impact Assessment of Waste Disposal Facilities
Environmental Management Systems ISO 14001
Environmental Planning and Assessment
Environmental Policy and Economics
Environmental Policy and Management Systems
Environmental Pollution Liability Audit
Environmental Risk Assessment and Site Audits
Expert Testimony and Litigation Advice
Expert Witness and Litigation
Exploration Boring and Drilling.
Gas Control and Utilisation
Gas Control, Collection and Utilisation
Gas Monitoring and Control
Geotechnical Investigations
Geotechnical, Geophysical and Geochemical Analysis
Groundwater Risk Assessment
Hazard and Exposure Risk Assessments
Hazardous Waste Management
Health Risk Assessments
Hydrogeological Investigations and Assessments,
In House Geotechnical and Chemical Laboratories.
In Situ Permeability Testing and Water Sampling Systems
Incineration and energy from waste
Industrial Waste Management and Effluent Treatment
Integrated Pollution Control Studies
Investigation and Design of Remedial Works
Land Decontamination and Reclamation
Landfill Design and Operational Support
Landfill Design and Planing
Landfill Engineering and Environmental Geotechnics
Landfill Gas and Leachate Remediation
Landfill Gas Management and Utilisation

Landfill Geophysiscs
Landfill Investigation and Design
Landfill Management
Landfill Monitoring and Evaluation
Landfill Remediation
Landfill Restoration and Landscape Design
Landfill Restoration, Ecology and Landscape
Landfill Site Monitoring and Reporting
Landscape and Ecological Services
Landscape Design
Leachate and Water Management and Treatment
Leachate Control and Treatment
Leachate Control, Collection and Treatment
Leachate Monitoring and Control
Leachate Treatment
Legislative Compliance Assessments
Monitoring and Audits
Odour Emissions Control
Operational Working Plans
Planning and Design Reviews
Planning and Licence Applications
Pollution Control
Pre purchase Audits and Due Diligence Assessment
Pre-acquisition Environmental Auditing
Pre-acquisition Site Audits and Contaminated Land Assessment
Preparation of Environmental Impact Assessments
Presentation of Expert Evidence
Project Assessment, Design and Implementation
QA Third Party Auditing
Quality Assurance of Liner Installation
Recycling and Resource Recovery
Regulation 15 Risk Assessment
Regulation 15 Risk Assessments and Contaminant Transport
Modelling Restoration
Restoration Plans
Risk and Environmental Liability Assessment
Risk Assessment and Analysis
Scientific Monitoring for Waste Regulation
Seepage modelling.
Site Assessment
Site Investigation and Assessment
Site Selection and Restoration Programmes
Slope Stability Analysis
Solid Waste Handling, Transfer, Treatment and Disposal
Speculative Design and Build Partnerships
Storage Tank and Lagoon Design
Transport Systems for Waste Collection and Disposal
Vibration, Dust and Noise Monitoring and Assessment
Waste Market Assessment and Commercial Studies
Waste and Waste Water Management
Waste Audits and Minimisation Proposals
Waste Disposal
Waste Incineration Technology
Waste Management and Disposal
Waste Management Licence Applications
Waste Management Planning
Waste Management Services
Waste Management Strategies and Plans
Waste Minimisation and Recycling
Waste Recycling and Minimisation
Waste Strategy and Regulation
Waste Stream Analysis and Waste Minimisation
Waste Treatment
Wastewater and Sludge Treatment
Wastewater Treatment
Water Pollution and Control
Water Quality Modelling and Monitoring
Water Treatment, Distribution and Management

UK is remarkable testimony to the idea that waste management is a collective responsibility.

Analyses of policy variables identified the main objectives and standards applicable to UK waste management practices. The application of various management tools such as the Waste Management Licences, Environmental Auditing and Monitoring, Enforcement and the Duty of Care are vital and significant in controlling all type of wastes and waste disposal activities. The implementation of the Waste Management Licensing Regulations has provided a strong legislative framework especially for the WRAs. One of the masterpieces of this regulation system is the introduction of the term 'fit and proper persons' which will ensure that all licensed facilities are well managed so as to accord with licence conditions. It also provides wider enforcement mandates for the WRA to ensure that licensed waste facilities are inspected and monitored if there are breaches of the licence conditions, prosecution follow.

It can be concluded that the result of the comprehensive legislations is the provision of directions and objective standards for all sectors involved in the waste management industry which in turn leads to sustainable waste management.

CHAPTER 5: MALAYSIAN WASTE MANAGEMENT SURVEY

5.1 Introduction

This chapter summarises an investigation into the Malaysian institutional and legal framework related to waste management and presents the results from a case study on waste management practises in some Malaysian municipalities. The research emphasises the role of the Federal and Local Government since both of these tiers are directly involved in determining the actual practice of waste management in Malaysia.

5.1.1 Waste Generation and Composition

It was discovered that according to the Ministry of Housing and Local Government (MOHLG), the predicted amount of waste generation per year increased at an average of 3.24% per annum (Table 5.1). It was anticipated that the amount of waste generation will decrease by year 2020 despite an increase in the population based on the assumption that the country will by then have successfully established a modern waste management system in all Local Authorities (LAs).

Table 5.1: Estimated Population and Waste in Malaysia.

YEAR	POPULATION	ESTIMATE AMOUNT OF WASTE (TONS/YEAR)
1991	17,567,000	4,488,369
1994	18,917,738	5,048,804
2015	31,773,889	7,772,402
2020	35,949,239	9,092,611

Source MOHLG, Malaysia

The amount of waste generated at a number of localities as in Table 5.2. indicated that the high generators of waste were from squatters and low income residential areas with an estimated between 0.44 - 0.57 kg/p/cd. Shops and markets were the main generators of commercial waste with the amount generated between 2.25 - 3.92 kg/stall/cd. This latest survey showed similar findings in the amount of waste generation to that shown by an earlier study from some Municipality and District Councils in 1986 and 1988 (Table 5.3).

The type and composition of waste in Malaysia varies among the states but the average is summarised as in Table 5.4. The composition of Malaysian municipal waste was characterised by a very high organic content with high moisture content (putresible).

Table 5.4: Type and Composition of Waste

Composition:	%
Putresibles	32.0
Textiles/ Leather	3.4
Paper/Cardboard	29.5
Wood and Timber	7.0
Plastics	16.0
Rubber	2.0
Glass	5.5
Ceramics	0.4
Ferrous metal	3.7
Non-ferrous metals	0.6
Unspecified	0.9

Source MOHLG, Malaysia

Table 5.2: Summary of Waste Generation Rates

Types of Waste Generators	No. of Samples	Waste Generation Rate (as surveyed)			Actual Waste General Rate
		High	Low	Average	
RESIDENTIAL					
Low	4	0.65 kg/p/cd	0.31 kg/p/cd	0.44 kg/p/cd	0.46 kg/p/cd[1]
Medium	8	0.37 kg/p/cd	0.29 kg/p/cd	0.35 kg/p/cd	0.37 kg/p/cd[1]
High	4	0.88 kg/p/cd	0.35 kg/p/cd	0.57 kg/p/cd	0.60 kg/p/cd[1]
Squatters	4	0.88 kg/p/cd	0.1 kg/p/cd	0.54 kg/p/cd	0.57 kg/p/cd[1]
COMMERCIAL					
Shops	3	3.56 kg/p/cd	0.91 kg/shop/cd	2.14 kg/shop/cd	2.25 kg/shop/cd[1]
shopping Complexes	3	0.006 kg/sq ft/cd	0.003 kg/sq ft/cd	0.004 kg/sq ft/cd	0.004 kg/sq ft/cd
Hotels	(Lit. Search)	-	-	-	0.9 kg/room/cd
Office Complexes	(Lit. Search)	-	-	-	0.002 kg/sq ft/cd
INDUSTRIAL	(Lit. Search)	-	-	-	440 kg/ha/cd
INSTITUTIONAL					
School	1	-	-	-	0.9 kg/p/cd
Government Office	3	-	-	-	0.02 kg/p/cd
WET MARKETS	2	4.43 kg/stall/cd	3.4 kg/stall/cd	3.92 kg/stall/cd	3.92 kg/stall/cd
NIGHT MARKETS	(Estimation)	-	-	1.30 kg/stall/cd	1.30 kg/stall/cd
HAWKER STALLS	(Estimation)	-	-	2.00 kg/stall/cd	2.00 kg/stall/cd

Note: [1] Adjustment for 5% recycling prior to collection, **kg** - Kilogramm **p** -person **cd** - collection day
Source: Engineering and Environmental Consultant Sdn. Bhd. (1990)

Table 5.3: Per capita Waste Generation Rate in Some Municipal and District Councils

Name of Councils	1986[1]	1988[2]		
	Per Capita Waste Generation Rate (kg/person/day)	Serve Population in 1988	Amount Collected (tons/day)	Per Capita Waste Generation Rate (kg/person/day)
Municipal Council				
Kangsar	-	60,000	40	0.667*
Kota Setar	0.787	188,000	150	0.796**
Pulau Pinang	0.711	494,000	360	0.730**
Seberang Perai	-	319,000	191(230)	0.600(0.721)***
Taiping	-	151,000	150	0.994*
Ipoh	0.495	400,000	216	0.540**
Petaling jaya	0.843	360,000	181(400)	0.506(1.143)****
Shah Alam	-	-	-	-
Kelang	-	242,000	190	0.786**
Seremban	-	170,000	120	0.706**
Melaka	0.758	196,000	90	0.459**
Johor Bahru	-	300,000	(300)	(1.000)**
Kota Bharu	0.510	193,000	100	0.517*
Kuala Terengganu	0.598	135,000	80	0.593*
Kuantan		188,000	100	0.532**
District Council				
Kuala Muda		180,000	86	0.478*
Baling		18,900	17	0.899*
Perak Tengah		13,400	15	1.119*
Hilir Perak		132,300	68	0.514*
Jelebu		30,000	25	0.834*
Tampin		46,600	41	0.881*
Alor Gajah		143,100	78	0.545*
Kota Tinggi		89,500	53	0.592*
Lipis		36,700	12	0.327*
Bachok		29,500	8	0.271*

* *Estimated amount*
** *Measured amount by weighbridge*
*** *Measured amount, JICA Study Team (1987)*
**** *Estimated amount, improvement of solid waste collection productivity MPPJ Study (1989)*
( ) *Include Industrial Waste*
Source: [1] Questionnaire on Solid Waste Management (May 1987)
Source: [2] Questionnaire on Solid Waste Final Disposal (February 1989)
Source: MOHLG, Malaysia

5.1.2 Waste Disposal

The survey from MOHLG documents verifies that the main disposal method practised by many LAs was landfill. Nationally there were approximately 155 official municipal disposal sites (Table 5.5). The majority of these landfills were open dumping grounds. It was learned that there were no true 'sanitary landfills' as those one defined in the UK. The term was used to indicate that these were new landfills which meet the requirement set by the MOHLG. It also refers to landfills which were upgraded from controlled landfills or dump sites. The term 'controlled landfill' refers to disposal grounds which were fenced and supervised. Some of these landfills were equipped with weighbridges provided by the MOHLG.

5.1.3. Waste Treatment and Processing

The survey discovered that recycling programmes were only implemented by a number of LAs. Most of these were related to the separation of wastes and were reported as having little effect in solving waste problems. It was learned through the information in Table 5.6 that thousands of tonnes of waste which were recoverable were disposed of to landfills.

Table 5.6 Material Imported and Landfilled (tonnes)

Materials	Imported	Landfilled
Ferrous Metal	2,527	124,757
Non-ferrous metal	5,424	28,734
Glass	1,413	71,586
Plastics	4,568	124,521
Paper	6,640	502,353
Rubber	17,970	60,776
Raw materials	38,942	912,727

Source; MOHLG, Malaysia

Table 5.5: Number and Type of Disposal Sites 1995

State	Type of Disposal Sites			Total
	Open Dumping	Control Dumping	Sanitary Landfill	
Johor	12	14	1	27
Kedah	9	5	1	15
Kelantan	12	2	0	14
Melaka	2	3	0	5
Negeri Sembilan	8	6	0	14
Pahang	7	5	3	15
Perak	15	11	4	30
Perlis	0	1	0	1
Pulau Pinang	1	1	1	3
Selangor	5	15	0	20
Terengganu	2	8	1	11
Total	73	71	11	155

Source; Ministry of Housing and Local Government (1996.)

5.2 Institutional Framework

Before presenting the case study results, the researcher has to analyse the current waste management framework which is practised in the country. This approach was taken by the researcher to establish the findings on the present institutional framework as the basis for discussion of the results obtained during the interview. It was established that the status of Local Government in Malaysia is an autonomous institution to the extent of the autonomy granted by the superior government i.e., it is a subordinate to the Central or the State Government. Unlike in the UK, the Malaysian system of Government is divided into three tiers: the Federal (Central) or sovereign national; the State or the quasi-sovereign; and the Local or the infra-sovereign. From the interviews, it was found that at present solid waste management in Malaysia is controlled based on this multi-tiered government system. Although the Federal and State Government supposedly enacted the policy on waste the actual management of waste is performed by the Local Government as accorded by the law (refer Section 5.3).

5.2.1 The Federal Government

It is the Federal Government which is actually the policy making body. Most of the key decisions on waste matters at the Federal level are implemented through the participation of the following department within these Ministries;

- Economic Planning Unit, Prime Minister Department (EPU)
- Ministry of Finance (MOF)
- Local Government Division, Ministry of Housing and Local

Government (MOHLG)

- Engineering Services Division, Ministry of Health (MOH)
- Department of Environment, Ministry of Science, Technology and Environment (MOSTE)
- Ministry of Works (MOW)
- Ministry of Land and Regional Development (MOLRD)

5.2.1a Waste Management

It was learnt that at the federal level, the Local Government Division, Ministry of Housing and Local Government (MOHLG) and the Engineering Services Division, Ministry of Health (MOH) were the two responsible bodies for waste disposal in urban and rural areas respectively.

It is the MOHLG that formulates and implements policies for the development of a uniform and modern Local Government system for the whole of Malaysia. The Technical Section, Local Government Division of the MOHLG, provides technical advice in public health engineering and solid waste management to all States and Local Governments.

Meanwhile the MOH implements and monitors the National Environmental Sanitation Programme (NESP) in rural areas. This is a health and sanitary management programme which covers four important issues: the water supply; excreta disposal; sludge disposal; and solid waste disposal. Thus the MOH is responsible for formulating technical solutions to the solid waste problems in

rural areas. It was understood that the MOH gives advice to rural residents to bury or to burn their refuse as the main mean for waste disposal.

In response to this, the Federal Government has prepared several documents including by-laws, action plans and guidelines to assist the LAs in managing their waste. Despite all these efforts the survey indicated that the current system for waste management is still inefficient and results in significant environmental problems.

5.2.1b Environmental Protection

Environmental issues related to solid waste management come under the jurisdiction of the Department of Environment (DOE), Ministry of Science, Technology and Environment. This department is responsible for the prevention, abatement, and control of pollution and enhancement of the environmental quality in accordance with the Environmental Quality Act.

The DOE gives advice to LAs on locations of future dumping sites. It monitors existing dumping sites and attends to public complaints of inefficient waste handling. It is the responsibility of the DOE to ensure that solid waste management facilities which fall under prescribed activities such as landfills, incinerators and recycling plants, fulfil EIA requirements.

5.2.2 The State Government

It was also revealed that each State Government co-ordinates the LAs' affairs, including: (1) allocation of land for solid waste final disposal; (2) gazetting of related by-laws; and (3) financial help. In all states the management and development of waste facilities were governed through the participation of these departments;

- State Economic Planning Unit (SEPU)
- State Economic Development Corporation (SEDC)
- State Division of Local Government (SDLG)
- State Medical and Health Service Department SMHSD)
- State Public Works Department (SPWD)
- State Town and Country Planning Department (STCPD)

At state level, the department which is of importance to solid waste management is the State Division of Local Government. One of its main responsibility is to find land for the final disposal of waste since all matters related to land are under the jurisdiction of the state government only.

5.2.3 The Local Government

By law, the Local Government or as commonly referred as the Local Authority (LA) in Malaysia is responsible for solid waste management. These LAs were classified into three categories; the City Council, the Municipal Council and the District Council. A common administrative structure in a LA which is responsible for waste collection and disposal is illustrated in Figure 5.1

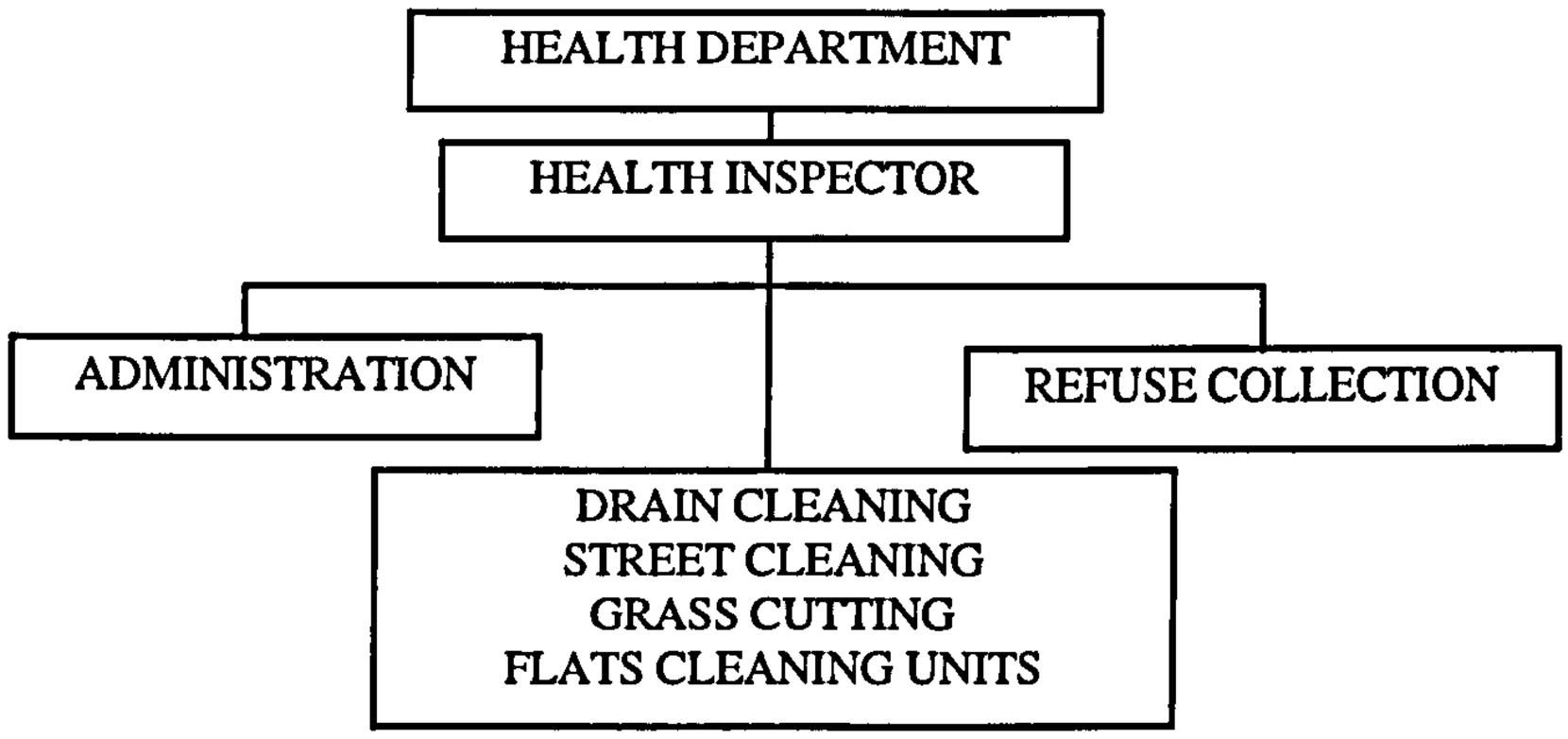


Figure 5.1: Organisational Charts of a typical cleansing services section in a Local Authority

The actual management of solid waste by the LA includes collection, transportation and disposal of the waste. These roles are performed in most of the smaller LAs by the Cleaning Services Section; whereas it is the responsibility of the Urban Services Section in larger LAs. It was also noted that the key personnel managing the waste in the various LAs were the Public Health Inspectors (PHIs). The majority of them were trained at the Public Health Institute, MOH as Health Inspectors and not waste managers.

It was observed during the survey that Cleaning or Urban Services Section is the most labour intensive among other sections within the LA. In some LAs these sections employ almost a third of the LAs workforce. Many of these employees are directly involved in the waste collection, transportation and disposal activities. These include the administrative staff ., labourers, drivers and supervisors.

The survey discovered that there are two basic categories of waste operators within a LA. First, those who work for the LAs and second, those who work for industries and big commercial establishments. Their qualification range from specialists using modern and sophisticated equipment to those with very limited experience using improvised vehicles.

5.2.4 Private Contractors

As mentioned in the previous paragraph, the roles of private waste collectors, hauliers and operators were very significant in many LAs. However, the researcher was unable to obtain any statistics on this group since they were not required to register or be licensed by any authority. As such, most of the problems relating to fly-tipping or illegal dumping of waste reported were associated with these private operators.

5.3 Legal Framework

From the survey, the researcher found that solid waste management in Malaysia is controlled by legislation implemented by the Federal, State and Local Authorities. However the provision solely to manage wastes as in the UK should be introduced to solve the current waste problems.

There is no statutory definition of 'waste' or 'solid waste' as stipulated in the UK's EPA 90. Instead the laws and regulations enacted are scattered in different Acts and By-Laws. The researcher listed in Table 5.7 some of the identified gazatted legislation which empowers various authorities in Malaysia

to govern and manage waste.

Table 5.7: List of Acts related to waste management in Malaysia

1. (Prescribed Premises) Scheduled Waste Treatment & Disposal Facilities Order (1989) Regulation (1989)
2. Clean Air Regulations (1978)
3. Earthwork By-law (1988)
4. Environmental Quality Act (1974)
5. Land Conservation Act (1960)
6. Licensing of Food Establishments By-Laws (1985)
7. Local Government Act (1976)
8. Private Hospitals Act (1971) and Private Hospital Regulations, (1973)
9. Refuse Collection, Removal and Disposal By-Laws (1983)
10.Sewage and Industrial Effluent Regulations (1979)
11.Street, Drainage and Building Act 1974
12.The Licensing of Trades & Business industries By-Laws (1986)
13.Town and Country Planning Act 1976
14.Uniform Building By-Laws (1984)
15.Waters Act (1920)

Source; MOHLG

5.3.1 The Acts

From the above list the researcher highlights and examines Acts which were considered to contain significant 'waste management' matters.

5.3.1a The Local Government Act, 1976

This is the main legislation which consolidates previous laws relating to the administration and operation of LAs. It enables the State Government to declare an area as a local authority and to define its boundaries and status, i.e., either as a Municipal Council or a District Council. Thus, this Act enables States Authorities to direct LAs to waste management issues. The powers given to a local authority by this Act can be summarised as follows:-

- to prohibit waste deposition in streams, water course or public drains, and charge and recover the cost of works resulting from illegal waste deposition,

- to maintain public health including specific actions to establish, maintain and carry out such sanitary services,
- to make, amend or revoke by -laws for the better carrying out the provisions of the Act, to establish, maintain and compel the use of any service for removal of night soil, slops, rubbish and all kinds of refuse and effluent,
- to take action against any person where a nuisance within or affecting any part of a Local authority appears to be caused by some act or default committed outside its areas,
- to provide the control and supervision by registration, licensing or otherwise of a trade, business or industry which is of an obnoxious nature or which could be a source of nuisance,
- to prescribe fees and charges for any matter or thing required or authorised to be done thereunder,
- to impose penalties for breaches of by-laws either by a fine or a term of imprisonment.

5.3.1b The Street, Drainage and Building Act, 1974

This Act consolidated the laws relating to street, drainage and buildings in all LAs in Peninsular Malaysia. This Act places a requirement on the owners and occupier of buildings to keep adjacent private roads, public places, streets and buildings clean.

5.3.1c Town and Country Planning Act, 1976

It is within this Act that land and buildings used for solid waste management require planning permission. However, through the interview, it was discovered that this activity was undertaken by the Local Authorities themselves thus any siting of waste facilities becomes part of the area's structural plan without the need for approval.

5.3.1d The Environmental Quality Act, 1974

This Act introduced into Malaysian Law as a comprehensive piece of legislation to provide a common legal basis for co-ordinating all activities relating to protection of the environment.

Section 21, Prohibition and Control of Pollution empowered the Minister to specify the acceptable conditions for the discharge, emission or deposit of wastes into the environment. Prohibitions from discharging of wastes into Malaysian water were covered under Section 29. Power to prohibit or control licensed persons from discharging, of waste in certain circumstances are controlled under Section 33.

The Environmental Quality Order Prescribed Activities, (Environmental Impact Assessment) 1987 requires any person or agency intending to carry out a prescribed activity to submit a report on its potential effects on the environment to the Director General, Department of Environment (DOE), for approval. This Order lists the "prescribed activities" for which an EIA is mandatory, including

Item 18(b) for Municipal Solid Waste which refers to the construction of incineration, composting, recovery or recycling plants and municipal solid waste landfill facilities

Section 34A(2) of the 1985 Amendment Act specifies that where an EIA is required under the legislation, it shall follow guidelines prescribed by the Director General of DOE.

5.3.2 Local Authority By-Laws

It was also found that some by-laws which were drafted by the MOHLG were not adopted by some LAs. A few which were significantly important and selected by the researcher are highlighted below.

5.3.1a Anti -Litter By-Laws

This is similar to the Street, Drainage and Building Act but it places similar obligation on the stall-holders to keep their business premises free from litter. Market places are included in this by-law.

5.3.2b Refuse Collection, Removal and Disposal By-Laws

This by-law is almost identical to the 'Duty of Care' Regulation in the UK EPA 90. This is the only by-law using terms such as commercial, industrial and building material waste. However there is no definite definition for most of these wastes.

According to research by Sugunan (1984) only 39 out of 90 LAs in West Malaysia gazetted the above two by-laws whereas other LAs have delayed until additional allocation for enforcement is given. This situation also explains why in some gazetted LAs these by-laws are not enforced.

A review of these by-law indicates that the majority relate to the LA duties to maintain cleanliness, sanitation and public health. Most of the by-laws focus on the obligations of waste generators to ensure proper storage of waste and to ensure removal and disposal at dump sites. The by-laws do not provide proper definition of waste. None of the by-laws were found to control the operations, collection and disposal of waste. The absence of this control was due to the fact that these operations were carried out by the LAs themselves.

5.4 Waste Policy

5.4.1 National Policy

The researcher had the most challenging task of finding a National Policy on Waste. Although the Prime Minister had launched a 'National Cleanliness Campaign' in 1993, there seems to be an absence of policy related to the management of waste. If there were such a policy, it is only in the form of a proposal by the Technical Section, MOHLG as contained in the 'Action Plan for A Beautiful and Clean Malaysia (ABC)' document published in 1988.

In that document it was proposed that the 'National Solid Waste Management Policy' will be used by all LAs as a guide for an effective waste management.

The highlight of policy objective states;

'To establish by the year 2010 a municipal solid waste management system to cover the whole of Malaysia and that are uniform, cost-effective, environmentally sound and socially acceptable procedures to enhancing further the image of Malaysia in terms of its beauty and cleanliness'.

5.4.2 State and Local Government

The researcher was unable to obtain policy statements related to waste management produced by any State or LA. No policy was formulated by any LA despite their responsibility of safeguarding the health and safety of the people and the environment. The absence of such policies may explain why the LA have lost a sense of direction in managing their waste arising sustainably.

5.5 Education and Training

It was discovered that the Public Health Inspectors (PHI) and Public Health Assistants (PHA) were persons responsible for waste management in most LAs. The survey revealed that most of these LA PHIs and PHAs do not have formal training in waste management. Their training at the Public Health Institute, MOH, was strongly oriented to rural health management.

It was also found that the formal education on solid waste management was given only at the Department of Civil and Environmental Engineering in

Universiti Pertanian Malaysia. This course is offered only as a module and not as a degree per se.

In Malaysian schools, a review of the new curriculum show that students were taught public hygiene and health education. Although the new curriculum for primary school emphasis the role of individuals in an environment, the aspect of waste management and its impacts on humans and the environments were absent.

5.6 The Case Study

5.6.1 The survey area

A total of 6 out of 8 LAs within the Klang Valley were visited and officers responsible for the waste management were interviewed. Four of these LAs were Municipal Councils, one District Council and one City Council. All of these LAs were located in the state of Selangor except for the City Council which is the governing body for the Federal Territory of Kuala Lumpur.

5.6.2 Waste Collection and Disposal

Table 5.8 shows that domestic waste was the main type of waste recorded. However these records were estimated figures since most LAs do not have adequate facilities to weigh and to record the amount of waste generated daily. Other type of wastes statistics were not available since most of these LAs emphasise their collection on domestic waste.

Commercial and industrial waste was mostly collected by private collectors and there were no records of the amount of these waste submitted to the LA. However, in towns where there were large industrial sectors, industrial wastes formed a significant amount of the total waste collected.

Table 5.8: Waste production in tonnes/day

	D/W	CL/W	I/W	A/W	CN/W	S/W
DBKL		N/A	N/A	N/A	N/A	N/A
MDP	200	N/A	N/A	N/A	N/A	N/A
MPAJ	450	N/A	N/A	N/A	N/A	N/A
MPK	600	N/A	N/A	N/A	N/A	N/A
MPPJ	600	N/A	N/A	N/A	N/A	N/A
MPSA	250	N/A	N/A	N/A	N/A	N/A

D/W=Domestic Waste **CL/W**=Commercial Waste **I/W**=Industrial Waste
A/W=Agriculture Waste **CN/W**=Construction Waste **S/W**=Scrapyard Waste
N/A=Not Available

There were variations in the amount of waste generated through the week with high amounts on Mondays and Tuesdays. From the interviews, it was shown that the amount of waste generated fluctuated according to the culture, customs, seasons and activities in a particular area or day. However the researcher could not produce data to support these statements since many LAs do not keep collection statistics' records.

The amount of bulky waste was found to be higher during the Chinese New Year festive season. A high waste collection of putrecible waste was also recorded during the Indian Deepavali and the Muslim Id Fitri celebrations. In certain locations, were weekday markets generated a high level of waste. The durian fruit season was marked not only by the high quantity of waste generated from their left-over but a high number of complaint of its odours and the nuisance created.

Table 5.9 shows that most of the LAs have only one landfill site except for DBKL. DBKL has the largest collection area and most densely populated area compared to other LAs. The MPPJ has one transfer station which also accommodates some waste coming from nearby LAs.

Table 5.9: Number of disposal facilities operational within the Local Authority

	L/F	INC	C/P	T/S	R/C	STO	S/Y
DBKL	2	0	0	0	0	0	0
MDP	1	0	0	0	0	0	0
MPAJ	1	0	0	0	0	0	0
MPK	1	0	0	0	0	0	0
MPPJ	1	0	0	0	1	0	0
MPSA	1	0	0	1	1	0	0
TOTAL	7	0	0	1	2	0	0

L/F.....Landfill **INC** ....Incinerator **C/P** ....Composting Plant
T/S.....Transfer Station **R/C**.....Recycling Centre **STO**.....Storage Centre
S/Y.....Scrapyard

Collection varies from LA to LA. A few of the LAs have fully contracted out the collection service while some have not contracted out the service and collect the waste themselves. The majority of LAs have contracted out about half the service and retain the other half. However contingency plans were placed to take back the service, using their workers, if there were failure by the contractors. In some LAs, owing to heavy traffic in the central business areas during working hours, collection is undertaken at night. Most LAs do not collect industrial waste and this service is provided by private contractors. All LAs collect domestic and institutional waste three times a week and commercial waste were collected daily.

Door to door and kerbside collection services were provided by the LAs in all areas accessible to the collection vehicles. Individual residents have to provide their own container. In areas that were inaccessible to collection vehicles, central large bins were provided. The same types of bins were also provided to institutional and high rise residential buildings, markets and commercial centres.

All LAs use compaction vehicles for their service. About half of the LAs use roll-on, roll-off vehicles where there were bulk generation of waste in areas such as markets and shopping complexes. Open lorries were mainly used for collection of green waste, drains and road sweeping or as stand-by-vehicles.

The methods of disposal in all LAs were observed to be unsatisfactory and to have adverse impacts on the environment. Although some LAs claim that they practise sanitary landfill, it was observed that there were no proper collection and treatment of leachate facilities. Most of the LAs practise the controlled tipping method of disposal where a thin soil cover is applied over the waste, periodically or daily, after compaction. It was observed that few of the LAs practice open dumps without proper soil covers though the waste were compacted to reduce volume. Most LAs permit outsiders to dispose of waste at dump sites.

There were two recycling centres recorded within these LAs but these facilities were small and on a trial basis. In other LAs, unofficial recycling was carried

out as a source of additional income, by workers during collection. Scavenging was carried out on the disposal sites with permission given by the LAs concerned.

5.6.3 Policy, Planning and Management

It was surprising to discover that most of the LAs do not have policies on waste (Table 5.10). MPPJ does have some policies and strategies on waste as a result of a study by an international consultant in 1992. However this policy does not provide enough information for a comprehensive analyses as the policies gathered in the UK study.

Table 5.10: Presence of Policy or Strategy on Management of Waste

	D/W	CL/W	I/W	A/W	CN/W	S/W
DBKL	No	No	No	No	No	No
MDP	No	No	No	No	No	No
MPAJ	No	No	No	No	No	No
MPK	Y1,Y2	No	No	No	No	No
MPPJ	Y1,Y2	No	No	No	No	No
MPSA	No	No	No	No	No	No

Present of :
Y1...Yes Policy **Y2**...Yes Strategy **No**.... No Policy and Strategy
D/W.....Domestic Waste **CL/W**....Commercial Waste
I/W.....Industrial Waste **A/W**.....Agriculture Waste
CN/W...Construction Waste **S/W**.....Scrapyard Waste

Table 5.11 shows that almost all LAs produce a Local Area Plan (LAP). These LAPs were produced by the Council Town and Regional Department. Reviews on each of these documents indicate that there were no priorities and allocation for waste disposal sites or waste processing facilities. Most of the LAs do not produce the WMP except for MPPJ. Only MPK and MPSA carried out an Industrial Waste Survey (IWS) while other LAs do not perform this survey since they are not abide by any law for such survey.

Table 5.12 provided some important findings on the attitude and hopes by the LAs on future waste management. Based on this survey it was found that generally all councils were able to provide satisfactory collection services with their available resources. DBKL and MPK were unhappy with their present waste management practices based on high cases of fly-tipping and illegal dumping especially in rivers, ponds and idle lands.

