



United Kingdom Offshore Operators Association
EXPLORATION DATA WASTE MANAGEMENT
REFERENCE HANDBOOK

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1. ABOUT THE HANDBOOK

1.1 Background

The UK oil and gas exploration companies generate significant quantities of data-related material each year, the majority of which is held at a number of in-house and sub-contracted storage facilities. The materials in question are magnetic tapes of varying types, reports and paper documents, film-based materials including sepiia maps and seismic plots and drilling-related core slabs and cuttings.

In response to the ongoing costs of storage and the progressive redundancy of the exploration data materials, e.g. through transfer to digital storage media, there is a need to secure sustainable, cost-effective management routes that meet the industry's environmental criteria.

This Handbook has been produced in conjunction with a report commissioned by CDA to address the issue of exploration data waste management. It is intended to provide CDA and UKOOA members with a source of reference material on the available options for the management of exploration data and a directory of service providers who can offer relevant waste management services. Information on the key legislative drivers affecting the management of exploration data wastes is also provided.

The Handbook has been produced by Entec as part of a study carried out in collaboration with CDA and its member companies, with input from waste management and data storage companies.

1.2 Handbook use

The Handbook is intended for use by companies and organisations managing the disposal of redundant exploration data materials no longer required as a resource. It is not intended to be an in-depth guide to every exploration data waste management technique, or to provide a complete directory of those companies that may be able to offer relevant waste management services. It is however intended to provide guidance to the reader to enable exploration data waste management decision-making to be made with a greater level of understanding, and to provide signposts to sources of further information.

This version of the Handbook is a first publication and as such is subject to continual improvement as feedback is received from users, and changes in UK legislation make updating reference sources necessary. The Handbook contains a [feedback form](#) where comments and suggested alterations can be posted electronically back to CDA for incorporation into future versions.

The Handbook contains hyperlinks to sources of further information and websites that are not managed by UKOOA or CDA and although every care has been taken to ensure that the details are correct at the time of publication, no guarantee can be made that this will remain the case.

For consistency and ease of use, a glossary of waste management terms and stakeholders is provided towards the end of the Handbook.

1.3 How to offer feedback

As this is a live working document, feedback from users is essential to the successful continual improvement of this Handbook. Comments on the usability, practicality and relevance may be made on the feedback form provided, or by e-mail to mail@cdal.com.

2. EXPLORATION DATA WASTE - DESCRIPTION & CLASSIFICATION

2.1 Definitions of waste

The term 'waste' is used to cover all manner of materials from household to high level radioactive waste and is defined in s75 of the Environment Protection Act (as amended by the Environment Act, 1995) as 'any substance or object in the categories set out in Schedule 2B to this Act, which the holder discards or intends or is required to discard'.

'Controlled wastes' are defined within the Controlled Waste Regulations, 1992 and fall into one of three categories:

1. commercial waste - that which comes from the activities of a business or enterprise including waste from offices, markets, fairs, government buildings, social premises and corporate bodies.
2. industrial waste - that which comes from industrial activities, including commercial premises such as garages, laboratories, workshops, dredging and tunnelling wastes, industrial processes, vehicles, aircraft and noxious wastes.
3. household waste - that which is produced by persons engaged in daily activities of living on an individual, group or family level including domestic properties, prisons, campsites, meeting halls, public places and residential homes.

This Handbook deals only with exploration data wastes, which are considered by the waste management sector (i.e. companies offering waste management services to public and private bodies) to be classified as commercial/industrial waste. Exploration data waste that is potentially hazardous would be classified as either special waste (likely to be July 2005) or hazardous waste (July 2005 onwards) as defined below:

- special waste - defined as a sub-set of industrial waste and regulated by the Environment Agency (EA)/Scottish Environment Protection Agency (SEPA) under the Special Waste Regulations, 1996 / Special Waste (Amendment) Regulations, Scotland, 2004, this includes oily wastes, poisonous or noxious substances, some clinical waste and harmful waste.
- hazardous waste - defined by [Council Directive 91/689/EEC](#) and listed in the European Waste Catalogue, this definition will eventually replace the term 'special waste' in the UK when the proposed Hazardous Waste Regulations (Special Waste (Amendment) Regulations, Scotland 2004) come into force, expected July 2005.

Legislative developments within the waste sector (from the European Union and the UK) are likely to necessitate changes from the current classifications to a more harmonised system across the EU. [Council Directive 1999/31/EC](#) on the landfill of waste redefines the four categories as: municipal waste, inert waste, non-hazardous waste and hazardous waste, as defined in Council Directive 91/689/EEC on hazardous waste.

2.2 Material Assessment

The materials assessed for the study have as far as practicable been given representative **unit weights** to enable Handbook users to calculate potential disposal costs in terms of the waste industry standard weight classification, £ per tonne. It must be recognised however that where weights are quoted, they are only indicative figures, based on the information provided at the time of the study.

Table 1 – Exploration data material weights and storage volumes

Material description	Unit weight	Unit storage volume	Storage weight range
IBM 3480 Cartridges	0.22 kg	30 per box	6 - 7 kg per box
9 track tapes		13 per box	4 - 17 kg per box
2400 ft	1.29 kg		
1200 ft	0.66 kg		
600 ft	0.33 kg		
21 track tapes	3.06 kg	8 per box	24 - 26 kg per box
Paper well reports		Various numbers, typically a box holds approximately 3 reams of paper.	5 - 15 kg per box
Small (15-20 pages)	0.175 kg		
Large (75-100 pages)	0.65 kg		
Film - seismic sections	0.225 kg	20 per 42" tube	4 - 6 kg per box
Film - well logs	0.09 kg	20 - 25 per box	2 - 2.5 kg per box
Core samples			
Resinated slab	0.75 - 1.5 kg	2 - 3 per wooden box	5 - 10 kg per crate
Half-cut slab	1.5 - 2 kg	15 - 20 lengths per crate	15 - 25 kg per crate
Dried cuttings	0.5 kg	25 plus per box	7.5 - 12.5 kg per box
Wet / unwashed cuttings	0.5 - 5 kg	10 - 20 per box	15 - 75 kg per box

The weights given by various storage companies vary considerably and all weights include packaging. These unit weights have been used to develop the scenarios included in Appendix 1, however they must be treated as indicative and the weight range of each storage box is likely to be a more accurate figure.

It is likely that unless waste materials are to be separated from the packaging prior to ultimate disposal, thus facilitating options such as recovery of cardboard for recycling, contamination assessment or packaging re-use, the packaging will be included in the disposal of the redundant data. The cost of separation of the waste from the packaging must be taken into account should CDA members wish to pursue this option as it could potentially be a labour intensive process.

A full list of all the exploration data materials currently held in storage was not available at the time of writing. It has been recognised that individual companies usually maintain their own records of data storage and therefore should have an appreciation of the volumes potentially requiring disposal in the future.

2.3 Material Storage

Exploration data is currently stored on behalf of producer companies and the DTI (Department of Trade and Industry) at many locations around the United Kingdom by companies including Iron Mountain, DPTS and Fugro-Robertson. The key storage location areas within the UK identified during the study are: - South East England, Scotland, North Wales and the Midlands. The storage location is important when determining proximity to waste management sites.

2.4 Material Characterisation

Although physical and chemical analysis of the exploration data was outside the scope of the project leading to the development of this Handbook, an assessment of the potential contamination has been made based on information provided by the oil and gas industry companies, storage companies, the DTI and waste management companies.

