



# VOCABULARY HANDBOOK OF POPs-CONTAMINATED SITES

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# Vocabulary Handbook of POPs-Contaminated Sites



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## Disclaimer

The Vocabulary Handbook of POPs-Contaminated Sites provides succinct and accessible explanation of 1312 contaminated sites-related terms, which are commonly used in contaminated site investigation, risk assessment and remediation. Definitions provided in this handbook come from a number of sources, some of which are on the web. Citations should be made to the original documents, which are referenced herein. Figures have been introduced to illustrate definitions or to aid the understanding of the terms. This compilation has been developed by the Chinese Research Academy of Environmental Sciences (CRAES) to facilitate the application of UNIDO's Toolkit on Remediation and Management of POPs-Contaminated Sites. It does not necessarily represent the views or stated policy of UNIDO. While every effort has been made to ensure that this handbook is as clear and accurate as possible, the CRAES will not be held responsible for any remaining inaccuracies. Users of this handbook should satisfy themselves concerning its application to their situations or circumstances.

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## Preface

The management of sites contaminated with POPs has been encouraged by the Stockholm Convention and therefore Parties have committed to address the challenges related to it. It is perceived that POPs stockpiles and wastes exhibit potential contamination to soil and ground water sources if the management measures have not been in place. The Stockholm Convention calls for Environmentally Sound Management of these stockpiles and wastes to prevent leakages to the environment and thereby eliminate harmful effects to human health.

The National Implementation Plans (NIPs) of countries documented the contaminated sites and plan to provide for sustainable management actions and remediation where possible. UNIDO has been in the forefront of developing NIPs and assisting countries to take actions of implementing them taking into account the priorities listed in the NIPs. Particular attention is given to contamination caused by pesticides and PCBs due to their frequent use in agriculture and food production or in industry and energy sectors. Based on its sustained provision of industrialization services and technical assistance to member states, UNIDO has a comparative advantage to work on management of contaminated sites.

UNIDO team of the Stockholm Convention Unit, together with other international partners, has joined effort to make this important reference Handbook available for use by scientists, technicians and practitioners.

Dr. Mohamed Eisa   
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## Foreword

Contaminated sites are recognized as a major environmental issue in both developed and developing countries. The enormous increase in site assessment and remediation activities in the last thirty years has witnessed a corresponding increase in the number of terms used in contaminated sites management. Not only there are newly coined terms or new usages, but there has also been a need to attach more precise meanings to certain terms in a specific context of use. Certainly, an explanation of any of the terms can be found somewhere, but finding the correct source can be time consuming. The attraction of a reference book of definition and the necessity of compiling such a work are, therefore, obvious.

The purpose of the Vocabulary Handbook of POPs-Contaminated Sites is to provide a reference tool for those working in contaminated sites management, including regulators, site assessors, environmental consultants, auditors, landowners, developers and industry. A Chinese-language version of the Vocabulary Handbook of Contaminated Sites has been published in June 2009 to create common understanding and consistent terminology, and encourage standardization in the use of terms and definitions by Chinese agencies, institutions, and organizations, which provide technical support for, set policy for, and/or regulate contaminated sites. This English-language version of Vocabulary Handbook of POPs-Contaminated Sites is developed at the request of United Nations Industrial Development Organization (UNIDO) to aid the application of UNIDO's Toolkit on Remediation and Management of POPs-Contaminated Sites.

A wide variety of terms have been involved in the prevention, identification, investigation, classification, risk assessment, and remediation of contaminated sites. Use of standardized terms helps improve understanding of plans, criteria, guidelines, and project proposals and results, and achieve harmonization of approaches to the management of contaminated sites. This handbook supplements standard environmental dictionaries with terminology specially used for POPs-contaminated sites management. Totally, 1312 terms have been selected and included in this handbook. Each entry has been filled as comprehensively as possible at this stage in the evolution of this handbook. The compilation of the handbook has attempted to avoid the "Fallacies of Definition" based on our knowledge and our experiences in contaminated sites management. The terms have been classified into six categories and their listing has been divided into six sections accordingly:

