

Waste recycling, treatment and disposal sites

*drum and tank cleaning and recycling
plants*

Industry Profiles, together with the Contaminated Land Research Report series, are financed under the Department of the Environment's contaminated land research programme.

The purpose of these publications is to provide regulators, developers and other interested parties with authoritative and researched advice on how best to identify, assess and tackle the problems associated with land contamination. The publications cannot address the specific circumstances of each site, since every site is unique. Anyone using the information in a publication must, therefore, make appropriate and specific assessments of any particular site or group of sites. Neither the Department or the contractor it employs can accept liabilities resulting from the use or interpretation of the contents of the publications.

The Department's Contaminated Land Research Report series deals with information needed to assess risks; procedures for categorising and assessing risks; and evaluation and selection of remedial measures.

General guidance on assessing contaminated land and developing remedial solutions which is complementary to the Department's publications is provided by the Construction Industry Research and Information Association (CIRIA).

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DOE Industry Profile

Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants

	Page
Preface	(iii)
1. Background	1
1.1 Tank cleaning	1
1.2 Drum reconditioning	2
2. Processes	3
2.1 Tank cleaning	3
2.2 Steel drum cleaning and recycling	4
2.3 Plastic drum cleaning and recycling	6
3. Contamination	6
3.1 Factors affecting contamination	7
3.2 Migration and persistence of contaminants	7
4. Sources of further information	8
Annex Potential contaminants	11
Table 1a Main groups of contaminants and their probable locations — tank cleaning	13
Table 1b Main groups of contaminants and their probable locations — drum cleaning and recycling	14

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Preface

DOE Industry Profiles provide developers, local authorities and anyone else interested in contaminated land, with information on the processes, materials and wastes associated with individual industries. They are not definitive studies but they introduce some of the technical considerations that need to be borne in mind at the start of an investigation for possible contamination.

Every site is unique. Investigation of a site should begin with documentary research to establish past uses. Information on the site's history helps to focus a more detailed investigation. This knowledge needs to be supplemented by information on the type of contamination that may be present and where on site it may be found. Profiles give information on the contamination which might be associated with specific industries, factors that affect the likely presence of contamination, the effect of mobility of contaminants and guidance on potential contaminants.

The date when industrial practices first commenced on a site and its location are important clues in establishing the types of operations that may have taken place, so each profile provides a summary of the history of the industry and its likely geographical spread within the United Kingdom.

Profiles should be read with the following reservations in mind:

individual sites will not necessarily have all of the characteristics described in the profile of that industry;

practices can vary between sites and change over time;

as practices change, problems of possible contamination may also change;

the profile may refer to practices which are no longer followed, and may omit current practices which avoid contamination.

The risks presented by contaminated sites depend on the nature of the contaminants, the targets to which they are a potential threat (such as humans or groundwater) and the routes or pathways by which they reach these targets. The current or proposed use of a site and its environmental setting are crucial in deciding whether treatment is necessary and if so, the methods to be used. Some sites may not need treatment.

The information in profiles may help in carrying out Control of Substances Hazardous to Health (COSHH) assessments for work on contaminated land - see Health and Safety Guidance Note HS(G) 66 *Protection of workers and the general public during the development of contaminated land*, Health and Safety Executive, 1991, and *A guide to safe working practices for contaminated sites*, Construction Industry Research and Information Association, 1995.

Note: the chemical names given to substances in this profile are often not the modern chemical nomenclature, but the names used historically for those substances.

Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants

1. Background

The drum and tank cleaning and recycling industry covers a broad range of activities and processes but is divided into three main sectors:

- tank cleaning centres
- drum reconditioning centres
- static tank cleaning companies.

Static tank cleaning companies visit sites owned by third parties and carry out in situ cleaning of large tanks both above and below ground. Static tank cleaning is not described in this profile.

Drums and tanks are manufactured from a variety of materials ranging from cardboard and glass fibre, to plastic and metal. The tank cleaning and drum recycling/reconditioning industry operating in the United Kingdom usually deals with metal and plastic containers. This profile is mainly concerned with steel containers (see Section 2.2).

The tank cleaning industry is divided into three categories:

- Companies offering cleaning services to third parties as their primary business.

