Appendix B:

Wastes and Potential Hazards for Absolute and Mirror Entries in the European Waste Catalogue

The aim of this appendix is to:

- provide advice on the dangerous substances that may be associated with a particular hazardous waste entry;
- highlight indicative hazardous properties that may need to be considered for different hazardous waste entries;
- assist in assigning hazard properties to wastes for Duty of Care purposes; and
- provide explanation on classification using examples and further explanation to highlight key issues.

The appendix only lists the hazardous entries in the EWC 2002.

The appendix guides the user towards further actions appropriate to the likely hazards, and links to Step 4 and 5 in the Hazardous Waste Assessment Methodology set out in Chapter 3. Only general comments are possible for some six-figure waste categories. These categories cover wastes that could have a broad range of chemical constituents. Waste producers should consider all hazardous properties.

Where particular difficulties might arise in assigning some wastes to their correct category examples are given. These have been taken from a wide variety of industries that produce mixtures of different and sometimes complex wastes.

The examples presented here are based on the 8th Edition of the Approved Supply List (ASL). For the assessment of a waste the current version of the ASL must be used.

Absolute and Mirror Entry Wastes

01	Wastes Resulting from Exploration, Mining, Quarrying, and Physical and Chemical Treatment of Minerals	
01 03	**wastes from physical and chemical processing of metalliferous minerals**	
01 03 04*	**acid-generating tailings from processing of sulphide ore**	**A**
	Acid-generating wastes of this type are not normally corrosive, despite their ability to produce acidic leachates. They are likely to comprise irritant (H4), harmful (H5), and/or ecotoxic (H14) sulphates of the heavy metals. There may also be potential hazards (H5, H6, H7, H10, H11, or H14) from the presence of a wide range of the metals and their compounds including: nickel; copper; zinc; antimony; tellurium; arsenic; cadmium; mercury; thorium; lead.	
01 03 05*	other tailings containing dangerous substances	M
01 03 07*	other wastes containing dangerous substances from physical and chemical processing of metalliferous minerals	M
	01 03 05 primarily relates to non-sulphide ores which may or may not contain heavy metals. 01 03 07 however could relate to a broader spectrum of ore processing wastes. Unless acid generating, the wastes are unlikely to be irritant (H4), but there are other possible hazards (H5, H6, H7, H10, H11, or H14) from the presence of a wide range of the metals and their compounds including: nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead.	
01 04	**wastes from physical and chemical processing of non-metalliferous minerals**	
01 04 07*	wastes containing dangerous substances from physical and chemical processing of non-metalliferous minerals	M
	These wastes may arise from processing of minerals including gypsum, salt, potash, asbestos, graphite, fluorite, calcite, clay, sand and gravel. They might contain potentially hazardous minerals from other 01 04 processes (e.g. asbestos) or potentially hazardous metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds and should be considered under the following hazards: H5 to H7, H10, H11, or H14.	
01 05	**drilling muds and other drilling wastes**	
01 05 05*	oil-containing drilling muds and wastes	M
	Oil-containing muds and wastes should be assessed on the basis of the concentration of oil present in the waste. Typically they will be carcinogenic (H7), and may also contain highly flammable or flammable constituents, H3A (third indent); H3B.	
01 05 06*	drilling muds and other drilling wastes containing dangerous substances	M
	Drilling muds are normally barium sulphate based, which is not a dangerous substance. However, there are over 2000 separate inorganic and organic substances supplied to the offshore industry as drilling mud additives. These serve the purpose of foaming agents, antifouling agents, corrosion inhibitors, emulsion preventers, shale-swelling inhibitors etc. Many ìrecipesîfor drilling muds are unique to the company or individual in charge of the operation: it is difficult to be prescriptive about likely hazards. Even supposedly ìlow toxicityîwater-based muds may contain ecotoxic additives (H14). If the chemical constituents of the mud are unknown, any additives should be assessed to determine any potential hazard.	

Examples B1.1 | **EWC: 01 05 06***

Drilling muds containing dangerous substances

Drilling muds and fluids are designed to do a variety of tasks: lubricate the drill bit, lift rock cuttings to the surface, provide a transport medium for cement and other materials required down-hole, maintain well pressure to avoid blow-outs, etc. The fluids can contain anti-foaming agents, anti-fouling agents, corrosion inhibitors, emulsion preventers, shale-swelling inhibitors etc. They tend to be complex mixtures of substances. There are over 2000 separate inorganic and organic substances supplied to the offshore industry as drilling mud additives. Many "recipes" for drilling muds are unique to the company or individual in charge of the operation, it is difficult to be specific about likely hazards, although water-based muds are usually disposed of offshore.

The most likely hazard from drilling muds disposed of on-shore will be the oil content of "organic phase drilling muds". The oil can be either a diesel fraction petroleum (carcinogenic category 3: R40); or so called synthetic oil, predominantly composed of esters and vegetable oils. However, all used drilling fluids (including water-based ones) will be contaminated with crude oil to some extent, so it is the oil content that will initially determine whether it is hazardous. If the oil concentration is below threshold levels, other constituents may still render the fluid hazardous.

- A synthetic organic phase drilling mud has been tested and found to contain 0.4% sodium hydroxide, various inert compounds, and is contaminated with 0.5% unrefined crude oil.

- Sodium hydroxide is classified as C; R35 and would be hazardous at concentrations above 1% (see Section C4 of Appendix C on irritant/corrosive threshold values for the derivation of this value). As the concentration is below the threshold the example mud is non-hazardous due to the sodium hydroxide content. However, some muds may reach the threshold concentration of 1%.

- Unrefined oil is classified as Carc Cat 1: R45. Therefore the mud is hazardous under carcinogenic (H7) as the concentration of crude oil in the sample is above 0.1%.

If the drilling mud is not hazardous it would fall under one of the categories 01 05 04, 01 05 07, 01 05 08, or 01 05 99.

02	Wastes from Agriculture, Horticulture, Aquaculture, Forestry, Hunting and Fishing, Food Preparation and Processing

02 01	wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing	
02 01 08*	agrochemical waste containing dangerous substances	M

The hazardous substances under this heading are likely to include pesticides and fungicides. If known constituents are present above their threshold concentration values then the waste should be treated as hazardous by one or more of H5; H6; H7; H10; H11 and H14. If the chemical constituents of the waste are unknown, then it should be treated as hazardous unless tested.

Containers and packaging from pesticides, fungicides and the like, which have been rinsed in accordance with Crop Protection Association Guidance would not be considered as hazardous waste. (See example under Chapter 15)

Examples B2.1 | **EWC: 02 01 08***

Agrochemical wastes containing R52-53 substances

A waste contains 7% of the insecticide piperazine which is classified as C: R34, R42/43 and R52,53.

Piperazine does not have a substance specific threshold concentration for H14. The threshold for R52,53 is the individual substance limit of 25%. The presence of the R34 risk phase, however, reduces the threshold concentration to 5% (by hazard H4) or 10% (by hazard H8) (see Appendix C4). Therefore as the concentration in the waste is 7%, the waste would be hazardous by irritant (H4).

The risk phrase R42/43 applies to the category of danger sensitising, which is a property not covered by the HWD.

Examples B2.2 | **EWC: 02 01 08***

Agrochemical wastes containing R50-53 substances

An insecticide waste contains:

- 0.2% aldrin, which is classified as T: R24/25, 48/24/25, Carc Cat 3: R40 and N: R50, 53; and
- 0.9% DDT (dicophane), which is classified as T: R25, 48/25, Carc Cat 3: R40 and N: R50, 53.

The hazardous waste threshold limits associated with these risk phrases are:

R24/25, R48/24/25 R25 and R48/25 ≥ 3%

Carc Cat 3: R40 ≥ 1%

R50, 53 ≥ 0.25% (neither aldrin or DDT have substance specific threshold concentrations)

The waste would be hazardous by ecotoxic (H14) because DDT is present above the individual substance threshold of 0.25%. It is not necessary to use the additive equations (See Appendix C14)

The waste would **not** be classified as carcinogenic (H7), because neither aldrin or DDT are present above the threshold concentration of ≥ 1% for substances classified as Carc Cat 3: R40. For the waste to be hazardous, the individual substance concentration must exceed this threshold limit. (See Appendix C7)

As the total concentration of the substances is less than 3%, the waste would **not** be hazardous by toxic (H6). (See Appendix C5)

Examples B2.3 | **Unrinsed Insecticide Packaging** **EWC: 02 01 08***

Waste packaging having contained a fenoxycarb insecticide. The preparation as supplied contains different concentrations of the following dangerous substances in the form of a water dispersible granule:

- fenoxycarb at 25% , with classification: N: R50, 53
- sulphuric acid monododecyl ester sodium salt at 2-10%, with classification: Xi : R36/38

Non-hazardous components silica, respirable crystalline (20-35%) and balance not specified (30-53%)

After transferring the product to a spray tank, the 1 kg paper bag with plastic liner was not rinsed leaving a remaining residue which represents 1% of the original content of the package. As the packaging contains material that could be removed by physical or mechanical means it should be considered as a process waste and not under Chapter 15: therefore only the remaining residue itself is assessed to determine whether the waste is hazardous. The weight of the packaging is not considered when assessing the waste against the threshold limits in these circumstances.

Fenoxycarb does not have a substance specific limit for R50,53. The general threshold limit for an individual R50,53 substance (0.25%) is used. Therefore at a 25% concentration the insecticide would be hazardous waste by H14 and the packaging should be considered as hazardous under 02 01 08*

The sulphuric acid monododecyl ester sodium salt is below the 20% threshold for Xi R36/38, so the waste would not be considered as irritant (H4).

03	Wastes from Wood Processing and the Production of Panels and Furniture, Pulp, Paper and Cardboad	
03 01	**wastes from wood processing and the production of panels and furniture**	
03 01 04*	sawdust, shavings, cuttings, wood, particle board and veneer containing dangerous substances	M
	Possible contaminants include oil, varnishes and glues. If any of these is present and contains harmful constituents above their threshold values, the waste is hazardous. H3A(third indent); H4; H5; H6; H7; H12 and H14 may apply. Some hardwood dusts are carcinogenic and may be hazardous by H7.	
03 02	**wastes from wood preservation**	
03 02 01*	non-halogenated organic wood preservatives	A
03 02 02*	organochlorinated wood preservatives	A
03 02 03*	organometallic wood preservatives	A
03 02 04*	inorganic wood preservatives	A
	A wide variety of compounds are used as biocides (pesticides, fungicides etc.). The majority of wood preservatives are classified as harmful/toxic (H5/H6) or irritant/corrosive (H4/H8) with a large number having the potential to be classified as ecotoxic (H14). Relevant hazards may include H3B to H8 and H12 to H14.	
03 02 05*	other wood preservatives containing dangerous substances	M
	Most wood preservatives would fall under one of the absolute entries above. Halogenated hydrocarbon wood preservatives would normally be organochloro compounds, and would therefore come under 03 02 02* above. However, some rarely used preservatives could possibly include fluoro-carbons and bromo-carbons. Relevant hazards may include H3B to H7 and H12 to H14.	

Examples B3.1 | **EWC: 03 02 05***

Wood preservatives containing dangerous substances

Most wood preservatives would fall under one of the absolute entries 03 02 01* to 03 02 04*. In particular, halogenated organic wood preservatives would normally be organochloro compounds, and would therefore come under 03 02 02*.

Some halogenated organic preservatives do not contain chlorine and therefore would come under the "*mirror entry*" 03 02 05* (not 03 02 01* which covers non-halogenated organic wood preservatives). These non-chlorinated compounds vary from the simple bromomethane (a toxic gas at room temperatures) to the complex: 2(1H)-pyrimidinone, tetrahydro-5,5-dimethyl-, [3-[4-(trifluoromethyl)phenyl-1-[2-[4-(trifluoromethyl) phenyl]ethenyl]-2-propenylidene]]hydrazone. Both of these could be used as biocides in wood preservation. However, there appear to be no published hazard data for the latter compound. This can be a problem under various EWC categories when dealing with little-used compounds. If the substance has been used the original container for the biocide may be available: the manufacturer's Safety Data Sheet should be taken into account. If the waste is solely a biocide, as opposed to a wood treatment containing a biocide, the waste should be classified under 06 13 01*.

If the wood preservative is found to be non-hazardous, it would fall under the entry 03 02 99.

04	Wastes from the Leather, Fur and Textile Industries	
04 01	**wastes from the leather and fur industry**	
04 01 03*	degreasing wastes containing solvents without a liquid phase	M
	Tanneries typically use organic solvents to de-grease certain hides before processing, particularly sheep and pig skins. Wastes without a liquid phase would be expected to have fairly low levels of solvents, but if they are present above threshold concentrations they may be hazardous under H3A, H4 to H7 and H10.	
04 02	**wastes from the textile industry**	
04 02 14*	wastes from finishing containing organic solvents	M
04 02 16*	dyestuffs and pigments containing dangerous substances	M
04 02 19*	sludges from on-site effluent treatment containing dangerous substances	M
	The textile industry uses a wide variety of chemical products during the cloth finishing and dyeing processes. The scouring (washing) of fabrics and yarns uses halogenated solvents (usually perchloroethylene) as well as soaps and detergents, but other processes may well leave residues that will end up in the waste stream. These residues include acids and alkalis for pH adjustment and a variety of chemicals (including metallic complexes) used to impart flameproof, durable press, or moth-resistant finishes. However, if these wastes do not also include organic solvents they should be classified as non-hazardous under 04 02 15. Solvent-containing wastes should be considered under H3B; H4 to H7 and H10, and additionally under H8 and H11 if acid, alkali or heavy metal contamination is present. Dyestuffs and pigments, and sludges from effluent treatment, can contain a range of organic and inorganic substances, including heavy metals. These wastes should be considered under H3B; H4 to H8 and H10 to H12.	

Examples B4.1 | **EWC: 04 02 14***

Textile industry finishing wastes

The textile industry uses a wide variety of chemical products during the cloth finishing and dyeing processes. The scouring (washing) of fabrics and yarns uses halogenated solvents; usually perchloroethylene (tetrachloroethylene) which is classified as Carc Cat 3: R40 and N: R51, 53. Therefore a waste containing perchloroethylene would be hazardous by carcinogenic (H7) at ≥ 1% and, as there is no substance specific threshold, by ecotoxic (H14) at ≥ 2.5% general threshold.

These processes may also use trichloroethylene, which is classified as Carc Cat 2: R45, Muta Cat. 3: R68, R67, Xi: R36/38 and R52, 53 (with no substance specific threshold for R52,53). A waste would be hazardous, by carcinogenic (H7), if trichloroethylene is present at a concentration = 0.1%. At higher concentrations of trichloroethylene the waste would be classified with additional hazardous properties and these would be required for Duty of Care purposes:

- at ≥ 1% trichloroethylene, the waste would also be classified as mutagenic (H11);
- at ≥ 20% trichloroethylene, the waste would also be classified as irritant (H4); and
- at ≥ 25% trichloroethylene, the waste would also be classified as ecotoxic (H14).

The industry will also use soaps and detergents, whose residues may be present but are not normally hazardous. Other processes may well leave residues that will end up in the waste stream. These residues include acids and alkalis for pH adjustment, and a variety of chemicals used to impart flameproof qualities, durable press, or moth-resistant finishes. These can include metallic complexes, borax, borates, cyanides, urea formaldehyde, phosphates, organo-phosphates, pentachlorophenol. The wastes should be assessed against these (or other specified chemicals) if suspected.

However, if these wastes do not include these (or other suspected) chemicals or solvents above threshold concentrations they would be classified as non-hazardous under 04 02 15.

05	Wastes Resulting from Exploration, Mining, Quarrying, and Physical and Chemical Treatment of Minerals	
05 03	**wastes from petroleum refining**	
05 01 02*	desalter sludges	A
05 01 03*	tank bottom sludges	A
05 01 04*	acid alkyl sludges	A
05 01 05*	oil spills	A
05 01 06*	oily sludges from maintenance operations of the plant or equipment	A
05 01 07*	acid tars	A
05 01 08*	other tars	A
05 01 11*	wastes from cleaning of fuels with bases	A
05 01 15*	spent filter clays	A
	Oil and tar containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability (e.g. H3A first indent; H3B). Non-oily sludges can be either strongly acid or alkaline depending on the process and are therefore often corrosive (H8); they may also contain cyanides, sulphides and thiols.	
05 01 09*	sludges from on-site effluent treatment containing dangerous substances	M
	Most sludges will come under one of the absolute entries above. Possible contaminants in other sludges may include phenols, cyanides and sulphur-containing compounds in trace quantities. The most likely potential hazards will be toxic (H6) and carcinogenic (H7) although other hazards (including H3A (first indent), H4, H5, H8 and H14) may also apply.	
05 01 12*	**oil containing acids**	**M**
	If oil is present above threshold concentrations, the waste is carcinogenic (H7). Other hazards may include H4 to H6, H8 and H12 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
05 06	**wastes from the pyrolytic treatment of coal**	
05 06 01*	Acid tars	A
05 06 03*	Other tars	A
	Oil and tar containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards. Acid tars will contain high concentrations of sulphuric acid and should therefore additionally be treated as corrosive (H8), if acidic components are present above threshold concentrations.	
05 07	**wastes from natural gas purification and transportation**	
05 07 01*	wastes containing mercury	M
	The presence of mercury means the waste should be considered under H4 to H6, H8 and H14. In addition these wastes are generally inert catalysts contaminated with sulphur compounds, with a possible risk of acid generation (H13).	