01. Generic Terms (47 terms);
02. Terms Related to Site Contamination and Environmental Process(290 terms);
03. Terms Related to Site Investigation and Monitoring (279 terms);
04. Terms Related to Site Risk Assessment (298 terms);

05. Terms Related to Site Remediation (282 terms);

06. Terms Related to Contaminated Sites Regulation (116 terms).

The terms are presented in a logical order within each category, and are numbered for ease of reference. Generally, the terms' singular forms are presented unless plural forms are definitely necessary. The terms are laid out as follows:

1. The number for ease of reference.
2. The term being defined in bold, followed by abbreviation or acronym, if any, in parentheses.
3. The definition to provide a common interpretation of terminology.

In some cases, there are multiple parts to a definition; these are shown as 1), 2) etc. In other cases, there is more than one definition for a term; these are listed as (1), (2) etc. Where different terms are used to describe the same concept, they are attached to the same number and separated by a forward slash. The handbook also contains figures (sketches, images, photos, schematics and graphs) designed to illustrate the definitions or to facilitate the understanding of the terms. Most of these figures are adopted from Internet or related guidance documents, and citations should be made to the original sources, which are referenced herein.

For convenience of reference the main body is followed by an index in which terms are listed in alphabetical order.

This handbook is a compilation of existing definitions. Terms provided in the handbook are taken from a number of glossaries of contaminated sites-related terms. Every attempt has been made to use technical literature, including articles, textbooks, dictionaries, and regulatory documents, of which many are on the web. Citations should be made to the original documents, which are listed in the reference section.

The editors would like to thank Dr. Mohamed Eisa (UNIDO) for his encouragement in developing this handbook. We hope that the handbook will be a useful reference to UNIDO's Toolkit on Remediation and Management of POPs-Contaminated Sites.

Editors

May, 2010



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# 01. GENERIC TERMS

## 01.001 Environment

(1) The components of the earth, including air, land and water, all layers of the atmosphere, all organic and inorganic matter and living organisms, and the interacting systems that include all of these components. (2) Everything that surrounds and affects or influences an organism or a group of organisms; it includes both biotic and abiotic components as well as both natural and human-built elements.

## 01.002 Environmental Pollution

Generally, the presence of a substance in the environment that because of its chemical composition or quantity prevents the functioning of natural processes and produces undesirable environmental and health effects.

## 01.003 Chemical Contamination

Contamination of soil or groundwater with chemical contaminants, including inorganic and organic substances, as opposed to biological or radiological contamination.

## 01.004 Physical Contamination

The introduction or presence of harmful substances or forces in the environment that cause damage to the environment and its processes due to their material actions, as through vibration, thermal alteration or electromagnetic radiation.

## 01.005 Radioactive Contamination

Deposition of any radioactive material in any place where it is not desired, particularly where it may be harmful to persons or equipment.

## 01.006 Biological Contamination

Contamination of soil or groundwater with bacteria, viruses and fungi as opposed to chemical or radiological contamination.

## 01.007 Pollution Prevention

The use of materials, processes, or practices to reduce, minimise, or eliminate the creation of pollutants or wastes. It includes practices that reduce the use of toxic or hazardous materials, energy, water, and/or other resources.

## 01.008 Environmental Medium

A major environmental category that surrounds or contacts humans, animals, plants, and other organisms (e.g. surface water, groundwater, soil or air) and through which chemicals or pollutants move.

## 01.009 Solid-Based Medium

Media such as soil, surface soil, subsurface soil, sediment, debris, sludge, and solid waste.

## 01.010 Contaminated Medium

Media affected by contaminants at a site. Types of media include: soil, solid waste, groundwater, surface

water, sediment, sludge, leachate, and residuals.

#### 01.011 Soil

The naturally occurring unconsolidated material on the surface of the earth that has been influenced by parent material, climate (including the effects of moisture and temperature), macro- and micro-organisms, and relief, all acting over a period of time to produce soil that may differ from the material from which it was derived in many physical, chemical, mineralogical, biological, and morphological properties.