- Companies whose primary business is tank haulage and who retain tank cleaning facilities on site for their own use.

- Specialist chemical, gas transport and storage companies who have purging facilities and equipment for their own dedicated tanks.

The processes used by specialist chemical, gas transport, fuel transport and storage companies are outside the scope of this profile.

1.1 Tank cleaning

The importance of tank cleaning has increased as concerns about product liability at the point of sale have grown. Tankers used for the transport of materials and goods have, in the past, varied in their design and size. Trucks with a 23 tonne net payload (38 tonnes gross) are now the most common and are used to carry a wide range of materials.

In the 1970s, tankers tended to carry single products, but later, with the need for greater flexibility and competitiveness, the ability to carry different materials with efficient washing between loads became important.

Products are now transported in either dedicated or non-dedicated tanks. Dedicated tanks are used for sensitive, hazardous or special materials, for example brewing and dairy products, gases and hazardous substances such as

hydrofluoric acid, hydrochloric acid, bitumen and sulphur. Non-dedicated tanks are used for chemicals, edible products, oils, fats and greases.

Individual sites often handle tankers servicing a single industrial sector, for example from the chemical industry, food industry, or the oil industry. The particular industry served by a tanker cleaning site is unlikely to change significantly once a stable client base is established.

There are currently 25-30 major tank cleaning companies carrying out an estimated 250 000 cleaning operations each year at 45-50 locations in the United Kingdom. The market leader currently has 45% of the market share, spread between its 9 operating sites. However, a large number of the companies are single site operations.

The exact number of tank cleaning sites in the United Kingdom is difficult to determine precisely. The Hazardous Cargo Bulletin's Tank Depot Guide for 1987 identified 76 tank cleaning sites in the United Kingdom. The 1994 Tank Guide identified 75 sites, providing detail about the type and range of facilities available at each location (see Section 4 for further details of these references). Tank cleaning centres predominate in areas of the country where the oil and chemical industries are located, for example Liverpool, Manchester, North East England, West Yorkshire, South Wales, Southampton and Humberside. Details of specific company locations are available in the Tank Guide.

In order to address environmental and health and safety issues, road tanker operators and cleaners have established the National Road Tanker Cleaners Association (NRTCA). A Code of Conduct has been introduced to formalise the activities of the industry and most road tanker cleaners now observe it.

The present number of tank cleaners will probably decrease with the introduction of improved technologies and practices to reduce costs and improve environmental performance.

1.2 Drum reconditioning

Drum reconditioning centres receive drum containers which may require emptying before they are cleaned and then prepared for re-use.

Until the late 1930s, steel drums were scrapped once their contents had been used. During and particularly after the Second World War, the economic and industrial climate changed and it became worthwhile to recondition and reuse drums and other containers. The chemical industry underwent significant changes and demanded that sturdy drums were made, using materials which could retain the substances being transported, which were easy to handle and which could be reused. The use of wooden drums and containers declined rapidly with the introduction of steel and plastic drums.

The Association of Drum Manufacturers in the United Kingdom has 12 member companies which produce new drums to customer specifications. The Association has no members who operate cleaning or recycling facilities, but does have links with the Federation of Drum Reconditioners to facilitate the recycling and disposal of drums.

The Federation of Drum reconditioners has a list of registered members and the locations of drum reconditioning sites throughout the United Kingdom (currently 35 companies at 50 sites). Most sites are located around Liverpool, Manchester, the West Midlands, West Yorkshire and London.

2. Processes

2.1 Tank cleaning

A tank cleaning facility consists of an array of bays with extensive concrete surfaces and drainage systems. The bays may be used to clean certain tanks, for example food containers, or for other tasks, for example external washes. The largest tank cleaning sites can clean about 120 tanks per day.

On arrival, tanks are inspected visually and delivery notes are examined to check for the presence of any toxic materials. Detailed washing procedures vary from one company to another and depend upon the nature of the materials transported in the tanker. In addition, a range of specialised cleaning procedures are offered by different companies for clients who require particular and stringent processes to be used. Therefore, the industry operates both standardised and customised procedures.

