DDT (4,4=-DDT or p,p=-DDT) & DDE (4,4=DDE or p,p=-DDE)

DDT: ($C_{14}H_9Cl_5$; CAS #50-29-3) DDE: ($C_{14}H_8Cl_4$; CAS #72-55-9) (Pesticides)

DDT synonyms include 1,1,1-trichloro-2,2,-bis(p-chlorophenyl)ethane
4,4=-dichlorodiphenyl trichloroethane

DDE synonyms include 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene
dichlordiphenyldichlorethylene

SOURCE/USE

DDT must be created by chemical synthesis and most preparations contained significant proportions of related compounds, many of which also possess insecticidal activity. DDE is a component of technical grade DDT and is also a metabolite of DDT. DDT has been banned from general use in the U.S. since 1972 because it was accumulating in the environment and possibly hurting wildlife and because of cancer incidence in animal tests. It is still available for emergency use by public health officials and the military for certain situations involving insect borne disease prevention.

ROUTES OF EXPOSURE

DDT/DDE are well absorbed after ingestion and after skin exposure when dissolved in oily carriers. They are less absorbed from lung and are most likely to be cleared and removed through mucus, swallowed, and absorbed in the gut. DDT/DDE are stored in fat tissue of animals as well as man, and the most common source of human exposure currently is through the food chain. The risk of any acute DDT/DDE exposure off post due to the RMA remediation activity is very small, but in any such exposure, the most likely route of exposure would be inhalation. Also, the concentrations resulting in acute clinical effects discussed in this document reflect occupational exposures or animal studies and are much higher than those likely to be encountered at the fence line during remediation at the RMA.

APPLICABLE STANDARDS AND LIMITS	
ATSDR MRL	Not Available
OSHA PEL (DDT)	1 mg/m^3
ACGIH TLV (DDT)	1 mg/m^3
NIOSH REL (DDT)	0.5 mg/m^3
Odor threshold	Not Available
RMA acute fence line criteria	ARC - ✍ MARC - ✍
RMA chronic fence line criteria	Cancer - 0.028 $\mu g/m^3$ Noncancer - 1.8 $\mu g/m^3$

✍- Inadequate data. Cancer and noncancer chronic criteria will be used to evaluate and limit site emissions.

The goal of the remediation is exposure prevention through remedial design, environmental monitoring, and modeling. Failure of prevention could result in acute and/or chronic exposures. Following is an overview of the types of health effects associated with DDT/DDE exposure.

ACUTE HEALTH EFFECTS

Studies in human volunteers and cases of accidental human ingestion plus animal studies, establish that acutely toxic levels of DDT/DDE cause excitation of the CNS, including tremors and convulsions. Headache, nausea, vomiting, disturbance of sensation in the skin of the lower face and lips, dizziness, loss of equilibrium, confusion, malaise and fatigue also occur. In humans, symptoms have generally cleared within 72 hours.

No remarkable acute effects of DDT/DDE on the respiratory system were found in man or animals other than mild irritation.

DDT/DDE are mildly irritating to skin and eye. Much of this effect is possibly due to solvent carriers. Transient rash from direct application of powder to skin resolves when exposure stops.

The liver is a major target of effect in animals in acute and chronic exposures. Adaptive changes with eventual tissue damage occur in animals. Human exposure is associated with temporary elevation of liver enzymes in serum, which is considered a marker for liver toxicity. Severe liver damage was not noted.

Minimal cardiovascular effects in animals are reported. Damage to the blood forming organs, the marrow and lymphatic tissue, the immune system and an estrogen-like effect on the reproductive system are shown in animal studies with marked variation between species. Reduced fertility, loss of embryos, and impaired development of fetuses are demonstrated in some species, but there does not appear to be any increase in birth defects. DDT/DDE can cause damage to kidney tissue in experimental animals.

CHRONIC HEALTH EFFECTS

Several studies of workers exposed to technical DDT/DDE did not show any specific human health effect related to chronic DDT/DDE exposure. However, DDT/DDE are found in the fat tissues of exposed humans and have relatively slow clearance rates from the body.

EPA classifies DDT/DDE as probable human carcinogens. Reproductive toxicity and cancer are shown in animal studies. There is some weak human data and considerable animal data in a variety of species to demonstrate that DDT and DDE are capable of at least some toxicity to chromosomes and genetic content.