Examples B5.1 | **EWC: 05 01 11***

Refining of petrol and petroleum products

Aqueous solution from the cleaning of petrol is collected by bulk tanker and generally contains:

- up to 10% sodium hydroxide,
- up to 2% phenol,
- up to 3% sulphide.

An analysis provides the following results:

pH = 12.2

Alkalinity = 31,300 mg/kg

Free cyanide <1 mg/kg

Total phenols = 15,209 mg/l

Mercaptans = 1.24 mg/kg

Sulphide = 4,810 mg/kg

The waste would be hazardous waste because it is covered by an absolute entry. However, the hazardous property assigned to the waste will be dependent on the nature of the solution.

Sodium hydroxide is classified as C: R35 and at a concentration of 10% would result in the waste being hazardous by corrosive (H8); this is confirmed by the pH 12.2.

The concentrations of free **cyanide** and **mercaptans** are below threshold levels.

Phenols have a range of classifications in ASL depending on their actual structure, for example:

- phenol itself is classified as Muta Cat 3: R68, T: R23/24/25,Xn R48/20/21/22 and C: R34, giving thresholds of 1%, 3%, 25%, and 5% respectively.
- 2,4-dichlorophenol is classified as T: R24, Xn: R22, C: R34 and N: R51, 53 (with not substance, specific threshold) giving thresholds of3%, 25%, 5% and 2.5% respectively.

As the actual phenols present are not known, the potential worst case should be considered. At a concentration of 1.5%, the only relevant classification is Mut Cat 3: R68, which would result in the waste being hazardous by Mutagenic (H11).

As with the phenols the actual **sulphide** substances present in the waste are not known. Sulphide compounds have a range of classification. Sulphides can release hydrogen sulphide in the presence of acids, so this waste has the potential to be classified as H12. To demonstrate H12, a substance or preparation should be capable of releasing a toxic gas at a rate in excess of 1 litre/kg substance/hour. The concentrations of sulphide substances capable of releasing this quantity of gas can be calculated (see Appendix C12). The threshold concentrations for some common sulphide substances have been calculated (see Table C12.2) and these range from 0.1% to 0.8%. With a concentration of 0.48% sulphide in the waste, the concentration of sulphide substances within the waste is likely to be greater than threshold concentrations for some common sulphide substances. Therefore the waste should also be assigned H12.

Examples B5.2 | **EWC: 05 01 08***

Refining of petrol and petroleum products – Oil wastes

An oil produced from refluxing of crude oil contains 92.4% hydrocarbons, in a mixture of aliphatic and aromatic hydrocarbons with chain lengths unknown.

There are no obvious entries under 05 01 (Waste from petroleum refining) for oil-based wastes which are not sludges or tars. If the waste is in the form of a tar it would be covered by 05 01 08*, which is an absolute entry, making the waste hazardous by carcinogenic (H7) as most hydrocarbons from oil refining are classified as Carc Cat 2: R45.

However, if it is in liquid form, entries under Chapter 13 to 15 need to be considered. The most appropriate entry would be 13 08 99*, which again is an absolute entry, making the waste hazardous.

Examples B5.3 | **EWC: 05 01 12***

Oil-containing acid wastes from petroleum refining

These wastes derive primarily from the alkylation process. Initial process wastes are strongly acidic, containing up to 90% mineral acids such as hydrofluoric or sulphuric acids. However, these wastes are usually treated and/or partially recycled on-site, and so it is not expected that wastes for off-site disposal would be in this form. Other refining wastes derived from for example sulphur-removal treatment may contain mineral acid impurities as process by-products.

The hazards arising from these wastes would fall under the irritant/corrosive (H4/H8) and toxic (H6) from the mineral acid content.

- Hydrofluoric acid classified T+: R26/27/28 C: R35 and would cause a waste to be hazardous by very toxic (H6) at or above the threshold concentration of 0.1%, and by irritant/corrosive (H4/H8) at or above the threshold concentration of 1% (see Section C4 of Appendix C on threshold values for the derivation of these values).
- Sulphuric acid classified C: R35 would cause a waste to be hazardous by irritant/corrosive (H4/H8) at or above the 1% threshold concentration (see Section C4 of Appendix C on irritant/corrosive threshold values for the derivation of these values).

If no acids are present above their threshold concentrations, the waste would need to be considered under other entries referring to oils in this chapter or Chapter 13.

06	Wastes from Inorganic Chemical Processes	
06 01	**wastes from the manufacture, formulation, supply and use (MFSU) of acids**	
06 01 01*	sulphuric acid and sulphurous acid	A
06 01 02*	hydrochloric acid	A
06 01 03*	hydrofluoric acid	A
06 01 04*	phosphoric and phosphorous acid	A
06 01 05*	nitric acid and nitrous acid	A
06 01 06*	other acids	A
	All of these acids are classified as C: R35 or C: R34 (hazardous by H4/H8 see Section C4 of Appendix C on irritant/corrosive threshold values), except 06 01 06* which could be irritant or corrosive. 06 01 04: Wastes from phosphoric acid production can include uranium and other heavy metals from impurities in the feedstock, and sulphur and fluorine compounds from the manufacturing process. All the other processes will produce acidic wastes covered by some or all of the hazards H2, H4 to H6, H8 and H12.	
06 02	**wastes from the MFSU of bases**	
06 02 03*	ammonium hydroxide	A
06 02 04*	sodium and potassium hydroxide	A
06 02 05*	other bases	A
	All of these products are classified as corrosive/irritant and the associated wastes are likely to be also. Likely hazards include H4 to H6, H8, H12 and H13.	
06 03	**wastes from the MFSU of salts and their solutions and metallic oxides**	
06 03 11*	solid salts and solutions containing cyanides	M
	All cyanide compounds are toxic and should be considered under the following hazards if present above their threshold concentrations: H6, H12 and H14.	
06 03 13*	solid salts and solutions containing heavy metals	M
06 03 15*	metallic oxides containing heavy metals	M
	Potentially hazardous metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H4 to H8, H10, H11, or H14.	
06 04	**metal-containing wastes other than those mentioned in 06 03**	
06 04 03*	wastes containing arsenic	M
06 04 04*	wastes containing mercury	M
	Arsenic and mercury and their compounds should be considered under the hazards H4 to H8 and H14.	
06 04 05*	wastes containing other heavy metals	M
	Potentially hazardous metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H4 to H8, H10, H11, or H14.	
06 05	**sludges from on-site effluent treatment**	
06 05 02*	sludges from on-site effluent treatment containing dangerous substances	M
	A broad range of materials is possible under this heading: all hazards H1 to H14 should be considered. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	

06 06	**wastes from the MFSU of sulphur chemicals, sulphur chemical processes and desulphurisation processes**	
06 06 02*	wastes containing dangerous sulphides	M
	The main hazards under this category are the toxic (H6) and corrosive (H8) properties of sulphides, hydrosulphides, carbon disulphide, and sulphur-halogen and sulphur-phosphorus compounds. In addition, metal sulphides can be carcinogenic (H7) and ecotoxic (H14). Therefore these wastes should be primarily considered under H4 to H8 and H14 but also H3A, H10, H12 and H13.	
06 07	**wastes from the MFSU of halogens and halogen chemical processes**	
06 07 01*	wastes containing asbestos from electrolysis	M
	Asbestos is classified as both toxic (H6) and carcinogenic (H7). If the waste contains more than the threshold concentration for carcinogenic (H7), the waste is hazardous. The waste may also be corrosive due to the presence of sodium hydroxide, and toxic due to the presence of heavy metal impurities. Hazards H6 and H8 may then apply if concentrations are above threshold values.	
06 07 03*	barium sulphate sludge containing mercury	M
	Barium sulphate sludge is generally not hazardous but the presence of mercury or its compounds means the waste should be considered under the following hazards: H4 to H6, H8 and H14.	
06 07 02*	activated carbon from chlorine production	A
06 07 04*	solutions and acids, for example contact acid	A
	These wastes are corrosive due to the presence of either hydrochloric or sulphuric acids. The following hazards may apply: H4 to H6; H8; H12 and H13.	
06 08	**wastes from the MFSU of silicon and silicon derivatives**	
06 08 02*	wastes containing dangerous silicones	M
	Silicones (including siloxanes) are generally inert but can exhibit irritant, toxic and flammable properties. Impurities from their manufacture could, in theory, mean that flammable gases might be evolved under some circumstances. Hazards H3A (third indent); H3B; H4 to H6 and H12 may apply.	
06 09	**wastes from the MSFU of phosphorus chemicals and phosphorus chemical processes**	
06 09 03*	calcium-based reaction wastes containing or contaminated with dangerous substances	M
	Primary calcium-based reaction wastes may contain elemental phosphorus (spontaneously flammable in air, Hazard H3A (second indent and fifth indent) and toxic H6), and trace concentrations of uranium, thorium and other hazardous heavy metals. Secondary wastes may include contamination from other phosphorus compounds, some of which are also spontaneously flammable; and could also include a wide range of phosphorus-containing products and intermediates (e.g. pesticides) which could be toxic (H6).	
06 10	**wastes from the MFSU of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture**	
06 10 02*	wastes containing dangerous substances (mirror entry)	M
	There are possible hazards from the presence of nitric acid, (H2 and H8), used as a feedstock in the production of many nitrogen-containing chemicals. There may be unstable nitrogen compounds from the production of nitrate fertilisers or explosives (H1), and other contaminants (e.g. phosphorus compounds, see 06 09 03) from the production of NPK fertilisers may also be present. Heavy metal contamination may be present due to spent catalysts (H5 to H7 and H14).	

06 13	wastes from inorganic chemical processes not otherwise specified	
06 13 01*	inorganic plant protection products, wood-preserving agents and other biocides.	A
	Inorganic biocides can contain heavy metal compounds and should be considered under the following hazards: H4 to H8, H10, H11, or H14.	
06 13 02*	spent activated carbon (except 06 07 02)	A
	Spent activated carbon could have absorbed large volumes of flammable or other hazardous substances: unless contaminants are known all hazards H1 to H14 should be considered.	
06 13 04*	wastes from asbestos processing	A
	Asbestos is classified as both toxic (H6) and carcinogenic (H7). If the waste contains more than the threshold concentration for carcinogenic (H7), the waste is hazardous.	
06 13 05*	soot	A
	Soot may be contaminated with PAHs causing it to be carcinogenic (H7) and can also contain significant levels of heavy metals. Relevant hazards may include H3A (third indent), H4 to H8 H10 to H12 and H14.	

Examples B6.1 **EWC: 06 01 02***

Hydrochloric acid

Two hydrochloric acid waste streams; one is an 8% hydrochloric acid solution and the other is a 15% hydrochloric acid solution. Hydrochloric acid is classified as C: R34, Xi: R37. Both wastes would be hazardous waste because they are covered by an absolute entry. However, they would not be assigned the same hazardous property. The hazards irritant and corrosive are linked because they both refer to the potential for harm or damage to tissue. Corrosive substances exhibit irritant properties at low concentrations. Substance classified as R34 are H4 Irritant at concentrations between 5% and 10% and corrosive at concentrations ≥ 10%, therefore:

- the 8% hydrochloric acid solution would be hazardous waste and the appropriate hazard would be Irritant (H4)
- the 15% hydrochloric acid solution would be special waste and the appropriate hazard would be Corrosive (H8).

See Appendix C4, Section C4.6, for details on assigning the appropriate hazard to corrosive substances.

Examples B6.2 **EWC: 06 04 03***
EWC: 06 04 05*

Arsenic and antimony trifluoride

A waste contains 2% arsenic. Arsenic is classified as T: R23/25, N: R50,53(without a substance specific limit).The general threshold for an individual R50-53 substance is 0.25%. The 2% concentration of is above this threshold, the waste is therefore H14 Ecotoxic.

A waste contains 2.3% antimony trifluoride. Antimony trifluoride is classified as T: R23/24/25 and N:R51, 53 (without a substance specific limit). The waste is not hazardous waste as the concentration is below the 3% threshold for toxic and the 2.5% general individual substance threshold for ecotoxicity.

A waste contains both 2% arsenic **and** 2.3% antimony trifluoride. Arsenic is assigned the risk phrases R23/25, and antimony trifluoride is assigned the risk phrase R23/24/25. Therefore the waste would be **hazardous** waste because the total concentration (4.3%) of substances classified as toxic is greater than the 3% threshold limit. The mixture would also be classified as ecotoxic because the concentration of arsenic is above the 0.25% general threshold for an individual R50,53 substance. The use of the additive equations is not therefore necessary in this case.

Examples B6.3

EWC: 06 04 04*
EWC: 06 04 05*

A complex waste containing H5 and H6 hazardous materials: mercury sulphate, potassium fluoride and barium sulphide

A waste containing 0.09% mercury sulphate, 2.5% potassium fluoride and 23% barium sulphide. The classifications in the ASL for these substances are:

- Mercury sulphate, T+: R26/27/28, R33, N: R50, 53; (substance specific limit 0.25%, Note 1 applies)
- Potassium fluoride, T: R23/24/25; and
- Barium sulphide, R31, Xn: R20/22, N: R50.

The waste would not be hazardous by Harmful (H5), Toxic (H6) and Ecotoxic (H14) because:

- the total concentration of substances classified as very toxic is less than 0.1%;
- the total concentration of substances classified as toxic is less than 3%; and
- the total concentration of substances classified as harmful is less than 25%;
- the concentration of N: R50 substances is below the 25% threshold (mercury is a trace impurity).

However, the waste has the potential to be hazardous by H12 because barium sulphide is assigned R31. Using the calculation method for H12 set out in Appendix C12, Section C12.3.1, the threshold concentration can be determined.

Balanced equation for the reaction of barium sulphide with an acid:

BaS	+	$2H^+ \rightarrow$	H_2S	+	Ba^{2+}
169 g		2 g	34 g		137 g
1 mol		2 mol	1 mol		1 mol

Limiting concentration for barium sulphide in waste

= [{(1 x molecular weight of BaS) / (Number of moles of H_2S x 22.4)} / 1000]x 100

= [{(1 x 169) / (1 x 22.4)} / 1000]x 100

= 0.75% ≈ 0.8%

Therefore the waste would be hazardous by H12 because the concentration of barium sulphide (23%) is greater than the calculated threshold limit of 0.8%.

