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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

December 6, 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4WD-FFB

Ms. Linda Saksvig
Department of the Navy - Atlantic Division
Naval Facilities Engineering Command
Code 1823
Norfolk, Virginia 23511-6287

SUBJ: MCB Camp Lejeune - OU4
Draft Remedial Investigation

Dear Ms. Saksvig:

The Environmental Protection Agency has completed its review of the above subject document. Enclosed are the comments from the Ecological review. Also, enclosed is the interim guidance for assigning toxicity equivalency factors (TEFs) which was inadvertently omitted from the November 22, letter.

If there are any questions or comments, please call me at (404) 347-3016 or 347-3555, vmx-6459.

Sincerely,

Gena D. Townsend
Senior Project Manager

Enclosure

cc: Mr. Neal Paul, MCB Camp Lejeune
Mr. Patrick Watters, NCDEHNR

Site 41. Beryllium, chromium, copper, iron, lead, manganese, and zinc are contaminants that may decrease viability of terrestrial invertebrates and floral species at this site. However, there does not appear to be an impact to rabbits, deer, quail, fox, and raccoon at the site.

Iron, lead, mercury, gamma-BHC, and 4,4'-DDT exceeded surface water ARARs/TBCs and lead, silver, 4,4'DDD, 4,4'-DDT, 4,4'-DDE, dieldrin, and PCB-1248 exceeded the sediment ARARs/TBCs. These two media do not provide good habitat since the seeps and drainage channels are ephermal and not conducive to attainment of a diverse and stable aquatic community. Additional studies are proposed for analysis of metals in the seeps and will be reported in a later version of this report.

Site 69. Surface soils at this site did not have any contaminant exceedances. Surface waters had concentrations of copper that exceeded the ARARs/TBCs. However, the fish populations seemed to be representative of this type of estuarine system. Contaminants found in the fish tissues included benzene, toluene, 2-methylphenol, 4,4'-DDE, 4,4'-DDD, PCBs 1254 and 1260, aluminum, beryllium, cadmium, iron, selenium, silver, and zinc. Compared to published background values the levels detected in the fish were low, and did not indicate that these COPCs were site related. Sediments had concentrations of cadmium, mercury, 4,4'-DDE, 4,4'-DDT, and PCB-1260 that exceeded the base-wide and median values. However, benthic invertebrates sampled were representative of estuarine species.

Site 74. For surface soils, chromium at the site exceeded soil toxicity reference levels and may impact soil invertebrates. Fox, rabbits, deer, quail, and raccoon do not appear to be impacted. Lead exceeded the ARARs/TBCs in surface waters. but the quotient ratio did not indicate a significant potential for impact to aquatic receptors. Sediments did not have any COPCs that exceeded ARARs/TBCs.

In summary, contaminants in surface soils may impact soil invertebrates at sites 41 and 74. Surface waters may be a problem at site 41 and will be studied further. Sediment contaminants exceeded reference levels but do not appear to impact invertebrates at 69 and 74. Sediments at site 41 will be studied further.

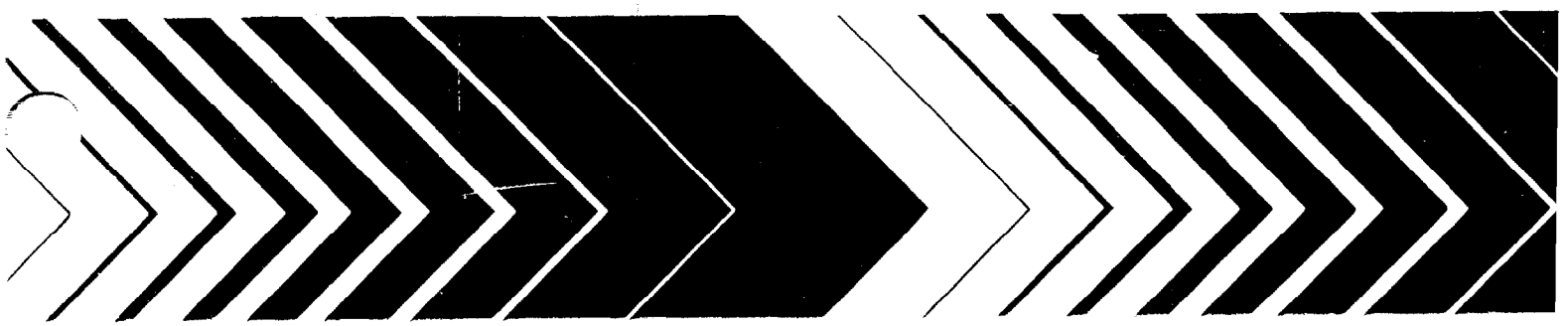
United States
Environmental Protection
Agency

