

# Notes

## A Solid Waste – General

The solid waste arisings and disposals data were drawn from two principal sources: the Waste Disposal Plans produced as a result of the Control of Pollution Act (1974) and the Waste Disposal (Management) Plans compiled under the Environmental Protection Act (1990). To supplement those plans, information and statistics were obtained from Waste Regulation Authority annual reports, regional reports, specialist waste management publications and from Environment Agency data wherever that was available.

The data were then used to compile regional summaries based on the current Environment Agency regions.

The inconsistency of the plans' approaches in characterising waste arisings and disposals resulted in only four broad waste stream categories being judged to be quantifiable on a national basis. The four categories replicated for each Environment Agency region, therefore, are: municipal, industrial/commercial, construction/demolition and special.

Several potential major sources of error in the published data were identified. For industrial/commercial arisings, errors may have resulted from: over-estimation in industrial waste arisings surveys; omission of major producers of licensed waste (eg who dispose of their own waste on site); and the emission of unlicensed materials such as agricultural, and mines and quarries wastes.

Construction/demolition waste figures may also be prone to error due either to their inclusion in some plans in the industrial/commercial waste stream, or to their omission altogether under schemes that are exempt from licensing. The accuracy of municipal waste figures is debatable as they could well be based on lorry movements rather than landfill site weighbridge findings.

The national tracking and accounting system for special waste is thought to provide the most accurate data.

Per-capita re-adjustment of DOE tonnage from 140 million tonnes p.a. to 85 million tonnes is demonstrated by the first 9 months landfill tax returns based (in the case of the latter) on a population of 50 million (excluding N. Ireland).

**A1** Figures based on a per-capita readjustment of DoE tonnages from 140 million tonnes p.a. to 85 million tonnes as demonstrated by the first 9 months landfill tax returns.

**A2** In respect of solid waste it should also be noted that some additional research material has been provided by Biffa. In particular information on gate

prices and CHP and other commercial information eg. Fig 6, Page 13.

## B Solid Waste – Specific

**B1** The published data given in the sources listed in the Bibliography is incomplete. The figures for certain categories of waste and/or for certain counties are not available. To produce total waste arisings and total waste disposals figures for a given region estimated data has had to be included in a number of cases. Where such gaps were identified the regional totals were estimated using the national average production per person multiplied by the regions population or proportion of the regions population. For the categories of industrial and specific waste estimates, the population figures were weighted to reflect the regions economic output.

**B2** The functions of SEWRAC were taken over by SERPLAN in 1996 following the formation of the Environment Agency.

## C Liquid Waste – General

All water data is taken from previously published sources detailed in bibliography on page 82. While there are certain discrepancies in the reporting periods for different data sets, most criteria are the same for all EA regions, Scotland excepted, so facilitating meaningful regional comparisons.

## Liquid Waste – Specific

**C1** 'Drought effective rainfall' – the Environment Agency's value for measuring water resources, based on average rainfall allowing for evaporation and for extreme conditions (drought) that might be expected to occur once every 50 years.

**C2** 'Surface water' – eg rivers, lakes and reservoirs.

**C3** 'Ground water' – eg wells, aquifers and boreholes.

**C4** 'Minimum charge' – charges for trade effluent are based upon strength (Suspended Solids and Chemical Oxygen Demand – see C5 below) and volume. The minimum charge is calculated for an 'average strength' effluent. If an effluent is stronger than average, then the charge per tonne will be higher.

**C5** 'Top 10 pollutants' – each region is affected to different degrees by different pollutants, of which there are many more than 10 in total. The composition of each region's 'Top 10' will therefore be unique to that region. In certain instances, particularly with organic pollutants, there is also a danger of double counting as some classifications overlap. The more significant discharges to the environment from industry are detailed in the Chemical Release Inventory (CRI), controlled by the Environment Agency. The CRI covers discharges to sewer as well as those directly to surface waters. However, it only covers discharges previously

controlled by Her Majesty's Inspectorate of Pollution under the Environmental Protection Act (1990) and is therefore not a comprehensive statement of pollution loads.

The following is a glossary of major CRI classified pollutants, where possible explaining their polluting effects.

