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IN VITRO AND IN VIVO GENOTOXICITY OF ISOLATED FRACTIONS FROM PAH AND CHLOROPHENOL MIXTURES

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Creosote and pentachlorophenol are chemicals commonly found in wood preserving waste (WPW). Improper disposal of WPW has led to widespread contamination of soil and groundwater in many locations. This study was to compare the *in vitro* and *in vivo* genotoxicity of isolated fractions of WPW with chemical composition. The complex mixture was collected from a contaminated aquifer at an old wood preserving facility located in the Northwestern United States. The WPW was fractionated using liquid-liquid extraction to obtain acid, base, and neutral fractions following the EPA 3650B Method. The neutral fraction was then enriched for chlorinated dioxins (PCDDs) using a mixed bed silica column followed by a carbon column; and enriched for polycyclic aromatic hydrocarbons (PAHs) using sequentially an alumina-silica column and a carbon column. The fractions were then analyzed for their chemical content using GC/MS, and tested in the *Salmonella*/microsome assay, *E.coli* prophage induction assay, and ³²P postlabeling assay to characterize genotoxicity. The chemical analyses indicate that the chlorophenols were concentrated in the acid fraction, the base fraction contained PAHs and phenolic compounds; and the neutral fraction contained PAHs and PCDDs. The PCDD fraction contained primarily hepta and octa chlorinated PCDDs along with the low molecular weight PAHs. The PAH fraction contained a large amount of the higher molecular weight and carcinogenic PAHs. In the *Salmonella*/microsome assay, the base fraction induced 119 net revertants at a dose of 0.1 mg/plate, while crude extract induced 19 net revertants at the same dose. In the prophage induction assay, both the acid and base fractions induced positive genotoxic responses. In the ³²P postlabeling assay, the PAH fraction produced approximately 3 times the DNA adduct frequency observed in the other fractions. Although the base fraction contained the lowest amount of benzo(a)pyrene, it induced the maximum genotoxic response *in vitro*. The data indicate that isolation of the most genotoxic compounds from a complex mixture may be necessary to obtain a more accurate measurement of potential carcinogenicity.