Contamination of the materials is a significant issue given that the co-disposal of hazardous and non-hazardous wastes is due to cease in July 2004 (further details in Chapter 3). The conclusions drawn from the assessment of information and current legislation available are:

Contamination is considered a negligible risk in the paper waste and film materials

There is a potential issue with high levels of silver in the tape materials (as a heavy metal, the environmental impact of silver is potentially significant), although further investigation has shown that the composition of the tape is very similar to photographic film and therefore is not considered hazardous under the [Waste Acceptance Criteria](#) (WAC). A quantitative assessment of the levels of silver in the tape material has not been undertaken as part of the scope of work of the project.

Core samples and core cuttings are potentially the most likely to be contaminated, with estimates of 50% of all core samples having some degree of contamination.

- Exact classification of the contaminants will require batch testing on individual samples from specific sections of the wells, as cutting compounds are frequently changed and the hydrocarbons within the rock strata vary with depth
- Contaminants are likely to be predominantly hydrocarbon-based, although some chemicals used in the compounds may remain within the samples
- Half-slabs, washed and dried cuttings and resinated slabs are likely to contain the least contamination but this may still be at a level that is above the Waste Acceptance Criteria and therefore may require further chemical analysis to enable the waste management company to have characterisation of the wastes prior to acceptance.
- Wet unwashed cuttings are likely to be heavily contaminated, requiring pre-treatment prior to landfill disposal (if chosen as the preferred management option) and will almost certainly fall under the [Special Waste Regulations 1996](#), soon to be replaced with the Hazardous Waste Regulations or in Scotland, the Special Waste (Amendment) Regulations, 2004, which are already in force.

It has been very difficult to ascertain not only the potential levels of contamination within the exploration data core material but also an indication of the type of contamination that may be present. Analytical testing will be required on any material that has the potential to be classified as hazardous waste and also to meet the Waste Acceptance Criteria, due to be implemented in July 2005. In the interim period, between July 2004-July 2005, a site specific approach will be taken, based on loading rates of new wastes, the types of new waste and the types of waste already in the landfill.

2.5 Material Classification

Following [Council Decision 2000/532 EC](#), which replaced Council Decisions 94/3 and 94/904, a harmonised list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Article 1(4) of Council Directive 91/689/EEC on hazardous waste now exists in the form of the European Waste Catalogue (EWC).

This list is centrally updated on a regular basis and assigns a classification code in the form of a six-digit figure (e.g. 01 06 15) pertaining to a description of the waste, which must be applied to each and every waste regulated under national legislation such as, the Waste Management Licensing Regulations, 1994 in the UK.

Appendix 2 gives an interpretation of the EWC codes that are likely to be relevant to the exploration data waste streams. At the point of waste consignment, the process of assigning an EWC code to each waste stream will most likely be undertaken jointly by the holding company and waste management companies. It must be recognised that the legal onus is on the waste producer to code the waste.

3. UK WASTE MANAGEMENT FRAMEWORK

The historic disposal of waste in the UK has typically been through landfilling. Around 70 percent of the 165 million tonnes of controlled waste (i.e. waste regulated by the EA and SEPA) produced each year currently goes to landfill¹.

Recent changes in the management of waste, driven by government policy and legislation has come about through an increased understanding of the environmental impact of waste management. Enforced through regulation, Government waste strategies and policies emphasise the need to protect the environment for current and future generations (the concept of ‘sustainable development’). These changes are now resulting in considerable amounts of ‘waste’ being beneficially recovered or recycled.

Management of waste in the UK is by three distinct drivers:

- Policy
- Legislation
- Economics and market conditions

3.1 Policy Drivers

Waste Minimisation

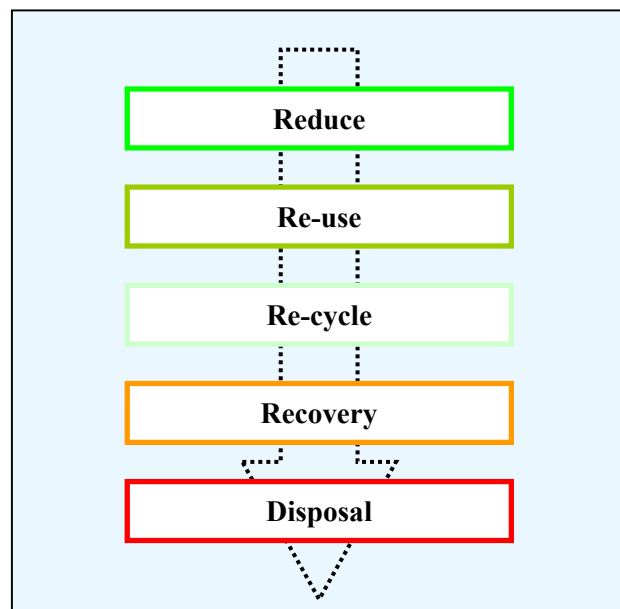
As a technique waste minimisation is applicable to all waste producing sectors and has the potential to reduce the quantity and ‘hazardousness’ of waste at low or even zero cost. Various waste minimisation measures exist, including; process optimisation, material substitutions, re-use of materials, improved understanding and training on waste management issues.

The EA/SEPA, DTI (through the Sustainable Technologies programme and support of Faraday projects), Envirowise, trade associations and individual companies have a role in supporting and promoting waste minimisation, providing business models and funding mechanisms to help deliver ‘clean technology’ and long-term savings.

Waste minimisation forms the foundation and top tier of the Waste Hierarchy defined in Figure 1.

Companies producing exploration data waste should consider opportunities to reduce quantities generated as a first priority.

Figure 1 - The Waste Hierarchy



¹ Source Environment Agency

National Waste Strategy

The National Waste Strategy for England and Wales was published in May 2000 and sets out the Government's policy and vision for the promotion of sustainable waste management until 2020. A similar document, National Waste Strategy, Scotland was published in 1999.

The key outcomes of the strategy include;

- The need to reduce volumes of waste produced
- Foundation of a Waste Hierarchy (as presented in Figure 1 above)
- Use of Best Practicable Environmental Option (BPEO) in waste management decision-making
- Setting of targets for re-cycling, recovery and composting for 2005, 2010 and 2015
- Adoption of the Proximity Principle and regional self-sufficiency
- Waste should be managed as a resource
- Requirements to drive minimisation through initiatives and focus groups. Examples of relevant initiatives and groups subsequently set up include:
 - WRAP (the Waste and Resources Action Programme)
 - Envirowise

3.2 Economic Drivers

Market conditions will dictate the cost of waste management; with the introduction of new legislation that bans co-disposal of hazardous and non-hazardous waste it is expected that prices for both landfill and treatment of hazardous waste will increase significantly.









A landfill tax is applied by the Government for each tonne of waste sent to landfill. The tax is currently levied at £15/tonne for active waste (i.e. waste which in the environment of the landfill has the potential to cause pollution) and is set to rise by £3/tonne per year up to £35/tonne in an effort to discourage landfill and aid the process of promoting waste minimisation, material recovery and re-cycling.

3.3 Legislative Drivers

Many of the requirements and protocols associated with waste management activities are derived from the process of legislative development and implementation. European Directives (such as the Hazardous Waste Directive and Landfill Directive) are transposed into UK law through an Act of Parliament, and Regulations developed in order to enable regulatory authorities to manage the environmental, health and safety impacts.

Table 2 overleaf provides a summary of the legislation relevant to exploration data wastes and contains hyperlinks to the legislative references should further information be required.