07	Wastes from Organic Chemical Processes	
07 01	**wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals**	
07 01 01*	aqueous washing liquids and mother liquors	A
07 01 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 01 04*	other organic solvents, washing liquids and mother liquors	A
07 01 07*	halogenated still bottoms and reaction residues	A
07 01 08*	other still bottoms and reaction residues	A
07 01 09*	halogenated filter cakes and spent absorbents	A
07 01 10*	other filter cakes and spent absorbents	A
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent) and the former in particular may be toxic and carcinogenic (H4 to H7). A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered	
07 01 11*	sludges from on-site effluent treatment containing dangerous substances	M
	A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
07 02	**wastes from the MFSU of plastics, synthetic rubber and man-made fibres**	
07 02 01*	aqueous washing liquids and mother liquors	A
07 02 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 02 04*	other organic solvents, washing liquids and mother liquors	A
07 02 07*	halogenated still bottoms and reaction residues	A
07 02 08*	other still bottoms and reaction residues	A
07 02 09*	halogenated filter cakes and spent absorbents	A
07 02 10*	other filter cakes and spent absorbents	A
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent) and the former in particular may be toxic and carcinogenic (H4 and H7). A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered.	
07 02 11*	sludges from on-site effluent treatment containing dangerous substances	M
07 02 14*	wastes from additives containing dangerous substances	M
07 02 16*	wastes containing dangerous silicones	M
	A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	

07 03	**wastes from the MFSU of organic dyes and pigments (except 06 11)**	
07 03 01*	aqueous washing liquids and mother liquors	A
07 03 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 03 04*	other organic solvents, washing liquids and mother liquors	A
07 03 07*	halogenated still bottoms and reaction residues	A
07 03 08*	other still bottoms and reaction residues	A
07 03 09*	halogenated filter cakes and spent absorbents	A
07 03 10*	other filter cakes and spent absorbents (absolute entry)	
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent) and the former in particular may be toxic and carcinogenic (H4 to H7). A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered.	
07 03 11*	sludges from on-site effluent treatment containing dangerous substances	M
	A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
07 04	**wastes from the MFSU of organic plant protection products (except 02 01 08 and 02 01 09), wood preserving agents (except 03 02) and other biocides**	
07 04 01*	aqueous washing liquids and mother liquors	A
07 04 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 04 04*	other organic solvents, washing liquids and mother liquors	A
07 04 07*	halogenated still bottoms and reaction residues	A
07 04 08*	other still bottoms and reaction residues	A
07 04 09*	halogenated filter cakes and spent absorbents	A
07 04 10*	other filter cakes and spent absorbents	A
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent), the former in particular may be toxic and carcinogenic (H4 to H7), and biocides may be ecotoxic (H14). A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered.	
07 04 11*	sludges from on-site effluent treatment containing dangerous substances	M
07 04 13*	solid wastes containing dangerous substances	M
	These wastes are likely to contain traces of solvents and biocides, which may be hazardous under one or more of H3, H4 to H7 and H14. However, a broad range of materials is possible under these headings: all Hazards H1 to H14 should be considered.	
07 05	**wastes from the MFSU of pharmaceuticals**	
07 05 01*	aqueous washing liquids and mother liquors	A
07 05 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 05 04*	other organic solvents, washing liquids and mother liquors	A
07 05 07*	halogenated still bottoms and reaction residues	A
07 05 08*	other still bottoms and reaction residues	A

07 05 09*	halogenated filter cakes and spent absorbents	A
07 05 10*	other filter cakes and spent absorbents	A
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent) and the former in particular may be toxic and carcinogenic (H6; H7). A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered.	
07 05 11*	sludges from on-site effluent treatment containing dangerous substances	M
07 05 13*	solid wastes containing dangerous substances	M
	A broad range of materials is possible under these headings: all Hazards H1 to H14 should be considered.	
07 06	**wastes from the MFSU of fats, grease, soaps, detergents, disinfectants and cosmetics**	
07 06 01*	aqueous washing liquids and mother liquors	A
07 06 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 06 04*	other organic solvents, washing liquids and mother liquors	A
07 06 07*	halogenated still bottoms and reaction residues	A
07 06 08*	other still bottoms and reaction residues	A
07 06 09*	halogenated filter cakes and spent absorbents	A
07 06 10*	other filter cakes and spent absorbents	A
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent) and the former in particular may be toxic (H6) and carcinogenic (H7). A broad range of materials is possible under these headings: all hazards H1 to H14 should be considered.	
07 06 11*	sludges from on-site effluent treatment containing dangerous substances	M
	A broad range of materials is possible under these headings: all Hazards H1 to H14 should be considered.	
07 07	**wastes from the MFSU of fine chemicals and chemical products not otherwise specified**	
07 07 01*	aqueous washing liquids and mother liquors	A
07 07 03*	organic halogenated solvents, washing liquids and mother liquors	A
07 07 04*	other organic solvents, washing liquids and mother liquors	A
07 07 07*	halogenated still bottoms and reaction residues	A
07 07 08*	other still bottoms and reaction residues	A
07 07 09*	halogenated filter cakes and spent absorbents	A
07 07 10*	other filter cakes and spent absorbents	A
	Many organic solvents, both halogenated and non-halogenated, may be flammable (H3A first indent) and the former in particular may be toxic and carcinogenic (H6; H7). Due to the broad range of materials possible under these headings, all hazards H1 to H14 should be considered.	
07 07 11*	sludges from on-site effluent treatment containing dangerous substances	M
	A broad range of materials is possible under these headings: all Hazards H1 to H14 should be considered.	

Examples B7.1 | **EWC: 07 05 01***

From the manufacture of pharmaceuticals

Aqueous acidic zinc solution is produced in the manufacture of a pharmaceutical, with the following waste description:

Hydrochloric acid	12%	C: R34, Xi: R37
Nitric acid	3%	O: R8 C: R35
Zinc (as ZnCl2)	74 g/litre	Xn: R22, C : R34, N: R50, 53
Chloride	100 g/litre	
Organics	Traces	
pH	<0.1	

The waste would be hazardous waste because it is covered by an absolute entry. However, the hazardous property assigned to the waste will be dependent on the nature of the solution.

The concentrations of the hydrochloric, nitric acid and zinc chloride are above the relevant thresholds for R34 and R35 (5% and 1% respectively): this would result in the waste being hazardous by corrosive (H8).

The waste would also be hazardous by ecotoxic (H14) because of the zinc chloride concentration of 7.4%, which is above the general 0.25% threshold for an individual N: R50, 53 substance.

08 Wastes from the Manufacture, Formulation, Supply and Use (MFSU) of Coatings (Paints, Varnishes and Vitreous Enamels), Adhesives, Sealants and Printing Inks

08 01 wastes from MFSU and removal of paint and varnish

08 01 11*	waste paint and varnish containing organic solvents or other dangerous substances	M
08 01 13*	sludges from paint or varnish containing organic solvents or other dangerous substances	M
08 01 15*	aqueous sludges containing paint or varnish containing organic solvents or other dangerous substances	M
08 01 17*	wastes from paint or varnish removal containing organic solvents or other dangerous substances	M
08 01 19*	aqueous suspensions containing paint or varnish containing organic solvents or other dangerous substances	M

Paint and varnish formulations have changed significantly over the past few years with elimination/reduction in the heavy metals used and a move towards the use of water-based paints. Therefore the potential hazards will depend on the age of the paint or varnish. The main hazards arising from older paint and varnish fall into two main categories: namely the presence of (i) any of a range of flammable and/or harmful/toxic and carcinogenic organic solvents, and (ii) potentially hazardous metals in the pigments (including antimony, cadmium, chromium, lead, nickel, strontium, zinc). If any of these are at or present above threshold concentration the Hazards H3A (first indent); H3B to H8, H10; H11 and H14 may apply. Many newer paints and varnishes may not posses these hazards because of changes in formulation and should be assessed accordingly based on their actual composition.

08 01 21*	waste paint or varnish remover	A
	These waste streams often contain methylene chloride (dichloromethane) which is a category 3 carcinogen (H7). These wastes could include white spirit (Stoddard solvent) which had the potential to be hazardous by H3B, H5 and H14.	
08 03	**wastes from MFSU of printing inks**	
08 03 12*	waste ink containing dangerous substances	M
08 03 14*	ink sludges containing dangerous substances	M
08 03 17*	waste printing toner containing dangerous substances	M
	As with paints and varnishes, formulations have changed significantly over the past few years with elimination/reduction in the heavy metals used. Therefore the potential hazards will depend on the age of ink being considered. The main hazards arising from older inks fall into three main categories: namely (1) the presence of a range of flammable and/or toxic organic solvents; (2) potentially hazardous metals in the pigments; and (3) the irritant nature of some waste inks. If any of these is present above the relevant threshold concentrations, the hazards H3A, H3B to H7, H10; H11 and H14 may apply. Many modern inks use pigments that are non-toxic; however, the formulation of the ink will need to be considered and the hazardous properties may be limited to H3A, H3B to H5.	
08 03 16*	waste etching solutions	A
08 03 19*	disperse oil	A
	The main hazards arising from these wastes are their corrosive and flammable characteristics and the toxic and/or carcinogenic effects of any oils present. They should be considered principally under H3B to H8 and H13.	
08 04	**wastes from MFSU of adhesives and sealants (including waterproofing products)**	
08 04 09*	waste adhesives and sealants containing organic solvents or other dangerous substances	M
08 04 11*	Adhesive and sealant sludges containing organic solvents or other dangerous substances	M
08 04 13*	aqueous sludges containing adhesives or sealants containing organic solvents or other dangerous substances	M
08 04 15*	aqueous liquid waste containing adhesives or sealants containing organic solvents dangerous or other substances	M
	Many organic solvents, both non-halogenated and halogenated, may be flammable and the latter in particular may be toxic and carcinogenic. H3A (third indent); H3B; H4 to H7; H10; H11; and H14 should all be considered.	
08 04 17*	rosin oil	A
08 05	**wastes not otherwise specified in 08**	
08 05 01*	waste isocyanates	A
	A wide range of isocyanates are used in the production of polyurethane foam, thermoplastic elastomers and polyurethane paints. The potential hazards includes harmful/toxic (H5/H6), irritant/corrosive (H4/H8), carcinogenic (H7) and ecotoxic (H14).	

Waste etching solutions

(Note: Etching solutions could also be covered under Chapter 11)

Etching solutions are usually acid or alkaline in nature: waste etching solutions are covered by an absolute entry and are therefore hazardous waste. However, the hazardous property assigned to the waste etching solution will be dependent on the nature of the etching solution, as highlighted below:

1. Ammonia copper etchant from printed circuit board manufacture

Ammonia copper etchant in printed circuit board waste contains various amounts of copper (as copper ammonia chloride) with between 10% and 20% ammonia as ammonium hydroxide.

Ammonia solution classified in the ASL C: R34 and N: R50. Substances classified as R34 are corrosive (H8) at concentrations ≥ 10% and irritant (H4) at concentrations < 10%. Therefore assessing ammonia solution content alone, copper ammonia etchant could be hazardous by H4 or H8 depending on the concentration of the ammonia solution.

The concentration of copper compounds also needs to be considered because some copper compounds are classified as N: R50, 53. The general threshold limit for an individual N: R50, 53 substance is 0.25%. Most ammonia copper etching solution will be hazardous by H14 as well.

The concentrations of N: R50, 53 substances are additive, with a threshold of ≥ 0.25%. There is also an additive 25% threshold for N:R50, 53 and R50 substances.

2. Acidic copper etchant from printed circuit board manufacture

Acidic copper etchant in printed circuit board waste is essentially mineral acid solutions containing variable concentrations of dissolved copper (often between 5-10%). The acid concentration can be as low as 5% or as high as 25% w/w.

Assessing the waste on hydrochloric acid content (classified as C: R34 and Xi: R37 in the ASL): as with ammonia copper etchant, substance classified as R34 are corrosive (H8) at concentrations ≥ 10% and irritant (H4) at concentrations < 10%.

Assessing the waste on nitric acid content: nitric acid is classified by the ASL as C: R35 and O: R8. Substances classified as R35 are corrosive (H8) at concentrations ≥ 5% and irritant (H4) at concentrations < 1%.

Again, the concentration of copper compounds also needs to be considered because a number of copper compounds are assigned the risk phrase N:R50, 53. Acid-based copper etching solution may be hazardous by H14.

Examples B8.2 | **EWC: 08 04 09***

Urea formaldehyde resin (cured solid or uncured liquid)

Urea formaldehyde resin is usually sold for use as a wood glue or woodchip glue. It would be covered by "*mirror entry*" 08 04 09*. An acid (e.g. formic) catalyst is used to cure the resin to a solid.

When the resin is to be disposed, of the acid is added to solidify it. The free formaldehyde reduces to low levels e.g. about 2% in wood glues, 0.2-1% in woodchip glues.

Formaldehyde is classified in the ASL as Carc Cat 3: R40, T: R23/24/25, C: R34, R43. The risk phrase with the lowest threshold limit is Carc Cat 3, which is the concentration of an individual substance classified as Carc Cat 3 at ≥ 1%. Therefore urea formaldehyde resins, cured or uncured, will tend to be hazardous by carcinogenic (H7).

If the total concentration of free formaldehyde and any other substances classified as toxic is ≥ 3%, the waste would be hazardous by harmful/toxic (H5/H6). It would also be hazardous by irritant/corrosive (H4/H8) if the concentration of free formaldehyde is greater than 5%.

The acid catalyst should be present in low concentrations and will not generally make the waste resin hazardous. However, if ≥ 1% free formic acid, which is classified in the ASL as corrosive (R35), is present the waste will become hazardous.

Note: The analysis of free formaldehyde is difficult because the resin hydrolyses in testing.

Examples B8.3 | **EWC: 08 01**

Waste paint, varnish and ink containing dangerous substances **EWC: 08 03 12***

Many different formulations are used in paint, varnish and inks. This makes it difficult to classify wastes if the constituents are unknown. The potentially hazardous components of waste paint, varnish and ink come under two headings:

1. **Solvents:** a wide variety of solvents are used which variously display flammable and/or toxic characteristics. These include:

   Hexane: highly flammable (R11); toxic for reproduction category 3 (R62); harmful (R65,48/20); irritant (R38, R67); and ecotoxic (R51,53). The waste is hazardous by ecotoxic (H14) if it contains 2.5% or more hexane ; a flashpoint test would be needed to determine if the waste is flammable.

   Cyclohexane: highly flammable (R11); harmful (R65); irritant (R38, R67); and ecotoxic (R50/53). The waste is hazardous by ecotoxic (H14) if it contains 0.25% or more hexane; a flashpoint test would be needed to determine if the waste is highly flammable.

   Toluene: highly flammable (R11); toxic for reproduction category 3 (R63); harmful (R48/20, 65); and irritant. (R38, R67) The threshold concentration is 5% due to R63. A flashpoint test wouldbe needed.

   Xylene: flammable (R10); harmful (R20/21); irritant (R38). The threshold concentration, if flashpoint test indicates the waste is not flammable, is 20% due to R38.

2. **Pigments:** most pigments used today are non-toxic. However, some older pigments use hazardous metallic compounds. These compounds may include the following:

   Antimony trioxide is classified as Carc Cat 3: R40, and therefore labelled harmful, and hazardous over a threshold concentration of 1%, by carcinogenic (H7).

   Lead chromate is classified as:

   - Carc Cat 3: R40, hazardous, by carcinogenic (H7), over a threshold concentration of 1%;
   - Repr Cat 1: R61, (and Repr Cat 3: R62 R33), hazardous, by toxic for reproduction (H10) above a threshold concentration of 0.5%; and
   - N: R50/53, hazardous by H14 at or above a general threshold concentration of 0.25% Lead (ASL note 1).

   Strontium chromate is classified as:

   - Carc Cat 2: R45, hazardous, by carcinogenic (H7), above a threshold concentration of 0.1%;
   - Xn (R22), hazardous, by harmful (H5), above a threshold concentration of 25%; and
   - N: R50/53, hazardous by ecotoxic (H14) at or above a general threshold concentration of 0.25%.

09	Wastes from the Photographic Industry

0901	wastes from the photographic industry	
09 01 01*	water-based developer and activator solutions	A
09 01 02*	water-based offset plate developer solutions	A
09 01 03*	solvent-based developer solutions	A
09 01 04*	fixer solutions	A
09 01 05*	bleach solutions and bleach fixer solutions	A
09 01 13*	aqueous liquid waste from on-site reclamation of silver other than those mentioned in 09 01 06	A
	There are possible hazards from the presence of silver nitrate or oxide, which are both oxidising agents (the former is also corrosive); and of developer and fixer solutions which may be harmful (H5), toxic (H6), corrosive (H8), ecotoxic (H14) and H12.	
09 01 06*	wastes containing silver from on-site treatment of photographic wastes	M
	There are possible hazards from the presence of silver nitrate or oxide, which are both oxidising agents (the former is also corrosive); and of trace levels of the potentially hazardous metals lead, nickel, cadmium, mercury and their compounds. Because the waste will depend on the particular recovery process used, it should be assessed against all Hazards H1 to H14.	
09 01 11*	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03	A
	This entry is an absolute entry because the batteries referred to are classified as hazardous (there is a corresponding non-hazardous entry for single-use cameras containing non-hazardous batteries, 09 02 12). There are possible hazards from the presence of potentially hazardous metals lead, nickel, cadmium, mercury and their compounds. The waste should be considered under the following hazards: H5 to H7, H10 to H12 or H14.	

Examples B9.1 | **EWC: 09 01 04***

Photographic Fixer Solution.

Photographic fixer solutions contain ammonium thiosulphate. However, ammonium thiosulphate is not listed in the ASL. Ammonium thiosulphate can react with acid forming sulphur dioxide, water, sulphur and ammonium nitrate. Sulphur dioxide exhibits the risk R23 (toxic by inhalation), and sodium thiosulphate is therefore a candidate for hazard H12.

