

Health Consultation

ST. CLAIR SHORES PCBS – RESIDENTIAL SOILS

ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

EPA FACILITY ID: MIN000510063

NOVEMBER 27, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR Toll Free at
1-800-CDC-INFO

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

HEALTH CONSULTATION

ST. CLAIR SHORES PCBS – RESIDENTIAL SOILS

ST. CLAIR SHORES, MACOMB COUNTY, MICHIGAN

EPA FACILITY ID: MIN000510063

Prepared By:

Michigan Department of Community Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Table of Contents

Summary	1
Purpose and Health Issues	1
Background	1
Discussion	3
Environmental Contamination and Removal Activities	3
Exposure Pathways Analysis	5
Toxicological Evaluation	6
Children’s Health Considerations	7
Community Health Concerns.....	7
Conclusions.....	8
Recommendations.....	8
Public Health Action Plan.....	8
Preparers of Report	9
References.....	10
Certification	11

List of Tables

Table 1. Exposure pathways related to PCB-contaminated soil around the Ten Mile Drain, St. Clair Shores, Macomb County, Michigan	6
--	---

List of Figures

Figure 1. St. Clair Shores and vicinity, Macomb County, Michigan.....	2
Figure 2. Areas near the Ten Mile Drain investigated by EPA and MDEQ in 2005/2006, St. Clair Shores, Macomb County, Michigan	4

List of Appendices

Appendix A. Michigan Department of Community Health Response to Community Health Concerns Voiced at 3/1/06 Ten Mile Drain Town Hall Meeting, St. Clair Shores, Michigan	A-1
Appendix B. Letter to St. Clair Shores, Michigan residents concerned about a perceived cancer cluster	B-1
Appendix C. ATSDR Public Health Hazard Categories	C-1

Summary

In 2001, polychlorinated biphenyls (PCBs) were discovered in sediments of two connected canals slated to be dredged in St. Clair Shores, Macomb County, Michigan. The U.S. Environmental Protection Agency (EPA) conducted a time-critical removal of the contamination in the canals and the sewer system that discharges to them. Follow-up monitoring indicated that PCBs were still entering the sewer system at an upstream location. Soil sampling results revealed PCB contamination in the utility corridor through which the sewer runs and on several residential properties. EPA removed surficial soils that exceeded the state's direct-contact criterion and lined the sewer with a barrier to prevent further leaking.

Surficial soils pose no apparent public health hazard, currently or in the future. Any past hazard regarding exposure to the soils cannot be determined. Deeper soils pose an indeterminate future hazard. Monitoring should be continued to ensure the integrity of the sewer and the protection of the canals. A full remediation of the site would remove any potential threat.

Purpose and Health Issues

The purpose of this health consultation is to document the continued involvement and public-health activities of the Michigan Department of Community Health (MDCH) at the PCB-contaminated area in St. Clair Shores, Macomb County, Michigan (Figure 1). MDCH initially became involved at this site in 2002, when pre-dredging testing of sediments in the Lange and Revere Streets canals revealed high levels of PCBs (ATSDR 2003). Although EPA removed contaminated sediments in the canals and the sewer system that drains to the canals, recontamination became evident during follow-up monitoring (Weston 2005, EPA 2006a).

