HEALTH CONSULTATION

DOEBOY DUMP

JACKSONVILLE, DUVAL COUNTY, FLORIDA

CERCLIS NO. FLD980846448

Prepared by:

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Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

BACKGROUND AND STATEMENT OF ISSUES

The Agency for Toxic Substances and Disease Registry (ATSDR) was requested by the United States Environmental Protection Agency (EPA) to evaluate the human health significance of polychlorinated biphenyl (PCB) levels detected in fish collected from the Doeboy Dump site in Jacksonville, Florida.

The Doeboy Dump site is located near the intersection of Dina Road and 45th Street in Jacksonville. The dump is approximately 35 acres, which includes a borrow pit of about 5 acres and filled with water. The pit is connected to nearby Moncrief Creek by a drainage ditch. Wastes reportedly disposed of in the borrow pit or nearby include miscellaneous trash and debris, possible industrial wastes, incinerator residue, and buried drums. Area surrounding the site is urban and primarily residential. Residents have been observed fishing from the borrow pit and reportedly eat the fish caught there [1].

Under the direction of EPA, five fish samples were collected from the borrow pit (i.e., 4 mullet and one bass) in January 1999. Information regarding the size of the fish was not available. Fillets from the samples were analyzed for several PCB mixtures (i.e., Aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260), pesticides, and metals.

Of the tested analytes, only Aroclor 1260 was consistently detected at levels above EPA screening values. Aroclor 1260 was detected in four of the five samples (three mullet and one bass). Concentrations in the four samples ranged from 0.44 to 0.91 mg/kg with a mean concentration of 0.64 mg/kg.

DISCUSSION

PCBs are commonly found in fish tissues. However, there is limited information regarding average concentrations. A 1984 survey reported the geometric mean concentration of PCBs in fish (whole body) collected from 112 sites throughout the U.S. as 0.390 mg/kg [2]. It is reasonable to assume that current average PCB concentrations in fish would be lower since the production of PCBs was banned in 1977. Also, the 1984 survey was based on whole fish specimens. Due to storage of PCBs in fat and other tissue which may not be included in a fillet sample, the PCB concentration in fillet samples would likely have been lower. Thus, the average PCB concentration of 0.64 mg/kg in fish collected from the borrow pit is likely increased from national averages since 1) PCB concentrations in the fillets are higher than 1984 national averages for whole fish; and 2) PCB concentrations in fish would be expected to have diminished since 1984.

While PCB levels may be elevated in the fish samples, the health significance of this elevation is likely to be minimal in individuals who may consume these fish. The primary health effect which has been associated with PCB exposure is chloracne [3,4]. Chloracne is similar in appearance to acne in teens (acne vulgaris) and typically affects the facial areas.

Lesions usually appear several weeks to months after exposure and may be refractory to treatment. Chloracne attributed to PCBs has been associated primarily with high-level occupational exposures which would be considered much higher than those that might result from eating contaminated fish.

A precise dose-response model for development of chloracne from PCB exposure has not been developed [3]. Due to inconsistencies in dose-response relationships observed in exposed populations, some researchers have questioned whether chloracne is actually due to PCBs or co-exposure to other contaminants [4]. Chloracne or other significant dermatologic conditions have not been associated with exposure to PCBs from eating contaminated fish [4].

A number of other non-cancer health endpoints have been investigated such as hepatic, cardiovascular, reproductive, or developmental effects. However, results have been inconsistent and inconclusive. Although PCBs have been classified by the EPA as B2 or probable human carcinogens based on animal studies, a definite association between PCB exposure and cancer in humans has not been established. Studies of individuals occupationally exposed to high levels of PCBs have not shown a consistent relationship between PCB exposure and cancer [5].

PCB levels in fish samples from the borrow pit can also be compared with current Food and Drug Administration (FDA) recommendations for foods sold through interstate commerce. Tolerance levels are established by the FDA for a number of environmental contaminants, such as PCBs, which may be considered ubiquitous in the environment. FDA considers these levels sufficient for protection of the public health. The FDA tolerance level for all PCB mixture types in edible portions of fish excluding the head, scales, viscera, and inedible bones is 2 mg/kg. Tolerance levels for PCBs in other foods include 1.5 mg/kg in milk or dairy products and 3 mg/kg in poultry or red meat. The average PCB level in the fish samples from the borrow pit were approximately three times lower than FDA tolerance levels for PCBs in fish [6].