Table 5.11: Present of Planning Arrangement within the Local Authority

	LAP	WMP	IWS
DBKL	Yes	No	No
MDP	Yes	No	No
MPAJ	Yes	No	No
MPK	Yes	Planned	Yes
MPPJ	Yes	Yes	No
MPSA	Yes	No	Yes

LAP..... Local Area Plan
WMP... Waste Management Plan
IWS.....Industrial Waste Survey

Table 5.12: Management and Planning for better waste management system

	1	2	3	4	5
DBKL	NO	YES	YES	NO	YES
MDP	YES	YES	YES	UNSURE	NO
MPAJ	YES	YES	YES	YES	YES
MPK	NO	YES	YES	YES	YES
MPPJ	YES	YES	YES	YES	YES
MPSA	YES	YES	YES	YES	YES
YES	**67%**	**100%**	**100%**	**67%**	**83%**
NO	33%	0%	0%	17%	17%
UNSURE	0%	0%	0%	17%	0%

1. Are you satisfied with the current waste management system
2. Waste is a national problem and not only confined to your area
3. A national Waste Management Agency should be established
4. The waste disposal activities should all be privatised
5. Environmental Management Standard (e.g. ISO 14000, BS7750) should be introduced

All respondents agree that waste is a national issue and a national agency should be created to manage and regulate all waste activities. However, DBKL disagrees with the privatisation of waste activities. An explanation on this disagreement is based on DBKL's ability to provide better services in their area. They have the largest fleet of collection vehicles, excellent maintenance facilities and experienced personnel in waste collection and street cleansing. DBKL claims that its services are those with the highest reputation amongst most other City Councils in the Country.

Almost all LAs agree with the introduction of the Environmental Management Standard in waste management. Only one respondent disagreed on the basis that their LA was far behind other LA in managing their waste arising.

Table 5.13 shows that most of these LAs have their main problem in securing waste disposal sites. The LAs, where the life of the existing landfills or dump sites is facing exhaustion, are in great difficulty of obtaining new disposal sites within their operational boundaries.

Table 5.13: Problem situation in waste management within your Local Authority

	1	2	3	4	5
DBKL	N	M	M	M	M
MDP	N	I	M	M	I
MPAJ	I	M	M	M	M
MPK	N	M	M	M	M
MPPJ	N	N	M	I	N
MPSA	N	M	M	I	I
M	0	67%	100%	67%	50%
I	17%	17%	0%	33%	33%
N	83%	17%	0%	0%	17%

M- Main Problem I - Immediate Problem N- Not a Problem
1. Shortage of fund 2. Man-power problem 3. Lack of sites
4. Lack of expertise 5. Lack of management system

Almost a third indicated that they have difficulty finding trained man-power in managing the collection or disposal of waste. Some LAs have problems with personnel due to absenteeism and medical leave. They also find difficulty in finding suitable workers as replacements when vacancies occur owing to good opportunities in the private sector job market.

The selection of sites was also acknowledged as a key sensitive issue. Since the State has overall authority on land allocation, it leaves the LAs at the mercy of being given unsuitable land for dumping such as near idle mining pools, swamps and river banks. About half of these LAs identify their main problem as a lack of an appropriate management system. This confirms the initial finding that the majority of the personnel lack professional training. Interestingly, almost all LAs show that funding was not identified as problem. It was learnt that ample grants were given by the State and Federal Government.

5.6.4 Law and Enforcement.

Almost half of the LAs agree that present waste laws and regulations were inadequate. Table 5.14 also reveals that there should be laws with regard to the transportation and movement of waste between the LAs. Most LA were satisfied with the present laws on movement of waste within their own boundaries. Most of the LAs also agree that a national Enforcement Agency is needed to improve the present waste management practices.

Table 5.15 shows that most of the LAs perform site inspection on most of the landfills. Only MPK performs Environmental Monitoring. DBKL also performs site inspections on old landfill sites since most of these sites were developed into either a commercial or residential area.

Table 5.14: Opinion on the existing laws and enforcement

	1	2	3	4	5	6	7	8
DBKL	YES	YES	YES	YES	YES	YES	NO	YES
MDP	NO	YES	YES	YES	YES	YES	NO	YES
MPAJ	NO	YES	NO	NO	YES	NO	NO	YES
MPK	NO	YES	NO	YES	NO	NO	YES	YES
MPPJ	NO	NO	NO	YES	NO	NO	YES	NO
MPSA	YES	YES	NO	NO	YES	NO	YES	YES
YES	33%	**83%**	33%	**67%**	**67%**	33%	**50%**	**83%**
NO	**67%**	17%	**67%**	33%	33%	**67%**	**50%**	17%
UNSURE	0%	0%	0%	0%	0%	0%	0%	0%

1 Laws regarding the disposal/treatment location/Sites
2 Laws regarding transportation and movement of wastes within the Local Authority
3 Laws regarding transportation and movement of wastes between Local Authority
4 Laws on storage of waste in premises
5 Laws on disposal of wastes
6 Laws on trade of wastes
7 Definition of types and kind of wastes
8 Should a national Enforcement Agency on Wastes be established

Table 5.15: Monitoring activities of disposal sites or facilities

	L/F	O/L/F	INC	S/P	R/C	T/S	S/Y
DBKL	SINPS	SINSP	NO	NO	NO	NO	NO
MDP	SINPS	NO	NO	NO	NO	NO	NO
MPAJ	SINPS	NO	NO	NO	NO	NO	NO
MPK	EMON	NO	NO	NO	NO	NO	NO
MPPJ	SINPS	NO	NO	NO	NO	NO	NO
MPSA	SINPS	NO	NO	NO	NO	NO	NO
SINSPS	**83%**	17%	0%	0%	0%	0%	0%
EMON	17%	0%	0%	0%	0%	0%	0%
EAUD	0%	0%	0%	0%	0%	0%	0%

SINSP....Site Inspection **EMON**... Environmental Monitoring **EAUD**....
Environmental Auditing **NO**..... Not Applicable or none

5.6.5. Education and Training

Table 5.16 shows that all LAs agreed that most of their staff do not have proper training in waste management. Most of them learn how to manage waste through attending courses and seminars. The majority learn through experience and visits to other LAs inside and outside the Country.

Table 5.16: Training and co-operation in waste management

	1	2	3	4	5	6	7
DBKL	Y	Y	N	N	N	Y	Y
MDP	Y	Y	N	N	N	Y	N
MPAJ	Y	Y	N	N	N	Y	Y
MPK	Y	Y	N	N	Y	N	Y
MPPJ	Y	Y	N	N	N	Y	N
MPSA	Y	Y	N	N	Y	Y	Y
YES	100%	100%	100%	100%	67%	83%	67%
NO	0%	0%	0%	0%	33%	17%	33%
UNSURE	0%	0%	0%	0%	0%	0%	0%

1 Staff educated/trained in waste management
2 Waste Management should be part of the school curriculum
3 Involves in consultancy work in waste
4 Carry-out research work on waste
5 Involves in education
6 Establish co-operation with other Authorities, Committees, Organisations
7 Main problems related to waste should be blamed to the unco-operative attitude of the public

Almost all LAs interviewed agreed that waste management is a subject which should be introduced as part of the school curriculum. Most LAs indicated willingness to participate in joint consultancy and research works in waste management or waste related issues.

It was also revealed that only a few LAs were involved in public waste education. Most LAs perform visits to schools and display posters at strategic location. Most of the LAs do have co-operation with other LAs in the form of joint committees. Most of the meetings occurs as annual events or on ad-hoc basis and usually discuss issues of common interest.

Table 5.17 is an attempt to identify group influence on LAs waste management decisions This section of the interview was difficult as most of the respondents paused for thought before providing the answers. The MOHLG was the main Federal Government body cited to have great influence on their decision making process. Other Federal Agencies listed do not have great influence. The Local Area Development and Security Committee was cited as the main groups that do give have influence on their decision making.

Table 5.17: Group Influence on Local Authority Waste Management Decision

Group	1	2	3	4	5	6	7	8	9
DBKL	M	L	N	N	N	N	N	N	N
MDP	M	M	N	N	N	L	N	M	L
MPAJ	M	L	N	N	N	N	N	L	L
MPK	M	L	N	N	N	N	N	L	L
MPPJ	M	L	N	N	N	L	L	L	L
MPSA	L	N	M	N	N	M	L	M	L
M	83%	17%	17%	0%	0%	17%	0%	33%	0%
L	17%	66%	83%	0%	0%	33%	33%	50%	83%
N	0%	17%	0%	100%	100%	50%	67%	17%	17%

M = Most Influence L = Less Influence N = No Influence

Group;
1 Ministry of Housing and Local Government
2 Ministry of Science, Technology and Environment
3 Ministry of Health
4 Ministry of Trade and Industries
5 Ministry of Finance
6 District/Municipal Council
7 Consumer Association
8 Member of Parliament/State Assembly
9 Local Area Development and Security Committee

5.7 Conclusion

Institutionally solid waste management in Malaysia has traditionally been delegated to and is the responsibility of the LA in which, this research confirms, no policies were in placed. Activities related to solid waste management consume substantial LAs resources both in terms of personnel and funds leading to unsustainable waste management.

Legislation and by-laws were limited to satisfying general public hygiene standards and the provision of new legislation relating to waste is essential to provide the direction and objectivity of policies and standards needed for effective waste management. The failure to implement laws arises in part from poor enforcement but also from the poor attitude of the LAs and the lack of civic awareness of the public.

Education and training of personnel in waste management was lacking despite the high interest shown by many LAs in adopting new technologies and environmental management techniques in waste management. Collaboration between professional bodies, the private sectors and the LAs in terms of research and consultancy do not exist leaving the whole responsibility for solid waste management to the LAs.

Overall, the findings on waste management in Malaysia shows a total contrast with those discovered in the UK studies. The present waste management systems have to be improved with the robust introduction of specific legislation on waste and the formation of the correct institutions to overlook the Country's waste activities.

CHAPTER 6: DISCUSSION

6.1 Introduction

The findings from the previous chapters on waste management in the UK, with special reference to those practised within the English counties, have thrown some light on the basic requirements for sustainable waste management. It is now understood that the practise of waste management revolves around certain issues which have to be based on an institutional system of bureaucracy to enable the regulations and enforcement to work in an international context. The policies on waste identified from this research are derived from an analysis of many different issues. The researcher divides the findings into four components: i. the type of waste, ii. the means of disposal, iii. the concerns for environmental impacts, iv. the tools for managing all waste activities. Each category is derived from sets of policies related to the latest developments in the UK waste laws and enforcement system. In designing any waste policy and strategy, all these components have to be taken into consideration and should be directed towards the objective and aim of reducing the impacts of waste disposal on the environment (Figure 6.1).

The waste policy and strategy discovered suggests that the source of policy, besides those derived from legislation and regulation passed by the UK Parliament, have complimentary interrelationship with other components such as the waste industries, education and research bodies, the legislated

established authorities such as the Planning and Waste Authorities and public participation (Figure 6.2). The interaction between these components has produced a comprehensive UK waste policy and strategy with each of the issues in each component able to set its own objectives and strategies leading to the establishment of a national policy on waste. Obviously the co-operation

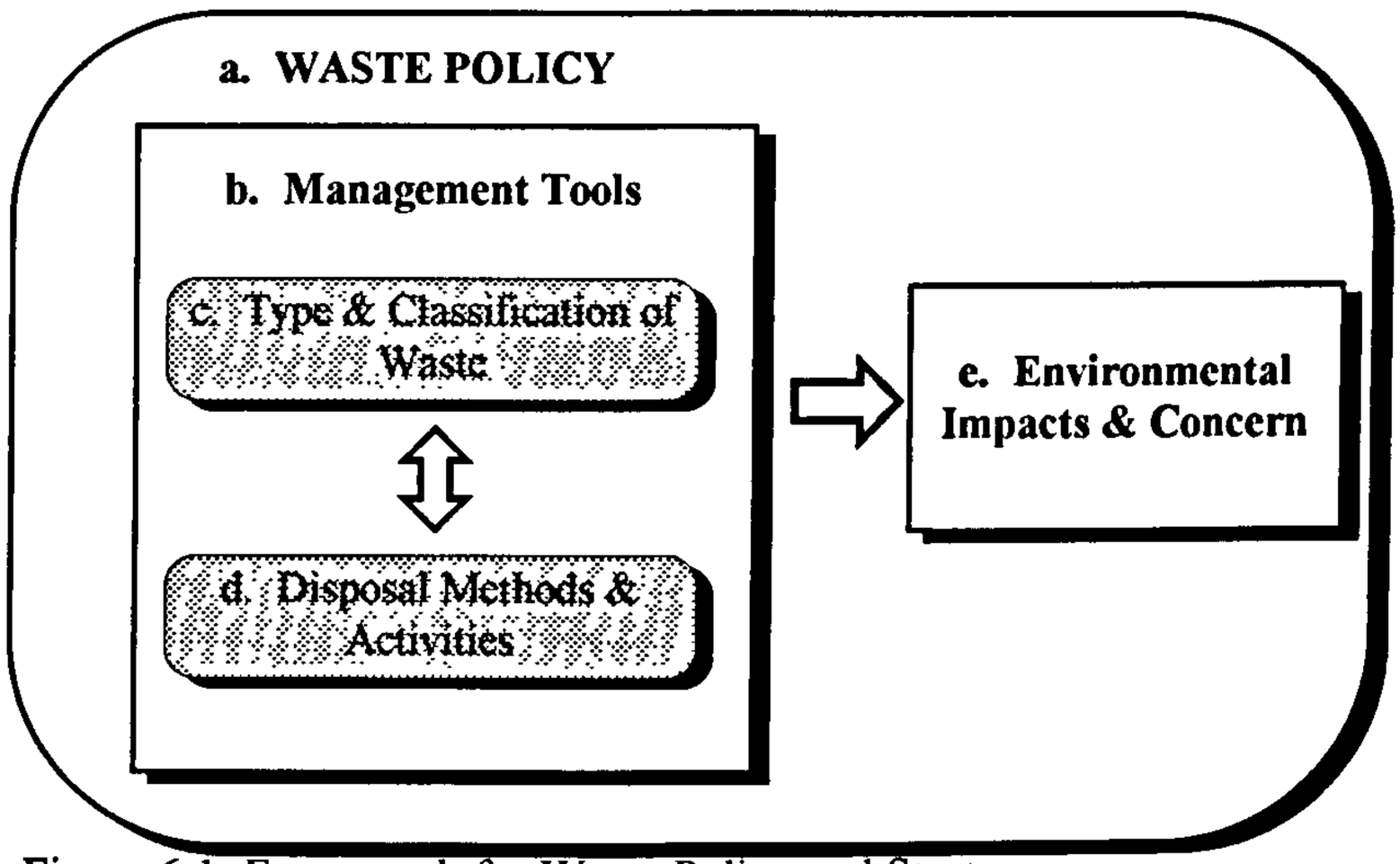


Figure 6.1: Framework for Waste Policy and Strategy
Source : Author

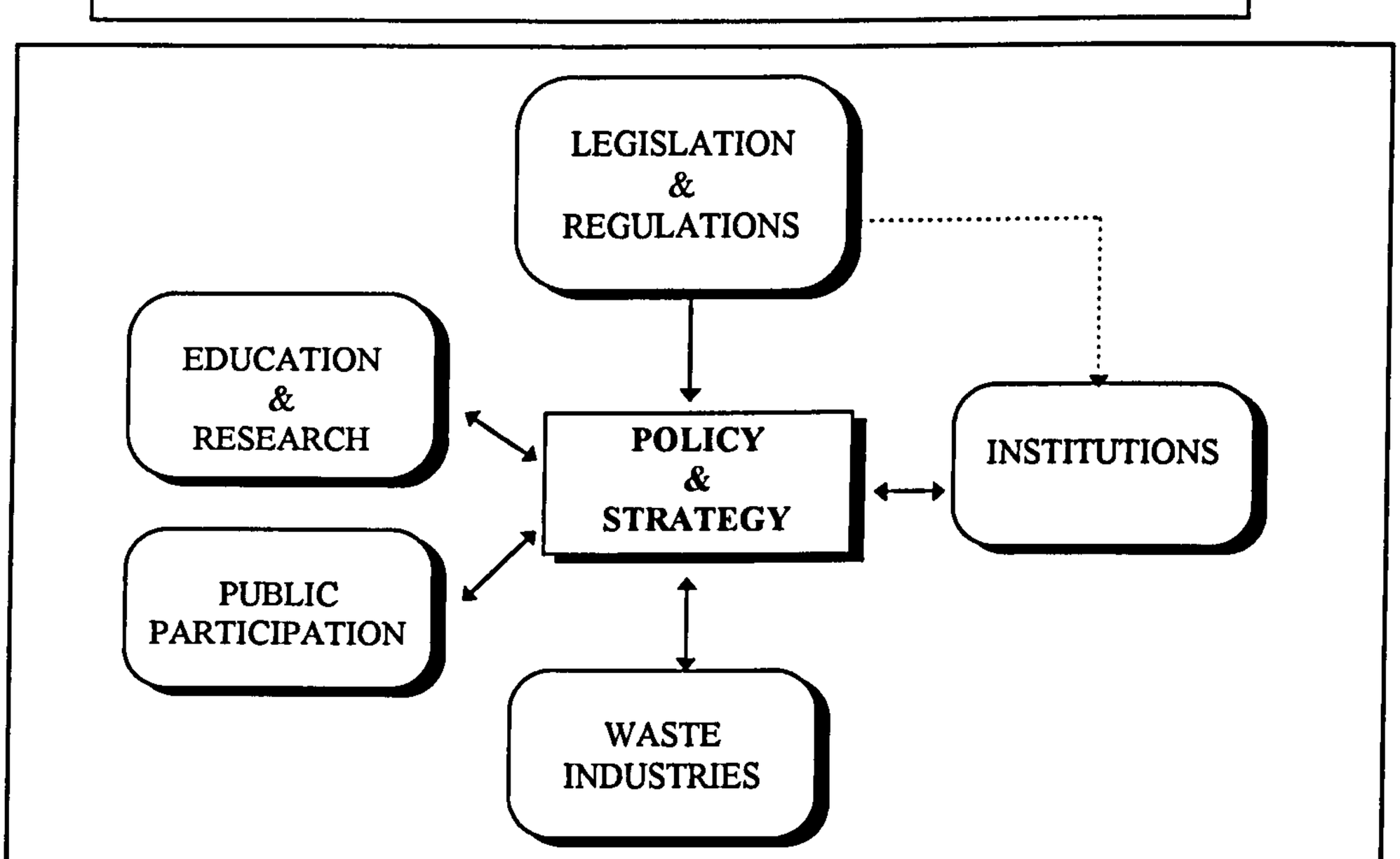


Figure 6.2: Sources for waste policy and strategy and its interaction with other major components
Source : Author

between these components has significantly altered the traditional role of waste management in the UK which was historically under the responsibility of the local authority.

6.2 Waste Policy

It was observed that the policies and strategies for waste addressed all stages in a waste management system. A waste management system is described by Tchonbanoglous (1993) as being composed of all the activities from the point of waste generation until its final disposal (Figure 6.3).

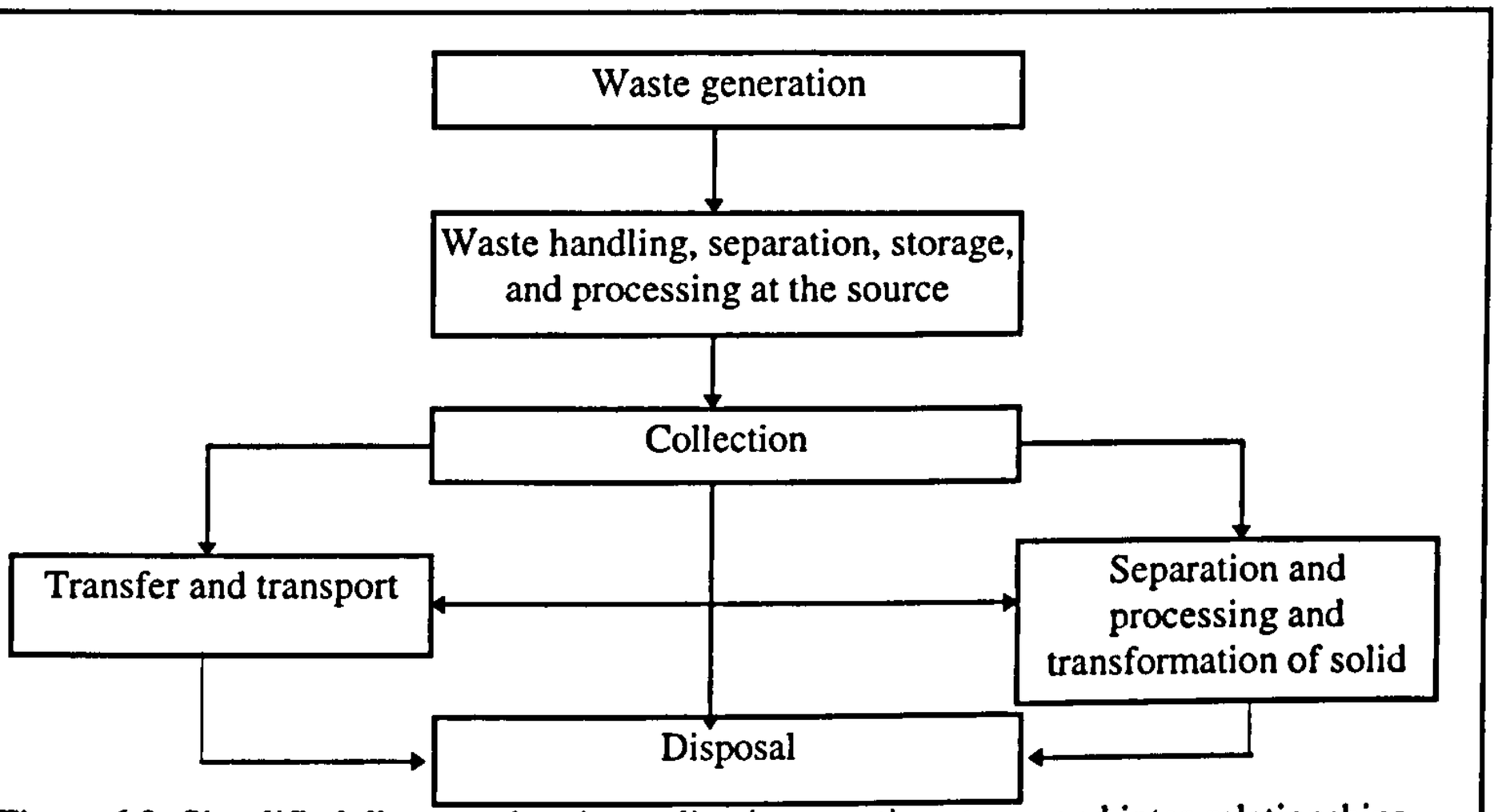


Figure 6.3: Simplified diagram showing policy intervention stages and inter-relationships between the functional elements in a solid waste management.
Adapted from Tchonbanoglous (1993) and modified by Author

The research has shown that waste policies from most of the counties compliments the effort of the central government to improve the quality of waste management in the UK. Table 6.1 summarises some of the general waste strategy adopted in many of the English counties surveyed.

Table 6.1: Summary of the general Waste Strategies in English Counties

Related Policy On	Strategy
Annual Report	An annual monitoring report to be published in the WRA Annual Report detailing implementation progress, advances in waste management techniques and details of progress with respect to the viability of other waste treatment methods
Co-disposal	Licence conditions will be specified to ensure appropriate standards are maintained and sites are judged suitable by the degree to which it is engineered for leachate containment.
Composting	Encourage waste stabilisation via composting prior to landfilling where practicable
Education and Research	Encourage research into the recirculation of landfill leachates to maximise gas production and aid its rate of utilisation, and to increase waste and leachate stabilisation rates.
Enforcement	Action will be taken where there is a potential of significant environmental pollution or disturbance to occupiers or nearby premises or operators has persistently ofended against site licence conditions or standard of care exeercised by operators is substantially below standard.
Environmental Monitoring and Audit	Undertake periiodic comprehensive evaluation of the conditon of the site's waste management and working plan in accordance with the requirements of the relevant WMP
Landfill	Continue to investigate, assess and monitor the existing and potential impacts of all landfill sites to determine any cause of pollution of the environment or harm to human health.
Landfill Aftercare	Waste Management Licenses to be backed up by a minimum of 60 years financial provision period for landfill aftercare.
Landfill Capacity	Control potential household, industrial and commercial waste disposal and landfill capacity in line with planned requirement
Landfill Gas Utilisation	Encourage the collection and utilisation of landfill gas to reduce the contribution of greenhouse gases to the atmosphere
Leachate	Continue to carry periodic surveys on active, closed or completed landfill sites and carry out controls where necessary.
Licensing Controls	Continue to promote the highest standards of waste management site operations through the strict application of licensing controls

continue.on next page

from previous page

Related Policy On	Strategy
Proximity Principle	Waste should be dealt with as near as possible to where it is generated subjected to the environment, economic and transport considerations.
Reduction, Recovery and Recycling	Encourage the reduction of waste requiring disposal and waste recovery processes. Advocate recycling initiatives by industries, district, voluntary group, schools, etc.
Self-Sufficiency Concept	Continue to promote self sufficiency in the disposal of general household , industrial and commercial wastes via landfilling
Siting of Facilities	Promote waste management facility location in line with optimum transport policy to minimise pollution and resource usage
Transfrontier Movement	Against the import of waste from abroad for landfill disposal unless it is shown that native facilities are inadequate or no other facility in the proximity or closer to the point of arising.
Waste Heirarchy Options	Constantly reviewing current waste management options subjected to the selection through BPEO
Waste Management Licence	All applicants will be reqired to provide working plan which include information on site location, process and method of working, facilities, equipments,, pollution prenvetion measures, contigency plans etc.
Waste Management Plan	Reviewing the Waste Management Plan every 5 years.
Waste Planning	Ensure adequate and accurate waste planning information is provided by licensed facilities in order to monitor the progress of the plan.

It is noteworthy that when the UK Government sent out a draft on Waste Strategy for England and Wales for consultation in January 1995, it set out the strategies and provided the policy framework for waste management with the aims to identify how wastes can be managed in a more sustainable way by setting targets. It is within such a framework that all authorities related to the management of wastes could provide for and set the goals and strategies for the management of the wastes arising in their areas in order to reach defined targets.

The first aim of the strategy is to stabilise the amount of production of household waste at its present (1995) level. Despite the increase in the purchasing power of consumers and economic activities, programmes to maintain the amount of waste produced as end products of these activities must be constructed and implemented if the target is to be met successfully. This innovative idea of waste reduction has led waste authorities to base their waste reduction policies and strategies on the priority of waste hierarchy.

The second aim is to reduce the proportion of controlled waste going to landfill by 10 percent over the next 10 years; and to make a further similar reduction in the 10 following years is a challenging task and requires co-ordinated effort by all authorities. The mechanism and tools to achieve this second aim involve the creation of new ideas and the introduction of new laws and legislations. The aim of recycling 25percent of household wastes by the year 2000 and to increase the use of recycle waste materials as aggregates in England from 30

million tonnes p.a. at present to 55 million tonnes p.a. by 2006 again involves the requirement of new laws and legislation besides the renewal of effort on the present recycling efforts authorised to the district councils.

The strategy also introduces the Waste Hierarchy, an arrangement of disposal options priority, which represents the Government's policy to achieve sustainable waste management, by increasing the proportion of waste managed by the options towards the top of the hierarchy. The waste strategy also aims to give a clear message to all waste producers that there is a need to reduce the amount of wastes that they generate, and that they must take greater care of what they produce. As part of this initiative the UK Government has introduced a landfill tax with the aim of ensuring that wastes disposed of to landfill are properly priced to reflect the true environmental costs of landfill disposal. The other objective is to apply the "polluter pays" principle and to promote more sustainable approaches to waste management. Westman (1984) described policies as more specific statements of legislative directions that can be enforced. Policies may be further differentiated into a series of objectives, which may in turn be achieved by certain broad planning approaches or strategies (Figure 6.4). These strategies contain specific tools or procedures used to achieve an objective or objectives.

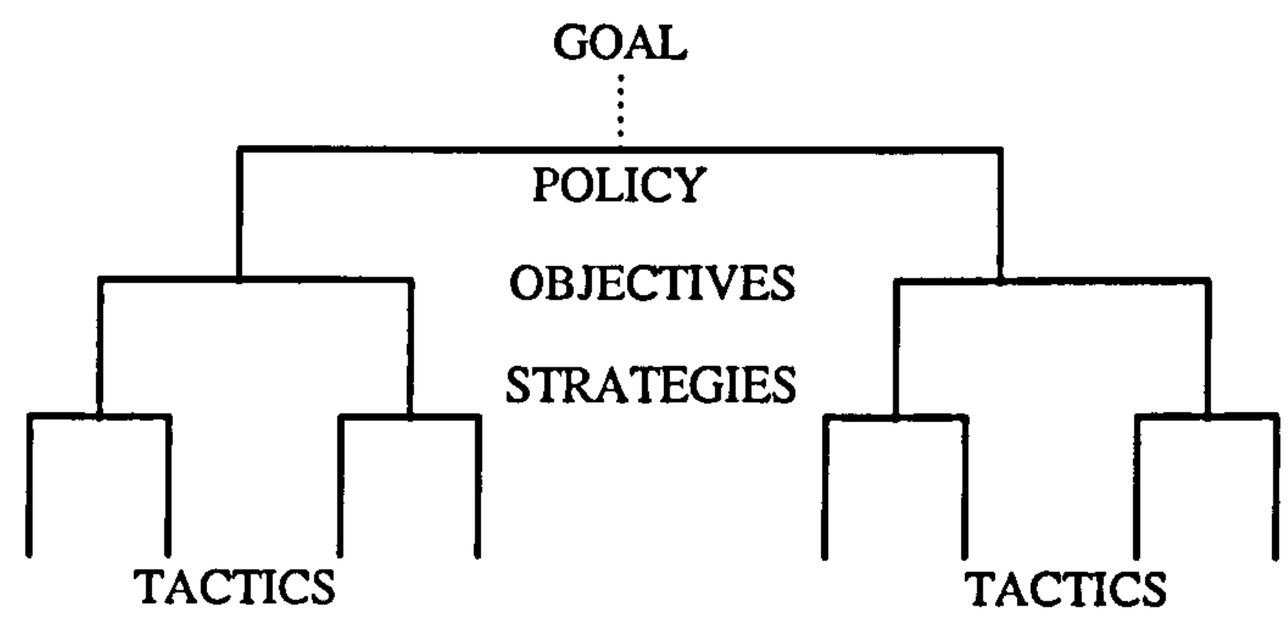


Figure 6.4: A typical framework for establishing and implementing social intent through law.
Adapted from: Westman, 1994

According to Westman (1984), in parliamentary system countries in particular, policies are less readily subjected to court challenge whereas in the United States, a failure to adhere to policies may result in civil suits against the policy makers. His statements may have some truth for the parliamentary system in developing countries such as Malaysia but not in a developed country like the UK. However, in this decade of economic growth and development, the management and the regulation of wastes is becoming an increasingly important and sensitive area for most governments of developing countries. Most of governments policies acknowledge that waste management should follow the best possible environmental option and should therefore be based on a waste hierarchy and include the continuous reviews and changes in laws and regulation.

This research has shown that many counties in the UK have made provision for the re-use and recycling of waste as an alternative to reducing the amount of waste disposed of to landfills. Wolbeck (1987) stated that a waste management policy should not confine itself to recycling and final disposal of

wastes but it has to include all those processes related to waste generation and utilisation. According to him, to achieve the objectives of 'resource conservation' and 'protection of the environment,' a policy for waste management has to include the aim of reducing wastes at the point of production and to substitute scarce raw materials by more easily available one in the production process.

Kramer (1992) stated that environmental policy should aim at preserving, protecting and improving the quality of the environment, thus contributing towards protecting human health and ensuring a prudent and rational utilisation of natural resources. He reiterates that a policy for waste must first of all, aim at the prevention of waste generation and must promote the reuse and recycling of wastes beside taking the necessary steps to ensure that waste is eliminated without harm to man or the environment, either at present or in the future. He suggested that it would be preferable if these policy aims could be realised through voluntary action by all waste generators. However, this is not realistic, as the sense of responsibility for the protection of fauna and flora, water, air and soil, the landscape, as well as future generations is not well-rooted in our society. Also, the individual waste generator may not even be aware of the risks which his wastes will impose, alone or together with other wastes, on the environment. Legislative action to address the wastes problem is therefore necessary and law makers will have to bear in mind the basic considerations of responsibility as mentioned above.

This study also found that in the UK active participation from the private sectors including the LAWDCs, in managing the treatment and disposal of waste has helped in developing waste policy and strategy. Pets (1994) noted that the UK has traditionally adopted a decentralised and free-market approach to environmental policy and strategy development with a heavy reliance upon a private-sector based waste disposal industry, particularly for hazardous wastes of which almost 100 percent is treated at private facilities. This free-market approach means that the ability and willingness of any waste authority or government to adopt and invest in options higher in the waste management hierarchy by any sectors, private or public, have been based almost entirely upon perceived economic benefits. Furedy (1992) and Hardoy et al. (1992) suggested that developing countries could elevate their waste economy by introducing private-sector industries which they can develop from the existing waste business activities such as the itinerant buyers who collect or purchase certain kinds of wastes direct from households and business or who recover materials from the streets and city dumps.

The policy and strategy of allowing the county council to compete for tenders for waste collection or disposal with the private sectors is a step forward to improve the quality of waste management and to reduce cost. According to Waite (1995), the policy of introducing refuse collection services subjected to compulsory competitive tendering (CCT) for the collection of household waste, which was originally carried out by the local authority itself through its Direct Labour Organisation (DLO), has resulted in the improvement on the quality of

services and management of MSW and resulted in the costs of collection being significantly reduced in many cases. The strategy used in the CCT allows private sector firms to compete for the work of household waste collection, with the intention of ensuring that local authority-provided services are competitive. By having such an arrangement, a local authority may draw up a clear and well defined contract specification which sets out exactly how the service should be provided with the aim of meeting the health and safety of the public and the environment.

6.3 Definition

This research indicates that all waste policies and strategies have to be based upon a formal and ample definition of waste. The confusion of waste management in many developing countries, particularly as discovered in the Malaysian survey, arises from the lack of a clear and concise definition of waste. This lack of clear definition has been a significant impediment to the development of sound waste management policy and strategy for many countries. As such, waste management decision makers should give significant attention to definitions at the front end of the waste management planning process since all future legislation, regulations and public dialogue will refer to and depend on these definitions. The precision of waste definition in legal terms is of significant importance to the authorities when there are cases for legal compensation involving pollution from waste-related activities. Williams (1994) stated that with consistent definitions, it is possible to form the basis for a defensible measurement system and it facilitates dialogue with all

affected and interested parties in legal disputes.

According to Kramer (1992) and Willliams (1994), at a fundamental management level, without a clear definition, the result has been a state of confusion by public or authorities as to what constitutes MSW and what capacity exists to manage these waste. Williams (1994) cited three examples of how confusion arises in a situation of undefined waste. First, in landfills which accepted contaminated soils, municipal sludges or combustion ashes which are commonly not classified as MSW, the MSW generation rates do not consider these volumes. Thus, landfill capacity for MSW can be significantly overstated, resulting in MSW management plans which fail to plan for needed landfill capacity. Second, it arises in relation to recycling issues where sometimes demolition wastes or scrapyard wastes are included; therefore, the use of these recycling rates can overstate the amount of waste managed by recycling and underestimate the amount of alternative capacity needed. Finally, in states which have set specific recycling standards, they may be faced with waste item for recycling and commodities which do not actually recycle.

