



## MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

Jennifer M. Granholm, Governor; Steven E. Chester, Director

### REMEDIATION AND REDEVELOPMENT DIVISION and WASTE AND HAZARDOUS MATERIALS DIVISION

## INFORMATION BULLETIN #4

# TITTABAWASSEE/SAGINAW RIVER FLOOD PLAIN-CITY OF MIDLAND SOILS Environmental Assessment Initiative Midland, Saginaw and Bay Counties *March 2004*

### Introduction

This is the fourth in a series of information bulletins from the Department of Environmental Quality (DEQ). The intent is to keep area residents informed on progress and future plans regarding the Tittabawassee/Saginaw River Flood Plain and Midland Soils Environmental Assessment Initiative/Corrective Action Programs. Prior bulletins have included information on several DEQ initiatives: Phase I, II flood plain sampling efforts/reports; public health advisories; ecological risk assessments; the Dow hazardous waste facility operating license; and the Community Advisory Panel (CAP).

**News from DEQ:** Since the last information bulletin was mailed in June 2003, the DEQ has developed or continues to implement the following activities; each of these items is addressed in the bulletin:

- **Dioxin Exposure Issues**
- **Dow Hazardous Waste Facility Operating License**
- **Community Advisory Panel (CAP)**
- **Soil/Sediment Sampling**
- **Ecological Risk Assessment**

**News from DCH:** In addition to DEQ efforts, the Department of Community Health (DCH) continues to evaluate human health risks associated with the identified soil and sediment dioxin contamination. DCH items included in this bulletin are:

- **DCH Pilot Exposure Investigation**
- **Steps You Can Take to Reduce Exposure**

**News from MDA:** The Department of Agriculture (MDA) is assessing the potential health risks related to food production within the dioxin contaminated flood plain areas downstream of Midland. Included in this bulletin is an update on:

- **MDA Public Meeting and Other Initiatives**

**Where do I get more information?** A glossary is provided at the end of the bulletin, along with a list of key information contacts. In addition, a DEQ web page, [www.michigan.gov/tittabawassee](http://www.michigan.gov/tittabawassee), provides residents with all DEQ, DCH, and MDA information distributed on dioxin and Tittabawassee/Saginaw River Flood Plain contamination, including past DEQ bulletins, brochures and reports.

### Public Information Meeting

Representatives of the DEQ, DCH, and MDA will host a public information meeting for community residents once the DEQ has reviewed and approved Dow's revised Scopes of Work (SOW) and Interim Response Activity (IRA) work plans. A public meeting is anticipated later this Spring/Summer. Results of recent dioxin investigations and other related issues will also be discussed at the meeting.

### Dioxin Exposure Issues

A great deal of effort has been underway by The Dow Chemical Company (Dow) to prepare and the DEQ to review and approve the work plans necessary to carry out the numerous corrective action tasks outlined under the Dow Hazardous Waste Facility Operating License (license) issued by the DEQ in June 2003. This includes such actions as conducting interim response activities, where necessary, to immediately prevent or reduce exposures; and further sampling in areas where contamination has not yet been adequately characterized. The DEQ review effort involves close coordination with the DCH, the state agency primarily charged with public health protection, the MDA, and the United States Environmental Protection Agency (EPA). In response to recent questions from the community about dioxin exposures and the potential risks posed by dioxin contamination, the following information on dioxin

sources and health effects offers some background and clarification.

### **Sources of Dioxin:**

The majority of dioxin in the environment and the food chain (meat, dairy, fish, and shellfish) is not naturally occurring. The major sources of dioxins found in the environment today are the result of past industrial practices including chemical and pesticide manufacturing, bleaching of pulp and paper, and burning of waste materials. Many of these sources of dioxins are controlled today through environmental regulations. There are also naturally occurring sources like forest fires, but these contribute little to the current dioxin levels in the environment. Since past major sources of dioxins are now controlled by regulation, sources that are most significant for this site now are locally elevated levels in soils and sediments from previous inadequately uncontrolled sources, and to a much lesser extent backyard burning of household waste (i.e., plastics containing polyvinylchloride).

In the Tittabawassee River sediments and floodplain soils, the high levels of dioxin contamination -- up to 7200 parts per trillion (ppt) toxic equivalent (TEQ) -- are suspected to be related to releases from Dow in Midland. These sediments and soils are a reservoir of contamination that continues to be a source as it migrates. They have levels of dioxins much higher than "background" levels found in a survey of soils in urban and rural areas across Michigan. This survey identified dioxin levels up to 35 ppt TEQ in Michigan soils, with the average level about six ppt TEQ.