Health significance of PCBs in fish can also be examined through estimation of potential doses from consuming fish. The PCB dose from eating fish from the borrow pit can be estimated according to the following equation:

$$\text{Dose} = (IR)(C)/BW$$

where:

IR = ingestion rate (0.032 kg/day)
C = chemical concentration (mg/kg)
BW = body weight (70 kg)

This calculation assumes consumption of one 8 ounce or 227 gram fish fillet per week which equates to a fish ingestion rate of 32 grams/day. Assuming an average fish PCB concentration of 0.64 mg/kg results in a dose of 2.9×10^{-4} mg/kg body weight per day.

This dose can be compared with EPA reference doses (RfDs) [7]. A chronic RfD is defined as an estimate (with an uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime. Thus, doses which are less than the RfD are unlikely to be associated with any non-cancer health effects. Doses which exceed the RfD are not necessarily associated with adverse health effects but suggest more detailed analysis may be warranted.

Using the above exposure assumptions, the dose from eating fish at the average PCB concentration would exceed the EPA RfD for PCBs (Arochlor 1254) of 2 x 10^{-5} mg/kg/day for non-cancer health effects. However, several factors suggest that PCB exposure in this population is likely to be much less based on the following: 1) The dose calculations assume anglers fish regularly and exclusively from the borrow pit. This would seem unlikely, particularly for a lifetime exposure scenario as would be assumed when comparing the dose to a chronic RfD; 2) Calculations did not factor in the finding that PCBs were not detected in one of the fish samples at the limit of detection which would further reduce the average dose; and 3) Calculations assume that the chemical concentration in freshly caught fish does not change when fish are cooked. Studies suggest that chemical concentrations in fish are decreased substantially during cooking. For example, PCB levels in fish may decrease by 20-68 percent or more depending on the lipid concentration of the fish and methods of cooking [8,9]. Adjustment for these assumptions would reduce the calculated dose downward towards the RfD. Such a dose would be unlikely to be associated with adverse health effects.

ATSDR Child Health Initiative

ATSDR considers children in the evaluation of all exposures. ATSDR uses health guidelines that are protective for children and considers them as a special population which may be more sensitive than adults to chemical exposures. Due to body size, PCB doses in children on a per kilogram basis of body weight may be higher than adults for equivalent fish intakes. However, as discussed above, PCB doses from fish are unlikely to be associated with adverse health effects at these dose ranges. For comparison, FDA has also set a tolerance level for PCBs in infant foods of 0.2 mg/kg. PCB doses for children from occasional consumption of fish would likely result in PCB doses below those that might occur from ingestion of infant foods with a PCB concentration at the established guideline.

CONCLUSIONS

PCB concentrations in fish samples collected from the borrow pit are elevated. However, the average PCB concentration is these samples was approximately three times lower than current FDA guidelines for PCB levels in fish. Occasional consumption of fish from the borrow pit at the measured PCB levels are unlikely to result in doses which would be associated with significant acute or chronic health effects.

Ingestion of mullet or bass from the borrow pit at the measured PCB levels is classified as a "no apparent public health hazard."

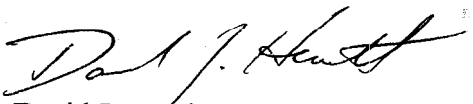
Data used in this consult was based on a relatively small number of fish samples and may not be representative of PCB levels in other fish or animal species present in the borrow pit.

RECOMMENDATIONS

Due to the limited number of fish and species which were tested, consideration should be given to testing additional fish samples including other species, such as catfish, if they are being consumed by anglers to further characterize PCB levels.

Based on available data, a fish advisory banning the consumption of fish from the borrow pit does not appear warranted at this time. However, until PCB levels in fish from the pit are better defined, consideration should be given to notifying individuals who may consume fish from the pit of the testing results. This information could include: 1) Elevated levels of PCBs have been detected in mullet and bass from the pit; 2) Levels detected thus far are below FDA guidelines for fish which you might purchase from a store and are unlikely to be associated with adverse health effects from occasional consumption; 3) Due to uncertainties regarding PCB levels in other species, it is recommended that consumption of fish from the pit be limited to one meal per month; and 4) Additional testing of other fish species from the pit is planned.

ATSDR will review additional data for other fish species as necessary.



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