Table 2 - UK Legislation related to exploratory data materials

Legislative Reference	Key Requirements	Hyperlink	Wastestream Applicability					Timescale (Year end)				Impact / Further Information
			Cores	Tapes	Film	Paper	Packaging	2004	2005	2006	2007	
Environmental Protection (Duty of care) Regulations, 1991 (SI 2839)	Implemented through Section 34 of the Environment Protection Act, 1990 - Prevent unauthorised disposal of waste by 3rd party - Prevent escape of waste - Ensure transfer of waste is to authorised person - Written description of waste required on transfer - Implementation of Waste Transfer Notes		✓	✓	✓	✓	✓	Currently in force, no amendments imminent				Ensure wastes are disposed of responsibly by licensed operators. Waste Transfer Notes must be completed for each load, or a 'season ticket' for 12 months. A consignment note and EA notification in advance is required if the waste is classified 'special'. EPA 90 requires wastes to be disposed of in accordance with facility's Waste Management Licence
Environment Act, 1995	Enabling Act of Parliament for the Packaging Waste Regulations (see below) - Powers given to EA/SEPA to make charges for WMLs							Currently in force, no amendments imminent				
Producer Responsibility Obligations (Packaging Waste) Regulations, 1997 (SI 648)	Implemented through the Environment Act, 1995 - Reduce over-packaging products - Eliminate certain dangerous materials from packaging - Provide consumers with packaging information - Reduce proportion of packaging to landfill - Increase recovery and recycling of packaging waste - Burden for recovery on the producer							Currently in force, no amendments imminent				CDA storage companies to be listed as 'Packer/Filler' so would be required to recover 36% of packaging materials a year. Majority of wastes in storage though should be exempt as legislation only counts for wastes produced after 1997. If companies already recovering wastes from mainstream activities then no need to do anything regarding exploration data wastes
Pollution Prevention & Control Act, 1999	Enabling Act of Parliament for the Landfill (England & Wales) Regulations, 2001 - Landfill sites permitted and regulated under the Pollution Prevention & Control Regulations, 2000 (SI 1973)		✓	✓	✓	✓	✓	Act formally given Royal Assent in 1999				
Council Directive 1999/31/EC The Landfill Directive	- Promote waste minimisation - Classify & segregate waste - End to co-disposal of haz/non-haz wastes - Pre-treat all hazardous wastes by July 2004 - Implement Waste Acceptance Criteria (WAC) - Pre-treat non-hazardous wastes by mid-2007 - Encourage on-site treatment of wastes - Encourage non-landfill service provision		✓	✓	✓	✓	✓	Directive formally adopted April 1999 Hazardous Waste Regulations - UK, July 2005				Sensitivities over classification of the samples. If contaminated with oil or dangerous substances will be classified as a hazardous waste and require disposal in a hazardous waste landfill. Otherwise disposal to inert landfill should be acceptable. Requirement to pre-treat all Haz waste to landfill and end of co-disposal by July 2004.
The Landfill (England & Wales) (Amendment) Regulations, 2004 (Draft)	Draft Regulations incorporating the WAC, implements the requirements of the EC Landfill Directive		✓	✓	✓	✓	✓	WAC Implementation July 05				
Special Waste (Amendment) Regulations, Scotland, 2004	Regulations implementing Hazardous Waste Directive in Scotland. A list of wastes that will be classified as special wastes reflects that contained in Article 1 (4) of the HWD.		✓					Amendments to Regulations				
Special Waste Regulations, 1996 (SI 972)	Implements the requirements of the EC Hazardous Waste Directive. Amendments have been made to fully incorporate the European Waste Catalogue code into UK law - legislation expected mid-2004		✓					Amendments to Regulations				
Hazardous Waste Directive (91/689/EEC)	Introduces concept of unified waste catalogue code for the classification of special wastes and provides annex information pertaining to wastes with hazardous properties that require effective management		✓					Directive implemented June 1995				If identified as containing oil or dangerous substances will be classified as hazardous and disposed of accordingly, otherwise not. Paper, film and tapes are non-hazardous and can be disposed of as active (non-hazardous) waste.

4. WASTE MANAGEMENT DECISION MAKING

The process of waste management starts as soon as the material is identified as a waste due to the fact that the holder no longer requires it or it is no longer of value to the holder and it is intended to be discarded.

Many of the exploration data materials once redundant to the holder do not necessarily require outright disposal as there may be value in the component parts or calorific value of the waste that enables some element of recovery in line with the waste hierarchy.

The preferred waste management option for all redundant exploration data will vary according to the holder's priorities and viable options at the time of disposal. This decision-making process is guided by this Handbook.

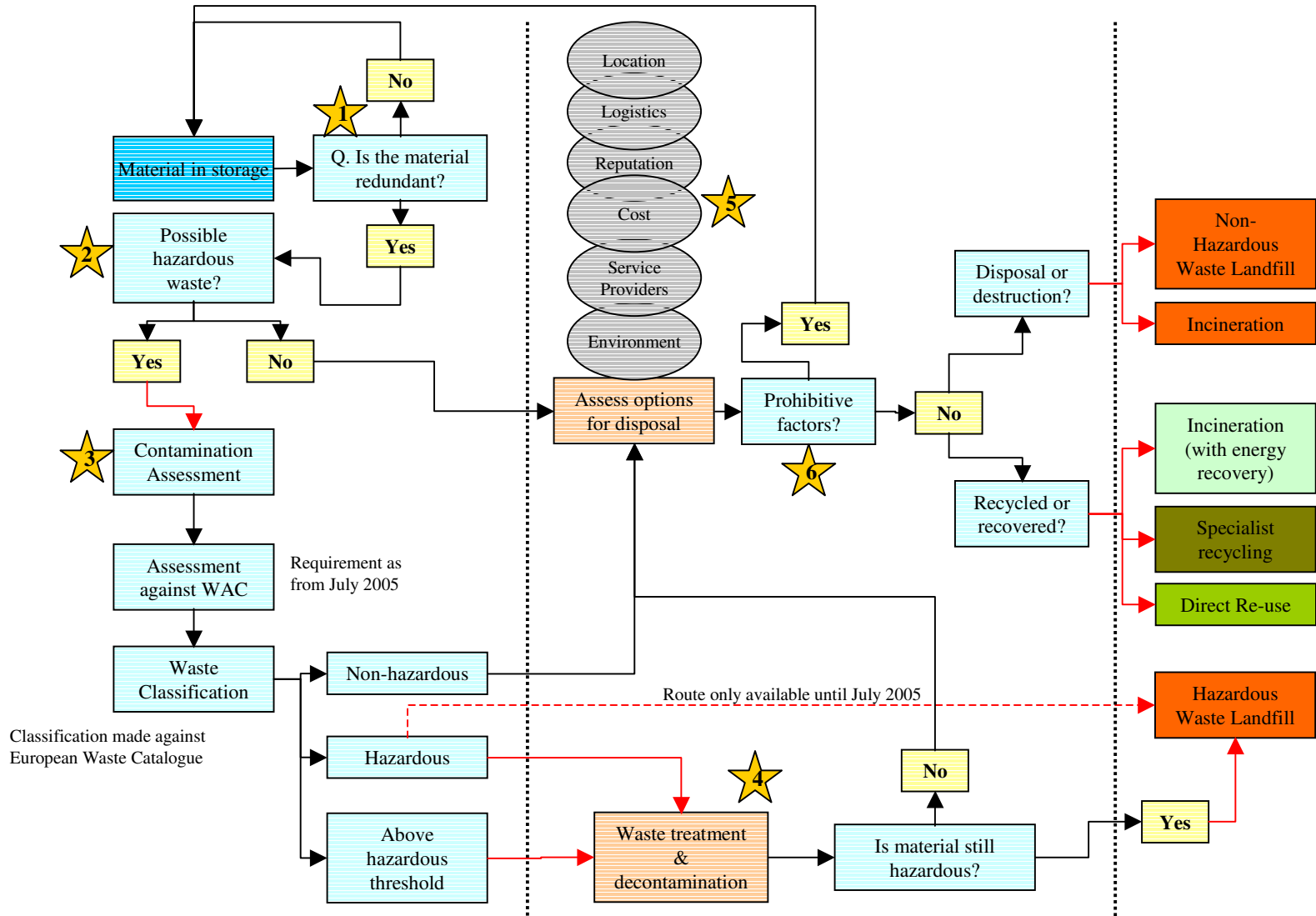
The aim of this Handbook is not to determine the exact management option for each waste but to provide a source of information that will provide useful guidance to making a considered judgement on the option appropriate for each exploration data waste stream. An illustrative example of the stages in exploration data waste management decision-making is given in Figure 2 (overleaf).