Tanks are accepted for cleaning on the understanding that they are nominally empty. In practice a normal tank capacity of 23 tonnes net payload can produce a residue of up to 25 litres of material. Certain residues may be collected and segregated for subsequent collection by a third party who has the facilities for treating or disposing of them. Other residues are emptied into sealed holding tanks and retained in their concentrated form. These wastes are treated and the holding tanks are emptied periodically.

The 'mancovers' on the tanks are opened (either outside or in a vented building) to allow evaporation of any residual volatiles to the atmosphere. Suitable precautions must be taken to avoid inhalation of volatiles when opening the mancovers. The washing procedure begins after the road tank is emptied, following a visual inspection.

Washing procedures include the following:

- cold water
- hot water
- detergent
- sodium hydroxide solution
- paraffin (kerosene) pre-treatment
- sterilisation
- resin residue pre-treatment.

The number of washing operations depends on the previous contents of the tank. A typical hot water wash involves the tank being purged with steam or washed with high pressure hot water jets. The cleaning efficiency of the high pressure system reduces the quantity of water used and the need for its subsequent handling, treatment and disposal. The requirement for detergents and caustic solutions are also reduced with high pressure washing techniques.

Detergent washes and special pre-treatments are necessary in some cases.

Hard oils

Examples are coconut or palm kernel oil. These are loaded hot and would leave a fine hard skin inside the tank. Steaming the tank melts this residue so that it can be drained. Cleaning is then finished with a hot water and detergent wash.

Lube oil products

These are subject to pre-treatment with paraffin (kerosene). Paraffin is added to the tank, heated with steam and then drained. The cleaning is finished with a hot water and detergent wash.

Resin products

These are generally pre-treated with the specific solvent base of the product in question, for example white spirit, methyl ethyl ketone, xylene or acetone. Resin residues can also be removed with hot caustic solution boiled with steam. Dry pearl sodium hydroxide is added to the tank and dissolved by the injection of steam.

Final tests on tank cleanliness include determining the pH, and checking the colour and clarity of the wash water.

Other specialist activities allow for the purging of heating coils with steam. Specialist services, often relating to food and drink products, may use anti-bacterial agents to ensure tank sterility.

Tanks carrying food products are often cleaned in dedicated bays to avoid cross-contamination with odours from adjacent activities. In some cases, there is a requirement to dry the cleaned tanks using a hot air line. This is especially important for minimising microbial spoilage of food products and for those tanks used to transport powders such as flour or polyvinyl chloride (PVC) granules.

The effluent treatment systems present vary from site to site but generally comprise the following elements. The aqueous effluent is collected by an interceptor system and allowed to settle; oil is skimmed from the surface and removed by suction to a separate tank. The residual emulsion is then filtered and transferred to balancing tanks where some agitation and aeration can take place. The treatment process involves 'cracking' the emulsion by adding concentrated sulphuric acid, adjusting the pH of the solution with sodium hydroxide, and coagulating with ferrous sulphate and coagulation polymers prior to separation by flotation and skimming. Sludges are then transferred to holding tanks, prior to disposal at authorised landfill sites.

2.2 Steel drum cleaning and recycling

An estimated six million steel drums are manufactured annually in the United Kingdom. Five million steel drums are recycled each year; of these about 800 000 are cleaned by high temperature heating (furnaced) and the rest are washed. The drums range from near perfect, used drums, which may just require repainting, to quite badly damaged drums which require a substantial amount of repair work. On average, steel drums pass through the recycling process twice.

Drums for cleaning and reconditioning are normally empty, but residues are inevitably brought on to the site. One of two operations is carried out; an aqueous wash for drums contaminated with soluble materials, or a burning or furnacing

process for steel drums which are heavily contaminated with tars, adhesives and heavy greases.

2.2.1 The washing process

Bungs are removed from drums, paint stripper is applied to the labels and the drums are placed on a conveyor. Drums identified as needing an oil wash pre-treatment are set aside at this stage.

The drums are up-ended on the conveyor to drain the residues through an open gutter into a pit. After drainage, the drums are placed in the horizontal position and moved to the external wash.

The external wash procedure involves a wash with a hot sodium hydroxide or sodium metasilicate solution, followed by a hot water rinse. The drums are checked to ensure that their rims are circular and any residual labels are scraped off manually.

