Profiling the Ottawa River II

Wednesday, September 11, 1996
6:30PM to 9:00PM
Friendship Park Senior Center
2930 131st Street
Toledo, Ohio

Sponsored by the
Maumee Remedial Action Plan (RAP) Implementation Committee

Maumee River
REMEDIAL ACTION PLAN

Coordinated by:
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TMACOG
LEADING REGIONAL PROGRESS

Funded by:
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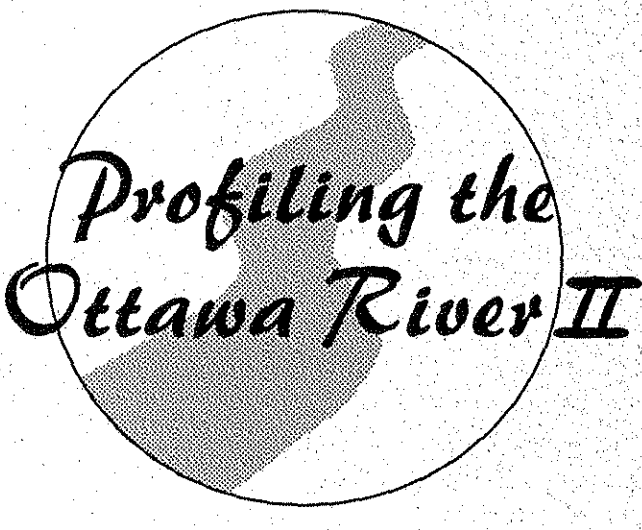
OhioEPA
Ohio Environmental Protection Agency



Moderator:

Lou Hebert, Newscaster, WTOL - TV Toledo Eleven

Panel:

Overview of the Remedial Action Plan

Mark Pietrykowski, Chair, Maumee RAP Implementation Committee

Toxic Hot Spots

Lee Pfouts, Chair, Maumee RAP Ottawa River Action Group

Dura, Stickney, Tyler and XXKem

Ali Moazed, Site Coordinator, Ohio Environmental Protection Agency

Unnamed Tributary and North Cove

Patrick Heider, Site Coordinator, Ohio Environmental Protection Agency

Financing CSOs and SSOs

Don Moline, Public Utilities Director, City of Toledo

Permitted Point Sources

Elizabeth Wick, Engineer, Ohio Environmental Protection Agency

Aquatic Health of the River

Tom Balduf, Biologist, Ohio Environmental Protection Agency

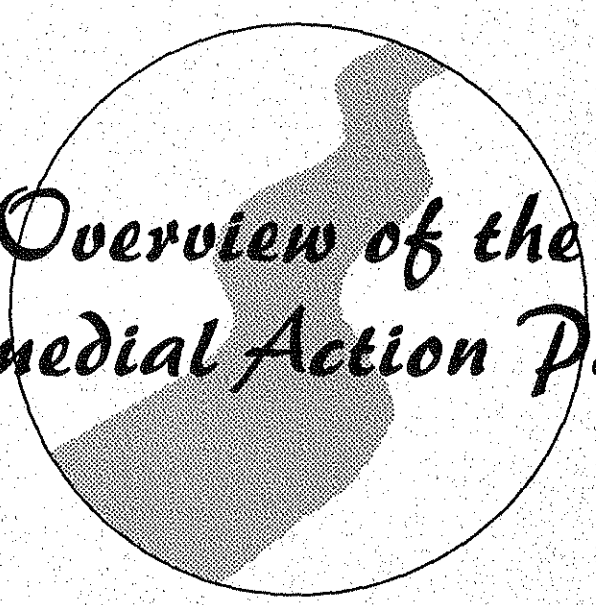
Human Health Risk

Michael Bisesi, Ph.D., Occupational Health Chair, Medical College of Ohio

Wildlife Problems

Mark Shieldcastle, Biologist, Ohio Department of Natural Resources

Sponsored by the
Maumee Remedial Action Plan (RAP) Implementation Committee
Dumps & Landfills Action Group and Ottawa River Action Group



Overview of the Remedial Action Plan

By Mark Pietrykowski, Chair
Maumee RAP Implementation Committee

Maumee River Remedial Action Plan

The Maumee River Remedial Action Plan is a community effort to restore the health and beauty of the Maumee River and Bay ecosystem for the benefit of all who live in our region. We are striving for abundant open space and a high quality natural environment; adequate floodwater storage capacities and flourishing wildlife; citizens who take local ownership of their resources; and rivers, streams and lakes that are clean and clear and are viewed by all as recreational attractions. We have made many accomplishments in the last several years, but we still have a long way to go to reach our goal of fishable and swimmable waters in all of Lucas County and a portion of Wood and Ottawa counties.

The Maumee RAP began in 1987 as a cooperative venture between TMACOG, the Ohio EPA, and many local stakeholders who were concerned about clean water in Northwest Ohio. RAPs are programs that stemmed out of an agreement between the United States and Canada to clean up our Great Lakes Basins. Designated as an Area of Concern in 1987, the Maumee RAP is one of 42 RAPs along the Great Lakes with the goal to have fishable and swimmable waters. We completed our inventory of the problems in the area in 1991 and since then have been working through action groups to implement the recommendations for improvement.

The RAP action groups have concentrated their efforts on problems associated with the lack of open space and wetlands, agriculture runoff, urban runoff, combined sewer overflows and dumps and landfills. Volunteers on these groups represent governmental agencies, active citizens and the private sector. We have only begun to address the many pollution sources in our region and it is our hope that more citizens in Lucas, Wood and Ottawa counties can help us in this endeavor.

The following is a list of the action groups and the issues that they currently address:

Dumps and Landfills Action Group

The Dumps and Landfills Action Group serves as an oversight and advisory committee in the cleanup process of the uncontrolled waste sites in our area of concern. They monitor the work of the US EPA, the OEPA and the potentially responsible parties with their plans for the remediation of the dumps.

The Dumps and Landfills Action Group holds many public meetings to inform citizens of the progress being made in cleaning up the dumps. This group is planning a workshop to take place on October 29 (1:00 p.m. - 4:00 p.m., Ohio EPA-Northwest District Office) to better inform committee members and local decision makers of the risks involved with the contaminants found in sediments and leachate from waste sites.

Urban Runoff Action Group

The Urban Runoff Action Group is working to control and treat pollutants in urban stormwater runoff. Chemicals on the lawn, pesticides in the garden, used motor oil down the storm sewer, and household chemicals improperly used or disposed of, all eventually end up in the nearest stream.