$(NH_4)_2S_2O3 + 2HNO_3 = SO_2\uparrow + H_2O + S\downarrow + 2NH_4NO_3$

ammonium thiosulphate	nitric acid	sulphur dioxide	water	sulphur	ammonium nitrate
Molecular weights					
148 g	63 g	64 g	18 g	32 g	80 g

The mass of ammonium thiosulphate which will produce 1 litre of sulphur dioxide gas

= 148 / 22.4 = 6.6 g

Therefore, the limiting concentration of ammonium thiosulphate by Hazard H12 (assuming there are no buffering agents present)

= 6.6 / 1000 x 100 (%) ≈ 0.7%

10	Wastes from Thermal Processes	
10 01	**wastes from power stations and other combustion plants (except 19)**	
10 01 04*	oil fly ash and boiler dust	A
10 01 09*	sulphuric acid	A
10 01 13*	fly ash from emulsified hydrocarbons used as fuel	A
	Oil-containing wastes should be treated as carcinogenic as well as under any relevant additional flammability or other hazards. The acid content may render the wastes corrosive. Additionally, fly ashes can contain high concentrations of hazardous metals and their compounds (particularly nickel, lead and vanadium). These wastes are therefore mainly hazardous under H3B, H4 to H8, H10 and H12 to H14.	
10 01 14*	bottom ash, slag and boiler dust from co-incineration containing dangerous substances	M
10 01 16*	fly ash from co-incineration containing dangerous substances	M
10 01 18*	wastes from gas cleaning containing dangerous substances	M
10 01 20*	sludges from on-site effluent treatment containing dangerous substances	M
10 01 22*	aqueous sludges from boiler cleansing containing dangerous substances	M
	Sludges and gas cleaning wastes may be highly acidic and therefore may be corrosive depending on content and the following hazards may apply: H4; H5 and/or H8. Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H5 to H7, H10, H11, or H14.	
10 02	**wastes from the iron and steel industry**	
10 02 07*	solid wastes from gas treatment containing dangerous substances	M
10 02 11*	wastes from cooling-water treatment containing oil	M
10 02 13*	sludges and filter cakes from gas treatment containing dangerous substances	M
	Solid wastes from gas treatment may be alkaline and therefore potentially irritant/corrosive (H4/H8). If the oil components cannot be assessed against the threshold levels, oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards; the acid content of some of them may render them corrosive. Flue dusts comprise particulates removed from gases emitted by furnaces. The metals from flue dust tend to be readily leachable. There is therefore a possible toxicity hazard from heavy metal contamination. These wastes are hazardous under H3B; H4 to H8 and H10 to H12 if the dangerous substances are present above threshold concentrations.	
10 03	**wastes from aluminium thermal metallurgy**	
10 03 04*	primary production slags	A
10 03 08*	salt slags from secondary production	A
10 03 09*	black drosses from secondary production	A
	These may contain nitrides, carbides, cyanides, fluorides and chlorides, and often produce toxic (ammonia) or flammable (methane) gas when in contact with water. Drosses may react strongly with water to emit flammable gas (hydrogen). Relevant hazards include H3A (fifth indent), H5 to H7, H12 and H13.	

10 03 15*	skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	M
10 03 17*	tar-containing wastes from anode manufacture	M
10 03 19*	flue-gas dust containing dangerous substances	M
10 03 21*	other particulates and dust (including ball-mill dust) containing dangerous substances	M
10 03 23*	solid wastes from gas treatment containing dangerous substances	M
10 03 25*	sludges and filter cakes from gas treatment containing dangerous substances	M
10 03 27*	wastes from cooling-water treatment containing oil	M
10 03 29*	wastes from treatment of salt slags and black drosses containing dangerous substances	M
	These may contain cyanides, fluorides and chlorides. Drosses may react strongly with water to emit flammable gas (hydrogen) (H3A (fifth indent); H13). Tars and oils are carcinogens (H7), and solid wastes from gas treatment may be alkaline and therefore potentially corrosive. If these, or other dangerous substances, are present above threshold concentration they should be considered under H4 to H8.	
10 04	**wastes from lead thermal metallurgy**	
10 04 01*	slags from primary and secondary production	A
10 04 02*	dross and skimmings from primary and secondary production	A
10 04 03*	calcium arsenate	A
10 04 04*	flue-gas dust	A
10 04 05*	other particulates and dust	A
10 04 06*	solid wastes from gas treatment	A
10 04 07*	sludges and filter cakes from gas treatment	A
	The main hazards associated with these wastes are the levels of hazardous metals present, although drosses present a different hazard of spontaneous flammability. Hazards H3A (second indent), H4 to H8 and H10 are likely to apply.	
10 04 09*	wastes from cooling-water treatment containing oil	M
	If oil is present at concentrations above the threshold values, the waste should be considered under the following: H3B; H4 and H7. There are also possible hazards from potentially hazardous metals arsenic; cadmium and lead (H5; H6, H10 and H14).	
10 05	**wastes from zinc thermal metallurgy**	
10 05 03*	flue-gas dust	A
10 05 05*	solid waste from gas treatment	A
10 05 06*	sludges and filter cakes from gas treatment	A
	Likely hazards are associated with the presence of zinc; cadmium; lead and arsenic metals and their compounds and should be considered under the following hazards: H4 to H7, H10 and H14. Solid wastes from gas treatment may be alkaline and therefore potentially corrosive, and H8 may apply	

10 05 08*	wastes from cooling-water treatment containing oil	M
10 05 10*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	M
	The main hazards under these two headings are 10 05 08: H3B and H7, the oil content determining whether the waste is considered carcinogenic; 10 05 10: H3A (fifth indent).	
10 06	**wastes from copper thermal metallurgy**	
10 06 03*	flue gas dust	A
10 06 06*	solid wastes from gas treatment	A
10 06 07*	sludges and filter cakes from gas treatment	A
	Likely hazards are associated with the presence of copper; bismuth; lead; nickel and tin and their compounds and should be considered under the following hazards: H5 to H7, H10, H11, or H14. Solid wastes from gas treatment may be alkaline and therefore potentially corrosive, and H8 may apply.	
10 06 09*	wastes from cooling-water treatment containing oil	M
	If the oil components cannot be assessed against the threshold levels, oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards, e.g. H3B.	
10 07	**wastes from silver, gold and platinum thermal metallurgy**	
10 07 07*	wastes from cooling water treatment containing oil	M
	If the oil components cannot be assessed against the threshold levels, oil-containing wastes should be treated as carcinogenic (H7),as well as under any relevant additional flammability or other hazards related to heavy metal content, e.g. H3B, H5 to H7, H10 and H14.	
10 08	**wastes from other non-ferrous thermal metallurgy**	
10 08 08*	salt slag from primary and secondary production	A
	Most salt slags are derived from aluminium processing and will come under 10 03 08, but recycling of magnesium and its alloys also results in salt slag wastes. These may contain nitrides, carbides, cyanides, fluorides and chlorides, and often produce toxic (ammonia) or flammable (methane) gas when in contact with water. Relevant hazards include H3A (fifth indent), H5 to H7, H12 and H13.	
10 08 10*	dross and skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities	M
10 08 12*	tar-containing wastes from anode manufacture	M
10 08 15*	flue-gas dust containing dangerous substances	M
10 08 17*	sludges and filter cakes from flue-gas treatment containing dangerous substances	M
10 08 19*	wastes from cooling-water treatment containing oil	M
	Oil and tar containing wastes should be treated as carcinogenic (H7) as well as under any relevant additional flammability (H3). Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H5 to H7, H10 to H12 or H14.	

10 09	**wastes from casting of ferrous pieces**	
10 09 05*	casting cores and moulds which have not undergone pouring containing dangerous substances	M
10 09 07*	casting cores and moulds which have undergone pouring containing dangerous substances	M
10 09 09*	flue-gas dust containing dangerous substances	M
10 09 11*	other particulates containing dangerous substances	M
10 09 13*	waste binders containing dangerous substances	M
10 09 15*	waste crack-indicating agent containing dangerous substances	M
	These wastes will be hazardous if the content of harmful, toxic etc. impurities (mostly inorganic/metallic) is above threshold concentrations. Likely hazards include H4 to H7. The main concern relating to casting sand is the presence of phenol, although concentrations in cast sand tend to be low. Most foundry sands may contain some PAHs resulting from incomplete combustion of organic constituents. Binders are generally harmful/toxic (H5/H6) and/or irritant/corrosive (H4/H8). Crack-indicating agents usually contain solvent and are flammable (H3B) and harmful (H5).	
10 10	**wastes from casting of non-ferrous pieces**	
10 10 05*	casting cores and moulds which have not undergone pouring, containing dangerous substances	M
10 10 07*	casting cores and moulds which have undergone pouring, containing dangerous substances	M
10 10 09*	flue-gas dust containing dangerous substances	M
10 10 11*	other particulates containing dangerous substances	M
10 10 13*	waste binders containing dangerous substances	M
10 10 15*	waste crack-indicating agent containing dangerous substances	M
	These wastes will be hazardous if the content of harmful, toxic etc. impurities (mostly inorganic/metallic) is above threshold concentrations. Likely hazards include H4 to H7. The main concern relating to casting sand is the presence of phenol, although concentrations in cast sand tend to be low. Most foundry sands may contain some PAHs resulting from incomplete combustion of organic constituents. Binders are generally harmful/toxic (H5/H6) and/or irritant/corrosive (H4/H8). Crack-indicating agents usually contain solvent and are flammable (H3B) and harmful (H5).	
10 11	**wastes from manufacture of glass and glass products**	
10 11 09*	waste preparation mixture before thermal processing, containing dangerous substances	M
10 11 11*	waste glass in small particles and glass powder containing heavy metals (for example from cathode ray tubes)	M
	Possible hazards from metals used in colouring glass e.g. cadmium, chromium, cobalt, and from mercury and other heavy metals in cathode ray tubes should be considered under the following hazards: H5 to H7, H10, H11 or H14.	

10 11 13*	glass-polishing and -grinding sludge containing dangerous substances	M
10 11 15*	solid wastes from flue-gas treatment containing dangerous substances	M
10 11 17*	sludges and filter cakes from flue-gas treatment containing dangerous substances	M
10 11 19*	solid wastes from on-site effluent treatment containing dangerous substances	M
	Possible hazards from trace levels of heavy metals should be considered under the following hazards: H5 to H7, H10, H11 or H14.	
10 12	**wastes from manufacture of ceramic goods, bricks, tiles and construction products**	
10 12 09*	solid wastes from gas treatment containing dangerous substances	M
10 12 11*	wastes from glazing containing heavy metals	M
	Possible hazards from metals nickel; copper; zinc; chromium, cobalt; arsenic; cadmium; antimony; mercury; lead or their compounds should be considered under the following hazards: H5 to H7, H10 to H12 or H14. Some of the more hazardous metals (e.g. uranium; thorium; arsenic; cadmium) are only likely to be found in older waste glazes, and would probably be under the heading 17 01 06. Additionally, gas treatment wastes are potentially harmful under H4 and H8 due to their likely alkalinity.	
10 13	**wastes from manufacture of cement, lime and plaster and articles and products made from them**	
10 13 09*	wastes from asbestos-cement manufacture containing asbestos	M
10 13 12*	solid wastes from gas treatment containing dangerous substances	M
	Asbestos-containing wastes are hazardous under carcinogenic (H7) and toxic (H6) if present above the threshold value. Gypsum and plasterboard wastes, and sulphate residues from flue gas treatment, can react with other wastes to produce hydrogen sulphide and acidic products. They may be hazardous under H13 if present above threshold concentrations.	
10 14	**waste from crematoria**	
10 14 01*	waste from gas cleaning containing mercury	M
	Possible hazards from mercury and its compounds should be considered under the following hazards: H5, H6, H8 and H14.	

Examples B10.1

EWC: 10 03 04*
EWC: 10 03 08*
EWC: 10 03 09*

Assessment for hazard H3A(v)

The main constituents which may make aluminium drosses and slags hazardous are aluminium, aluminium nitride, aluminium carbide. Aluminium powder is classified F: R15 and R10, with aluminium carbide assigned R15. Applying this calculation method to the aluminium drosses and slags gives the following threshold limits. (Note: other constituents may make the aluminium drosses and slags by hazardous H12, see Appendix C12.)

Aluminium powder (R15) giving rise to hazard H3A(v)

2Al	+	$3H_2O$	→	Al_2O_3	+	$3H_2$
aluminium		water		aluminium oxide		hydrogen
27 g		18 g		102 g		2 g
2 mol		3 mol		1 mol		3 mol

Limiting concentration of aluminium powder in waste

= [(2 x 27) / (3x22.4)] / 1000 x 100 = 0.08% ≈ 0.1%

Aluminium carbide (R15) giving rise to hazard H3A(v)

Al_4C_3	+	$6H_2O$	→	$2Al_2O_3$	+	$3CH_4$
aluminium carbide		water		aluminium oxide		methane
144 g		18 g		102 g		16 g
1 mol		6 mol		2 mol		3 mol

Limiting concentration of aluminium carbide in waste

= [144 / (3x22.4)] / 1000 x 100 = 0.21% ≈ 0.2%

Examples B10.2

EWC: 10 03 04*
EWC: 10 03 08*
EWC: 10 03 09*

Assessment of aluminium dross waste for Hazard H12.

The main constituents which may make aluminium drosses and slags hazardous are aluminium, aluminium nitride, aluminium carbide. Aluminium nitride is an R29 substance which may make the waste special by H12. The aluminium nitride content may be between 0 and 1% (slag) or 0 and 10% (dross). Applying this calculation method to the aluminium drosses and slags gives the following threshold limit for H12. (Note: other constituents may make the aluminium drosses and slags by H3A(v), see Appendix C3.)

Aluminium nitride (R29) giving rise to hazard H12

AlN	+	$3H_2O$	→	$Al(OH)_3$	+	NH_3
aluminium nitride		water		aluminium hydroxide		ammonia
41 g		18 g		78 g		17 g
1 mol		3 mol		1 mol		1 mol

Limiting concentration of aluminium nitride in waste

=[(1 x 41) / (1 x 22.4) / 1000]x 100 = 0.18% ≈ 0.2%

Calcium oxide and hydroxide

Limestone, calcium oxide and calcium hydroxide are used in flue gas scrubbing systems. Calcium oxide reacts with water to produce calcium hydroxide. Neither substance is listed on the ASL. The risk phrase R41 (irritant) has been verified for calcium oxide and calcium hydroxide from the IUCLID database (see Appendix D). The threshold limit concentration for R41 substances is ≥ 10% $^{w}/_{w}$.

Therefore, wastes containing calcium oxide or calcium hydroxide at a concentration of ≥ 10% $^{w}/_{w}$ will be hazardous waste by irritant (H4).

11	Wastes from Chemical Surface Treatment and Coating of Metals and other Materials; Non-Ferrous Hydro-Metallurgy	
11 01	**wastes from chemical surface treatment and coating of metals and other materials (for example galvanic processes, zinc coating processes, pickling processes, etching, phosphatising, alkaline degreasing, anodising)**	
11 01 05*	pickling acids	A
11 01 06*	acids not otherwise specified	A
11 01 07*	pickling bases	A
11 01 08*	phosphatising sludges	A
11 01 16*	saturated or spent ion exchange resins	A
	These will mostly be corrosive/irritant (H8/H4) and may contain high concentrations of potentially toxic heavy metals which could be hazardous under H5 to H7. Etching solution could also be considered under these entries (see Example B8.1).	
11 01 09*	sludges and filter cakes containing dangerous substances	M
11 01 11*	aqueous rinsing liquids containing dangerous substances	M
11 01 13*	degreasing wastes containing dangerous substances	M
11 01 15*	eluate and sludges from membrane systems or ion exchange systems containing dangerous substances	M
11 01 98*	other wastes containing dangerous substances	M
	Possible hazards from metals nickel; copper; zinc; arsenic; cadmium; lead or their compounds should be considered under the following hazards: H5 to H7, H10 to H12 or H14. Degreasing wastes may contain strong alkalis (H8).	
11 02	**wastes from non-ferrous hydrometallurgical processes**	
11 02 02*	sludges from zinc hydrometallurgy (including jarosite, goethite)	A
	Sludges from zinc hydrometallurgy are acidic wastes with possible high concentrations of potentially hazardous heavy metals: they will be hazardous under one or more of the hazards H4 to H8.	
11 02 05*	wastes from copper hydrometallurgical processes containing dangerous substances	M
11 02 07*	other wastes containing dangerous substances	M
	These are acidic wastes with possible high concentrations of heavy metals and should be considered under the following hazards: H5 to H7, H10, H11 or H14.	
11 03	**sludges and solids from tempering processes**	
11 03 01*	wastes containing cyanide	A
11 03 02*	other wastes	
	Cyanides are normally classified as harmful (H5), very toxic (H6) and ecotoxic (H14).	
11 05	**wastes from hot galvanising processes**	
11 05 03*	solid wastes from gas treatment	A
11 05 04*	spent flux	A
	Solid wastes from zinc galvanising processes are possibly acidic with high concentrations of potentially toxic heavy metals, while gas cleaning residues are potentially alkaline. The flux is usually zinc ammonium chloride. After dipping in molten zinc, products are then quenched in a sodium dichromate solution. These wastes will be hazardous under one or more of the hazards H4 to H8.	

