DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date April 30, 1993

From Senior Toxicologist, TSS, ERCB, DHAC (E-57)

Subject Health Consultation: Kin-Buc Landfill (2004)
Edison Township, New Jersey

To Steve Jones
ATSDR Regional Representative
US EPA Region II
Through: Director, DHAC, ATSDR (E32)
Chief, ERCB, DHAC (E57)
Acting Chief, TSS, ERCB, DHAC (E57)

BACKGROUND AND STATEMENT OF ISSUES

The Kin-Buc Landfill site is an inactive municipal and industrial waste management facility located along the Raritan River in Edison Township, New Jersey. Chemical contamination from the facility has migrated into Edmonds Creek, which discharges into the Raritan River [1]. Officials of the Edison Township Department of Health and Human Resources have expressed concern over the potential bioaccumulation of contaminants in edible fish and shellfish in the river [2]. They requested the Agency for Toxic Substances and Disease Registry (ATSDR) to examine the available data and determine whether human consumption of the biota from the Raritan River poses a public health hazard.

Landfilling at the Kin-Buc Landfill began in 1947 and continued until the facility closed in 1976. The site consists of three inactive disposal sites that cover about 220 acres. Leachate from the landfill was collected in ponds at the southeastern end of the Kin-Buc I mound. Adjacent to these ponds is a tidal pool (Pool C), which discharged to Edmonds Creek through a connecting channel.

Polychlorinated biphenyls (PCBs) were detected in sediment from Pool C at concentrations as high as 730 parts per million (ppm) [1]. PCBs were also detected in sediment from Edmonds Creek. In general, the PCB sediment concentrations in Edmonds Creek decreased with increasing distance from Pool C, suggesting that Pool C was the source [1]. Most of the PCB sediment concentrations in Edmonds Creek were below 10 ppm; however, a few hot spots were detected, including a sediment sample collected upstream of a sill that contained 300 ppm PCBs.

Eight sediment samples were collected from the Raritan River near the discharge area of Edmonds Creek. Three of the samples had detectable concentrations of PCBs, and the maximum detected concentration was 3.3 ppm. No PCBs were detected in two sediment samples collected upstream near the outfall of Martins Creek into the Raritan River.

The Kin-Buc landfill is located in an industrialized area, and three other landfills (Edison Township, Edgeboro, and ILR) are located in the immediate vicinity. Therefore, in addition to the Kin-Buc landfill, other sources may be contributing to PCB contamination in the Raritan River.

On March 30, 1993, representatives of ATSDR conducted a site visit to the Kin Buc Landfill. During the site visit, we observed a dark, oily layer floating on the surface of the water in Pool C. Prior to 1986, as many as 13,000 gallons per year of an oily leachate were collected from the landfill and transported to an off-site incinerator for disposal. However, there is currently little or no discharge from the landfill to Pool C.

The channel which previously connected Pool C with the Edmonds marsh area has been filled in with dirt near its exit from Pool C. However, we observed that standing water in the remaining portion of the channel was discolored. The RPM for the site indicated that beginning this summer, a slurry wall extending down to bedrock will be constructed around the Kin Buc I mound and Pool C. In addition, sediment in Edmonds Creek that is contaminated with PCBs at concentrations in excess of 5 ppm will be dredged from the creek.

Because of concerns over bioaccumulation of PCBs in biota, fiddler crabs, mummichogs (a small, pelagic fish), and several terrestrial animals (mice, rats, muskrats) were captured from the Edmonds marsh area and analyzed for PCBs [1]. The average total body content of PCBs in 12 fiddler crabs from Edmonds Creek was 1.0 ppm, and the maximum PCB concentration was 2.09 ppm. In 6 mummichogs collected from Edmonds Creek, the average total body content of PCBs was 3.08 ppm, and the maximum concentration was 4.1 ppm. None of the PCB concentrations in muskrat, mouse, or rat liver exceeded 1 ppm.

In 1986-1987, the New Jersey Department of Environmental Protection conducted a fish monitoring program in the state [3]. One of the sampling points was at the Raritan River near the Kin Buc Landfill. Fillets from five fish were combined and analyzed for PCBs. The findings from this survey are reported in Table 1. As indicated, in 1986 the PCB

concentrations in blue crab (hepatopancreas), striped bass, and white perch exceeded 1 ppm except for one striped bass composite sample. In 1987, PCB concentrations exceeded 2 ppm for all species except for blue crab muscle (0.28 ppm). The current Food and Drug Administration Action Level for PCBs in fish and shellfish is 2 ppm.