This group is currently working with the Ohio EPA in establishing a stormwater management program for watersheds in our area of concern. Within the next two years, municipalities surrounding Toledo will be phased into the permit process and will be required to develop and implement a municipal stormwater management program.

The Urban Runoff Action Group also sponsors a storm drain stenciling program in many communities in our area of concern. With this project, volunteers paint a "Dump No Waste, Drains to Lake" sign on storm drains to educate the public that storm drains run directly to our waterways and to encourage citizens to properly dispose of their waste instead of dumping it into drains.

We need your help to improve water quality in our Area of Concern.
For more information on how you can get involved in the Maumee RAP, please contact:

TMACOG
PO Box 9508
Toledo OH 43697-9508
419-241-9155 ext. 125 or 126

By Lee Pfouts, Chair
Maumee RAP
Ottawa River Action Group

TOXIC HOT SPOTS

Lee Pfouts
Profiling the Ottawa River II
September 11, 1996

The Ottawa River has a watershed of 178 square miles covering parts of Northwestern Ohio and Southeast Michigan. The western section of the watershed is known as Ten Mile Creek and is mainly agricultural. The Ottawa River section, from the City of Sylvania to Monroe Street, is mainly residential and commercial. The section from Monroe Street to Suder Avenue is heavy industrial and contains over a dozen dumps along with six combined sewer overflows. The remaining section from Suder Avenue to Maumee Bay is mainly residential with a large concentration of marinas north of Summit Street. The area I am going to discuss today is from the heavy industrial area to Maumee Bay.

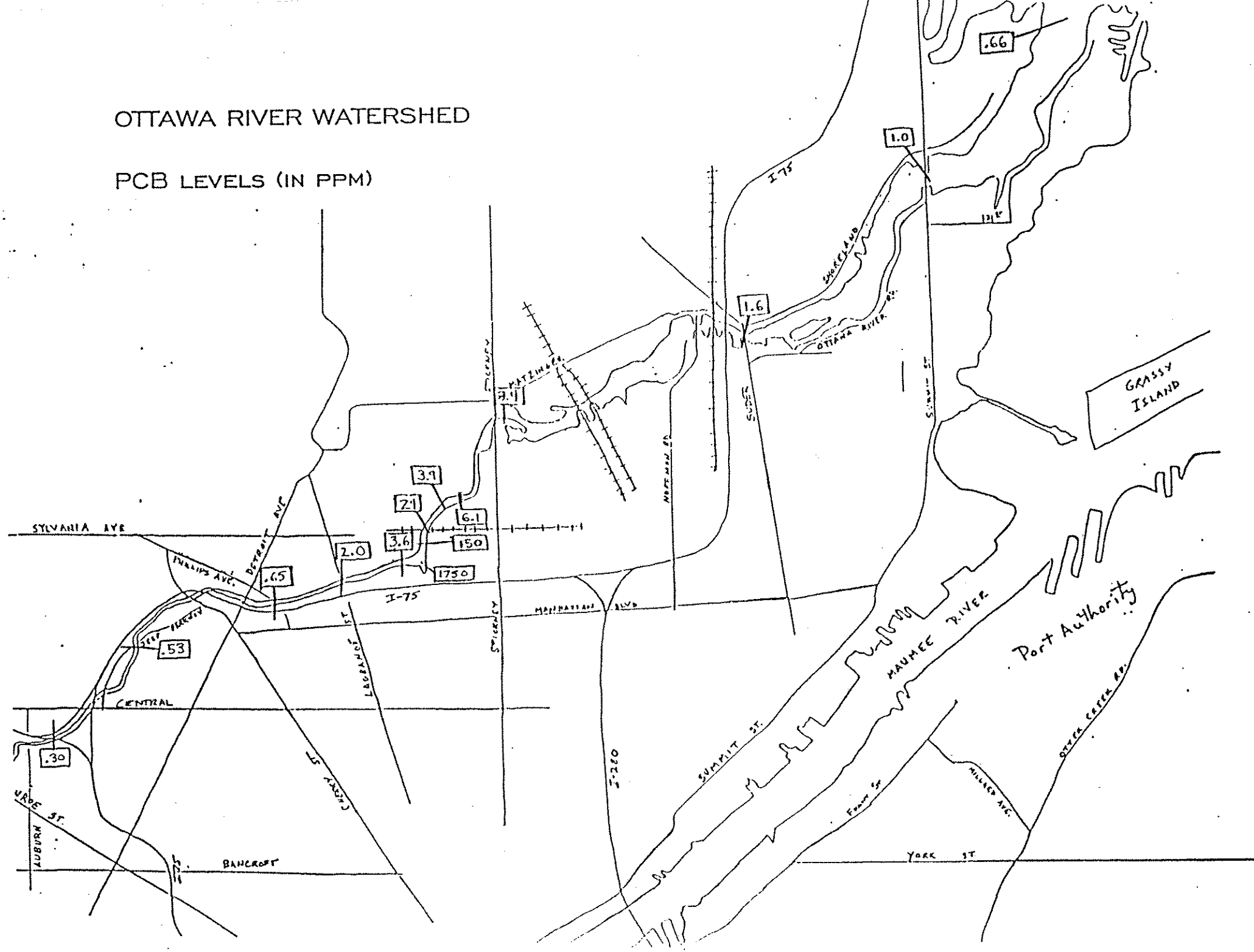
I constructed the maps of the contaminants in the sediments of the Ottawa River from preliminary data to show some of the hot spots on the river. I used data from the top layers of the sediment and did not use any data from more than twelve inches deep. The data is from the OEPA samplings of 1991, 1993, and 1994, along with Toledo's Environmental Services Division's data and some of Dura Landfill's data. When there was more than one set of data for a certain location, I averaged the data. I made maps for the following contaminants: polychlorinated biphenyls (PCBs), Cadmium (Cd), Chrome (Cr), and Lead (Pb). I used these four because they are good indicators of pollution from industrial sources, Combined Sewer Overflows (CSO), and dumps and landfills.

