ENVIRONMENTAL ASPECTS OF DECOMMISSIONING

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Prepared by WG-5 Environment

Disclaimer

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Amendments to 137/13

Section	Change
	Editorial to align style with IHC associations
4.1.2	Updated relevant legislation
4.4	Example updated
4.5	Added reuse option and added references

NOTE Technical changes from the previous edition are underlined

1 Introduction

Decommissioning is receiving increasing attention from the authorities, industrial gas companies and future property owners and occupants.

This publication aims to provide guidance to EIGA members, specifically directors, facility managers, environmental specialists, design and engineering departments and technical managers on the current legislation and best practices that should be applied to decommissioning activities.

2 Scope and purpose

2.1 Scope

Decommissioning includes dismantling, demolition and disposal of plant buildings and equipment, and dealing with the potential liabilities associated with the closure of part or all of the location.

This publication does not give specific advice on health and safety issues, which shall be taken into account before undertaking any activity. On these issues the relevant EIGA documents and / or national legislation should be consulted for advice.

2.2 Purpose

This publication provides guidance on the identification and management of environmental risks associated with decommissioning, dismantling, demolition and disposal of plant, equipment and facilities and closure or partial closure of plants or facilities.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall

Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should

Indicates that a procedure is recommended.

3.1.3 May

Indicates that the procedure is optional.

3.1.4 Will

Is used only to indicate the future, not a degree of requirement.

3.1.5 Can

Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Decommissioning

Decommissioning means the permanently taking out of service plant, equipment or facilities. Decommissioning includes dismantling, demolition and disposal of plant buildings and equipment, and dealing with the potential liabilities associated with the closure of part or all of the location.

4 Planning for decommissioning

4.1 Background

4.1.1 Why is this important?

There is increasing recognition that the environmental risks associated with plant, equipment and facilities can be significant. These areas are receiving increasing attention from the authorities, from companies and other stakeholders. There are legal requirements at a European, national and local level, which can also be important in site permits.

Some of the important drivers are:

- the trend for redevelopment of industrial areas leading to change of land use in the surrounding area;
- redevelopment and restructuring of companies and the economy;
- the trend for more lifecycle or producer responsibility legislation;
- site permits are increasingly referring to decommissioning activities; and
- the development of environmental liability and the concept that site owners can be responsible for cleaning up past pollution, even if they did not cause it. Authorities are increasingly pushing for holding companies to be responsible for the liabilities of their subsidiaries.

This leads to the need to:

- identify and comply with legal requirements including those on decommissioning, waste, land contamination, site safety and liability; and
- identify and assess risk, to prevent any additional contamination and prevent pollution on and off site.

4.1.2 Legal requirements

There is increasing legislation concerning the legal liability for site clean-up, decommissioning, demolition, disposal and remediation. There are specific requirements under operational permits such as the Industrial Emissions Directive (IED 2010/75/EU) permits for a site closure plan [1].[1]

A requirement of the IED, which replaced Integrated Pollution Prevention and Control (IPPC directive 2008/1/EC), is to have a decommissioning plan for both existing and new facilities covered by the scope of the directive [1, 2]. It also requires the use of best available techniques to prevent or minimise pollution to the environment. For the industrial gases industry, the scope includes hydrogen and acetylene production sites amongst others. Further information can be found in EIGA Doc 108, *Environmental Legislation applicable to Industrial Gases Operations within the EU* [3]. The IED is now implemented for existing and new facilities [1].

[1] References are shown by bracketed numbers and are listed in order of appearance in the reference section.

Appropriate notifications shall be made to different local and national authorities when decommissioning activities are planned. Additional pollution prevention measures or remediation may be required depending on the planned future uses of the land.

There is EU legislation concerning the safety of construction sites which is applicable to plant dismantling and demolition activities when these activities are over 30 man days in duration (Council directive 92/57/EEC *on the implementation of minimum safety and health requirements at temporary or mobile constructions sites*) [4]. This requires, amongst other things, a formal safety, health and environmental plan for demolition activities.

