

Session S-5

Sources of Unintentional by-products

Manufacturing Sector

This sector includes manufacturing of chemicals and of products that use materials containing Persistent Organic Pollutants (POPs), such as textile manufacturing for example. Releases of POPs from these types of activities occur mainly through solid waste products or through discharges of liquids and sludges.

The following table summarizes some manufacturing processes and the POPs they emit.

Industry or Process or Product Use	Special Indicators	POPs Emissions
Production of chlorinated organic chemicals	Chloro-aromatics (phenols, benzene, etc.), chlorine solvents, oxychlorinators	PCDD/PCDF, PCB, HCB
Cl ₂ production using graphite electrodes		PCDD/PCDF, HCB
Oil refining and catalyst regeneration		PCDD/PCDF, PCB, HCB
Pulp and paper production	Cl ₂ bleaching	PCDD/PCDF

Product Application and Use

This category includes consumer goods, industrial manufacturing processes and products, and chemical stockpiles.

Examples of these are presented in the table below.

Industry or Process or Product Use	Special Indicators	POPs Emissions
Pesticide/herbicide application	2,4,5-T, Pentachlorophenol (PCP)	PCDD/PCDF, HCB
Textile/wool/leather dyeing and finishing	Use of chloranil, alkaline extraction	PCDD/PCDF
Industrial bleaching processes	Use of chlorine	PCDD/PCDF
Transformer and electrical equipment use	PCB-oil	PCB
Solvent use and application	De-greasing, dry-cleaning	PCDD/PCDF, PCB, HCB
Use of paint containing PCB or PCP	Mostly from old stockpiles	PCB

Recycling Processes

The table below includes examples of recycling processes that may lead to emissions of Persistent Organic Pollutants (POPs) excluding thermal processes, which are addressed in following section on Thermal Processes.

Industry or Process or Product Use	Special Indicators	POPs Emissions
Metal (including vehicle) recycling	By-products, i.e. shredder, waste oil, refrigerant, electronic scrap	PCDD/PCDF, PCB, HCB
Paper recycling	De-inking sludge	PCDD/PCDF
Sewage and paper sludge and effluent application on land, i.e. fertilizer	Agriculture, composting	PCDD/PCDF, PCB
Solvent recovery	Residue sludge	HCB
Waste oil recovery		PCB
Plastics recycling	Extrusion	PCDD/PCDF
Metal fly ash recycling	Extraction	PCDD/PCDF

Thermal Processes

Practices involving elevated temperatures and combustion processes can be important sources of Persistent Organic Pollutants (POPs). The operational characteristics of a particular process such as materials used, effectiveness of combustion, and pollution control mechanisms are critical to the amount of POPs released.

The table below includes various thermal activities and corresponding POPs they are likely to release. Processes are separated in two groups, namely controlled and uncontrolled combustion.

Industry or Process or Product Use	Special Indicators	POPs Emissions
Iron ore sintering for blast furnaces	Fly ash re-circulation	PCDD/PCDF
Primary copper smelting		PCDD/PCDF
Secondary scrap metal processing, including steel, aluminum, lead, zinc, copper and magnesium	Cable burning, metal recovery from flyash	PCDD/PCDF, PCB
Coke production and carbo-chemical processes	Use of lignite/brown coal	PCB, HCB, PCDD/PCDF
Cement kilns	Use of halogenated hazardous waste as a fuel source	PCDD/PCDF, PCB, HCB
Mineral processing (lime, ceramic, glass, brick)	Small scale, uncontrolled	PCDD/PCDF
Municipal waste incineration (technological)	Old, Air Pollution Control (APC)-unequipped	PCDD/PCDF

Industrial waste combustion (technological)	Old, APC-unequipped	PCDD/PCDF
Waste wood combustion (technological)	Treated wood	PCDD/PCDF
Hazardous waste incineration (technological)	Old, APC-unequipped	PCDD/PCDF
Sludge incineration (technological)	APC-unequipped, batch-type incinerator	PCDD/PCDF
Medical/clinical waste incineration	APC-unequipped, batch-type incinerator	PCDD/PCDF
Crematorium and animal carcass burning	APC-unequipped	PCDD/PCDF
Wood/biomass combustion (technological)	Large quantities, salt content	PCDD/PCDF
Landfill gas/biogas combustion	APC-unequipped	PCDD/PCDF
Coal combustion (technological)	Brown coal/lignite, old, small	PCB
Internal combustion engines (i.e. vehicles and stationary motors)	Leaded gasoline, Diesel, old, low maintenance	PCDD/PCDF, PCB
Biomass burning (intentional, uncontrolled)	Forest, bush, agricultural residues (i.e. straw)	PCB, PCDD/PCDF
Accidental fires (unintentional, uncontrolled)	Industrial complexes, warehouses, residential houses	PCDD/PCDF, PCB
Landfill fires (unintentional and intentional)	Uncontrolled (backyard) burning	PCDD/PCDF, PCB
Plastic container/barrel burning	Halogenated plastic	PCDD/PCDF
Rubber/tire/cable/circuit board waste		PCB

The last 5 practices take place in facilities that are not equipped with air pollution control systems and consequently, the amounts of POPs they release are typically high.

Waste Disposal and Reservoirs

The following table summarizes possible sources of Persistent Organic Pollutants (POPs) from non-thermal waste disposal processes and from existing reservoirs, i.e. stockpiles.

Industry or Process or Product Use	Special Indicators	POPs Emissions
Landfills and leachate from these	Sludge, fly ash, metal ash	PCB, HCB
Ocean dumping	Solid/sludge/liquid waste	PCDD/PCDF
Transformer storage/stockpiles	PCB-oil	PCB

PCP-treated wood	Telephone poles, railroad ties	PCB
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