Map #1 - PCBs

The first map is for PCB contaminants. The highest concentration of PCBs in the river sediments is at the unnamed tributary. Concentrations of over 1750 ppm has been found in the sediments of this small stream. The PCB concentrations drops off as you go in either direction from the source. The reason that contamination is seen in each direction is that the Ottawa River flows back and forth, depending on which way the wind blows Lake Erie. Other sources of PCBs identified in the area are the dumps. In the early 1980s, PCBs were found leaching from the Dura Dump. The bank next to this dump had PCB concentrations of over 135 ppm and floating oil had PCB concentrations of over 550 ppm. The bottom sediments in the river had PCB concentrations of less than 10 ppm. The PCB concentrations downriver from Summit Street are less than 1 ppm, but this is still more than three times higher than the levels at Monroe Street.

OTTAWA RIVER WATERSHED

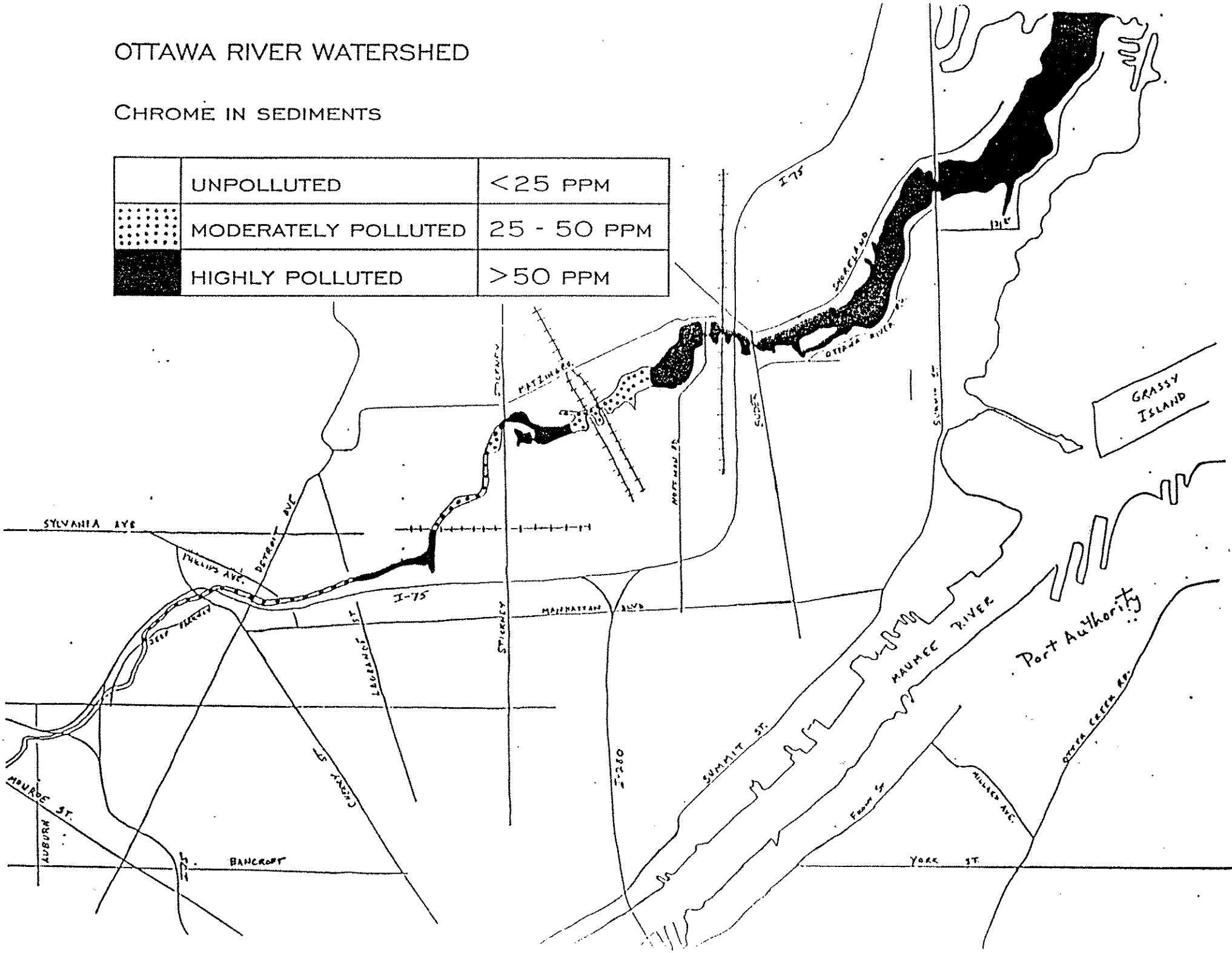
PCB LEVELS (IN PPM)

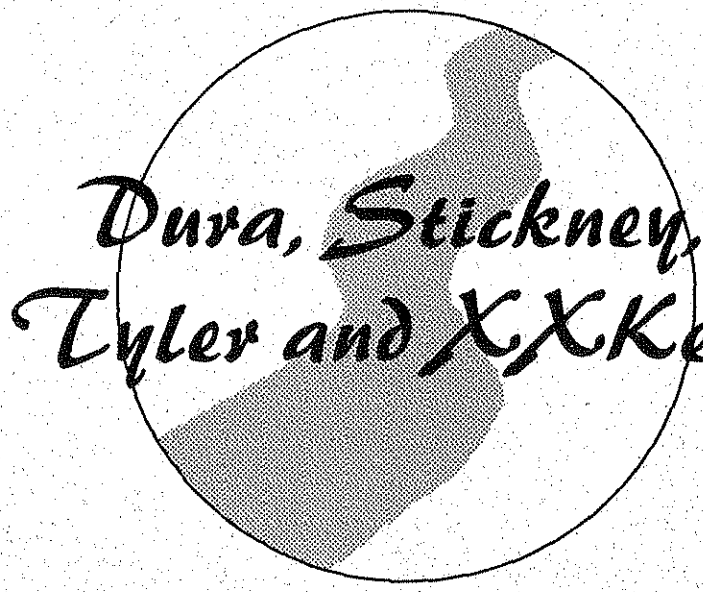


OTTAWA RIVER WATERSHED

CHROME IN SEDIMENTS

	UNPOLLUTED	<25 PPM
	MODERATELY POLLUTED	25 - 50 PPM
	HIGHLY POLLUTED	>50 PPM





By Ali Moazed, Site Coordinator
Ohio Environmental Protection Agency
Division of Emergency and Remedial Response

Ali M. Moazed
Ohio Environmental Protection Agency
Division of Emergency and Remedial Response

Stickney Avenue Landfill and Tyler Street Dump

The Stickney Avenue Landfill and Tyler Street Landfill (the sites) are former municipal and industrial landfills located on opposite sides of the Ottawa River, approximately 5 1/2 miles upstream from the mouth of the River. The Tyler site, which is one-tenth of a mile upstream from the Stickney site, is approximately 41 acres. The Stickney site is nearly 50 acres in size. From 1958 through 1966, the Stickney site was used for disposal of municipal and industrial waste. In 1966, disposal activities were discontinued and the landfill was covered with soil, graded and seeded. The Tyler site accepted wastes from approximately 1951 to the early 1970's. A number of wastes were deposited at the site including grease, oil, sewage sludges, solvents, heavy metals, corrosives, paint wastes, and municipal garbage.