6.4 Legislation

The research has also provided an indication that the UK's success in managing its wastes is due to the progressive change in legislation. This finding corresponds with Hawkins (1983) views, which identified four major factors contributing to the rapid development of waste management services in

the UK. The most significant of all is the changes in the organisational structure of the industry, both in the public and private sector followed by the reorganisation of local governmental areas responsible for waste disposal into authorities. Other factors that contributed to this achievement were an increase in international interest in environmental protection and legislative developments arising out of the desire of all leading political parties to act on waste management issues in reaction to the interest of protecting the environment.

This research discovers that most of the UK policies and strategies on wastes are based on the advice and guidelines provided by the central government through the Waste Management Papers produced by the DOE. In contrast as indicated in the survey, there are no national standards guideline provided for or by the local authorities in Malaysia. The scattered distribution of laws and regulations adopted by the Malaysian local authorities has proved to be a detrimental weakness in the enforcement of all waste-related by-laws. The standardisation of laws and regulations is an important element to ensure a consistent level of service and high quality of management.

According to Petts and Eduljee (1994), there are three basic tenets to the achievement of the UK waste control strategy: (i) the devolution of regulatory responsibility including strategic long-term waste disposal planning to local authorities, with central government primarily responsible for devising legislation and providing technical assistance, (ii) a system of licensing

disposal and treatment facilities which requires a planning permission as a prerequisite, (iii) reliance upon the market to provide appropriate facilities with no direct government financial inducements or economic controls. This is in contrast to many developing countries where legislations on wastes have not been at the top of the national agenda for the country's development. Metzger (1987) identified the problem of many developing countries placing waste management at the lowest priority in their list for national development. He reiterated the salient features of a viable, effective and locally sustainable waste management system which should include comprehensive legislation, a sound organisational structure, sound finances, public participation and a robust infrastructure. Metzger (1987) and Szelinski (1987) both reiterated that the basic legal requirements which have to be provided when establishing a waste management scheme should identify what is to be regulated as waste, who is responsible for waste disposal, where can waste be disposed of and how shall disposal take place.

The research also uncovered that in the UK policy and strategy are influenced and in most cases derived from EC Directives. The adoption of the these directives into the national legislation of the member countries has helped to standardise the practice of waste management. However, as discovered in the Malaysian survey and in other developing nations, many of these countries face collection of waste problems which arise due to cumbersome or inappropriate regulatory structures. Szelinski (1987) emphasised that waste management is a complex matter since it differs substantially from normal

industrial activities, particularly because waste generally has a negative value. As such, the legislative framework for waste management must assure that the public's responsibility for waste management is established and that management decisions are made at the appropriate level of government. Metzger (1987), Szelinski (1987) and Panayotou (1991), all agreed that comprehensive waste management legislation should allow for strong and competent authorities with stringent controls on waste disposal practices. Most important are the duties which are essential to make the system work, as indicated by the results on the UK waste survey, where laws can be enforced and controls can be executed.

Panayotou (1991) and Hardoy, et al. (1992) observed that most existing environmental regulations in the Third World countries are usually replicas of past regulations of the developed countries which are difficult to enforce and fit appropriately to the local cultures. If developing countries wish to adopt the waste legislation of developed nations, due consideration should be given to the realities and cultures that the legislation might impose on the public. For instance, Elkington, et al. (1989) reviewed US waste management technology and its relevance to the Third World. He noted that the main priorities for waste management is through waste reduction. This waste reducion policy may work well in the US but not necessarily true in the Third World countries where material recyclers whose livelihoods are dependent on these wastes will be most affected.

This research also reveales that UK legislation on wastes is considered to be very extensive and covers most waste activities. Kramer (1992) emphasised that legislation on waste should not only address the questions that are directly linked to the generation and elimination of wastes but also the preservation of the environment. As such, rules on the transport of wastes should be formulated and enforced. Since wastes have little or no economic value, the temptation to lose it during transport is high. Furthermore, risks for an accidental pollution of the environment are higher during the transport of wastes. Rules have to be made on damage caused by wastes to man or the environment by waste, be it damage due to an accident or damage caused during an ordinary, authorised handling of the wastes.

It has been observed that many policy statements have the tendency of introducing the tools of auditing and monitoring of licence waste activities as part of the condition in granting the Waste Management Licence. The aim of having the responsibility on waste licence operators to perform audits and to monitor these activities ensures that it operations are within the law. Williams (1994) stated that in developing specific legislation and regulations, it is important that the full impact of individual legislative or regulatory provisions be monitored after the programme has been implemented. To increase the efficiency and supervision of the enforcement as stipulated by the laws and legislations, there is a need for co-operation among all levels of government organisations.

Another important factor that contributes to determining policy and strategy is the availability of waste data. It is difficult to develop sound MSW management strategies without good data as discovered in the Malaysian survey. Wilson (1981) said that an essential requirement for planning is information on the quantity and types of wastes. Williams (1994) stated that creative waste management strategies often require knowledge of how wastes are generated and not just what volumes are generated. There are often cases where a large percentage of the wastes is generated by a small percentage of waste generators. He stressed that MSW management strategies developed without quality data on risks and costs of all available options under consideration are not likely to optimise decision making and may, in some cases, result in unsound decisions. Because data are often costly and difficult to obtain, decision makers should plan for an active data collection stage before making critical strategy choices. While this approach may appear to result in slower progress in the short-term, it will result in true long-term progress characterised by cost-effective and environmentally sound strategies.

6.5 Institution

This research reveals the importance of the role of legislated institutions such as the WCA, WDA and WRA in fulfilling the aims and objectives of waste policy and strategy. It is discovered that each policy and strategy is related in terms of responsibility and accountability to either one or combinations of several authorities. Hence, to fully realise the aim of sustainable management,

an appropriate operational and institutional framework must be in place to generate a high quality of waste management. The management structure should consist of at least a central administrative body able to govern the overall policy and procedure guidelines in waste-related activities. This may include the management of financial resources and grants to the state or local authority. In order for the designed administrative framework to function effectively, it should rely, to a large extent, on appropriate legislative support since the basic function of the administrative framework would be to reduce cost while effectively implementing the provisions permitted by legislation.

Hardoy, et al. (1992) stated that it is not technical capacity that greatly reduces pollution but the political will and institutional capacity to act effectively. The failure of quality waste management in Malaysia is identified and attributed to the intervention of politics and loose institutional arrangement both of which significantly inhibit appropriate environmental actions. As an example of an industrial pollution control intervention, perhaps the most serious, is the intervention of 'political bodies' overriding the decision of the local authority to reject applications for investment of industries identified and associated with industrial pollution (Zulkifli,1996).

6.6 Planning

It is noted from this research that much of waste policy and strategy is based on the future planning for waste arising in every county. Much of this planning is achieved through the provision authorised from the TCP Act 1990 and the

EPA 1990. Long term planning, as shown in the survey, is provided in the form of: (i) waste recycling plans which are compiled by the WCAs, (ii) waste and structure local plans which are produced by the local planning authorities, and (iii) the waste management plans which are produced by the WRAs. It can be deduced from this research that waste planning is carried out both by the regulator of waste (WRA) and the Planning Authority and guided by official documentation (Figure 6.5). It is through this process that a waste policy and strategy could easily be devised and integrated between these two authorities or shared with other interested parties.

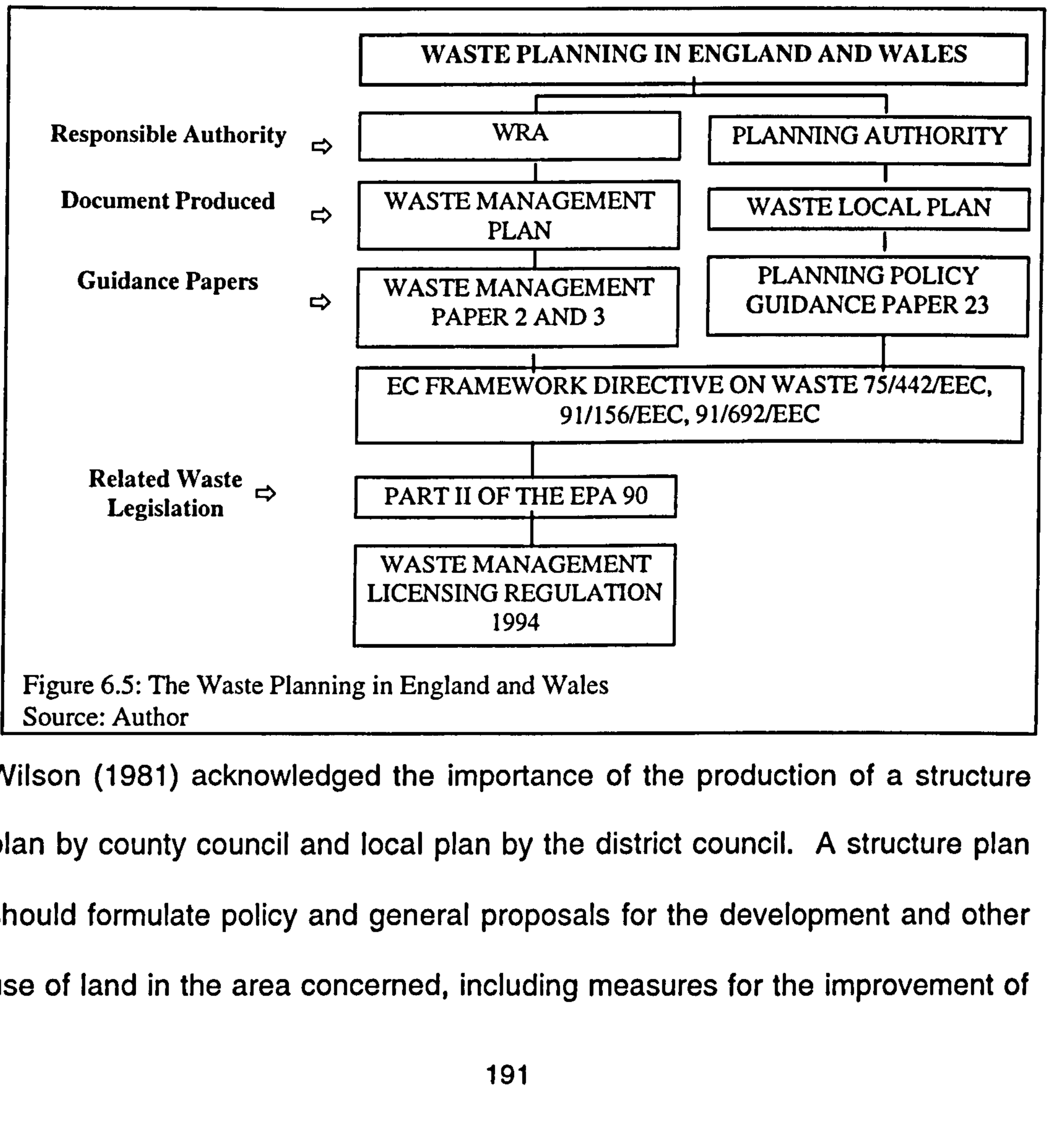


Figure 6.5: The Waste Planning in England and Wales
Source: Author

Wilson (1981) acknowledged the importance of the production of a structure plan by county council and local plan by the district council. A structure plan should formulate policy and general proposals for the development and other use of land in the area concerned, including measures for the improvement of

the physical environment and the management of traffic. Structural matters are those which affect the whole or a significant part of the area or which influence the development of the area in a significant way. Thus, a structure plan is an overall statement of policy and strategy over the medium to long-term. A local plan provides more definitive guidance for development and control of a much smaller area, such as a small town or part of a larger town. The emphasis of a local plan is thus tactical rather than strategic. Cooling, et al. (1993) said that the system of granting permission for land development adopted since the TCP Act was first introduced in 1947, is not to prevent change but to control it and to secure economy, efficiency and amenity in the development and use of land.

Petts (1994) acknowledged that there is a need for a strategic planning action for a formal framework and consideration of the use of BPEO on wastes. If adequately co-ordinated, these plans could provide a framework within which regional BPEOs can be formulated for various waste streams and the final choice of options and the identification of appropriate sites.

It is also established from this research that the role of the Waste Management Papers (WMPs), produced by the DOE, as a tool in providing advice and determining the direction of the waste policy and strategy is vital. The advice required in developing a policy, besides the technical aspects as contained in the WMPs, includes guidance on how to make arrangements for future arising wastes . Cooling, et al. (1993) identified several ways in which government

advice on planning policy is made known via three important documents. The first is through the publishing of White Papers which contain the general thrust of the government thinking setting out where policies are to change or emerge and where legislation or other government action will be initiated. Second is through distribution of Circulars, which are documents giving advice both on legislation and procedures and on practical planning policies and finally, through the Planning Policy Guidance notes which continue the latter function of the Circular i.e., practical planning policies.

6.7 Education and Public Attitudes and Participation.

This research has identified the role that the LA has to play in educating the public and in designing the policy and strategy. Since wastes are generated by the entire community and all segments of society, any solution to the problem of wastes must arise from and be supported by that same population. Cheremisinoff and Ferrante (1989), said the general public, will not initiate or support any improved techniques in waste management unless the scope, magnitude, and severity of the solid-waste crisis is demonstrated. Such an educational step may be the most significant single undertaking in the achievement of the successful management of wastes. The production of the Annual Report by the WRA is seen as the first step in presenting the problems of collection and disposal to the public.

Backman and Lindhqvist (1992), stated that a waste prevention strategy requires the broad participation of society, since, in addition to industry's

activities, the professional and private activities of the citizens are of decisive importance. A waste prevention strategy makes specific demands on the participation of industry in a process aimed at minimising the environmental impact both from the production itself and from the products that are used in society.

Another legislative instrument identified in this study being used as complementary instruments in educating the public, waste generators and waste industries is the Duty of Care. Backman and Lindhqvist (1992) stated several times that today's environmental problems, to a high degree, are caused by attitudes rather than by technical problems. It always takes a long time to break old traditions and to alter current attitudes and practices. Despite the late changes in attitude of the public, Cointreau (1982) and Hardoy, et al. (1992) observed that professional attitudes are beginning to change with regard to the collection and processing of waste where there is a greater recognition of the need to develop local solutions which match local needs and possibilities. To succeed in overcoming these attitudinal problems associated with waste, extensive information and educational efforts are needed to alter the directions of industrial activities and the work of the authorities by encouraging research and developing the educational system.

Besides attitudinal problems, Kramer (1992) identified that one of the many problems of wastes is the affluence of the society. Urbanisation, consumption patterns, transport and other technologies have further contributed to more

production, more distribution and more consumption. This phenomena is world-wide especially in developing countries where the standard of living has improved and waste problems will appear in these countries in the next millennium.

Backman and Lindhqvist (1992), stated that an informative instrument that should be developed and administered within companies and organisations is the waste reduction audit. In line with waste preventive strategy, the waste reduction audit functions as a tool for the documentation of the types and quantities of the wastes produced and for the identification and evaluation of various options for the minimisation of the generation of wastes and pollutants. Regular waste reduction audits, thus, become the internal steering instrument of the company directorate for localising mismanagement of all resources of the company. They also ensure that waste minimisation goals are attained.

It is also discovered in this research that formal education in the area of waste management appears in a multitude of disciplines ranging from basic sciences such as biology and chemistry to highly sophisticated engineering and technologies. Hawkins (1983), acknowledged that students of waste management are now faced with a multidisciplinary subject both professional and scientific disciplines and embracing a range of skills. Whilst there are recognised training courses in waste management, no specialist professional qualifications on waste management exist or are offered in any formal institutions or by the existing professional associations. The survey indicated

that a well designed educational programme should contain elements of raising awareness, increasing the participation of individuals and groups in waste management activities. Other elements which are identified include the encouragement of collective or community-based action in recycling schemes, and promoting effort for long-term behavioural changes through the distribution of pamphlets which give advice and guidance on better waste management through public participation.

Education and research on wastes requires financial support. How much allocation an institution should receive will be based on the nature and type of the research interest. It is the availability of research funds that limits research interest. One of the strategies identified by Backman and Lindhqvist (1992) is that of imposing environmental fees that bear a reasonable relation to current costs of handling and treatment. Sufficient funds could then be collected for the initiation of active and purposeful programmes for research, education and the communication of information about new and better processes and technologies.

6.8 Environmental Impacts and Concern

The research also discovered that the priority now given to the development of waste policy is derived from concern for the environmental impacts from waste activities. The type of risk associated with waste disposal, when it is identified, will be an important tool in waste management planning and decision making. Kramer (1992) stated that wastes have a long-term risk potential for man and

the environment. Waste disposal sites and other waste treatment facilities therefore need a permanent surveillance system, which is capable of discovering leakages to the environment, providing and enforcing repair work, and providing, where necessary, for the adaptation of risk prevention technologies through new knowledge, new methods and new techniques.

Although recycling is an alternative choice for reducing impacts to the environment, it could not be a complete process unless the legal and institutional framework creates markets for the recycled materials. (Kreith, 1994). Waite (1995), however, stated that recycling should be seen as the means by which we seek to minimise the environmental impact of both raw material production and waste disposal and should not be seen as a panacea for our waste disposal problems. This means that the technical and engineering function of waste management, such as recycling, cannot function in a vacuum.

Backman and Lindhqvist (1992) discovered that companies that have instituted a waste prevention programme such as waste reduction audits, have found economic advantages arising from decreased costs of production and an increase in tackling environmental problems early in the production process.

6.9 Enforcement

Another instrument which has a significant role in ensuring that waste policies achieve these objectives is the use of robust enforcement practices by relevant

authorities. The advantage of having legislated institutions armed with enforcement mandates is the ability to evaluate the performance of waste operators. The centralisation of waste enforcement into a single body, the WRA, with standard guidelines and operating procedures to monitor all waste disposal activities and sites resulted in significant improvement in waste management practices. It is noted in the survey that the use of periodic inspections of waste sites as the main strategy in ensuring licence operators comply with licence conditions, is an accomplishment of the policy despite a few reports of backlogs of inspection frequencies in some counties. One key contributor to this backlog is the fact that in some counties, enforcement programmes are understaffed. It is important that inspection frequencies, as stated by the Waste Management Paper No. 4 'Licensing of Waste Facilities', are met if the authorities hope to gain the trust of the public. Williams (1994) observed that the public continues to distrust both the individuals who operate waste facilities and the regulators who enforce proper operation of those facilities when the amount of inspection visit fails to achieve the amount targeted.

The weakness in the enforcement practices discovered in the Malaysian survey is mainly due to enforcement unit which is mandated with broad general enforcement tasks. The unit is not only understaffed but lacks professional training in the monitoring of waste disposal site (Tan (1996), Chong (1996) and Zulkifli (1996)).

6.10 The S.W.O.T Analyses

This researcher has provided the following analysis that summarises some key findings and observations.

6.10.1 Strength

This study is an attempt to understand the requirements and the prerequisites for developing a framework on sustainable waste management policy and strategy. It is based on the successful experience of a developed country, the UK.

It has shown that the primary means of setting the aims and objectives of a sustainable waste management in the UK is through the provisions of legislation derived from the Parliament or the EC Directives. The establishment of the EPA 90 with specific laws and regulations on wastes has successfully improved the management and the quality of waste service throughout UK.

It is clearly demonstrated in this research that with the establishment of official institutions, such as the WCA, WDA and WRA, the responsibility of managing the wastes is delegated, with each institution having a significant role in protecting the environment from any impacts associated with waste collection, transportation, keeping and disposal of wastes.

The study has revealed the importance of waste definitions and the

identification of various disposal methods before any policy and strategy is adopted. Without clear and concise definition on waste, confusion on how wastes should be managed and how data should be generated and collected will occur and will make accurate forward planning impossible.

6.10.2 Weaknesses

A successful waste management policy and strategy in the UK is achieved through the transformation of many elements within a decade of the upsurge in environmental awareness among the international community. The less developed countries, as experienced in Malaysia, have to acknowledge that waste management in the developed countries is achieved at the expense of high capital investment. Since the majority of the developing countries are incapable in meeting the cost and financial requirements, thus effective waste management is always a difficult task to achieve.

Results from this research indicate that the areas of weaknesses for developing countries in designing policies and strategies for waste are due to:

1. the lack of proper legislation on waste activities especially on the definition of waste and the need for waste planning,
2. the lack of waste data as a means to estimate and to make prediction on the kind of waste disposal needs ideal for the disposal of such wastes,
3. the lack of legislated institutions with mandated powers to enforce and regulate all waste companies, brokers and site operators,
4. the lack of research in the area of waste management and the absence of

educational institutions that are able to provide direction in improving the environment due to any waste pollution and related impacts,

5. the lack of co-ordination between authorities (central, state, local, district) causing weaknesses and inefficiency in the local government.

These weaknesses are attributed, in developing countries, to the lack of financial capabilities due to the weaknesses of their economies or political instability.

6.10.3 Opportunities

This research discovers ample opportunities for developing countries to harness their resources and overcome the above identified weaknesses, and to improve the waste management practices and hence, improving the environment. These opportunities include:

1. introducing special waste legislation with provisions that will conform to the socio -economic culture of the locality,
2. periodically performing waste surveys in all economic and public sectors and generating waste data which will provide suggestions and indications for improving present waste management practices,
3. upgrading and introducing proper authorities that will attend to all matters related to waste activities.
4. encouraging research and education opportunities in all academic and research institutions with emphasis on identifying the BPEO for each type of waste stream that produce significant environmental threats,

5. improving the co-ordination between all parties which have interests in the management of waste.

6.10.4 Threats

This research discloses some threats in most developing countries while trying to make some changes in the management of waste. As explained in the earlier section, it is unavoidable that these actions may transgress and encroach the interest of other parties. The common phenomena found in most developing countries is that small but influential interest groups rule the country and to control the nations economy.

Although this research indicates that developed countries have agreed to dispose of all waste arising through the national and regional self-sufficiency concept and to avoid exporting waste through the Transfrontiers Shipment Waste Regulation, the threat of wastes being sent away to the poor developing countries is unavoidable. This export practice may not be significant for the municipal solid wastes but is likely to happen in the disposal of toxic and hazardous wastes.

The biggest of all threats identified by the findings of this research is the awesome amount of financial investment that a developing countries must resort to by borrowing from either the local or foreign international banks. Thus, waste management is looked upon as an unsound investment for countries which have poor economic and business performance.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

This research has investigated the current waste management practices in the UK and identified the prerequisites for sustainable waste management through analysing the waste policies and strategies obtained from various English Counties. The analyses of policies and strategies on waste practices exposed several issues identified as essentials as the tools and instruments in achieving the aims and objectives of sustainable waste management. These tools and instruments are all derived from a single updated and comprehensive source of environmental legislations, the EPA 1990.

It is irrefutable from the result of this research that all waste policies and strategies adopted by most counties are established with the aim of protecting and reducing the impacts on the environment and health. These policies and strategies conform with the aims and objectives of sustainable waste management which expect to balance the economic cost of waste disposal and development with the protection of the quality of the environment. It is apparent from this research that these policies and strategies can only be achieved once the fear and risk of environmental impacts from waste disposal activities are set at the top of the planning and development agenda.

It is also apparent that developing countries that wish to achieve sustainable

waste management need to design their legislative and institutional frameworks as the main reference and source for waste policies and strategies. Most of the policies and strategies on waste are composed from an integration of components of waste issues as identified in this research. The most important issues include the meaning of wastes which require clear and concise definitions and the types of disposal facilities which are available and affordable.

It is imperative for developing countries to place an organised institutional body to govern, regulate and monitor the national waste arising and practices. Management Licensing and a requirement of waste auditing and monitoring as part of the licence condition are identified as the latest tools to control and monitor all associated waste activities. This control requirement leads to the necessity for the formation of an independent enforcement agency which is mandated with legal powers and well-trained personnel.

This study also established that education, research and public participation are some of the paramount tools for long-term improvement and changes in the attitude and ethics of the public towards proper waste management. Formal waste education at the tertiary level in a developed country such as the UK is gaining recognition as more higher educational institutions begin to introduce courses in waste management. The subject areas in waste education and research are identified as an integration of law, science and engineering disciplines.

It is acknowledged from this research that the Malaysian waste management system is inefficient and poorly organised. The lack of waste data and the disarray of regulations within the various acts and by-laws, and the need to empower various authorities with laws and regulation indicate the need for a total refurbishment of how waste is managed in Malaysia. Education and research in waste are lacking and training of personnel in proper waste management is absent.

7.2 Recommendations

The findings from this research have produced the following recommendations for consideration by all interested parties, particularly those from developing countries, who are associated in the planning and the management of wastes:

1. All types of wastes must be defined. Definitions of waste have to be concise to avoid confusions. Institutional frameworks for waste management cannot be operated without a formal legal definition of all types of wastes. Definitions of wastes are crucial in the process of determining the success of any waste policy or strategy.

2. Public awareness must be increased because public will is essential in determining how wastes should be managed in the most economical and environmentally sound manner. Environmental awareness programmes and activities have to be planned and they should incorporate the idea of educating the public on cost implication and impact from waste disposal.

3. Comprehensive solid waste management legislation must be formulated so that effective sustainable solid waste management programmes can be laid out. These legislations should include the organisation for waste regulation, collection and disposal. It is through the appropriate provision from these laws and regulations that the 'right and proper' authority, will be able to manage, regulate and monitor all waste activities within specified conditions.

4. National, regional and local waste policies and strategies must be formulated, from which waste data can be generated. The data will provide guidance and direction for all waste industries to improve the quality of their services. The presence of policies and strategies will strengthen in a systematic manner all authorities responsible in improving the efficiency and effectiveness of their services. It will lead to the co-ordination and co-operation of efforts by all waste authorities to improve waste management and protection of the environment.

5. A national waste authority and enforcement agency must be established with a defined organisational structure so as to avoid duplication and inefficient conflict between local authorities. In Malaysia, the Ministry of Housing and Local Government (MOHLG) of the Federal Government should be empowered to control the activities of waste regulation. Additionally, the MOHLG should issue Codes of Practice and exercise designated functions in licensing matters. In addition, the MOHLG should appoint inspectors to perform the task of auditing and monitoring the waste facilities and disposal

sites.

6. A national or regional waste master plan for every 5 years must be formulated. The federal or central government should establish planning legislation and regulation to enable effective planning permissions to be granted for depots, workshops, transfer stations, material recycling facilities, incinerators, landfill sites, and treatment plants and any other facility required for waste collection, transfer and disposal. The planning legislation and regulation should be drafted in such a way that it details the requirement of a waste management licence and other environmental legislation and regulations. Its principal objective should be the proper use of land for environmental activities and the establishment of the necessary provisions for restoration and the control of aftercare. The planning legislation and regulations should include provisions for Certificates of Completion and Certificates of Discharge from further obligations with respect to environmental sites and facilities.

7. Waste management staff have to be trained professionally. Establishing waste management education, research and training centre is thus a requirement. Sustainable waste management requires trained personnel in various expert areas which include the operating, maintenance, compliance, and health and safety procedures.

APPENDICES:

Avon CC WRA Policies

1	That the overall objective of the WRA is the disposal of waste at he lowest financial cost to the community, bearing in mind its use as a resource and having due regard to hygiene and the safeguarding of the environment.
2	That landfill of untreated or treated waste be permitted to continue as a system of disposal on the understanding that developers recognise that the costs of final land reinstatement, landfill and aftercare should be accepted as an integral part of the costs of the landfill operation.
3	That appropriate recognition be given to the needs of industry within the County of Avon in respect of waste disposal, particularly for toxic and liquid wastes, but that industry be encouraged to adopt, where possible, the in house recycling of waste.
4	That the waste disposal industry within the private sector be encouraged to participate in the disposal of difficult wastes and in recycling by the establishment of treatment centres and private resources recovery units.
5	The Authority is committed to the high standard of waste management embodied in the COPA 1974 and he EPA 1990. Every new licence application will be considered by the Public Protection Committee for formal resolution including the outcome of the necessary consultation provokes. Such consultation will include statutory consultee, Parish Councils (where appropriate), other professional bodies and other Department of Avon considered by the County Planning Officer to have a relevant input to make to the proposal.
6	That the scope of application of waste management facilities be subjected to continuous appraisal and that encouragement be given to the expansion of the type of waste which may be accepted to as broad as range as possible; whilst remaining mindful of associated parameters, such as water quality, amenity and public health.
7	That in relation to the licensing aspects of those additional disposal facilities resulting from the introduction of the Collection and Disposal of Waste Regulations 1988 on the 3rd October 1988, discretion will be exercised over associated enforcement matters. Such discretion will only apply until the backlog of inherited facilities requiring to be licensed is resolved, and will not apply where deliberate avoidance or procrastination by the operator is experience and/or where the operations on site are seen to constitute a risk to water pollution, or danger to public health, or are seriously detrimental to the amenities of the facilities commencing operations after 3rd October 1988 nor existing facilities where a change to the nature or extent of operations is proposed. In applying this policy care will be exercised to ensure the avoidance of uneven standards and that all facilities caught by the Regulations are dealt with equally.
8	That the principles of Her Majesty's Inspectorate of Pollution revised Waste Management Paper Number 4 "The Licensing of waste Facilities" (Third Impression 1989) and any subsequent revisions are adopted as part of the CC strategy in licensing waste disposal facilities. This will include the progressive review and upgrading as necessary of all site licence conditions to ensure compliance with modem standards, codes of practice and environmental need. Each licence to be fully reviewed every 5 years or sooner if required to ensure that the site continues to pose no threat to public health, risk of water pollution or serious detriment to local amenities. The County Planning Officer has delegated authority to modify licences in order that the Authority can respond rapidly to changing circumstances.
9	The Authority will comply in fully with the notification and control procedures of both the COPA (Section 17) "Special Waste Controls" and the "Transfrontier Shipments of Hazardous Waste Regulations 1988" requirements and delegate to the County Planing Officer the authority to process consignment notifications as required by the two sets of regulations. The County Planning Officer the authority to process consignment notifications as required by the two sets of regulations. The County Planning Officer will also pursue any irregularities evident as a consequence of the procedures. As part of these duties the County Planning Officer will also pursue any irregularities evident as a consequence of the procedures. As part of these duties the County Planning lofficer may arrange for sample of waste to be analysed by the County Scientific Adviser in order to be satisfied with its composition prior to removal of the waste for final disposal.
10	The Authority will provide an effective site monitoring system which ensures that waste management and disposal at licensed facilities is carried out with no unacceptable risk to the environment , to public health and safety, to amenities and to water quality. This will be achieved by a programme of regular site inspection to ensure compliance with conditions and systematic programme of on-site environmental monitoring, including sampling to assess water quality, leachate production and landfill gas generation. The frequencies and extent of such inspections and monitoring to be determined by the County Planing Officer.
11	The Authority will be represented at the Joint Regional Committee for Waste Regulation established under the auspices of the South West Regional Planning Conference, with attendance at this meeting to be an approved duty of Members.
12	The Authority will implement the licensing of scrapyards and vehicle dismantlers as described in paragraph 6 of the report to Public Protection Committee, 30 the May 1991.
13	The Authority will join the co-ordinated local authority database of waste carriers (CLADWAC) and the County Planning Officer is given delegated authority to approve satisfactory applications for registration of waste carriers under the Control of Pollution (Amendment) Act 1989 and to issue certificates subject to there being no evidence of relevant convictions will be referred to Public Protection Committee for decision. Financial provision for the cost of joining CLAWDAC including the acquisition of computer expenditure and for the necessary local publicity will be met from income to be obtained form application fees.
14	The Authority delegates to the County Planning Officer those waste regulation function as listed below:- (i) authority to enter any land or vessel where appropriate; (ii) authority to modify licences; (iii) authority to enforce, inspect, monitor, issue notices and institute proceedings with regard to licensed sites;

	(iv) take appropriate enforcement action for all other unauthorised waste management activities.
15	The WRA will be established within the County Planning Department
16	That pending the full implementation of the WRA staffing structure, inspection and enforcement duties under the "Duty of Care" provisions of the EP Act 1990 will be confined to areas where there is significant environmental impact.
17	The Authority will continue the Waste Survey of for the County of Avon and produce a Waste Disposal Plan as required by Section 50 of the EPA 1990. The initial target for the production of the Plan will be the end of 1994.
18	The Authority will delegate to the County Planning Officer the power to deal with the implementation of the Environmental Information Regulations 1992 and levy an appropriate charge.
19	The Waste Regulation Policies WRA5, WRA7. WRA8, WRA13 and WRA14 be reviewed and a new policy introduced which will provide the County Planning Officer with the Authority to refuse processing of the various applications where specified criteria has not been met.
20	Representations be made to the Government on the need for the Regional Committees (of the Environment Agency) to contain representatives who would be accountable to the public and experienced in the field of waste management (Public Protection Committee. When creating Environment Agency the Public Protection Committee stressed the need for public accountability in its dealings.
21	That a Joint Ad Hoc Working Group be agreed, to comprise members of the Public Protection Committee, Planing, Highways and Transport committee and Resources (Environment) Sub-Committee for the purpose of facilitating the joint production of "Waste Disposal and Waste Local Plans", "Three members of each committee be nominated to serve on the Joint Ad Hoc Working Group;". " The Joint Ad Hoc Working Group be convened once both plans had been progressed further and at time when appropriate decisions would be required from Members;". "That the decision of the committee be referred to the Planning, Highways and Transport Committee and Resources (Environment) Sub-Committee for consideration and nominations to the Joint Ad Hoc Working Group."
22	"New duties (relating to the Waste Management Licensing (Amendments etc.) Regulations 1995, be delegated to the County Waste Regulation Officer", with regard to scrap related activities, the County Waste Regulation Officer would: (i) provide regular updates to the Committee on the position with registered scrap exemptions; report to Committee any registered scrap activities which on inspection, fail to make the exemption criteria; (ii) advise Committee of registered scrap operators who fail to renew the annual fee or whose registration is subsequently cancelled; and "For licensing proposals where the WRA is required to judge the Technical Competence of the site manager, those whose competency is subsequently held in question (thereby preventing the issue of the licence and possibly affecting the employment of individual) should be considered by the Committee before the final decision is taken".

Abstracted from: Avon County Council, Waste Management Plan, pg. 103-111. (March 1996)

Bedfordshire Structure Plan (Policies related to waste)

102	The CC's waste disposal policy will be based on rigorously controlled tipping on landfill sites and the CC will normally only permit the deposit of controlled waste on land previously used for mineral working. In implementing this policy the CC will have particular regard to its priority of restoring the brick pits in Marston Vale.
103	When considering applications for new, or extensions to existing, landfill sites, particular attention will be paid to:- i. the desirability of filling the site in question in order to achieve a high standard of restoration; ii. the need to ensure that there is no danger of pollution to water resources and no effect upon fold storage and flood plain areas iii. the transportation implications of the proposal, both items of the impact on the County highway network and local consideration of access to the site; iv. the visual impact of the proposed operations on the landscape, especially when in, or adjacent to, Areas of Outstanding natural Beauty, Areas of Great Landscape Value, or on areas popular for recreation v. the effect on, and relationship to, sensitive nearby land uses by reason of noise, dust, smell, litter and general disturbance vi. the likely effects of the production of gas vii. local environmental and wildlife consideration Before granting permission for the disposal of any waste materials, the CC will need to be satisfied as to; viii. the availability of suitable material in sufficient quantities to ensure that the development is implemented in a satisfactory manner and completed within an appropriate time scale, and that the site is restored on a progressive basis such as to make possible an after use ix. the proposed method and programme of tipping and restoration and provisions for adequate landscaping and screening to protect local amenities x. arrangement for the aftercare and management of the restored land xi. arrangements, where necessary, for the control of gas during and after tipping and for monitoring of

	leachate.
104	The CC will not normally permit the deposit of controlled waste on agricultural land. Where exceptions are made to this policy the Council will need to be satisfied that; I. there is a need to raise the level of the land in order t improve it for agriculture purposes; Ii. the application meets the criteria of Policy 103 Iii. the operation will be carried out in competent manner
105	There will be a general presumption against the use of additional sites for the disposal of special wastes. If, exceptionally, the CC is minded to grant or renew a permission for the disposal of special wastes, it will have particular regard to the criteria outlined in Policy 103
106	The CC will actively encourage the extension and use of gas from landfill sites where commercially viable
107	The local authorities will encourage the recycling of waste products by the siting of suitable facilities at tidy-tips and other appropriate locations throughout the County.

