

Health Assessment for

7-28-88

BURNT FLY BOG NATIONAL PRIORITIES LIST SITE

MARLBORO, MONMOUTH COUNTY, NEW JERSEY

AUGUST 24, 1988

Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

SUMMARY

The Burnt Fly Bog site, a National Priorities List site, is located near Marlboro, Monmouth County, New Jersey in the fringe area of the New Jersey Pine Barrens. The major contaminants at the site are polychlorinated biphenyls (PCBs) and lead. Both of these contaminants have been found in all environmental media at the site. The site is located in a rural area with only a few scattered, nearby residences. Exposure to contaminants may occur from contact with soil, sediment, water, air, or biota from the site. In order to protect the public health, access to contaminated areas should not be permitted except for properly-protected remedial workers. Because of the potential for ground water contamination, private well owners surrounding the site should be advised to connect to the public water system. In addition, the consumption of game animals, berries, fish, and other biota from Burnt Fly Bog should be discouraged unless it can be determined that they are free of contamination. Remedial activities are addressing the contamination in the Upland Area, the Asphalt pile, the Northerly Wetlands, the contaminated soil and tar patch area, and the Westerly Wetlands.

BACKGROUND

A. SITE DESCRIPTION

The 60-acre Burnt Fly Bog site is located near Marlboro, New Jersey in a fringe area of the New Jersey Pine Barrens. Contamination at the site emanated from the direct dumping and spreading of hazardous materials from improperly constructed and operated oily waste treatment/disposal facilities located in the upland areas bordering the site. Under several owners, these facilities have degenerated to several abandoned waste oil storage/treatment lagoons containing residual oil sludges and aqueous wastes, contaminated waste piles, and buried and exposed drummed wastes. Uncontrolled discharges from these upland waste sources to adjoining wetlands have resulted in groundwater, surface soil, and shallow subsurface soil contamination.

Land use of the site between 1950 and 1965 always included one or more of the following: 1) use of lagoons for reprocessed oil storage or settling; 2) storage of the filter clay from an oil reprocessing operation; 3) sanitary landfilling, and 4) sand and gravel pit operations. There have reportedly been no major dumping or storage operations at the site since 1969.

A number of contamination sources are visible at the site. These sources include not only the lagoons, drums, and the waste piles, but may also include contaminated soils and sediment, and sludge flows that have resulted from contact with various types of waste materials received at the site.

Remedial activities are addressing the contamination in the Upland Area consisting of the lagoon areas, the Asphalt Pile, the Northerly Wetland, the Contaminated Soil and Tar Patch Area, and the Westerly Wetlands. As the result of a Preliminary Site Characterization (Stage I) performed in the summer of 1984 at the site, excessive concentrations of PCBs and lead were found to exist in the Westerly Wetland. This area covers approximately 10 acres. Discussion with the U.S. Environmental Protection Agency (EPA) resulted in the development of a second-stage field investigation program to more accurately define the volume of PCB-contaminated soil in the Westerly Wetland and to determine the feasibility of removing the contaminated soil to an off-site location. These Stage II Field Investigations were conducted in June 1985. In April 1987, a Supplemental Stage II investigation was initiated to more accurately define the volume of lead contamination, as well as to obtain data that was not acquired in the previous field investigations.

B. SITE VISIT

Personnel from ATSDR conducted a site visit at the Burnt Fly Bog site on May 3, 1988.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

A. WESTERLY WETLAND CONTAMINATION

The following table indicates the contaminants of concern found in the Westerly Wetlands, the range of concentrations found, and the media in which they were found.

Media	Contaminant	Levels Found
SOIL	PCBs	ND - 390
	Lead	2 - 31,000
SEDIMENT	PCBs	0.39 - 140
	Lead	44 - 7500
SURFACE WATER (1)	Lead	0.029 - 1.9

Notes:

Units = part per million (ppm)

Sampling was carried out in 1985 and 1987.

ND = Not detected

(1) Ground water from the Englishtown aquifer discharges to the surface of the Westerly Wetlands. Therefore, the surface water samples consisted of a mixture of groundwater discharge and surface water runoff from the uplands area.

B. PHYSICAL HAZARDS

Water-filled lagoons at the site may pose a potential physical hazard to trespassers. However, access to the site has been restricted by the installation of a 10-foot high security fence along the exposed southern and eastern boundaries of the lagoon area.

DEMOGRAPHICS

The Burnt Fly Bog site is located on the border of Marlboro Township, Monmouth County, and Old Bridge Township, Middlesex County. Marlboro Township's dominant land uses include agricultural land, vacant and wooded lands, and residential developments. The area is primarily rural in character, containing scattered single family residences. An automobile salvage yard is located at the junction of Tyler Lane and Spring Valley Road.

Tyler Lane provides access to the abandoned hazardous waste site. Several single family residences are located along Tyler Lane, and the "Tyler House" is located at the end of the road. The Tyler House is a half-way house for adults with alcohol or drug addiction problems. A 25-acre horse farm is located directly south of the lagoons.