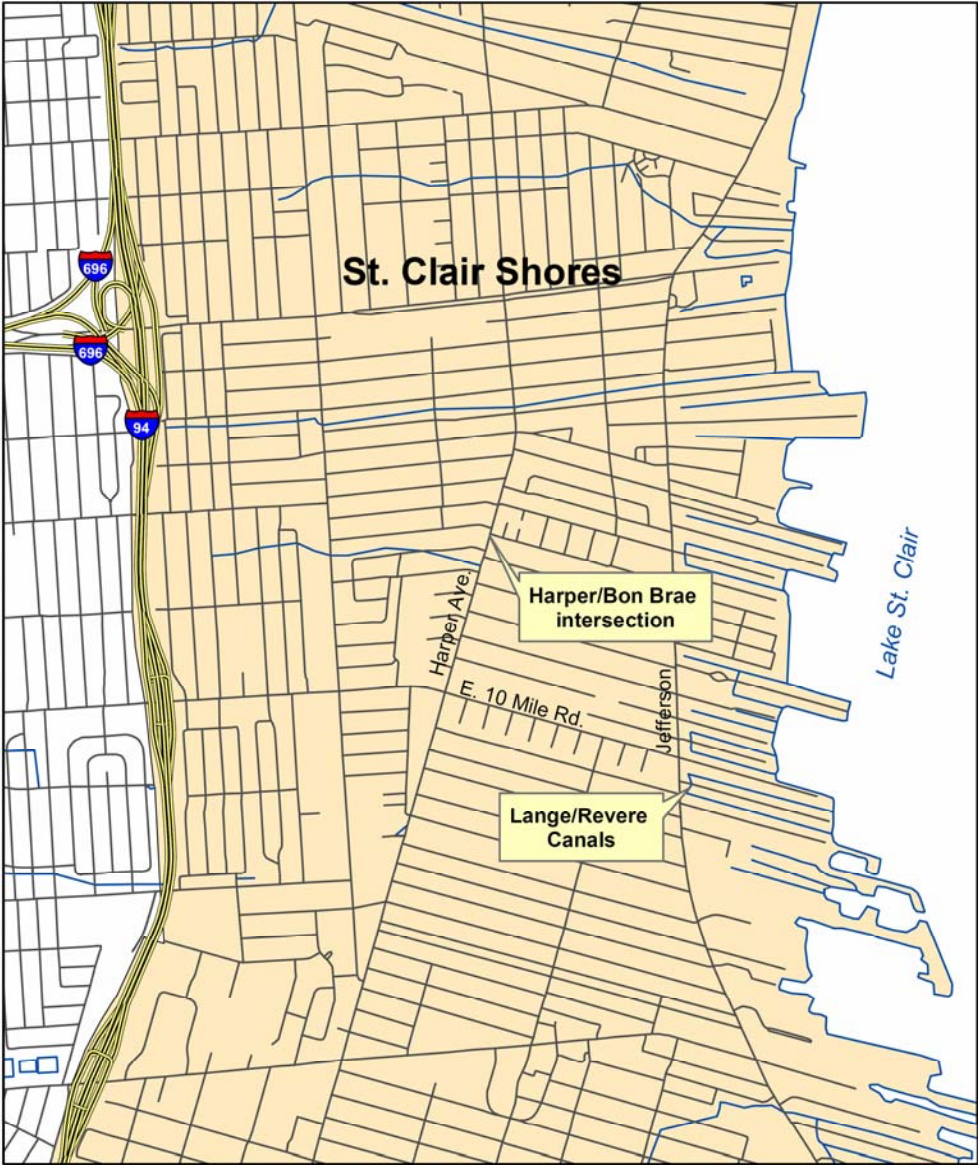
MDCH conducted this health consultation for the federal Agency for Toxic Substances and Disease Registry (ATSDR) under a cooperative agreement. ATSDR conducts public health activities (assessments/consultations, advisories, education) at sites of environmental contamination and concern. ATSDR is primarily an advisory agency. Therefore, its reports usually identify what actions are appropriate to be undertaken by the regulatory agency overseeing the site, other responsible parties, or the research or education divisions of ATSDR. As such, ATSDR recommendations may not encompass all types of federal and state requirements from a regulatory perspective. The purpose of a health consultation is not to evaluate or confirm regulatory compliance but to determine if any potentially harmful exposures are occurring or may occur in the future.

Background

In 2001, analyses of sediments from two canals set to be dredged in St. Clair Shores, Macomb County, Michigan (Figure 1) indicated that the sediments were heavily contaminated with PCBs. Further investigation of the site revealed that the PCBs were in the storm sewer system that discharges to the canals. Several local, state, and federal regulatory and public health agencies were involved in the activities that followed this discovery, which included a time-critical removal action by EPA (ATSDR 2003).

Follow-up monitoring revealed that PCBs were still entering the storm sewer system. A more in-depth investigation was carried out in April and May 2005, centering around the Bon Brae Avenue and Harper Avenue intersection. The investigation included sampling at suspected

Figure 1. St. Clair Shores and vicinity, Macomb County, Michigan



Location



source area locations and along a former open drain between the homes on Bon Heur and Bon Brae Avenues (Figure 2). EPA and the Michigan Department of Environmental Quality (MDEQ) determined that PCBs were in the sand and gravel backfill of the utility corridor through which the Ten Mile Drain passes. The contamination in the backfill was likely leaking into the sewer. Several sampling locations along the former open drain contained PCBs as well (Weston 2005).

A Focused Feasibility Study suggested that shallow (0 to 3 feet below ground surface [bgs]) soils exceeding acceptable levels be removed and that the sewer be sealed in such a way as to prevent future contamination by the surrounding PCB-containing backfill. The regulatory agencies began planning for these actions and held a public meeting on March 1, 2006 to inform the community. At the meeting, a citizen told the MDCH toxicologist that her husband had moved soil from near one of the sampling locations that was contaminated to low areas of their property, to minimize flooding. (The soil had been moved before the discovery of PCBs in the sewer system.) MDCH asked MDEQ to confer with the citizen, which resulted in additional soil being sampled at specific locations along the former open drain. MDEQ determined that, although PCBs were present in some of the samples, the contamination was likely not related to that within the utility corridor. Long-term residents remembered seeing electrical transformers in the open drain in the past (R. Berak, MDEQ Remediation and Redevelopment Division [RRD], personal communication, 2007). Several locations along the former open drain were included in the planned excavation.