#### 01.012 Land

Land is the solid part of the earth's surface or any part thereof. A tract of land is defined geographically as a specific area of the earth's surface. Its characteristics embrace all reasonably stable, or predictably cyclic, attributes of the biosphere vertically above and below this area, including those of the atmosphere, the soil, and the underlying geology, the hydrology, and plant and animal populations, and the results of past and present human activity, to the extent that these attributes exert a significant influence on the present and future uses of land by man.

#### 01.013 Ambient Air

Defined by contrast with specific alternatives such as indoor air, workplace air etc. In general it is usually outdoor air.

#### 01.014 Surface Water

Bodies of water that are above ground, such as rivers, lakes, and streams. It could also include wetland areas where water may be present intermittently according to the season. It can also mean the snowmelt or rain that is flowing on the ground surface.

#### 01.015 Groundwater

Water found beneath the earth's surface, usually in aquifers, that fills pores between such materials as sand, soil, or gravel and that often supplies wells and springs. Because ground water is a major source of drinking water, there is growing concern over con-

tamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

#### 01.016 Sediment

Soil, sand, and minerals washed from land into water, usually after rain or snowmelt. They pile up in reservoirs, rivers and harbors, destroying fish and wildlife habitat, and clouding the water so that sunlight cannot reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to wash off the land after rainfall.

#### 01.017 Environmental Soil Science

Environmental soil science is the study of the interaction of humans with the pedosphere as well as critical aspects of the biosphere, the lithosphere, the hydrosphere, and the atmosphere. Environmental soil science addresses both the fundamental and applied aspects of the field including: buffers and surface water quality, vadose zone functions, septic drain field site assessment and function, land treatment of wastewater, stormwater, erosion control, soil contamination with metals and pesticides, remediation of contaminated soils, restoration of wetlands, soil degradation, nutrient management, movement of viruses and bacteria in soils and waters, bioremediation, application of molecular biology and genetic engineering to development of soil microbes that can degrade hazardous pollutants, land use, global warming, acid rain, and the study of anthropogenic soils, such as terra preta.

#### 01.018 Soil Survey

A general term for the systematic examination of soils in the field and in the laboratory, their description and classification, the mapping of kinds of soil, and the interpretation of soils for many uses, including their suitabilities or limitations for growing various crops, grasses and trees, or for various engineering uses and predicting their behaviour under different management systems.

### 01.019 Agricultural Soil

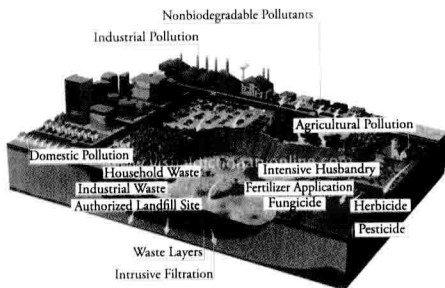
1) Land used for farming, agricultural, horticultural, viticulture, vegetable-growing, market gardening, pastoral, grazing, poultry farming, silvicultural, floricultural or piscicultural purposes, and 2) any other land declare to be farm lands for the purpose of soil.

### 01.020 Urban Soil

A shorthand for all soils located in urbanized, industrial, trafficked, mining and military areas, which are severely influenced by various human activities, but not only by cultivation. Urban soils have a non-agricultural, manmade surface layer produced by mixing, filling, or contamination of land in urban and suburban areas.

### 01.021 Soil Pollution

Soil pollution is defined as the build-up in soils of persistent toxic compounds, chemicals, salts, radioactive materials, or disease causing agents, which have adverse effects on plant growth and animal health.



The major sources of soil pollution  
(<http://visual.merriam-webster.com>)

### 01.022 Soil Protection

A series of preventive, precautionary (including monitoring and risk assessment), and curative measures taken to ensure that fewer substances can escape to the atmosphere and pollute the soil and the maintenance of soil functions.

### 01.023 Soil Quality

All current positive or negative properties with regard to soil utilization and soil functions. Soil quality encompasses two distinct, but related parts: inherent quality, the innate properties of soils such as those that lead to soil formation; and dynamic quality, covering the main degradation processes (physical, chemical and biological) and farm management practices.