**SS** – Suspended Solids: a measure of the amount of solid particles suspended in water. This is a non-specific category relating to both organic and non-organic material. SS damages the aquatic environment for two reasons: it blocks out light upon which plant life depends and it can settle as sediment, so reducing river depth.

**BOD** – Biological Oxygen Demand: a specific measure of organic material that is readily degraded by micro-organisms. BOD is used as an indicator of the deoxygenating potential of a waste in a river – the higher the value the worse it is for aquatic life.

**COD** – Chemical Oxygen Demand: similar to BOD except that degradation of organic matter occurs by chemical means. COD is a non-specific measure, used as an indicator of the organic content of a waste.

**TOC** – Total Organic Carbon: another non-specific measure of organic material. All the following substances will register as both COD and TOC if present in large enough concentrations: sugar, oil, pesticides, chlorinated organics and a whole range of toxic organic compounds.

**Oil** – as it sounds, though the CRI also classifies oily solids in this category. Oil interferes with oxygen transfer into water by coating the surface and can therefore suffocate aquatic life. It may also be toxic if ingested by aquatic life.

**Chlorine, Fluorides and Bromides** – are potentially toxic in themselves but can also combine with organic materials giving rise to toxic/carcinogenic compounds that can be long lived in the environment and accumulate in food chains.

**Lead, Mercury and other Heavy Metals** – all are toxic to aquatic life to some degree and at higher concentrations are harmful to humans: lead attacks the nervous system, for example, while mercury retards development. Other heavy metals include iron, zinc, manganese, copper, copper compounds, arsenic, nickel, cadmium, chromium, titanium and those in Metals Group 2 below.

**Heavy Metals, Total** – this term covers the total register of all heavy metals excluding cadmium and mercury.

**Metals Group 2** – this term covers the total register of antimony, arsenic, chromium, cobalt, copper, lead, manganese, nickel, tin and vanadium.