The closest concentration of residential land uses is found along Ticetown Road in Old Bridge Township, approximately 1.5 miles north of the site. Plans for the construction of two new residential developments, to be located approximately 1.3 miles northwest of the lagoons, were being considered in 1983. The current status of this construction is unknown.

EVALUATION

A. SITE CHARACTERIZATION (DATA NEEDS AND EVALUATION)

1. Environmental Media

Soil, air, sediment, surface water, and groundwater at the site were analyzed for volatile organic chemicals, semi-volatile organic chemicals, pesticides/PCBs, metals, cyanide, and phenols. Groundwater and surface water supplies that are used for drinking and other domestic purposes were not adequately identified. Information on the depth, contamination, and uses of the Englishtown aquifer, the water supply used at Perth Amboy, and further information on the users of Deep Run Creek is needed.

2. Demographics and Land Use

The demographics of the site area were adequately characterized in the information reviewed by ATSDR.

3. Quality Control and Quality Assurance (QA\QC)

QA/QC was adequately addressed in the materials reviewed. An analysis of the QA/QC results indicates that errors in sampling technique or laboratory analysis are not responsible for the lower lead levels in the 1987 sampling event as compared to the 1985 sampling event (see environmental pathways section of this report for a more detailed discussion.)

The conclusions contained in this report are based on the data package supplied to ATSDR. The accuracy of these conclusions is based on the reliability and availability of the data contained in the materials reviewed.

B. ENVIRONMENTAL PATHWAYS

The major environmental pathways at the Burnt Fly Bog site are surface water, groundwater, sediment, and soil. High concentrations of lead have been found in the water samples taken on-site. Since the solubility of lead is inversely proportional to pH, the high concentrations of lead in the water are expected since the surface waters on the site are acidic (approximately pH 5).

The Westerly Wetland portion of the site is a discharge zone for the Englishtown Aquifer. Prior to the installation of public water lines, the Englishtown Aquifer was used as a water source by residents east of the site. Because of the site topography, groundwater flow, as well as surface water drainage, is to the west into Deep Run. In times of drought, or if heavy groundwater use east of the site draws down the Englishtown aquifer, the Westerly Wetland could become a recharge zone for the underlying aquifer, thereby contaminating it with chemicals from the site.

Contamination has entered the Westerly Wetland through surface water runoff and groundwater migration from the adjacent upland lagoons. Lead and PCBs were detected in the wetland sediments, soil, and water. Analysis of sampling data showed a decrease in contaminant levels from 1985 to 1987. These lower concentrations cannot be attributed to QA/QC.

No data were available to indicate whether Deep Run Creek has been impacted by contaminants from the site. The New Jersey Fish, Game, and Wildlife Department indicated that fishing in this stream is unlikely because fish productivity is low. The only species likely to live in the acidic water are yellow perch and possibly pickerel. Site contaminants may also be taken up by wild game and plants at the site.

During periods of dry weather, there is a potential for a fire to start in the area. Once a fire is started, peat layers may burn for extended periods of time. In the case of such a fire, PCBs in the soil and their pyrolysis products could be released to the atmosphere in particulate or in vapor form, posing a hazard to nearby residents.

C. HUMAN EXPOSURE PATHWAYS

Potential human exposure pathways at the site include: dermal absorption of soil contaminants, ingestion of contaminated soil, ingestion of contaminated plants and animals, ingestion of contaminated ground- and surface waters, inhalation of reentrained contaminated dust, and inhalation of airborne contaminants during a fire event.

Because children have been previously observed on-site, contact with contaminated soil is a possible route of exposure to site contaminants. The concern about this pathway is increased by a report of lead poisoning of a child in the area in 1982. Currently the site is partially fenced, reducing the likelihood of neighborhood children trespassing on the site.

Ingestion of contaminated fish, wild plants and wild game is a possible human exposure pathway. Ingestion of fish caught from Deep Run may be a pathway of concern since PCBs may accumulate in their tissue. Ducks and geese may accumulate contamination through ingestion of contaminated soil eaten while consuming vegetation growing in the Wetlands.

Inhalation exposure to PCBs and pyrolysis products of PCBs could result from the generation of airborne contaminants during a fire at the site, as occurred in 1973.

PUBLIC HEALTH IMPLICATIONS

Surface soil and sediment samples from the Westerly Wetlands contain concentrations of PCBs as high as 390 ppm. In laboratory experiments, the oral ingestion of PCBs by rats has resulted in liver enlargement, hyperplastic nodules, and carcinomas. Most tests for PCB mutagenicity have been negative. Therefore, it has been suggested that the tumorigenic effect of PCBs in rats may be due to their activity as a tumor promoter rather than as a tumor initiator.

In humans, PCBs have not been conclusively demonstrated to be carcinogens. However, the exposure of workers to high air and/or dermal doses of PCBs has been associated with chloracne and alterations in liver function tests. In laboratory experiments, feeding a PCB-containing diet to pregnant animals was teratogenic.