The Sites have undergone an Engineering Evaluation/Cost Analysis (EE/CA) under an Administrative Order on Consent between U.S. EPA and a group of six potentially responsible parties (PRPs). The EE/CA was an investigation structured to define the extent of contamination, determine the levels of contaminants, and evaluate the appropriateness of implementing a standard U.S. EPA remedy to control contamination at landfills for the two sites. The findings of the investigation are summarized in EE/CA reports which were finalized in August 1996. Ohio EPA provided technical review and oversight of EE/CA activities.

The EE/CA study included collection of surface soil, riverbank soil, ground water, leachate, and landfill gas samples and the installation of monitoring wells. Sampling revealed organic and inorganic contaminants, including pesticides, PCBs, heavy metals, and polynuclear aromatic hydrocarbons (PAHs).

A streamlined risk evaluation (SRE) was prepared to assess the risks posed by the sites. It was determined that the primary chemicals of concern at the Sites include heavy metals (inorganic compounds) and organic compound such as pesticides, PCBs, and PAHs. The SRE determined that the ingestion of fish which had consumed these contaminants posed an unacceptable health risk.

An Action Memorandum describing the remedy selected by U.S. EPA as appropriate for the Site was issued in February 1996. U.S. EPA selected a remedy consisting of the following components: construction of a landfill cover system, site grading, riverbank stabilization, construction of a landfill gas venting system, a performance monitoring plan, institutional controls and operation and maintenance.

The PRPs are expected to sign an agreement on October 1, 1996 to implement the remedy. Initial steps in the construction of the capping system such as fencing, removal of surface vegetation, and stock piling of materials may begin this winter. Full-scale construction activities

ordered the removal of all wastes and the drainage and removal of the lagoon contents. Final closure of the lagoon called for filling with non-metallic auto-demolition material, capping with clay and topsoil, and seeding the area with grass. Closure activities were terminated in 1983; however, residual sludges and associated contamination were not removed and the impoundment was never properly capped.

At the request of U.S. EPA, Ohio EPA conducted a limited field investigation (Supplemental Expanded Site Inspection) of the central portion of the XXKem Site--specifically the lagoon area. Data pertaining to concentrations of contaminants in subsurface soil and ground water in the central portion of XXKem were obtained to supplement the Stickney EE/CA and serve as a basis for assessing the applicability of the proposed remedy for Stickney to the XXKem Site.

During the course of the field investigation, six soil borings were completed in the central portion of the XXKem site. Three of the borings were completed as monitoring wells. Samples for chemical analysis were collected from the soil borings and the ground water monitoring wells.

Analytical results from subsurface soil samples indicated the presence of extremely elevated concentrations of volatile organic compounds(VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides, and polychlorinated biphenyls (PCBs). Below is a partial list of contaminants and the maximum concentration detected in soil samples collected during the supplemental ESI.

- **VOCs** - tetrachloroethene (4,000,000 ug/Kg), trichloroethene (40,000,000 ug/Kg or **4%**), methylene chloride (34,000,000 ug/Kg or **3.4 %**), vinyl chloride (18,000 ug/Kg) and 1,2-dichloroethane (2,800,000 ug/Kg)

- **SVOCs** - 1,2-dichlorobenzene (170,00 ug/Kg), 4-methylphenol (130,000 ug/Kg), benzo(a)anthracene (12,000 ug/Kg), benzo(b) fluoranthene (9,400 ug/Kg), benzo(a)pyrene (7,100 ug/Kg), and indeno[1,1,3-cd]pyrene (5,000 ug/Kg)

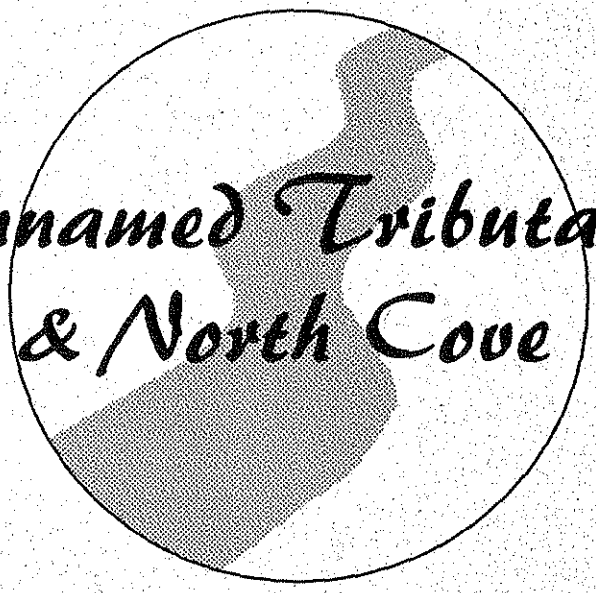
- **PCB** - Aroclors 1242 (200,000 ug/Kg), 1248 (140,000 ug/Kg), 1254 (110,000 ug/Kg), and 1260 (93,000 ug/Kg)

- **pesticides** - heptachlor epoxide (2,500 ug/Kg) and 4,4-DDE (1,100 ug/Kg)

- **metals** - antimony (122 mg/Kg), arsenic (29 mg/Kg), cadmium (175 mg/Kg), copper (37,300 mg/Kg), lead (4380 mg/Kg), mercury (5.3 mg/Kg), and cyanide (58.5 mg/Kg)

Analytical results from leachate samples indicate the presence of VOCs, SVOCs, metals, pesticides, and PCBs at concentrations significantly greater than background. Below is a partial list of contaminants detected in leachate monitoring wells installed as part of the supplemental ESI for XXKem.