The EU directive regarding the environmental liability for the remediation of environmental damage (Directive 2004/35/CE *on environmental liability with regard to the prevention and remedying of environmental damage*) places responsibility on the operators of certain industrial installations and those carrying out certain activities to prevent pollution (for example Seveso and IED sites) [5].

It is critical to identify all the legal requirements at an early stage in the planning and make contact with the appropriate authorities to understand their requirements.

There is no European wide agreement on the definition of what a contaminated site is, though some principles are agreed, see Appendix A.

4.2 Principles for design of decommissioning

The concept of design for decommissioning is important and future decommissioning shall be considered when designing new facilities. It is important to establish an environmental baseline to compare against the future condition of the site.

Design for decommissioning includes:

- identifying and implementing current and future legislation, legal and contractual requirements such as:
    - considering legal requirements under the IED including specific site condition and closure plans (taking the site back to a satisfactory state and preventing ongoing pollution before permits can be handed back [1]; and
    - legislation on end of life equipment, for example Directive 2012/19/EU *on waste electrical and electronic equipment (WEEE)* [6].
- establishing contractual liability, i.e. the company should only be responsible for pollution caused by their own operations, such as:
    - any insurance requirements;
    - possible provisions for future costs; and
    - conditions and method statements for sub-contractors.

  NOTE This applies equally both for properties that are bought or leased, for example, industrial gas operations often take place on the customer's site.
- conducting baseline assessments of soil and groundwater to identify any existing pollution, sources and possible pathways offsite and to provide a comparison point for future assessment so that it is easier to show the responsibility for existing pollution at the end of the life of the plant (see 4.3.4) considering:
    - the influence of neighbours and surrounding land use;
    - the possible impacts of natural phenomena, such as flooding, on the possible spread of pollution offsite; and

- the impacts of rainwater runoff.

- specifying design requirements such as:
  - using materials that are easy to recycle or reuse;
  - using a modular design to make it easier to assemble, disassemble and transport the plant;
  - minimising the use of hazardous materials;
  - minimising the amount of contaminated material or hazardous waste that will be generated upon decommissioning;
  - using pollution prevention measures such as concrete areas, interceptors, containment, and liners to prevent or mitigate pollution from ongoing operations;
  - avoid the installation of underground storage tanks containing hazardous substances, if possible;
  - consider the installation of double contained piping systems for extremely hazardous and toxic chemical piping systems; and
  - avoiding the use of unlined or earthen pits for any reason.

This information may be used to start the site dossiers (see 4.4) and should be generated at the design stage for new plants.

4.3 Steps and process for creating decommissioning plans

4.3.1 Work process steps

The general steps in the work process, shown in Figure 1, are

- initiation phase;
- information gathering and audit phase;
- decision and planning phase;
- agree actions with the authorities where necessary; and
- implementation

The implementation and execution site closure plan is agreed with the authorities under European, national or local legislation.