Discussion

Environmental Contamination and Removal Activities

Analytical results from the soil sampling were compared to the MDEQ Residential and Commercial I Direct Contact Criteria (DCC) for PCBs. The DCC is a concentration of a chemical in soil that is not expected to result in adverse health effects following long-term ingestion of (eating) and dermal (skin) contact with the soil. The MDEQ DCC for PCBs is 4 parts per million (ppm), which equals 4 milligrams (mg) of PCBs per kilogram (kg) of soil (MDEQ 2006). The criterion assumes that a person will be exposed to the contaminated soil for 350 days per year over a 30-year duration. The criterion also assumes that a child will unintentionally eat about 200 mg of soil per day (slightly less than one-eighth teaspoon) and an adult will eat about 100 mg of soil per day (MDEQ 2005).

A total of about 325 soil samples were collected (Weston 2005; R. Berak, MDEQ-RRD, personal communication, 2006). Because many sampling locations were located on private residential or commercial properties, MDCH has chosen not to show each individual sampling location, so that property owners' privacy may be protected. Rather, Figure 2 shows the general areas where sampling was conducted:

- Area 1 centers on the Bon Brae Avenue and Harper Avenue intersection, near the beginning of the Ten Mile Drain.
- Area 2 is a residential/commercial area east of Harper Avenue, between Lakeland Boulevard and Bon Brae Avenue.
- Area 3 is the residential area between Bon Heur and Bon Brae Avenues that contains part of the former open drain.

Figure 2. Areas near Bon Brae Avenue and Harper Avenue intersection where soils were sampled to determine extent of PCB contamination, St. Clair Shores, Macomb County, Michigan.*



Location



* Areas are generalized and not geocoded. For more detailed location information, refer to Weston 2005.

Area 1 contained a hotspot of PCBs in surficial (0 to 1 foot bgs) soil with a concentration of 31,820 ppm. The highest concentration of PCBs found in this area, not including the hotspot, was 49.6 ppm at a depth of 0 to 3 feet bgs.

The highest concentration of PCBs found in Area 2 was 822 ppm, taken from a depth of 1 to 3 feet bgs.

The highest concentration of PCBs found in Area 3 was 160 ppm, at a depth of 0 to 6 inches bgs. The pattern of contamination in this area appeared to follow the former open drain, with many sampling locations further from the drain not showing detectable amounts of PCBs.

EPA used the soil data to determine areas where removal activities should occur, using a clean-up goal of 4 ppm. After the first 8 to 12 inches of soil in an area was removed, the remaining soil was tested to see if it met the clean-up goal. If the concentration exceeded 4 ppm, further removal occurred until the goal was met. EPA began removal activities in May 2006 and completed them in August of that same year (EPA 2006a, 2007).

A “cured-in-place pipe” (CIPP) was inserted into the sewer system in July 2006 (EPA 2006b). The CIPP acts as a barrier to prevent PCBs remaining in the surrounding backfill from leaking into the sewer.

Exposure Pathways Analysis

To determine whether persons are, have been, or are likely to be exposed to contaminants, MDCH evaluates the environmental and human components that could lead to human exposure. An exposure pathway contains five elements:

- a source of contamination
- contaminant transport through an environmental medium
- a point of exposure
- a route of human exposure
- a receptor population

An exposure pathway is considered complete if there is evidence, or a high probability, that all five of these elements are, have been, or will be present at a site. It is considered either a potential or an incomplete pathway if there is a lower probability of exposure or there is no evidence that at least one of the elements above are, have been, or will be present. Table 1 shows the exposure pathways analyzed for this site.

Table 1. Exposure pathways related to PCB-contaminated soil around the Ten Mile Drain, St. Clair Shores, Macomb County, Michigan.

Source	Environmental Transport and Media	Chemicals of Interest	Exposure Point	Exposure Route	Exposed Population	Time Frame	Exposure Likelihood
Improper disposal of PCBs	Soil	PCBs	Soil	Dermal absorption, incidental ingestion, inhalation	Local residents, landscape workers	Past	Potential
						Present	Incomplete
						Future	Incomplete
			Sediment in sewers	Dermal absorption, incidental ingestion, inhalation	Utility workers	Past	Incomplete
						Present	Incomplete
						Future	Incomplete
			Sediment in the Lange/Revere canals	Dermal absorption, incidental ingestion, inhalation	Residents working on boats, docks, or retaining walls	Past	Potential
						Present	Potential
						Future	Potential

Note: The presence of a complete or potential exposure pathway in this table does not imply that an exposure would be substantive or that an adverse health effect would occur.

According to long-term local residents, the former open drain contained electrical transformers in the past. It is likely that people, especially children at play and owners of property through which the drain ran, were exposed to the transformers and contaminated soils. Since the removal has been completed, the potential for exposure to unacceptable levels of PCBs in the surficial soils in this area has been eliminated.