Internal washing comprises the following three elements:

- the pre-rinse, which applies hot water at 80-95°C to remove oils without forming emulsions

- the main wash, which uses a solution of sodium hydroxide or metasilicate, again at 80-95°C

- the final hot water rinse.

Free liquid is sucked out of the drums and they are shot blasted externally using steel shot which is itself recycled. The drums are de-dented with the application of air at pressure in an armoured cabinet. Leak testing is undertaken through water immersion and the drums are dried over gas burners.

The drums are graded by visual inspection for reuse, remake, repair, or de-rusting treatment. The acceptable drums are moved to the painting booth. The paint used is organic solvent-based, air-drying paint especially formulated to be oil and petrol resistant. Paints and solvents are stored in bulk on site at the drum recycling facility.

Several off-line processes take place, including oil washing, acid de-rusting, remaking and repair.

- Internal oil washing is a pre-treatment given to certain drums before the external wash. It comprises a wash with diesel and then two washes with hot sodium hydroxide solution.

- Acid de-rusting involves two washes with hydrochloric acid followed by a cold water rinse. Residual acid is neutralised with sodium metasilicate. Sodium nitrite is used as the rust prevention agent.

- Remaking involves removing the drum head with a large 'can opener', shot blasting if required, and applying a new head.

- Drum repair involves gas-welding damaged joints.

Liquid wastes from the washing process, together with residues arriving on site in the drums, are usually treated with concentrated sulphuric acid to break emulsions.

The waste is pumped to a settling tank for oil separation. The free oil is drained and the aqueous residue is neutralised with sodium hydroxide. After further oil separation, the oil-free aqueous effluent is discharged to the sewage system.

2.2.2 *The furnacing process*

The drum lid is removed and placed on top of the drum which is inverted on to a conveyor belt. This carries the drum into the incinerator which is normally fuelled with diesel and operates at 850°C with an after-burner which operates at the same temperature. The drums remain in the incinerator for about 2 minutes.

The drums pass from the incinerator through a water curtain to control flashback and are further quenched with a water spray. The drums are shot blasted inside and out, de-rusted, tested for leaks and painted. they may also be lined with materials such as epoxy phenolic or clear varnish linings. After the shot blasting stage, many of the operations are similar to those described in Section 2.2.1.

2.3 **Plastic drum cleaning and recycling**

Approximately 1 million 200 litre plastic drums are made annually in the United Kingdom and about 300 000 are reconditioned for reuse . As plastic can absorb chemicals, extreme care must be taken in the use of reconditioned plastic drums to prevent the cross contamination of the product being filled with the previous chemical contents of the drum.

In the United Kingdom reconditioned drums are not used for the carriage of dangerous goods. Plastic drums that have been used for viscous materials like adhesives and paint cannot be adequately cleaned and are therefore not recycled.

Drums for cleaning have their bungs removed and are upended on a conveyor over a gutter or pit to be drained, then turned horizontally and washed as follows:

External wash The drums are washed with hot sodium hydroxide or sodium metasilicate solution, followed by a hot water rinse; residual labels are scraped off.

Internal wash The drums are pre-rinsed with hot water (80-90°C) to remove oils without forming emulsions. The main wash uses hot (80-95°C) sodium hydroxide or sodium metasilicate solution, followed by a final rinse with hot water.

Drums are then leak-tested under water, free liquid is sucked out and they are dried with hot air.

3. **Contamination**

The contaminants on a site will largely depend on the history of the site. Potential contaminants are listed in the Annex and the probable locations on site of the main groups of contaminants are shown in Tables 1a and 1b. It is most unlikely that any one site will contain all of the contaminants listed. It is recommended that an appropriate site investigation be carried out to determine the exact nature of the contamination associated with individual sites.

3.1 Factors affecting contamination

Because of the nature of activities occurring on these sites, it is important to establish the integrity of drainage and containment infrastructure when surveying for contamination. On older sites, sumps and soakaways merit particular attention.