- **VOCs** - 1,2 dichloroethane (140,000 ug/L), 1,1-dichloroethene (5,100 ug/L), trichloroethene (23,000 ug/L), and toluene (13,000 ug/L)



By Patrick Heider, Site Coordinator
Ohio Environmental Protection Agency
Division of Emergency and Remedial Response

Patrick J. Heider
Ohio Environmental Protection Agency
Division of Emergency and Remedial Response

Introduction to Unnamed Tributary:

The subject area is referred to as the "Unnamed Tributary" of the Ottawa River which is a major tributary to Maumee Bay. The Unnamed Tributary is located north of Interstate 75 and Greeley Street between LaGrange Street and Stickney Avenue within the City of Toledo, Ohio. The site is owned by the City of Toledo. The tributary was historically part of the main channel of the Ottawa River. Prior to 1940, as shown by aerial photographs, the Ottawa River was straightened and rechannelized in this area. Parts of the abandoned river channel were later filled in, also as indicated from historical aerial photographs. When Interstate 75 was built the abandoned river channel was further filled, leaving what remains today as the Unnamed Tributary. The Unnamed Tributary is approximately 700 feet long and 50 feet wide. It enters the main channel of the Ottawa River at river mile 5.97. It is fed by two large storm sewers and is stagnant during periods of low rainfall. The Ottawa River goes through flow referrals depending on the wind direction, forcing river water and suspended sediment into the tributary. The suspended sediment or sediment load, which often carries contaminants with it subsequently settles out of the river water in the low energy environment of the tributary. The Unnamed Tributary is bordered by a low floodplain to the west and high banks on the south and east. The land on the east bank of the Unnamed Tributary has been appropriated by local individuals for a motorcycle motocross track. The Unnamed Tributary is located upstream and somewhat adjacent to the Stickney Avenue and the XXKem facility. Dura Avenue landfill is located a short distance downstream and across the Ottawa River from the tributary. The Tyler Street landfill is located directly across the river from the tributary and was also an area where waste was used to fill the abandoned river channel left when the River was straightened. All of these sites have PCB contamination and have active on-site remedial activity.

The Ottawa River from river mile 8.8 to Maumee Bay has been under a fish and contact advisory by the Ohio Department of Health (ODH), since 1991. Sediments in the Unnamed Tributary are believed to be one of the primary remaining sources of polychlorinated biphenyl (PCB) contamination to the Ottawa River, Maumee Bay and the western basin of Lake Erie contributing to the advisory. The highest PCB sediment levels recorded in the main channel of the Ottawa River, 110 parts per million (ppm) were immediately downstream from the mouth of the Unnamed Tributary at river mile 5.96. The highest levels for PCBs in sediments in the Maumee River basin were found in the Unnamed Tributary, 2500ppm. A sediment core sample taken from the tributary, near the confluence with the Ottawa River, tested 1300 ppm from a section of the core at 0-6" in depth, 190 ppm from a section of the

North Cove Landfill

The former North Cove Landfill site (herein referred to as the Landfill or the Site) is located within a historic industrial corridor adjacent to the Ottawa River. The Landfill is currently occupied by Interstate Highway I-75 (I-75), the Ottawa River, the former Willy's Test Track and Chrysler Jeep Assembly Plant. The Chrysler Jeep Assembly Plant is adjacent the Landfill to the south and east, residential neighborhoods are adjacent the Landfill to the north and west. The Landfill is estimated to cover an area of approximately 16 acres. The Site was utilized as a landfill from an undetermined period prior to 1941 through the third quarter of 1970. A portion of the Landfill was previously owned by the City of Toledo and subsequently leased to Willy's Motor Company, Kaiser Jeep Corporation (Kaiser) and American Motors Corporation (AMC). The aforementioned companies are predecessors at the assembly plant which is now owned and operated by Chrysler. Historically, the Landfill operation accepted wastes generated at the assembly plant. A portion of the former Willy's Test Track, which was previously owned by Kaiser, was also utilized as a disposal area. The City of Toledo later acquired ownership of the test track area in a land transfer with AMC. AMC ceased operation of the landfill within a year of purchasing Kaiser, Chrysler has never used the site as a landfill.

In September of 1972, the City of Toledo sold a portion of the land on which deposition of wastes occurred to the State of Ohio Department of Transportation (ODOT) for the construction of I-75. The route of I-75 traverses directly over the former landfill area. During the construction period of I-75, fill material and liquids were noted in various excavations. The Ottawa River was diverted to the current channel which lies over the southern portion of the landfill in order to accommodate I-75. The construction of I-75 was completed in 1973.

In 1979, the City of Toledo initiated construction of a sanitary sewer which transects the southeast portion of the Willy's Test Track. Historical documents indicate that solvent fumes as well as crushed drums containing unknown materials were encountered in certain excavations. Interceptor wells were installed and free-phase solvent was observed on the water table. Toluene, xylene, ethylbenzene, heavy aromatics and esters were detected in groundwater samples from the interceptor wells. The installation of the interceptor wells was initiated as a temporary measure during the coarse of the sanitary sewer construction project.

Given the nature and circumstances surrounding the North Cove landfill, a number of limited scope investigations have been historically undertaken by various entities including the City of Toledo, the Ohio EPA, ODOT, and Residual Management Technologies, Inc. on behalf of the Chrysler Corporation. Historical analytical results demonstrate the presence of various volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls and pesticides, and metals at elevated levels. The media adversely impacted as a result of the historical operations of the former North Cove landfill include soil, Ottawa River sediments, landfill leachate and the Ottawa River itself.

By Donald Moline, Public Utilities Director
City of Toledo

PROFILING THE LOWER OTTAWA RIVER II

SEPTEMBER 11, 1996

FINANCING CSOs AND SSOs

Donald M. Moline, Director of Public Utilities

Where are the Combined Sewer Overflows (CSOs) on the Ottawa River?

There are six overflows on the Ottawa River at Lagrange, Windermere, Detroit, Lockwood, Ayers and Monroe Streets.
(See Handout for location and listing)

What has been accomplished to date in regard to CSOs on the Ottawa River? What was the cost?

In the 1980's the Ten Mile Creek Relief Sewers were constructed to reduce basement flooding and combined sewer overflows. Tide gates were also installed to prevent stream intrusion caused by high lake levels from flowing into the CSO control regulators and causing dry weather overflows. Total cost of this work was over $60 million.

What is being done now and what is proposed for the future? What is the estimated cost?

In 1995, the Combined Sewer Overflow Plan was updated to reflect current data with emphasis on the Ottawa River. This updated plan recommended eleven optimization projects to eliminate or reduce flows from the various combined sewer areas throughout the City. The estimated cost of these optimization projects is $12.3 million. Currently two projects on the Ottawa River with an estimated cost of $700,000 are in the design stage.