The highest levels of dioxins are usually found in contaminated soils and sediment, and in animal fat. People who eat lots of fish, fatty meats, or high fat dairy products may be exposed to higher levels of dioxins. Dioxins are in the food we eat because it is in our environment. Beginning to remove dioxins from the environment, or eliminating exposure to these sources, will help to remove them from our diet.

People who live near or work at contaminated sites containing dioxins, waste incinerators, or manufacturing facilities that historically produced dioxins as a by-product may also have additional dioxin exposures beyond their diet from direct contact with waste materials, or with contaminated soils and sediments, and other pathways.

### **Health Effects:**

As with most chemicals, the type of toxicity depends on: 1) how people are exposed (air, food, soil, water), 2) how much of the chemical (concentration/dose) they are exposed to, 3) how long they are exposed (days, months, years), and 4) the susceptibility of the person being exposed.

Higher exposures to dioxins in human populations have been linked with many adverse effects including chloracne, increased incidence of cancer, cardiovascular disease, diabetes, birth defects, and blood disease (porphyria). Fetuses, infants, and children may be especially sensitive to dioxin exposure because of their rapid growth and development. Low-level exposures to dioxins in human populations have been linked to more subtle effects on developing fetuses including alterations in thyroid function, immune function, learning abilities, behavior, and effects on tooth enamel. The same adverse effects noted above and other biological responses to dioxins have also been observed in animal studies with controlled exposures to dioxin.

It's important to note, some effects of dioxins, such as chloracne in humans and wasting disease/death in some rodents, have only been observed in a few species that appear more sensitive to that particular effect. Other effects of dioxins, including changes in liver enzymes, hormonal effects, and effects on the developing nervous system, appear to occur in many or most species, including humans. Based on the available information, dioxins are believed to have the potential to cause a wide range of adverse effects in humans.

The EPA has characterized the mixture or group of dioxins to which people are usually exposed as "likely human carcinogens." The EPA has also characterized 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD)-- the most toxic chemical in the dioxin group -- as a "human carcinogen." In addition, the U.S. Department of Health and Human Services, National Toxicology Program 9th Report on Carcinogens (January 2001) lists 2,3,7,8-TCDD as a substance "known to be a human carcinogen."

The DEQ has evaluated the data on dioxin exposures in humans, animals, and what is known about how dioxins affect cell and tissue functions. These data indicate that humans are susceptible to

various adverse effects of dioxins. This DEQ conclusion is consistent with the World Health Organization (WHO), the International Agency for Research on Cancer (IARC), U.S. Centers for Disease Control and Prevention and its Agency for Toxic Substances and Disease Registry (ATSDR), and the EPA.

It is not yet known if people exposed to the elevated levels of dioxins found in soils in the Midland area and in down river flood plains have or will experience any of these adverse effects.

### **Dow Hazardous Waste Facility Operating License**

Dow is obligated to comply with the corrective action requirements in its license, **regardless** of whether elevated exposures or health effects are or can be demonstrated to be occurring. It should be noted that conclusively demonstrating a health effect from dioxin exposure in a "health study" may not be possible because of the high national "background" rate of lifetime cancer occurrence (1 in 4) and the difficulty in measuring subtle non-cancer dioxin related effects. Dow is required to proactively prevent unacceptable exposure from occurring in the future - not just react only after health effects have been conclusively determined to be present. The license imposes a phased, prioritized program to investigate and clean up on-site and off-site releases consistent with the environmental protection standards that are applicable to all hazardous waste facilities and sites of environmental contamination in Michigan.

#### **Scopes of Work – Notice of Deficiency**

As part of the license requirements, Dow was required to submit Scopes of Work (SOW) to conduct remedial investigations on the Tittabawassee/Saginaw River flood plain and Midland area soils. Dow submitted the SOW on August 11, 2003. Staff with the DEQ Waste and Hazardous Materials Division (WHMD) completed a technical review of the SOW and sent a Notice of Deficiency (NOD) to Dow on December 12, 2003. Dow submitted the revised SOW on February 17, 2004 to respond to deficiencies identified in the NOD. Specifics follow:

Scopes of Work (SOW): The SOW address corrective actions beyond the facility boundary for Midland area soils and the Tittabawassee River and floodplain area. Between August and November 2003, the DEQ held seven review meetings with Dow regarding the SOW. The intent of these

meetings was to help ensure the resubmitted SOW would comply with the license requirements, thus enhancing their chances for approval without extensive modifications. The SOW also needed to be revised to address applicable public concerns and to include executable Interim Response Activity (IRA) work plans. In addition to the seven review meetings, comments were also received from the public at two DEQ public meetings held on September 22 and 25, 2003. Further, Dow attended a Community Advisory Panel (CAP) meeting on September 3, 2003, to solicit specific suggestions from CAP members for improving the SOW (see Community Advisory Panel for additional information).

