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**CHLORINATED PESTICIDE SCREENING TEST FACT SHEET**

**INTRODUCTION**

Chlorinated hydrocarbon pesticides have been widely used throughout the world since the early 1940's. While the DDT family is the best known, it is only one of a large number of related compounds used for a variety of pest control needs. The compounds belong to related chemical classes of aryl, carbocyclic, or heterocyclic groups with molecular weights of 300 - 500. Humans can be exposed through ingestion of contaminated food and water, inhalation of dust or vapors, and by direct skin contact. These chlorinated hydrocarbon compounds have a great affinity for lipid-rich tissues and can accumulate in various organs. Adipose tissue concentrations 300 - 500 times greater than serum levels have been documented for members of this class. These compounds are extremely persistent in the environment and may have effective half-lives in actual use in excess of 20 years. The primary acute toxic effect of this family of pesticides is at the site of nervous tissue and muscle membranes. However, a wide variety of other toxic actions have been established in human and experimental animal studies, including changes in CNS biogenic amine levels, induction of mixed function oxidase activity in the liver, and changes in enzymes associated with gluconeogenesis. At the clinical level, toxic effects include induction of chemical hepatitis, anemia, dermatitis, a chronic neuro-psychiatric syndrome, and for a number of the compounds, carcinogenic potential in animal studies. The exact body tissue storage levels for each compound varies, but a number of factors are known to influence metabolic and subsequent turnover; among them: vitamin levels, drug use, other hydrocarbon exposures, and multiple pesticide interactions.

**ALDRIN & DIELDRIN**

These related compounds are broad-spectrum cyclodienes widely used for agricultural purposes for 20 years until general use was suspended by EPA in 1974. They are still used in the U.S. today for termite control, and continue to be widely used for general purposes elsewhere in the world. In the body, aldrin is rapidly converted to dieldrin, which is the usually observed storage form. When aldrin is seen, it often implies a relatively recent exposure. (Trade names-HHND, Aldrex, Octalene, Toxadrin, Alvit, Octolox, Panorama)



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**ENDRIN**

Endrin is extensively used on field crops. The biological half-life of endrin is relatively short compared to other class members, perhaps a week or less, but it is considered to have a rather high relative toxicity for the class. Endrin exposure can increase urinary steroid excretion, and affect CNS biogenic amine concentrations. (Trade names - Endrex, Hexadrin)

**LINDANE** (gamma-BHC, alpha-BHC, beta-BHC, delta-BHC)

All BHC isomers are readily absorbed from the lungs, skin, and gastrointestinal tract. The predominant body storage form is the beta isomer, followed by the parent gamma isomer (lindane), though all forms have been detected. Lindane is used primarily in the U.S. to treat seeds and soil, and for beetle control in wood sources. The lindane family is metabolized in the liver and excreted by the kidneys. Lindane's toxic effects include aplastic anemia and epileptic seizures from high exposures, while the other isomers are CNS depressants. Case reports exist on tumor induction in humans, particularly childhood neuroblastoma. (Trade names - Benzene Hexachloride, Acitox, Hammer, Lindagam, Silvanol)

**CHLORDANE** (alpha-CHLORDANE, gamma-CHLORDANE, HEPTACHLOR, HEPTACHLOR EXPOXIDE, trans-NONACHLOR)

Chlordane and Heptachlor mixtures are the predominant termiticides used in the U.S. today, though chlordane is also found in many household and garden products. They are efficiently absorbed by all three major routes of exposure. Chlordane has a biological half-life of 3 months and an environmental persistence in excess of 20 years. Heptachlor use has been restricted since 1978 to certain crops, some seed treatments, and termite control, in amounts of 1-2 million pounds annually. The parent compound is converted in the liver to heptachlor epoxide, an observed storage metabolite. (Trade names - Chlortox, Chlordrite, Termex, Octa-Klor, Chlor-Kil)

**DDT, DDE, DDD**

DDT and its partially dechlorinated derivatives, DDE and DDD, are commonly found in U.S. residents. Studies have shown a biological half-life exceeding 2 years, which is probable even longer at lower exposure levels. Precisely 60% of the population tested have detectable DDT - related residues despite the elimination of widespread use in the U.S. after 1973. Recently, DDT contamination hot spots have occurred in Texas, California, and the Pacific Northwest, presumably from use of bootleg stores and the importation of DDT and contaminated products from Mexico



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and elsewhere. Recent concern has also centered on contamination with DDT in another widely used pesticide known as Dicofol (Kethane), which the EPA is considering for special restrictions. (Trade names - Anofex, Zerdane, Digmar, Pentschlorin, Neocid)

### **HEXACHLOROBENZENE**

Hexachlorobenzene is used directly as a fungicide, is frequently found as a contaminant of other fungicides, and its greatest exposure potential occurs from its unavoidable presence in the manufacture of chlorinated solvents (such as perchloroethylene) which are nearly ubiquitous in the general environment. HCB is recognized as a liver toxin and has produced epidemic disease cases of porphyria cutanea tarda in humans during gross environmental contamination. (Trade names - No Bunt, Anticarie, Granero, Res-Q)

### **ENDOSULFAN (ENDOSULFAN I, ENDOSULFAN II, AND ENDOSULFAN SULFATE)**

Commercial endosulfan is a 70% : 30% mixture of isomers I and II. It was first registered for use in the U.S. in 1960, and is available in powder, granular, and liquid concentrate formulations. Its primary uses are for agricultural purposes, except livestock. It is not used on stored products, nor against household pests. The observed biological half-life is 1 - 2 weeks for endosulfan. Both endosulfan I and endosulfan II are known to be metabolized to endosulfan sulfate. Adverse health effects in animal studies include liver, kidney, and reproductive damage in addition to the primary neurological toxicity expected. (Trade names - Endosol, Sulfanex, Thionate, GoldenLeaf Tobacco Spray)

### **METHOXYCHLOR**

Methoxychlor is a widely used insecticide because of its long residual action against many species of insects. It is a replacement for DDT. Methoxychlor is very soluble in both aromatic and chlorinated solvents, as well as ketone solvents.

### **MIREX**

Mirex was introduced in 1959 and has been widely used in the southern and western U.S. for fire ant control formulated as granules impregnated with vegetable oil. The primary toxicity occurs following ingestion, with little contact activity. Mirex is noted as a hepatic enzyme inducer, and causes a variety of adverse reproductive and hematological effects in animal studies. Cataracts have been induced in two feeding studies. It is persistent in fat stores, with a biological half-life of 3 - 4 months. (Trade names - Dechlorane, GC-1283)

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**PCB** (POLYCHLORINATED BIPHENYLS)

These compounds are valuable as insulating coolants in electrical transformers and capacitors, and are found in paints, coatings, varnished, high-pressure lubricants, and cutting fluid additives due to their chemical stability and non-flammability. They can be found as oily liquids or waxy solids. In commercial use, PCBs are normally complex isomeric mixtures, usually described by the chlorine content. PCBs are easily absorbed, and accumulate in body tissues secondary to poor metabolism. Toxic effects include a persistent dermatitis, chloracne, liver damage, disturbances of triglyceride metabolism, and gastric and neurological damage. PCBs may be contaminated with levels of other significantly toxic compounds such as dioxins and dibenzofurans. Firefighters and hazardous waste operators are at high risk for exposure.

**PENTACHLOROPHENOL**

Pentachlorophenol was first used as a wood preservative commercially in 1936 and is still widely used for this purpose today. Practical uses for pentachlorophenol include treatment of leather, textiles, photographic solutions, adhesives, and finished paper products. Over-exposure can result in dermatitis, anemia, and liver damage.

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