Abstracted from: Bedfordshire County Council : Waste Management Statement 1995 - 2005, pg, 55-57. (March 1996).

Bedforshire CC Waste Management Policies

1	The CC will encourage a reduction in the overall dependent on landfill as means of waste disposal by promoting waste avoidance, the minimisation of waste at source and encouraging the development of alternative means of waste treatment. This would be through the re-use and recycling of materials, material recovery facilities, incineration with power generation and heat recovery and composting.
2	The CC will seek to maximise the use of recycle materials in its purchasing policies and construction contracts and will encourage this philosophy in other organisations.
3	The CC will encourage proposals for recycling and will co-operate with District Councils in any review of their Recycling Plans seeking to achieve a co-ordinated and consistence approach within the County.
4	The CC will seek to ensure the provision of at least one high quality waste transfer/recycling centre within five miles of the major centres of population.
5	The CC will encourage the provision of a network of high quality waste transfer/ recycling facilities for commercial wastes close to centres of commercial activity.
6	The CC will seek to ensure that there are sufficient inert only waste disposal sites throughout the County.
7	The CC will seek to dispose of waste materials at least possible cost to the community having due regard to the safeguarding of the environment and the use of waste as a resource.

Abstracted from: Bedfordshire County Council: Waste Waste Management Statement 1995 - 2005, pg. 61-64. (March 1996).

Berkshire Waste Management Plan

1.	The CC will; • licence to appropriate standards non-exempt operations for the keeping, treatment and disposal of waste, ensure that the conditions of such licences take full account of the requirements and recommendations of all legislation and guidance applicable, and ensure that best practice is followed; • register exempt operations for the keeping, treatment and disposal of waste (as required by statute); In order to prevent: a) pollution of the environment b) harm to human health c) serious detriment of the amenities of the locality
2.	The CC will ensure; • the provision of a level of site inspection and monitoring at licensed sites based at least upon the minimum standards of Waste Management Paper 4 • the regulation, inspection and monitoring of registered exempt activities
3.	The CC will; take appropriate enforcement action against breaches of site licence conditions • take enforcement action against non-exempt sites not licensed for the keeping, treatment and disposal of waste • take enforcement action against registered exempt activities which are not meeting the objectives of the waste management licensing system
4.	The CC aims to ensure that up to date legislative requirements and operating standards are applied to all licensed waste activities by reviewing licences at intervals of no more than four years
5.	The CC aims to monitor closed waste disposal sites in order to identify those which pose a potential threat to

	human health and the environment. Accordingly the CC will; • advise landowners of such sites of the need for remedial works and inspect those works to ensure their satisfactory completion or • In cases where the landowner cannot be locates in sufficient time to avoid harm to human health and the environment, undertake the necessary remedial works and recover the full costs from the landowner
6.	The CC will maintain a database of old waste disposal sites sufficient to provide advice to District Councils regarding proposal for development within 250 metres of identified site.
7.	The CC will produce an Annual Report on the discharge of the functions of the Waste Regulation Authority. Included in the Report will be an assessment of the implementation of the Waste Management Plan and any corrective measures required
8.	The CC will review the Waste Management Plan every three years and amend or alter the Plan In the light of the findings of such reviews.
9.	The CC will seek to change the attitudes of householders, young people and business so that they appreciate that waste and its environmental impacts are relevant to them, and that individuals, groups and businesses have a significant role to play in bringing about community benefits through waste minimisation, re-use and recycling.
10.	The CC will support (including a contribution to funding) a partnership with the Borough and District Councils through the Berkshire Recycling Forum in order actively to spread information regarding waste reduction and recycling the communities of Berkshire
11.	The CC will seek to decrease the amount of household waste being produced by; • forming partnership with Borough and District Council and other interested bodies providing waste and environment related advice and information • giving a consistent message to householders emphasising waste minimisation, re-use and recycling options and opportunities
12.	The CC will seek to decrease the amount of all wastes being produced by young people and schools by; • forming a partnership with people and schools (both primary and secondary) and Borough and District Councils providing waste and environmental information for use within the National Curriculum • promoting self examination of the existing use of resources by means of environmental auditing • giving a consistent message emphasising options and opportunities for waste minimisation, re-use and recycling
13.	The CC will seek to decrease the amount of industrial and commercial waste being produced by; forming a partnership wit business and Borough and District Councils providing waste and environment related information promoting the self examination by business of existing Industrial and commercial process and practices through the use of environmental or waste audits setting up a joint and/or promoting existing arrangements with business and Borough and District Councils for waste exchanges and business waste recycling points supporting Borough and District Councils Business Forum
14.	The CC will seek to reduce the amount of waste requiring treatment and /or disposal by undertaking, either directly or indirectly by encouraging others, initiative to recycle the highest sensible portion of all controlled wastes
15.	The CC will ensure that its own activities are undertaken in ways which will, wherever possible, contribute towards achieving a sustainable and environmentally friendly use of resources.
16.	The CC will play its full role in helping to achieve the recycling of 25% of household waste by the year 2000 and to increase this to 35% by 2006
17.	The CC aims to support the efforts of Borough and District Councils and others involved in the recycling of household waste by; • extending its existing bank systems and establishing new systems at both Civic Amenity Sites and other convenient locations • providing sites on suitable CC property for the collection of household recyclables (provided such sites conform to the Guidance Note for Local Recycling Sites) • providing storage an sorting facilities at convenient locations • forming a marketing partnership for the sale of recyclables for the secondary materials market • Influencing and stimulating the use of secondary materials in order to increase demand • giving financial support to Borough and District Council and selected third parties by means of Recycling Credits • giving financial support to local innovative and pilot schemes for new uses of recycled waste form money saved by the CC's recycling efforts
18.	The CC will play its full role in helping to achieve the recycling of 15% of industrial and commercial wastes by the year 2000 and to increase this to 25% by 2006. Such recycling will be carried out by the business concerned and the waste industry.
19.	The CC aims to promote the recycling of industrial and commercial wastes by; • providing at cost, a waste audit service advise business on the way to treat and/or dispose of their wastes, bearing in mind the main criteria of environmental and financial benefit • encouraging the 'at source' sorting of these wastes at business premises, in order to make recycling as simple and economic as practicable • encouraging the provision of recycling facilities by the waste industry and making arrangements for

	businesses to directly use storage and sorting facilities provided initially for household wastes
20.	The CC will play its full role in helping to achieve the recycling of 30% of inert waste by the year 2000 and to increase this to 40% by 2006. Such inert waste recycling will be carried out by the waste industry
21.	The CC will aims to support and increase the recycling of inert wastes by; • encouraging the on-site recycling of inert material arising at development sites • encouraging the provision of sufficient inert waste sorting, processing and storage sites to meet the demand for such recycled aggregates and other similar material • seeking to ensure that inert waste from Civic Amenity Sites and commercial and industrial sources is collected separately and sent to inert waste recycling sites • for civil engineering and other works within its control, providing specifications which will encourage and permit the use of recyclable materials if it is technically and economically feasible
22.	In making provision for waste management facilities, the CC will seek to balance the need to treat and/or dispose of waste with the need to protect living conditions and the environment
23.	The CC will seek to phase out the disposal to landfill of putrescible waste in Berkshire and of Berkshire's putrescible waste outside the County by the year 2006
24.	The CC will seek to treat as much waste as is practicable via alternative technologies to landfill, ensuring that • the best available technique not entailing excessive cost is used taking account of any emerging statutory requirements as far as these are known • the sensible recovery of recyclables from the waste is maximised • where energy from waste is generate as mush is recovered as is practicable and economic • as much waste as is practicable is processed into useful resources or products • as much waste as is practicable is treated, there by minimising that going to landfill
25.	The CC supports the need for the Government to introduce financial measures intended to preserve non-renewable energy resources and reflect the true cost of landfill
26.	The CC will seek to ensure the provision of landfill sites to meet the changing disposal 'needs' of controlled wastes arising in Berkshire over the period of the Plan provided that; • the capacity of such sites does not compromise the implementation of alternatives to landfill • all landfill sites meet the requirements of the Guidance Notes for Design of Landfill Sites in Berkshire
27.	The CC will seek to ensure that; • as much Difficult and Special waste as is practicable is dealt with in-County by licensing suitable landfill sites and alternatives to landfill • there are sufficient suitable facilities to enable those wastes which cannot be dealt with in-County to be safely stored before being transported out-County for treatment and/or disposal at licensed facilities • as far as is practicable all facilities provided under this Policy meet the requirements of Policies WM24 and WM26
28.	The CC aims to ensure that waste disposal by land raising is not permitted unless it is clearly demonstrated that there is no practical alternative
29.	The CC will seek to ensure the provision of waste management facilities to meet the essential needs of waste produced in Berkshire for as wide a range of waste as practicable. Treatment facilities which also cater for selected wastes produced in surrounding counties (including the rest of the South East Region) may be acceptable where these facilities make a significant contribution to Berkshire's needs. In considering the level of provision required, account will not be taken of waste imported into the United Kingdom for landfill
30.	The CC will seek the implementation of landfill gas utilisation measures at all new waste landfill sites receiving putrescible waste
31.	The CC will provide a service for the treatment and/or disposal of household waste by; • normally inviting competitive tenders from the waste industry • ensuring that any service purchased will minimise pollution of the environment and harm to human health and maximise recycling • favouring contractors which have achieved quality assured operations to BS 5750 or ISO 9000 (this will be tender qualification requirement form 1st July 1996) • (with respect to contracts involving transport) ensuring that tenders offer the alternatives of sealed and unsealed contained transport
32.	The CC will seek to improve the service provided at Civic Amenity Sites by; • increasing the number and/or size of sites, provided there is a demonstrable need for further facilities • increasing the recycling of waste at the Civic Amenity Sites as much as is practicable in order to decrease that going to treatment and/or disposal • receiving selected wastes for business for recycling or disposal • when alternative technologies have been implemented, separating wastes as required in order to ensure that the minimum practicable is disposed of to landfill

Abstracted from: Royal County of Berkshire: Waste Management Plan for Berkshire, pg. 44-99. (July 1995).

Berkshire Waste Local Plan

01	In identifying land or considering proposals for waste management development the County Council will have regard to the extent to which the development is sustainable in form and location and helps to conserve natural resources and minimises traffic congestion, travel distances, waste generation and pollution
02	In considering proposals for waste management development, account will be taken of the extent to which the development contributes positively to the achievement of the waste management strategy and its hierarchy of priorities. Proposals which conflict with or prejudice the strategy and priorities will normally be refused.
03	The CC will seek to make provision for meeting Berkshire's waste management needs in ways which are consistent with the Council's waste management priorities and the environmental capacity of the County to accommodate waste management development.
04	The CC will seek to phase out the use of landfill and land raising in Berkshire as a method of disposal of putrescible waste by 2006
05	Berkshire will seek to make an appropriate contribution to meeting regional waste management needs in ways which are consistent with Council's waste management policies and the environmental capacity of the County to accommodate waste management development.
06	Proposal for development will be expected to include provision for, and provide the submission of details in respect of, measures, to; • minimise, re-use and recycle waste; • minimise the pollution potential of unavoidable waste • dispose of unavoidable waste in an environmentally acceptable manner The Local Planning Authorities (LPA) will not normally permit application which do not adequately address these requirements
07	The LPA will seek to encourage and support appropriate action and initiatives to reduce the creation of waste and give favourable consideration to appropriate development proposals which are required for the purpose of minimising and re-suing waste or which incorporate the waste minimisation and re-use measures.
08	In considering proposals for development, the LPA will seek to ensure that the development provides for the use of recycled materials where appropriate.
09	The LPA will require major development proposals and proposals attracting a significant number of people to provide as an integral part of the development; facilities for the public to recycle waste (bring system) facilities within individual or groups of properties or premises that the requirements of policies WLP26, WLP29 to WLP32 and all other relevant policies of the Plans are satisfied.
10	In considering proposal for development not covered by Policy WLP9, the LPA will seek to ensure that the development makes appropriate provision for the recycling of waste.
11	The sites listed in Table: Policy WLP1 are identified as preferred areas and preferred areas of search for waste management uses. These preferred areas are identified on the Proposals Map and shown in more detail in Appendix 7
12	The CC will seek to ensure the maximum practicable re-use, recovery and recycling of Berkshire's waste by granting permission for waste management facilities in appropriate circumstances and locations.
13	The LPA will normally permit, I appropriate circumstances and locations, proposals for establishing source separation and storage facilities for waste generated in dwellings and groups of dwellings and industrial and commercial premises provided that the requirements of policies WLP26 and WLP29 to 32 and all other relevant policies of the Plan are satisfied.
14	Planning permission will not normally be granted for the disposal of wastes in engineered landfill sites except in the following categories: • putrescible/polluting waste which is not recyclable and not suitable for alternative treatment by processing • the rejects and residues of waste recycling and treatment • putrescible/polluting waste which cannot practically be disposed of by any another means • inert waste which is necessary for operational needs
15	Proposals for engineered landfill sites must include provision for facilities for the separation of putrescible/polluting waste from inert waste and the removal of recyclable wastes prior to landfilling. Waste which is received at the site and has not been subject to previous separation, recycling, or treatment must be sorted and separated and the recyclable fraction removed prior to final disposal. Proposals must include appropriate facilities for this purpose either on the landfill site as appropriate for elsewhere
16	Outside Preferred Areas, proposals for waste management development will normally be permitted on sites within existing permanent waste management facilities or within existing or proposed Industrial areas [containing a proportion of uses in the Use Classes categories B2 to B8]. subject to: • consideration of environmental impacts • the proposals overcoming or accommodating all constraints deriving from the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan.
17	Outside Preferred Areas, proposals for green waste composting will be supported in principle outside built-up areas and settlement boundaries defined in Local Plans where this involves the re-use of authorised permanent buildings which are in keeping with their surroundings or the use of land within or adjacent to farm building complexes, subject to; • the proposals being appropriate in scale, form, character and siting to its location in the countryside

	• the proposals overcoming or accommodating all constrains deriving from the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan
18	Outside Preferred Areas the LPA will support in principle proposals involving the processing of sewage sludge and other suitable waste within existing sewage works, subject to: • the proposals being appropriate in scale, form, character and siting to its location • the proposals overcoming or accommodating all constraints deriving form the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan.
19	Outside Preferred Areas, the LPA will support in principle proposals involving the treatment of suitable farm and stable wastes on farms and stables, subject to; • the proposals being located within or adjacent to existing groupings of farm building • the proposal being appropriate to scale, form, character and siting to its location • the proposal overcoming or accommodating all constraints deriving from the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan
20	Outside the Preferred Areas for engineered landfill set out in Policy WLP11 applications for engineered landfill may be acceptable where the proposal forms part of a planning permission for mineral extraction outside the Preferred Areas in the Replacement Minerals Local Plan but which is approved pursuant to the provision of that Plan, or to subsequent amendments or revisions thereof; provided that; • the landfilling of waste is appropriate and necessary to achieve satisfactory restoration of the mineral extraction site; • the site satisfies all of the technical requirements for engineered landfill and the proposed infilling forms part of a comprehensive scheme of restoration • the resulting final landform, landscape and after use are sympathetic t the character of the surrounding area • the proposals overcome or accommodates all constraints deriving form the considerations set out in Policies WLP26 and WLP29 to WLP32 and satisfy the requirements of Policies WLP14 and WLP15 and all other relevant policies of the Plan.
21	The CC will seek to safeguard for appropriate waste management purposes: • the existing permanent authorised sites in waste management uses: civic amenities, and household waste transfer stations • sites for minerals extraction which are in accordance with the provision of the Draft Replacement Minerals Local Plan where landfilling would form an acceptable and appropriate means of restoring the mineral working and which are suitable in technical and planning terms for engineered landfill • sites where permanent permission is granted for the establishment of waste treatment, recycling, storage and transfer facilities which the CC considers are essential to the achievement of the objectives of the Waste Management Plan
22	There will be support in principle for temporary facilities on demolition and constructions sites for the recovery, separation and where appropriate, processing of the waste materials generated, subject to: • consideration of environmental impacts • the proposals overcoming or accommodating all constraints deriving from the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan.
23	Proposal for temporary inert waste and skip waste recycling facilities on inert waste landfill sites for the duration of the landfill operation will normally be permitted provided that; • the recycling relates to waste brought to the site for disposal and is required to separate inert waste from putrescible/polluting waste and recover recyclable materials • the proposals overcome or accommodate all constraints deriving form the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan.
24	the disposal of inert waste by landfilling will only normally be permitted in: • preferred areas for mineral extraction identified in the Replacement Minerals Local Plan and subsequent amendments and revisions thereof where there is a requirement for filling is limited to that which is required to achieve the restoration objectives set out in that Plan • other sites approved for mineral extraction pursuant to the policies of the Replacement Minerals Local Plan where the disposal of waste forms an appropriate and necessary part of a scheme to achieve satisfactory restoration of the mineral site • the proposals overcome or accommodate all constraints deriving or accommodate all constraints deriving form the considerations set out in Policies WLP25, WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan
25	Planning permission will not normally be granted for the disposal of inert waste by landfill unless proposals can demonstrate that the material to be deposited will undergo sorting and processing to remove recyclable and any non-inert materials prior t landfilling. Where waste is likely to be received untreated the proposals must include provision for temporary sorting, transfer and recycling facilities at the landfill site where appropriate or elsewhere
26	Planning applications for waste management development will only be permitted if the LPA are satisfied that: • there is a need for the development and/or there is a wider environmental benefit resulting form it which outweighs the adverse environmental and other effects resulting for it • the development and its associated traffic would not give rise to any unacceptable adverse environmental impacts
27	In considering whether to make an exception to the general presumption against development which does not accord with the provisions of Policies WLP11, WLP16 to WLP21 and WLP23 to WLP24 and WLP34, the CC

	will make account of: • whether there is a need to develop land outside the preferred sites or other areas defined in the above policies in order to meet the need for waste management facilities as defied by the Plan • whether the need could be mote acceptable met elsewhere than on the application site, having particular regard (among other things) to the presumptions against waste management uses in the specific areas indicated in Policy WLP28 • whether the proposals overcome or accommodate all constraint deriving form the considerations set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan.
28	There will be a strong presumption against allowing waste management development, either within or adversely affecting the following areas: • areas designated as sites of Special Scientific Interest • statutory nature reserves • Scheduled Ancient Monuments • land owned by or covenanted to the National Trust • common land and town or village green • major historic parks and gardens • conservation areas • statutory Green Belt land • the sites and settings of buildings and features of architectural and/or historic interest • groundwater protection areas where the proposals would conflict with National Rivers Authority's groundwater protection policy • the function of land important to the character or amenities of individual settlements, including land important to the separation of settlements except for: 1. the landfilling of waste where this forms an acceptable and necessary element of permitted mineral extraction 2. temporary waste recycling and transfer facilities located on landfill sites in accordance with Policies WLP15 and WLP23 • Metropolitan Green Belt and land outside built up areas and settlement boundaries except for the following purposes: a) the landfilling of wastes where this forms an acceptable and necessary element of permitted mineral extraction and restoration b) temporary waste recycling and transfer sites located on landfill sites in accordance with Policies WLP15 and WLP23 c) green waste composting in accordance with the requirements of Policy WLP17 d) the treatment of sewage and other wastes in accordance with the requirement of Policy WLP18 e) the treatment of farm and stable waste in accordance with the requirements of Policy WLP19 • North Wessex Downs Area of Outstanding Natural Beauty and Area of Special Landscape Importance except for the following purposes: 1. the landfilling of wastes where this form an acceptable and necessary element of permitted mineral extraction and restoration 2. temporary waste recycling and transfer sites located on landfill sites in accordance with Policies WLP15 and WLP23 3. the treatment of sewage and other wastes in accordance with the requirements of Policy WLP18 4. the treatment of farm and stable waste in accordance with the requirements of Policy WLP19 • areas at risk form flooding except in exceptional circumstances where adequate and appropriate flood compensation measures are provided as part of the proposals • Wildlife Heritage Sites, Parks and Gardens of County Importance, and non-scheduled archaeological sites meriting preservation in situ where these interests would be harmed by waste management development; • the immediate settings of rivers and canals where this would result in material adverse impacts
29	Within the framework provided by Policy WLP26, the merits of waste management development proposals will be assessed having regard to all relevant considerations and in particular: • the likely effects of the traffic and traffic-related impacts which the development would generates; • the need to safeguard living conditions • the likely effects of the proposed development on air and water quality, including the possible amenity and wider environmental implications of any emissions, changes in quality and quantity of watercourses and groundwater and drainage and flooding impacts • the effect on the landscape and visual impact of the proposed development and the need for additional on-site and off-site landscaping including planting and screening, planting in advance of the development and the need to safeguard areas of attractive landscape and local landscape character, individual landscape features (woodlands, hedgerows etc.) and areas of nature conservation landscape values; • the need to safeguard the character and amenities of individual settlements and to safeguard important open gaps between settlements form development which would cause long-term harm to the function of the land • the need to safeguard and enhance the character and use of sites used for recreation and public rights of way • the need to safeguard sites of ecological, geological, archaeological, historic, architectural or scientific importance

	• the likely cumulative effects of the proposed development in combination with other developments taking place, or permitted to take place in the locality • the need to minimise disturbance form waste disposal operations by securing the phased released of sites where appropriate and the orderly progression of working and restoration where landfilling is taking place • the need to ensure satisfactory restoration, after-care and management of sites for an acceptable after-use.
30	Every application for waste management development must be accompanied by a written statement, drawings and plans which: • describe the existing conditions of the site and surroundings • set out the detailed development proposals • analyse the implications and impact of the proposals against relevant factors in Policies WLP26 and WLP29 • explain the measures proposed to overcome or accommodate relevant issues and constraints and mitigate any adverse impacts • assess the degree to which these measures address the constraints and overcome any such impacts Proposals which do not provide sufficient information or fail to meet the environmental standards and planning requirements set out in the relevant policies of this Plan will not normally be permitted.
31	The CC will require an Environmental Statement to be submitted with a planning application where, having regard to the relevant Regulations and the provisions of DoE Circular 15/88, it appears to them that proposals for waste management are likely to have significant environmental effects. Any decision not to require such a Statement in a particular case will cot preclude the Council, when taking the decision on the overall merits of the application concerned, form judging that the environmental effects of the proposal are sufficient to justify refusing planning permission.
32	When considering proposals for waste management development, opportunities will be sought for securing environmental improvements and other benefits both on site and in the surrounding area to which the proposed waste management facility relates for environmental enhancement and the promotion of conservation and recreational opportunities.
33	The LPA will not normally permit the disposal of waste by land raising unless; there is no reasonably practicable alternative, including the use of existing waste disposal facilities the benefits of the scheme outweigh the environmental impacts and other adverse impacts which the development is likely to cause the proposal overcomes or accommodates all constraints deriving from the consideration set out in Policies WLP26 and WLP29 to WLP32 and all other relevant policies of the Plan

Abstracted from: Royal County of Berkshire: Deposit Draft Waste Local Plan for Berkshire, pg. 37-104. (December 1994)

Buckinghamshire WRA Policies

1	The Authority will require applications for the landfilling of putrescible waste to have been preceded by an investigation of the potential for landfill gas utilisation. Where the investigation demonstrates such a scheme to be environmentally acceptable, the Authority will expect to see theses details include in the application. At existing sites, the Autoharp will also encourage the utilisation of landfill gas.
2	The Authority considers that no deposit of waste with landfill gas generating potential should take place within 250 metre of residential development unless the Authority is satisfied that measures can be taken for the monitoring and control of landfill gas such that this distance can be reduced. Under no circumstances will the deposit of waste with landfill gas generating potential be permitted within 50 metres of residential development.
3	Waste Management Licences issued by the WRA require the operator to monitor landfill sites for the presence of landfill gas at a frequency recommended by Waste Management Paper No 27, with periodic checking undertaken by the Authority. Where monitoring indicates gas level in excess of Government guidelines, the WRA will require remedial action be taken.
4	Sites at which it is proposed to deposit putrescible wastes must be capable of being engineered to minimise the escape of polluting matter so as to avoid pollution of water, land, or air. Such sites are unlikely to be considered suitable within groundwater protection zones or where constraints to effective pollution prevention measures are present.
5	Waste transfer facilities at which it is proposed to accept degradable or putrescible waste must be constructed and operated under cover, except where the waste is to be deposited directly into container, prior to prompt disposal elsewhere.
6	The Authority will seek to ensure, as far as possible, that the movement and disposal of Special Wastes within the County is carried out in accordance with statutory procedures.
7	The Authority will seek to ensure that difficult waste is handled, treated and disposed of by the most appropriate means. This is likely to involve transpiration of the waste to suitable specialist facilities.
8	The Authority will consider, on their own merits, applications to import waste into Buckinghamshire in accordance with the Transfrontier Shipment of Waste Regulations 1994. The Authority will object to the importation of waste for landfilling (other than the landfilling of pre-treated residues) and will resist unnecessary movements into or out

	the County that do not accord with the proximity principle.
9	The Authority will continue to research into the options for the treatment/disposal of discarded tyres. In the absence of alternative reclamation/disposal routes, the Authority advocates the shredding of tyres where they are likely to be disposed of in significant quantities.
10	The Attire will seek to ensure that the correct means of storage, transportation and disposal are employed in respect of clinical waste, as defined by regulations. The Authority considers high temperature incineration to be the most appropriate means of disposal for this type of waste.
11	The Authority recognises the importance of waste minimisation and will promote the avoidance and reclamation of waste at source by all producers of waste in line with the requirements of Article 3 of the EC Waste Framework Directive. To this end, it will provide a service to liaise with industry and commerce and advise on good practice.
12	The Authority will seek to ensure that information and advice on the requirements and implications of the EPA 1990 is made available to industry, commerce and the general public in accordance with the requirements of the Freedom of Access to Environmental Information Regulations 1992; in particular it will seek to promote the Duty of Care.
13	The Authority will seek to determine waste management licensing, waste carrier and waste broker applications within the statutory time period; where the complexity of the application does not allow for this, the applicant will be requested to permit an extension of that time period.
14	Waste Management Licences will be reviewed and updated on a frequency not exceeding five years in order to reflect the increasingly higher standards demanded of waste facilities.
15	The Authority will provide sufficient resources to ensure that licensed waste management facilities are incepted, as a minimum , at frequency in accordance with statutory guidance issued by government.
16	The Authority will inspect establishments or undertakings which are registered as exempt form waste management licensing in order to prevent pollution of the environment and harm to human health. Such visits will be unannounced and will be at a frequency that accords with their perceived pollution potential.
17	The Authority will seek to protect the environment form permanent damage by the indiscriminate disposal of waste or the use of inappropriate methods or locations. Where there has been a breach of a licence condition, under control in as short a time period as possible, taking enforcement actin where appropriate.
18	The Authority will have due regard to the proper protection of the environment and the proper use of waste management facilities through the system of monitoring and enforcement of relevant conditions of the waste management licence.
19	The Authority will investigate, within a two day period, any illegal deposit, treatment, keeping or disposal of controlled waste as reported to or identified by the Authority. Where a suspected breach of the law is confirmed and sufficient evidence can be gathered, enforcement action will be taken against the offender as required.
20	The Authority will carry out investigative work at close landfill sites to determine the potential for pollution of the environment and harm to human health. Such work will be carried out with the consent of the landowner and/or the co-operation of the appropriate local authority environmental health department. Priority will be given to investigating closed landfill sites in close proximity to existing developments in order to ensure that there is no risk to human health or property and to enable the Authority to make more detailed responses to planning consultations under the General Development Order.
21	The Authority will endeavour to respond to consultations received under the Town and Country Planning Act 1990 General Development Order within specified time-scales. Where the proposed development is considered to be at risk from migrating landfill gas, the Authority will advise that further investigative work be undertaken and measures adopted to ensure protection of the property concerned. Where domestic housing with gardens is proposed within 50 metres of a known gassing landfill, the Authority will recommend that planning permission be refused unless the developer can clearly demonstrate how the development is to be protected.
22	The Authority will, as far as permitted by regulations, continue to arrange for the provision of a chemical collection service from householders and schools for those (small) quantities of material for which no viable alternative means of collection and/or disposal exists.
23	The Authority will continue to support the work of both the London and South East Regional Planning Conference (SERPLAN) and the South East Waste Regulation Advisory Committee (SEWRAC) in respect of waste management and regulation. The Authority recognises the importance of ensuring that even standards of regulation are applied across the waste management industry in order to provide maximum environmental protection.
24	The Authority will continue to seek to comment on consultation documents issued by Government, and in particular on those related to the formulation of new legislation/guidelines in respect of waste management and regulation.

Abstracted from: Buckinghamshire County Council: Waste Monitoring Statement, pg. 35-38. (April, 1995).

Buckinghamshire Waste Management Plan Policies

1	The CC will seek, within the constraints of policy and with due regard to the safeguarding of the environment and the use of waste as a resource, to dispose of municipal waste at the least possible cost to the community.
2	The preferred disposal route for the majority of municipal waste generated in Buckinghamshire will be direct delivery to landfill
3	The County Council will seek to ensure that there are sufficient inert waste site available throughout the County, and particularly in proximity to urban areas.
4	The County Council will seek to see that provision is made for at least one household waste and recycling centre in those areas which have a combined population, within a five mile catchment area, of at least 10,000 persons.
5	Emphasis will be placed on regarding waste as a resource, both i its potential recyclable content and in its value in the reclamation or restoration of land. The Council will promote the reclamation of waste materials where the process can be shown to be viable in the medium term; the council will support non-economically viable reclamation where it is clearly of environmental benefit when compared to the alternative disposal routes.
6	Whilst priority will normally be given to the landfilling of wastes over landraising, the Authority considers that the latter may be acceptable in certain circumstances, and may even be preferable to infilling unsuitable voids.
7	The County Council will monitor those landfill sites under its ownership, wherein the disposal of waste was carried out by the county Council as Waste Disposal Authority. Remedial works will be carried out where necessary.

Abstracted from: Buckinghamshire County Council: Waste Monitoring Statement, pg. 34. (April 1995)

Cambridgeshire WRA Policy

1	The Authority will regulate waste producers and all waste management activities in Cambridgeshire, including handling, treatment, recycling, transfer and final disposal under the provisions of The Control of Pollution Act 1974 and any subsequent legislation.
2	The Authority will ensure acceptable standards of waste management operations at all waste management sites by the application of appropriate licence conditions backed by inspection and monitoring.
3	The Authority will seek to ensure that all movements of special Waste and Transfrontier shipments of waste in Cambridgeshire are notified to the Authority and will comply with appropriate statutory procedures.
4	The Authority will seek to ensure that all carriers and brokers of controlled waste within the County are registered in compliance with the Control of Pollution (Amendment) Act 1989 and that information and advice is provided to commercial operators and other organisations which have a "duty of care" in handling waste.
5	The Authority will endeavour to identify and reduce unsatisfactory or illegal waste management practices and will take all reasonable actions to correct them through the appropriate channels. In enforcement it will give priority to those cases which involve; a) significant environmental pollution or disturbance to occupiers of nearby premises b) significant irreversible damage to a site c) an operator known to have a record of previous unauthorised activity, or warning against such activity d) continued flouting by licensed site operators of site licence conditions, and may apply the authority's adopted enforcement diversion policy in other circumstances as appropriate.
6	The Authority will endeavour to identify, inspect and monitor the condition of land in which controlled waste has been deposited to detect whether it is in such a condition that it may cause pollution of the environment or harm to human health; and will take such steps as are reasonable to avoid such pollution or harm
7	The Authority will monitor the effect of appeal decisions and take note the effectiveness of status and will make representations to government where improvements may be possible.
8	The Authority will investigate the production and disposal of controlled waste in the County and prepare and modify as necessary a County Waste Management Plan, setting out the arrangements made, required and proposed for the treatment or disposal of such waste.
9	The Authority will liaise with bordering authorities in order to facilitate better co-operation and co-ordination so as to provide a more strategic approach so as to provide a more strategic approach to waste disposal planning and regulation.
10	The Authority will work to persuade all waste producers and handlers in the County to minimise waste and its environmental impacts through the adoption of the EC Waste Management Hierarchy. Particular attention will be paid to applying this hierarchy to the production and handling of potentially hazardous wastes.
11	The Authority will provide advice when requested on the management of materials other than controlled waste and when unsatisfactory or illegal waste management practices come to the attention of the Authority, all reasonable actions will be taken to correct them through the appropriate channels.
12	The Authority will establish and maintain a register of waste regulation information as prescribed by the legislation and will make the register open to free inspection by members of the public at all reasonable hours.
13	The Authority will produce, publish and submit to the Secretary of State, a report for each financial year detailing

	the discharge of its functions under relevant legislation.

Abstracted from: Cambridgeshire County Council Waste Regulation Autority Annual Report 1994/1995, pg. 4-6.

Cleveland CC Waste Disposal Plan Policies

1	The Council will continue to dispose of waste by a combination of incineration and landfill
2	The Council will seek to maintain at least 5 years landfill capacity at all times
3	The Council will seek to develop new landfill sites to meet its future requirements for landfill capacity
4	The waste throughput at the Potrack Incinerator will be maximised in order t minimise the use of landfill space.
5	The Council will provide household waste reception areas, wherever possible, at suitable operational disposal sites.

Abstracted from: Cleveland County Council: Waste Disposal Plan: Draft , pg. 100. (February 1987).

Cumbria CC Waste Regulation Policies

1	The CC will endeavour to licence, monitor and enforce to the required standard all waste management facilities so as to reduce any detrimental impact upon the environment.
2	The CC will provide adequate resources to enable it to provide an effective waste regulation service throughout Cumbria
3	The CC will take appropriate action whenever activities in breach of waste management legislation are detected.
4	The CC will ensure that where leachate forming wastes are deposited all new landfill sites will provide containment and leachate collection facilities in the highest practical environmental standard
5	Liquid wastes, certain clinical and special wastes will only be acceptable at landfill sites if those sites meet both the current legislative requirements and relevant published advise for containment sites and until other more environmentally suitable options become available.
6	The CC will request that an independent environmental assessment with regard to radioactivity be undertaken before considering any application for a waste disposal licence to dispose of sediment form the marine environment.
7	The CC will require operators of all licence landfill sites to provide adequate monitoring and control procedures for landfill gas and will encourage the utilisation of landfill gas as an energy resource whenever possible.
8	The CC will take an active role in local authority organisations, such as the North West Regional Association, which are committed to improving the standards of waste regulation in the North West.
9	The CC will provide general advice and information on waste management matters and will endeavour those concerned of their responsibilities regarding waste management legislation.

Abstracted from : Cumbria County Council: Waste Disposal Plan- Draft for Consultation, pg. 12-16. (February, 1993).