Examples B11.1 **EWC: 11 01 13***

1. Waste degreaser

Waste degreaser containing trichloroethylene. Trichloroethylene is classified in the ASL as:

- Carc Cat 2: R45;
- Muta Cat 3: R68
- R67
- Xi: R36/38; and
- R52,53. (no substance specific limit)

Lubricating grease is listed in the ASL (under Petroleum substances: grease) as Carc Cat 2: R45. This is subject to note N to the ASL:

> *Note N:*
>
> *The classification as a carcinogen need not apply if the full refining history is known and it can be shown that the substance from which it is produced is not a carcinogen. This note only applies to certain complex oil-derived substances.*

The waste would be hazardous, by carcinogenic (H7), if either the trichloroethylene or the lubricating grease is present at ≥ 0.1%. At the following high concentrations of trichloroethylene the waste would be classified with additional hazardous properties:

- At ≥ 1% trichloroethylene, the waste would also be classified as mutagenic (H11);
- At ≥ 20% trichloroethylene, the waste would also be classified as irritant (H4); and
- At ≥ 25% trichloroethylene, the waste would also be classified as ecotoxic (H14).

2. Other degreasing solvents

Dichloromethane is classified, in the ASL, as Carc Cat 3: R40; therefore degreasing wastes containing ≥ 1% dichloromethane will be hazardous by carcinogenic (H7). In addition, wastes containing dichloromethane can often contain other hazardous materials such as formic acid (from paint stripping) or isocyanates (from polyurethane resin manufacture), which would also need to be assessed.

Examples B11.2 **EWC: 11 01 13***

Kerosene-based high flash degreasing solvent

This material is used as a degreasing solvent in garages and other businesses. Used degreasing solvent is accordingly contaminated with whatever the solvent is being used to clean off, e.g. waste oil on vehicle parts.

Some entries in the ASL include a reference to kerosene in the name. All of them have been classified R65 (Harmful: may cause lung damage if swallowed).

Waste kerosene-based degreasing solvent would in almost every instance contain more than 25% kerosene and therefore would be classified as hazardous waste by virtue of containing a substance that is harmful.

Waste kerosene-based degreasing solvent may also be classified as hazardous through contamination by other substances. Where this solvent is used for degreasing automotive parts it is very likely to be hazardous by containing waste oil. Waste oil from internal combustion engines is classified as carcinogenic. Waste kerosene-based degreasing solvent contaminated with carcinogenic oil at a concentration ≥ 0.1% w/w would be hazardous waste.

Wastes from non-ferrous hydrometallurgical processes

All potentially hazardous wastes from hydrometallurgical processes, excluding zinc and copper, come under this heading. As a result, a very wide range of potentially toxic metals and aqueous solutions may be encountered. However, there is little processing of primary ores carried out in the UK, so most waste streams will be derived either from metal recycling processes, or possibly from stabilisation of incineration wastes before they are landfilled.

Recovery of cadmium, cobalt and nickel from spent rechargeable batteries can be carried out using a variety of organophosphoric or sulphuric acid leaching stages. The processes are designed to maximise recovery of commercially re-saleable metals, so the final waste stream is only likely to be hazardous by the acid content. A reaction waste containing more than 1% sulphuric acid (R35) or a concentration of more than 5% phosphoric acid (R34) will render the waste hazardous by corrosive (H8).

Non-hazardous wastes from non-ferrous hydrometallurgical processes not covered by 11 02 03 and 11 02 06, or appropriate codes in Chapters 13 to 16, will be classified 11 02 99.

12	Wastes from Shaping and Physical and Mechanical Surface Treatment of Metals and Plastics	
12 01	**wastes from shaping and physical and mechanical surface treatment of metals and plastics**	
12 01 06*	mineral-based machining oils containing halogens (except emulsions and solutions)	A
12 01 07*	mineral-based machining oils free of halogens (except emulsions and solutions)	A
12 01 08*	machining emulsions and solutions containing halogens	A
12 01 09*	machining emulsions and solutions free of halogens	A
12 01 10*	synthetic machining oils	A
12 01 12*	spent waxes and fats	A
12 01 19*	readily biodegradable machining oil	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards. One or more of the hazards H3A (first and third indent), H3B to H8 and H12 to H14 may apply.	
12 01 14*	machining sludges containing dangerous substances	M
12 01 16*	waste blasting material containing dangerous substances	M
12 01 18*	metal sludge (grinding, honing and lapping sludge) containing oil	M
12 01 20*	spent grinding bodies and grinding materials containing dangerous substances	M
	Oil-containing wastes should be treated as carcinogenic (H7) as well as under any relevant additional flammability or other hazards. Likely hazards are due to contamination of these wastes from the material being ground or shaped. As these can be from a wide range of materials they should be assessed under H2; H4 to H8 and H10 to H12 if dangerous substances are present above threshold concentrations.	
12 03	**wastes from water and steam degreasing processes (except 11)**	
12 03 01*	aqueous washing liquids	A
12 03 02*	steam degreasing wastes	A
	Oil-contaminated wastes from de-greasing processes should be treated as carcinogenic (H7), as well as hazardous under any relevant additional flammability or other hazards.	

Examples B12.1 **EWC: 12 01 18***

Manufacture of motor vehicles and engines

The analysis of an oily grinding sludge is as follows:

pH	7.6
Oil	31%
Aluminium	28%
Copper (metal)	1.3%

Plus traces of other metals such as iron and zinc.

The presence of oil at 31% will make the waste hazardous by H7 (carcinogenic). In addition, the nature of the aluminium in the waste needs to be assessed because aluminium powder is pyrophoric.

13	Oil Wastes and Wastes of Liquid Fuels (except edible oils, and those in chapters 05, 12 and 19)	
13 01	**waste hydraulic oils**	
13 01 01*	hydraulic oils, containing PCBs[1]	A
13 01 04*	chlorinated emulsions	A
13 01 05*	non-chlorinated emulsions	A
13 01 09*	mineral-based chlorinated hydraulic oils	A
13 01 10*	mineral-based non-chlorinated hydraulic oils	A
13 01 11*	synthetic hydraulic oils	A
13 01 12*	readily biodegradable hydraulic oils	A
13 01 13*	other hydraulic oils	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	
	PCB's are classified as R33, N: R50,53. R33 is not considered in the assessment of a hazardous waste. At or above a threshold concentration of 0.25% of PCB's and PCT's the waste will be ecotoxic H14.	
13 02	**waste engine, gear and lubricating oils**	
13 02 04*	mineral-based chlorinated engine, gear and lubricating oils	A
13 02 05*	mineral-based non-chlorinated engine, gear and lubricating oils	A
13 02 06*	synthetic engine, gear and lubricating oils	A
13 02 07*	readily biodegradable engine, gear and lubricating oils	A
13 02 08*	other engine, gear and lubricating oils	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	
13 03	**waste insulating and heat transmission oils**	
13 03 01*	insulating or heat transmission oils containing PCBs	A
13 03 06*	mineral-based chlorinated insulating and heat transmission oils other than those mentioned in 13 03 01	A
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils	A
13 03 08*	synthetic insulating and heat transmission oils	A
13 03 09*	readily biodegradable insulating and heat transmission oils	A
13 03 10*	other insulating and heat transmission oils	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	
	PCB's are classified as R33, N: R50,53. R33 is not considered in the assessment of a hazardous waste. At or above a threshold concentration of 0.25% of PCB's and PCT's the waste will be ecotoxic H14.	

[1] For the purpose of this list of wastes, PCBs will be defined as in Directive 96/59/EC.

13 04	**bilge oils**	
13 04 01*	bilge oils from inland navigation	A
13 04 02*	bilge oils from jetty sewers	A
13 04 03*	bilge oils from other navigation	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	
13 05	**oil/water separator contents**	
13 05 01*	solids from grit chambers and oil/water separators	A
13 05 02*	sludges from oil/water separators	A
13 05 03*	interceptor sludges	A
13 05 06*	oil from oil/water separators	A
13 05 07*	oily water from oil/water separators	A
13 05 08*	mixtures of wastes from grit chambers and oil/water separators	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	
13 07	**wastes of liquid fuels**	
13 07 01*	fuel oil and diesel	A
13 07 02*	petrol	A
13 07 03*	other fuels (including mixtures)	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	
13 08	**oil wastes not otherwise specified**	
13 08 01*	desalter sludges or emulsions	A
13 08 02*	other emulsions	A
13 08 99*	wastes not otherwise specified	A
	Oil-containing wastes should be treated as carcinogenic (H7), as well as under any relevant additional flammability or other hazards.	

Examples B13.1 **EWC: 13 05 03***

Oil interceptor sludge

Oil interceptor sludges are covered by an absolute entry and are therefore hazardous waste. However, the hazardous properties assigned to such wastes will be dependent on the nature of the any substances caught by the interceptor, as highlighted below:

An oil/water interceptor waste contains atrazine from a spillage. Atrazine is classified Xn: R48/22, R43, N: R50,53 (with no substance specific concentration limit).

The waste would be hazardous, by H7 Carcinogenic, due to the presence of oil. However, depending on the concentration of atrazine the waste may possess other hazardous properties. At the following high concentrations of atrazine the waste would be classified with additional hazardous properties:

- At ≥ 0.25% (general substance threshold) atrazine, the waste is classified as ecotoxic (H14); and

  At ≥ 25% atrazine, the waste is classified as Harmful (H5).

If oil is present, oil-containing wastes should be treated as carcinogenic (H7).

Examples B13.2 **EWC: 13 07 01* to 13 07 03***

EWC: 13 02 04* to 13 02 08*

Diesel and petrol mixtures

Diesel, petrol, or diesel/petrol mixtures are absolute entries and therefore hazardous wastes.

Waste engine, gear and lubricating oils

Waste engine, gear and lubricating oils are absolute entries and therefore hazardous wastes.

Examples B13.3 **EWC: Mirror Entries**

Mirror Entries ñ Wastes containing diesel, petrol or engine, gear and lubricating oils

Most oil wastes, with the exception of edible oils, are listed in Chapters 12 and 13 of the EWC as absolute entries and are therefore hazardous waste.

However, some mirror entries make a specific reference to oil as a dangerous substance, for example:

10 02 11* wastes from cooling-water treatment containing oil

Such wastes are hazardous only if the concentration of the specified "*dangerous substance*" i.e. oil, is greater than or equal to the appropriate thresholds

Other mirror entries make a general reference to dangerous substances that provides for thresholds to be used. Further guidance is provided in Appendix C7.

Diesel in mirror entry wastes

Diesel commonly has a flashpoint of > 55°C but the entries in the ASL classify diesel as Carc Cat 3: R40. Therefore a mirror entry waste containing diesel would be hazardous, by carcinogenic (H7), if the concentration of diesel was ≥ 1%

Petrol in mirror entry wastes

Petroleum is listed in the ASL as a Carc Cat 2:R45. Therefore a mirror entry waste containing petroleum is hazardous by carcinogenic (H7), where the concentration of petrol is 0.1% or greater,

The current average benzene content for petrol sold in the UK is around 0.7% (UKpia ñ Briefing: Benzene in Petrol, February 2002);

The flashpoint would need to be assessed to determine if the waste is flammable (H3).

Lubricating oil in mirror entry wastes

There are 14 entries for lubricating oils listed on the ASL under the general heading Petroleum Substances, Baseoil ñ Unspecified. All these entries have been classified under the ASL as Carc Cat 2: R45, subject to notes H and L in the ASL (see below). The concentration threshold for Carc Cat 2 substances is ≥ 0.1% w/w. Therefore a mirror entry waste containing a 0.1% or greater concentration of lubricating oil the would be hazardous, by Carcinogenic (H7)

Note: Lubricating oils quoted in the ASL are only listed as partial entries, i.e. these substances have been assessed for carcinogenicity only .

Engine Oil in mirror entry wastes

Most unused engine oils as supplied by the manufacturer do not have carcinogenic properties. Reference should be made to the Safety Data Sheet for any hazards (e.g. carcinogenic, irritant or harmful) associated with the oil (including additives or contaminants).

Used engine oil is a carcinogen under the Control of Substances Hazardous to Health Regulations 1994: therefore any mirror waste containing used engine oil equal to or above the threshold (0.1% w/w) will be classified as hazardous waste under carcinogenic (H7).

For both used and unused engine oils other hazards may also need to be assessed, particularly irritant, harmful and ecotoxic properties

14	Waste Organic Solvents, Refrigerants and Propellants (except 07 and 08)	
14 06	**waste organic solvents, refrigerants and foam/aerosol propellants**	
14 06 01*	chlorofluorocarbons, HCFC, HFC	A
14 06 02*	other halogenated solvents and solvent mixtures	A
14 06 03*	other solvents and solvent mixtures	A
14 06 04*	sludges or solid wastes containing halogenated solvents	A
14 06 05*	sludges or solid wastes containing other solvents	A
	These wastes are variously highly flammable under H3A (first indent), flammable (H3B), irritant (H4), harmful (H5) and ecotoxic (H14).	

Examples B14.1

EWC: 14 06 01* to
EWC: 14 06 03*

Hazardous properties for solvent wastes

Waste organic solvents can possess a range of hazardous properties: they are covered by an absolute entry and are therefore hazardous waste. However, the hazardous property assigned to waste solvents will be dependent on the nature of the individual waste.
For example:

1. **A solvent waste containing 1,1,2 trichloroethane:** Trichloroethane is classified as Carc Cat 3: R40 Xn: R20/21/22, R66. The associated hazardous properties are carcinogenic (H7) and harmful (H5).
2. **A solvent waste containing allyl alcohol:** Allyl alcohol is classified as R10, T: R23/24/25, Xi: R36/37/38 and N: R50. The hazardous properties associated with these risk phrases are flammable (H3B), toxic (H6), irritant (H4) and ecotoxic (H14).
3. **A solvent waste containing pentachloroethane:** Pentachloroethane is classified as Carc Cat 3: R40, T:R48/23 and N: R51, 53. The hazardous properties associated with these risk phrases are carcinogenic (H7), toxic (H6) and ecotoxic (H14).
4. **A solvent waste contains 2-nitrotoluene:** **4**-nitrotoluene is classified as T: R23/24/25, R33 and N: R51, 53. The hazardous properties associated with these risk phrases are toxic (H6) and ecotoxic (H14).

Examples B14.2 **EWC: 14 06 01***

Ozone depleting chemicals (halogenated organic compounds)

Ozone depleting chemicals have been and are used for a number of purposes, e.g. as refrigerants, aerosols, solvents and foam blowing agents. Many of the substances are banned from manufacture; those presently used by industry are from recycling sources and their use is to be phased out shortly. The most likely hazard associated with ozone depleting chemicals (chlorinated, fluorinated and/or brominated hydrocarbons) is ecotoxic (H14). This is because substances that are listed in Annex I to Council Regulation (EC) No 2037/2000 on substances that deplete the ozone layer and its subsequent amendments are classified as R59.

Foam containing CFCs and HCFCs/HFCs

CFCs and HCFCs/HFCs have been/are used to blow polyurethane foams and extruded polystyrene (XPS).

No CFCs have been used in foams since 1995. This resulted in alternative foam blowing agents being used which include HCFCs, hydrocarbons (pentane), and CO^2/water. It is expected that HFC will be used in the future; they are currently used in the blowing of extruded polystyrene. The use of HCFCs as blowing agents will be phased out between now and 2004.

The main uses of polyurethane foams containing CFCs, HCFCs were:

Rigid insulation foam in refrigeration units (also covered by 16 02 11* and 16 02 15*)

Prior to 1993 the majority of this foam was blown with CFCs. At that point CFCs were phased out and foams were blown with HCFCs and hydrocarbons. Now the majority is blown with hydrocarbons but HCFC are still used.

Rigid building insulation foam (also covered by 17 06 03*)

Prior to 1993 the majority of this foam was blown with CFCs. At that point CFCs were phased out and foams were blown with HCFCs and hydrocarbons. Now the majority is blown with hydrocarbons but HCFC is still used. Basic characterisation under the Landfill Directive Waste Acceptance Criteria should assist in determining the nature of any foam.

Integral Skin - Steering wheels/dashboards (also covered by 16 01 21*)

Prior to 1993 the majority of this foam was blown with CFCs. Since 1998 the main blowing agent has been CO^2/water.