<p><b>C6</b> 'Major' – Major Pollution Incidents signify those events that have had a severe and lasting effect on a stretch of river. They almost invariably result in prosecution.</p> <p><b>C7</b> 'This practice' – The EC's Urban Waste Water Treatment Directive (91/271) has been implemented in the UK under the Urban Waste Water Treatment (England and Wales) Regulations 1994 (SI 1994 No. 2841). The regulations lay down minimum standards for the treatment of domestic sewage and industrial waste waters, with stricter standards applying to more sensitive areas. The requirement for secondary treatment will inevitably drive up trade effluent treatment charges. The regulations also demand that sewage dumping to sea – a highly favoured UK route – must stop by the end of 1998. This demand will also impact very heavily on the water companies.</p> <p><b>D Terms</b></p> <p><b>D1</b> 'Consented' – "available void with both planning and waste licencing consent."</p> <p><b>D2</b> 'Unconsented' – "available void with planning but without waste licencing consent."</p> <p><b>E Gaseous Waste – Gener al</b></p> <p>There are three main difficulties involved in collating and interpreting data on emissions to the atmosphere. The first is that such emissions do not always remain in the same state indefinitely. The atmosphere is a vast, open chemical reaction chamber where volatile gases continue reacting until they reach a stable state. Unstable gases, which react with others to form stable compounds, in turn continue to cross-react with other stable compounds in a multiplicity of sequential changes, some of which take place in seconds and others which take several years to complete.</p> <p>In consequence, a profile of emissions to the atmosphere is artificial. It is a snapshot version of what happens over the period of a year at the instant of release. The actual compositional analysis of the atmosphere at the end of that year may be utterly different. Sulphur dioxide is converted to acidic rain, carbon monoxide becomes carbon dioxide, oxides become sulphides and so on in endless profusion.</p> <p>The second difficulty lies in the absence of absolutes when measuring air emissions. Industrial emissions are calculated by monitoring flow rate and concentration of pollutants, but are often estimated either on historical monitoring data, or on emissions factors based on the generic process occurring.</p> <p>The final main difficulty is that the atmosphere is in reality a complex series of moving air masses. Emissions in one region migrate erratically into adjacent regions and alter their states as deposition takes place into surface water, the sea and the ground.</p>	<p>Highly reactive, short life substances can cause severe localised damage in terms of stone erosion and metals corrosion and they can also drive reactions in the atmosphere. By and large, though, it is the stable, long life chemicals that we must fear. These generally rise in the atmosphere and form increasing levels of concentration in the troposphere (the lowest level of the atmosphere) and sit there – often for centuries.</p> <p>These materials have the capacity to alter the planet's ability to shield itself from destructive solar radiation and to inhibit the reactive processes within the atmosphere that are essential to organic life – including our own.</p> <p><b>Gaseous Waste – Specific</b></p> <p><b>E1</b> 'Emissions to air' – The following is a glossary of major CRI classified pollutants, where possible explaining their polluting effects. Carbon Monoxide (CO) – a colourless gas formed by the incomplete combustion of fuels which contain carbon, the main UK emission source being road transport. CO reduces the capacity of blood to carry oxygen and can increase the risk of heart problems.</p> <p>Carbon Dioxide (CO<sub>2</sub>) – a colourless, odourless gas produced by combustion of carbon compounds and by respiration. CO<sub>2</sub> and methane (see below) are notorious as 'greenhouse gases': They absorb quantities of the sun's ultraviolet radiation before it can be transmitted back into space from the earth's surface, so creating a heating effect. The amount of CO<sub>2</sub> in the atmosphere has greatly increased in the UK in recent years despite attempts to find alternatives to the prevalent fossil fuels.</p> <p>Greenhouse gases are strong absorbers of (infra red) heat radiation which have a direct global warming potential (DWP).</p> <p>Nitrogen Dioxide (NO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>x</sub>) – nitric oxide (NO) and NO<sub>2</sub> are both oxides of nitrogen, though NO<sub>2</sub> alone is thought to damage human lungs and respiratory effectiveness. NO<sub>x</sub> arise from any combustions with air and around half of national NO<sub>x</sub> derives from road transport – a proportion that rises considerably in urban areas.</p> <p>Methane – a colourless, odourless gas which is the main constituent of natural gas. Methane is produced naturally by the decay of vegetable matter under water and from sewage and landfill. Its polluting effect is global as it is a 'greenhouse gas'. landfill accounts for 23% of methane source emissions in the UK.</p> <p>Non-Methane Volatile Organic Compounds (nmVOC) – this is a term used to describe a number of substances, such as hydrocarbons, which have a regional, rather than global, pollutant effect. Benzene, for example, is a hydrocarbon with a known carcinogenic effect.</p>	<p>Particulates, Total Suspended Particles (TSP) and PM10 – Particulates (often called aerosols) are a combination of different materials originating from industrial and natural sources – power station ash, mining and quarrying dust, natural dust, sea salt, pollen and fungal spores, for example. Particulates are associated with respiratory and cardio-vascular problems. PM10 is the fraction of TSP in the air with an aerodynamic equivalent diameter of 10 micrometers or less, with man-made particles tending to be smaller than natural ones.</p> <p>Sulphur Dioxide (SO<sub>2</sub>) – a gas which, when dissolved in water, will transform into sulphuric acid and can be deposited to the ground by rainwater. The main source of the UK's SO<sub>2</sub> is the burning of sulphur bearing fuels such as coal. In high concentrations SO<sub>2</sub> can cause breathing difficulties and also damage vegetation.</p> <p><b>E2</b> 'Part A Industry' – industries classified under the Environmental Protection Act (1990) as the most polluting. These include oil refining, power generation and many others.</p> <p><b>E3</b> 'CO<sub>2</sub> as carbon' – the tonnages quoted are for the carbon content of the CO<sub>2</sub> only. Were the oxygen contents to be included, tonnages would increase by a multiple of 2.9</p> <p><b>E4</b> 'Critical loads' – a relatively new (c 1986) concept that at its simplest means the maximum amount of pollutants that ecosystems can tolerate without being damaged. A critical load can be redefined to suit specialist interest areas such as, for example, fresh waters, where the critical load might be: "the highest load that will not lead, in the long term, to harmful effects on biological systems, such as the decline or disappearance of natural fish populations."</p> <p><b>E5</b> 'Acid deposition' – the deposit to ground, rivers or sea of acids, mainly via rainfall.</p> <p><b>E6</b> 'Allowing for current agricultural management practices' – indicates the allowance, when calculating critical loads, for the agricultural input of lime (raising alkaline levels) in arable or intensive farming areas.</p> <p><b>E7</b> 'Wet deposition rate' – the measure of acid deposited via rainfall.</p> <p><b>E8</b> 'EC directive on SO<sub>2</sub>' – the EC's Large Combustion Plant Directive commits the UK to reducing SO<sub>2</sub> emissions by 60% by 2003. Current estimates predict this target will not be met.</p> <p><b>E9</b> 'UNECE vegetation guidelines' – the United Nations Economic Commission for Europe has set annual mean critical loads for airborne SO<sub>2</sub> and NO<sub>2</sub> at 7.5 and 15 parts per billion respectively.</p> <p><b>E10</b> 'Energy Technical support Unit'. AEA Harwell Tel: 01235 433516</p>
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# Editorial glossary