### 01.024 Soil Environmental Quality

Environmental quality is a set of properties and characteristics of the environment, either generalized or local, as they impinge on human beings and other organisms. Soil environmental quality is a state of environmental conditions in soils, expressed in terms of indicators or indices related to soil environmental quality standards.

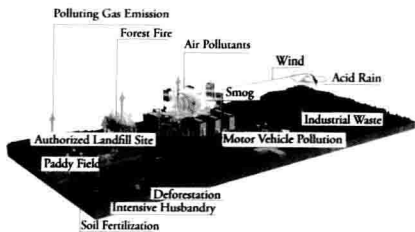
### 01.025 Soil Function

Soil functions describe the significance of soils to man and the environment. Important soil functions include:

- 1) Control of substance and energy cycles as compartment of ecosystems.
- 2) Basis for the life of plants, animals and man.
- 3) Carrier of genetic reservoir.
- 4) Basis for the stability of buildings.
- 5) Basis for the reproduction of agricultural products.
- 6) Buffer inhibiting movement of water, contaminants or other agents into groundwater.
- 7) Reservoir of archaeological remains.
- 8) Reservoir of paleoecological remains.

### 01.026 Air Pollution

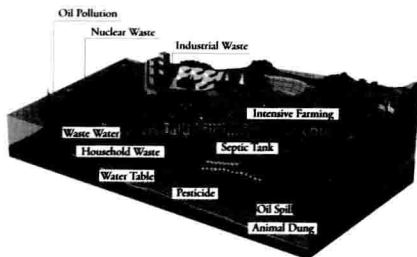
Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damages the natural environment, into the atmosphere.



The major sources of air pollution  
(<http://visual.merriam-webster.com>)

### 01.027 Surface Water Pollution

Surface water pollution is the contamination of surface water bodies such as lakes, rivers, and oceans. All water pollution affects organisms and plants that live in these water bodies and in almost all cases the effect is damaging either to individual species and populations but also to the natural biological communities. It occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful constituents.



The major sources of water pollution  
(<http://visual.merriam-webster.com>)

### 01.028 Source Water Protection

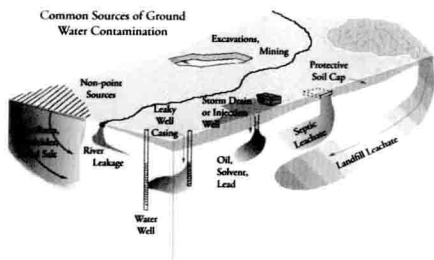
Source water protection means taking positive steps to protecting those water resources (including watersheds, rivers, lakes and aquifers) from contamination (thereby reducing the reliance on treatment of drinking water supplies) or overuse.

### 01.029 Drinking Water Protection

Drinking water protection means implementing strategies within a drinking water protection area to minimize the potential impact of contaminant sources on the quality of water being used as a drinking water source.

### 01.030 Groundwater Pollution

Contamination of subsurface water from agricultural, urban, and industrial uses, including fertilizers, pesticides, septic tank systems, street drainage, and air and surface-water pollution.



The major sources of groundwater pollution  
(<http://www.idahogeology.org/>)

### 01.031 Groundwater Protection

Groundwater protection describes the management processes by which groundwater quality and resources are protected against pollution and over-exploitation.

### 01.032 Greenfield

Land on which no urban development has previously taken place; usually defined as 'greenfield' where located on the periphery of an existing built-up (urban) area.

### 01.033 Brownfield

Land that has been used previously for settlement and industrial or commercial purposes, but is currently not used for these purposes, and maybe derelict. This includes sites that have been used for



mining, quarries, waste dumping sites, military installations, and similar uses.

#### **01.034 Contaminated Land**

Land that contains substances that when present in sufficient quantities or concentrations are likely to cause harm directly or indirectly, to man, to the environment, or on occasions to other targets. Contaminated land is a generic term used to describe parcels of land where hazardous substances are, have been, or are likely to be present in the environment.