The key issues are:

- Foams blown with CFCs and HCFCs will arise in the waste stream in a range of diverse locations for a long time to come because of the applications of the foams.
- Foams blown from HFC are likely to increase in the future as HCFCs are phased out.
- The majority of polyurethane foams produced before 1993 will be CFC blown foams.
- As the numbers of blowing agents have increased over the last 5 years it will be difficult in future to identify which foams contain HCFC and HFC.

15	Waste Packaging; Absorbents, Wiping Cloths, Filter Materials and Protective Clothing Not Otherwise Specified	
15 01	**packaging (including separately collected municipal packaging waste)**	
15 01 10*	packaging containing residues of or contaminated by dangerous substances	M
15 01 11*	metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers	M

These categories include such a broad range of potentially hazardous wastes that they should be considered under all the hazards H1 to H14.

For packaging waste to be considered under 15 01 10*, the maximum amount of material has to be removed by physical or mechanical means (draining and scraping) to leave a residue or contamination that cannot be removed by such means. When considering wastes under 15 01 10*, the weight of the packaging can be taken into account when assessing the waste against the threshold limits. However, a positive flashpoint test would result in the waste being hazardous regards of the other thresholds.

If the packaging contains material that can be removed by physical or mechanical means, it should be considered as a process waste and the entry from an appropriate chapter used (e.g. 08 01 11* waste paint and varnish containing organic solvents or other dangerous substances). In such cases, the weight of the packaging should not be considered when assessing the waste against the threshold limits.

15 02	**absorbents, filter materials, wiping cloths and protective clothing**	
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	M

Oil-containing wastes should be treated as carcinogenic (H7) if present above threshold concentrations, as well as under any relevant additional flammability or other hazards. As this category includes such a broad range of potentially hazardous wastes they should also be considered under all the Hazards H1 to H14.

Examples B15.1 **EWC: 15 01 10***

Waste packaging

Waste packaging from a vehicle repair shop needs to be assessed to determine if it is hazardous . The wastes contain different quantities and concentrations of the following dangerous substances:

Lead chromate, classification: Carc Cat 3: R40, Repr Cat 1:R61, Repr Cat 3: R62, R33 and N: R50, 53.

(Lead Chromate is qualified by Note 1, meaning that that the lead concentration is used for H14 only.)

Methoxypropyl acetate, classification: R10, Repr Cat 2:R61, Xi: R37

Xylene, classification: R10, Xn: R20/21, Xi: R38

1. Lead chromate colours

A product, known from the manufacturer's Safety Data Sheet to contain 25% lead chromate, is coated on the inside of 2.5 litre tins. The producer has determined, from either information on the product label or knowledge of the weight of an empty tin, that no more than 25g remain in each tin. It cannot be removed by physical or mechanical means. The molecular weight of lead chromate is 323, and lead 207.

As the residue cannot be removed by physical or mechanical means, the waste should be considered under 15 01 10* and the weight of the packaging can be taken into consideration. For H14 only:

The weight of the dangerous substance (lead) in the waste =25 g x 25% x 207(/323 = 4.0g

The total weight of the packaging = 25 g (residues) + 260 g (tin) = 285 g

Concentration of dangerous substance (lead chromate) in the waste = 4.0 g/285 g = 1.4%

The specific substance H14 threshold for lead chromate is 0.25% lead.

For carcinogenic (H7) and toxic for reproduction (H10) the thresholds are 1.0% and 0.5%.

The weight of the dangerous substance (lead chromate) in the waste =25 g x 25% = 6.3 g

The total weight of the packaging = 25 g (residues) + 260 g (tin) = 285 g

Concentration of dangerous substance (lead chromate) in the waste = 4.0 g/285 g = 2.2%

The waste is therefore carcinogenic (H7),toxic for reproduction (H10), and ecotoxic H14.

2. Groundcoat base and hardener

The product contains 2% lead chromate, 5% methoxypropyl acetate and up to 50% xylene. Over 100 g of waste can be poured from each of the 2.5 litre tins. As waste can be removed by physical or mechanical means the waste should be considered under an entry appropriate for the contents, in this case 08 01 11*. The concentrations of the dangerous substances within the waste would result in the waste being hazardous by ecotoxic (H14), carcinogenic (H7) toxic for reproduction (H10) and irritant (H4). A flashpoint test would be required to determine if the waste was flammable (H3B). A positive flashpoint test would result in the waste being hazardous regardless of the other thresholds.

Examples B15.2 **EWC: 15 01 10***

Rinsed insecticide packaging waste

Waste packaging arising from the application of an organophosphorus insecticide as a dilute emulsion in water. The preparation as supplied contains different concentrations of the following dangerous substances:

- chlorpyrifos 44.53 % , classification : T: R25 and N: R50/53 (substance specific threshold 0.000025%)
- aromatic hydrocarbon solvent (1) 1-5%, classification : Xn : R65-66-67 and N : R51-53
- aromatic hydrocarbon solvent (2) 40-50% classification : Xn : R10-37-65-66-67 and N : R51/53
- calcium dodecylbenzenesulphonate 1-5%, classification : Xi : R38-41.

After transferring the product to a spray tank, the 5 litre package (net content 5.4 kg as supplied) is rinsed with water using integrated pressure rinsing or manual triple rinsing in accordance with Crop Protection Association guidelines. The remaining residue (excluding the aqueous component) which cannot be removed by physical or mechanical means represents 0.01% of the original content of the package. As the residue cannot be removed by physical or mechanical means the waste should be considered under 15 01 10* and the weight of the packaging can be taken into consideration.

The maximum weights of the dangerous substances in the waste are therefore :

chlorpyrifos : 5.4 kg x 44.53% x 0.01% = 0.24 g

aromatic hydrocarbon solvents (1+2) : 5.4 kg x 55% x 0.01% = 0.30 g

calcium dodecylbenzenesulphonate : 5.4 kg x 5% x 0.01% = 0.03 g

The total weight of the packaging = 0.57 g (residues) + 188 g (plastic bottle plus cap plus label) = 188.57 g

Concentrations of dangerous substances in the waste are therefore :

chlorpyrifos: 0.24 g/ 188.57 g = 0.13%

aromatic hydrocarbon solvents (1+2): 0.30 g/ 188.57 g = 0.16%

calcium dodecylbenzenesulphonate : 0.03 g/ 188.57 g = 0.02%

The lowest threshold for chlorpyrifos is 0.000025% because of the N: R50/53 classification.

The lowest threshold for aromatic hydrocarbon solvents (1+2) is 2.5% because of the N: R51/53 classification for both solvent components.

The lowest threshold for calcium dodecylbenzenesulphonate is 10% because of the Xi R41 classification.

The waste contains an ecotoxic substance, chlorpyrifos, at a concentration at or above its substance specific threshold. The waste is therefore H14 Ecotoxic.

Since the residue is aqueous following the rinsing process, the waste is also not hazardous by flammable (H3B) and a flashpoint test is not needed.

The waste is below the threshold for classification as hazardous by irritant (H4).

Therefore the waste packaging is classified as hazardous under 15 01 10*.

16	Wastes Not Otherwise Specified in the List	
16 01	**end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)**	
16 01 04*	end-of-life vehicles	M
16 01 08*	components containing mercury	M
16 01 09*	components containing PCBs	M
16 01 10*	explosive components (for example air bags)	A
16 01 11*	brake pads containing asbestos	M
16 01 14*	antifreeze fluids containing dangerous substances	M
16 01 21*	hazardous components other than those mentioned in 16 01 07 to 16 01 11 and 16 01 13 and 16 01 14	M
	These categories include such a broad range of potentially hazardous wastes that they should be considered under all the Hazards H1 to H14. PCB's are classified as R33, N: R50,53. R33 is not considered in the assessment of a hazardous waste. At or above a threshold concentration of 0.25% of PCB's and PCT's the waste will be ecotoxic H14.	
16 01 07*	oil filters	A
16 01 13*	brake fluids	A
	Oil-containing wastes should be treated as carcinogenic (H7) as well as under any relevant additional flammability or other hazards. H3B to H8 may apply.	
16 02	**wastes from electrical and electronic equipment**	
16 02 09*	transformers and capacitors containing PCBs	M
16 02 10*	discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09	M
16 02 11*	discarded equipment containing chlorofluorocarbons, HCFC, HFC	M
16 02 12*	discarded equipment containing free asbestos	M
16 02 13*	discarded equipment containing hazardous components[2] other than those mentioned in 16 02 09 to 16 02 12	M
	The mirror entries above contain specific and general references to hazardous components. In each case the component alone is assessed to determine whether it is hazardous as illustrated for 16 02 15 below. The equipment is hazardous if it contains a component assessed to be a hazardous component.	
16 02 15*	hazardous components[2] removed from discarded equipment	A
	This entry is an absolute entry because the components referred to are classified as hazardous (there is a corresponding non-hazardous entry for non-hazardous components, 16 02 15). The main hazards in these groups arise from the presence of asbestos and halogenated hydrocarbons; these are carcinogenic (H7) and ecotoxic (H14) respectively. PCB's are classified as R33, N: R50,53. R33 is not considered in the assessment of a hazardous waste. At or above a threshold concentration of 0.25% of PCB's and PCT's the waste will be ecotoxic H14. Hazardous components[2] are components which contain dangerous substances at concentrations at or above the threshold concentrations. A component is assessed in isolation and the concentrations of dangerous substances are considered on the basis of the weight of the component. Because a broad range of potentially dangerous substances could be present in hazardous components, they should be considered under all the hazards H1 to H14.	

[2] Hazardous components from electrical and electronic equipment may include accumulators and batteries mentioned in 16 06 and marked as hazardous; mercury switches, glass from cathode ray tubes and other activated glass, etc .

16 03	**off-specification batches and unused products**	
16 03 03*	inorganic wastes containing dangerous substances	M
16 03 05*	organic wastes containing dangerous substances	M
	The main hazards from 16 03 03 will be the presence of harmful or toxic substances, whereas the hazards from 16 03 05 will mainly be associated with flammability and toxicity. However because a broad range of materials is possible under these headings, all hazards H1 to H14 should be considered. Safety Data Sheets should be available to assist in the classification of unused products; however, if the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
16 04	**waste explosives**	
16 04 01*	waste ammunition	A
16 04 02*	fireworks wastes	A
16 04 03*	other waste explosives	A
	Many explosives and waste explosives are not hazardous waste if they come under the definition of explosives used in the Explosives Act 1875 ("the Act"). Wastes should first be assessed to ascertain whether they come under this definition. If not, the principle risk from these chemicals is toxicity. Nitroglycerine, nitroguanidine and trinitrotoluene are the most toxic (although in their pure form they would come under the Act). Organic solvents and compounds may be present from raw materials or from the purification process. Chlorinated solvents are not used in production but may be used for cleaning. High concentrations of nitric or sulphuric acid residues may be present. Hazards may include H1, H3A (first to third indents), H4 to H6, H8, H12 and H13. Contaminated land at former explosives manufacturing sites would be classified 17 05 03.	
16 05	**gases in pressure containers and discarded chemicals**	
16 05 04*	gases in pressure containers (including halons) containing dangerous substances	M
	Waste under this entry includes gas cylinders and pressurised aerosols; the assessment should consider both propellants and contents: Propellants: generally these may be flammable alkanes (H3A- first indent) or, in older containers, ozone-depleting substances such as CFCs and derivatives, including halons (H14). Contents: due to the broad range of materials possible under these headings, all hazards H1 to H14 should be considered. The degree of "emptyness" may be difficult to assess and opening the container may be unwise. Unless gas cylinders are known to be empty they should be considered to contain sufficient quantities of gas for a full hazard assessment.	
16 05 06*	laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	M
16 05 07*	discarded inorganic chemicals consisting of or containing dangerous substances	M
16 05 08*	discarded organic chemicals consisting of or containing dangerous substances	M
	Due to the broad range of materials possible under these headings, all hazards H1 to H14 should be considered. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested; the classification should be based on the known activities of the laboratory.	
16 06	**batteries and accumulators**	
16 06 01*	lead batteries	A
16 06 02*	Ni-Cd batteries	A
16 06 03*	mercury-containing batteries	A
16 06 06*	separately collected electrolyte from batteries and accumulators	A
	Possible hazards from the metals nickel; copper; arsenic; cadmium; mercury; lead and antimony or their compounds should be considered under the following hazards: H5 to H7, H10 to H12 or H14. Electrolyte from batteries and accumulators is normally strongly corrosive (H8).	

16 07	**wastes from transport tank, storage tank and barrel cleaning (except 05 and 13)**	
16 07 08*	wastes containing oil	M
16 07 09*	wastes containing other dangerous substances	M
	Oil-containing wastes should be treated as carcinogenic (H7) if the oil is present above the threshold value. The nature of the cleaning solution could also determine the relevant hazards. The waste should also be considered under any relevant additional flammability hazards; however, due to the broad range of materials possible under these headings, all hazards H1 to H14 should normally be considered. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
16 08	**spent catalysts**	
16 08 02*	spent catalysts containing dangerous transition metals[3] or dangerous transition metal compounds	M
16 08 05*	spent catalysts containing phosphoric acid	M
16 08 07*	spent catalysts contaminated with dangerous substances	M
	Possible hazards from transition metals (defined below) as well as arsenic; antimony; tellurium; thorium and lead or their compounds should be considered under the following hazards: H5 to H7, H10 to H12 or H14, along with H3A(v) if the metals are finely divided.	
16 08 06*	spent liquids used as catalysts	A
	This entry appears to be designed to catch reaction liquors that have not been previously classified (whether truly catalytic in nature or not). Because a broad range of materials is possible under these headings, all hazards H1 to H14 should be considered.	
16 09	**oxidising substances**	
16 09 01*	permanganates, for example potassium permanganate	A
16 09 02*	chromates, for example potassium chromate, potassium or sodium dichromate	A
16 09 03*	peroxides, for example hydrogen peroxide	A
16 09 04*	oxidising substances, not otherwise specified	A
	The main hazard for these wastes is oxidising (H2), but H4 to H8, H11, H12 and H14 may apply. The main method of treatment for such wastes is normally controlled reaction to completion: hazard H2 will then not be present.	
16 10	**aqueous liquid wastes destined for off-site treatment**	
16 10 01*	aqueous liquid wastes containing dangerous substances	M
16 10 03*	aqueous concentrates containing dangerous substances	M
	Because a broad range of materials is possible under these headings, all Hazards H1 to H14 should be considered.	
16 11	**waste linings and refractories**	
16 11 01*	carbon-based linings and refractories from metallurgical processes containing dangerous substances	M
16 11 03*	other linings and refractories from metallurgical processes containing dangerous substances	M
16 11 05*	linings and refractories from non-metallurgical processes containing dangerous substances	M
	Likely contaminants may include metal oxides (including those deposited from fumes), organic compounds, and benzene and phenols if chemically bonded cores are used. Hazards may include H3A (third indent), H4 to H7, H12 and H13.	

[3] For the purpose of this entry, transition metals are: scandium, vanadium, manganese, cobalt, copper, yttrium, niobium, hafnium, tungsten, titanium, chromium, iron, nickel, zinc, zirconium, molybdenum and tantalum. These metals or their compounds are dangerous if they are classified as dangerous substances. The classification of dangerous substances determines which among these transition metals and which transition metal compounds are hazardous.

Examples B16.1 **EWC: 16 05 06***

Picric acid from a laboratory

Picric acid is used primarily in the manufacture of explosives and as an intermediate in dye manufacturing. It is also present in many laboratories, for use as a chemical reagent. Water is added to picric acid to act as a desensitiser. The wetted product is significantly less shock sensitive than the dry acid. Picric acid allowed to dry out to less than 10% water by volume becomes unstable and may pose an explosion hazard.

Picric acid is classified as E: R2, R4 and T: R23/24/25: the waste is therefore a candidate for hazards H1, H6 and H13.

If Picric acid from a laboratory is to be disposed of, testing or assessment of test results would be required to determine if the concentration of the picric acid would make it explosive or potentially covered by H13.

However, picric acid is also classified as T: R23/24/25 and will therefore be hazardous by toxic (H6), if the concentration exceeds 3%, regardless of whether the waste is explosive.

Examples B16.2 **EWC: 16 07 09***

Tank cleaning waste

Tank cleaning waste containing petroleum and diesel is to be disposed of:

Diesel is classified as Carc Cat 3: R40 and therefore tank cleaning waste containing diesel would be hazardous, by carcinogenic (H7), if the concentration of diesel is ≥ 1%.

Petroleum is listed in the ASL as a Carc Cat 2: R45. The current average benzene content for petrol sold in the UK is approximately 0.7 % (Source: UK PIA Briefing: Benzene in petrol, Feb. 2002). Benzene is classified as F: R11, Carc Cat 1: R45, Muta Cat 2: R46, T: R48/23/24/25, Xn: R65, and Xi: R36/38. Therefore tank cleaning waste containing petroleum may be hazardous by carcinogenic (H7), mutagenic (H11), toxic (H6), harmful (H5) and irritant (H4) depending on thenature and quantity of the organic compounds within the waste. The flashpoint would need to beassessed to determine if the waste is flammable (H3): if the flashpoint of the tank cleaning waste is <55°C, the waste will be hazardous.