PCBs remaining in deeper soils along the utility corridor could potentially leak into the sewer system. The CIPP liner that was installed in the sewer does not cover the entire length of the sewer system. Utility workers entering the sewer in the course of their job would be wearing personal protective equipment and not be exposed to contaminated sediments.

Although the Lange/Revere canals were cleaned and dredged in earlier activities, acceptable levels of PCBs may remain. These are not expected to cause harm. If PCBs enter the sewer and discharge to the canals anew, residents working in those canals could be exposed to contaminated sediments at unacceptable levels.

Toxicological Evaluation

PCBs are complex mixtures of synthetic organic chemicals with no known natural source. They exist as colorless to light yellow, oily liquids or solids. They have no known smell or taste. Some PCBs are volatile and may exist as a vapor in air. Because they don't burn easily and are good insulating materials, PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in the United States in 1977 because there was evidence that the chemicals build up in the environment and may cause harmful effects. Products that may contain PCBs include old fluorescent lighting

fixtures, electrical devices or appliances containing PCB capacitors made before PCB use was stopped, old microscope oil, and old hydraulic oil (ATSDR 2000).

Sediments from the canal will likely wash off the skin before there is a chance to transfer them to the mouth. Although PCBs can be absorbed through the skin and via inhalation, MDCH does not expect sufficient dermal contact with any contaminated sediments to result in harm nor does the agency expect any PCBs to enter the air.

The most likely source of human exposure to PCBs is through the eating of contaminated fish. Long-term consumption of Great Lakes sport fish has been implicated in behavioral and learning deficits detected in children born to mothers who have eaten the fish (ATSDR 2000). MDCH maintains a fish consumption advisory for certain species of fish caught in Michigan waters (MDCH 2007).

Children's Health Considerations

Children may be at greater risk than adults from exposure to hazardous substances at sites of environmental contamination. Children engage in activities such as playing outdoors and hand-to-mouth behaviors that could increase their intake of hazardous substances. They are shorter than most adults, and therefore breathe dust, soil, and vapors found closer to the ground. Their lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. The developing body systems of children can sustain permanent damage if toxic exposures are high enough during critical growth stages. Fetal development involves the formation of the body's organs. Injury during key periods of prenatal growth and development could lead to malformation of organs (teratogenesis), disruption of function, and premature death. Exposure of the mother could lead to exposure of the fetus, via the placenta, or affect the fetus because of injury or illness sustained by the mother (ATSDR 1998). The obvious implication for environmental health is that children can experience substantially greater exposures to toxicants in soil, water, or air than adults can.

Children living in the Ten Mile Drain area would not be expected to have access to the storm sewers and should not be at risk to any chemicals present in those structures. If PCBs enter the canals again, exposure to the sediments is not expected to be sufficient to cause harm. Surficial soils no longer pose an exposure risk.

Community Health Concerns

At the March 1, 2006 public meeting, several attendees raised concerns about the PCBs and proposed removal action. MDCH addressed the questions at the meeting and prepared a follow-up document, which the city placed on its website. Appendix A contains the document prepared by MDCH.

The resident whose husband had moved some of the soil before the contamination was discovered was concerned about her family's and neighbors' health. The area to which the soil had been moved is commonly used by children. The resident had grown up in the area and her parents were long-term residents. MDCH helped the resident understand the soil sampling results and discussed health implications of past and present exposures with the resident.

The EPA on-scene coordinator referred two residents with perceived cancer cluster concerns to MDCH. The residents felt that there was a high rate of cancer in the Ten Mile Drain area and that it was due to the PCB contamination. Upon reviewing the information provided by the residents, MDCH realized that these concerns had been addressed during the agency's earlier involvement at the site (ATSDR 2003). The toxicologist informed the residents of the earlier work. Appendix B contains the letter MDCH sent to the residents.

Conclusions

In the past, the PCB contamination along the Ten Mile Drain likely posed a public health hazard, especially when the former open drain had exposed transformers in it. However, the degree of exposure to the PCBs in the former drain and surrounding soils cannot be determined. Now that the surficial soils with unacceptable levels of PCBs have been removed, there is no apparent public health hazard posed by direct contact with the soils currently or in the future. (Appendix C contains descriptions of the public health hazard categories used by ATSDR.)

Although surficial soils have been removed, deeper soils, especially those within the utility corridor, contain PCBs at unacceptable levels. Although there is a liner that should prevent PCBs from leaking into the sewer, the liner does not cover the entire sewer system. It is possible, therefore, that PCBs can enter the sewer and, potentially, the Lange/Revere canals. The future public health hazard cannot be determined. Continued monitoring is necessary to ensure the integrity of the liner and the sewer.

Recommendations

1. Continue monitoring the Ten Mile Drain system to ensure that PCBs do not enter the sewers and, subsequently, the canals and Lake St. Clair.
2. Maintain, and update as necessary, the fish advisory for Lake St. Clair.