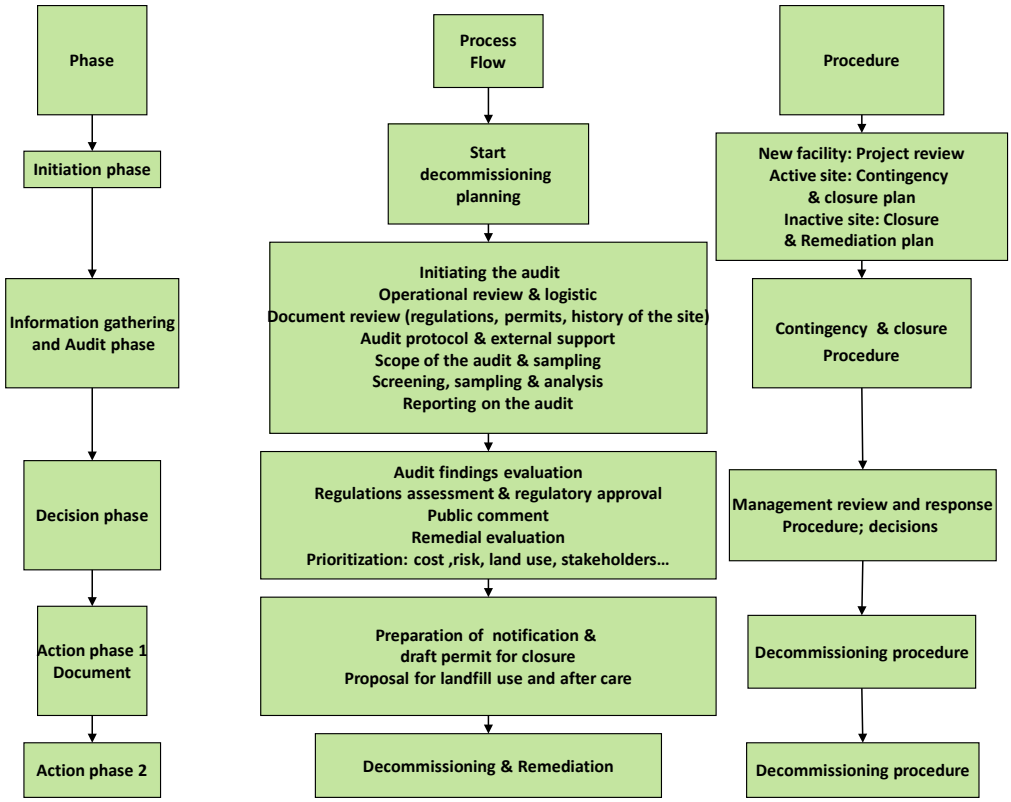

Figure 1 – Decommissioning work process steps

4.3.2 Initiation phase

The development of a decommissioning plan is normally triggered by:

- new facility or site;
- business restructuring (involving leasing, buying or selling of land);
- changed activity on an old site;
- notice of cancellation of the relevant customer contract; or
- a decision to close the site or relocate plant and equipment.

For a new facility this is initiated at the project review stage.

For active sites a contingency and closure plan should be developed.

For inactive sites a closure and remediation plan should be developed and typically this needs approval from the relevant authorities.

It is important to determine what triggers any site clean-up requirements (for example remediation or containment of contaminated soil and groundwater).

For example, clean-up is triggered on cessation of operations under French national legislation. In the UK remediation is only required for ‘fit for purpose’ standard, so sites for industrial use shall only be cleaned up to a standard suitable for that use, not to the most stringent standard. In Spain certain industrial activities shall publish a risk assessment regarding land contamination.

4.3.3 Information and audit phase

This phase involves:

- initiating the audit and information review;
- operational review and logistics;
- document review (regulations, permits, history of the site);
- interviews with key operating personnel;
- audit protocol and external support;
- scope of the audit and sampling;
- screening, sampling and analysis; and
- reporting on the audit.

The report forms the basis of the information to go into the plan which includes all identified legal requirements, an assessment of all the associated environmental hazards and legal requirements and the actions needed to comply with these and to minimise the risks. A checklist of items to be considered is included in Appendix B.

Current and past operating personnel are useful sources of information on the site and operational practices (past and present).

4.3.4 Environmental risk assessment

It is necessary to identify and assess existing land condition and risks to soil and water and prevent any additional contamination and pollution.

First, it is important to identify the historical uses of the land and the surrounding area. Some of the possible sources of contamination are shown in Appendix C (for industrial gases operations) and Appendix D (for other industrial operations).

From this information, a desk study may be conducted (often called ‘phase 1’ assessment) and a decision may be made as to the need for detailed testing (‘phase 2’ assessments). This list may be used to identify potential contaminants that might be present and to give guidance as to what substances might be present and require including in testing of soil and groundwater.

It is important to make sure that the people conducting the risk assessment (internal or external) have appropriate qualifications and experience. Important considerations are the selection of sub-contractors and specification of requirements and making sure that they have appropriate qualifications.

4.3.5 Decision phase

In this phase the information and findings of the previous phase are evaluated. There is then a review and decision at the appropriate level by company management. For small sites this may be a review by local line managers, for larger sites or businesses this may require decisions at Board level, for example if financial provisions are required which can impact the company significantly.

The decisions on the actions to be made shall consider:

- regulations assessment and regulatory approval;
- evaluation of the options for remediation;

- prioritisation: cost, risk, land use, considering stakeholders views and public comment, for example public notification or consultation may be required;
- resources required for action phase; and
- Selection of sub-contractors and specification of requirements and making sure that they have appropriate qualifications.