Potential contaminants are product residues, oily wastes created at the sites and the hydrocarbon fuels, solvents, detergents, acids and alkalis used in various activities on site. Many of these and other substances used in smaller quantities, for example ferrous and aluminium sulphates, are water-soluble and their release or disposal may lead to the contamination of ground or surface water. Sources of potential contamination are leakage from underground storage tanks and pipelines, spillages in areas of tank and drummed chemical storage and surface run-off from storage areas and washing facilities if adequate containment is not provided.

In addition to the contaminants associated with the principal operations at sites, asbestos may be associated with thermal lagging of pipes and tanks and as insulation material or cladding/sheeting in the fabric of buildings. Some larger sites may also have electricity sub-stations which may have included components that contained polychlorinated biphenyls (PCBs). Contamination may occur as a result of the filling, leakage or dismantling of transformers containing PCBs.

3.2 Migration and persistence of contaminants

Small amounts of petroleum hydrocarbons and organic solvents may pose a considerable threat to water resources through surface run-off and groundwater infiltration. The less soluble compounds which become adsorbed on to clay or organic matter provide on-going sources of water pollution long after the original source has been removed, by continuing to allow the contaminant to slowly desorb into the soil-water. The higher the organic matter and clay content within the soil, the greater the adsorption of solvents and the lower their mobility. Conversely, the greatest migration of contaminants occurs in coarse-grained sands and gravels with little organic matter. The hydrocarbons and non-chlorinated solvents are less dense than water and those which are insoluble in water tend to float on top of the water-table.

Biodegradation processes in soils can be influenced by a number of factors, namely moisture content, oxygen concentration and pH, acting separately or in combination. For example, low moisture content reduces microbiological activity, while high moisture content can reduce oxygen penetration and possibly lead to anaerobic soil conditions. Such conditions enhance the biodegradation of some materials, for example chlorinated compounds, while aerobic conditions are needed to biodegrade many oils. Also, low pHs tend to reduce the bacterial population and encourage fungal activity; at pHs lower than 5, microbiological activity is much reduced. The presence of heavy metals also inhibits micro-organisms. As a result of these factors, at high concentrations in soil, even relatively non-persistent compounds may not biodegrade readily.

Mineral acids migrate within soil-water in the dissociated form, that is as the hydrogen ion and the corresponding anion, for example chloride or sulphate. Soils act as a buffer which tends to neutralise slight acidity. Dissolved chloride and sulphate migrate freely through the soil. Mineral acids and alkalis are not biodegradable.

PCBs have a low solubility in water and do not degrade. They are fat-soluble and tend to accumulate in food chains.

Asbestos is neither mobile nor biodegradable and will persist in the ground. Wind dispersal of contaminated soil may be a further transport mechanism where there is gross surface contamination by some of the less mobile contaminants, particularly asbestos.

4. Sources of further information

4.1 Organisations

For information concerning the drum cleaning and recycling industry in the United Kingdom, the following organisations should be consulted:

The Association of Drum Manufacturers
Crowton House
The Broadway
Crowborough
Sussex
TN6 1DA

Federation of Drum Reconditioners
Unit 14
Reliance Trading Estate
Reliance Street
Newton Heath
Manchester
M10 0AL

The National Road Tanker Cleaners Association (NRTCA)
55 Weeland Road
Nottingly
West Yorkshire
WF11 8BG

Road Haulage Association
Roadway House
35 Monument Hill
Weybridge
Surrey
KT13 8RN

4.2 Sources of information concerning the activities described in this profile

The HCB tank guide - directory of the tank container and road tanker industries worldwide. 4th edition. Intapress Publishing Limited 1994.

Tank container world. Published bi-monthly by Baltic Publishing Limited, Great West Road, Brentford, Middlesex, TW8 9BU.

Materials reclamation weekly. Published by EMAP Maclaren, Maclaren House, 19 Scarbrook Road, Croydon, Surrey, CR9 1QH.

Information on researching the history of sites may be found in:

Department of the Environment. *Documentary research on industrial sites.* DOE, 1994.