Public Health Action Plan

1. The city of St. Clair Shores and the MDEQ have developed a monitoring, investigation, and interim-response plan that is slated to start the fall of 2007.
2. The MDEQ Remediation and Redevelopment Division's Superfund Section is conducting further investigations to determine if the site should be recommended for the National Priorities List for clean-up.
3. MDCH will maintain and update the fish advisory, based on data received from the MDEQ Fish Contaminant Monitoring Program.

Preparers of Report

Michigan Department of Community Health Division of Environmental and Occupational Epidemiology

Christina Bush, Toxicologist
Toxicology and Response Section

ATSDR Region 5 Office

Mark Johnson
Office of Regional Operations

ATSDR Division of Health Assessment and Consultation

Trent LeCoulre, Technical Project Officer
Cooperative Agreement Program Evaluation Branch

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. ATSDR, Division of Health Assessment and Consultation. Guidance on including child health issues in Division of Health Assessment and Consultation documents. July 2, 1998.

Agency for Toxic Substances and Disease Registry (ATSDR). Health consultation concerning Ten Mile/Lange/Revere Drainage System (a/k/a Ten Mile Drainage System PCB Spill). Atlanta: US Department of Health and Human Services; 2003 Jul 31.

Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta: US Department of Health and Human Services; 2000.

Michigan Department of Community Health (MDCH). 2007 Michigan Family Fish Consumption Guide. http://www.michigan.gov/documents/FishAdvisory03_67354_7.pdf

Michigan Department of Environmental Quality (MDEQ). Remediation and Redevelopment Division Operational Memorandum No. 1 – Technical Support Document – Attachment 6: Part 201 Soil Direct Contact Criteria/Part 213 Soil Direct Contact Risk-based Screening Levels. 2005 April. http://www.deq.state.mi.us/documents/deq-rrd-OpMemo_1-Attachment6.pdf (2005)

Michigan Department of Environmental Quality (MDEQ). Remediation and Redevelopment Division Operational Memorandum No. 1: Part 201 Soil Direct Contact Criteria/Part 213 Soil Direct Contact Risk-based Screening Levels. Attachment 1, Table 2 - Soil Residential/Commercial I Criteria. 2006 January. http://www.deq.state.mi.us/documents/deq-rrd-OpMemo_1-Attachment1Table2SoilResidential.pdf

U.S. Environmental Protection Agency (EPA). Pollution Report for St. Clair Shores Drain (PolRep 1). June 13, 2006. <http://www.epaosc.net> (2006a)

U.S. Environmental Protection Agency (EPA). Pollution Report for St. Clair Shores Drain (PolRep 7). August 9, 2006. <http://www.epaosc.net> (2006b)

U.S. Environmental Protection Agency (EPA). Pollution Report for St. Clair Shores Drain (PolRep 8). July 9, 2007. <http://www.epaosc.net>

Weston Solutions of Michigan, Inc. (Weston). April-May 2005 Site Investigation Report and Focused Feasibility Study, Saint Clair Shores Drain Site, St. Clair Shores, Macomb County, Michigan. Volume I of II. Prepared for Michigan Department of Environmental Quality Remediation and Redevelopment Division. Okemos (MI): Weston; 2005 Oct. W.O. No.: 20083.066.001.

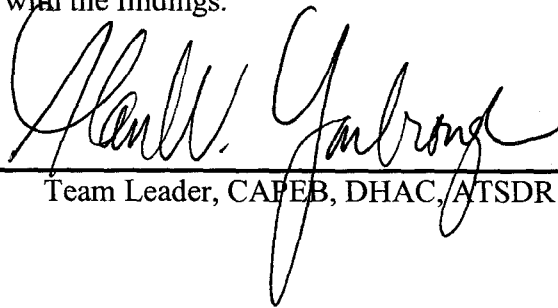
Certification

This **St. Clair Shores PCBs – Residential Soils** Health Consultation was prepared by the Michigan Department of Community Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures. Editorial review was completed by the cooperative agreement partner.



Technical Project Officer, Cooperative Agreement Program Evaluation Branch (CAPEB),
Division of Health Assessment and Consultation (DHAC), ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.



Team Leader, CAPEB, DHAC, ATSDR

Appendix A

Michigan Department of Community Health Response to Community Health Concerns Voiced at 3/1/06 Ten Mile Drain Town Hall Meeting St. Clair Shores, Michigan

1. Residents have concerns about exposure to the PCBs. Should residents move out of their homes during this next clean-up? Should residents move away?

Any exposure that people might have to the PCBs in the Ten Mile Drain area would be brief and infrequent and is not expected to result in adverse health effects.

▶ Exposure to PCBs within the sewer system is not expected to occur because residents do not have access to the sewers and public works employees would be wearing personal protective equipment when they enter the sewers.