**Anaerobic digester** – A method of reducing organic matter (often sewage sludge) through the action of bacteria in a sealed vessel. Methane produced as a by-product is utilised for heat or electricity.

**AONB** – Area of Outstanding Natural Beauty

**BATNEEC** – Best Available Technology Not Entailing Excessive Cost

**BPEO** – Best Practical Environmental Option

**CHP** – Combined heat and power

**Civic amenity site** – A collection point where rubbish can be delivered by local residents for disposal elsewhere.

**Civic Amenity Waste** – Waste deposited at a civic amenity site.

**Commercial Waste** – Waste from shops and offices.

**Conditions** – Attached to planning permissions and waste management licenses to describe permitted or required activities.

**Construction and Demolition Waste** – Waste from the construction and demolition industry.

**EPA (1990)** – Environmental Protection Act 1990

**Energy-from-waste** – Where heat from incinerating waste is collected and used for heating water and/or electricity generation

**Environment Agency** – Established under the Environment Act (1995) to take over the functions of Her Majesty's Inspectorate of Pollution (HMIP), the National Rivers Authority (NRA) and the county Waste Regulation Authorities (WRAs)

**Estimated Waste Arisings** – A "Predicted Waste Arising" for a country.

**Green Belt** – The area of land around a town or city, where built development is restricted to determine the limit of the urban area.

**HMIPI** – Her Majesty's Industrial Pollution Inspectorate

**HWRC** – Household waste recycling centre

**Household Waste** – Waste originating from domestic properties and activities.

**Incinerator Residues** – Material remaining in an incinerator after combustion.

**Industrial Waste** – Waste originating from industrial activity.

**Inert Wastes** – Waste containing no biodegradable or chemically active constituents

**Inspector** – i.e. Planning Inspector. Employed by the Planning Inspectorate to act for the Secretary of State for the Environment. The

Inspector reconsiders District or County Council planning decisions.

**Landfill** – Waste disposed at a void, often a former quarry, sand or clay pit, filled to the original ground level.

**Landfill Capacity** – The remaining void space to be filled by landfilling in a country or region.

**Landfill Gas** – Gas produced by the decomposition of waste in a landfill under anaerobic (oxygen deficient) conditions. The gas is composed of 65% methane, 34% carbon dioxide and a range of other gases in the remaining 1%.

**Landfill Gas Monitoring** – The routine measurement of gas produced by a landfill

**Landraise** – Where waste is deposited in a mound above the original ground level.

**MRF** – Materials Recycling Facility, pronounced 'merf'. Also see HWRC.

**Mt** – Million tonnes

**Major Waste Disposal Site** – A waste disposal site over 1 Hectare (ha) in size (DoE definition)

**Municipal Waste** – Waste collected by local authorities

**Need** – The demand for a mineral in an planning area e.g. county

**PFA** – Pulverised Fly Ash e.g. from coal fired power stations

**Planning Decision** – Where a Planning Authority (from District Council to Secretary of State for The Environment) decides if a planning application is approved or refused

**Predicted Waste Arisings** – National average waste production per person, multiplied by the regional population or a weighted regional population

**Progressive Restoration** – Systematic backfilling of a void once the mineral has been extracted]

**Proposal** – The intended development, the subject of planning permission.

**Recovery** – The process of recycling waste material or heat

**Regional Planning Guidance** – Abbreviated to RPG followed by a number e.g. RPG8 - East Midlands. RPG13 = Northwest " issued by the Secretary of State for the Environment primarily to guide the preparation of strategic land-use plans...." in the counties of that region.