Cumbria Waste Disposal Policies

1	The CC will consider all proposed waste disposal options before deciding upon contracts for the disposal of waste. This decision will be taken only after full investigation of the environmental and financial costs involved.
2	The CC will ensure that its waste management contracts take full account of contractors proposals for minimising pollution to the environment.
3	The CC will continue to undertake both environmental monitoring and any necessary remedial action regarding landfill sites it has operated.
4	All CC waste management contracts will seek to encourage recycling of waste whenever possible.
5	The CC will encourage the recycling of waste through the payment of household waste recycling credits, the maintenance of an industrial and commercial waste recycling information exchange and wherever possible the provision of information and assistance.
6	The CC will review and endeavour to upgrade where necessary Household Waste facilities so that they are all manned, secure, designed and operated to the highest practical environmental standards and meet the general requirements of the people who use them.

7	The CC will endeavour to provide household waste sites throughout the County so that 90% of the resident population live within 5 miles of a facility.

Abstracted from: Cumbria County Council. Waste Disposal Plan. Draft for Consultation,pg 16-19. (February, 19930

Dorset WRA Policies

1	The overall objective of the WRA is to ensure that the transport, keeping, treatment and disposal of waste are undertaken in a manner which does not cause harm to health or cause pollution of the environment.
2	The WRA will encourage waste minimisation through guidance to waste producers and other interested bodies
3	The WRA will ensure sites for the recycling and final disposal are managed to satisfactory standards.
4	The WRA will; I. licence to appropriate standards operations for the keeping, treatment and disposal of waste, ensure that the conditions of such licences take full account of the requirements and recommendations of all legislations and guidance applicable, and ensure that best practice is followed; and ii. register exempt operations for the keeping, treatment and disposal of waste (as required by statue); In order to prevent; (a) pollution of the environment (b) harm to human health; and (c) serious detriment to the amenities of the locality.
5	The WRA will ensure: I. the provision of a level of site inspection and monitoring at licensed sites based on the standards in Waste Management Paper 4; and ii. the regulation, inspection and monitoring at licensed activities exempted by statute form the licensing procedures.
6	The WRA will: I. take enforcement action against breaches of site licence conditions; ii. take enforcement action against illegal sites used for the keeping, treatment, and disposal of waste; and iii. take enforcement action against registered exempt activities which are not meeting the objectives of the waste management licensing system. iv. Take enforcement action against illegal disposal e.g. fly tipping.
7	The WRA aims to ensure that up to date legislative requirements and operating standards are applied to all licensed waste activities by reviewing licences at intervals of not more than four years.
8	The WRA will maintain database of old waste sites sufficient to provide advice to the planning authority regarding proposals for development within 250 metres of any identified site.
9	The WRA will produce an annual report on the discharge of its functions.
10	The WRA will ensure; i. the development of well designed and engineered landfill sites ii. the encouragement of new initiatives in waste minimisation for commercial and industrial companies through advice to local firms.
11	The WRA will continue to provide reliable information on waste production and waste management methods as an aid to all those involved in making waste management decisions.
12	The WRA will provide a register of environmental information in keeping with the principle of freedom of access to information on the environment. This information will be available for inspection at the WRAs main office during normal office hours.
13	key steps that the WRA will take in regard to household waste include; i. supporting initiatives to develop further recycling and waste minimisation for household waste by supporting the work of local authority recycling and voluntary sector schemes ii. supporting the work of the Dorset Recolling Group.
14	The WRA will; maintain environmental control over the disposal, processing and recycling of such waste through the licensing procedure.
15	The WRA will licence the handling of clinical waste prior to incineration and will carry out inspection to ensure the terms of the waste management licence are complied with

Abstracted from: Dorset County Council : Waste Management Position Statemenet, pg. 86-88, (February, 1996)..

Essex CC Policies

1	Sites for deposit of waste will only be permitted where there is an identified national, regional or local need for the facility concerned.
2	Planning permission will not normally be given for the deposit of waste unless the proposals provide for: 1. the restoration of the land to a suitable condition for an appropriate after-use 2. progressive filling, restoration and maintenance of the restored land (for less than five years after completion of tipping) 3. steps to deal with leachate and landfill gas generation following cessation of tipping operations.
2A	In considering the suitability of any site for waste disposal the CC will take account of facilities already available for the deposit of waste and may refuse permission if there is adequate alternative provision.
3	Planning permission will not be given for the deposit of waste where it is likely to have an adverse effect on public safety, local government or underground and surface water, unless proposal are included to fully mitigate the adverse effects.
3A	Planning permission will only be given for the deposit of waste where the transport of waste materials to and from the disposal site is unlikely to cause environmental damage, or significant loss of amenity to residential properties.
4	The deposit of waste will not normally be permitted on land in nature reserves, sites of special scientific interest, sites of archaeological or historic interest, or where it would have an undue on the environment or where it would conflict with country conservation policies.
5	The deposit of waste will not normally be permitted on land in agricultural use.

Abstracted from: Essex County Council :Essex Structure Plan, pg.32 (January 1995).

East Sussex Waste Strategy

1	The CC considers that the waste management framework for East Sussex should be based on applying a hierarchy of options in which the order of preference will normally be; 1. reduction or minimisation of waste 2. re-use of products and materials 3. recovery of resources by • recycling of materials • composting of organic materials • energy recovery 4. disposal of remaining waste to landfill This is subject to the options selected being those appropriate to particular stream of waste being the 'best practicable environmental options' (BPEO) and to the necessary financial resources being available from the local authorities or others to effect implementation.
2	The CC will seek on integrated approach which links together the waste management options appropriate for East Sussex and will strive to secure the most effective use of that integrated system and its network of facilities.
3	The CC considers that the majority of East Sussex waste should be managed and disposed of within East Sussex. This is subject to special consideration of /County border areas and the meeting of specialised needs for which solution outside the County may be appropriate.
4	Within East Sussex, the CC considers that waste should be dealt wit as near as possible to where it is generated. This is subject to environmental, economic and transport considerations which are appropriate to the waste management options adopted: to the functional requirement of those options and the types of facility to be provided and to meeting specialised needs.
5	The CC will seek to promote waste reduction, re-use an increased recycling. This is subject to economic considerations and the overall environmental and other benefits to be gained. The CC will apply this approach in delivering its own services.
6	The CC will support the introduction of composting and energy recovery methods, in addition to Waste Derived Fuel processing, as parts of an integrated system. This is subject to environmental, economic and transport considerations.
7	The CC will seek to reduce the need for land reliance on landfilling. However, it will pursue this disposal methods where it represents the 'best practicable environmental option' (BPEO).
8	The CC will seek to achieve, by all appropriate means available to it, a reduction in construction industry waste being disposed of to landfill to 500,000 tonnes annually by 2000. Particular support will be given to measures aimed at the reduction of waste arising at source through improvements in the design of developments and in construction practices.
9	A programme of actions aim at reducing the amount of construction industry waste disposed of to landfill will be drawn up by the CC, in consultation with the Borough and District Council, and the Construction and Waste Industries. The programme will include considerations of the following; a) the role of strategic and Borough/District planning policies, guidance and control with regard to wastes arising form new development and demolition. b) Preparation of guidance and advice for developers and the construction industry to encourage, through

	improved practices in the design, construction or demolition of development, reduction in waste requiring disposal. c) Setting up a 'brokering' system to co-ordinate the demand and supply of reusable waste materials. d) Lobbying national government for supportive legislation, policy and initiatives.
10	The CC will adopt practices in its own activities including highway and building works which seek to reduce, reuse and recycle construction industry waste, subject to maintaining construction performance standards, and will urge other organisations, including Borough and District Councils, to do likewise.
11	The CC will support the provision of additional recycling facilities in the County for processing construction industry waste by; a) encouraging the production and use of secondary aggregates b) identifying appropriate sites for recycling facilities in the Waste Local Plan
12	The CC will seek to ensure that sufficient landfill capacity is provided in East Sussex to meet the residual requirements for the disposal of construction industry waste as follows; a) encourage small scale inert landfill sites for restoration and enhancement projects b) encourage the provision of inert waste landfill sites in appropriate locations c) provide for appropriate levels of general landfill space for the non-inert elements of construction industry waste that cannot be reused or recycle d) resist the use of landfill space for untreated construction industry waste where it is considered that priority should be given to provision for treated construction industry waste. Acceptable proposals for sites will need to satisfy planning criteria and otherwise accord with the planning policies of the CC.
13	The CC puts forward for consolation, five Options for dealing with household, commercial and other industrial waste. Having considered the responses to the consultation, the CC will formulate a preferred Options to be incorporated in the final East Sussex Waste Management Strategy to be adopted.
14	The CC will monitor the management of Special Waste generated in East Sussex and take an appropriate action to ensure that environmental problems are minimised in this County.
15	The CC will work with East Sussex Health Authorities and the clinical waste management industry to ensure that arrangements made for the disposal of East Sussex clinical waste are appropriate to the hazards of the waste being disposed of.
16	The CC will seek collaboration with the statutory sewage undertakers in East Sussex that adopted strategies for managing sewage sludge that are compatible with the Council's Strategic planning policies, and where appropriate, that inter-relationships are established between the waste management methods adopted by the CC and those of the statutory undertakers and between the facilities to be provided.
17	The CC will seek collaboration with the agricultural industry and NRA to ensure that all agricultural waste are disposed of effectively and with minimal environmental harm. More stringent controls over the spreading of wastes on agricultural land will be sought, and the relevant authorities requested to improve the monitoring of its effects on water resources.
18	The CC will encourage the re-use and recycling of waste arising from mineral operations in East Sussex. The disposal of waste to appropriate landfill sites will only be acceptable when the residual material cannot be utilised for restoration or other comparable purposes, either within the mineral working site producing the waste or elsewhere.
19	The CC seeks to safeguard the environment of the East Sussex coastline, coastal waters and seabed, and navigable rivers from harm arising from the discharge of waste from shipping and the effects of marine pollution. The CC will take action by any appropriate means available to pursue this aim.
20	To implement the Waste Strategy, the CC will take action within its planning, waste disposal and waste regulation responsibilities and its own operations. It will also seek the support and co-operation of other Local Authorities in East Sussex and adjoining areas, the waste industry, the County business community, the statutory and community organisations and local residents. The Council will also lobby Government and other bodies in support of the Strategy.
21	*In implementing the adopted strategy for the management of household, commercial and other industrial waste, the CC as WDA will need to ensure that its contracts with private sector companies are both in line with the Strategy and provide adequate facilities to enable the Council to meet its statutory obligations at all times.*

Abstracted from : East Sussex County Council: East Sussex Waste Strategy Consultation Draft, pg 13-43. (March 1995).

GMWDA Policies

1	The CC will minimise the direct tipping of refuse by investing in treatment plants and bulk haulage facilities
2	When considering proposals for new sites for waste disposal or waste treatment plants, the Local Planning Authority will have regard to; 1. the need for tipping space or waste treatment plants 2. visual amenity 3. the effect (traffic, noise, smell, litter and vermin) on neighbouring development, particularly residential areas 4. public health and safety (geology, proximity to water catchment areas, landforms, proximity to the airport, air pollution) 5. resource conservation (agriculture land, sites of biological interest, recreation potential, future use of the site 6. other County Council policies 7. any relevant matters
3	The CC will seek to reserve those sites specially capable of accommodating hazardous, toxic and noxious waste for these materials.
4	To seek to provide, as far as practicable, and to encourage the provision of sufficient facilities within Greater Manchester for the disposal of controlled wastes arising in Greater Manchester, other than those wastes which require specialised treatment facilities.
5	To seek to ensure, in consultation with other regulatory authorities, the provision of suitable facilities for the treatment of wastes arising in Greater Manchester which require specialised treatment and to encourage the development of treatment facilities to reduce the quantity and toxicity of special wastes disposed of by landfill.
6	Where practicable, to treat those wastes which are capable of treatment prior to disposal, and to pursue treatment and disposal option which would not give rise to pollution of the environment or harm to human health and would provide high standards of environmental protection and maximise the opportunities of recycling of waste.
7	To continue to utilise the existing four wet pulverisation plans as the principal methods of treatment of controlled wastes and to supplement this treatment methods by the continued use of the existing municipal incineration plants, for as long as they remain viable and the employment of practicable end disposal options which may be available.
8	To monitor and assess any technical and economic development of waste treatment, disposal or resource recovery methods with particular reference to their environmental impact, and to consider their adoption and where appropriate and practicable to enter into appropriate arrangements with other parties.
9	To seek to ensure that the Authority's waste disposal function is fulfilled by the use of facilities under its ownership and or control.
10	To continue to adopt landfill as the ultimate methods of disposal of controlled wastes and residues irrespective of the treatment method employed.
11	To seek to acquire sufficient landfill in convenient locations as close to the urban areas as possible to enable the Authority to meets its statutory disposal duties; to utilise compulsory purchase powers, if necessary, to acquire sites of strategic importance; and to consider the adoption of land-raising as an alternative to landfilling, if landfill capacity cannot be secured. In the absence of any prospect of securing landfill capacity within the Authority's area, to seek to export treated and untreated wastes to landfill sites outside the Authority's area.
12	To consider the following factors in the assessment of potential landfill sites; physical suitability sufficient site capacity to be capable of economic development and use environmental impact (ground and surface water drainage, odour, dust, nuisance) planning restrictions location (with respect to arising/collection authority requirements) access (road and rail for import and export) operational considerations health and safety considerations capability of beneficial use upon completion total acquisition, development, operating and restoration costs
13	To continue to accord a high priority to the progressive restoration of operational and completed landfill sites, in order to secure their subsequent beneficial use.
14	To dispose of the GMWDA interest in completed landfill sites at the earliest practicable opportunity; subject to the appropriate statutory requirements, to offer such sites initially to the district council in whose area the site is situated, before any decision is taken to dispose of sites upon the open market.
15	To consider the factors contained in Policy WDA9 in the assessment of potential sites for the provision of treatment facilities, subject to the inclusion of the availability of mains services to meet treatment facility requirements.
16	In order to conserve landfill capacity licensed for the disposal of household wastes, to discourage the use of that capacity for the disposal of commercial and industrial wastes.
17	Where treatment facilities and licensed landfill operated by or under the control the Authority are made available for the reception and disposal of waste from commerce and industry, to impose a charge reflecting the full economic cost to the Authority for the provision of that treatment and disposal service including, where appropriate, the replacement cost of the land used, to impose a discounted level of charges upon the constituent district council

	collection authorities for the disposal of commercial and industrial wastes collected by them under their statutory powers and delivered to the Authority for disposal, and to waive charges for the disposal of wastes, except special wastes, received from registered charities.
18	To provide directly and by means of agency arrangements with the constituent district councils, civic amenity facilities of a high standards and design where members of the public can dispose of bulky and other wastes which are not collected in the course of the normal waste collection service; to upgrade existing facilities where necessary; and to develop the potential for recycling and resource recovery form wastes deposited at these facilities.
19	To encourage and promote recycling of waste materials and to adopt recoiling and resource recovery from waste if, in meeting social needs, the scheme can be demonstrated to be financially viable, to have a significant effected upon the waste disposal workload and to reduce eventually landfill requirements.
20	To encourage and promote the commercial exploitation of gas generated at public and private sector landfill sites
21	To seek to provide specialised facilities for the disposal of clinical wastes, to supplement the declining existing disposal facilities, in order to ensure the safe disposal of these waste types; and to impose a scale of charges reflecting the full economic cost to the Authority of the provision of that disposal service.
22	To provide a service for the collection and disposal of unwanted laboratory etc. Chemicals, free of charge for quantities up to 50kg. from constituent district council premises (e.g. schools), private households, Police and Fire Authority establishments (for safety considerations) and to extend the provision of the service to other defined premises e.g Chemists, commercial producers, subject to the imposition of a charge.
23	To operate and maintain the Authority's reception, treatment and disposal facilities to the highest practicable standards with emphasis upon efficiency, reliability and flexibility and with due to regard to cost, health and safety and local amenity considerations.
24	To expect and encourage the private sector to continue to provide facilities for the treatment and disposal of commercial and industrial waste arisings in Greater Manchester and to maintain the adequacy of provision of treatment and disposal facilities.
25	To encourage all waste producers to limit and reduce the production of waste and to exercise an effective duty of care in respect of their individual waste arising and their use of disposal facilities.
26	To undertake the licensing of all controlled waste treatment and disposal activities in a manner so as to ensure that those activities are managed and operated to the highest practicable environmental and public health standards.
27	To impose conditions, upon waste disposal site licences which will minimise the effects upon the environment, remove danger to public health, cause no water pollution and ensure adequate control of site operations.
28	To ensure that waste disposal facilities are licensed of to the treatment and disposal of the appropriate technically acceptable range of wastes; and to review all such licences on a regular basis to modify licences where such modification is deemed to be necessary.
29	To undertake the regular inspection, monitoring and control of all licensed facilities, to ensure compliance with licence facilities, to ensure compliance conditions and in the event of contravention's, to rigorously enforce statutory and licence requirements.
30	To give particular attention to the extent to which any gases may be produced by waste disposal activities and to impose conditions on waste disposal site licences, to ensure that any such production is adequately monitored and controlled in order to remove any threat of pollution of the environment, harm to human health or severe detriment to the amenities of the locality.
31	Not to permit waste disposal where discharge to water courses or groundwater would fail to meet standards or groundwater would fail to meet standards acceptable to the Regional Waste Authority; to impose conditions on waste disposal site licences to restrict the types of waste deposited and to specify engineering works needed to safeguard against water pollution.
32	To access the suitability for licensing of any future Authority-operated facility for the treatment and disposal of special waste.
33	To exercise the controls over the movement, treatment and disposal of special and hazardous waste within Greater Manchester, arising within and outside the UK and to ensure close co-operation between the regulatory authority and agencies involved.
34	Within the existing legal framework, to oppose the important into Greater Manchester of any controlled waste from outside the UK, unless it can be demonstrated that the waste requires significant specialised treatment and that the treatment required can only be provided by facilities within Greater Manchester.
35	To resist the disposal of liquid wastes and sludge by landfill if other routes are known to be available; to encourage the dewatering of liquid wastes and sludge at landfill sites only if no other suitable disposal route is available, where no pollution of water resources is likely to result and where co-disposal would be compatible with other deposited wastes.
36	To accept for disposal of crocodolite (blue) and amosite (brown) asbestos wastes only if suitable and licence disposal facilities are available; and to continue to provide facilities at civic sites for the disposal of cysotile (white) asbestos.
37	To resist the disposal of low-level radioactive wastes, generated at hospitals, universities, other research establishments etc. within Greater Manchester, at disposal facilities operated by the Authority.
38	To ensure the treatment and disposal of waste sealed in drums at licensed facilities is undertaken in accordance with an approved code of practice.
39	To liase with other waste disposal and regulatory authorities in the north west with a view to encouraging consistent high standard of environmental and pollution control and waste regulation throughout the region.
40	To continue to provide, free of charge, access to information relating to licences waste disposal facilities, waste

	regulatory maters and waste disposal matters, with the exception of; the provision of copies of site licences and resolutions, for which a charge will be imposed searches for the presence of landfill sites and/or landfill gas information for which a charge will be imposed the provision of more than ten sets of consignment notes for the carriage and disposal of hazardous wastes for which a charge will be imposed; and instances of the provision of consistency service to outside bodies, when the levy of a charge will be considered.

Abstracted from: Greater Manchester Waste Disposal Authority Annual Report 1993/ 1994. Pg,. 111-145.

Policies of Hertfordshire CC WRA

1	The WRA, in support of Policy 23 and Policy 23A of the Approved Structure Plan Review Incorporating Approved Alterations 1991, will liaise with local planning authorities and the waste disposal industry to promote an adequate number and distribution of waste disposal facilities of an appropriate type within Hertfordshire.
2	Before the WRA issues a waste management licence it will require the applicant to provide a working plan based on a model plan provided by the WRA at a level of detail appropriate to the size and potential environmental impact of the proposed facility. It will at the working plan to be reviewed regularly and updated as necessary.
3	The WRA will seek, through licence conditions, to prevent pollution of the environment and danger to public health and to minimise detraction from amenity.
4	The WRA will review all waste disposal licence at least every 5 years and update them as necessary to ensure that they comply with continuously increasing standards of environmental protection.
5	The WRA will have regard to Government guidelines in determining inspection frequencies at licensed sites but will give priority to sites where the rate of waste inputs high and where the potential environmental impact so the site is high, or where other factors, including the operator's performance or history, indicate a need for increased vigilance
6	The WRA will seek to reduce all authorised waste disposal and waste handling operations at fixed sites by providing information and advice to waste disposer, and by seeking compliance with the law by offenders. In enforcement it will give priority to those cases which involve: 1. significant environmental pollution or disturbance to occupiers of nearby premises 2. significant irreversible change to a site 3. an operator known to he WRA to have a record of previous authorised activity, or warnings against such activity 4. continued flouting by the operator of standards which would be acceptable at a licensed operation, after a warning has been issued by the WRA
7	The WRA will seek to control fly-tipping of waste by commercial operators and other organisations by providing advice and information to all who have a duty of care in handling waste. It will prosecute in all cases where it obtains adequate evidence of failure in the duty of care
8	Prior to the implementation of /section 61 of the Environmental Protection Act 1990 the WRA will assist District Council in assessing whether former landfill sites in Hertfordshire present a risk form landfill gas, land contamination or water pollution.
9	In assessing acceptable risk relating to waste disposal or handling the WRA will have regard to best current practices as defined in Waste Management Papers or other relevant documents issued by the Government. Licence conditions will include arrangements to secure regular and relevant monitoring to demonstrate compliance with such practice.
10	An annual report summarising motoring data relating to environmental measurements obtained by the WRA in compliance with licence conditions will be published. Information and advice on this data will be made available on request
11	The WRA will gather and process information on waste quantities in Hertfordshire and publish it in annual report.
12	The WRA will encourage and support research into actual or potential adverse environmental effects of waste disposal facilities where such research will assist it to fulfil its regulatory role.
13	The WRA will provide information and advise to waste producers to promote waste avoidance and recycling and so minimise the need for landfill
14	The WRA will encourage and support the utilisation of landfill gas.
15	The WRA will ensure accurate and timely information on any waste disposal activity is available. It will encourage and support the formation of local liaison committees.
16	The WRA will liaise and co-operate with other authorities, particularly WRA, to promote efficient joint use of resources where appropriate, and consistently of waste regulation policies and standards.

Abstracted from : Hertfordshire County Council :Waste Disposal Statement 1992-1997. Pg. 18-21. (March 1993)

Hertfordshire County Structure Plan Policies (relating to waste)

23	The CC will permit the handling and disposal of refuse and other wastes provided that; 1. disposal of waste restores land severely damaged by mineral or other works or forms parts of a scheme for mineral working and subsequent site restoration in accordance with policy 9 2. Completion of disposal activities leads to an appropriate and beneficial after-use of land 3. disposal does not give rise to unacceptable adverse effects on the local environmental or adversely affect the interests of landscape conservation, nature conservation and archaeology 4. screening and landscaping of the site is carried out in advance of and during operations and there is prompt and effective restoration of all disposal areas There will be a general presumption against the tipping of waste materials on all open land except where the local planning authority is satisfies that significant agricultural or land drainage improvements or landscape enhancement will result.
23A	The CC will support the establishment of waste transfer stations and recycling plants at suitable strategic locations in the county, taking into account national, regional and local needs for such facilities. Sites should normally be located within or close to urban areas and close to the main highway or rail network, and development of such sites should not lead to increase in traffic levels which would be detrimental to the highway network, especially on minor rural roads. Sites processing toxic waste will in addition not be so located as to require access through urban areas. Exceptionally where development is proposed within rural area, it should wherever practical, be sited on existing damaged land, proposals will not normally be permitted in the Chilterns area of outstanding natural beauty or landscape conservation area. Each development must be designed, constructed and operated to minimise its environmental impact, particularly on residential areas.

Abstracted from: Hertfordshire County Council : Waste Disposal Statement 1992-1997. Pg. 64-65. (March 1993).

Kent Waste Management Plan Policies

1	The CC will seek to reduce the reliance on landfill as a means of waste disposal by encouraging proposal for; • minimisation at source by producers • re-use and re-cycling of materials • incineration with heat and/or power production • composting • production of refuse-derived fuel
2	Re-cycling will be promoted by publicity, education and co-operation with District Councils in the preparation of re-cycling plans.
3	The CC will progressively develop re-cycling centres at existing household waste sites in urban areas and will support proposals for household waste and recycling facilities in rural areas.
4	In letting contracts for construction, the CC will take every opportunity to use re-processed material and will encourage others to adopt this approach.
6	The CC will encourage the reservation of strategic airspace for final disposal of treated residues and will support new landfill proposal only when the strategic need has been demonstrated.
7	Proposals for high quality transfer stations will be supported provided they are consistent with the CC strategy, have storage capacity for no more than day's intake and (except for inert waste) are constructed for operation entirely under cover. Transfer facilities for inert waste may include further storage for recycling.
8	The CC will encourage the provision of special waste disposal facilities and will support proposals for special waste treatment plants particularly for acid and alkali liquids.
9	The CC will help special waste producers to meet their responsibilities under the duty of care and will provide information on facilities inside and outside the County.
10	The CC will co-operate with the NRA in identifying arising on non-notifiable liquid wastes and promote the provision of high quality outlets.
11	The CC will continue to research and disseminate information on the options for the treatment of difficult wastes.
12	The CC will continue to provide a service at household waste centres for the collection of very small quantities of difficult and special wastes for which no other viable alternative means of collection exists.
13	The WRA will only license the disposal of clinical waste by incineration. The CC will support proposals for the provision of clinical waste incineration plant at Kent hospitals and elsewhere in the County.
14	the CC will seek the highest practicable standards in order to provide maximum environmental protection by applying appropriate conditions as set out in Appendix N and by continually reviewing standards in conjunction with SEWRAC
15	Applications for licences will be properly and thoroughly considered whenever possible within the statutory

	period., provided the following information has been supplied: (i) evidence of a valid planning consent (ii) a competent and detailed engineering description of the proposal and a working plan. Information discussion will be welcome at the planning stage prior to submission of a licence application.
16	In order to protect the environment, licences waste management facilities will be inspected as a minimum in accordance with guidance issued by the Government in 'Waste Management Paper No. 4 'Licensing of Waste Disposal Sites' and remedial action will be sought if conditions are not being observed. Persistent failure to comply with conditions will lead to prosecution where appropriate.
17	Illegal waste treatment and disposal activities will be investigated and provided this falls within the power of the authority, prosecutions will be carried out where justified and joint action with other authorities will be supported.
18	When necessary, the CC will carry out direct action to remove materials or other wise prevent pollution or damage to the environment and recover costs from the person or group carrying out the activity.
19	The WRA will continue to carry out periodic surveys of gas, leachate and other hazards on closed or completed landfill sites, and carry out controls where necessary. These controls will include the following; (i) inform the site owner as to what is considered necessary to protect members of the public and the environment and to protect the interest of the site owner and neighbouring landowners. (ii) Monitor the installation of remedial measures action. (iii) Carry out appropriate work and recover the costs from landowners who fail to take action.
20	The CC will maintain a register of all licensed waste management facilities and of persons registered in Kent to carry controlled waste.
21	The CC will provide a centre of information and advice on the requirements and implications of current legislation, the location of facilities outside Kent for disposal of waste which cannot be handled in the County, and will pro-actively seek to educate industry and the public in order to prevent thoughtless environmental crime.
22	The CC will continue to influence regional and national policy by supporting the work of the SERPLAN and the SEWRAC.

Abstracted from: Kent County Council: Waste Management Plan, pg. 53-55 (September, 1993)

Leicestershire Waste Management Plan Policies

1	The CC will ensure that the management of all controlled waste incorporates the principle of "integrated waste management" through the implementation of the following strategic hierarchy 1. reduction 2. re-use 3. recovery of materials and energy with equal emphasis on • recycling • energy recovery • composting 4. final disposal
2	The CC will implement the following strategy objectives: a) an on going assessment for the potential to reduce the quantity of waste taken to final disposal by landfill through • waste reduction • waste re-use • waste recycling including composting • energy recovery by anaerobic digestion b) the adoption in 1988 of long term waste management methods taking into account the results of the waste reduction assessment. These adopted methods to commence as soon as development of contractual obligations allow after 1988. c) the placing of contracts t provide flexibility in the choice of waste management methods adopted in 198 and to ensure that waste reduction objectives are met before final disposal.
3	The CC will decide in 1998 which methods will be adopted to achieve the sustained reduction of waste input to final disposal in order to maximise the availability of suitable facilities by 2002.
4	The CC will dispose of the residue of household and civic amenities by controlled landfill. Whenever appropriate preference will be given to disposal sites which employ energy recovery measures from the landfilled waste.
5	The CC will encourage the minimisation of industrial and commercial waste through a dissemination programme based on the Leicestershire waste minimisation initiative. The CC will also investigate the potential for increasing the re-use and recycling of these wastes.
6	The CC will investigate the potential to maximise the re-use and recoiling of secondary aggregates.
7	The CC will seek to increase the range and quantity of special waste disposed of in Leicestershire in order to reduce exportation to counties in the East Midlands Regional Group.
8	The CC will keep under the social, technical and environmental developments affecting the viability of all waste management methods.

Abstracted from: Leicestershire County Council: Waste Disposal (Management) Plan. Consultation Draft, 1995. Pg. 75-87.

Lancashire CC Waste Disposal Plan

1.	The CC will investigate instances of unauthorised waste handling and breaches of waste management licence conditions promptly. In general and depending upon available resources the nature of the possible offence and in particular its seriousness, written warnings will be considered in the first instances. Should there be clear evidence that these warnings have not been adhered to, the CC will consider taking evidence with a view to further, possible legal action being instituted. In the most serious of cases, where pollution of the environment or harm to human health is a direct consequences, where special waste is involved or where frequent offenders are encounter the CC will consider immediate legal action in the first instance.
2.	The Waste Regulation Sub-Committee will act under delegated powers through the Highways and Transportation Committee. At each meeting reports on applications for licences, and for modifications, transfers and surrenders, will be submitted for determination. Draft licences or the wording of modifications thereof will be presented for consideration. Reports containing recommendation according to licence modification, suspension, revocation, transfer and surrender will be presented. Other reports on the application of enforcement powers including statutory notices, prosecutions and carrier revocation will be made. The Local Government (Access to information) Act 1985 will apply to all proceedings. Copies of the agendas of the meetings and will be also available in advance of the meetings and will also be available for public inspection. The meetings will be open to the [public for all items, with the exception of occasions when information is discussed which is defined as exempt under the above Act.
3.	The CC will endeavour to process any application in accordance with time scales set down by the Secretary of State. However, it recognises that this is not always achievable, particularly where more information's needed form the applicant. Rather than formally reject an application on the grounds that it is deficient in its scope or contents, it will endeavour to obtain from applicant sufficient additional information for the scheme to be critically evaluated. In endeavouring to obtain this information, the CC will make explicit the nature of the existing problem area. However the onus will remain with the applicant to provide the information. It is the policy of the CC that guidance will only be given to an applicant in broad terms. Detailed, site specific proposals should be provided by the applicant or by a suitably qualified environmental consultant.
4.	When an applicant for a waste management licence has been received which contains a significant recycling element, the CC will class such an application as a "Fast Track Application". On receipt, such an application will be allocated a Named Officer of the WRA. A second named officer will also be allocated to the project to act as a back-up in case of sickness. The identity of these Officers, along with the fact that the application has Fast Track Status, will be communicated to the applicant on receipt of the application. Unless the applicant expresses the wish other wise. The Named Officer will be responsible for; • having regular liaison meetings either the applicant on the progress of the application • setting up date for meetings, as necessary with statutory consultees • ensuring applicant is aware of exactly what is required of the application and of the manner in which the application is being dealt with • ensuring that, whatever possible, the application is dealt with at the next available meeting of the WRA Sub-Committee • ensuring the application is given a priority in respect of other work under taken by the Authority It should be made clear that this "Fast Track" approach only relates to the manner by which applications for waste management licences are processed. It does not mean that less stringent environmental and other control measures will be tolerated on such facilities.
5.	The CC will ensure that all complaints are dealt with promptly and will establish standards for responding and to complaints. Wherever possible the complainant will be informed of the outcome of the investigation and what, if any further action is intended. The anonymity of complainants who request confidentiality will be respected. A summary of the previous year's complaints will be presented in the WRA's annual report.
6.	The CC will as a general principle and in the light of its statutory duties, consider the merits of any particular course of action in relation to the environmental quality of Lancashire, the health of the County's inhabitants and the effects on business that make up the County's industry and commerce. The level of response will be appropriate to these considerations. While regard will be paid to any potential costs on industry and commerce in Lancashire, the CC recognises that it must uphold the law as approved by Parliament. In parallel, it recognises that litigation of an essentially trivial nature should not be placed before the criminal courts. Accordingly, the CC will continue in its practice of balancing these requirements so that officer time is used effectively and that protection of the environment of Lancashire and the human health of its population is not compromised.
7.	In close liaison with the County Planning Officer, the WRA will look to its powers under Schedule 4 of the Waste Management Licensing Regulations 1994 to undertake a review of waste management sites covered by planning permissions issued prior to 31st April 1994. this review will also include cases where planning permissions are not required, and instances where certificates of established use or lawful use have been issued. The purpose of the review will be to ensure each site conforms to the relevant objectives set down in Schedule 4 to the 1994 Regulations and in the Directive on Waste (75/442) as amended by Directive 91/156. In particular, such a review will: ♦ ensure "that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment and in particular without-