Office of Research and
Development
Washington, DC 20460

EPA/600/R-93/089
July 1993

EPA

Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons



bioassays wherein PAHs were tested as complete carcinogens rather than as initiators only, meets this criterion. This data set is compiled from four reports with standard study protocols, using adequate numbers of test animals (20-36). These studies are not without deficiencies. For example, neither the Bingham and Falk (1969) paper nor Wynder and Hoffmann (1959) reported solvent control tumor incidences. Estimated orders of potential potencies based on skin painting tests as reported by Clement (1988) are given in Table 8. These are rounded to orders of magnitude using the rule presented above.

The values in Table 8 are recommended for interim use. They are based on well conducted studies using a standard, easily comparable endpoint well-known to be associated with exposure to PAHs; namely, complete carcinogenesis after repeated exposure to mouse skin. The potencies of PAH for comparison were calculated by Clement Associates (1988) using both forms of the model (one and two stages as indicated in Table 8). For this exercise no claim as to biological relevance is made for the modeling procedure; rather, it represents a convenient curve-fitting procedure, based on plausible assumptions. It is recommended that only the order of magnitude ranking be used. The quality of the data and the analysis thereof do not support any greater precision.

CONCLUSIONS

The values in Table 8 are provided for interim use. Research on relative potencies for PAHs and on the development of a TEF methodology is being undertaken by OHEA and other parts of the Agency. Areas of research include: the assumption of additivity of carcinogenic activity of PAHs; the basis for choice of studies and data sets; and the choice of modeling procedures.

In summary, a series of relative potency values (orders of magnitude) is provided as temporary guidance for the risk evaluation of PAHs. It is recognized that the list of PAHs in Table 8 is not sufficiently extensive to meet the needs of Programs and Regions; part of the continuing work on PAHs will be the consideration of the expert panel approach of ranking PAH hazards undertaken by OERR. Also in progress is

work to expand the series to include PAH for which there are animal carcinogenicity studies that did not include BAP as a positive control.

The guidance in this paper should be applied only to assessment of carcinogenic hazard from oral exposure to PAHs. There is currently no inhalation unit risk for BAP that has been found acceptable by the CRAVE. At this time, there is no basis for judgment that BAP or other PAHs will be equipotent by oral and inhalation routes. The documented effects of particulate matter and other cocarcinogens on BAP carcinogenic effects in animal lungs are confounding issues for the derivation of an inhalation unit risk for BAP and the establishment of potencies for inhalation vs. oral exposure to other PAHs.

In order to apply this guidance of relative potencies to mixtures, empirical data are needed on the additivity (or lack thereof) of carcinogenic effects of PAHs. Results of testing simple mixtures of PAHs and mixture components must be compared to assessments made from bioassays of complex environmental mixtures. Research of this nature is being undertaken by the U.S. EPA Health Effects Research Laboratory and by several research groups under contract to the Electrical Power Research Institute.

TABLE 8

Estimated Order of Potential Potencies of Selected PAH Based on Mouse Skin Carcinogenesis

Compound	Relative Potency[a]		Reference
Benzo[a]pyrene	1.0	1.0	
Benz[a]anthracene	0.145	0.1	Bingham and Falk, 1969
Benzo[b]fluoranthene	0.167	0.1	Habs et al., 1980
Benzo[k]fluoranthene	0.020	0.01	Habs et al., 1980
Chrysene	0.0044	0.001	Wynder and Hoffmann, 1959
Dibenz[a,h]anthracene	1.11	1.0	Wynder and Hoffmann, 1959
Indeno[1,2,3-cd]pyrene	0.055[b]	0.1	Habs et al., 1980; Hoffmann and Wynder, 1966

[a]Model was $P(d)=1-\exp[-a(1+bd)^2]$ for all but indeno[1,2,3-cd]pyrene

[b]Simple mean of relative potencies (0.021 and 0.089) the latter of which was derived using the one-hit model.