4.3.6 Action phase

Following approval by company management, the plans are put into action. This may include:

- preparation, notification and draft permit for closure;
- proposal for landfill use and after care, if applicable;
- actual decommissioning and remediation; and
- monitoring and review of the plan, amending this if necessary.

4.4 Site assessment register

It is recommended that a site assessment dossier or register be kept for all sites.

Existing facilities should maintain a site dossier to document:

- all the environmental data, decisions, authority correspondence, and any incidents or remediation activities for the site;
- any existing contamination and incidents during on-going activities such as spillages, fire etc;
- environmental baseline data; and
- historical plans, maps, photographs and records of past operations.

This provides a useful record to refer to the site history. Implementing environmental management systems (see EIGA Doc 107, *Guidelines on Environmental Management Systems*) may help in both controlling the risks and systemising the documentation [7].

This register should be kept indefinitely. Many jurisdictions specify a minimum period, for 30 years after site closure in France so that questions can be answered about past activities.

4.5 Guidelines for decommissioning industrial gas facilities

4.5.1 Air separation units

These are generally modular plants that can be taken apart and the individual units potentially reused. For example, compressors, dryers, refrigeration units and even the whole plant itself can be relocated depending on the condition. Where reuse it not possible, the equipment should be dismantled, segregated and recycled as far as practically possible and remainder disposed appropriately as waste. These plants contain a high proportion of metals that can be recycled.

Specific issues that need to be considered when decommissioning air separation units are:

- chemicals, oils and fluorinated refrigerant gases (F gases and ammonia) are flushed from equipment and correctly disposed of or recycled, for F gas requirements see EIGA Doc 192, *Fluorinated Gases Management (under revised Regulation 517/2014)* [8];

- hazardous material such as asbestos, that could be present in insulation or equipment, are identified and dealt with by specialists;

- transformers and capacitors are tested for Polychlorinated Biphenyls (PCBs) before disposal or reuse;

- procedures are established for safe removal of perlite insulation, although perlite is an inert material it can spread over a wide area if released with potential to cause a serious incident or an expensive clean up (see EIGA Doc 146, *Perlite Management*) [9];

- above and below ground oil tanks are identified and removed;

- process and electrical connections are closed off and cut; and

- areas where oil, water treatment chemicals or organic cleaning solvents were used or spilled are checked for contamination.

4.5.2 Acetylene plants

Acetylene plants are modular and may be taken apart and the individual units potentially reused. For example, generators, dryers, and whole plants may be reused. Where reuse it not possible the equipment should be dismantled, segregated and recycled as far as practically possible and remainder disposed appropriately as waste.

Specific Issues that need to be considered when decommissioning acetylene plants are:

- removal of carbide and other process materials for reuse;

- past disposal practices for cylinders, lime or purification, for example were these disposed of on site?

- past or associated site activities such as cylinder massing and de-massing;

- reuse or disposal of current inventory of acetylene cylinders (see EIGA Doc 05, *Guidelines for the Management of Waste Acetylene Cylinders*) [10];

- integrity of lime ponds or pits (past leaks and current status), cleaning lime residuals and filling with non-contaminated materials;

- hazardous material such as asbestos that could be present in insulation or equipment are identified and dealt with by specialists.

- transformers and capacitors are tested for PCBs before disposal or reuse;

- above and below ground oil, acetone or Dimethylformamide (DMF) tanks are identified and removed

- process and electrical connections are closed off and cut, also considering the water supply; and

- areas where acetone, lime, other chemicals (acids, alkalis), mercury (from the purification material), chromic acid or oil were used or spilled are checked for contamination.

4.5.3 Hydrogen plants

Hydrogen plants largely modular and may be taken apart and the individual units potentially reused. Where reuse it not possible the equipment should be dismantled, segregated and recycled as far as practically possible and remainder disposed appropriately as waste. These plants contain some high value metals that can be recycled.