	• risk to waste, air, soil, plant or animals • causing nuisance through noise or odours • adversely affecting the countryside or places of special interest:" (Paragraph 4 (1)(a) of Schedule 4 of the 1994 Regulations).
8.	There will be a presumption in favour of the release of information on waste management activities, including environmental monitoring data. Statutory exceptions to the "right to information" will be acknowledge by the CC. Unless there is a strong reason, as set down in the Environmental Information Regulations 1992, not to release the information it will enter the public domain. Where appropriate, information will only be regarded as confidential for a limited period of time and this requirement will be subject to review. Requests for information to remain confidential will need to be comprehensively substantiated on a case basis. The CC will, wherever practicable, encourage owner of information provided voluntarily (i.e. which falls within Environmental Information Regulations 1992 Regulation 4(3) to make it available to the public. The CC will keep under review its charging strategy for copies of information it provides to industry, commerce and the general public.
9.	Whilst the CC recognises the Government's desire and intention that the Duty of Care primarily involves a significant degree of self regulation, it considers that this must be backed up by checks by the WRA on compliance. Accordingly, periodic checks will be made by visits to waste producers and carrier, along with more regular verification at disposal sites. The latter will be done on occasions at site inspections, but particularly at the time of the site audits referred to in Policy 27 In addition, the CC will endeavour to ensure that, when incidences of non-compliance are brought to its attention by her parties in the Duty of Care such incidences will be investigated thoroughly and promptly and appropriate action will be taken,
10.	The CC will have regard to guidance issued by the Secretary of State, but reserves the right to differ from the guidance in the light of local circumstances and technical and environmental factors.
11.	The CC will continue to investigate, assess and monitor the existing and potential environmental impacts of all landfill sites in the County, in particular to determine whether any such sites may cause pollution of the environment or harm to human health; and will assess the need for regulatory action or other measures to bring about remedial work. The CC will continue to apply for Supplementary Credit Approval to allow the investigation of former sites considered to propose a potential risk to the people and environment of the County. In any case where the CC as waste regulation authority is advising planning authorities about building development which may be affected by existing or proposed landfill sites, the CC will require the developer or the developer's representative to demonstrate the long term safety, security and integrity of their proposals. It will also be expected that local planning authorities will imps appropriate planing conditions to safeguard any existing or proposed development and its users.
12.	Fees and Charges. (I) charges: Holders of Waste Management Licences. Fees and charges will be levied as set down in the Waste Management Licensing (fees and Charges) Scheme 195 (or any subsequent modification) or other appropriate enactment. Invoices to waste management licence holders will be sent out for substance charges by the end of April each year. An explanatory note will accompany the invoices which explains the nature of the charges being levied and the manner by which payment is to be made. The deadline for payment will be included in the bill. Where the licence holder disputes the level of the charge, the holder will be asked to set out the reasons. After these have been considered, the CC will if appropriate, send out a re-assessment of the charge expected. Licence holders will receive two reminders. Should these reminders not result in a payment, the CC will, under s41(7) of the 1990 Act, consider the partial revocation of the non-payer's licence. The partial revocation will relate to those elements of the licence which permit waste to be accepted, kept, treated or disposed of at the site. However, where waste has never been accepted at the site, the CC will consider full revocation of the licence. If the licence holder pays the fee after partial revocation, the holder will be required to make a further application to reinstate the licence. If the licence holder still fails to pay, the site will be subject to appropriate surveillance by officers of the WRA. Should waste disposal or recovery activities be observed on the site after the partial or full revocation, the CC will look to enforcement action in the first instance. In any case the sum outstanding will be subject to the CC normal debt recovery procedures. (ii) Charges: Registered Waste Carriers. Prior to the end of the three year registration period, a registered waste carrier will be sent an appropriate registration form, explanatory leaflet and invoice for the registration, explanatory leaflet and invoice for the re-registration fee. A reminder letter will be sent. (iii) Fees Fees will be set in accordance with the Waste Management Licensing (Fees and Charges) Scheme 1995 (or any subsequent amendment). They will be based upon the type of site, the licensed activity and the quantity of waste that the site is licensed to accept on March 31st of the year. If the applicant successfully applies for a modification to reduce the quantity permitted but the licensed in that year, no refunds will be given. Similarly, no additional charges will be levied if the quantity is increased. However, in the following year any invoice sent out will reflect the reduction in appropriate charge.
13.	The production of an annual report will continue, with intended publication within six months of the end of the financial year, A copy of the Report will be sent to the Secretary of State. Subject to unexpected constraints upon finance, copies of the report will be circulated on publication to all English WRAs, all holders of waste management

	licences in Lancashire and other interested parties. Copies of the report will be available for inspection in the offices of the WRA.
14.	The CC will endeavour to respond to all consultation papers from the Department of the Environment within the time periods set down and in a positive manner.
15.	All licence conditions will be drafted in clear, plain English that permits them to be readily understood by the licence holder, the holder's agent and members of the public. All conditions will be necessity, relevant, unambiguous, enforceable, and comprehensive so that the licence holder and members of the public are able to clearly appreciate the requirements of the licence with respect of any particular site. All licensed waste management facilities will be subject to the following minimum licence requirement;- • clear conditions which describe the nature of the activity or activities permitted at the site, and the type and quantity of waste that the site may accept; • adequate gating, fencing or other equivalent security; • an adequately surfaced site entrance; • provision to minimise or otherwise control the effects of noise, duct, litter, rodents, Insect, birds, visual amenity and foul water drainage; • provision as necessary for the cleaning of vehicle wheels; • adequate bunding or other suitable containment of all tanks or other vessels containing liquid wastes and /or fuel and oils for mobile plant; • a site notice board which clearly shows the name, address and telephone number of both the licence holder and the WRA (except in exceptional circumstances); • a record keeping system for wastes entering the site and, where applicable, being taken form the site. Such records will be required to be forwarded to the WRA at appropriate intervals; • a requirement that uncontrolled fires are prevented; and • where relevant, appropriate environmental monitoring in accordance with Policy 76.
16.	The CC will make available appropriate application forms and guidance that clearly indicate what is required of the applicant when making a licence application. The CC will liaise with the other North West WRA to provide a consistent regional approach to the provision of applications forms and guidance notes.
17.	Waste Management Licences will be base around a comprehensive working plan. An applicant for a waste management licence will be required to provide the working plan. An applicant for a waste management licence will be required to provide the working plan at the time of the application and as part of it. Where appropriate, such information may also be required when an application is made for a modification of the licence. The working plan will be expected to shoe, in detail and comprehensively, how the applicant proposes to design, prepare, operate and restore the site. It will be the responsibility of the applicant to provide relevant, environmentally acceptable and technically adequate information when the working plan is submitted with the licence application (or application for a licence modification/transfer). If necessary, the CC will over-ride, by way of an appropriate licence condition, items contained in a working plan which are viewed as being technically or environmentally in appropriate. The waste management licence holder will be expected to operate the site in accordance with the submitted working plan. Any proposed amendment to the working plan shall be submitted to the WRA. It is generally expected that the licence holder will, at his/her own volition or as submit modifications or other appropriate updates to the working plan over the waste management facility's lifetime.
18.	Fit and proper person (I) Relevant Offences. The following factors will be taken into account when evaluating relevant offences possessed by an applicant for a waste management licence: • Factor 1: The type of applicant (whether the applicant is an individual, a partnership pr a company); • Factor 2: Whether it is the applicant or another relevant person who has been convicted of a relevant offence(s); • Factor 3: The nature and gravity of the prescribed offence(s), In particular whether special waste was involved or where serious pollution to the environment to human health resulted; and • Factor 4: The number of offences which have been committed In all cases, the applicant will be given an opportunity to comment on previous relevant offences, with a view to submitting any details of mitigating circumstances that the applicant would wish the CC to take into account. All decisions for the refusal of a waste management licence application or for the revocation of existing waste management licence on the grounds that the applicant (or the applicant's senior management) has been convicted of "relevant offences" will be taken by the Waste Regulation Sub-Committee. (ii) Technical competence. For those sites which are not subject to the WAMITAB Scheme as set down in Regulations 4 of the Waste Management Licensing Regulation 1994, the policy of the Authority will be as follows: • the licence holder will be required by way of an appropriately worded waste management licence condition to nominate the list of those persons who it is intended will provide technically competent management. Such persons will be required to produce evidence of their technical competence in the form of a curriculum vitae, by way of references form previous employment and, if required by an interview. • each licence holder will need to identify those persons who constitute technically competent management and will be required to make provision for additional staff meeting such criteria in order to make up for sickness, holidays and so on. (iii) Financial Provision

	Unless a convincing case is made otherwise by the applicant, this Authority will normally require the obligation for financial provision to be discharged by way of an appropriately established and funded escrow account for any proposal involving the disposal of biodegradable or otherwise difficult wastes. In the case of other disposal and recovery sites, the CC's criteria for judging proposals for financial provision will have the following basis. Sufficient financial provision must be shown to be available to fully subsist the day-to-day requirements of the licence. such provision will need to be supplemented by further provisions aimed at adequately protecting the public purse form any liabilities for the long term aftercare of the site.
19.	Where environmentally appropriate, this Authority supports the principle of the co-disposal of both special and difficult wastes with other domestic, commercial or industrial waste. Licence conditions will be drafted to indicate comprehensively those wastes which are suitable for co-disposal. The CC will work towards setting limits in each waste management licence which will clearly show the maximum permissible quantities and concentrations of substances that are appropriate within clearly indicated time periods. All waste inputs will be required to be monitored and evaluated in accordance with the requirements of Policy 78. In addition, comprehensive monitoring of any co-disposal site and its impact on the environment will be required according to Policy 76.
20.	In evaluating an application for a Waste Management Licence, or modification of site licence, and in parallel to the criteria contained in s36 of the 1990 Act, the following matters will be taken into account, as appropriate, prior to a waste management licence being issued: • ensuring that waste is recovered or disposed of without endangering human health and without using process of methods which could harm the environment and in particular without- 1. risk to water, air, soil, plants or animals; or 2. causing nuisance through noise or odours; or 3. adversely affecting the countryside or places of special interest; Such objectives will also apply in relation to the day-to-day site inspection functions, along with criminal enforcement.
21.	The CC will use its statutory powers to ensure that all landfill sites are subject to an appropriate level of design, engineering and construction so as to minimise their impact on the environment. Where appropriate, a holder of, or an applicant for, a Waste Management Licence will be required to undertake a risk-assessment which considers the interaction of the site of with its environment. Account will be taken of the relevant statutory provisions, current guidance and the industry good practice when assessing the suitability of proposed landfill designs, the adequacy of the risk assessment methods proposed and the outcomes of such assessments.
22.	All new waste management facilities will be required to have completed adequate preparatory works prior to wastes being accepted. The nature of those works will be clearly specified in the working plan/waste management licence. Such works will require the formal approval of the WRA prior to wastes being accepted on the site. This approval shall be in writing, or in certain circumstances, given verbally and will be subsequently confirmed in writing within a reasonable time-scale.
23.	The CC will provide guidance, backed up by licence conditions where appropriate, on the levels of contamination permissible for wastes subject to landfill in the County. The Authority will co-operate with colleague in the North West to ensure that consistently high standards of management of contaminated land are applied across the region; with a view to agreeing a common definition of contaminated land and to determine levels permissible when such material is deposited at landfill sites. The Authority recognises the need to protect the environment and human health from potentially adverse effects of contaminated land and will ensure that these principals are applies at landfill sites disposing of contaminated land. The Authority will also attempt to ensure that highly engineered strategic sites are not unnecessarily filled with materials containing only low levels of contamination. The Authority recognises the particular problems associated with former landfill sites as a category of contaminated land and will endeavour to carry out, or will require others to carry out, investigations of such sites where this is needed to ensure protection of the environment and human health.
24.	In general, the CC will ensure that the unloading areas of new transfer stations accepting wastes liable to become windblown, or which may present other possible detriment to local amenity, will only be permitted within suitable buildings. All storage and reception areas will be surfaced where necessary to prevent the contamination of the land underneath. All new transfer stations will be required to have appropriate arrangements for the collection and disposal of contaminated drainage. The working plan and/or the licence for such sites will clearly indicate the location of storage areas and the maximum quantities of wastes to be stored in each of the areas. All skips used for the receipt and storage of asbestos will be required to be kept locked shut when not being filled, emptied or inspected.
25.	All licensed waste management facilities where metal scrap is processed, and where there is the possibility of leakage or spillage of oil or other fluids, shall be surfaced with concrete or other equivalent materials. A similar requirement for surfacing applies to sites where waste motor vehicles are subject to dismantling. The purpose of the surfacing is to construct an impermeable pavement which will prevent the contamination of the land underneath. Where such areas are not under cover they shall be drained to a foul sewer drainage occurs, an appropriately designed interceptor shall be incorporated. Only in exceptional circumstances will other drainage arrangements be permitted and theses should satisfy Policy 74 and the requirements, as appropriate, to the relevant Water Company, the NRA and other statutory organisations.
26.	The CC will seek to achieve the inspection frequencies as set out in Waste Management Paper 4, unless there is an over-riding reason why this is not practicable, possible or environmentally desirable. it will be the policy of the CC that inspections will be carried out any tine and without prior notice to the licence holder. The results of any inspection will be recorded on an appropriate inspection form. Wherever practicable, a duplicate of the details recorded on the form will be given to the licence holder (or the licence holder's representative) at the

	time of the inspection and the nature of any problems will be discussed if appropriate. However, in other circumstances a copy of the inspection form will be promptly sent by post to the licence holder or to the licence holder's agent. A copy of the report will be placed on the public register.
27.	The CC will undertake a programme of detailed site audits involving a prolonged evaluation by two or more officers at licensed sites. The purpose of the site audit will be to carry out a comprehensive evaluation of the condition of the site's waste management licence and working plan. Depending upon the type of site, matters that may be evaluated will include environmental monitoring, detailed checking of incoming loads of controlled waste and compliance with the Duty of Care. Following completion of the audit, a detail report will be produced and placed on the public register.
28.	No application for a surrender of a site licence will be accepted until the CC has received evidence that there will be no significant risk of pollution of the environment or harm to human health from the site in question. Consideration of applications for the surrender of a waste management licence will be made in the light of current technical knowledge, current practice and statutory and non-statutory guidance. IN all cases a detailed report by the licence holder must be submitted which satisfies the requirements of Regulation 2 of the Waste Management Licensing Regulations 1994 and, where appropriate, the relevant Waste Management Papers.
29.	Subject to demands on staffing, the CC will seek to consider the implementation of a programme of appropriate periodic inspections of all producers of hazardous waste.
30.	All prenotifications of special waste will be evaluated against the licence conditions of the relevant intended destination (or, as appropriate, the Authorisation granted under Part 1 of the 1990 Act) to ensure that the proposed consignment is permitted at the intended destination. Regular special waste producer visits will be undertaken to both audit the paperwork and to take samples, where appropriate, to ensure compliance with the waste description and composition given on the consignment notes. The waste producer will have the primary responsibility to sign the relevant sections of consignment notes and this responsibility will not normally be permitted to be delegated to third parties, e.g. agents or contractors.
31.	Any international movements of wastes described by Annexes 3 and 4 of Regulation 259/93 to or from Lancashire will be required to be in accordance with all international conventions of which the UK is a party. Wastes will not be accepted for disposal or recovery in Lancashire from any country which is not a Basle Convention Party or subject to a bilateral agreement (as defined in Regulation 259/93). Wastes generated Lancashire will not be permitted to be exported through Lancashire to other countries, unless in the UK and the recipient Country's competent authority approves the shipment. The CC will require all international waste movements, as part of the prior approval process required by Community Regulation (259/93), to have a full description of the composition of the waste. Unless full information is given, proposals for such waste movements will be subject to a formal objection. Where required, the CC will reserve the right to request that a sample of the waste be sent over and analysed at the consignee's expense.
32.	The CC will co-operate with any other competent Authority in ensuring the safe passage of waste through Lancashire and its ports.
33.	The CC will continue to allow and authorise movements of waste to recovery provided they are in compliance with Regulation (259/93/EEC) and the UK Waste Import/Export Plan (when available). The Authority will object to any movement of waste the proposed recovery of which results in a product whose production cannot be justified under national legislation or economic and environmental considerations.
34.	The CC will only permit such movements of waste if they are in compliance with European Regulations and UK national policy.
35.	The CC will raise objections to any movements of hazardous waste produced in Lancashire and destined for recovery in the EC if the EEC Regulation 259/93 and the Waste Import/Export Plan are not adhered to. The CC, if notified of the intention to send non-hazardous waste listed in Annex II of Regulation 259/93/EEC to other EC countries, will notify the Competent Authority of Destination and any other interested parties.
36.	The CC will raise objections to any movements of waste produced in Lancashire and destined for disposal in the European Community if the Regulation on supervision and control of shipments of waste within, into and out of the European Community, 259/93/EEC and the national Waste Import/Export Plan (when falsified) are not adhered to. If notified of the intention to send waste to other EC countries, the CC will notify the Competent Authority of Destination and any other interested parties.
37.	The CC will take all possible steps to prevent the export of waste for recovery to non EU countries where (1) the OECD decision does not apply to the country or (2) the country has not concluded a bilateral agreement with the United Kingdom Government. The CC will also object to all movements of waste if it is not satisfied that the waste will not be recovered in a safe and environmentally sound manner.
38.	The CC will raise objections to the export of waste to non EFTA association states which are not parties to the Basle Convention. It will also prevent the export to EFTA countries which are Parties to the Basle convention if the country has not given written consent to the import of the waste and /or this Authority is not satisfied that the waste will be disposed of in an environmentally sound manner.
39.	The CC will object to the movements of all waste to ACP states with the exception of green list waste destined for recovery sites which are subject to permits issued by the country of destination.
40.	Objections will raised against proposals for shipments which are to pass to transfer stations or to other storage when the final disposal or recovery site is not made clear or agreed in advance. Details of the final destination must form part of the notification document which relates to the transaction.
41.	It will be the policy of the CC that proposals for international waste movements will not be consented to if the waste is to be directly disposed to landfill. This policy applies to both the shipments consigned directly to landfill and those passing through transfer stations or other temporary storage. In addition, it will be the policy of the Authority that

	objections will be raised to shipments to treatment plants where there is no obvious appropriate treatment or recovery methods to deal with the waste. Similar objections will be raised where here had been evidence that materials have been added in order to claim the lower level of controls in Regulation 259/93 on waste passing to recovery.
42.	If the CC has received information that asbestos waste containing crocidolite and amosite is to be imported, it will immediately notify the Health and Safety Executive. It will liaise closely with the Executive and with the regulatory authorities covering the site of the notified to ensure that the waste does not enter the UK.
43.	The CC will ensure that all contracts under Regulation 259/93 will contain clauses which require the notifier to take back the waste at the holder's expense. Should such information not form of the contract or the CC not have seen a copy of the contract, all notifications will be objected to.
44.	The CC will issue Certificates of Financial Guarantee under Regulation 259/93/EEC only when it is satisfied that the sum assured is adequate and that the provision made will ensure the sum of money is released to the Authority should the need arise.
45.	The CC will use the powers granted under the Transfrontier Shipment of Waste Regulations 1994 to ensure that all costs involved in implanting the Regulations are recouped from the notifier of the waste. This cost will include any normal monitoring and administrative duties as well as the cost of ensuring the safe disposal of the waste in the case of an illegal movement of waste.
46.	The CC will systematically object to all movements of waste which are not in accordance with the Waste Import/Export Plan for the UK when it is introduced.
47.	The CC acknowledges the requirement in Paragraph 14 of Circular 11/94 to have regard to the principle of the waste management hierarchy, as expressed in order of preference by; 1. waste reduction 2. waste re-sue 3. waste recovery • recycling • composting recovering energy by incineration or landfill gas extraction and electricity generation 4. waste disposal However the CC, having regard to the fact that the statutory framework laid down by Parliament only allows it a limited degree of influence with respect to this hierarchy and the management of industrial or commercial waste, will endeavour to lobby for appropriate legislative changes to give effect to the above hierarchy.
48.	The CC will aim to encourage the retention of a disposal and recycling capacity which is as comprehensive as possible to deal with all types of controlled waste. It will aim to stimulate the expansion of the capacity of the recycling industry, commensurate with the increased need to divert waste away form final disposal. The CC recognises that it is essential for local communities to have appropriate capacity available in the form of landfills, household waste centres, scrap yards, transfer stations and other recovery sites for industrial, commercial and household wastes. Accordingly the CC will encourage the waste management industry to provide acceptable sites for the recycling and final disposal of industrial, domestic and commercial wastes which are as close to the site of generation as possible. This is so long distance haulage is avoided and the community where the waste arises has to deal with its disposal.
49.	The CC will endeavour to provide for the disposal of all waste within Lancashire, unless those wastes require specialist treatment where capacity is best provided on a regional or national basis.
50.	The CC will, in consultation with other Members of the North West Regional Association, endeavour to ensure that an adequate supply of waste management facilities is available in the North West.
51.	Within its statutory remit, the CC will ensure that any new site is used for the disposal or the recovery of wastes most appropriate to its environmental setting. There will be a presumption in favour of new disposal and recovery sites so that adequate arrangements continue to exist in the County for the disposal of locally generated waste.
52.	Subject to availability in the locality, proposals for waste management facilities which will involve extensive cross country movements of controlled waste will only be supported if they utilise under-used transport infrastructure such as rail and canals.
53.	There will be a presumption in favour of recycling proposals even if they involve cross border movements into Lancashire form both the North West region and also form elsewhere in the UK
54.	Whilst recognising that its statutory remit is extremely limited in respects of the relevant objectives relating to the waste disposal plan, the CC will attempt to implement the objectives in accordance with the provisions of Schedule 4 of the 1994 Waste Management Licensing Regulations. The following constitute the relevant objectives; a) encouraging the prevention or reduction of waste production and its harmfulness, in particular by; I. the development of clean technologies more sparing in their use of natural resources; II. the technical development and marketing of products designed so as to make no contribution or to make the smallest possible contribution, by the nature of their manufacture, use or final disposal, to increasing the amount of harmfulness of waste and pollution hazards; and III. the development of appropriate technique for the final dispel of dangerous substances contained in waste destined for recovery; and b) encouraging; I. the recovery of waste by means of recycling, reuse or reclamation or any other process with a view to extracting secondary raw materials; and, II. the use of waste as a source of energy
55.	The CC will, as required, ensure that its waste disposal plan is periodically reviewed, and will endeavour to keep its data vase of waste production and disposal in the County up to date. Should significant changes be made to the Plan's content or policies, the CC will publicise the modifications to the

	Plan in the most appropriate way and will send particulars of the modifications to the Secretary of State for the Environment.
56.	The CC will levy a charge for the provision of information or advice to organisations such as environmental consultants, property developers, housing associations and their agents on the proximity of proposed developments to operational or former landfill sites and the potential hazards and risk arising there from.
57.	It is the policy of the CC that landfill should be only used for the disposal of waste tyres where no other practicable environmental option exists. Unless explicitly demonstrated as environmentally acceptable by the relevant licence holder, no whole tyres should be disposed of in significant quantities at landfill sites. Where chopped or shredded tyres are landfilled, they should be interspersed with other waste materials so that they do not dominate the filled void at any one location. The CC will review the disposal of tyres at landfill sites should it become apparent over the Plan's implementation period that other non-landfill disposal or recovery methods are commercially available. Whilst any proposals for facilities involving the recycling, re-use and recovery of tyres and the energy therefrom will be supported in principle, no proposal involving the extensive stockpiling of tyres will be countenanced. It will be the policy of the CC to require applicants to identify their disposal and recovery outlets. The Authority will seek to ensure that adequate financial provision is made, as part of the licensing process, to affect satisfactory remediation of the site if abandoned by the licence holder.
58.	The CC will encourage proposals for transfer stations and collection networks for small quantities of solvent wastes in appropriate locations.
59.	The CC will support attempt to increase the recyclable content of road vehicles and other scheme which enhance the recycling levels for such vehicles. Where appropriate the CC will lobby at national forum for initiatives which enhance the recyclable content of motor vehicles. The CC will encourage an approach by vehicle manufacturer to develop a dismantling and recycling facilities for the products of that manufacturer. Such a proposal would be subject to the environmental requirement for such facilities as detailed in Policies 72. It will also be subject to obtaining any necessary statutory permissions, licences and/or consents to allow the proposal to proceed.
60.	The CC will support proposals which increase the level of reclamation of building and demolition wastes. Subject to environmental, planning and other locational considerations, there will be a presumption in favour of such facilities in Lancashire. However, the CC also recognises the positive operational and environmental benefits of continuing to use demolition wastes for the purposes of constructing works at landfill sites.
61.	The CC will attempt to ensure that, in conjunction with other North West Counties, an adequate collection and disposal network exists for clinical wastes so that small quantities do not undergo long distance haulage. Clinical waste will be managed in accordance with specific and up to date technical guidance, including the revised version of Waste Management Paper 25 In general, the CC will see to ensure that Group E clinical waste from commercial or industrial sources is segregated form other non-clinical wastes into identifiable containers. Where such materials is required to be disposed to landfill, this only take place in pre-formed trenches in already deposited non-clinical waste. Such deposits must then be covered immediately. Effect will be given to this requirement through the imposition of appropriate Waste Management Licence conditions.
62.	The CC will encourage the provision of facilities, particularly at household waste disposal centres for the receipt of small quantities of chemicals from domestic properties. It will seek to ensure that an adequate collection and disposal network continues to exist and is developed in Lancashire for small quantities of chemical wastes from householders and form other sources such as schools.
63.	The CC will seek to ensure that a comprehensive range of facilities for the disposal of asbestos will remain available for all asbestos waste generated in Lancashire. The best practical environmental option for most types of asbestos is landfill. However, landfill will only be acceptable when a site licence holder has demonstrated that the site has staff that are technically competent, and that an appropriate infrastructure to handle the material and dispose of it is in place. In all cases, landfill site licence conditions will require that dust and fibre monitoring is undertaken at the site and that the results will be submitted to the WRA at regular intervals. The CC will carefully consider developments in new technologies for asbestos treatment and will seek to encourage them where they are technically viable and environmentally appropriate.
64.	The CC will seek to monitor the total quantity of red list substances deposited at particular landfill sites. On the basis of this, and other, information it may decide to restrict the disposal of certain types of wastes containing red list substances from being landfilled.
65.	The CC will keep under review the supply of suitable disposal/recovery facilities for spent vehicle batteries. Where a shortfall has been identified in capacity, proposals to make up this capacity will be encouraged. Any such proposal will be subject to Policies 4, 14, 18, 72, 73, 74, 75 & 76, and any required statutory permission, licence or consent.
66.	Operators of landfill sites who apply for modifications to existing waste management licences in relation to the deposit of sewage sludge will be required to demonstrate: I. the effect of the deposit of sewage sludge on the site's water balance, leachate drainage system (if applicable) and lining system II. that any pathogens which my be released in site dust will not occur at levels which may present a risk of harm to human and animal health III. positive proposals which will result in no unacceptable odours passing beyond the site boundary Unless these criteria can be satisfied, the application for the modification will not be accepted.

	Similarly, if the deposit of sewage sludge at any landfill site fails to satisfy the criteria listed at (a) to (c) above, the CC will look to its powers under the 1990 Act to cause a mitigation of any effects. Should alternative disposal or recovery infrastructure be developed in the Country which represents a better practicable environmental option than the landfilling of sewage sludge, the CC will consider the benefits of implementing modifications to existing waste management licences to divert the sewage away.
67.	All requests for controlled waste carrier or broker registration application forms, and subsequent completed applications, will be processed promptly after receipt. Where incomplete detail have been recorded on the forms received, the applicant will be contacted in the first instance and requested to provide the information which is believed to be incomplete. Subject to Policy 68, applications for registration and renewals will be refused on the basis of incomplete information only when the applicant has failed within a reasonable time-scale, to apply the requested information.
68.	The following factors will be taken into account when evaluating whether a person is suitable to be granted or retain a certificate of registration as a controlled waste carrier/broker: • factor 1: the type of applicant (whether the applicant is an individual, a partnership or a company); • factor 2: whether it is the applicant or another relevant person who has been convicted of a prescribed offence(s); • factor 3: the nature and gravity of the prescribed offence(s), in particular whether special waste was involve or where serious pollution of the environment or harm to human health resulted; and • factor 4: the number of prescribed offences which have been committed. In all cases, the applicant will be given an opportunity to comment on previous relevant offences, with a view to submitting any details of mitigating circumstances that the applicant would wish the WRA to take into account. All decisions for the refusal of controlled waste carrier/broker applications or for the revocation of existing controlled waste carrier/broker registrations will be taken by the Waste Regulation Sub-Committee.
69.	The CC will seek the co-operation of all persons involved in the land spreading of controlled wastes, with a view to obtaining the information identified below in advance of spreading commencing. It is intended that this information is received at least two weeks prior to spreading commencing. The information to be submitted is as follows: I. the date at which spreading will commence II. its location and the name and address of the affected occupier/land owner III. a copy of the written consent of the occupier/owner of the land IV. the type of material to be spread, the name and address of sources of such materials and the quantity to be spread V. where spreading is undertaken under paragraphs 7, 8, and 9 of the Schedule 3 of the Waste Management Licensing Regulation 1994, a report will be required form an appropriately qualified body of acknowledged agricultural (or other relevant) expertise, which clearly demonstrates that the outcome of the spreading process will be of benefit to agriculture or another ecological improvement. Confirmation will be needed that the operation will not be detrimental to any sites subject to a statutory or non-statutory designation under the relevant provisions on nature conservation (e.g. site of special scientific interest, biological heritage site, etc.) VI. where spreading is carried out under paragraph 8 of the Schedule 3, a copy of the planning permission for the activity
70.	Subject to Policies 69, the CC will inspect sites operated by establishments or undertaking which are exempt from the need to posses a waste management licence under the Waste Management Licensing Regulations 1994. Such a visit will be undertaken to ensure that the requirements of the amenity are not arising from their operation. In general and where appropriate, such visits will be unannounced. The regularity of inspection of exempt sites will be at a frequency which is based upon the site's pollution potential and possible environmental impact.
71.	The CC will establish and maintain a register of exempt activities as is required by Regulation of 18 of the 1994 Waste Management Licensing Regulations. The CC will, subject to availability of resources and other factors, attempt to fulfil the duty agreed by the UK Government at the Council of Ministers that exempt waste management facilities will be inspected. The intervals between inspection will be determined by the potential level of environmental impact of the exempt site.
72.	The CC will ensure through its statutory powers that licensed sites are managed to the highest practicable standards in accordance with the criteria set down in s42(1) of the 1990 Environmental Protection Act, any relevant statutory and non-statutory guidance and industry good practice. Waste management licence conditions will be set and maintained at the highest standard appropriate, having regard to local circumstances, the Waste Management Paper series and accepted "best practice" within the industry. Subject to resources being available, the CC will undertake a programme of progressive review of waste management licences, to ensure that the standards required of operators comply with these criteria and any subsequent amendments thereto.
73.	All waste management licences which existed on May 1st 194 and which are affected by Directive 80/68 will be modified to add a condition which requires licence holders to undertake the investigation/risk assessment as specified in Regulation 15 of the 1994 Waste Management Regulations. Such an assessment will be required to cover the technical precautions needed to mitigate any discharges that contravene the requirements of the Directive. Licence holders will then be required to submit a written report on the results. The NRA will be consulted in the report and, depending on the nature of the technical precautions considered to be necessary, licences will be modified to require further studies to be undertaken or appropriate remedial works to satisfy the requirement of the Directive. All new sites or applications for extensions to existing sites which are affected by Directive 80/68 and Regulation 15 of the 1994 Regulations will be required to submit the details specified above as part of the application. Where required by the relevant legislation, and in order to ensure that such implications are addressed at the earliest

	opportunities, applicants for sites which require a planing permission will be encourage to submit those details in conjunction with an Environmental Assessment to the County Planning Authority.
74.	New waste management facilities will not be permitted where unacceptable risks are presented to surface watercourses. Conditions will be included in new licences (and existing licences will be appropriately modified) with a view to protect surface watercourses. Example of such conditions are those which restrict waste types, require specific surface water drainage arrangements or other site engineering works, such as capping are being carried out. Conditions will also be included to require the environmental monitoring of surface waters, where appropriate.
75.	Unless demonstrated as in appropriate by the applicant to the satisfaction of both the WRA and the NRA, all new landfill sites accepting biodegradable waste shall be lined, using natural and/or synthetic materials. All new biodegradable waste disposal sites shall have adequate site drainage so that leachate can be collected. Leachate will not be allowed to build up in the site beyond a level which will place an excessive head of pressure upon any lining systems. The base of all new lined sites shall be surveyed accurately both prior to and after the laying of any basal seal. In the case where natural containment materials are used in situ, a survey will be required of the levels of the basal material prior to the deposit of any waste. In either case, the details of the survey shall be provided to the WRA. It is the policy of the CC that the installation of all type of lining system will be subject to appropriate quality assurance procedures.
76.	In accordance with the polluter pays principle, it is the policy of the CC that environmental monitoring should be undertaken by the licence holder. Environmental monitoring will be required to be carried out in accordance with the requirements of the relevant Waste Management Papers, other statutory guidance and industry good practice. Where it is apparent that the licence holder is unable to provide a satisfactory quality of environmental monitoring, the CC reserves the right to modify the relevant waste management licence to require the licence holder to arrange for such work to be done by an appropriately qualified and technically competent environmental consultant. The CC will undertake periodic independent monitoring to verify, as far as is reasonably practicable, that the results submitted by, or on behalf of, licence holders are comprehensively and accurate. The CC will also carry out environmental monitoring at unlicensed sites where appropriate.
77.	Except where environmentally unnecessary, conditions will be placed on licences requiring that all landfill sites are monitored for gas production and migration. Technical measures shall be used to ensure that uncontrolled gas migration does not occur by the installation of appropriate gas barriers and, if necessary the extraction of the gas. All sites accepting significant quantities of biodegradable wastes shall be required to submit emergency plans detailing the measures to be taken if gas migration is detected. The Authority will require all waste management licence applications pertaining to the landfilling of significant quantities of biodegradable waste to contain an investigation of the potential for landfill gas utilisation. Where the investigation demonstrates that such a scheme is environmentally appropriate, the Authority will expect to see detailed proposals for landfill gas utilisation included in the application. At existing sites, landfill site operators will be expected to ensure that landfill gas is collected and commercially utilised an appropriate manner or, if this is not possible, collected and burned efficiently so as to reduce its contribution to global warming.
78.	All landfilled sites and waste treatment facilities accepting special and certain difficult wastes will be required to have tested or otherwise analysed the composition of such wastes to ensure that they comply with the conditions of the waste management licence. All landfill sites and treatment plants accepting special wastes will be required to have facilities for the carrying of appropriate testing and suitably trained personnel on site when such wastes are being received, treated and suitably trained personnel on site when such wastes are being received, treated or disposed of. The working plan for such sites will contain a programme of testing and analysis, along with the competent person's name and qualifications. Should there be a change in the relevant personnel, the licence holder will be required to submit new details for advance approval. In genera, the disposal of special wastes in landfill will only be undertaken in areas of the site well away form the main working area and away form possible contract with members of the public.
79.	The CC recognises its public duty to respond to enquires from operators of waste management facilities, members of the public and others wherever possible. But it also recognises that it should not necessarily deal with enquires which will involve a significant cost to the WRA or may present significant legal liabilities. In such, instance, the WRA reserves the right to direct the enquirer to contact an appropriately qualified consultant or similar body. It also reserves the right to make charges for the supply of information as set down in Policy 56.
80.	The CC will continue to provide, free of charge, general advice on matters relating to waste management so that waste recovery and disposal continues through the best practicable environmental option. The exception to this principle will be: a) where a statute, circulars or statutory instruments indicate that a charge must, or may be made; b) where large quantities of official documents are requested by a commercial body: for example Special Waste consignment notes, Transfrontier waste shipment documents, copies of site licences, or site lists c) where the advice would involve a significant amount of an officer time or resources, or may result in the possibility that a legal liability may be placed that a legal liability may be placed upon the CC d) at seminars or other forum where it is appropriate to make a charge to cover the Authority's expensed e) where another policy in this Plan states to the contrary. The CC reserves the right to decline to give advice where the provision of it may cause possible future liabilities being incurred by the CC or where it is judged that advised would be best gained from utilising a specialist such as a suitably qualified environmentally or other consultant. The Authority will keep under review its charging stately for copies of information it provides to industry, commerce and the general public.

81.	Subject to demands on staffing, the CC welcomes approaches by outside educational organisations to arrange work placements and student projects. However, an important criteria of such a project will be the utility of the work to the WRA or to the waste management industry as a whole and that appropriate arrangement exist for the supervision of the students. The possibility of joint research in appropriate areas will be also be open to exploration. The WRA welcomes approaches form educational institutions to give talks on facet of waste management and will endeavour to carry out such work where resources permit.

Abstracted from: Lancashire County Council: Waste Disposal Plan. Draft for Consultation, pg. 96-112. (November 1995).

