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227.71 Limiting Permissable Concentrations

A. 2,4-D and 2,4,5-T toxicity studies using freshwater and marine aquatic organisms were accomplished by the USAF Environmental Health Laboratory at Kelly AFB Texas (EHL/K). Also, sea water hydrolysis studies were performed. These studies together with an extensive literature review were used to characterize the expected effects and behavior of Orange herbicide components in aquatic systems. A thorough discussion of the findings ~~are~~ in Section F4, Part II of the Environmental Statement on the "Disposition of Orange Herbicide by Incineration".. In the discussion, the following generalizations were made:

(1) 2,4-D and 2,4,5-T are metabolized by fish.

(2) 2,4-D and 2,4,5-T do not undergo biomagnification through the food chain.

(3) Ester forms of 2,4-D and 2,4,5-T are usually more toxic to aquatic animals than are the parent acid forms so that hydrolysis is an important factor in reducing the toxicity of the esters.

(4) 2,4-D and 2,4,5-T and their N-butyl esters (NBE) rapidly disappear from sea water, via mechanisms of hydrolysis, metabolism and chemical interactions.

B. In acute toxicity studies by EHL(K), the 48 hr LC_{50}^{*} values in the shrimp (Penaeus sp.) were 5.6 ppm for 2,4-D NBE and 33 ppm for 2,4,5-T NBE. Oysters (Crassostrea virginica) were exposed to ~~[illegible]~~ concentrations of 2,4-D NBE ranging from 0.5 ppm to 85 ppm. The only acute effect observed was the death of one of the oysters (10%) in the highest concentration at 48 hours. Using the above toxicity data the limiting permissible concentrations are ~~[illegible]~~ 0.056 ppm for 2,4-D NBE and 0.33 ppm for 2,4,5-T NBE. Because of the

highly toxic nature of 2,3,7,8 TCDD, limits are proposed to be 0.0001 ppm based on detection limits, ~~rather than toxicity data~~.

*TL_{50} and LC_{50} (Tolerance Limit and Lethal Concentration) are concentration values statistically derived from the establishment of a dose-related response of experimental organisms to a toxicant. The LC is based on a measured response of death only. The TL is based on a count of unaffected organisms. The subscript number for both indicates the percent response expected for the calculated concentration. Therefore, in most cases, the TL_{50} = LC_{50} or the concentration in which 50% death is expected. Note that a more toxic chemical has a smaller LC_{50}.