The light blue boxes in the diagram represent a point at which a question must be answered to move forward to the next stage. The answer will frequently rely on either external information (e.g. the results of material analysis) or individual company criteria (such as environmental policy). Key issues to be addressed in reaching the most appropriate decision are: -

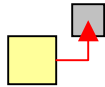
- The amount of energy used in recycling or treating a waste to reduce the potential risk to the environment or render the waste less hazardous;
- The transportation of wastes to specialist centres and onto final disposal, the impact of associated emissions and the potential complexity of special waste pre-notification and transport regulations if the waste is hazardous;
- The potential environmental risk posed by the substance in its raw state and possible need to stabilise or pre-treat the waste before final disposal;
- Consideration of the risk to human health and implications of exposure, possibly requiring an assessment to meet current regulations and Health & Safety Executive guidelines;
- The potential value of the waste to other parties including: complexity of confidentiality of certain documents or media, age of the waste, appropriate compatibility with modern work methods and systems;
- The logistics associated with 'environmentally engineered' disposal solutions such as volume of waste and economies of scale and availability of waste in terms of bulk, batches or random timescales. This can be a particular problem as many specialists require certain quantities (guaranteed) to ensure recycling or re-using is economically viable; and
- The cost to the consignor associated with all of the above.

The critical point of the flowchart is at star number 5, where individual factors relevant to the organisation, its policies and principles come into play. An individual company should develop its own decision criteria, this Handbook can only provide information to guide that decision.

Figure 3 – Stages in exploration data waste management



Key to diagram



Red arrows are used to indicate transportation of the waste. Whilst this may not always be the case (for example where storage companies may have in-house laboratories) it is more usual that where red arrows are used, the waste will require physical movement.



The first decision stage is made at the point where material is identified as redundant and is therefore classified as 'waste'. Up to this point, it is still a resource. A project or rolling programme may be used to identify data as redundant.



The second stage is to ascertain if the waste material is hazardous. The CDA study has shown only the rock core samples and core cuttings are likely to be hazardous. Paper, tapes and film can all be classed as non-hazardous.



A contamination assessment will be required to determine the classification of the waste will be and indicate if pre-treatment before disposal is required. Contamination assessment would could made by a laboratory, waste storage company with appropriate facilities or within in-house laboratories and may involve material transportation (red line).



Waste could be treated if contamination level is higher than WAC for hazardous landfill, or if the material is to be recycled but requires some pre-treatment to ensure it is in a suitable form (e.g. grinding, crushing & blending)



The circles in Grey represent examples of the factors a company may use in waste management decision making, it is by no means exhaustive but rather indicative as each company is likely to have their own criteria for assessment.



The element of 'prohibitive' factors is included as part of the decision-making process as it may be the case that the cost is too high or data is still required to be retained.

5. WASTE MANAGEMENT OPTIONS

In addition to the consideration of the decision-making criteria listed in Chapter 4, an understanding of what options are available together with the information on these options is required to enable the selection of the most suitable option. This information has been gathered using Entec's experience of the waste sector and the treatment technologies available, together with input from commercial waste management operators to provide indicative cost ranges and further technical explanation of the options. Table 3 details these options.

The options identified include: -

Re-use of components within the waste or the waste as a unit - e.g. tape units

Recycling of components within the waste - e.g. core samples for aggregate

Recovery of the energy within waste through specific incineration facilities

Disposal of the waste by landfill or destruction in conventional incinerator

The key consideration should be to minimise the risk or potential harm to the environment and/or human health caused by disposal of these wastes, however this alone does not represent an approach in keeping with the principles of sustainability, as consideration must be made to the three factors of environment, society and economy, often known as the 'triple bottom line'.

Options that re-use or recycle the material may be more favourable should a company wish to promote its environmentally sensitive approach to waste management within environmental reporting frameworks, e.g. corporate social responsibility reports. These waste management solutions are perceived by many stakeholder groups as the best practicable solution to waste management, as the waste is not simply buried, leaving a potentially complex future legacy but instead is maximising a resource. There are however, many considerations to be made when appraising waste management options as discussed in Chapter 4.

Table 3 - Waste management options available for redundant exploratory data - details