**SBI** – Site of Biological Importance

**SERPLAN** – The London and South East Regional Planning Conference, who provide a strategic planning forum for certain counties

of the Environment Agency's Anglia, Thames and Southern regions.

**SEWRAC** – The South East Waste Regulation Advisory Committee, who provided a strategic waste regulation forum for the SERPLAN area.

**Slag Waste** – Material remaining after metal has been smelted

**Special Waste** – The Legislation which defines this group is described in Statutory Instrument 1996 No. 2019. The substances are or contain compounds harmful to human health.

**SSSI** – Sites of Special Scientific Interest

**Tpa** – Tonnes per annum

**Transfer Station** – See Waste Transfer Station

**UDP** – Unitary Development Plan contains the planning policies of a Unitary Authority i.e. a District Council not under a County Council planning structure e.g. London and other Metropolitan Boroughs.

**WDA** – Waste Disposal Authority

**WRA** – Waste Regulation Authority

**Waste Arisings** – The waste produced

**Waste Disposal (Management) Plans** – Waste Regulation Authorities (WRAs) were created under the Environmental Protection Act (1990). They replaced the former Waste Disposal Authorities and these plans contain the WRAs policies and supporting information

**Waste Disposal Plans** – Prepared by Waste Disposal Authorities under the Control of Pollution Act (1974). Contain the Authority's policies and supporting information

**Waste Disposals** – Waste deposited at various reception points

**Waste Local Plan** – Or minerals and Waste Local Plan. Produced by the County Councils under the Town and Country Planning Act 1990.

**Waste Recycling** – The recovery of waste materials for reuse or reprocessing

**Waste Regulation Appeal** – An appeal to the Secretary of State for the Environment by an operator who disagrees with a decision of the Waste Regulation Authority

**Waste Stream** – The movement of waste from source to destination

**energy from waste** – The incineration of refuse to produce electricity or heat

**Water Monitoring** – Collection and analysis of ground water e.g. for chemical contamination

**Working Plan** – Attached to a planning permission or a waste management licence - it supplements the conditions and describes how the site will operate

# Contributors/Auditors

## ***NCBE (NATIONAL CENTRE FOR BUSINESS AND ECOLOGY)***

The National Centre for Business & Ecology was set up in 1995 to provide applied environmental advice and services to business, to develop and influence environmental best practice, and to promote and assist the implementation of sustainable development. The Centre is a partnership between The Co-Operative Bank and the four Greater Manchester Universities; Manchester, UMI, Manchester Metropolitan and Salford. The Centre is informed and motivated by the Bank's ethical policies and its commitment to environmental improvement. The resources to deliver the Centre's mandate come from an expert staff, the wealth of knowledge within the academic sector, and a large number of associates who share the Centre's objectives.

## ***ARIC (THE ATMOSPHERIC RESEARCH AND INFORMATION CENTRE)***

The Atmospheric Research and Information Centre specialises in the study and resolution of atmospheric issues. ARIC was established in 1984 and is now the leading supplier of research, information and consultancy in atmospheric sciences. The information Programme operated by ARIC is supported by the Department of the Environment, Transport and the Regions. ARIC, based at the Manchester Metropolitan University, has an extensive technical library, major field and laboratory equipment, and computer software dedicated to air quality problems.

## ***GMGU (GREATER MANCHESTER GEOLOGICAL UNIT)***

The Unit, which is based in the University of Manchester, acts as a technical advisory service for the 10 district councils of Greater Manchester on earth science issues, including waste and minerals planning. It provides similar services for Calderdale MBC, West Yorkshire and information services for the private sector.

## ***DEPARTMENT OF PLANNING AND LANDSCAPE***

The department of Planning and Landscape at the University of Manchester hosts the Groundwork Professor of Land Restoration and Management. The Department is one of the largest and oldest environmental professional schools in the United Kingdom with an international reputation especially in the field of Environmental Impact Assessment.