4.3 Related DOE Industry Profiles

Chemical works: inorganic chemicals manufacturing works
Chemical works: organic chemicals manufacturing works
Waste recycling, treatment and disposal sites: hazardous waste treatment plants
Waste recycling, treatment and disposal sites: solvent recovery works

4.4 Health, safety and environmental risks

The Notes issued by the Chief Inspector of Her Majesty's Inspectorate of Pollution (HMIP) provide guidance for the process prescribed for integrated pollution control in Regulations made under the Environmental Protection Act 1990. Of particular relevance is:

Her Majesty's Inspectorate of Pollution. *Burning out of metal containers.* Chief Inspector's Guidance to Inspectors. Process Guidance Note IPR 5/5. London, HMSO, 1992.

The Control of Substances Hazardous to Health (COSHH) Regulations 1994 and the Management of Health and Safety at Work Regulations 1992 are available from HMSO. Information on relevant health and safety legislation and approved codes of practice published by HSE publications are available from Health and Safety Executive Books, PO Box 1999, Sudbury, Suffolk, CO10 6FS (telephone 01787 881165), as well as HMSO and other retailers.

Information on the health, safety and environmental hazards associated with individual contaminants mentioned in this profile may be obtained from the following sources:

Howard P H. *Handbook of environmental fate and exposure data for organic chemicals.* Vols I and II. USA, Lewis Publishers, 1990.

Sax N and Lewis R. *Hazardous chemicals desk reference.* New York, Van Nostrand Reinhold Company, 1987.

Verschueren K. *Handbook of environmental data on organic chemicals.* 2nd Edition. New York, Van Nostrand Reinhold Company, 1983.

4.5 Waste disposal and remediation options

Useful information may be obtained from the Department of the Environment series of Waste Management Papers, which contain details of the nature of industrial waste arisings, their treatment and disposal. A current list of titles in this series is

available from HMSO Publications Centre, PO Box 276, London, SW8 5DT. Of particular relevance is:

Department of the Environment. *Special wastes: a technical memorandum providing guidance on their definition.* Waste Management Paper No 23 London, HMSO, 1981. New edition in preparation.

Publications containing information on the treatment options available for the remediation of contaminated land sites, prepared with the support of the Department of the Environment's Research Programme, can be obtained from National Environmental Technology Centre Library, F6, Culham, Abingdon, Oxfordshire, OX14 3DB.

A full list of current titles of Government publications on all aspects of contaminated land can be obtained from CLL Division, Room A323, Department of the Environment, Romney House, 43 Marsham Street, London, SW1P 3PY.

Advice on the assessment and remediation of contaminated land is contained in guidance published by the Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London, SW1P 3AU.

Annex Potential contaminants

The chemical compounds and other materials listed below generally reflect those associated with the industry and which have the potential to contaminate the ground. The list is not exhaustive; neither does it imply that all these chemicals might be present nor that they have caused contamination.

Tank cleaning

Hydrocarbon fuels and oils	diesel paraffin (kerosene) mixed oil interceptor wastes
Acids	sulphuric
Alkalis	sodium hydroxide sodium metasilicate
Detergents	cationic and non-ionic detergents sodium hydroxide and nitrilotriacetic acid in proprietary traffic film removers for external washing
Organic solvents	eg white spirit methyl ethyl ketone (MEK) xylene acetone
Metal salts	ferrous sulphate aluminium sulphate

Waste residues removed from tanks prior to cleaning may also have been stored on site. These wastes will depend on the nature of the material transported and may cover a wide range of potential contaminants, for example hydrocarbons, hydrofluoric acid, hydrochloric acid, sulphur etc.

Drum cleaning and recycling

Hydrocarbon fuels and oils	diesel mixed oil interceptor wastes
Acids	hydrochloric sulphuric
Alkalis	sodium hydroxide sodium metasilicate
Solvent-based resins and varnishes	eg xylene aromatic hydrocarbons glycol ether derivatives

Paints and paint strippers

Metal salts

ferrous sulphate
aluminium sulphate
sodium nitrite

Waste residues removed from drums prior to cleaning may have been stored on site. These wastes will depend on the nature of the material in the drums and may cover a wide range of potential contaminants.