Waste Technology / Waste Techniques	Relative Cost*			Cost Notes	Wastestream Applicability					Explanatory Notes	Benefits	Barriers
	High	Medium	Low		Cores	Tapes	Film	Paper	Packaging			
Incineration with energy recovery	✓			Higher cost base due to the higher operational expenditure at thermal treatment facilities to conventional disposal methods.		✓	✓	✓	✓	Waste can be incinerated to recover the potential energy. Typically, the calorific value of the waste is critical to determining the potential of energy recovery.	Incineration with energy recovery offers benefit of effective disposal and maintains security if confidential documents are to be disposed of.	The waste must be free from contaminants and hazardous substances to ensure cost effectiveness. Substances such as plastic film may contain chemicals not suitable for incineration.
Materials recycling	✓	✓		Costs dependant on the quality of materials and market needs.		✓	✓	✓	✓	Due to the nature of these wastes a percentage will be recyclable. This will be determined on quality, how the waste is presented i.e. mixed or single stream and markets for the product.	Opportunity to recycle the materials rather than disposing of them and not utilising them as a potential resource. Materials may hold some value to materials reprocessors.	The storage methods employed (mixed wastes) may mean there is a need to segregate wastes before recycling. This could be labour intensive and outweigh the cost benefits of recycling. Material quality will be a driving issue as will be the requirement for a suitable market for the recyclable product.
Tapes reuse	✓			Costs would need to take account of labour charge in sorting and separating useful materials. Unwanted materials would attract additional landfill or incineration charges.		✓				A market exists for a number of the tapes examined in this study. The percentage of materials sent for re-use would be determined on the quality and age of the tapes and market need.	Top of the waste hierarchy with no need for any disposal option. Also the possibility of the tapes holding some intrinsic value with possible re-users willing to pay for them?	Older, damaged, unsuitable or unwanted tapes due to quantities will still need to be disposed of. Very market specific which may change over time.
Re-useable aggregate	✓	✓		Specific costs are not given per tonne of material but the cost of analysis and transport to the recycling centre would need to be incorporated in the unit price. Quality of material and potential market demand would affect price - this would require recycler to assess a representative sample.	✓					Rock samples could be crushed and blended to produce a mixed hardcote surface for re-use as a building aggregate or road surface additive. WRAP website has potential list of recyclers that may be willing to consider processing the materials.	Aggregate material is re-used, which enables the producer to claim environmental waste reduction targets as the material is not waste but commodity.	Use of the rock cores for recycled aggregate relies on the fact that no contamination is present. High labour cost associated with extracting from storage boxes, crushing, grading and classifying type I / type II aggregate.
Quarry Re-use	✓	✓		Specific costs not available as they are dependent on numerous variables such as transport costs, quality of material and market demand.	✓					Mixed samples could be amalgamated and added to an existing quarry to re-use as base product	Rock samples are re-used as base material through an accepted production route.	Materials will require simple grading. Quarry required to accept incoming waste initially and obtain a WML exemption certificate
Waste shredding	✓			Indicative costs given range from £100 - £500 per tonne of material. Collection has been quoted as being included in these costs.		✓	✓	✓		Shredding of waste to enable landfill acceptance criteria to be met. Also used to maintain confidentiality if film or paper documentation is to be landfilled	Maintains confidentiality of commercially sensitive documentation and papers. Enables the WAC for paper disposal to be met. Coming in mid-2007 under Landfill Regulations, 2002	Could be prohibitively expensive and there will be transport costs associated with getting the paper to the shredding facility or a WML Site with the facility. Sorting the commercially sensitive documents could prove costly due to time/labour required.
On-Site Destruction	✓			High cost due to fully integrated service. Includes on-site destruction, transport and disposal.		✓	✓	✓		Similar to waste shredding. Destruction equipment will be delivered to the waste source (where applicable) to pre-treat the waste prior to disposal and ensure confidential destruction of materials.	Confidential destruction of wastes on site.	Higher costs than remote destruction. Not all facilities will be suitable/allow destruction equipment on site for long/any periods of time.
Off-Site Destruction	✓			High cost due to fully integrated service. Includes transport of wastes for destruction, transport and disposal.		✓	✓	✓		Similar to waste shredding. Waste collected and delivered to a central depot where destruction equipment is kept to pre-treat the waste prior to disposal, ensuring confidential destruction of materials.	Cheaper than on-site destruction, allows destruction of materials where locations do not make on-site destruction an option.	Does not offer the same 'first hand' security for confidential destruction as done remotely. Confidential destruction certificates will however be issued where appropriate.
Crushing & Ball Milling	✓			Cost in the region of £340 / tonne including transportation, separation, crushing, treatment and final disposal (which would be inert landfill). The cost is based on a batch quantity of material of 50 tonnes in weight. As equipment will need to be hired and transport costs relatively fixed, this figure will rise should less than 50 tonnes be disposed of in any single batch.	✓					Contaminated cores are separated from packaging and crushed. Ball Milling machine then utilises friction to generate heat that effectively removes hydrocarbon and other contaminants, which can be disposed of separately as special waste. Rock powder then landfilled as non-special waste.	Removes the need for disposal of cores as special waste and recovers the oils contained within for future re-use. Ensures that rock powders will meet the WAC for non-hazardous wastes	Contaminated packaging will require separate treatment or disposal as special waste.
Incineration without energy recovery		✓		Higher cost base due to the higher operational expenditure at thermal treatment facilities to conventional disposal methods.		✓	✓	✓	✓	Wastes can also be incinerated without the utilisation of the combustion process to generate energy. This is typically undertaken in smaller incineration plants not geared towards large scale municipal contracts, or those specialist wastes.	Offers an effective means of disposal and maintains security if confidential documents are to be disposed of.	The waste must be free from contaminants and hazardous substances to ensure cost effectiveness. Substances such as plastic film may contain chemicals not suitable for incineration. No benefits that are associated with energy recovery
Hazardous Waste Landfill	✓			Special Waste will require separation from non-special which is an obvious cost element in terms of man-hours. Reduced capacity from July 2004 will mean steep increases in cost of hazardous waste landfill.	✓				✓	Special waste cost of landfilling high. Core samples plus packaging are heavy items, typically 10kg boxes. Requires pre-notification of waste movement and hazardous landfill site, possibly incurring high transport costs.	Cores and packaging can be disposed of without separation reducing the potential time cost associated with separation activities.	Cost of disposal likely to be high plus additional transport and logistic costs. Pre-treatment required from July 2005 will push costs further and lack of treatment capacity may produce logistical problems.
Inert material landfilling			✓	Inert landfill costs from £7 / tonne.	✓					Landfilling inert substances requires that there be no contamination above a specified level. Landfills accepting only inert waste are exempt from the LFD	Relatively low cost option providing the materials are inert. Clarification will be required prior to disposal that material is not carbon-based.	Not a 'green' disposal option. Inert landfill of substances whose energy can be recovered not a viable option.

* Relative cost figures are HIGH (>£100/tonne) MEDIUM (£35-100/tonne) LOW (<£35/tonne)

6. WASTE MANAGEMENT SERVICE PROVISION

The following section gives details of the information gained through communication with 22 waste management companies around the UK who offer waste management or disposal services nationally, close to the key exploration data storage locations, exploration data or offer specific re-cycling services. Each waste management company was approached and information was given regarding the data exploration wastes. An indicative cost range was provided by most respondents, together with details of the services they could provide. As transportation is likely to be a significant cost and environmental consideration, particularly for hazardous wastes, the companies were asked to quote if they could offer a collection service to CDA members directly from the storage locations, either on a carriers round or through dedicated collections.

The options available to CDA members for managing redundant exploration data incorporates four of the five main tiers of the waste hierarchy, with the exclusion of reduction as the materials have already been produced. It is widely accepted that modern, high density data storage techniques are currently enabling oil companies to minimise the volume of data material produced.

The information provided by waste management companies on the service options available has been summarised in Table 4 to form a quick reference guide.

Table 4 – Summary of waste management options for redundant exploration data

Treatment Method	Tapes	Paper	Cores	Film	Packaging
Material re-use	✓	✗	✗	✗	✓
Material re-cycling	✓	✓	✓	✓	✓
Incineration (<i>with energy recovery</i>)	✓	✓	✗	✓	✓
Material treatment	✓	✗	✓	✗	✗
Incineration	✓	✓	✗	✓	✓
Landfill (<i>non-hazardous</i>)	✓	✓	✓	✓	✓
Landfill (<i>hazardous</i>)	✗	✗	✓	✗	✗

Although many of the waste management companies provided estimates of cost for disposal of exploration data materials, the figures are only indicative and have been presented as ranges in Table 5, showing the lowest and highest quote for each waste management option. Many of the waste management companies were reluctant to quote a price due to the lack of information regarding material composition and volumes for disposal. As such Table 5 should be used as an indicative guide. It is recommended that direct contact is made with waste management companies when wastes are to be disposed of, to obtain accurate quotes.

Table 5 - Indicative range of costs for management/disposal of redundant exploration data

Waste Type	Management Option	Price Range (£ / tonne)	Price range (£ / unit)
Tapes Average 13 '9-track' tapes per box Weight 17 kg per box*	Landfill	48 - 75 (disposal only)	0.81 - 1.28 (per box)
		185-600** (inc. collection)	3.15 - 10.20 (per box)
	Incineration	150 - 240	2.55 - 4.08 (per box)
	Recycling	235 - 800 (inc. collection)	4.00 - 13.60 (per box)
Film Average 20 seismic sections per 42" tube Weight approx 6 kg per tube	Landfill	3500 - 4000	3.10 - 4.80 / tape
	Landfill	48	0.29 (per tube)
		185 - 600* (inc. collection)	1.11 - 3.60 (per tube)
	Incineration	150 - 240	0.90 - 1.44 (per tube)
		235 - 550 (inc. collection)	1.41 - 3.30 (per tube)
	Recycling	N/A	N/A
Cores Average 20 bags of unwashed cores per box Average box weight 20 kg	Landfill	45 - 75 (disposal only)	0.90 - 1.50 (per box)
	Hazardous treatment & landfill	350	7.00 (per box)
	Inert landfill	7 - 45	0.14 - 0.90 (per box)
	Incineration	N/A	N/A
	Recycling	Various***	N/A
Paper Average 10 kg of reports and mixed paper items per box (1ft ³)	Landfill	48	0.48 (per box)
		185 - 440* (inc. collection)	1.85 - 4.40 (per box)
	Incineration	101 - 150	1.01 - 1.50 (per box)
		120 - 450 (inc. collection)	1.20 - 4.50 (per box)
	Recycling	120	1.20 (per box)
		107 - 400* (inc. collection)	1.07 - 4.00 (per box)

* Tape weight based on 9 track, 2400 ft

** Integrated service including waste destruction

*** Cost of re-cycling material dependent upon type of material. If inert, re-use for aggregate may be transport cost only.