Lincolnshire Waste Disposal Plan Policies

1	The CC will provide or arrange a minimum of one site for the disposal of household and commercial wastes to serve each of the eleven sectors in Lincolnshire whenever provision of such a site is justified by the amount of waste it receives.
2	The highest standards commensurate with good economic practice will be sought in the management, planning, development, operation, restoration and after care of the CC waste disposal services and the achievement publicised.
3	Whenever adequate capacity is available and conditions attaching to the use of a site permit, industrial wastes (including certain special and difficult wastes) will be accepted at CC sites at a commercial charge.
4	Privately operated sites will be encouraged particularly where they complement or would replace existing facilities and serve to conserve capacity at sites which can accept a wider range of wastes. Efforts will be directed towards assisting the technical and economic viability of key sites.
5	A system of household (amenity) facilities tailored to suit the characteristics of the area served will be provided on the basis of five miles average maximum travelling distance, the actual location of facilities being weighted towards centres of population.
6	Recycling will be undertaken at CC sites and as much material as practicable returned to some beneficial or useful purpose.
7	Planning conditions may be used to:- A) minimise the impact of the development on its surroundings (by requiring landscaping, screening and boundary treatments., and controlling means of access hours and total duration of operations and any phase requirements); B) specify how the site should be restored and what aftercare measures have to be applied to return the land to the intended beneficial use (including pollution control measures, finished contours, thickness of soils and planting).
8	Licence and resolution issued under the COPA 1974 will be reviewed as necessary, but no less frequently than every five years, and may be suspended or withdrawn if operations prove unsatisfactory. Licence conditions will be necessary, comprehensive, unambiguous and enforceable and be used to;- A) safeguard public health and the environment; B) achieve satisfactory standards of management, operation and self-monitoring. They will also require the production and continual updating of a working plan showing operational procedures any how work will progress within the site.
9	Licensed sites will be regularly inspected and monitored as recommended in waste management paper no 4 to ensure compliance with licence conditions and checks will be made elsewhere of unlicensed and illegal activities. Enforcement action will be taken to correct contravention and ensure that all waste disposal activities comply with standards consistent with those sought by the legislation, codes of practice and the like. There will be a presumption towards legal action in serious or significant or continuos contravention, the results of which will be published regularly. Controls will be applied equally to public and privately operated facilities.
10	The movement and disposal of special wastes will be controlled by a system of consignment notes. A small scale collection service will be provided to collect or receive such wastes form householders and education establishment for which there may be a charge.
11	Advice will be given to producers, carrier, disposers, of waste and the general public on methods and opportunities for correct disposal or re-use of waste materials. Particular effort will be devoted to returning as much waste as possible to some beneficial purpose before it becomes mixed or contaminated and therefore less valuable and less able to be re-use or re-cycled. Emergency advice will be provided, particularly via the civil contingency plans relating to oil and chemical spillage, accidents and the like, and regarding developments on or near filed or contaminated land.
12	The WDA will obtain and maintain current information concerning the quantities and nature of controlled wastes arising or arriving in the county and publish a plan showing what arrangements are necessary for its disposal which will be reviewed as necessary but no less than every five years.
13	Abandoned vehicles will be dealt with as provided for under the Refuse Disposal (Amenity) Act 1978 either directly or by delegated arrangements agreed with each collection authority.
14	The CC will continue to raise public awareness of issues concerning wastes and seek to mobilise the community to take care of their surroundings. These activities will be organised or stimulated through the tidy Lincolnshire

	Campaign, (sponsorship for which will continue to be sought from local business, central government and elsewhere) and published in the Litter Plan.

Abstracted from : Lincolnshire County Council: Waste Disposal Plan- 1987/1999, pg. 9-12. (September 1989).

London Waste Management Policy Statement

1	The authority will regulate waste producers and all waste producers and all waste management activities in London including its handling, transport, treatment, recycling, transfer and final disposal. The Authority will also carry out the arrangements for the surrender of waste management licences. These activities are carried out under the provision of the EPA 1990 and related legislation. This is a statement of the basic role of the Authority; that once material becomes a controlled waste this Authority has a duty to ensure that it is not disposed of illegally or improperly. In general, the execution of this duty will involve being aware of the nature of waste being produced, handled treated etc. And being satisfied that it is properly dealt with so as not to cause pollution or harm to human health.
2	The Authority will ensure acceptable standards of waste management operation by the application of appropriate licence conditions backed by supervision and monitoring at all waste management sites. The Authority is responsible for the licensing of waste management sites and the Authority should strive to impose those licence conditions which will result in acceptable environmental standards of waste management's. Having set these conditions, the Authority should provide advice required to keep the site within the limits of acceptability as defined by any licence. Site visits and periodic checks, including scientific monitoring of site operations, should be made so that the Authority becomes aware of any breach of licence conditions at an early stage.
3	The Authority will seek to ensure that all special waste movements in London are modified to the Authority and comply with appropriate statutory procedures. This is a basis statement of enforcing the legal requirement on producers, carriers and disposers of special waste in London to submit consignment notes to the Authority to regulate and control the movements and disposals of special waste. The statutory procedures include the Authority supervising the system of consignment notes and inspection the producers', carriers' and disposer's records of disposals.
4	The Authority will endeavour to identify unsatisfactory and illegal waste management practices and will subsequently take all reasonable actions to correct them through the appropriate channels. The major thrust of this policy is in the: • enforcement of Waste Management Licences issued by the Authority • enforcement of the Special Waste Regulations • registration of exempt waste management activities • monitoring of waste deposited illegally There are two other situations to which this policy applies. The first is where the Authority, in the course of its duty, becomes aware of waste management practices which can only be corrected by other agencies such as the disposal of waste to water without a permit for its discharges, which should be notified to Thames Water Utilities or the National Rivers Authority. The Second is where general areas of unsatisfactory waste management practices are causing concern and an action on the part of the Authority is considered necessary, for example: • the fly tipping initiative • the clinical waste initiative • the co-ordination of registration of waste carriers • the review of licensing of metal recycling sites A current contenders for considerations under this policy could be the transfrontier shipment of waste. Consideration should also be given to the relevance of renewed initiatives on the regulation of construction and demolition waste reclamation facilities, and the safe disposal of scrap tyres.
5	The Authority will give proper consideration to any relevant guidance which the Secretary of State may issue, and will monitor the effect of appeal decisions. The Authority is required to take account of guidance in new Waste Management Papers, Regulations and Circulars and other information issued by the Secretary of State of the Environment. Monitoring appeal decisions assists the Authority in improving the effectiveness of licensing and enforcement provisions.
6	The Authority will take note of the effectiveness of statute and will make representatives to the Government where improvements may be possible. The final policy on enforcement defines the responsibility of this Authority for the continued and enhanced effectiveness of legislation for the regulation and control of waste management in London. The effectiveness of present pollution control legislation in London can be directly assessed only by this Authority. Since London experience conditions for waste management which are unlike those else in this Country, it is of vital importance that the Department of the Environment receives feedback on legislation and constructive comment upon different and new legislative needs from this Authority.
7	The Authority will encourage the co-ordination of waste management planning and the exchange of information

	about all elements of waste management's throughout London, the South East Region of England and more broadly as appropriate. All of the boroughs and WDAs in London are dependent upon facilities lying outside London for waste disposal capacity. The longer term regulation and control of waste management in London is closely associated with the provision of acceptable waste disposal sites outside London. It is therefore in the interests of both this Authority and the other waste authorities in London for waste management planning to be carried out as comprehensively as possible on a co-operative basis. This will closely involve SEWRAC and SERPLAN and may involve other regional or national bodies. Major transfrontier shipments of waste have now become a reality and the planning of London's waste management should be seen as part of an international pattern.
8	London Borough Councils will be encouraged to consult with the Authority in development planning applications covering waste management activities. Every new waste management site requires both planning permission and a waste management licence in order to operate. There are some area in the control of waste management sites which may be better tackled through development planning control than through site licences. The Authority is automatically consulted with regard to any development within 250 metres of land which had been used at any time during the proceeding 30 years of r the deposit of refuse or waste but it is not a statutory consultee on planning applications for waste management sites. However, the Authority would welcome the opportunity to comment upon such applications. It should be noted that the London boroughs are formally consulted by the Authority in the waste management licence process and that a substantial proportion of boroughs already consult this Authority on applications for waste management sites. The common of the Authority on a planning application for a waste management site should normally cover: • The need to safeguard public health and prevent the pollution of water and the ecological suitability of the site for waste disposal. • If the application is for landfill, the potential for rapid, high quality restoration to agricultural or other uses. The probable level of demand for the site and its environmental effect, both locally and more widely in London. • The suitability of the site for receiving different types of waste in an environmentally sae manner having regard to he proposed after use. • The broader waste management planning considerations which include a presumption against sites being given consent for landfill except to restore mineral workings or improve derelict land.
9	The Authority will make available its expertise in the various methods of recycling and waste reduction in order to provide guidance and encouragement to licence holders, waste producers, other Authorities and any other interested bodies. In particular the Authority will encourage: The establishment of more improved waste recycling centres for use by the public at civic amenity sites and elsewhere. The development of new and encouragement of existing schemes to maximise the economic recovery of resources from London's household, commercial and industrial waste. Any increase in the amount of waste recycled or recovered is a reduction in the amount of waste seeking disposal in limited landfill resources. It should also present an environmentally acceptable means of waste disposal. Thus the Authority should promote an interest in recycling and waste reduction as it represents a contribution to the planning regulation and control of waste management in London.
10	The Authority will provide advice when requested on the management of materials other than controlled waste and when unsatisfactory or illegal waste management practices come to the attention of the Authority al reasonable actions will be taken to correct them through the appropriate channels. The Authority will oppose the deposit in landfill sites of any radioactive waste designated as requiring special precautions.
11	The Authority will oppose the transportation through the Greater London are of spent nuclear fuel.

Abstracted from: London Waste Regulatory Authority Annual Report 1994/1995,. pg. 32-34.

South Yorkshire Waste Regulation Policies

1	The Joint Committee will regulate waste producers, handlers, transporters, treaters, recyclers and disposers under the COPA 1974 and EPA 1990.
2	The Joint Committee will ensure environmentally acceptable standards of waste management operations by the application of appropriate licence or COPA 1974, section 11 resolution conditions, backed by supervision and motoring at all waste management facilities.
3	The Joint Committee will seek to ensure that all special waste movements in South Yorkshire are probably managed in accordance with The Control of Pollution (Special Waste) Regulation 1980.
4	The Joint Committee will seek to ensure that all transfrontier shipments of hazardous waste to and from South Yorkshire are properly managed in accordance with The Transfrontier Shipment of Hazardous Waste Regulations 1988.
5	The Joint committee will endeavour to identify unsatisfactory or illegal waste management practices and will subsequently take al reasonable action to correct them through the appropriate channels.
6	The Joint committee will monitor the effective of the existing statutory provisions and make representations to improve these through the A.M.A., professional institutions, regional groups and directly to the DOE and HMIP
7	The Joint Committee will encourage the co-ordination of waste management planning and the exchange of

	information about all elements of waste management across South Yorkshire.
8	The Joint Committee will continue to encourage recycling of controlled waste.
9	The Joint Committee will oppose transfrontier movement of waste for direct landfilling.
10	The Joint Committee will encourage, through training and educating, better waste management practices.
11	The Joint Committee will continue to encourage the "Polluter Pays Principle" where possible.

Abstracted from: South Yorkshire County Council Waste Regulation Authority Annual Report 1993/1994, pg. 29-31.

Merseyside WDA Policy

1.	The selection of any method of waste treatment, disposal or recycling will have due regard to the forms of pollution which are liable to arise, whether of air, land or water.
2.	Merseyside WDA facilities will be chosen and operated so as to minimise any adverse effects on the environment or the local community.
3.	The same stringent environmental and technical criteria for the selection of landfill sites will be used throughout Merseyside, in conjunction with the relevant authorities.
4.	Landfill sites will not normally be established in the most environmentally sensitive areas.
5.	Landfills sites will not normally be established on most valuable land.
6.	Only sites that can be restored to more beneficial use will be selected for development as new landfill facilities.
7.	The preparation, operation and restoration of any landfill site will be consistent with a defined after-use as required by the local planning authority.
8.	The design and operation of landfill sites will seek to prevent water pollution, danger to public health and nuisance to the community.
9.	The Authority will seek to ensure that there are adequate measures to deal with any leachate or gas generated during landfill site operations, and in consultation with the local planning authority, after operations have ceased.
10.	The selection and operation of sites for treatment plants or Waste Reception Centres (WRCs) will be based on the same principles as for landfill sites in respect of the prevention of pollution, danger to public health or nuisance to the local community.
11.	Hours of operation of Waste Reception Centres will be sufficient to provide access for residents at reasonable times, to discourage illegal disposal of household waste.
12.	Private sector facilities will be required to operate to similar standards to those required of Merseyside WDA sites, and licence conditions will be imposed on private site operators accordingly.
13.	Site licence conditions will be supported by adequate levels of inspection and enforcement.
14.	The ability of any facility to receive any waste, including Special Waste will be assessed on the technical merits of the facility and the nature of the waste to be accepted.
15.	The disposal of liquid wastes and sludges will be allowed only where no pollution of water resources is likely to result, and where the nature of the waste is compatible with conditions on site.
16.	The disposal of fibrous asbestos will be permitted at certain landfill sites subject to strict controls over bagging, placing and burying the waste.
17.	The exact location of the deposit of Special Wastes will be recorded.
18.	MWDA will seek to ensure that clinical wastes are collected, handled and disposed of safely, in consultation with the collection authorities and health authorities.
19.	MWDDA will seek high standards of site construction and maintenance, specifically in respect of hard surfacing, access roads, fencing, screening, landscaping, wheelwashing where necessary, and employees' facilities.
20.	MWDA will protect the health and safety of its employees and site users.
21.	Facilities will be operated with sufficient employees to ensure the provision of high service standards.
22.	MWDA will seek to provide the local authorities and other users with a safe, efficient and flexible service.
23.	High quality Waste Reception Centres will be provided of the convenience of Merseyside residents and to ensure the safety of users.
24.	MWDA will endeavour to provide a Waste Reception Centre within a three mile radius of every resident of Merseyside.
25.	MWDA will consult local occupiers and their representatives regarding proposed new facilities and existing major facilities.
26.	Opportunities for the recycling of materials and the recovery of energy at MWDA facilities will be investigated, and if appropriate, developed.
27.	At existing and planned waste treatment plants and transfer stations, the following methods of resource recovery will be investigated, and if appropriate, developed.
28.	At planned, existing and restored landfill sites, the recovery of methane for energy will be investigated, and if appropriate developed.
29.	At Waste Reception Centres, the further opportunities for segregation and resale of different materials will be investigated, and if appropriate, developed.
30.	MWDA will offset the cost of Merseyside District Councils engaged in the recycling of segregated materials that

	would otherwise require disposal facilities, by making premium payments to them equal to the marginal cost of disposing of those materials.
31.	MWDA will wherever possible attempt to encourage or support other efforts at recycling and waste reduction.
32.	MWDA will attempt to ensure that, except where very specialised treatment is required, there are sufficient waste disposal facilities within Merseyside for the wastes produced in Merseyside.
33.	MWDA will attempt to ensure, in consultation with other North West authorities and operators, that wastes produced in Merseyside which require specialist treatment facilities can be treated within the North West Region.
34.	MWDA will continue to encourage the private sector to provide facilities in Merseyside for the treatment or disposal of various types of wastes.
35.	MWDA will discourage the deposit of large quantities of building and other inert wasted at landfill sties which have been selected and engineered to deal with household and similar wastes.
36.	MWDA will seek to minimise the overall costs of municipal waste collection and disposal, in consultation with the collection authorities.
37.	MWDA will use the smallest number of disposal facilities consistent with acceptable transport costs in order to help minimise environmental impact and take advantage of economies of scale.
38.	MWDA facilities having sufficient suitable capacity will generally be available to private sector users, at such cost as may be determined by the Authority.
39.	The technology of different waste treatment and disposal methods will continue to be monitored and assessed by the Authority.
40.	The method of waste management proposed by MWDA at any new facility will be determined according to the balance between economic, environmental impact and opportunities for resource recovery.
41.	MWDA will endeavour to ensure that its responsibilities are fulfilled through the use of MWDA owned and operated facilities.
42.	To ensure the acquisition of sites which are of strategic importance to the waste disposal function, MWDA will initiate compulsory purchase proceedings to be used if sites cannot be acquired by agreement.
43.	MWDA will employ private sector contractors for the treatment or disposal of waste where appropriate.

Abstracted from: Merseyside WDA Waste Disposal Plan : A Strategy for the 1990s. (1995).

Norfolk County Council

1	Licensed facilities: standards of design and operation. All applicants for Waste Management Licences will be required to provide a working plan to include the following minimum information: 1. A plan showing the location of the facility, with all existing and known prospective developments within 250 metres of the boundary of the site 2. Detail of the processes involved and method of working 3. Details of the buildings, equipment and facilities to be provided, used or converted, including the construction and location of storage areas, reception and control facilities, and vehicle circulation routes. 4. The Location and specification of boundaries, walls, fences, gates, screening and landscaping. 5. Relevant pollution prevention measures. 6. For landfill sites; measure for the measurement of gas, surface water and leachate, including contingency plans to deal with any unacceptable breakout of leachate, and plans for the phased capping and restoration of the site.
2	Inspection and Monitoring of the operation of Licensed Waste Facilities. All licensed waste facilities will be inspected on a regular basis and monitored for compliance with licence conditions, taking account of current Department of the Environment guide-lines.
3	Review of Waste Management Licences. All waste management licences will be reviewed at regular intervals, not exceeding every five years, and revised and up-dated as necessary to take account of changed operational requirements and/or revised management guide-lines.
4	Enforcement Action at Licensed Sites. Enforcement action will be taken in line with Regional Policy, giving priority to cases where; • there is a potential of significant environmental pollution or disturbance to occupiers of nearby premises; • the operator of the site has persistently offended against site licence conditions or environmental legislation. • the standard of care exercised by the operator is substantially below that which can reasonably be expected.
5	Enforcement Action at Unlicensed Sites. Unlicensed waste disposal will be controlled by prosecution of offenders wherever possible, having regard to the seriousness of the offence.
6	Monitoring of Pollution. All operators will be required to monitor their activities at licensed waste disposal sites in order to prevent pollution of the environment, harm to health and serious detriment to the local amenity.
7	Annual Report. An Annual Report will be produced in May of each year detailing the WRA's activities over the previous financial

	year.
8	Public Register. A Public Register of prescribed particulars will be maintained, as required by Section 64 of EPA 90, and made available for public inspection at all reasonable hours, together with a Register of Waste Carriers.
9	Environmental Information. Environmental information will be made available for public inspection, in accordance with the requirements of the Access to Environmental Information Regulations 12992 and EPA 90.
10	Utilisation of Landfill gas. Proposals for the utilisation of landfill gas for the generation of power or heat, will be encouraged.
11	Public Participation and Liaison. Local liaison groups will be promoted and the public will be encouraged to take an interest in waste disposal issues and regulation activities.
12	Liaison with other Authorities. Close liaison will be maintained with all relevant authorities on matters related to waste disposal, including; planning permissions; waste management licenses; registration of waste carriers; and development within 250 metres of landfill sites.
13	Recycling Facilities. Encouragement will be given to the establishment of recycling facilities, subject to environmental and planning policies and constraints.

Abstracted from: Norfolk County Council: A Waste Management Plan for Norfolk, pg.44-48. (November 1995).

Northumberland Waste Management Policies

1	The CC will encourage waste procedures to consider the best practicable environmental option (BPEO) for each of their waste streams
2	The CC will require that waste management facilities are prepared, operated, restored and completed by using the best available techniques not entailing excessive cost (BATNEEC)
3	The CC will promote the adoption of an environmentally sustainable approach for the management of wastes in the county
4	The CC will seek to reduce the reliance upon landfill as the primary methods of waste disposal by encouraging waste procedures and those involved in waste management to minimise or re-use waste at source or to segregate and recycle
5	The CC will continue to assess new developments and changes in waste management technology and will encourage the waste management industry to do likewise.
6	The CC will, provide adequate resources for a comprehensive and high standard of waste regulation in order to ensure that waste is managed to the highest practicable standards by industry, commerce and the general public of Northumberland
7	The CC will inspect all waste management facilities in accordance with guidance issued by the government
8	The CC will require that an operator takes appropriate remedial action if waste management licence conditions are not being complied with. Persistent failure to comply with licence conditions will lead to enforcement action including licence revocation, suspension or prosecution where appropriate.
9	Before assessing a waste management licence application, the CC will require the applicant to provide sufficient information appropriate to the size, nature and potential environmental impact of the proposed site.
10	The CC will ensure that all licences issued are written in accordance with the statutory guidance provided in Waste Management Paper No. 4. Other guidance issued by the government, and with regard to, where appropriate, regional or national policy and agreements.
11	The CC will continually review all waste management licences in order to ensure that facilities are being operated in accordance with appropriate new technologies and practices. Any significant changes to the licence will be implemented as soon as practicable.
12	The CC will ensure, through the waste management licensing system, that landfill sites are continually operated in such manner necessary to prevent pollution of the environment, harm to human health and serious detriment to the amenities of the locality.
13	The CC will require that all new landfill sites (and new parts of existing landfills) that are accepting leachate and landfill gas forming wastes are designed and operated following the undertaking of a site specific risk assessment.
14	The CC will require leachate collection system to be installed at all new landfill sites (and new parts of existing landfills) that are accepting leachate forming wastes, The subsequent treatment of the excess leachate will be required, either on or off site prior to disposal.
15	The CC will require that all operators of landfill sites implement appropriate leachate, groundwater and surface waster monitoring procedures.
16	The CC will require all operators of landfill sites to implement landfill gas monitoring procedures and where necessary, install appropriate, control measures. Landfill gas should preferably be collected and flared and in any

	case will not be allowed to escape in an uncontrolled manner.
17	The CC will actively seek the utilisation of landfill gas.

Abstracted from: Northumberland County Council. Northumberland Waste Management Plan, pg. 3-4. (Draft 1995)

Staffordshire Waste Management Strategy

01	The life cycle of waste can be viewed form cradle (when the material becomes waste) to grave (when the waste is reused, recovered or becomes inert following disposal
02	The waste management strategy should be environmental and economically sustainable. the aims may be achieved by ; minimising environmental impacts, such as pollution of the environment, harm to human and loss of amenity with operating costs which are acceptable to the community of Staffordshire. The best ways achieving these aims will be via an integrated approach to waste management.
03	The waste management options can be arranged into an hierarchy of waste management options. This hierarchy is useful as a general model, but using the hierarchy rigidly will not necessarily result in achieving the aims of environmental and economic sustainability in all cases. This is because different options will be more appropriate to different wastes and there can be any overall best or worst options. Therefore the complete waste management system for Staffordshire could be examined holistically.
04	Waste minimisation and then effective management of the inevitable waste that will be produced is required. Such a strategy apart from being environmentally and economically sustainable is likely to be integrated, market oriented, flexible and operated on a county scale. One method of comparing the overall environmental inputs and economic costs is Life Cycle Inventory
05	Life cycle Inventory can be used to predict and compare both the environmental and economic performance of different integrated waste management systems for a specified area, this could be a City, District or County.
06	Waste is an inevitable product of all sectors of society as demonstrated by the amount of waste arising in the county, managing this waste more effectively is a matter for this Plan to address. The goal of sustainable waste management can only be achieved if society in general and industry in particular, produce more goods and services with less pollution and waste. Waste minimisation is at the top of the waste management hierarchy. However waste minimisation is a necessary precursor to effective waste management rather than part of it. Waste minimisation will affect the quantity and composition of waste, but there will lawyers be some waste which will need to be managed effectively.
07	The prerequisite to environmental and economic sustainability are the needs to prevent pollution of the environment and harm to human health. A balance will have to be found between the environmental benefit and economic cost and this is most likely to be done by a strategy which is integrated and flexible.
08	An integrated waste management strategy for Staffordshire will deal with all types and source of waste as detailed in chapter 4 Waste arising and will include waste collection and sorting followed by one or more of the following options: • re-use • recovery recycling composting anaerobic digestion landspreading refused derived fuel waste to energy landfill gas utilisation • disposal landfill treatment
09	To manage waste sustainable requires a range of the above options. However all forms of recovery leave some residual materials that requires disposal
10	The hierarchy of waste management options gives general guidance on the relative desirability of the different management options, but it has limitations. rather than a strategy based solely on the hierarchy an holistic strategy is proposed which recognises that all management options have a role to play. this approach does not predict the best system since there are difference across Staffordshire in both the nature and quantity of waste generated and the existing infrastructure of waste management facilities that have been developed to cope with it.

Abstracted from: Shropshire County Council: Waste Management Plan-Consultation Draft, pg. 118-119. (December 1995).

Staffordshire WRA Policies

01	The WRA will encourage prospective applicants for Waste Management Licences to discuss their proposals with the WRA before submitting an application and to utilise the relevant regional application package and guidance notes
01	An application for Waste Management Licences will not be considered as valid and the period of determination shall not be deemed to have commence unless all the information as required by statutory guidance has been supplied. Failure to supply additional information as required by the relevant regional application package will result in the period of determination not being extended.
03	In addition to the statutory consultees the WRA will where appropriate consult; the relevant district and parish council the county director of planning and economic development the county fire and rescue service any statutory undertaker whose activities may be affected
04	the WRA will endeavour t determine Waste Management Licence applications within the statutory periods of determination; where the complexity of the application does not allow for this and all the information required by the WRA has been submitted, the applicant will be requested to agree to an extension of the period of determination
05	the WRA will require a detailed and comprehensive Working Plan to be submitted by the applicant the format and content of which will required WRA approval. Any difficult or special wastes will not be authorised unless the Working Plan contains specific codes of practice for dealing with these wastes.
06	all Waste Management Licences will be kept under constant review and revised and updated as necessary to take account of higher standards, operational practices and national guidance.
07	the WRA will not authorised the deposit of biodegradable waste within 250 metres of any development unless the WRA is satisfied that measures can and will be taken for the monitoring and control of landfill gas such that this distance may be reduced. Under no circumstances will the deposit of biodegradable be authorised within 50 metres of development.
08	landfill sites at which it is proposed to deposit biodegradable waste must be engineered to a high standard to prevent pollution of the environment. Such site are unlikely to be considered suitable within major aquifers. Existing sites and engineering standards will be subject to review
09	waste transfer stations at which it is proposed to accept biodegradable waste in excess of 100 tonnes a day must be constructed and operated under cover
10	the WRA will inspect establishments or undertakings which are registered as exempt form Waste Management Licensing in order to prevent pollution of the environment and harm to human health. Such visits will be unannounced and at a frequency that accords with their perceived pollution potential.
11	all licensed waste management facilities will receive unannounced inspections on a regular basis to check compliance with licence conditions at frequencies related to the nature of the facility and taking into account Department of the Environment Guidelines.
12	the WRA will require licence holders to sample and monitor waste, landfill gas, leachate and ground and surface waters as appropriate for the facility concerned.
13	the WRA will undertake compliance monitoring on waste, landfill gas, leachate and ground and surface waters as appropriate for the facility concerned in order check licence holders results.
14	the WRA will seek to determine application for registration as a carrier and/or broker within the statutory two month time period. Where applicants have committed relevant offences the WRA will consider refusing the application or revoking the registration.
15	the WRA will object to the importation of waste for landfilling and there will be a presumption against unnecessary movements into or out of Staffordshire that did not accord with the proximity principle.
16	the WRA will seek to ensure that the movement and disposal of special wastes within Staffordshire is carried out in accordance with statutory procedures by regular checks on dispose and producer consignment notes.
17	the WRA will seek to ensure that difficult waste is managed by the best practicable environmental option and support the movement of difficult waste to suitable specialist facilities.
18	incineration is the preferred option for all clinical waste, group A and B must be incinerated but it is accepted that it may be appropriate for some group E waste to be landfilled, where landfill is proved to be a non hazardous option in that case.
19	where a proposed development is considered to be at risk form migrating landfill gas, the WRA will advise that further investigative work be undertaken and measures adopted to ensure protection of property. Where residential development is proposed within 50 metres of a known gassing landfill, the WRA will recommend that Planning Permission be refused unless the developer can clearly demonstrate how the development is to be protected.
20	the WRA will adopt a prosecution procedure based very closely on the guidance given in the code for Crown Prosecutors. However, other factors will also be taken into account the WRA including any statutory defences and statutory guidance give by Central Government departments.
21	the WRA will encourage waste minimisation through guidance to waste producers and other interested bodies.
22	the WRA will encourage the re-use of waste through guidance to any who manage waste and other interested bodies

23	the WRA will encourage all appropriate methods of waste recovery and where possible, the establishment of waste recovery facilities.
24	the WRA will seek continued improvements in the effectiveness of collection, flaring and utilisation of landfill gas. There will be a presumption against the passive venting of landfill gas unless it can be shown that methane oxidation is reducing methane emissions t a low level. Proposals for the utilisation of landfill gas for the generation of power or heat will be encouraged.
25	the WRA will fully review the Waste Management Plan after five years, and publish an annual monitoring report detailing, implementation and progress and any known changes in waste arisings, waste management facilities and waste management options available.
26	the WRA will liaise with the Director of Planning and Economic Development, other neighbouring Planning Authorities, where relevant and District Planning Authorities in respect of development planning applications, waste management licence applications and the Waste Management Plan and consultations under the General Development Order 1988.
27	the WRA will take an active role in the West Midlands Waste Regulation Joint Advisory Committee and other regional organisations and is committed to improving waste regulation standards across the West Midland Region.
28	the WRA will regularly review its work load giving priority to statutory duties, non statutory tasks will be tanked and carried out with regard to protection of the environment and public health. The WRA will carry out these duties and tasks with a view to minimising the burden placed upon those so regulated.
29	the WRA will seek to ensure that information and advice on waste regulation is made available to industry, commerce and the general public by publication and dissemination of information.
30	the WRA will provide a register of information as required by Regulation 10 of the Waste Management Licensing Regulations 1994 at its principal office and will be available for inspection during normal office hours.

Abstracted from: Staffordshire County Council: Waste Management Plan-Consultation Draft, pg. 121-124. (December 1995)..

Staffordshire CC Policies

147	the county council will seek to ensure that waste treatment and disposal facilities including landfill sites are distributed throughout Staffordshire in locations to satisfy the needs of each district. In considering the provision of such facilities, regard will also be had to the needs arising within the West Midlands conurbation. Such facilities will not normally be permitted if they are likely to have an adverse effect upon: • local settlements, houses and amenities • the location and operation of surface and underground waste resources • high quality agricultural land • areas of outstanding natural beauty and areas of special landscape value • sites of high nature conservation value described in Policies 84 and 85: • country side recreation sites
148	the county council will encourage: • the recycling and reclamation of wastes particularly where this can be shown to give environmental benefits: • using disused mineral workings and derelict or despoiled land for waste treatment plants and new landfill sites, provided that such sites are compatible with Policy 147
149	the county council will require completed landfill sites to: • blend in with the topography of the area surrounding the site • be free draining • facilitate the implementation of the agreed afteruse • be landscaped in a manner appropriate to the setting • provide appropriate facilities for the monitoring and treatment of leachate, gaseous emissions and settlement.

Abstracted from: Staffordshire County Council: Waste Management Plan-Consultation Draft, pg.124.125. (December 1995).

Shropshire WRA Waste Management Policies

1	The CC supports the concept of the Waste Management Hierarchy (as outlined in the Government's draft Waste Management Strategy) and will actively encourage waste producers to eliminate wastes where possible and to deal with what remains by the best practical environmental option.
2	The CC will take an active role in local authority organisations, such as the West Midlands Regional Association, which are committed to improving the standards of waste regulation in the West Midlands.
3	The CC will allocate adequate resources to the operation to the provision of an effective waste regulation service throughout Shropshire.
4	The CC will seek to carry out its Waste Regulation duties effectively but with due regard to the burdens placed upon site operators, waste carriers and waste producers. Where possible, producers will be revised to minimise these burden without compromising the objective of environmental protection.
5	The CC will seek to ensure that the procedures for notifying an dealing wit special wastes are checked and monitored.
6	The CC will licence, to the required standard, all waste management facilities to prevent any detrimental impact upon the environment. The CC will take note of advice given in Waste Management Papers and Regional and National guidelines in writing licence conditions.
7	The CC will regularly review all waste management licences and seek to modify them when appropriate.
8	The CC will endeavour to inspect all licensed and exempt facilities in accordance with the inspection frequencies indicated in Waste Management Paper N0.4 issued by the Department of the Environment . The frequency of inspection shall be determined principally by the type of material involved, the likely impact of any incident on the environment or human health, and the particular history of a facility.
9	Environmental monitoring will be required at all licensed waste management facilities prior to, during and after their operational life. The frequency and nature of the monitoring will depend on the type of facility and its potential to cause pollution. Site operators will be responsible for undertaking most of this work although the WRA will provide guidance, undertake periodic check monitoring, and assess all results.
10	Liquid wastes and untreated clinical wastes will generally not be acceptable at landfill sites within Shropshire.
11	The CC will investigate all reported incidents of alleged unauthorised waste management. Subsequent enforcement action will be prioritised to tackle those activities which pose the most imminent risk of significant pollution or danger to public health. Every effort will be made to keep the initial complainant informed of the progress and outcome of the investigations.
12	The CC will take appropriate enforcement action whenever activities in breach of waste management legislation are detected. Any action taken will be consistent throughout the County.
13	The CC will seek to raise awareness of waste management legislation and responsibilities amongst waste producers, carriers and those involved in the treatment, recycling and disposal of waste.
14	The CC will advise and respond to consultations form District Councils and other landowners on closed landfill sites and adjacent proposed developments and on the re-development of contaminated land.
15	The CC will not charge for the provision of general advice and information on waste management matters. More complex enquires and the provision of copies of documents will be subject to a modest charge in accordance with the CC's general charging procedure.
16	The CC will seek to establish and maintain public registers in accordance with statutory requirements for the following;- The Waste Management Licensing System, Carriers of Controlled Waste, Waste Dealers and Brokers, and for establishments and business carrying out exempt activities involving the recovery and disposal of waste.
17	The CC will regularly review the work of the Authority in the light f its charging commitments. Constituent tasks will b e ranked and carried out in order of their priority. Priority will be given to tasks which meet the Authority's statutory obligations and which protect the public and the environment. The information will be published on an annual basis as required by Section 67 of the Environmental Protection Act 1990.
18	the CC will try and accommodate all requests for slide presentations and attendance at other public meetings within Shropshire. In all but exceptional circumstances, the Authority's participation will be without charge.