▶ Sump pump back-ups or drain “snaking” may bring some contaminated sludge into residential basements, but whoever cleans up the sludge would be exposed only briefly, if at all, to PCBs in the air and likely wearing rubber gloves and rubber boots to prevent skin contact.

▶ The “surficial” (near-surface) soils that are going to be removed, because their concentration exceeds the MDEQ direct contact criterion, were found under the sod (grass). Sod provides a fair amount of protection from direct contact with soils. EPA plans to start excavating in April. If residents know that the areas to be excavated (sampling locations 017, 016, and 030) become muddy in the spring, they should avoid these areas until after the excavation is completed.

It is not necessary to move out of your home during the planned soil excavation and sewer liner placement. These actions should not release harmful levels of PCBs to the air (as vapors or as dust) nor excess contaminated sediment to the canals. The work should move along quickly (proposed total time is 45 days) so that you are minimally inconvenienced by noise and extra traffic.

The EPA and MDEQ have expressed their interest in a complete remediation of the contamination. As they seek ways and means of making a comprehensive clean-up happen, the measures taken now should prevent intermediate-term (at least 10 years) recontamination of the sewer and canals. MDCH and the Macomb County Health Department do not believe that sufficient exposure is occurring (if any is occurring at all) to cause you harm. Therefore, the health agencies do not feel that you need to move away.

2. Could children who dig in the soil where the “surficial” concentrations were higher than the MDEQ criterion, be exposed to PCBs?

The areas where MDEQ found PCBs in surficial soils above the agency’s criterion have been identified and will be excavated and then filled with clean soil. This action should be taking place this spring, possibly extending into summer, and will remove the potential for exposure to the contaminated soil in these areas.

It is possible that, in the past, children or adults could have dug in these areas and been exposed to PCBs. However, based on what we know about the concentrations now, it appears that the distribution of PCBs in the soil is spotty, with higher concentrations generally *not* near the surface. The highest concentration of PCBs found in surficial soils, 822 ppm, occurred at a spot where there had reportedly been a transformer fire. Electrical transformers contain PCBs, and a fire involving a transformer would release PCBs in the immediate vicinity.

3. Could garden produce take up the contamination into the edible portion of the plant?

Although the chemical properties of PCBs indicate that they preferentially accumulate in the fat of an organism, the chemicals can accumulate in plants. Uptake is less in root vegetables, because PCBs generally remain attached to the soil particles. Above-ground vegetables and fruits will not accumulate PCBs so much from the soil as they might from the air (as vapors). Studies on plants grown in PCB-contaminated soils estimate that uptake is less than 2 percent. It is likely that any vapors arising from the PCBs in the Ten Mile Drain area are substantially contained within the sewer system or deep soils and are minimally, if at all, present in the air in the residential areas.

Some plants may take up metals from soil. The earlier soil investigation in St. Clair Shores along the Lange and Revere canals indicated that some residential yards had concentrations of arsenic above state “background” (what would normally be expected, on the average, throughout the state). Data from experiments in which various vegetables and fruits were grown on arsenic-containing soil indicated a small amount of uptake into the plants. The slight increase in arsenic in the plant material, however, is not expected to negatively impact your health if you eat the produce.

4. If people want to get a medical test to determine if they have been exposed, where should they go?

Some people expressed concern regarding exposure to the PCBs and wanted to have a medical test to determine what amount of PCBs might be in their bodies. If you want to get a medical test, you should confer with your doctor first and discuss all possible exposures to PCBs that you may have had and how you were exposed.

► Although a medical test might indicate that you have been exposed to PCBs, and maybe to a greater extent than the general population, the test cannot predict whether you will become sick as a result of that exposure.

The most common way a person is exposed to PCBs is by eating fish that have PCBs in their fat. If these fish have not been appropriately cleaned and cooked so that the fat is removed from the fillet that is eaten, then PCBs likely will be taken up by your body when you eat the fish. (Please refer to the MDCH Michigan Family Fish Consumption Guide on our website [www.michigan.gov/mdch] to see which fish are of concern in Lake St. Clair and area rivers and lakes.) Other exposures to PCBs can occur via handling contaminated soil or sediment, being near an electrical transformer that is burning or explodes, or through your job (if you work with capacitors, transformers, or other PCB-containing devices).

► Nearly every person has been exposed to PCBs. The chemicals are found throughout the environment. Therefore, you are likely to have some amount of PCBs in your body, as would someone who does not live where contamination has been found in sediments and the soil. MDCH has been tracking people who were exposed to *polybrominated biphenyls* (PBBs) back in the '70s. We have tested thousands of samples throughout the state for both PBBs and PCBs. The testing results have shown that 10 parts per billion (ppb) PCBs in serum are common. The median (middle) value of PCBs in persons eating Great Lakes fish is about 50 ppb, though the value can range from 0 to 400 ppb.