In addition to Table 5 that gives indicative cost ranges for waste management options, Table 6 gives information on the service providers themselves. The table summarises contact/location details, although many of the larger waste management operators are UK-wide and have sites in many locations. A cross indicates that the service was not offered by the waste management company although that does not necessarily mean that a company will not be able to offer that option again in the future.



Table 6 – Exploration data waste management service provider response

Service Provider	Contact Details	Location	Non-hazardous / hazardous landfill	Incineration	Incineration (with energy recovery)	Recycling / re-use	Further Notes
Armstrong Waste Management	Mike Rae 01388 721333	Scotland	Tapes Cores Film Paper				Collection service if required Shredding service in 2005 (certified data destruction)
Biffa	Andy Walker 0121 505 1616	UK wide					Response not provided in timescale - contact directly
Cleanaway / Recall	David Curtis 07739 078832	UK wide	Cores				Collection service if required
Confidential Data Destruction Services	Anthony Pearlgood 0845 454 8004	UK wide					Collection, shredding & incineration services. 2 tonnes minimum load at fixed rate per tonne or standard volume rate per kilo
CVA	Not offering a service						
Enviroscot (Viridor)	Douglas Langdon 07773 358414	UK wide	Tapes Paper Film				Cores (inert only) Collection service offered at £185 - £350 per tonne Cores recycled at £20 per tonne

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Service Provider	Contact Details	Location	Non-hazardous / hazardous landfill	Incineration	Incineration (with energy recovery)	Recycling / re-use	Further Notes
Frogson Waste Oils	Alan Boocock 0114 270 1551	Midlands	✘	✘	✘	✘	Response not provided in timescale - contact directly
Karraway	Raphael Copeland 0208 236 0108	South East	Cores (non-hazardous only)	✘	Tapes Film	Paper	Prices per tonne range from £120 - £285 and include collection within M25
Keltonstone	David Smith 01582 572 431	South East	Cores (non-hazardous only)		Tapes Film	Paper	Confidential destruction of paper, baled and re-pulped.
Lacerta	Did not reply						
London Waste	Richard Kemp 0208 884 5524	South East	✘	✘	Tapes Film Paper	Cores (would require testing)	Collection service offered if required Would require a test burn on materials
Metrum	Greg Ward 0115 972 0949	UK - specialist recycle/disposal	✘	Tapes	Tapes	Tapes	Figures quoted at £3-4 per tape Collection service offered
Onyx UK	Phil Broadhead 07979 706947	UK wide	Cores	✘	Tapes Film	✘	Classification of cores required prior to disposal
SELCHP	Maxine Steward 0207 394 4770	South East	✘	✘	Tapes Film Paper	✘	Minimum 3-4 tonne loads Require test burn of all materials

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Service Provider	Contact Details	Location	Non-hazardous / hazardous landfill	Incineration	Incineration (with energy recovery)	Recycling / re-use	Further Notes
Shanks	Doug Morrison 01908 650635	UK wide	Cores	Tapes Film	✗	Paper	Varying rates for collection services
Shreds-4-You (Shredeasy)	Jim Watson 0800 269232	UK - specialist recycle/disposal	Cores Paper Film Tapes	✗	✗	✗	All materials include off-site destruction and landfill Minimum of 5 tonne loads
Silverlining	Did not reply						
SITA Recycling	John Barrett 0118 956 1777	UK - confidential recycling subsidiary of SITA	✗	✗	✗	Paper	Offer a variety of storage and collection methods dependant on disposal frequency and material type.
Total Waste Management	Brain Handcock 01224 875560	Aberdeen, Scotland	Cores (pre-treated)	✗	✗	Cores (pre-treated)	Ball-milling of cores to remove hazardous components prior to disposal (landfill) or recycling (aggregate)
Waste Recycling Group	Tom Diggle 07980 780810	South East & Midlands	Tapes Paper Film Cores	✗	✗	✗	Testing of wastes required prior to landfill to enable characterisation
Wastecare	Not offering a service						
Yorwaste	Did not reply						

APPENDIX 1 - EXPLORATION DATA WASTE DISPOSAL SCENARIOS

Worked examples

The following section contains two worked examples based on information supplied by CDA member companies that will enable the user to better understand the process of waste management decision-making with regard to exploration data.

The scenarios aim to demonstrate to the Handbook user, the practical aspects of working within a waste management framework, and follow a logical assessment from identification of the material, through to volume calculation and option assessment, where the final decision on how to manage the waste is made once a multitude of factors have been considered.

Scenario 1 - Magnetic Media

The first scenario is based on the identification of redundant magnetic data as it is copied onto higher density storage media as part of a company tape re-mastering project.

The scenario process will involve following the decision flowchart (Figure 2).

The tapes in question are as follows:

Redundant magnetic media

Stage 1

Identify redundant materials

52,000 9 track tapes (2400 ft)

Identify characteristics

Non-hazardous tapes

Stage 2

Assess the options for disposal of tapes located in the Aberdeen area using look-up table (Table 4)

- this shows that there are **four** options: -

Recycling

Incineration (with energy recovery)

Incineration (no energy recovery)

Landfill

Stage 3

Assess the key information that will be required to understand the waste stream and present the waste management companies with details regarding the waste: -

- location of materials

Aberdeen

- volume of materials (using Table 5)

$52,000 / 13^{(a)} \times 17^{(b)} = 68$ tonnes

^(a) - 13 tapes per box

- timescale of disposal

2004 - 2007

^(b) - 17 kg per box

- is collection required

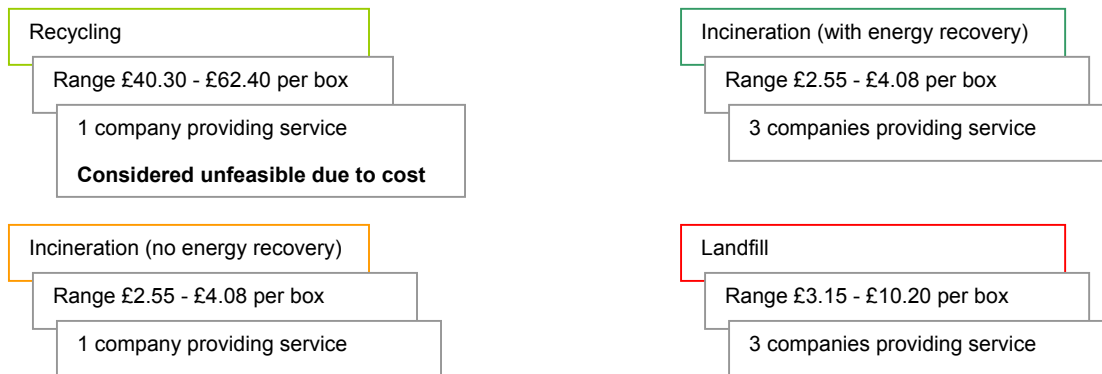
Yes, most likely

- is waste mixed composition

No - single stream tapes of various sizes.

Stage 4

Once the essential data has been gathered, it will now be possible to determine the initial cost based on Table 5 to ascertain the economic feasibility of the option (as shown in the grey circles in Figure 2 - Star No. 5) and the number of companies in the Aberdeen area who offer a collection service (Table 6).



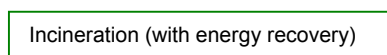
This initial screening suggests one option (Recycling) may not be feasible due to price. Indicative costs of the other three have been assessed and incineration appears to be the cheapest when an integrated collection service is required. Further options should however be explored when integrated collection services have not been quoted, but the contractor has expressed an interest in collection.

Stage 5

An appraisal of the options is now required, based on defined criteria, examples of which are given in the grey circles in Figure 2. This may include appraising the environmental elements and include reputation issues, especially if commitments have been made in the form of ISO 14001 Environmental Management System continual improvements or as part of an on-going performance improvement programme within a company management system.

