APPENDIX K

Ecological Toxicity Profiles

ECOTOXICITY PROFILES

Metals

Most metals occur naturally in the environment; however anthropogenic activities may increase concentrations over naturally occurring concentrations. Assessing the mobility and persistence of metals in environmental media is complicated and often difficult because of the many inorganic and organic complexes and salts they form. In addition, metals undergo a variety of processes in soil which included hydrolysis, reduction, oxidation, and adsorption. These reactions are highly dependent on factors such as pH, salinity, sulfides, oxygen, ionic strength, particle-surface reactions, and the presence of anions and natural organic acids (humics and fulvics). Adsorption of metals through cation exchange, specific adsorption, co-precipitation, or organic complexation by organic matter in soil is the dominant fate mechanisms in natural systems (Shacklette and Boerngen, 1984).

Copper

Copper is an essential micronutrient; however at higher concentrations it is toxic. Exposure to concentrations of copper in excess of dietary needs causes adverse health effects including liver and kidney damage, anemia, immunotoxicity, and developmental toxicity in animals. Copper is also toxic to plants. An overabundance of copper in soil may result in stunted plant growth, chlorosis, or wilt (Wren, 1986).

Mercury

Mercury has no known normal or beneficial biological function in wildlife. It is a mutagen, teratogen, and carcinogen that adversely affects the central nervous, renal and reproductive systems. Mercury binds with sulfhydrl groups on proteins resulting in numerous sites and modes of action, the most important of which is inhibition of cellular division. Mercury bioconcentrates in wildlife tissue and is further magnified in the food chain. Among carnivorous species, mercury levels are generally highest in fish-eating animals (Wren, 1986).

PAHs

Polycyclic aromatic hydrocarbons (PAHs) are chemicals formed during the incomplete or low temperature burning of coal, wood, oil, gas, garbage, and various other organic materials. Some PAHs are manufactured and used in the production of medicines, dyes, plastics, explosives and pesticides. PAHs are also commonly found in manmade materials such as asphalt, roofing tar,

and creosote wood preservatives (ATSDR, 1996). However, the primary source of PAHs in the environment is thought to be anthropogenic combustion of fossil fuels.

PAHs toxicity is structurally dependent, with the toxicity isomers varying from nontoxic to extremely toxic. Some PAHs have been shown to result in adverse reproductive effects and to cause cancer through dermal, inhalation, and ingestion pathways in laboratory animals. PAHs are metabolized by all tissues however some metabolites are more toxic than the original PAH compound (ATSDR, 1996).

REFERENCES

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