Sports fishermen from Edison Township reportedly consume fish from the Raritan River. Fishing occurs primarily from May to October. Consumption of fish from the river may be particularly high among residents who are socioeconomically disadvantaged.

DISCUSSION

PCBs are resistant to environmental degradation and bioaccumulate in aquatic and terrestrial animals [4]. In an experimental study, fiddler crabs were raised in a habitat containing PCB-contaminated sediment. The ratio between the PCB concentration in the sediment vs. the total crab ranged from 0.19 and 1.07, indicating uptake of PCBs from the sediment [5]. PCBs also bioaccumulate in fish, and fish to water bioconcentration factors of 27,000-105,000 have been reported for Aroclor 1254 [6]. In general, the PCB concentration in fish increases as the fish age or as the fat content of the fish increases. The concentration of PCBs may be particularly high in crab hepatopancreas because this organ is the site of PCB metabolism and because of its high lipid content.

Humans who have been exposed to high doses of PCBs in occupational situations have experienced elevations in liver enzymes and the skin disease, chloracne [4]. Epidemiological studies have also suggested a correlation between the consumption of PCB-contaminated fish by women and <u>in utero</u>, fetotoxic effects on their offspring [4,7]. However, in these latter studies, questions have been raised over the possible contribution of simultaneous exposures to contaminants other than PCBs [7]. Animal studies have indicated that PCBs may be carcinogens, although a carcinogenic effect in humans has not been unequivocally demonstrated [4].

The health impact of eating PCB-contaminated fish would depend on the PCB content of the fish and the frequency of fish consumption. Recent data have documented the presence of PCBs in fish from the Raritan River at concentrations that exceed the Food and Drug Administration Action Level of 2 ppm for fish and shellfish. It has also been reported that some

residents may frequently consume fish harvested from the river.

CONCLUSIONS

Based on the information reviewed, ATSDR concludes the following:

1. PCBs have migrated from the Kin-Buc landfill into Edmonds Creek. The discharge of Edmonds Creek into the Raritan River has resulted in the deposition of PCB-contaminated sediment in the Raritan River at the Edmonds Creek outfall. The extent of PCB contamination in the Raritan River has not been determined.

2. Surface water runoff and tidal water flow in the Edmonds Creek and the channel from Pool C may result in the transport of additional PCBs into the Raritan River.

3. PCB concentrations in excess of acceptable health-based levels were detected in edible species of fish (striped bass, white perch) and shellfish (blue crab hepatopancreas) from the Raritan River.

RECOMMENDATIONS

1. Prevent further off-site migration of PCBs and other toxic substances from the Kin-Buc landfill.

2. Restrict consumption of fish and shellfish from the Raritan River downstream of the Kin-Buc Landfill until it can be determined that PCB concentrations in edible fish and shellfish are below levels of health concern.

If further clarification is necessary or if additional data become available, please contact this office at 404-639-6360.

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Table 1

Concentration of PCBs (wet weight basis) in composite samples of the edible portions of fish and shellfish collected from the Raritan River near the Kin-Buc Landfill

Species	PCBs (ppm)	PCBs (ppm)
	1986	1987
Blue crab (H/M)[1]	1.21	2.07
Blue crab (H)	-	5.40
Blue Crab (M)	-	0.28
Striped bass	1.03	2.47
Striped bass	1.98	-
Striped bass[2]	0.72	-
White perch	1.43	7.12

(1) Hepatopancreas and Muscle
(2) composite of 2 fish instead of 52

REFERENCES

(1) Wehran EnviroTech; Draft Final Remedial Investigation Report for Kin-Buc Landfill Operable Unit 2; October 1991.

(2) John Grunne, Edison Township Department of Health and Human Resources; letter to James Pasqualo, NJDEP; August 18, 1992.

(3) New Jersey Department of Environmental Protection; Polychlorinated Biphenyls (PCBs), Chlordane, and DDTs in Selected Fish and Shellfish from New Jersey Waters, 1986-1987: Results from New Jersey's Toxics in Biota Monitoring Program; 1990.

(4) ATSDR; Draft Toxicological Profile for Selected PCBs; 1992.

(5) JR Clark et al; Accumulation of Sediment-Bound PCBs by Fiddler Crabs; Bull. Environ. Contam. Toxicol. 36 571-578 (1986).

(6) A Leifer et al; Environmental Transport and Transformation of Polychlorinated Biphenyls; EPA-560/5-83-025; 1983.

(7) MA Kamrin and LJ Fischer; Workshop on human health impact of halogenated biphenyls and related compounds; Env. Health Persp. 91 157-164 (1991).

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