For the purposes of this scenario, it has been deduced that incineration of the tapes (with energy recovery) is the best option as it is low cost and the most environmentally sustainable. As an integrated collection service has been offered by all service providers, transport logistics are not a consideration in this scenario.

Option choice for disposal of tapes: -



Stage 6

At this stage, it has now been established that incineration (with energy recovery) is the chosen exploration data waste management option, at a cost of somewhere between £450 and £550 per tonne of collected material. There may be the opportunity to reduce costs through the use of third party hauliers (waste carriers) to transport the waste to the disposal site and so remove this expense from the disposal cost. This would also include the possibility of using disposal points offered by companies that do not offer a collection service.

It is at this stage that a key decision point (Figure 2 - Star 6) should be considered. If the overall costs are still too high (or the addition of the disposal costs to the cost/benefit analysis model is required) or there are other factors that may hinder disposal of the reports, the materials need

not be removed from storage and the flowchart arrow to the first box is followed (project may be put on hold).

For the purposes of this scenario, we will assume that the costs are acceptable and it now remains to identify and contact the two waste management companies who are indicated as being able to offer a tape incineration service in the Aberdeen area -

Onyx UK

Cleanaway

Contact details for these two companies have been given in Table 6.

Stage 7

Contact the waste management companies to discuss the options for disposal and check the logistics of the disposal (i.e. agree actual costs, discuss collection arrangements and timescales). This has been undertaken for this scenario and two companies were chosen for a number of reasons including cost, data would be incinerated (confidentiality), ability to collect the waste, strong company track record and ability to provide an audit trail for the wastes from collection to disposal.

The costs for this particular scenario have not been given in this Handbook due to the requirements of CDA in maintaining an unbiased approach.

Stage 8

All that remains is to gain approval for waste disposal and agree a framework with the storage company to work through the logistics.

Scenario 2 - Paper Reports

The second scenario is based upon the disposal of a number of mixed format reports, 6500 boxes in total. The first stages will be an interrogation of the exploration data inventories, held by the CDA member company, to determine which of the materials require duplication (data scanning) prior to disposal and which can be disposed of directly.

The materials are held in storage facilities within the South East of England and the disposal timescale is estimated to be between 10 and 20 weeks.

The scenario process will involve following the decision flowchart (Fig. 2).

Stage 1

Identify redundant materials

6500 boxes of exploration data reports

Identify characteristics

Non-hazardous mixed paper and card

Stage 2

Assess the options for disposal of paper reports located in the South East using look-up table (Table 4)

- this shows that there are **four** options: -

Recycling

Incineration (with energy recovery)

Incineration (no energy recovery)

Landfill

Stage 3

Assess the key information that you will require to understand the waste stream and present the waste management companies with details regarding the waste: -

- location of materials

South-East England

- volume of materials (Table 5)

6500 x 10 kg = 6.5 tonnes

- timescale of disposal

10 - 20 weeks

- is collection required

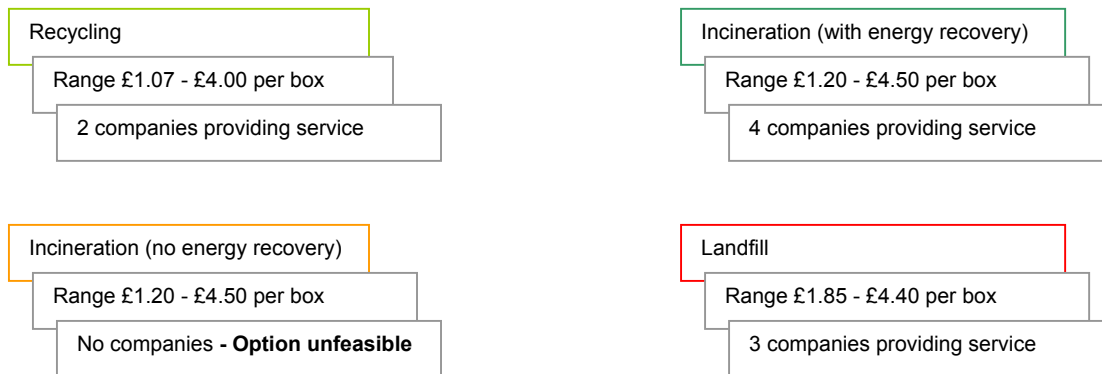
Yes, most likely

- is waste mixed composition

Sorting required, will be able to separate components such as plastic covers

Stage 4

Once the above data has been gathered, it will be possible to determine the initial cost based on Table 5 to ascertain the economic feasibility of the option(s) (as shown in the grey circles in Figure 2- Star No. 5) and the number of companies in the south east who offer a collection service (Table 6).



This initial screening suggests one option is not feasible and the other three are. Indicative costs have been assessed and paper re-cycling appears to be the cheapest when an integrated collection service is required.

Stage 5

Appraisal of the options is now required, based on defined criteria, an example of which is given in the grey circles in Figure 2. This may include appraising the environmental elements and include reputation issues, especially if commitments have been made in the form of ISO 14001 Environmental Management Systems continual improvements or as part of an on-going performance improvement programme within the company management system.

For the purposes of this scenario, it has been deduced that paper re-cycling is the best option as it is the least cost and is most environmentally sustainable. As an integrated collection service has been offered by all service providers, transport logistics are not a consideration in this scenario.

Option choice for disposal of reports: -



Stage 6

At this stage, it has now been established that paper re-cycling is the chosen exploration data waste management option, at a cost of somewhere between £107 and £400 per tonne of material. This gives a total disposal cost (including collection from storage site but excluding service charge by storage companies and labour time associated with separation and/or re-mastering) of between £695.50 and £2600.

It is at this point that a key decision point (Figure 2 - Star 6) must be addressed. If the overall costs are still too high (or the addition of the disposal costs to the cost/benefit analysis model is required) or there are other factors that may hinder disposal of the reports, the materials need

not be removed from storage and the flowchart arrow to the first box is followed (project may be put on hold).

For the purposes of this scenario, we will assume that the costs are acceptable and it now remains to identify and contact the two waste management companies who are indicated as being able to offer a paper re-cycling service in the South East -

Cleanaway

Shanks

Contact details for these two companies have been given in Table 6.

Stage 7

Contact the waste management companies to discuss the options for disposal and check the logistics of the disposal (i.e. agree actual costs, discuss collection arrangements and timescales). This has been undertaken for this scenario and Shanks were chosen as the preferred company for a number of factors including cost, data would be shredded (confidentiality), company was flexible on their collections (10 x 650 kg loads or 1 x 6500 kg load) and the company were open regarding the recycling process (re-cycled to produce low grade sheet paper).

The costs for this particular scenario have not been given in this Handbook due to the requirements of CDA in maintaining an unbiased approach.

Stage 8

All that remains is to gain approval for waste disposal and agree a framework with the storage company to work through the logistics.

Appendix 2 - Interpretation of European Waste Catalogue codes

The Table below gives an interpretation of the EWC codes that are likely to be relevant to the study waste streams. The Duty of Care on a waste producer extends to classifying the waste with a suitable EWC code.

Any waste marked with an asterisk (*) is considered as a **hazardous waste** pursuant to Article 1(4) first indent of Directive 91/689/EEC on hazardous waste, and subject to the provisions of that Directive unless Article 1(5) of that Directive applies. Such wastes are said to fall on the Hazardous Waste list (HWL). Wastes on this list may be hazardous irrespective of their contamination levels, these wastes being termed ‘Absolute Entries’, or potentially hazardous due to the fact that they contain dangerous substances ‘Mirror Entries’. Mirror entry wastes are subject to further assessment to determine their final classification as hazardous or non-hazardous.