Trespassers or children who play in the Westerly Wetlands could ingest small amounts of contaminated soil or could absorb PCBs through dermal contact with the soil. There is considerable uncertainty in estimating the amount of soil a child ingests or the amount of soil-skin contact.

Furthermore, PCBs are strongly attracted to the organic matter in soil, and this attraction would reduce their bioavailability. Because of these uncertainties, it is not possible to accurately quantitate the resulting health risks. However, it is possible that long-term exposure to PCB-contaminated soil could slightly increase an individual's lifetime risk of cancer. Therefore, it is recommended that access to the contaminated areas be restricted until appropriate remedial action is implemented.

Lead contamination of the soil may also pose a potential health risk to individuals who ingest small amounts of soil during play or work. The ingestion of lead can cause neurotoxicity, particularly in infants and young children. Chronic lead exposure can also have a deleterious effect on hemoglobin synthesis, kidney function, and blood pressure.

Blueberries and cranberries grow wild in the Burnt Fly Bog area. Therefore, there is concern for the potential accumulation of lead and PCBs in these fruits and other consumable plant products. Although trace amounts of PCBs and lead may be taken up by plants, soil residues and contaminants adhering to the outside of the plant surfaces may present a more significant exposure risk. It is recommended that blueberries and other plants from the wetlands should not be eaten unless it can be established that contaminant residues are below acceptable concentrations.

Contaminants can be transported off-site by surface water and sediment runoff. Since runoff from the site eventually discharges to Deep Run River, there is a potential for contaminant uptake by fish and other aquatic biota in Deep Run. Inorganic lead bioaccumulates with observed bioconcentration factors of 42 and 45 for brook trout and bluegill. In contrast, PCBs can accumulate in fish with bioconcentration factors of 100,000 or more.

No data were provided on contaminant concentrations in Deep Run. If water or sediment samples from Deep Run contain PCBs, then fishing should be prohibited in the impacted areas unless it can be demonstrated that fish PCB concentrations are below acceptable concentrations.

Burnt Fly Bog may also serve as a feeding area for game animals (deer, rabbits, squirrels) and waterfowl which can bioaccumulate PCBs. As discussed above for plants and fish, wild game animals should not be consumed unless it is determined that they are free of contamination.

In 1973, Burnt Fly Bog caught fire and burned for 16 hours before it was extinguished. Pyrolysis of PCBs can result in the formation of chlorinated dibenzofurans (CDF) and chlorinated dibenzodioxins (CDD). During a fire, these chemicals could be released to the atmosphere as vapors or adsorbed to particulate matter. Residues in the soil would be subject to ingestion by trespassers or workers at the site and could also be bioconcentrated by biota in the area.

CDFs and CDDs are toxic to the immune system and can cause adverse reproductive and teratogenic effects. In animal experiments, the CDD isomer, 2,3,7,8-tetrachlorodibenzodioxin, is a potent carcinogen.

To our knowledge, no tests have been conducted to determine whether there are any CDF or CDD residues in the burned area. In the absence of these data, no public health conclusions can be made for these potential contaminants.

In the early 1980s, elevated concentrations of lead (205 and 216 ug/l) were detected in water samples from two private wells from homes near the site. It is not known whether these elevated lead concentrations were the result of ground water contamination or the result of lead being leached from solder in the plumbing by corrosive water.

In 1985, public water distribution lines were extended into the area. Currently, all residences are reportedly connected to the public water system with the exception of the "Tyler House", which is adjacent to the site. To date, no contamination of this well has been detected. However, because of the proximity of this well to the site, the potential for contamination of this well is of concern.

CONCLUSIONS AND RECOMMENDATIONS

Based on information reviewed, ATSDR has concluded that this site is of potential health concern because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse health effects. As noted in the Human Exposure Section of this report, human exposure to site contaminants may occur and may have occurred in the past via dermal absorption of soil contaminants, ingestion of contaminated soil, ingestion of contaminated plants and animals, ingestion of contaminated ground- and surface waters, inhalation of reentrained contaminated dust, and inhalation of airborne contaminants during a fire event.

ATSDR recommends the following to protect human health in the area of the site:

1. Public access to the wetland area should be restricted to prevent exposure to site contaminants.
2. Plants and animals from Burnt Fly Bog and fish from Deep Run should not be consumed unless it is first determined that they are free of contamination.
3. Private well owners surrounding the site (e.g., the Tyler House) should connect to the public water system unless regular well monitoring is conducted to ensure that the wells remain free of contamination.

4. Remedial activities at the site which involve the excavation of buried materials may result in the release of volatile chemicals and particulate matter. We recommend that remedial workers observe all applicable OSHA regulations, that optimal dust control is implemented, and that real-time air monitoring be conducted at the site periphery to detect the emission of hazardous chemicals.

5. In accordance with CERCLA as amended, the Burnt Fly Bog, Marlboro, NJ site has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indications that human exposure to on-site contaminants may possibly occur and may have occurred in the past, this site is not being considered for follow-up health studies at this time because no exposed population can be defined and any exposures are considered to be infrequent.

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