The easiest way for PCBs to enter your body is by eating them, but, in some cases, you can also breathe their vapors or come into direct contact with them. As mentioned in the previous question's response, MDCH does not expect there to be significant, if any, amounts of PCBs in the air in the Ten Mile Drain area. Your skin is an effective barrier against most chemicals. If your hands are soiled with PCB-containing dirt, MDCH does not expect much, if any, absorption through the skin. Additionally, you would probably wash your hands after getting them dirty, which would remove the soil and the PCBs.

PCBs are stored in the body fat and can be detected in serum, blood plasma, and breast milk. Laboratory personnel should correct serum or plasma PCB concentrations for lipid (fat) content. Your doctor may not have experience with PCBs and may refer you to a professional with the Association of Occupational and Environmental Clinicians (www.aoec.org). The doctors in this organization have experience with patients have been exposed to chemicals at their job or elsewhere.

* * * * *

If you have additional health questions, please contact:

- Christina Bush, MDCH Toxicologist, 1-800-648-6942 or bushcr@michigan.gov
- the Macomb County Health Department, 586-469-5235

Appendix B. Letter to St. Clair Shores, Michigan residents concerned about a perceived cancer cluster.

November 29, 2006

[name and address removed to protect privacy]
St. Clair Shores, MI 48081

Dear [name removed]:

Jeff Kimble from the Environmental Protection Agency (EPA) forwarded to me the information that you and [name removed] gave him regarding a perceived cancer cluster in your neighborhood. I am the Department of Community Health (DCH) toxicologist who has been involved with the St. Clair Shores PCB Investigation since the PCBs were first discovered in the Ten Mile-Lange-Revere canals in 2001. The Department of Environmental Quality (DEQ) and EPA have kept me informed of continuing efforts to find and remove the source of the PCBs.

I had first learned of your concerns and received the information you compiled in the spring of 2002. (I either received the information directly from you at one of the EPA public meetings, or the Macomb County Health Department gave me a copy.) When I asked our cancer epidemiologist, Dr. Robert Wahl, to review the data, he told me that an analysis was already underway, having been requested by Representative Callahan *before* the discovery of the PCBs. This statistical analysis looked at the incidence rates of breast, lung, and prostate cancers, non-Hodgkin's lymphoma, and leukemia, as well as all cancers combined, in the St. Clair Shores area (zip codes 48080, -081, and -082). The area that you are concerned about, representing only several blocks, is not large enough, population-wise, to allow for statistical strength. Therefore, zip codes usually are the smallest geographic area Dr. Wahl analyzes.

Dr. Wahl's review covered the years 1985, when the Michigan Cancer Registry database started, to 1999, the most up-to-date data at the time. He compared the data for the St. Clair Shores' zip codes to that for Macomb County, as a whole, and to the state of Michigan overall. It is not unusual to find an occasional year when an area of interest has a higher cancer incidence rate. It is when there is a persistently higher incidence rate, several years running, that further study may be warranted. Dr. Wahl did *not* find a persistently higher incidence rate for the cancers indicated, except for lung cancer, which was elevated five years out of the 15 reviewed including 1996 through 1998 (three years in a row). Lung cancer has not been associated with exposure to PCBs. According to the Macomb County Health Department, the county does have a greater than average number of smokers, and smoking is a risk factor for lung cancer. DCH shared the results of this analysis with the Macomb County Health Department, who in turn shared them with Toxic Free Shores, the local group helping to steer the regulatory agencies' efforts. All parties agreed that further study was not warranted.

I have enclosed a factsheet on cancer clusters to provide you general information on cluster investigations. If you have further concerns, please contact the Macomb County Health Department's Medical Director, Dr. Kevin Lokar, at (586) 469-5511.

Thank you.

Christina Bush, Toxicologist
Bureau of Epidemiology
Division of Environmental and Occupational Epidemiology
Toxicology and Response Section

Enclosure

CC: Dr. Kevin Lokar, Macomb County Health Department
Jeff Kimble, US EPA



Cancer Clusters: Common Questions

You know several people in your neighborhood who have been diagnosed with or died from cancer within the past few years. You're worried. Is there something wrong in this area? Why does it seem so many people are getting cancer?

What is a cancer "cluster?"

A cancer cluster is a greater-than-expected number of cancer cases that occurs within a group of people in a geographic area over a specific period. A cluster may be "perceived" (i.e., a person notices what seems to be a high number of cancer cases) or "real" (i.e. statistical analysis of cancer incidence data shows that the number of cases is higher than would be predicted).

How is a cancer cluster identified?

Concerns regarding a perceived cancer cluster first should be discussed with a public health professional, either from your local health department or the Michigan Department of Community Health (MDCH). This person can help determine if an initial evaluation is necessary.

Simply counting the number of cancers found in a specific geographic area is not enough to determine if a cluster is present. An initial evaluation of a perceived cancer cluster requires the following information:

- cancer(s) of concern (breast, lung, prostate, etc.),
- number of cases,
- year of diagnosis for each case, and
- geographic area of concern.