Also recommended for the Ottawa River in the 1995 CSO update were two storage/treatment facilities having a total project cost of $35.5 million. The schedule for this work is dependent on completion of the eleven optimization projects and funding availability, but currently is planned for design in the year 2000.

What are SSOs and where are they located on the Ottawa River?

SSOs are Sanitary Sewer Overflows and differ from CSOs in that SSOs were designed for sanitary flows only, but due to excessive inflow and infiltration become surcharged and, many times, cause basements to flood. In an attempt to alleviate the flooded basements, overflows or relief pumps stations are installed, allowing the surcharged sewers to discharge into area streams. There are three such relief pump stations in the City, all in Point Place. Two are located on the Ottawa River at 145th Street and Edgewater Drive, and at 116th Street and Ottawa River Road. The third is located on Maumee Bay at 129th Street and Edgewater Drive.

The decision as to which source of funding to use is determined by the number of projects, project size, funding availability, and time restrictions.

Although Revenue Bonds and the various loan programs are needed sources of funding for major projects, unlike the grants programs of the past, you have to pay them back. These loan repayments, which are also funded from sewer user charge revenues, are shown as debt service in our annual budget and currently totals nearly $6 million per year.

To give you an example of how these capital projects affect you: a $10 million loan from Ohio EPA at the current interest rate and a 20 year payback would require approximately $735,000 per year in repayment costs. All other things being equal, that is with no change in operating expenses and sewer revenue, an increase in user charges would be necessary. The payments on the above $10 million loan, for example, would require a 2¼ % rate increase for all sewer users.

While these sewer rate increases can be tempered slightly through available grants programs, such as State Issue 2, by cost cutting measures in the operating divisions, or increased revenues from expanding service areas, the bottom line is that we will need future sewer rate increases to meet the requirements of the Clean Water Act and the goals of the Maumee River Remedial Action Plan.

Permitted Point Sources

By Elizabeth Wick, Engineer
Ohio Environmental Protection Agency
Division of Surface Water

UPDATE ON PERMITTED POINT SOURCES

Elizabeth Wick
Division of Surface Water
Ohio EPA, Northwest District Office

There are now only six entities that are permitted to discharge to the Ottawa River under the National Pollutant Discharge Elimination System (NPDES) program. These entities are:

- Hoffman Road Landfill
- Textileather Corporation
- Chrysler Corporation
- France Stone Company, Sylvania Quarry
- Centennial Manor Mobile Home Park
- B.P. Oil Company, Toledo Terminal

Combined sewers are sewers that were designed to convey both sanitary waste and storm water. Separate sewers are sewers that were designed to carry **only** sanitary waste. During rain events, combined sewers may overflow into a receiving stream. Overflows from separate sewers are illegal under the Clean Water Act.

There are still five combined sewer overflows (CSO) and two separate sewer overflows (SSO) that discharge to the Ottawa River during rain events. Portable pumps may still be used occasionally in the Point Place Area to relieve the sewers and prevent basement flooding. The city is permitted to discharge from the CSO's under their NPDES permit when the flow in the sewer system exceeds the capacity of the sewer system. They must monitor a portion of all the overflows on the system during each rain event. The city is not permitted to discharge from the SSO's. As a result, these discharges are in the process of being eliminated under Findings and Orders from the Director of the Ohio EPA.

The following combined sewer overflows discharge to the Ottawa River and are included in the city's NPDES permit:

- Lagrange Street and Manhattan Blvd.
- Windemere and Manhattan Blvd.
- Detroit Ave. and Phillips Ave.
- Lockwood Ave. and I-75
- Ayers Ave. and South Cove Blvd.

The following separate sewer overflows discharge to the Ottawa River:

- 290th St. at Ottawa River Road Pump Station
- 145th at Edgewater Drive Pump Station

France Stone, Sylvania Quarry - No changes have taken place at this facility and no additional violations are documented in the file.

Centennial Manor Mobile Home Park - No changes have taken place at this facility and no additional violations are documented in the file. However, the treatment plant will be eliminated and connected to the county sewer system in the near future.

BP Oil Co. , Toledo Terminal - No changes have taken place at this facility and no additional violations are documented in our file.

By Tom Balduf, Biologist
Ohio Environmental Protection Agency
Division of Surface Water

The Ottawa River: The River's Place in the Maumee Watershed

Tom Balduf
Division of Surface Water
Ohio EPA, Northwest District Office

While it may be tempting to look at the Ottawa River as an isolated entity, we need to look beyond the river's mouth, to see how it relates with the rest of the ecosystem of which it is a part, that is, the western end of Lake Erie. This may be difficult at times, since our attention has been so often drawn directly to the Ottawa, with its many sources of contamination, polluted sediments, and complex requirements for environmental monitoring.

The Ottawa River is an important contributor of water, sediment, and the materials they carry to the western end of Lake Erie, through the Maumee Bay. It is, as we well know, negatively and severely impacted by past misuses of its channel and riparian area, which continue to contribute contamination to the stream. We know a lot about this river, including something about its water chemistry, its sediment type and quality, its biota, and the effect it has on the Maumee Bay. We know quite a bit about the sources of contamination to the Ottawa, and we are beginning to understand the distribution of these contaminants in the sediments of the river. We do not yet have a detailed understanding of the complex relationships between cause and effect in the stream; i.e. we cannot yet relate all of the sources of contamination with distribution of specific contaminants in the sediments, partly due to the complexity of closely situated waste sites, which contribute overlapping inputs to the stream.

We are using innovative screening methodologies to map the contamination distribution in the river, and to try to relate these to specific inputs. This will require detailed analysis of all data, and will probably also require more sampling and analysis to make sure we have a "handle" on hot spots and zones of contamination. The methods we are using for screening give us the most economical use of limited sampling and analysis funds, and will help us to map out relatively large areas of the river. This will enable us to pinpoint areas where more detailed, and more expensive, sampling can be conducted to help us identify the very worst of the hot spots, and eventually, all areas where any level of contamination is detectable.

It is important that we be able to prioritize areas not only areas where sediment remediation is required, but also to make sure that no contaminated zones are left untouched, where some sort of work would improve the conditions of the river and encourage the recovery of the Ottawa River watershed.