Dangerous substances are also identified amongst the hazardous and non-hazardous wastes, being identified as;

'Dangerous substance' means any substance that has been or will be classified as dangerous in Directive 67/548/EEC as amended; 'heavy metal' means any compound of antimony, arsenic, cadmium, chromium(VI), copper, lead, mercury, nickel, selenium, tellurium, thallium and tin, including these metals in metallic form, as far as these are classified as dangerous substances.

Study Material Waste Streams and their Relevant EWC Code and Descriptor

Waste	Code	Description	Category
Rock samples and cores	01 05	Drilling muds and other drilling wastes	Wastes resulting from exploration, mining, quarrying and physical and chemical treatment of minerals
	01 05 05*	Oil-containing drilling muds and wastes	
	01 05 06*	Drilling muds and other drilling wastes containing dangerous substances	
	01 05 07	Barite-containing drilling muds and wastes other than those mentioned in 01 05 05 & 01 05 06	
	01 05 08	Chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 & 01 05 06	
	01 05 09	Fresh-water drilling muds and wastes other than those mentioned in 01 05 05 & 01 05 06	
	01 05 10	Wastes not otherwise specified	
Tapes and films	09 01 07	Photographic film and paper containing silver or silver compounds	Wastes from the photographic industry
	09 01 08	Photographic film and paper free from silver or silver compounds	
	09 01 10	Single-use cameras without batteries	
All wastes	15 01 02	Plastic packaging	Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified
	15 01 04	Metallic packaging	

Waste	Code	Description	Category
	15 01 06	Mixed packaging	
	15 01 09*	Packaging containing residues of or contaminated by dangerous substances	
Tapes	16 01 09	Plastic	Wastes not otherwise specified in the list
Rock samples and cores	17 05 03*	Soil and stones containing dangerous substances	Construction and demolition wastes (including excavated soil from contaminated sites)
	17 05 04	Soil and stones other than those mentioned in 17 05 03	
	17 05 05*	Dredging spoil containing dangerous substances	
	17 05 06	Dredging spoil other than that mentioned in 17 05 05	
Paper	20 01 01	Paper and cardboard	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions

It is felt that the only codes of potential concern with respect to their hazardous nature are the ones that relate to the contaminated rock core materials as these will require disposal through an established system underpinned by the current Special Waste Regulations in England and Wales (soon to be replaced with the Hazardous Waste Regulations) and the Special Waste Amendment regulations in Scotland (coming into force in July 2004). In England and Wales, 72 hours pre-notification of waste movement is currently required in writing to the Environment Agency should any hazardous waste be moved from its current storage location.

The actual process of classifying the waste against the EWC should be carried out by the waste management operator at the point of consignment (or in the case of hazardous wastes by the Environment Agency or the Scottish Environment Protection Agency). To enable this process to be undertaken, a description of the waste will be required containing sufficient information on characterisation, source of waste, composition and potential contamination.

GLOSSARY

Landfill	A disposal option that involves tipping waste into an engineered landfill site, designed to collect any liquid wastes and waste gases generated through decomposition of organic material. Co-disposal of hazardous and non-hazardous waste banned as from 15 th July 2004.
Hazardous waste landfill	A new classification of landfill under the implementation of the Landfill Directive in the UK. Sites classed as hazardous waste will only take hazardous material, as identified in the European Waste Catalogue. Currently anticipated that there may be fewer than 10 sites in the UK, none in Scotland, none in Wales and none in the London conurbation.
Secure landfill	Waste is physically destroyed (shredded) prior to landfilling at the tip face. This option usually for confidential materials, typically a certificate of destruction issued by the operator of the site as a guarantee to the customer that confidentiality is maintained.
Incineration with energy recovery	Waste is burnt at very high temperatures with the heat generated being 'recovered' by thermal conversion technologies (heat exchangers) to produce steam to drive electricity generating turbines.
Recycling	A waste management option whereby the component parts of the waste may be re-worked to produce a new product that may or may not be related to the original waste. Examples would be glass recycled to make more glass, newspaper recycled to make toilet tissue.
Recovery	Typically individual components of the waste may be separated and re-used or recycled due to their rarity (metals/catalysts) or their current market value (electrical components). Also used to describe waste management options that recover energy from the calorific value of waste by high temperature incineration.
Re-use	The highest tier of the waste hierarchy, typically because it involves substantially less energy than any of the other four options. Waste components or the entire waste product may be re-used or sold onto the open market at reduced prices e.g. old computer monitors.
BPEO	Best Practicable Environmental Option - A methodology using a scoring system based on set criteria (determined by a knowledgeable panel) to assess the waste management option that gives greatest benefit or causes least environmental damage.
Sustainable Development	A term introduced in the 1987 report by the World Commission on Environment and Development 'Our Common Future', that defined it as ' <i>meeting the needs of the current generation without compromising the ability of future generations to meet their own needs</i> '. Championed by many nations in the 1992 Rio Earth Summit, it is now the key principle in formulating environmental policy and legislation.
WRAP	'Waste Resources Action Programme' - a government funded initiative to promote the use of low waste technologies and provide advice and help to consumers and industry in reducing the volumes of hazardous and non-hazardous waste produced each year, often through grants and technical assistance.
Lets-recycle	Website dedicated to providing information and useful links to encourage recycling of many products. Aimed at both public consumers and industry, it is a one-stop-shop for all sorts of information and publications on how, where, why and how much recycling can be done.
Envirowise	Government funded initiative who work closely with industry to promote low waste technology and industrial best practice in waste minimisation techniques. Audits and information publications are two Envirowise products/services.
Hazardous Waste Forum	A panel of experts assembled to advise and inform government on policy and legislative in the field of hazardous waste. Often used to develop legislative and policy documents and provide technical advice related to industrial implications.
EWC	'European Waste Catalogue' - code book developed by the European Commission to classify all wastes potentially going to landfill - see Appendix 2.

Council Directive	Guiding document issued by the European Commission to be implemented in member states through their own legislative systems e.g. Landfill Directive is implemented in the UK through the Landfill Regulations and Hazardous Waste Regulations.
Council Regulation	Legislative document published by the European Commission that must be applied directly in member states as law. In the UK, this means no Act or Parliament or Regulations require to be passed/developed in order for it to become applicable in UK law. Typically applied in situations that require uniform legislative measures such as chemicals policy/control.
WAC	Waste Acceptance Criteria - a unified list of criteria used to determine the classification of landfill waste as either inert, active or hazardous. Adopted by the EC in 2003, to be transposed into UK law through the Hazardous Waste Regulations, expected in 2005.

LINKS & FURTHER INFORMATION

http://www.europa.eu.int/eur-lex/en/	Main page for EC legislation and Official Journal of the EC
http://www.esauk.org/	Home page of ESA, the Trade Association for the UK waste management industry
http://www.wrap.org.uk/	WRAP's homepage, providing useful information on recycled material and markets
http://www.aggregain.org.uk/	Website dedicated to recycling of aggregate from construction and demolition wastes (rock samples)
http://www.environment-agency.gov.uk/netregs	Environmental Regulation information, including a useful glossary of environmental terms associated with regulation
http://www.envirowise.gov.uk/	Homepage of Envirowise, offering businesses useful advice on waste management and minimisation issues
http://www.direct.gov.uk/Homepage/fs/en	Central UK Government homepage - offers access route to all government departments and provides a powerful search engine for regulation and information on waste management
http://www.defra.gov.uk/corporate/contacts/sites.asp	DEFRA's main links page
http://www.defra.gov.uk/environment/waste/links.htm	DEFRA's main links page related to waste and recycling in the UK
http://www.defra.gov.uk/environment/waste/index.htm	DEFRA waste and recycling homepage
http://www.defra.gov.uk/environment/waste/hazforum	Hazardous Waste Forum homepage