The person asking for the evaluation should provide this information. The information can be compared to data from the state as a whole, from the county in which the community is situated, or from nearby or similar geographic areas.

Further investigation may be warranted if:

- ▶ the rate of one type of cancer is increased,
- ▶ a rare type of cancer is seen at a high rate, or
- ▶ a type of cancer is seen in a group not usually affected by that cancer, such as a cancer in children that is normally seen in adults.

If a review is indicated, cancer incidence data must be evaluated by a qualified statistician or epidemiologist.

The larger the population of the geographic area investigated, the easier it is to interpret the information. For example, a cancer analysis in one zip code area is often difficult to interpret. Analysis of several zip codes, such as for a city, generally provides more certainty. Analysis of a single neighborhood would not have the statistical power to draw clear conclusions.

What causes cancer clusters?

A cancer cluster may be due to chance, miscalculation of the expected number of cancer cases, exposure to known causes of cancer (such as smoking), or exposure to unknown causes of cancer. In most cases, no specific cause can be determined for a cancer cluster.

What causes cancer?

Cancer is a common illness - 1 out of 3 people will develop cancer in their lifetime.

The cells in your body are constantly being damaged and repairing that damage. This is normal. When damage is not repaired, cancer can develop. The development of cancer can be thought of as a series of events, each with a certain likelihood of happening, rather than as a single, all-or-nothing occurrence. These steps take time. The total time between a cell being damaged to a cancer being detected is called the latency period. Blood-related cancers, such as leukemia, may take 4-5 years to develop; solid tumors, such as those found in lung cancer, may have a latency period of decades.

Environmental factors that may affect a person's likelihood of developing cancer include:

- ◆Lifestyle choices (nutrition, tobacco use, physical activity)
- ◆Naturally occurring exposures (UV light, radon)
- ◆Medical treatments (radiation, immune system-suppressing drugs)
- ◆Occupational exposures
- ◆Pollution

Many people believe that much of our cancer risk comes from chemical pollutants in our air, food, or water. However, most of our cancer risk comes from lifestyle choices. Non-environmental risk factors include age, race, gender, and genetic factors.

Just because you might be exposed to a carcinogen (a cancer-causing agent) does not mean that you will develop cancer as a result of that exposure. If you are concerned about developing cancer, you should discuss this matter with your physician. Many cancers are successfully treated if they are discovered in the early stages.

Other Sources of Information:

Check with your local health department regarding perceived cancer clusters in your area. If necessary, your local agency can refer you to MDCH for further information.

View the MDCH factsheet called "Cancer and the Environment" at http://www.michigan.gov/documents/mdch_Cancer&Environment_86809_7.pdf

View Michigan or county data regarding certain forms of cancer at the MDCH Cancer Registry. <http://www.michigan.gov/mdch>, under "Statistics and Reports."

Learn more about cancer cluster investigations at the Centers for Disease Control and Prevention website. <http://www.cdc.gov/nceh/clusters/default.htm>

Get cancer information from the American Cancer Society website. <http://www.cancer.org/docroot/home/index.asp>

Appendix C. ATSDR Public Health Hazard Categories

Depending on the specific properties of the contaminant(s), the exposure situations, and the health status of individuals, a public health hazard may occur. Sites are classified using one of the following public health hazard categories:

Urgent Public Health Hazard

This category applies to sites that have certain physical hazards or evidence of short-term (less than 1 year), site-related exposure to hazardous substances that could result in adverse health effects. These sites require quick intervention to stop people from being exposed. ATSDR will expedite the release of a health advisory that includes strong recommendations to immediately stop or reduce exposure to correct or lessen the health risks posed by the site.

Public Health Hazard

This category applies to sites that have certain physical hazards or evidence of chronic (long-term, more than 1 year), site-related exposure to hazardous substances that could result in adverse health effects. ATSDR will make recommendations to stop or reduce exposure in a timely manner to correct or lessen the health risks posed by the site.

Indeterminate Public Health Hazard

This category applies to sites where critical information is lacking (missing or has not yet been gathered) to support a judgment regarding the level of public health hazard. ATSDR will make recommendations to identify the data or information needed to adequately assess the public health risks posed by this site.

No Apparent Public Health Hazard

This category applies to sites where exposure to site-related chemicals might have occurred in the past or is still occurring, but the exposures are not at levels likely to cause adverse health effects. ATSDR may recommend any of the following public health actions for sites in this category:

- cease or further reduce exposure (as a preventive measure)
- community health/stress education
- health professional education
- community health investigation.

No Public Health Hazard

This category applies to sites where no exposure to site-related hazardous substances exists. ATSDR may recommend community health education for sites in this category.

For more information, consult Chapter 9 and Appendix H in the 2005 ATSDR Public Health Assessment Guidance Manual (<http://www.atsdr.cdc.gov/HAC/PHAManual/index.html>).