Abstracted from: Shropshire County Council: Waste Management Plan-Consultation Draft, pg. 148-154. (June 1995)

Surrey Waste Management Plan Policies

1	The CC will seek to ensure that licences are enforce for all activities involving the keeping, treatment or disposal of waste which are not otherwise exempt from the requirements for a licence. The CC will review the licences on a regular basis I order that they are kept up-to-date with relevant legislation.
2	In considering applications for licences for transfer stations and waste treatment plants near to residential, industrial or commercial buildings, the CC will require that the keeping and treatment of putrescible waste, or any other waste capable of giving rise to pests, dust, litter, water pollution or the impairment of surface water drainage, is carried out inside a covered building. Such a building should be enclosed on all but one side. For existing licensed sites the CC will review licences to require an improvement programme for the installation of such facilities. In all cases the CC will require that wastes are stored either in secure containers or on a paved impermeable hardstanding provided with a sealed drainage system.
3	In granting new licences for the disposal of waste soils and rubble into water filled and unlined excavations in aquifers, the CC will impose conditions calculated to prevent the disposal of any potentially polluting or contaminating wastes. Preference will normally be given to the imposition of licence conditions which do not involve the co-operation or participation of third parties to ensure full compliance, with responsibility for compliance being firmly with the licensee.
4	In considering licence applications for the disposal of waste on or in land giving access to usable groundwater, there will be a presumption against permitting the disposal of any wastes which might give rise to a discharge containing any List I substance, or List II substance in polluting concentrations, as defined in regulation 15 of the Waste Management Licensing Regulations 1994, and the Groundwater Directive 80/68/EEC
5	In granting new licences for the disposal for Type B and C or other potentially polluting or contaminating wastes, the CC will impose conditions requiring, inter alia:- • the monitoring and control of waste input • the secure containment of tipping areas t specifications which minimise the potential for leakage • robust arrangements for leachate management to specifications which offer the long term ability to control leachate levels throughout the landfill by abstraction, collection and/or reinjection of leachate • robust arrangements for minimising the leakage escape or discharge of any landfill gas to the surrounding environment except after efficient combustion to remove flammable and noxious components • the generation of useful heat and/or electricity form landfill gas whenever practicable • the prevention of the disposal of clinical waste in such sites • the prevention of litter blow and pest infestation at site, and the deposit of material onto the highway from vehicles visiting the site • minimisation of noise and dust • the monitoring of the generation of pollutants within the landfill, the quality of air land and water in the vicinity of the site, including substances discharged from landfill gas or leachate treatment processes. • measures calculated to accelerate the biological delay process operating within the landfill and the controlled removal of and safe disposal of pollutants form the landfill, leaving an inert residue within the shortest possible time, normally not more than 25 years following the completion of waste tipping.
6	There will be a presumption against granting any licence for the disposal of Type B or C or other potentially polluting or contaminating wastes, unless the CC is satisfied that the applicant is prepared to implement arrangements, acceptable to he CC for the long term monitoring, development, repair, maintenance and management of measures for the containment and control of any pollutant that may be generated at the site. The CC will ensure that such arrangements are based on adequate financial resources that would be unaffected by the impoverishment, bankruptcy or liquidation of the licensee, which would continue to be available for an indefinite period until a certificate of completion is issued.
7	The CC will inspect licensed sites to the minimum frequency published in Waste Management Paper No. 4. In exceptional cases where the management of the site is demonstrated to be a high calibre, such that the CC are confident that breaches of control are extremely unlikely, the inspection frequency may be relaxed. At landfill sites the CC will carry out a full audit of environmental management and monitoring systems operated by the licensee on an annual basis. inspections will also tale place at other unlicensed sites exempted or other wise permitted for the treatment, recovery, disposal, collection, brokering or transport of waste normally on an annual basis or as necessary to prevent pollution. The CC will also form time to a time inspect the premises of special; waste producers to ensure is being properly maintained.
8	The CC as WRA will respond to any breaches of waste management control promptly, and in a firm and constructive manner. It will ensure that the person responsible is made aware of his/her obligations to remedy any existing breach. The CC will prosecute in the following circumstances; • in the case of repeated breaches of waste management control and/or • were breaches directly, indirectly or potentially cause pollution of the environment, harm to human health or serious detriment to the amenity of the locality where this is judged by the CC to be in the public interest.

Abstracted from: Surrey County Council. Background Paper No. 1. Surrey Waste Management Plan, 1995, pg. 48-64. (November 1995)

Suffolk County Council

1	Applicants for waste management licences will be required to provide a working plan, the format and content of which will require the WRA's approval before licence issue, and approved working plans will describe in detail how waste management sites are to be prepared, operated and completed. The working plan will form an integral part of the licence and any proposed amendment will need the prior approval of the WRA. Licence conditions will be formulated with the aim of preventing pollution of the environment, harm to human health and serious detriment to the amenity of the locality. Licence conditions will be imposed that are necessary, comprehensive, unambiguous and enforceable.
2	All licensed facilities will receive unannounced visits by WRA staff at frequencies related to the nature of the facility and taking into account Department of the Environment (DoE) guidelines. Where external factors temporarily prevent the DoE performance targets being met, the WRA will give priority to sites which are given rise to: a) significant risk of detriment to human health b) threat of environmental pollution c) disturbance to local residents d) history of licence violations
3	All waste management licences will be kept under constant review, and revised and update as necessary. During the life of a licence changes can occur in UK and EC legislation, or in NRA or DoE policies, which may necessitate modification of the licence. Experience of operating the site may also reveal a need to modify practices to avoid water pollution or gas migration Review are also necessary to ensure consistency of licence conditions for similar operations.
4	Enforcement action will be taken against breaches of licence conditions, giving priority to cases where; a) there is a threat of environmental pollution or harm or disturbance to occupiers of nearby premises b) the operator has a history of offences c) operating standards are substantially below requirements Every opportunity will be taken to advise and educate operators where infringements appear to be inadvertent and do not pose an immediate threat to people or the environment.
5	Fly-tipping will be dealt with by prosecution of offenders wherever possible. A successful prosecution requires firm evidence. The Authority will seek to obtain such evidence. In addition , the Authority will seek to educate waste producers in their obligations under the Duty of Care.
6	A register of all known carriers of controlled wastes in Suffolk will be maintained, as required by the Control of Pollution (Amendment) Act 1989. Suffolk CC's WRA is linked to the co-ordinated Local Authority Database of Waste Carriers (CLADWAC) operated by the London WRA. The London WRA also prints the registration certificates issued by WRAs to registered carriers. The Authority will make every effort to inform carriers of their obligations to register, and enforcement will be used as a last resort against those who persistently and knowingly offend under the legislation.
7	Operators of facilities perceived to present a threat of environmental pollution or harm to human health will be requires to carry out environmental monitoring as a site licence condition. The monitoring regime will depend on the apparent threat, but will focus mainly on monitoring water quality and landfill gas migration. The WRA will periodically carry out monitoring The monitoring programme will take account of advice given by the Department of the Environment
8	Landfill sites filled or completed by Suffolk CC will be monitored by the WRA, and remedial measures proposed where necessary. Where water pollution or unacceptable gas migration is occurring or is imminent, preventive or remedial measures are recommended for implementation by the Waste Disposal Service. Any plant installed is maintained and operated by the WRA as agent to the Waste Disposal Service.
9	As soon as possible after the end of each financial year, an Annual Report will be produced detailing the WRA's activities during that financial year. The Annual Report is required under s67 of EPA 90, and a common format has been agreed with Norfolk and Cambridgeshire's WRAs. A copy will be sent each year to the Secretary of State for the Environment, and copies will be available to the public at reasonable cost.
10	The Authority will encourage, where possible, the establishment of recycling facilities, and will seek to persuade waste producers to minimise waste production. The WRA's practical ability to further recycling is limited to giving advice to industry and householders when the opportunity arises.
11	The WRA will seek to ensure that all movements of special; Waste and transfrontier shipments of hazardous waste in Suffolk are notified to the Authority and comply with the relevant legislation. There is a legal requirement on all keepers of special waste to submit consignment notes to the WRA and a duty on the Authority to control and regulate the movement of such wastes. The Authority also has duties to the transfrontier movement of certain wastes.
12	The WRA will remove, or arrange the removal of, drums found washed up on Suffolk's beaches, and will, at its

	discretion, remove or arrange the removal of spilt or abandoned hazardous wastes if their presence appears to pose a threat to human health or to the environment. Section 59 permits WRAs to deal with waste which has been unlawfully deposited. In most cases drums found washed up on beaches are unlabelled, and WRA personnel normally assume that the contents are potentially polluting or hazardous.
13	Environmental information and other prescribed particulars will be made available for pubic inspection. Environmental information Regulations 1992 require authorities holding information relating to the environment to make such information available for public inspection at all reasonable times. Section 64 of EPA 90 further requires waste regulation authorities to maintain a register of information on waste management licences and licence holders and to make it available for public inspection. The particulars to be included in the public register are prescribed by the Waste Management Licensing Regulations 1994. The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 require WRAs to maintain a register of carrier of controlled waste to make this available for public inspection.
14	The WRA will liaise closely with other authorities on matters of common interest. The Authority routinely consults with the NRA, HSE, District Councils, the County Planning Officer and the County Fire Officer on matters relating to waste management licences, while the District /councils are further consulted on proposed developments of land within 250 meters of an excising closed landfilled site. Partnership with Norfolk and Cambridgeshire WRAs in the Eastern Regional Waste Regulation Joint Committee also assists in the aim of developing common standards and practices across the East Anglian Region.

Abstracted from: Suffolk County Council Waste Disposal (Management) Plan 1994-2004. Draft Document, pg. 88-91 (March 1995).

Policies of the West Yorkshire WDA

1	The JC will secure waste disposal facilities to cover foreseeable needs for households, commercial and industrial waste as collected but the five district councils. All operational activities will closely monitored to ensure the disposal of waste is undertaken in a way which is cost effective and represents the best possible environmental options.
2	The JC recommends to the individual district councils that they give the joint committee the opportunity to examine jointly committee the opportunity to examine jointly with the planning authority, the suitability of all derelict and degraded land (opencast coal and mineral workings, disused railways, spoil heap etc.) for reclamation using controlled waste disposal, the restoration or alternative use of the land will not be unduly delayed.
3	The JC will investigate the possibility of grant aid for the development of all facilities
4	The JC will provide for the restoration of former landfill sites under its controls as a contribution to the improvement of the environment in order to facilitate beneficial afteruse.
5	The JC will carry out landfill gas monitoring at sites under its control in accordance with current legislation and codes of practice.
6	The JC will promote the commercial exploitation of methane gas at landfill sites.
7	The JC will encourage, and participate in, the reclamation of materials and waste recycling to reduce the amount of waste for disposal
8	Recycling credits will be paid to charitable organisations in respect of legislation and JC decisions.
9	The JC will maintain a network of household waste sites to ensure a reasonable level of availablility to all residents within West Yorkshire. Sites will be open at reasonable times when they shall be adequately secured against their unauthorised use. All wastes will be containerised and where practical, suitable waste materials will be salvaged for recycling.
10	In support of charitable organisations, the JC undertakes to dispose of wastes, except special wastes, arising from the charitable activities of all registered charities operating within West Yorkshire, free of charge.
11	The JC will prohibit blood sports and in the interest of public safety any use of firearms, in land under its control.
12	The JC will ensure as far as is reasonably practical, the health, safety and welfare of its employees and other parties affected by its responsibilities and undertakings. To this end, the JC will comply with appropriate health, safety and welfare legislation and nationally agreed codes of practice.
13	The JC will liaise with the planning authorities in West Yorkshire in respect of all waste disposal matters.
14	The JC will continue to provide general advice on waste management matters, and will charge for this service where appropriate.
15	The JC will seek to appoint staff of the highest calibre and subject to resources, employee skills and expertise will be developed to their maximum potential through to their maximum potential through further education and training programmes.
16	The JC supports full participation in waste management matters through representation at the appropriate bodies.

Abstracted from: West Yorkshire Management Plan.1995, pg. 95-98. (March 1996).

Policies of the West Yorkshire WRA

1	The JC will endeavour to raise the standard of waste disposal in West Yorkshire by the application of relevant and essential licence conditions. The Joint Committee will take note of advice given in Waste Management Papers and Regional and National Guideline in framing licence conditions.
2	The JC will base Waste Management Licences around a detailed and comprehensive working plan submitted by the site operator. Asbestos, drummed and clinical wastes will bit be authorised for disposal at a landfill site unless the working plan contains specific Codes of Practices for dealing with these wastes.
3	The JC supports the principle that applicants for, and holders of, Waste Management Licences shall be accountable and shall conduct their operations to avoid pollution of the environment and harm to human health. Consequently the JC will require them to declare how they will deal with, sample and monitor waste, landfill gas, leachate and ground and surface waters for the duration of the Licence, as appropriate to the facility concerned.
4	The JC supports the principle of Waste Regulation Officers carrying out environmental monitoring to verify the accuracy of the monitoring by the Licence Holder.
5	The JC acknowledges the minimum frequencies of inspections, stipulated in Waste Management Paper No. 4 issued by the DoE to be necessary for the proper discharges of the duty imposed on the IWRA by Section 42 of the Environmental Protection Act 1990.
6	The JC will regularly review the work of the Authority in the light of its changing commitments. Constituent tasks will be ranked and carried out in order of their priority. Priority will be given to tasks which meet the Authority's statutory obligations and which protect the public and environment.
7	In consultation with the \NRA, the JC will continue to require high standards of landfill containment to prevent pollution to ground water. Existing standards will be subject to review taking into account operational experience and national guidance.
8	The JC supports the principle of co-disposal of certain special and difficult wastes with other household, commercial and industrial wastes. Licence conditions will be specified to ensure appropriate standards are maintained at sites licensed to disposed of such wastes and the type of site judged suitable for co-disposal will be determined by the degree to which it is engineered for leachate containment. Any facility accepting wastes for co-disposal will only be authorised if such standards can be guaranteed.
9	The JC will continue to encourage and support the dewatering of liquid wastes, and generally will not permit the disposal of liquid waste to landfill.
10	When required, liaison will take place with Her Majesty's Inspectorate of Pollution to determine the most suitable landfill facilities in West Yorkshire to receive wastes from hospitals, universities etc. The JC will object to any proposal to dispose of radioactive waste from the nuclear industry in West Yorkshire.
11	The JC supports the view that there should be no direct landfilling of nationally imported waste and will act within its legal powers to this end.
12	The JC will encourage appropriate methods of recycling and waste reduction through guidance to licence holders, waste producers and other interested bodies and through its own activities.
13	The JC will liaise with the planning authorities in West Yorkshire in respect of development planning applications, waste management licence applications, the waste disposal plan and consultations under the General Development Order 1988.
14	The JC will prepare a revised Waste Disposal Plan under Section 50 of the Environmental Protection Act 1990 before March 1995. Preparation of a revision of the 1990 West Yorkshire Waste Disposal Plan will take account if any guidance or direction from the Secretary of State and will also consider the needs of the planning authorities in West Yorkshire.
15	The JC will review those activities over which it has control to determine opportunities for reducing environmental impact. Its polices aim to support this principle.
16	The JC will continue to provide general advice on matters relating to waste management, free of charge, apart from in the following instances; 1. the activities which through legislation require Authorities to make charges I.e. Registration of Carriers and the Licensing Charging Scheme and 2. other services such as responding to development enquiries, supply of special waste consignment notes and the provision of certain lists for which a charge may be made at rates to be determined by the JC.
17	The JC will seek to appoint staff of the highest calibre and, subject to resources, employees skills and expertise will be developed to their maximum potential through further education and training programmes.
18	The JC will ensure as far as is reasonably practical, the health, safety and welfare of its employees and other parties affected by its responsibilities and undertakings. To this end the JC will comply with appropriate health, safety and welfare legislation and nationally agreed codes of practice.
19	At each Waste Regulation Sub-Committee meeting a report will be presented detailing licences issued and licence modifications, transfers and cancellations that have taken place since the report to the last metering was compiled. A similar report will be presented giving details or clarification of any particular action taken.
20	Ward members in the five West Yorkshire District Councils will be informed of licence applications for facilities located within their wards.
21	The JC will play a full part in waste regulation at regional level through participation in the Yorkshire and Humberside Regulation Group and the associated officer groups. The JC supports the adoption of policies, guidance, codes of practice etc. To achieve consistent regional standards.

22	The JC support full participation in waste regulation at national level, through the numerous bodies and activities involved.
23	The Authority supports wide public access to environmental information. In consequences the Authority will seek to met the requirements for statutory Public Register and the provision of information under the Environmental Information Regulations 1992. The Authority will presume that no information required for the Regulation can be justified as commercially confidential unlooses a very strong case is made. The onus is on the person affected by the information to make and justify a claim for commercial confidentiality.

Abstracted from: West Yorkshire Waste Management Plan, pg. 85-90. (March 1996).

Wiltshire Waste Strategy

1	The County Council will support and encourage waste management practices which are consistent with the principle of sustainability.
2	The County Council considers that waste management in Wiltshire should be based on a hierarchy of options in the following order of descending preference: 1. Reduction and minimisation of waste 2. Re-use of products and materials 3. Recovery of resources by; • recycling • composting of organic materials • energy recovery 4. Disposal of remaining waste to landfill or incineration without energy recovery. The County Council will seek to increase the proportion of waste managed by the options towards the top of the hierarchy.
3	The County Council will seek to adopt an integrated approach to waste management which utilises a range of hierarchy options appropriate to Wiltshire.
4	The County Council will aim to ensure that Wiltshire's waste should be principally managed and disposed of within Wiltshire. This is subject to the need for specialised treatment and / or disposal of certain wastes where out of county solutions may be more appropriate.
5	the county Council considers that waste should be dealt with as near as possible to where it is generated. Subject to environmental, economic and technical considerations, the County Council will seek to ensure that Wiltshire's network of waste management facilities is consistent with the Proximity Principle.
6	The County council will seek to promote waste reduction, re-use and increased recycling, subject to economic considerations and the environmental benefits to be achieved. The County Council will adopt this approach in exercising its functions.
7	The County Council will support and encourage the introduction of energy recovery methods, as part of an Integrated waste management system, subject to environmental and transport considerations.
8	The County Council will seek to reduce the need for and reliance on landfilling / landraising.
9	The County Council considers that the waste management options pursued for each waste stream should represent the best practicable environmental option (BPEO). It will therefore seek to minimise pollution and other impacts on the natural and built environment, and local communities, resulting form waste management practices.

Abstracted from: Wiltshire County Council: Wiltshire Waste Strategy-Consultation Draft, pg. 7-9. ((March 1996).

CONTROL OF POLLUTION ACT 1974
(1974 c40)
ARRANGEMENT OF SECTIONS

Section	Licensing of disposal of controlled waste
3	Prohibition of unlicensed disposal of waste
4	Provisions supplementary to s3
5	Licenses to dispose of waste
6	Provisions supplementary to s 5
7	Variation of conditions and revocation of licences
8	Transfer and relinquishment of licences
9	Supervision of licensed activities
10	Appeal to Secretary of State from decisions with respect to licences
	Collection and disposal of controlled waste
16	Removal of waste deposited in breach of licensing provision
17	Special provisions with respect to certain dangerous or intractable waste
	Supplemental
30	Interpretation etc. of Part I

CONTROL OF POLLUTION (SPECIAL WASTE) REGULATIONS 1980
(SI 1980/1709)

ARRANGEMENT OF REGULATIONS

Regulation	Part I: Introductory
1	Citation, commencement and interpretation
2	Meaning of Special Waste
3	Certain radioactive waste to be special waste
	Part II: Consignment Notes
4	Duties of producers
5	Duties of carriers
6	Duties of disposers
7	Importers and exporters
8	Pipelines and on-site disposal
	Part III: Exception for Regular Consignments
9	Directions by disposal authorities
10	Disposals in another authority's area
11	Appeals
12	Forecasts
	Part IV: Registers and Site Records
13	Registers
14	Site records
	Part V: Directions as to the Disposal of Special Waste
15	
	Part VI: Enforcement

COLLECTION AND DISPOSAL OF WASTE REGULATIONS 1988

(SI 1988/819)

ARRANGEMENT OF REGULATIONS

CONTROL OF POLLUTION (AMENDMENT) ACT 1989

(1989 c 14)

ARRANGEMENT OF SECTIONS

6	Seizure and disposal of vehicles used for illegal waste disposal
7	Further enforcement provisions
8	Regulations
9	Interpretation
10	Expenses
11	Short title, commencement and extent

ENVIRONMENTAL PROTECTION ACT 1990

ARRANGEMENT OF SECTIONS

Waste On Land

Section	Part II
	Preliminary
29.	Preliminary
30.	Authorities for purposes of this Part
31.	Power to create regional authorities for purposes of waste regulation
32.	Transition to waste disposal companies etc.
	Prohibition on unauthorised or harmful depositing, treatment or disposal of waste
33.	Prohibition on unauthorised or harmful deposit, treatment or disposal etc. of waste
	Duty of Care as respect to waste
34.	Duty of Care etc. as respect to waste
	Waste Management Licences
35.	Waste Management licences: general
36.	Grant of licences
37.	Variation of licences
38.	Revocation and suspension of licences
39.	Surrender of licences
40.	Transfer of licences
41.	Fees and charges for licences
42.	Supervision of licensed activities
43.	Appeals to Secretary of State from decisions with respect to licences
44.	Offences of making false statements
	Collection, disposal or treatment of controlled waste
45.	Collection of controlled waste
46.	Receptacles for household waste
47.	Receptacle for commercial or industrial waste
48.	Duties of waste collection authorities as respects disposal of waste collected
49.	Waste recycling plans by collection authorities
50.	Waste disposal plans of waste regulation authorities
51.	Functions of waste disposal authorities
52.	Payments for recycling and disposal etc. of waste
53.	Duties of authorities as respects disposal of waste collected: Scotland
54.	Special provisions for land occupied by disposal authorities: Scotland
55.	Powers for recycling of waste
56.	Powers for recycling of waste: Scotland

45.	Power of Secretary of State to require waste to be accepted, treated, disposed of or delivered
46.	Power of Secretary of State to require waste to be accepted, treated, disposed of or delivered: Scotland
47.	Powers to require removal of waste unlawfully deposited
48.	Interference with waste sites and receptacles for waste
49.	Duty of waste regulation authorities as respects to closed landfills
Section	
	Special waste and non-controlled waste
62.	Special provision with respect to certain dangerous or intractable waste
63.	Waste other than controlled waste
	Publicity
64.	Public registers
65.	Exclusion from registers of information affecting national security
66.	Exclusion form registers of certain confidential information
67.	Annual Reports
	Supervision and Enforcement
68.	Functions of Secretary of State and appointment etc. of inspectors
69.	Powers of entry etc. of inspectors
70.	Power to deal with cause of imminent danger of serious pollution etc.
71.	Obtaining of information from persons and authorities
72.	Default powers of Secretary of State
	Supplemental
73.	Appeals and other provision relating to legal proceedings and civil liability
74.	Meaning of "fit and proper person"
75.	Meaning of "waste" and household, commercial and industrial waste and special waste
76.	Application of this Part to Isles of Scilly
77.	Transition from Control of Pollution Act 1974 to this Part
78.	This Part and radioactive substances

DISPOSAL OF CONTROLLED WASTE (EXCEPTIONS) REGULATIONS 1991
(SI 1991/508)

Regulation	
1	Citation and commencement
2	Exceptions form section 3(1) of the Control of Pollution Act 1974

SCHEDULE

Regulation 2(1) : Activities Referred to in Regulation 2(1)

CONTROLLED WASTE (REGISTRATION OF CARRIERS AND SEIZURE OF VEHICLES) REGULATIONS 1991
(SI 1991/1624)

ARRANGEMENT OF REGULATIONS

Regulation	
1	Citation, commencement and interpretation
2	Exemption from registration
3	Registers
4	Applications for registration
5	Refusal of applications
6	Registration as a carrier
7	Amendment of entries
8	Change of circumstances and registration of additional partners
9	Copies of certificates of registration
10	Revocation of registration
11	Duration of registration
12	Alteration of register to reflect cessation of registration
13	Duty to return certificates etc.
14	Production of authority
15	Appeals
16	Time limit of for bringing an appeal
17	Hearings
18	Notification of determination
19	Prescribed information
20	Prescribed steps to be taken before applying for a warrant to seize property
21	Removal of vehicles seized
22	Return of property seized
23	Disposal of property seized
24	Notice of disposal of a vehicle
25	Application of proceeds of sale
26	Service of notices

SCHEDULES

Schedule 1 - Prescribed Offences: Relevant Enactments

Schedule 2 -Application Forms

Part I - Application for registration as a carrier of controlled waste

part II -application for renewal of registration as a carrier of controlled waste

Schedule 3 -Certificate of Registration under the Control of Pollution (Amendment)Act 1989

ENVIRONMENTAL PROTECTION (DUTY OF CARE) REGULATIONS 1991 (SI 1991/2839)

ARRANGEMENT OF REGULATIONS

Regulation	
1	Citation, commencement and interpretation
2	Transfer notes
3	Duty to keep copies of written descriptions of waste and transfer notes
4	Duty to furnish documents

CONTROLLED WASTE REGULATIONS 1992 (SI 1992/588)

ARRANGEMENT OF REGULATIONS

Regulation	
1	Citation, commencement and interpretation
2	Waste to be treated as household waste
3	Waste not to be treated as household waste
4	Charges for the collection of household waste
5	Waste to be treated as industrial waste
6	Waste to be treated as commercial waste
7	Waste not to be treated as industrial or commercial waste
7A	Waste not to be treated as household, industrial or commercial waste
8	Application of Part II of the Act to litter and refuse
9	Exceptions from section 33(1) of the Act
10	Amendment of the Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulation 1991

SCHEDULES

Schedule 1 - Waste to Treated as Household Waste
Schedule 2 -Types of Household Waste for which a Charge for Collection may be made
Schedule 3 -Waste to be Treated as Industrial Waste
Schedule 4 -Waste to be Treated as Commercial Waste

ENVIRONMENTAL PROTECTION ACT 1990 (COMMENCEMENT NO 15) ORDER 1994 (SI 1994/1096)

1	Citation and interpretation
2	Provisions coming into force on 1st may 1994
3	Provisions coming into force after 1st May 1994

TRANSFRONTIER SHIPMENT OF WASTE REGULATIONS 1994 (SI 1994/1137)

ARRANGEMENT OF REGULATIONS

Regulation	
1	Citation and commencement
2	Interpretation
3	competent authorities of dispatch and destination
4	Competent authority of transit
5	correspondent
6	transmission of notification by component authority of dispatch
7	Financial guarantees or equivalent insurance
8	power of competent authority of dispatch to ensure return of waste
9	Power of competent authority of destination to ensure disposal of waste
10	Power of customs officer to detain shipment
11	Objections to shipments of waste in accordance with a waste management plan made by the Secretary of State
12	Offences
13	Offences by corporations etc.
14	Defences
15	Penalties
16	Provision of information etc.
17	notices

18	Amended
19	
20	Registration do dealers and brokers
21	Revocations

WASTE MANAGEMENT LICENSING REGULATIONS 1994
(SI 1994/1056)

ARRANGEMENT OF REGULATIONS

Environmental Protection Act 1990
Arrangement of Sections

Section	
	Part II Waste On Land
	Preliminary
29.	Preliminary
30.	Authorities for purposes of this Part
31.	Power to create regional authorities for purposes of waste regulation
32.	Transition to waste disposal companies etc.
	Prohibition on unauthorised or harmful depositing, treatment or disposal of waste
33.	Prohibition on unauthorised or harmful deposit, treatment or disposal etc. of waste
	Duty of Care as respect to waste
34.	Duty of Care etc. as respect to waste
	Waste Management Licences
35.	Waste Management licences: general
36.	Grant of licences
37.	Variation of licences
38.	Revocation and suspension of licences
39.	Surrender of licences
40.	Transfer of licences
41.	Fees and charges for licences
42.	Supervision of licensed activities
43.	Appeals to Secretary of State from decisions with respect to licences
44.	Offences of making false statements
	Collection, disposal or treatment of controlled waste
45.	Collection of controlled waste
46.	Receptacles for household waste
47.	Receptacle for commercial or industrial waste
48.	Duties of waste collection authorities as respects disposal of waste collected
49.	Waste recycling plans by collection authorities
50.	Waste disposal plans of waste regulation authorities
51.	Functions of waste disposal authorities
52.	Payments for recycling and disposal etc. of waste
53.	Duties of authorities as respects disposal of waste collected: Scotland
54.	Special provisions for land occupied by disposal authorities: Scotland
55.	Powers for recycling of waste
56.	Powers for recycling of waste: Scotland
57.	Power of Secretary of State to require waste to be accepted, treated, disposed of or delivered
58.	Power of Secretary of State to require waste to be accepted, treated, disposed of or delivered: Scotland
59.	Powers to require removal of waste unlawfully deposited
60.	Interference with waste sites and receptacles for waste
61.	Duty of waste regulation authorities as respects to closed landfills

Section	
	Special waste and non-controlled waste
62.	Special provision with respect to certain dangerous or intractable waste
63.	Waste other than controlled waste
	Publicity
64.	Public registers
65.	Exclusion from registers of information affecting national security
66.	Exclusion form registers of certain confidential information
67.	Annual Reports
	Supervision and Enforcement
68.	Functions of Secretary of State and appointment etc. of inspectors
69.	Powers of entry etc. of inspectors
70.	Power to deal with cause of imminent danger of serious pollution etc.
71.	Obtaining of information from persons and authorities
72.	Default powers of Secretary of State
	Supplemental
73.	Appeals and other provision relating to legal proceedings and civil liability
74.	Meaning of "fit and proper person"
75.	Meaning of "waste" and household, commercial and industrial waste and special waste
76.	Application of this Part to Isles of Scilly
77.	Transition from Control of Pollution Act 1974 to this Part
78.	This Part and radioactive substances

COUNCIL DIRECTIVE
of 15 July 1995on waste
(75/442/EEC)

Article	
1	Definition
2	Scope
3	Measures to encourage
4	Measures to avoid risk
5	Measures to establish an integrated network of installation
6	Designation of competent authority
7	Waste Management Plan
8	Holder of waste
9	Permit to operate as in Annex II
10	Permit to operate as in Article 4
11	Exemption
12	Sectoral reports
13	Inspection of establishment
14	Record keeping
15	Cost of disposing
16	Report of Measures in Implementation of this Directive
17	Amendments to Annexes
18	Committee to the Commission
19	Notification for compliance
20	Provisional National Law
21	Addresses to Member States

ANNEX I - Categories of Waste

Code	
Q1	Production or consumption residues not otherwise specified below
Q2	Off-specification products
Q3	Products whose date for appropriate use has expired
Q4	Materials spilled, lost or having undergone other mishap, including any materials, equipment, etc., contaminated as a result of the mishap
Q5	Materials contaminated or soiled as a result of planned actions (eg. Residues from cleaning operations, packing materials, containers, etc.)
Q6	Unusable parts (eg. Reject batteries, exhausted catalyst, etc.)
Q7	Substances which no longer perform satisfactorily (eg. Contaminated acids, contaminated solvents, exhausted tempering salts, etc.)
Q8	residues of industrial processes (eg. Slags, still bottoms, etc.)
Q9	Residues from pollution abatement processes (eg. Scrubber sludges, baghouse dusts, spent filters, etc.)
Q10	Machining/finishing residues (eg. Lathe turnings, mills scales, etc.)
Q11	Residues from raw materials extraction and processing (eg. Mining residues, oil field slops, etc)
Q12	Adulterated materials (eg. Oil contaminated with PCBs, etc.)
Q13	Any materials, substances or products whose use has been banned by law
Q14	Products for which the holder has no further use (eg. Agricultural, household, office, commercial and shop discards, etc.)
Q15	Contaminated materials, substances or products resulting from remedial action with respect to land
Q16	Any material, substances or products which are not contained in the above categories.

ANNEX IIA - Disposal Operations

Code	
D1	Tipping above or underground (eg. Landfill, etc.)
D2	Land treatment (eg. Biodegradation of liquid or sludge discards in sold, etc.)
D3	Deep injection (eg. Injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
D4	Surface impoundment (eg. Placement of liquid sludge discards into pits, ponds or lagoons, etc.)
D5	Specially engineered landfill (eg. Placement of liquid or sludge discards into pits, ponds or lagoons, etc.)
D6	Release of solid waste into a waster body except seas/oceans
D7	Release into seas/oceans including seabed insertion
D8	Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are disposed of by means of any of the operations in this Annex.
D9	Physico-chemical treatment not specified not specified elsewhere in this Annex which results in final compounds or mixtures which are disposed of by means of any of the operations in this Annex (eg. Evaporation, drying, calcination, etc.)
D10	Incineration on land
D11	Incineration at sea
D12	Permanent storage (eg. Emplacement of containers in a mine, etc.)
D13	Blending or mixture prior to submission to any of the operations in this Annex
D14	Repackaging prior to submission to any of the operations in this Annex
D15	Storage pending any of the operations in this Annex, excluding temporary storage, pending collection, on the site where it is produced

ANNEX IIB - Operations which may lead to recovery

Code	
R1	Solvent reclamation/regeneration
R2	Recycling/reclamation of organic substances which are not used as solvents
R3	recycling/reclamation of metals and metal compounds
R4	recycling/reclamation of other inorganic materials
R5	regeneration of acids or bases
R6	Recovery of components used for pollution abatement
R7	Recovery of components form catalysts
R8	Oil re-refining or other re-use oil
R9	Use principally as a fuel or other means to generate energy
R10	Spreading on land resulting in benefit to agriculture or ecological improvement, including composting and other biological transformation processes, except in the case of waste excluded under Article 2(1)(b)(iii)
R11	Use principally as a fuel or other means to generate energy
R12	Exchange of wastes for submission to any of the operations numbered R1- R10
R13	Storage of materials intended for submission to any operations in this Annex, excluding temporary storage, pending collection, on the site where it is produced

COUNCIL DIRECTIVE
of 12 December 1991on hazardous waste(91/689/EEC)

Article	1 -12

ANNEX I - Categories or generic types of hazardous waste listed according to their nature or the activity which generated them (Waste my be liquid, sludge or solid in form)
ANNEX II - constituents of the wastes in Annex I.B which render them hazardous when they have the properties described in Annex III
ANNEX III - Properties of wastes which render them hazardous

COUNCIL REGULATION
of 1 February 1993on the supervision and control of shipments of waste within, Into and out of the European community(259/93/EEC)

	Article
Title I : Scope and definitions	1 -2
Title II: Shipments of waste between member states:	
Chapter A: Waste Disposal	3-5
Chapter B: Waste for recovery	6-11
Chapter C: Shipment of waste for disposal and recovery between member states with transit via third states	12
Title III: Shipments of waste within member states	13
Title IV: Export of waste	
Chapter A: Waste for disposal	14
Chapter B: Waste for recovery	15-17
Chapter C: Export of waste to ACP States	18
Title V: Imports of waste into the Community	
Chapter A: Imports of waste for disposal	19-20
Chapter B: Imports of waste for recovery	21-22
Title VI: Transit of waste from outside and through the Community for disposal or recovery outside the Community	
Chapter A: Waste for disposal and recovery (except transit covered by Article 24)	23
Chapter B: Transit of waste for recovery from and to a country to which the OECD decision applies	24
Title VII: Common Provision	25-31
Title VIII: Other provisions	32-44

ANNEX I: List of international transport conventions referred to In Article 32
ANNEX II : Green list of wastes
A. Metal and metal-alloy wastes inmetallic, non dispersible form
B. Other metal bearing wastes arising from melting, smelting and refining of metals
C. Wastes from minng operations: these wastes to be taken in non-dispersible form
D. Soid plastic wastes
E. Paper, paperboard and paper product wastes
F. Glass waste in non-dispersible form
G. Ceramic wastes in non-dipsersible form
H. Textile wastes
I. Rubber wastes
J. Untreated cork and wood wastes
K. Wastes arising from agro-food industries
L. Wastes arising from tanning and fellmongery operations and leather use
M. Other wastes
ANNEX III: Amber list of wastes
ANNEX IV: Red list of wastes

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