Specific issues that need to be considered when decommissioning Hydrogen plants are:

- removal and disposal of refractory linings containing asbestos or man-made mineral fibre where specific working practices and disposal are required (see EIGA Doc 207, *Safe Operation and Maintenance of Furnaces Insulated with Refractory Ceramic Fibres (RCF)*) [11];
- past practices for disposal of catalyst material, and removal of existing catalyst;
- gaskets between the cells in an electrolyser;
- removal of water treatment, other chemicals and catalyst for reuse;
- hazardous material such as asbestos that could be present in insulation or equipment are identified and dealt with by specialists;
- transformers and capacitors are tested for PCBs before disposal or reuse;
- above and below ground oil tanks are identified and removed;
- process and electrical connections are closed off and cut; and
- areas where oil or water treatment chemicals were used or spilled are checked for contamination.

4.5.4 Cylinder filling plants and distribution depots

There is a relatively small amount of process equipment on these sites, and it is possible to reuse this equipment on other sites depending on the condition. Where reuse it not possible the equipment should be dismantled, segregated and recycled as far as practically possible and remainder disposed appropriately as waste.

Specific Issues that need to be considered when decommissioning filling plants are:

- removal and disposal of pipework that can be contaminated by specialty gases (see EIGA Doc 30, *Disposal of Gases*) [12];
- hazardous material such as asbestos that could be present in buildings or equipment are identified and dealt with by specialists;
- transformers and capacitors are tested for PCBs before disposal or reuse;
- above and below ground oil tanks are identified and removed;
- areas where oil, organic solvent or paint thinners were used or spilled are checked for contamination;
- vehicle parking areas; and
- painting equipment and areas are checked for waste paint and solvents and possible contamination.

4.5.5 Decommissioning of cylinders and contents

Cylinders and their contents at the end of their useful lives shall be treated in accordance with the legislation and industry standards. Guidelines may be found in EIGA Doc 05 and EIGA Doc 30 [10, 12].

4.5.6 Customer facilities and equipment on customer sites

There is a relatively small amount of process equipment on these sites, and it is possible to reuse this equipment on other sites depending on the condition. Typically, the majority of equipment located on customer sites is able to be removed and used again. Where reuse it not possible the materials (for example piping) should be dismantled, segregated and recycled as far as practically possible and remainder disposed appropriately as waste.

Specific Issues that need to be considered when decommissioning equipment on customer sites are:

- liaison with the customer;
- removal and disposal of pipework that can be contaminated by specialty gases (see EIGA Doc 30), especially for electronics facilities [12]; and
- areas where oil or chemicals were used or spilled are checked for contamination.

5 References

Unless otherwise specified, the latest edition shall apply.

[1] Industrial Emissions Directive, IED 2010/75/EU, www.europa.eu.

[2] Integrated Pollution Prevention and Control Directive (IPPC), 2008/1/EC, www.europa.eu.

[3] EIGA Doc 108, *Environmental Legislation applicable to Industrial Gases Operations within the EU*, www.eiga.eu

[4] Council directive 92/57/EEC *on the implementation of minimum safety and health requirements at temporary or mobile constructions sites*, www.europa.eu.

[5] Directive 2004/35/CE *on environmental liability with regard to the prevention and remedying of environmental damage*, www.europa.eu.

[6] Directive 2012/19/EU *on waste electrical and electronic equipment (WEEE)*, www.europa.eu.

[7] EIGA Doc 107, *Guidelines on Environmental Management Systems*, www.eiga.eu.

[8] EIGA Doc 192, *Fluorinated Gases Management (under revised Regulation 517/2014)*, www.eiga.eu.

[9] EIGA Doc 146, *Perlite Management*, www.eiga.eu.

[10] EIGA Doc 05, *Guidelines for the Management of Waste Acetylene Cylinders*, www.eiga.eu.

[11] EIGA Doc 207, *Safe Operation and Maintenance of Furnaces Insulated with Refractory Ceramic Fibres (RCF)*, www.eiga.eu.

[12] EIGA Doc 30, *Disposal of Gases*, www.eiga.eu.

[13] EIGA Doc 137.01, *Environmental Aspects of Decommissioning – Decommissioning Checklist*, www.eiga.eu.