Examples B16.3 **EWC: 16 08 02***

Spent nickel catalyst

The composition of a typical nickel-Mo catalyst is:

Aluminium oxide (Al_2O_3)	66%
Molybdenum trioxide (MoO_3)	20%
Nickel II oxide (NiO)	5%
Phosphorus Pentoxide (P_2O_5)	9%

Molybdenum oxide, nickel oxide and phosphorus pentoxide are classified in the ASL as:

Molybdenum oxide	Xn R48/20/22; Xi R36/37
Nickel oxide	Carc Cat 1: R49, R43, R53
Phosphorus pentoxide	C; R35

Applying the thresholds against the quoted composition, the catalyst would be hazardous waste, meeting the criteria of carcinogenic (H7), corrosive (H8) and irritant (H4). But not ecotoxic (H14)

Spent nickel-Mo catalyst wastes will be hazardous with a nickel oxide concentration of ≥ 0.1% or a phosphorus pentoxide concentration ≥ 1%. These constituents are not obvious from the simple catalyst description. Molybdenum trioxide will make the waste hazardous at a concentration of ≥ 20% w/w. Contamination of the spent catalyst by oils and other hazardous materials may also have to be taken into consideration.

Examples B16.4 **EWC: 16 05 06***

Laboratory waste

A consignment of laboratory waste includes containers of lead acetate and of carbon disulphide.

1. Lead acetate

Lead acetate is classified as Carc Cat 3: R40, Repr Cat 1: R61, Repr Cat 3: R62, Xn: R48/22, R33 and N: R50, 53. The lowest threshold for the listed risk phrases is 0.25% for N: R50, 53 (H14). However the R50-53 risk phrases are qualified by ASL note 1, so the 0.25% threshold is applied to the concentration of lead , rather than the lead acetate concentration, for H14 only.

- Toxic for reproduction (H10) at ≥ 0.5%
- Carcinogenic (H7) at ≥ 1%
- Harmful (H5) at ≥ 25%

2. Carbon disulphide

Carbon disulphide is classified as F:R11, Repr Cat 3: R62, 63, T: R48/23, Xi: R36/38.

- F: R11 is indicative of highly flammable, potentially H3A. On pure material, flashpoint will be below 21°C;
- For Repr Cat 3: R62, 63, the threshold limit of 5% will apply;
- For substances classified as toxic, T: R48/23, the threshold limit is 3%; and
- For substances classified as irritant, Xi: R36/38, the threshold limit is 20%.

In this case, for a pure substance, the waste could be hazardous by H3A, H4, H6 and H10.

Examples B16.5 **EWC: 16 01 13***

Brake fluid

Brake fluid typically contains one or more of the following chemicals:

- 1-butanol (n-butyl alcohol, propyl carbinol, butyl hydroxide, butyric alcohol, 1-hydroxybutane)
- sec-butyl alcohol (2-butanol, methyl ethyl carbinol, 2-hydroxybutane, butylene hydrate)
- 2-octanol (capryl alcohol, sec-caprylic alcohol, methyl hexyl carbinol)
- methyl isobutyl carbinol (4-methyl-2-pentanol, methylamyl alcohol, sec-hexyl alcohol)
- triethylene glycol mono-N-butyl ether (TGBE), (2-[2-(2 butoxyethoxy) ethoxy] ethanol, “Poly-solve™”, butoxytriglycol)
- triethylene glycol monomethyl ether (TGME), (2-[2-(2 methoxyethoxy) ethoxy] ethanol, methoxytriglycol, “Dowanol™”, glycol ether)
- heptanoic acid (heptoic acid, enanthic acid, enanthylic acid, n-heptylic acid, 1-hexanecarboxylic acid)
- diethylene glycol (2,2-oxydiethanol, bis (2-hydroxyethyl) ether)
- propylene glycol (1,2-dihydroxypropane)

It is covered by an absolute entry and is therefore hazardous waste. The hazardous properties assigned to such wastes will be dependent on the nature of the substances the brake fluid. The most likely hazards of brake fluid are:

- H3B flammable (R10)
- H4 irritant (R36, R37, R38)
- H5 harmful (R20, R21, R22)
- H8 corrosive (R34)

but other hazards might need to be taken into account.

17	Construction and Demolition Wastes (including Excavated Soil from Contaminated Sites)	
17 01	**concrete, bricks, tiles and ceramics**	
17 01 06*	mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances These wastes would not normally be considered hazardous; but if, exceptionally, there is contamination by dangerous substances (e.g. asbestos) all hazards H1 to H14 should be considered.	M
17 02	**wood, glass and plastic**	
17 02 04*	glass, plastic and wood containing or contaminated with dangerous substances These wastes would not normally be considered hazardous but if, exceptionally, there is contamination by dangerous substances at sufficient concentration (e.g. high concentrations of wood treatment or preservative products within a treated timber, taking account of the weight of the timber) all hazards H1 to H14 should be considered.	M

17 03	**bituminous mixtures, coal tar and tarred products**	
17 03 01*	bituminous mixtures containing coal tar	M
	Coaltar-containing wastes should be treated as carcinogenic (H7), and can be highly corrosive (H8) as well as flammable if the relevant substances are present above their threshold concentrations. H1 to H8 and H10 to H14 should be considered.	
17 03 03*	coal tar and tarred products	A
	Coaltar-containing wastes should be treated as carcinogenic (H7), and can be highly corrosive as well as flammable. Additional relevant hazards may include H3B to H8, H12 to H14.	
17 04	**metals (including their alloys)**	
17 04 09*	metal waste contaminated with dangerous substances	M
	This entry refers to metallic wastes which are contaminated by dangerous substances (e.g. oils, hazardous coatings, asbestos on pipe work (although 17 06 05* may be more appropriate)). Because of the broad range of possible contaminates under this heading, all hazards H1 to H14 should be considered.	
17 04 10*	cables containing oil, coal tar and other dangerous substances	M
	Oil-containing wastes should be treated as carcinogenic (H7) as well as under any relevant additional flammability or other hazards.	
17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**	
17 05 03*	soil and stones containing dangerous substances	M
17 05 05*	dredging spoil containing dangerous substances	M
17 05 07*	track ballast containing dangerous substances	M
	These categories include such a broad range of potentially hazardous wastes that they should be considered under all the hazards H1 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
17 06	**insulation materials and asbestos-containing construction materials**	
17 06 01*	insulation materials containing asbestos	M
17 06 03*	other insulation materials consisting of or containing dangerous substances	M
17 06 05*	construction materials containing asbestos	M
	Asbestos is carcinogenic (H7) and toxic (H6). Other insulating materials that may be present could include foams containing CFCs, hazardous by ecotoxic (H14). Roofing felts and other bituminous insulating materials are classified under 17 03.	
17 08	**gypsum-based construction material**	
17 08 01*	gypsum-based construction materials contaminated with dangerous substances	M
	Apart from any trace constituents, e.g. heavy metals, that may be present above threshold concentrations, gypsum-based. Waste can be hazardous under H12 and H13.	

17 09	other construction and demolition wastes	
17 09 01*	construction and demolition wastes containing mercury	M
	There are possible hazards from the presence of mercury or its compounds: if mercury is present at concentrations above the threshold values, it should be considered hazardous under H4 to H6 and H14.	
17 09 02*	construction and demolition wastes containing PCB (for example PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors)	M
	PCB's are classified as R33, N: R50,53. R33 is not considered in the assessment of a hazardous waste. At or above a threshold concentration of 0.25% of PCB's and PCT's the waste will be ecotoxic H14.	
17 09 03*	other construction and demolition wastes (including mixed wastes) containing dangerous substances	M
	This category includes such a broad range of potentially hazardous wastes that it should be considered under all the hazards H1 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	

Examples B17.1: Contaminated Soil **EWC: 17 05 03***

A derelict factory is to be redeveloped, the contaminated soil has been classified under 17 05 03* or 17 05 04. The initial analysis of the waste produced the following results :

Cations	Concentration (mg/kg)	Anions	Concentration (mg/kg)
Arsenic	530	Chloride	2,303
Cadmium	782	Fluoride	504
Copper	400	Sulphate	18,625
Lead	1620	Sulphide	8
Nickel	297	pH	8
Zinc	1446	TOC	34

Asbestos, Antimony, Barium, Hexavalent Chromium, Mercury, Molybdenum, PCBs, Selenium were not detected.

Chemical Speciation

Assessment of a hazardous waste normally requires that the dangerous substances present are identified.

In this case the initial analysis has identified the cation and anion concentrations, but does not identify the compounds that are present. At this point there are two options :

(i) to undertake further analysis using other techniques (for example X-Ray Diffraction (XRD)) to determine the identify of the compounds present, or

(ii) Use the initial analysis, knowledge of the properties of the soil in this case that may affect speciation, information on the history of the site and likely contaminants associated with its use, and the chemical properties of the possible substances to determine the worst case compounds that could plausibly be associated with the waste soil from this site. Other data sources may also, for example, provide further information on the types contamination associated with certain industries, processes or materials. Compounds that are not consistent with site history and the analysis, or that have chemical properties that mean they cannot exist in the waste, can in some circumstances be discounted. Due to the site/process specific variability of worst case compounds, 'generic' worst case compounds (and electronic tools and models that employ them) should not be used without first establishing that they are applicable to the specific waste in question.

The following worst case compounds have been identified and their concentrations calculated from the cation concentrations, for the site considered in this example.

Arsenic	diarsenic trioxide	As_2O_3	0.07%
Cadmium	cadmium carbonate	$CdCO_3$	0.12%
Copper	copper(I) oxide	Cu_2O	0.05%
Lead	lead sulphate	$PbSO_4$	0.24%
Nickel	nickel carbonate	$NiCO_3$	0.06 %
Zinc	zinc oxide	ZnO	0.18%

As noted above these worst case compounds are specific to this example and should not be applied to other contaminated soils with first establishing that they are applicable.

An example of how a worst compound concentration is calculated is provided here for lead sulphate:-

(i) Analysis indicates that 1620 mg/kg of lead (0.16%) is present in the waste soil.

(ii) The actual worst case lead compound in the soil is suspected (in this case) to be lead sulphate.

(iii) The atomic weight of lead is 207.2, and for sulphate is 96

(iv) The concentration of lead sulphate in the soil is therefore

$$\frac{(207.2+96)}{207.2} \times 1620 = 2370.6 \text{ mg/kg } (0.24\%)$$

Risk Phrases and Associated Hazardous Properties by Approved Supply List Entry

Diarsenic trioxide	Carc Cat 1: R45 T+: R28 C: R34 N: R50, 53	(H5/H6 H7,H4/H8, H14)
Cadmium compounds	Xn: R20/21/22 N: R50, 53	(H5, H14)
Copper (I) oxide	Xn: R22, N:R 50-53,	(H5, H14),
Lead compounds	Repr Cat 1: R61, Repr Cat 3: R62, Xn: R20/22, R33, N: R50-53	(H5, H10, H14)
Nickel carbonate	Carc Cat 3: R40, Xn: R22, R43, N: R50-53	(H5, H7, H14)
Zinc oxide	N: R50-53	(H14)

Note – cadmium carbonate and lead sulphate are not listed as individual substances in the Approved Supply List. However general entries are provided for unlisted compounds of these metals. These two entries are also qualified by ASL Note 1, which enables the use of metal cation concentration for H14 Ecotoxic only.

Hazardous properties and threshold concentrations

The concentrations determined by analysis and calculation were put into the concentration charts below (H5-H10) and overleaf (H14). Substance concentration was calculated for each worst case compound as shown above. Cation concentration has been used for H14 where ASL Note 1 applies.

	Concentration % at risk phrase						
Substance	Irritant Corrosive H4/H8 (R34)	Harmful H5 (R20,R21, R22)	Toxic H5/H6 (R28)	Carc Cat 1 / 2 H7 (R45)	Carc Cat 3 H7 (R40)	Repr. H10 (R60, R61)	Repr. H10 (R62, R63)
Diarsenic trioxide	0.07		0.07	0.07			
Cadmium carbonate		0.12					
Copper (I) Oxide		0.05					
Lead sulphate		0.24				0.24	0.24
Nickel carbonate		0.06			0.06		
Total Threshold	**5 / 10%**	**25%**	**0.1 / 7%**	**n/a**	**n/a**	**n/a**	**n/a**
Individual Threshold*	**n/a**	**n/a**	**n/a**	**0.1%**	**1%**	**0.5%**	**5%**
Concentration	**0.07**	**0.47**	**0.07**	**0.07**	**0.06**	**0.24**	**0.24**
Threshold Exceeded ?	**N**	**N**	**N**	**N**	**N**	**N**	**N**

*The concentration column is greyed out for the hazardous properties that are not 'additive' and therefore consider only the individual substance concentration. In these cases only where the concentration of an individual substance exceeds the threshold is the waste hazardous.

Assessment of H14 Ecotoxic

With reference to Appendix C14 of Technical Guidance WM2.

Step 1: The composition can and has been determined, through a combination of chemical analysis and use of worst case compounds. Further more specialist analysis could have been undertaken to determine the speciation of the metal present if further information was required. Animal testing is not appropriate.

Step 2: The waste contains 6 metal compounds with Ecotoxic risk phrases

Step 3: None of the six R50-53 substances present are at an individual substance concentration at or above the generic threshold limit of (0.25%) for an individual R50-53 substance.

Step 4: None of the six R50-53 substances has been assigned a substance specific threshold that is lower than the generic threshold for an individual substance.

Step 5: The Arsenic, Copper and Nickel compounds (rather than cations) and Cadmium cation (ASL Note 1) are present at concentrations below the trace impurity threshold of 0.1% and can be excluded from subsequent steps.

Step 6: The waste contains 2 substances (lead and zinc compounds) that must be considered further.

As illustrated in the overleaf for steps 7 to 10.

Step 7 : Equation considers the additive properties of substances that are both *'harmful to aquatic organisms'* and to potentially cause *'long-term effects in the aquatic environment'.* The calculation is presented in the table below. The concentration of Lead and Zinc Oxide exceeds the additive equation 1 threshold criteria of '1', so the waste possesses the hazardous property H14 Ecotoxic.

Steps 8, 9 and 10 are not considered.

Substance	H14 Ecotoxic (Step 7 Equation. 1)			
	$\sum \left(\frac{PN: R50–53}{0.25} + \frac{PN: R51–53}{2.5} + \frac{PN:R52–53}{25} \right) \geq 1$			
Risk Phrase	**R50-53**	**R51-53**	**R52-53**	**∑ (threshold = 1)**
lead sulphate	0.162% (lead)	0	0	
zinc oxide	0.18% (Zinc Oxide)	0	0	
Total Concentration	**0.342%**	**0%**	**0%**	
Equation elements	$\frac{0.342\%}{0.25}$ = **1.37**	$\frac{0\%}{0.25}$ = **0**	$\frac{0\%}{0.25}$ = **0**	Sum = 1.37

Summary

The threshold values were exceeded for the hazardous property H14 Ecotoxic. The waste is therefore hazardous and is classified under the EWC code 170503*.

Examples B17.2 **EWC: 17 06 01***
EWC: 17 06 05*

Asbestos

All forms of asbestos, regardless of the chemical form (e.g. chrysotile, amosite) or physical form (e.g. cement, fibres, dust) are listed as Carc Cat 1: R45 and T: R48/23 in the ASL. All forms of asbestos are regarded as hazardous waste, where the asbestos content is greater than the threshold concentration for Carc Cat 1 of ≥ 0.1% w/w.

It should be noted that asbestos is also Harmful (H5) at 3%, and Toxic (H6) at 25%.

Waste asbestos cement

The threshold concentration for Carc Cat 1 is 0.1%. Waste asbestos cement containing 10-15% asbestos (predominantly chrysotile) is therefore hazardous by carcinogenic H7. Since the HWD relate to hazard and not to risk, the ability of the waste to release free fibres is not relevant for consideration.

Note that asbestos is also classified R48/23: At a concentration of 3% or greater the waste is harmful (H5), however at a concentration of 25% or greater this is replaced by hazard toxic (H6)

Examples B17.3 **EWC: 17 09 02***

Wastes containing PCBs or PCTs

Construction and demolition wastes containing PCB are likely to decline as PCBs are phased out and destroyed. They were mainly used in transformers and capacitors but have been used for other applications such as sealants, resin-based floorings, sealed glazing units.