#### **01.035 Land Affected by Contamination**

Land that might have contamination present that may, or may not meet the statutory definition of contaminated land.

#### **01.036 Derelict Land**

Land so damaged by industrial or other development that it is incapable of beneficial use without treatment.

#### **01.037 Vacant Land**

Land that was previously developed and is now vacant could be developed without treatment.

#### **01.038 Contaminated Site**

A site at which hazardous substances occur at concentrations above background concentrations and where assessment indicates they pose, or are likely to pose, an immediate or long-term risk to human health or the environment.

#### **01.039 Persistently Contaminated Site**

Contaminated sites with a high percentage of pollutants with long degradation times whose presence cannot be reduced to an acceptable level within 1 to 2 generations through natural degradation and legally tolerated leaching processes.

#### **01.040 Hazardous Waste Site**

A place where hazardous wastes have been dumped, buried or improperly stored. Sites range from a crest of land containing thousands of tons of chemical wastes to a few drums of solvents dumped in a vacant lot.

#### **01.041 Waste Disposal Site**

Inoperative or operative landfills and other disposal sites.

#### **01.042 Reference Site**

A relatively uncontaminated site used for comparison to contaminated sites in environmental monitoring studies, often incorrectly referred to as a control site.

#### **01.043 Control Site**

A site that is undisturbed or unaffected by an activity and therefore can serve as a comparison to assess the state of a site that has been disturbed or affected by an activity. Area control sites are located further away than local control sites.

#### **01.044 Area Control Site**

Sites in the same area (e.g., a city or district) as the sampling site but not adjacent to it. In general, when control sites are anticipated for the purpose of comparison between the sampling and the control sites, local control sites are preferable to area control sites because local control sites are physically close to sampling sites.

#### **01.045 Local Control Site**

Local control sites are usually adjacent or very near the test sample sites. They are generally upwind or upstream of the sampling site. Whenever possible, local control site samples should be taken first, to avoid contamination from the sample site.

#### **01.046 Accident Site**

The location of an unexpected occurrence, failure or loss, either at a plant or along a transportation route, resulting in a release of hazardous materials.

#### **01.047 Orphan Site**

A contaminated property for which the owners or other parties responsible for the contamination are either unknown, insolvent or otherwise unavailable to undertake or fund the required remediation.

## 02. TERMS RELATED TO SITE CONTAMINATION AND ENVIRONMENTAL PROCESS

### 02.001 Contamination

The condition or state of soil, water, or air caused by a substance release or escape that results in an impairment of, or damage to, the environment, human health, safety, or property.

### 02.002 Potential Contamination

The state that a target located within the target distance limit that is subject to a potential release of hazardous substances from the site or which no actual contamination has been established.

### 02.003 Residual Contamination

The state that contaminants left at a site after the risks posed by the site have been reduced and the site no longer threatens people or the environment, or that currently is not possible to remove; Amount or concentration of contaminants remaining in specific media following remediation.

### 02.004 Non-Point Source Pollution

Contamination which does not come from one specific source, instead it is a collection of contaminant sources from a vast area.

### 02.005 Point Source Pollution

Contamination that comes from one specific source,

for example a pipe, sewer, or container.

### 02.006 Diffuse Pollution

Pollution from widespread activities with no one discrete source, e.g. acid rain, pesticides, urban runoff, etc.

### 02.007 Observed Contamination

The evaluation of a release of a hazardous substance to the ground surface based on analytical data appropriate for the soil exposure pathway.

### 02.008 Deposition

The lying, placing, or throwing down of any material.

### 02.009 Emission

The release of a substance into the atmosphere from either a "point" or a "diffuse" source. (A point source is one whose dimensions are small compared with the distance to the observation point, e.g. a smoke-stack seen from afar.)

### 02.010 Release

A release is any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, leaching, dumping, or disposing into the environment of a

hazardous or toxic chemical or extremely hazardous substance.

#### **02.011 Suspected Release**

A professional judgment preliminary assessment conclusion based on site and pathway conditions that a hazardous substance is likely to have been released to the environment.