[14] EIGA Doc 88, *Good environmental management practices for the industrial gas industry*, www.eiga.eu.

Appendix A – European definitions of contaminated sites

There is no general European wide definition or agreement on what exactly constitutes a contaminated site.

Data related to contaminated sites is quantitative as well as qualitative information in order to allow comparison among different countries and regions. The term contaminated site can include sites with different levels of environmental and human health impacts, ranging from minor to relevant negative effects. The remediation of contaminated sites can result in a full elimination or in a reduction of these impacts.

When making comparisons between sites in different countries and regions, it is necessary to apply quality criteria for contaminated sites, which are flexible enough to co-exist with national terms and definitions, this is following a suggestion at the first EEA workshop on contaminated land (EEA 1998).

Data on contaminated sites together with the specification of impact levels are much more reasonable and better comparable than data on contaminated sites in general without specification of an impact level. The impact level approach proved to be very practical and easy to implement.

Level 0 – No impacts: no use restrictions (mostly applied at remediated sites)

Level 1 – Minor impact (tolerable contamination); no use restrictions

Level 2 – No significant impacts under current use of environmental media, restricted use only

Level 3 – Significant impacts, action needed

Appendix B – Legal requirements checklist

The list below contains the typical information that is required to comply with the legal requirements in 4.1.2:

- liability, life cycle legislation;
- future uses of the land;
- information required for sale of land;
- requirements of the authorities; and
- change of land use in the surrounding area;

General for all facilities:

- information sources;
- historical operational, past practices and maintenance history;
- land condition;
- storage of hazardous substances and waste (type, location, containment etc);
- on and off-site waste disposals;
- ongoing significant maintenance cost to avoid pollution;
- typical Sources of pollution (see Appendix A);
- records; asbestos survey, ground survey, maintenance, incidents, etc.;
- decommissioning plans / planning;
- utilities, location underground, access, permit to work;
- selection of demolition and waste disposal contractors, segregation of demolition waste, permits for transportation and recycling, disposal;
- timely disposal;
- weather protection during decommissioning;
- health and safety implications;
- residual risk, location and type of residual contamination, pollution prevention measures in place; and
- future uses of the land and relevant remediation standards.

See EIGA Doc 137.01, *Environmental Aspects of Decommissioning – EIGA Decommissioning Checklist*, for an electronic version of the checklist [13].

Appendix C – Checklist for current and former site operations potential sources of pollution

Indicate the current or former operations at the site:

Gas Production	***Yes***	***No***
• Air separation unit		
• Filling plant		
• Gas treatment		
• Acetylene plant		
• Carbon dioxide production		
• Hydrogen production or purification		
• Nitrous oxide production		
• Mechanical workshops		
• Incineration of residual gases		
Other (see below) Others: ….....		
Maintenance		
• Maintenance of cylinders, (painting, heavy metals, acetylene and contaminated cylinders)		
• Tanks (painting and solvent washing)		
• Pipes (cleaning and degreasing)		
• Road tankers (cleaning and degreasing)		
• Cylinder (cleaning and degreasing)		
•		
Depot		
• Gas depot (cylinders / tanks)		
• Above ground tank storage of diesel, gasoline, heating oil, acetone etc		
• Underground tank storage of diesel, gasoline, heating-oil, acetone etc		
Fabrication		
• Solvent washing		
Fuel Stations		
Water Treatment		
Administration		
Other (see below) Others: ….....		

EIGA Doc 88, *Good environmental management practices for the industrial gas industry*, contains a full list of operations on industrial gases sites and possible sources of contamination [14]. Types of typical contamination, sources and common site practices and specific areas of attention are shown.

Examples of what to look for as shown below.

Air separation unit:

- control room:
    - asbestos.
- cooling towers:
    - use of chrome copper arsenate and other wood treatment chemicals – leaching;
    - water treatment chemicals – storage, leaks; or
    - asbestos.

- tanks:
    - perlite insulation.
- water treatment:
    - sludge; and
    - chemicals – use, storage.

- adsorbers;
- transformers:
    - use and storage of PCB/PCTs

- cleaning, degreasing and washing, use and storage of:
    - organic solvents;
    - petroleum hydrocarbon; or
    - chlorinated solvents.