Remedial activities should be continued at as many sites as possible, as an ongoing project while the river is more thoroughly studied and defined. Until the sources of contamination are cleaned up, the sediments will continue to receive and retain inputs of pollution. It is pleasant to imagine removal of contaminated sediments prior to removal of the inputs, but this would only be a temporary measure, since the contamination sources would only continue to add materials to the sediments of the river, which would have to be purged again.

It is vital that planners and decision makers have a thorough knowledge of the existing conditions in the river, so that contamination can be mapped and removal or other remediation plans made in the most responsible manner. This will enable the stakeholders in the Ottawa River

By Michael S. Bisesi, Ph.D.
Occupational Health Chair
Medical College of Ohio

Factors Influencing the Risk of Developing Adverse Health Effects Due to Exposure to Toxic Chemicals Contained in Surface Waters, Aquatic Life, and Sediments: A Toxicological Perspective

by

Michael S. Bisesi, Ph.D., RS, CIH
Environmental Scientist
Chairman, Department of Occupational Health
Associate Professor, School of Allied Health and School of Medicine
Medical College of Ohio
Toledo, OH

Introduction

This short communication will focus on fundamental scientific principles of toxicology that will increase the public's understanding of factors to consider relative to the issue and question of adverse human health effects associated with exposure to contaminated water, food (e.g. fish), and/or sediment from the Ottawa River. Concern, not panic, is always warranted over the potential adverse impacts to human health that can possibly result from swimming in surface water or ingesting food (e.g. fish) or water from surface water and subsurface sediments contaminated with various toxic chemical agents. Unfortunately, the certainty of adverse impact occurring is most often nebulous. The issue is indeed a contradiction, that is, the major area of certainty is the uncertainty.

Various factors must be considered when evaluating the potential for adverse impact to human health resulting from exposure to toxic substances, including those substances contaminating surface water and subsurface sediments. A toxicological perspective follows:

Factors of Human Exposure

Human exposure can be divided into two categories: external and internal. "External exposure" refers to the contact between the human body and a contaminated medium such as air, water, soil (including sediment), or food. Contact with the external media initially occurs between the respiratory system with air (including suspended or dissolved contaminants); the gastrointestinal system with food, water, and even soil; and the dermal (skin) system with air, water, and soil. In the case of contaminated surface waters (and sediments), the focus of this short communication, the most immediate and obvious concerns for external exposure are associated with swimming (dermal contact) and ingestion (gastrointestinal contact). Swimming in contaminated surface waters is an example of direct exposure to potentially toxic chemicals

The gender (i.e. male; female) can also influence the potential for initiation and progression of adverse effects associated with exposure to some toxic chemicals. One reason is the differences in the endocrine (hormonal) systems of males and females. For example, although breast cancer can develop in either men or women, females tend to be more vulnerable to developing breast cancer than males. This area is very complex and, like most areas, deserves additional scientific and medical research.

Age also has been shown to influence the fate of toxic chemicals. In general, the very young and very old tend to be most vulnerable to development of adverse effects following exposures to toxic chemicals. Indeed, no organism is too young to exhibit the impact of toxic exposures since damage can occur prior to birth during embryonic and fetal development.

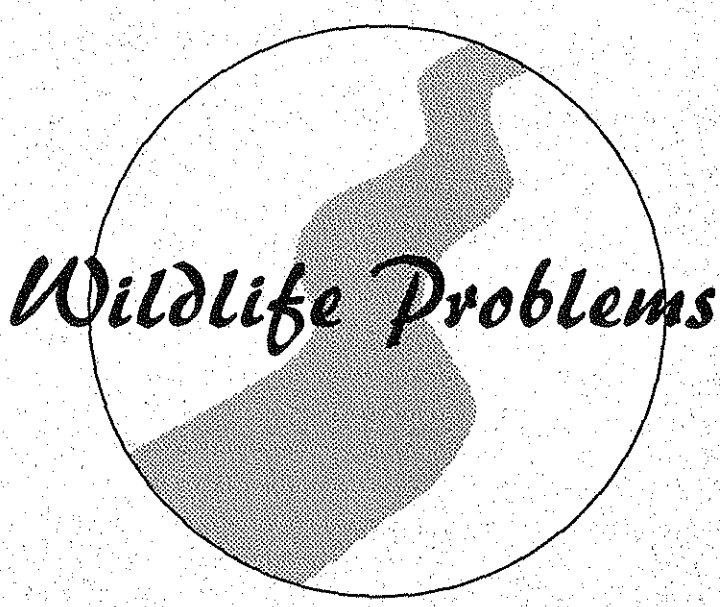
Factors Related to the Chemicals

The characteristics of the chemicals themselves also must be considered when evaluating the potential for initiation and progression of adverse effects to human health following exposure to toxic chemicals. Major characteristics include chemical composition (inorganic vs. organic; structure); physical state (solid, liquid, gas); solubility in biologic fluids (water soluble vs. fat soluble).

Chemicals such as polyaromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) are examples of organics and metals (e.g. lead; arsenic) are examples of inorganics. The chemical composition influences the ability of chemicals to absorb into the body and reach specific sites where toxic damage can occur (i.e. "target sites"). The physical state of a toxic chemical also influences the toxicity hazard mainly by influencing the potential for absorption into the body. Dissolved contaminants in surface waters and sediments are liquids, solids, or gases that are transported to and into the body in liquid form via the water matrix. Insoluble or undissolved contaminants, whether suspended or settleable in the water, are typically in a physical and sometimes a liquid (e.g. oils; greases) physical state.

The physical property of water and fat solubility also must be considered. Although both water soluble and fat soluble toxic chemicals can absorb into the body, in general the fat soluble molecules are organic and can enter more readily. This due to the fact that all cells are encased in a fatty ("lipid") membrane; fats dissolve fats. In addition, the fat soluble organic substances can store in fat ("adipose") tissue of aquatic organisms and humans. Inorganic metals dissolved or suspended in water also can be stored in aquatic and human organisms, via bonding to bone tissue.

The storage of chemical agents is referred to as bioaccumulation. These contaminants can accumulate over time and increase in concentration within organisms and result in bioconcentration and biomagnification. For example, fish can accumulate and store



By Mark Shiedcastle, Biologist
Ohio Department of Natural Resources
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WILDLIFE IMPAIRMENTS - HUMAN IMPAIRMENTS

What does quality of life mean to you? What role does wildlife play in ensuring your quality of life? These questions may seem simple at first, but are they? What really is important and what can be used to judge attainment?