General contaminants

Asbestos

Polychlorinated biphenyls (PCBs)

Table 1a Main groups of contaminants and their probable locations

Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants — tank cleaning

Contaminants		Location								
		Building fabric	Raw material delivery and storage	Tank cleaning areas	Process storage tanks, pipework and pumps	Process drainage	Wastewater treatment facilities and subsequent drainage	On-site waste disposal including soakways	Fuel storage	Electricity substations and transformers
Main groups	Sub-groups									
Metal compounds	aluminium sulphate iron sulphate									
Acids										
Alkalis										
Asbestos										
Organic compounds	diesel									
	paraffin (kerosene)									
	solvents									
	interceptor waste									
	polychlorinated biphenyls (PCBs)									
	detergents									

Waste storage areas may be contaminated with any of the wide range of residues that may have been removed from tanks prior to cleaning and by sludges from wastewater treatment. Shaded boxes indicate areas where contamination is most likely to occur.

Table 1b Main groups of contaminants and their probable locations

Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants — drum cleaning and recycling

Contaminants		Location											
		Building fabric	Raw material delivery and storage	Drum cleaning and recycling areas	Process storage tanks, pipework and pumps	Process drainage	Wastewater treatment facilities and subsequent drainage	On-site waste disposal including soakaways	Fuel storage	Electricity substations and transformers			
Metal compounds	Main groups												
	Sub-groups	aluminium sulphate iron sulphate											
Acids		sodium nitrite											
		sulphuric											
Alkalis		hydrochloric											
Asbestos													
Organic compounds		diesel											
		paraffin (kerosene)											
		solvents											
		interceptor waste											
		polychlorinated biphenyls (PCBs)											

Waste storage areas may be contaminated with any of the wide range of residues that may have been removed from drums prior to cleaning and by sludges from wastewater treatment. Shaded boxes indicate areas where contamination is most likely to occur.



Recycled paper

DOE Industry Profiles

Airports
Animal and animal products processing works
Asbestos manufacturing works
Ceramics, cement and asphalt manufacturing works
Chemical works: coatings (paints and printing inks) manufacturing works
Chemical works: cosmetics and toiletries manufacturing works
Chemical works: disinfectants manufacturing works
Chemical works: explosives, propellants and pyrotechnics manufacturing works
Chemical works: fertiliser manufacturing works
Chemical works: fine chemicals manufacturing works
Chemical works: inorganic chemicals manufacturing works
Chemical works: linoleum, vinyl and bitumen-based floor covering manufacturing works
Chemical works: mastics, sealants, adhesives and roofing felt manufacturing works
Chemical works: organic chemicals manufacturing works
Chemical works: pesticides manufacturing works
Chemical works: pharmaceuticals manufacturing works
Chemical works: rubber processing works (including works manufacturing tyres or other rubber products)
Chemical works: soap and detergent manufacturing works
Dockyards and dockland
Engineering works: aircraft manufacturing works
Engineering works: electrical and electronic equipment manufacturing works (including works manufacturing equipment containing PCBs)
Engineering works: mechanical engineering and ordnance works
Engineering works: railway engineering works
Engineering works: shipbuilding, repair and shipbreaking (including naval shipyards)
Engineering works: vehicle manufacturing works
Gas works, coke works and other coal carbonisation plants
Metal manufacturing, refining and finishing works: electroplating and other metal finishing works
Metal manufacturing, refining and finishing works: iron and steelworks
Metal manufacturing, refining and finishing works: lead works
Metal manufacturing, refining and finishing works: non-ferrous metal works (excluding lead works)
Metal manufacturing, refining and finishing works: precious metal recovery works
Oil refineries and bulk storage of crude oil and petroleum products
Power stations (excluding nuclear power stations)
Pulp and paper manufacturing works
Railway land
Road vehicle fuelling, service and repair: garages and filling stations
Road vehicle fuelling, service and repair: transport and haulage centres
Sewage works and sewage farms
Textile works and dye works
Timber products manufacturing works
Timber treatment works
Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants
Waste recycling, treatment and disposal sites: hazardous waste treatment plants
Waste recycling, treatment and disposal sites: landfills and other waste treatment or waste disposal sites
Waste recycling, treatment and disposal sites: metal recycling sites
Waste recycling, treatment and disposal sites: solvent recovery works
Profile of miscellaneous industries incorporating:
Charcoal works
Dry-cleaners
Fibreglass and fibreglass resins manufacturing works
Glass manufacturing works
Photographic processing industry
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Lime Grove,
Ruislip, HA4 8SF

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