#### **02.012 Observed Release**

The evaluation of a release of a hazardous substance to the environment based on analytical data of the migration pathway or direct observation of the release into the migration pathway media.

#### **02.013 Potential Contamination Source**

A substance, activity or land-use that could adversely impact public health and/or environmental quality.

#### **02.014 Contamination Source**

An area where a hazardous substance may have been deposited, stored, disposed, or placed. Also, soil that may have become contaminated as a result of hazardous substance migration. In general, however, the volumes of air, groundwater, surface water, and surface water sediments that may have become contaminated through migration are not considered sources.

#### **02.015 Point Source**

A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack..

#### **02.016 Non-Point Source**

The term non-point source is used to identify sources of pollution that are diffuse and do not have a point of origin or that are not introduced into a receiving stream from a specific outlet. Common non-point sources are rainwater, runoff from

agricultural lands, industrial sites, parking lots, and timber operations, as well as escaping gases from pipes and fittings.

#### **02.017 Line Source**

Line source means a one-dimensional source. An example of a line source is the particular emissions from a dirt road.

#### **02.018 Area Source**

Any source of air pollution that is released over a relatively small area but which cannot be classified as a point source. Such sources may include vehicles and other small engines, small businesses and household activities, or biogenic sources such as a forest that releases hydrocarbons.

#### **02.019 Diffuse Source**

Widespread sources of contamination such as the contents of landfill sites, residential areas or large industrial complexes containing a number of point sources.

#### **02.020 Harmful Substance**

Substance that, following contact with an organism can cause ill health or adverse effects either at the time of exposure or later in the life of the present and future generations.

#### **02.021 Hazardous Substance**

Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.

#### **02.022 Waste**

By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity).



### 02.023 Ignitable Waste

Ignitable wastes can create fires under certain conditions. Examples include liquids, such as solvents that readily catch fire, and friction-sensitive substances.

### 02.024 Corrosive Waste

Corrosive wastes include those that are acidic and capable of corroding metal such as tanks, containers, drums, and barrels.

### 02.025 Reactive Waste

Reactive wastes are unstable under normal conditions. They can create explosions and/or toxic fumes, gases, and vapors when mixed with water.

### 02.026 Solid Waste

Non-liquid, non-soluble materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes also include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid waste also refers to liquids and gases in containers.

### 02.027 Municipal Solid Waste

All solid waste generated in an area except industrial and agricultural wastes. Sometimes includes construction and demolition debris and other special wastes that may enter the municipal waste stream. Generally excludes hazardous wastes except to the extent that they enter the municipal waste stream. Sometimes defined to mean all solid wastes that a city authority accepts responsibility for managing in some way.

### 02.028 Construction and Demolition Waste

Waste building materials, dredging materials, tree stumps, and rubble resulting from construction, remodeling, repair, and demolition of homes, commercial buildings and other structures and pavements. May contain lead, asbestos, or other hazardous substances.

### 02.029 Hazardous Waste

(1) A solid waste or combination of solid wastes which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: A) Cause or contribute to an increase in mortality or to a serious, irreversible, or incapacitating reversible illness; or B) Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Hazardous wastes may be listed (named on a list within a regulation) or characteristic (exhibits one of the four characteristics: corrosive, toxic, ignitable or reactive). (2) By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. To be considered hazardous waste, the waste must possess at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity).

### 02.030 Non-Hazardous Waste

Waste that poses no risk of injury or infections. Non-hazardous waste is neither inert nor classed as special and does not fall within the hazardous waste classification. Basically, the difference between hazardous and non hazardous waste is whatever the regulator of choice decides it is. It's fairly arbitrary. It may be based on corrosivity, or the presence of various contaminants like chromium or cyanide above some limit of concentration, or any number of other things.

### 02.031 Inert waste

Inert waste is waste which is neither chemically or biologically reactive and will not decompose. Examples of this are sand, drywall, and concrete. This has particular relevance to landfills as inert waste typically requires lower disposal fees than biodegradable waste or hazardous waste.