Two years ago we first met to discuss concerns on the health of the Ottawa River. A lot of information was disseminated on a wide variety of subjects, including wildlife impairments. To many, impairments to wildlife species are of grave concern. To others, maybe a majority, it is a subject of little perceived interest. Tonight I hope to give you sufficient reason to not only reassess the importance of wildlife but more importantly to look at the Ottawa in a new light.

A major concern that always attracts attention is cost. What is the cost of the cleanup? Where will funds come from? A presentation of two years ago would lead one to believe that Ottawa River cleanup would consume 10 million dollars to acquire 90% success and 100 million for a complete cleanup. Is this accurate? Does this assume no action results in no cost? Where do these figures come from and what do they include? This assessment should raise numerous questions to those touched in any way by the Ottawa condition. Where are the cost assessments for unswimmable waters, fishing and related businesses, industries not present that could assist the economy if the river was clean, additional boating opportunities that are being lost due to water conditions or sediments that are too contaminated to be dredged, property value losses due to the reputation of the Ottawa? What are the costs to the entire western basin of Lake Erie due to the condition of the river? Where is the cost of the aesthetics of the river and the impairments of the quality of life to a resident and potential visitor? Is there really much difference in monetary cost between no action and total cleanup?

Quality of life is why wildlife should be important to everyone touched by the Ottawa. Some aspects of how wildlife affects the quality of life are obvious. Sheer enjoyment of watching and listening to direct contact such as fishing is a part of each of us at some level, consciously or subconsciously. Other values of wildlife are more indirect. Many species can act as indicators to our own health. They are biological units just like man and will demonstrate effects that are also affecting us. Their shorter generation time frame gives us an advantage to preview our own possible fate. The bald eagle has been recognized as a bioindicator of the health of the Great Lakes because of its similar location on the food chain to man. They are a canary in the mineshaft so to speak. Decisions made about the Ottawa will affect both eagle and man in the entire western basin of Lake Erie. Contaminants that have been associated with reproductive and behavioral problems are elevated and rising in the eagle population. The eagle is an indicator and is trying to tell us something. We'll never prove the link between contaminants and wildlife populations. Science isn't designed to prove things, only to disprove. We can only state that data suggest relationships and that patterns do exist, however, no one can prove contaminants don't affect wildlife or man. At what cost are these impairments to our quality of life?

There has been a lot of discussion in the past couple of years, right up to tonight. Everyone, presenters and audience alike have an agenda concerning the Ottawa. Everyone has a reason for interest. Some agendas are sincere. Some are paid for. It is up to each individual to determine which agenda follows their values, what you're willing to accept as your level of quality of life, and what you're willing to accept for future generations. To make your judgement you

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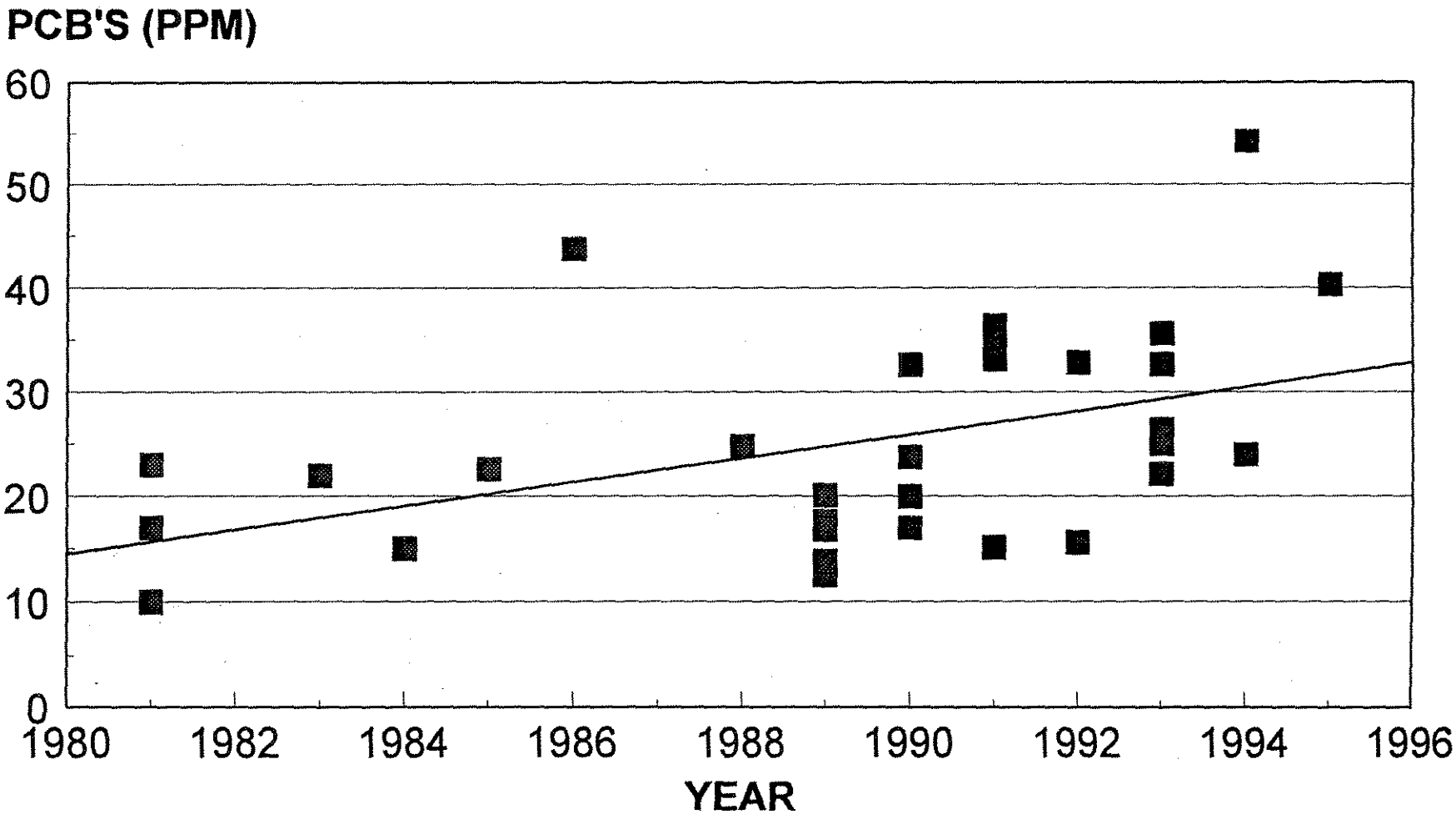

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