

# SBA

*Sustainable Business Associates*

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## **WASTES: PCB/PCT**

### **INTRODUCTION**

All production and consumption system conducts inevitably to generation of wastes and by-products that have to be managed.

Up to now, this activity was relatively independent of production and consumption, if we except wastes and by-products which have an evident use: precious metals dusts, sludges and dungs...

The necessary constraints of environment protection and rational management of energy and natural resources are now at the origin of an activity in full development centred on optimal wastes administration.

These last reflexions apply as far as PCB and PCT are concerned. They have conducted, among other things, to the very strong use restrictions taken towards these products.

### **CHARACTERISTICS AND USE OF THESE PRODUCTS:**

PCB or Polychlorinated biphenyls, and PCT or Polychlorinated terphenyls, are organic chlorinated chemical products. PCB are used for their great thermal stability and their electrical properties. These characteristics allow to use them as heat-carrier fluids for heat transfer in various industrial installations, or for electrical transformers and condenser filling up as dielectric fluids.

They have also, in the past, other applications now forbidden:

Metal cutting hydraulic oils

Additives in plastic materials, paint, lacquers, varnishes, glues, papers, inks...

Additives in insecticides formulation, bactericides...

Industrial PCB are complex mixtures of chemical PCB, solid, thick or liquid.

They are insoluble in water but soluble in most of organic solvents and in vegetable oils.

They correspond to the general formula:  $C_{10}H_{10-X}Cl_X$  with X contained between 1 et 10.

### **DANGERS**

Environment: These products are classed as dangerous for the environment. They are stable and no biodegradable, persistent, and little or not soluble in water

Human health:

Different accidents were noted down:

1966, Jansen discovers in Sweden traces of PCB in animals tissues, far from pollution sources,

1968, Yuso accident in Japan: contaminated rice consumption by about 2000 peoples

1981 France (Reims) : discovery of chlorinated benzofuran and maybe dioxins in soot collected after a transformer fire, bringing these oils use to specialists attention.

### **GENERATED POLLUTION:**

It was proved that PCB use may lead to two pollution types.

### **COLD POLLUTION**

Because of their great chemical stability (which in principle could constitute an innocuousness criterion) PCB, little biodegradable, pile up in living organisms thanks to their liposolubilité (solubility in fats). Because of that, they concentrate all along the alimentary chains.

### **PELAGIC ORGANISMS OF MEDITERRANEAN SEA**

ORGANISMS	Concentration in g/kg	Concentration Factor
Micro plankton I	4500	70 000
Trophic Level II	620	50 000
Trophic Level III	470	47 000
Surface Water		0,0025

This cold pollution is caused by the PCB (Pyralène, Askarel...) used in such fields as cutting fluids, paint additive, lacquers or insecticides formulations.

That is an "open" pollution because PCB is easily scattered in the environment.

### **HOT POLLUTION**

A PCB combustion (transformer fire) may generate toxic products which we find particularly in soot.

That are mainly Polybrominated dibenzofurans (PCDF) and Polychlorinated dibenzo-*p*-dioxins (PCDD). Their real presence is often contested in the cases of pure PCB fires, but is rather attributed to Trichlorobenzenes (TCB) often present in mixture with PCB. There are in theory 754 isomers of PCDD and 135 isomers of PCDF.

The monochlorinates, dichlorinates, trichlorinates, heptachlorinates and octachlorinates are considered not toxic.

The more toxic considered isomers are those having four Chlorine atoms placed in positions 2,3,7,8. This is the Dioxin found during Seveso disaster.

### **BANNING OF PRODUCTION**

Taking into consideration the presented risks, even if some people still wonder about the real danger, the PCB production (Askarel, Pyralène...) is now stopped and measures are taken to manage existing installations with greater security.

## **PRODUCTS AND WASTES TREATMENT**

The elimination of removed from market stocks and old electrical transformers is the subject of specific industrial treatment, particularly by incineration which gives a complete oils destruction, converting them in water, carbon dioxide and hydrochloric acid (temperature of 900°C minimum, with stay time of product vapours of 2 to 5 seconds).

### **PCB SUBSTITUTES**

Substitutes to PCB are progressively available in the market. It is a matter of: Insulating halogen liquids for transformers (LITH). They are biodegradable products having technical characteristics similar to those of PCB.  
New types of transformers using other insulating and cooling materials.

### **CONDITIONS OF PCB DESTRUCTION**

Electrical reformed transformers must compulsorily be the subject of particular treatment which consists to the following operations. These ones have absolutely to be assured by a specialized enterprise authorized by local authorities.

Equipment removal and transport in place of origin. These operations have to be the subject of particular conditions to assure in full security these movements. The rules in force oblige to entrust these operations to authorized carriers and collectors.

Operations to be made by the authorized Enterprise:

Apparatus draining and rinsing with appropriate solvent. The whole of products generated by these operations are considered as PCB wastes.

Equipment dismantling with cleaning and rinsing of elements which have been in contact with PCB.

Recovery of solid products particularly the metals (copper) which could be valorised. The cardboards and papers are incinerated in the same conditions as PCB.

Incineration of wastes containing PCB.

This operation must be done in approved incinerator for destruction of products of PCB type. Those apparatus are the subject of specific characteristics on incineration conditions and dust rejection (toxic dioxins emissions at chimney exit).

Any other installation cannot and have not to incinerate these products. The waste emitter must to make sure of the agreement before to entrust his waste to the treatment enterprise. His responsibility could be sued.

The loose and in barrels stocked liquid wastes must be the subject of special stocking conditions to exclude pollution risks of ground, surface and underground waters. (packaging, tanks and annexes watertight and on retention tanks sufficiently dimensionned and perfectly watertight).

The stocked products must be labelled in accordance with local legislation in force. These products stockage protection against fire must be respected with very great rigour. (instructions and means to put in place, prevention of domino effect).

All these operations are subject to a wastes follow-up slip which permits to follow, from beginning to end, the exact waste elimination conditions. (collection, transport, preparation, salvage, incineration, definitive unloading of waste transmitter).

### **WASTES TRANSFER PROBLEMS**

The dangerous wastes transfer are the subject of the legislation which respond to the United Nations Programme (UNEP) by Bales Convention application. This convention is intended to control transfrontier movements of dangerous wastes and their elimination conditions. It set furthermore, the legal context in which a transfer of those wastes between countries may be made.

A precise point on these conditions has to be made at local level to determine the exact applicable conditions between Algeria and European community countries.

### **CONCLUSION**

These thoughts are the simplified result of a compilation of the applied rules in all of the Countries of the European community. For the numbered data, we will see after which will be necessary following the problem evolution.

Taking into consideration the dangerous aspect of these products, the Algerian rules would have to be also demanding?

REMARK: I have consulted various approved organisms for the treatment, transport, collection, the apparatus dismantling, and products destruction with possibility of treatment in France. I am waiting for the answers with regard to Bales convention.

Philippe  
Consultant  
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Carbonnier  
Environnement