PCBs are listed in the ASL and are given the hazard classification N, with risk phrases R50, 53 (Very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment). This would give a threshold limit of 0.25%.

18	Wastes from Human or Animal Health Care and/or Related Research (except kitchen and restaurant wastes not arising from immediate health care)	
18 01	**wastes from natal care, diagnosis, treatment or prevention of disease in humans**	
18 01 03*	wastes whose collection and disposal is subject to special requirements in order to prevent infection Wastes under this heading should be considered under H9: see Appendix C9 for detailed guidance.	A
18 01 06*	chemicals consisting of or containing dangerous substances If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	M

18 01 08*	cytotoxic and cytostatic medicines	A
	Any medicinal product that possesses one or more of the hazardous properties Toxic (H6), Carcinogenic (H7), Toxic for Reproduction (H10), or Mutagenic (H11), is classified as 'Cytotoxic and Cytostatic'. This may include drugs from a number of medicinal classes for example antineoplastic agents, antivirals, immunosuppressants, hormonal drugs and others.	
18 01 10*	amalgam waste from dental care	A
	Amalgam waste is hazardous from mercury, and to a lesser extent from the other constituents of the amalgam (e.g. silver and tin). Hazard H13 applies as chemical or thermal processes involved in recycling, incineration or other treatment may liberate mercury from the amalgam. Hazards H6 and H14 apply to the mercury released.	
18 02	**wastes from research, diagnosis, treatment or prevention of disease involving animals**	
18 02 02*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	A
	Wastes under this heading should be considered under H9: see Appendix C9 for detailed guidance.	
18 02 05*	chemicals consisting of or containing dangerous substances	M
	If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
18 02 07*	cytotoxic and cytostatic medicines	A
	Any medicinal product that possesses one or more of the hazardous properties Toxic (H6), Carcinogenic (H7), Toxic for Reproduction (H10), or Mutagenic (H11), is classified as 'Cytotoxic and Cytostatic'. This may include drugs from a number of medicinal classes for example antineoplastic agents, antivirals, immunosuppressants, hormonal drugs and others.	
19	**Wastes from Waste Management Facilities, Off-Site Waste Water Treatment Plants and the Preparation of Water Intended for Human Consumption and Water for Industrial use**	
19 01	**wastes from incineration or pyrolysis of waste**	
19 01 05*	filter cake from gas treatment	A
19 01 06*	aqueous liquid wastes from gas treatment and other aqueous liquid wastes	A
19 01 07*	solid wastes from gas treatment	A
19 01 10*	spent activated carbon from flue-gas treatment	A
	Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H5 to H7, H10, H11, or H14.	

19 01 11*	bottom ash and slag containing dangerous substances	M
19 01 13*	fly ash containing dangerous substances	M
19 01 15*	boiler dust containing dangerous substances	M
19 01 17*	pyrolysis wastes containing dangerous substances	M
	Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H5 to H7, H10, H11, or H14. Solid wastes from gas treatment may be alkaline and therefore potentially corrosive (H8).	
19 02	**wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)**	
19 02 04*	premixed wastes composed of at least one hazardous waste	A
	Premixed waste is produced by the mixing (not involving a chemical reaction) of different types of wastes during waste treatment. Mixing to facilitate the handling of the wastes may reduce the concentration of dangerous substances below threshold limits. However, if any of the wastes were hazardous, the resulting "premixed" waste would be covered by this absolute entry, regardless of the concentrations of dangerous substances within the waste. This category includes such a broad range of potentially hazardous wastes that they should be considered under all the hazards H1 to H14.	
19 02 07*	oil and concentrates from separation	A
	Oil-containing wastes should be treated as carcinogenic (H7) as well as under any relevant additional flammability or other hazards.	
19 02 05*	sludges from physico/chemical treatment containing dangerous substances	M
19 02 08*	liquid combustible wastes containing dangerous substances	M
19 02 09*	solid combustible wastes containing dangerous substances	M
19 02 11*	other wastes containing dangerous substances	M
	These categories include such a broad range of potentially hazardous wastes that they should be considered under all the Hazards H1 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
19 03	**stabilised/solidified wastes[5]**	
19 03 04*	wastes marked as hazardous, partly[6] stabilised	A
19 03 06*	wastes marked as hazardous, solidified	A
	These categories include such a broad range of potentially hazardous wastes that they should be considered under all the Hazards H1 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested. (The corresponding non-hazardous entries for stabilised/solidified wastes from which the hazards have been removed or which have never possessed a hazardous property are 19 03 05 and 19 03 07.)	

[5] Stabilisation processes change the dangerousness of the constituents in the waste and thus transform hazardous waste into non-hazardous waste. Solidification processes only change the physical state of the waste (e.g. liquid into solid) by using additives without changing the chemical properties of the waste.

[6] A waste is considered as partly stabilised if, after the stabilisation process, dangerous constituents which have not been changed completely into non-dangerous constituents could be released into the environment in the short, middle or long term.

19 04	**vitrified waste and wastes from vitrification**	
19 04 02*	fly ash and other flue-gas treatment wastes	A
19 04 03*	non-vitrified solid phase	A
	Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H5 to H7, H10, H11, or H14.	
19 07	**landfill leachate**	
19 07 02*	landfill leachate containing dangerous substances	M
	Likely hazards to be considered are H4 to H7, H10 to H13 and H14 because of high ammonia, heavy metals and pesticides. If any of these components is sufficiently high the leachate may be classified as hazardous.	
19 08	**wastes from waste water treatment plants not otherwise specified**	
19 08 06*	saturated or spent ion exchange resins	A
19 08 07*	solutions and sludges from regeneration of ion exchangers	A
	These wastes may contain a variety of contaminants depending on the source of the foul water, e.g. industrial as opposed to household sources. They should be considered under all the Hazards H1 to H14.	
19 08 08*	membrane system waste containing heavy metals	M
	Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds should be considered under the following hazards: H5 to H7, H10, H11, or H14.	
19 08 10*	grease and oil mixture from oil/water separation other than those mentioned in 19 08 09	A
19 08 11*	sludges containing dangerous substances from biological treatment of industrial waste water	M
19 08 13*	sludges containing dangerous substances from other treatment of industrial waste water	M
	Oil-containing wastes should be treated as carcinogenic (H7) if the oil is present above threshold concentrations, as well as under any relevant additional flammability or other hazards. Sludges from biological treatment should also be assessed under H9. (There is a corresponding non-hazardous entry for 19 08 10*, where the grease and oils consist of edible oils and fats only, 19 08 09.)	
19 10	**wastes from shredding of metal-containing wastes**	
19 10 03*	fluff-light fraction and dust containing dangerous substances	M
19 10 05*	other fractions containing dangerous substances	M
	Possible hazards from metals such as nickel; copper; zinc; arsenic; cadmium; antimony; tellurium; mercury; thorium; lead or their compounds, plus PCBs and asbestos, should be considered under the following hazards: H5 to H7, H10, H11, or H14.	
	To maintain consistency with international and UK legislation and guidance, the Agencies consider that the level of 50 mg/kg (0.005%) should be the defining threshold concentration for wastes containing PCBs and PCTs; above that concentration such waste should be considered as hazardous waste.	

19 11	**wastes from oil regeneration**	
19 11 01*	spent filter clays	A
19 11 02*	acid tars	A
19 11 03*	aqueous liquid wastes	A
19 11 04*	wastes from cleaning of fuel with bases	A
19 11 07*	wastes from flue-gas cleaning	A
	Oil-containing wastes should be treated as carcinogenic if the oil is present above threshold concentrations, as well as under any relevant additional flammability or other hazards. H3B to H8 and H12 to H14 may apply.	
19 11 05*	sludges from on site effluent treatment containing dangerous substances	M
	Oil-containing wastes should be treated as carcinogenic if the oil is present above threshold concentrations, as well as under any relevant additional flammability or other hazards. H3B to H8 and H12 to H14 may apply.	
19 12	**wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified**	
19 12 06*	wood containing dangerous substances	M
19 12 11*	other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances	M
	These categories include such a broad range of potentially hazardous wastes that they should be considered under all the Hazards H1 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	
19 13	**wastes from soil and groundwater remediation**	
19 13 01*	solid wastes from soil remediation containing dangerous substances	M
19 13 03*	sludges from soil remediation containing dangerous substances	M
19 13 05*	sludges from groundwater remediation containing dangerous substances	M
19 13 07*	aqueous liquid wastes and aqueous concentrates from groundwater remediation containing dangerous substances	M
	These categories include such a broad range of potentially hazardous wastes that they should be considered under all the Hazards H1 to H14. If the chemical constituents of the waste are unknown, it should be treated as hazardous unless tested.	

Examples B19.1 **EWC: 19 01 07***

Flue gas treatment (FGT) residues from municipal solid waste incineration

Flue gas treatment (FGT) residues from municipal solid waste incineration contain fly ash from the incinerator as well as gaseous products of combustion. The flue gases are treated with activated carbon to absorb toxic products of incomplete combustion and slaked lime (calcium hydroxide, $Ca(OH)_2$) and to neutralise acid gases. The treated flue gas is then filtered in a bag house to remove all the particulates, including fly ash, used carbon and reacted lime residues.

Calcium hydroxide is added to the flue gas to scrub out acid gases such as HCl. Some carbon dioxide may also be scrubbed out, converting the calcium hydroxide to calcium carbonate. The exact concentrations of the resulting calcium compounds are difficult to determine. The pH of the aqueous solution of the residues, however, is routinely greater than pH 10.

FGT residues usually contain a variety of calcium compounds, including $CaCl_2$, $Ca(OH)_2$ and $CaCO_3$. Calcium chloride is listed in the Approved Supply List (ASL) as having the risk phrase R36 (irritating to eyes). Accordingly, FGT residues would be considered hazardous if the concentration of $CaCl_2$ were greater than 20%, but this is unlikely. $Ca(OH)_2$ and $CaCO_3$ are likely to be present in significant concentrations but these compounds are not included in the ASL. The risk phrase R41 has been verified for $Ca(OH)_2$ from the IUCLID database. The threshold limit concentration for R41 substances is ≥ 10% $^{w}/_{w}$. Therefore, wastes containing $Ca(OH)_2$ at a concentration of ≥ 10% $^{w}/_{w}$ will be hazardous waste by irritant (H4). Other alkali metal salts may also be present. Given that:

- the concentrations of $Ca(OH)_2$, and $CaCO_3$ are unknown and would be relatively difficult to determine, and
- the identity and quantity of other potentially corrosive alkali metal salts is also unknown,

it is not practical to base the classification of FGT residues on the concentrations of these materials in the waste. In this instance, testing (or prior knowledge of test results) is required.

For a waste comprising a complex mixture of calcium compounds such as FGT residues, a definitive chemical breakdown for the material is difficult, so test methods based on pH, neutral red assay, neutral red release, or dermal biobarrier tests (see Table C4.2) would be used to determine whether the waste is hazardous or not. For example, if the pH of the residue (when leached or dampened down if the residues are dry) is known to be greater than or equal to pH 11.5, this would indicate that the residue is irritant/corrosive and therefore hazardous waste.

Examples B19.2 **EWC: 19 02 05***

Filter cake sludge containing metal hydroxides

Metal hydroxide sludges and other sludges from metal insolubilisation treatment (such as filter cake) need to be assessed against all hazardous properties. Such filter cakes can include, for example , the following metal hydroxides: manganese, iron, cobalt, nickel, copper, tin, zinc and lead.

Substance	ASL Listed?	Classification	Threshold Concentration
Nickel hydroxide	✓	N: R50, 53	0.25%
		Carc Cat 3: R40	1%
		Xn: R20/22	25%
Lead hydroxide	✓	N: R50, 53 (ASL Note 1)	0.25% Lead
		Repr Cat 1: R61	0.5%
		Repr Cat 3: R62	5%
		Xn: R20/22, R33	25%
Cadmium hydroxide	✓	N: R50, 53 (ASL Note 1)	0.25% Cadmium
		Xn: R20/21/22	25%
Cobalt hydroxide	✗	R20/21/22	25%
		Xi: R36/37/R38	20%
Zinc hydroxide	✗	None	Not applicable

Lead, cadmium and nickel hydroxides are classified as N: R50, 53. However lead and cadmium hydroxide ASL entries are qualified by Note 1. This means that the metal concentration, rather than compound concentration, is used for H14 (only). Therefore if the individual concentrations of nickel hydroxide, lead or cadmium are greater than or equal to the general threshold for an individual substance of 0.25% then the waste would be hazardous by ecotoxic. If the total (additive) concentration of nickel hydroxide, lead and cadmium is greater than or equal to 0.25% the waste would also be hazardous by H14.

If the concentration of lead hydroxide is greater than or equal to 1% w/w, the waste will be hazardous by H10.

If the concentration of nickel hydroxide is greater than or equal to 1% w/w, the waste will be hazardous by carcinogenic (H7): carcinogenic risk phrases are not additive (Appendix C7).

If the concentration of cobalt hydroxide is greater than 20%, the waste would be hazardous by hazard irritant (H4). (Appendix C4).

If the concentrations of the hydroxides are less than those above but the total concentrations of the nickel, lead, cadmium and cobalt hydroxide is greater than or equal to 25% w/w, the waste would be hazardous by harmful (H5).

Further data would be needed to classify any other metal hydroxides known to be present in the filter cake. Contamination of the filter cake by oils and other hazardous materials may also need to be taken into consideration in order to assess whether the waste is hazardous or not.

If a fume dust or sludge containing metal oxides is being assessed, the relevant thresholds could be much lower: some metal oxides, for example nickel and cadmium oxide, are Category 1 or 2 carcinogens with a threshold of 0.1% and many heavy metal compounds are now classified as N: R50, 53 with a threshold of 0.25%.

Although this assessment is specific to metal hydroxide filtercake, the methodology applies to other sludges (e.g. sulphate sludges) and filter cakes.

20	Municipal Wastes (Household Waste and Similar Commercial, Industrial and Institutional Wastes) Including Separately Collected Fractions	
20 01	**separately collected fractions (except 15 01)**	
20 01 13*	solvents	A
20 01 14*	acids	A
20 01 15*	alkalines	A
20 01 17*	photochemicals	A
20 01 19*	pesticides	A
20 01 21*	fluorescent tubes and other mercury-containing waste	A
20 01 31*	cytotoxic and cytostatic medicines	A
	There are possible hazards from flammability (H3) ecotoxicity (H14); corrosive (H8), carcinogenic (H7) and teratogenic (H10) properties, plus trace levels of the potentially hazardous metals nickel; copper; zinc; chromium; cobalt; arsenic; cadmium; antimony; mercury; thorium and lead and their compounds. Potential hazards may include H3A (first indent), H3B, H4 to H8, H12 and H14. Any medicinal product that possesses one or more of the hazardous properties Toxic (H6). Carcinogenic (H7), Toxic for Reproduction (H10), or Mutagenic (H11), is classified as 'Cytotoxic and Cytostatic'. This may include drugs from a number of medicinal classes for example antineoplastic agents, antivirals, immunosuppressants, hormonal drugs and others. (There is a corresponding entry for non-cytotoxic and cytostatic medicines 20 01 32.)	
20 01 23*	discarded equipment containing chlorofluorocarbons	M
20 01 26*	oil and fat other than those mentioned in 20 01 25	A
20 01 27*	paint, inks, adhesives and resins containing dangerous substances	M
20 01 29*	detergents containing dangerous substances	M
20 01 33*	batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries	A
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components [7]	M
20 01 37*	wood containing dangerous substances	M
	Potential hazards include: • flammability (H3) and ecotoxicity (H14) in 20 01 23*, 20 01 26*, 20 01 27*; • trace levels of the metals nickel; copper; zinc; chromium; cobalt; arsenic; cadmium; antimony; mercury; thorium and lead or their compounds may occur in 20 01 27*, 20 01 33*, 20 01 35*, 20 01 37* and should be considered under the following hazards: H5 to H7, H10, H11, or H14; • irritant (H4) nature of some waste inks in 20 01 27*; and • carcinogenic (H7) and teratogenic (H10) properties may be found in 20 01 27*, 20 01 33*, 20 01 35*, 20 01 37*. There is a corresponding non-hazardous entry for • 20 01 26*, where the grease and oils consist of edible oils and fats only, 20 01 25; and • 20 01 33*, where the waste contains only non-hazardous batteries, 20 01 34. The components in electrical equipment are assessed in isolation to determine if they are hazardous waste. The equipment is hazardous, 20 01 23*, 20 01 35*, where it contains a Ôhazardous component .	

[7] Hazardous components from electrical and electronic equipment may include accumulators and batteries mentioned in 16 06 and marked as hazardous; mercury switches, glass from cathode ray tubes and other activated glass, etc.