Offices, cylinder filling:

- Oil tanks and storage areas, fuelling stations:

- hydrocarbons;
- other organic solvents, petroleum hydrocarbons, chlorinated solvents, other solvents; or
- cylinders with toxic, corrosive or unknown products.

Acetylene:

- lime ponds or tanks;

- end of like acetylene cylinders;

- neavy metals chromic acid, mercury;
- disposal of purification materials;
- fabrication, storage, washing areas:
  - organic solvents;
  - petroleum hydrocarbons;
  - chlorinated solvents; or
  - heavy metals.

Appendix D – Potential contaminants associated with main industrial sectors

This list may be used to identify potential contaminants that might be present and to give guidance as to what substances might be present and needed to be included in testing of soil and groundwater.

Sector	Contaminant	Example
Gasworks	Coal tar	creosote
	Phenols	phenol
	Cyanide	free / complex
	Sulphur	sulphide / sulphate
Iron and Steel works	Metals	copper, nickel, lead
	Acids	sulphuric, hydrochloric
	Mineral oils	-
	Coking works residues	(as for gasworks)
Metal finishing	Metals	cadmium, chromium, copper, nickel, zinc
	Acids	sulphuric, hydrochloric
	Plating salts	cyanide
	Aromatic hydrocarbons	benzene
	Chlorinated hydrocarbons	1,1,1-Trichloroethane
Non-ferrous metal processing	Metals	copper, cadmium, lead zinc
	Impurity metals	antimony, arsenic
	Other wastes	battery cases, acids
Oil refineries	Hydrocarbons	various fractions
	Acids, alkalis	sulphuric, caustic soda
	Lagging, insulation	asbestos
	Spent catalysts	lead, nickel, chromium
Paints	Metals	lead, cadmium, barium
	Alcohols	toluol, xylol
	Chlorinated hydrocarbons	methylene chloride
	Fillers, extenders	silica, titanium dioxide, talc
Petrochemical plants	Acids, alkalis	sulphuric, caustic soda
	Metals	copper, cadmium, mercury
	Reactive monomers	styrene, acrylate, VCM
	Cyanide	toluene di-isocyanate
	Amines	aniline
	Aromatic hydrocarbons	benzene, toluene
Petrol stations	Metals	copper, cadmium, lead, nickel, zinc
	Aromatic hydrocarbons	benzene
	Octane boosters	lead, MTBE
	Mineral oil	-
	Chlorinated hydrocarbons	trichloroethylene
	Paint, plastic residues	barium, cadmium, lead
Rubber processing	Metals	zinc, lead
	Sulphur compounds	sulphur, thiocarbonate
	Reactive monomers	isoprene, isobutylene

	Acids	sulphuric. hydrochloric
	Aromatic hydrocarbons	xylene, toluene
Semi-conductors	Metals	copper, nickel, cadmium
	Metalloids	arsenic, antimony, zinc
	Acids	nitric, hydrofluoric
	Chlorinated hydrocarbons	trichloroethylene
	Alcohols	methanol
	Aromatic hydrocarbons	xylene, toluene
Tanneries	Acids	hydrochloric
	Metals	trivalent chromium
	Salts	chlorides, sulphides
	Solvents	kerosene, white spirit
	Cyanide	methyl isocyanate
	Degreasers	trichloroethylene
	Dyestuff residues	cadmium, benzedrine
Textiles	Metals	aluminium, tin, titanium, zinc
	Acids, alkalis	sulphuric, caustic soda
	Salts	sodium hypochlorite
	Chlorinated hydrocarbons	perchloroethylene
	Aromatic hydrocarbons	phenol
	Pesticides	dieldrin, aldrin, endrine
	Dyestuff residues	cadmium, benzidine
Wood processing	Coal tar	creosote
	Chlorinated hydrocarbons	pentachlorophenol
	Metalloids / metals	arsenic, copper, chromium

For an example list of contaminants with thresholds and limits for remediation, see information for Flanders: https://navigator.emis.vito.be/mijn-navigator?woId=23568.