Notice of Deficiency (NOD): In general, the NOD required the SOW to be clarified, expanded, and prioritized to comprehensively address the requirements for conducting a Remedial Investigation (RI). Dow's proposed timeframes for initiating and completing the RI tasks needed to be compressed. The NOD required Dow to expand the SOW by addressing high priority IRAs. Examples of some high priority IRAs required by the DEQ included conducting investigation and exposure mitigation in areas where residents may be at higher risk for dioxin exposure. The Midland neighborhoods nearest to Dow and frequently flooded residential properties along the Tittabawassee River were specifically identified for immediate investigation and implementation of exposure controls. Other IRAs required by the DEQ were targeted at informing residents and workers about potential exposure risks and control measures and included posting warning signs in public parks and other high use areas along the river, and developing a reliable notification process for any subsurface work activities in potentially contaminated areas to minimize exposure and inappropriate relocation of soils and dredged sediments. These activities are to be completed as soon as possible. Other RI field investigation activities, such as more extensive soil and sediment sampling to determine the nature and extent of contamination, were required to be identified in the SOW and appropriately prioritized for completion. The NOD and Dow's revised SOW are available for review at this DEQ web site: [www.michigan.gov/tittabawassee](http://www.michigan.gov/tittabawassee) (from Related Links heading, select Dow Hazardous Waste Facility Operating License & Corrective Action Information).

The revised SOW were submitted to the DEQ/WHMD by February 17, 2004. The DEQ is now in the process of reviewing the SOW to determine if they adequately address the NOD

comments and meet the requirements of the operating license. The DEQ anticipates issuing an approval of the SOW, with any necessary modifications, in April.

### **Community Advisory Panel**

The DEQ created a Community Advisory Panel (CAP) to provide a forum for community input to the Department on various tasks involved in managing contamination associated with Dow in the rivers, flood plain and City of Midland. It was envisioned that the CAP would also act as a means to communicate information from the DEQ to stakeholder groups represented and that the CAP would have a role in community information/public participation efforts.

The CAP consists of the following representatives:

- 1) Residents of the City of Midland
- 2) Residents of the Tittabawassee and Saginaw River flood plain
- 3) Environmental groups (i.e., Lone Tree Council, Tittabawassee River Watch)
- 4) Affected local governments (cities of Midland, Saginaw, and Bay City and townships governing areas in the flood plain)
- 5) Local health departments
- 6) County boards of Midland, Saginaw, and Bay Counties
- 7) Business interests
- 8) County parks
- 9) Representatives of the press

The first CAP meeting was convened on July 31, 2003 with subsequent meetings in 2003 held on September 3, October 8, and December 3, and on January 7, 2004. In general, the following topics were discussed: the license, public outreach efforts and needs, and the SOW for off-site corrective action to address Midland soils and soil and sediment contamination in the Tittabawassee River and flood plain. Copies of meeting summaries are available at this DEQ web site: [www.michigan.gov/tittabawassee](http://www.michigan.gov/tittabawassee) (from Community Involvement heading, select CAP), or can be provided electronically by contacting Ms. Cheryl Howe at [howec@michigan.gov](mailto:howec@michigan.gov). Hard copies are available by writing Ms. Howe at DEQ Waste and Hazardous Materials Division, Hazardous Waste and Radiological Protection Section, P.O. Box 30241, Lansing, Michigan, 48909.

### **Soil and Sediment Sampling**

In June 2003 the DEQ released its Final Report of the Phase II Tittabawassee/Saginaw River Dioxin Flood Plain Sampling Study. Included in this report were recommendations to conduct additional investigation activities to: better understand dioxin distribution within certain areas of the Tittabawassee River flood plain, and downstream into the Saginaw River and Saginaw Bay.

Dow is required under the June 2003 license to fully investigate and remediate hazardous substance releases from its Midland production facility to the City of Midland and to the Tittabawassee River. Therefore, the additional soil/sediment sampling work recommended in the Phase II report, is being addressed under the license by Dow. The DEQ is conducting oversight and auditing of Dow-led investigations to ensure compliance with the license provisions, and will continue to initiate actions to protect the public health and the environment. In this regard, the DEQ is currently conducting the following additional investigation activities:

- During June, July, November and December 2003, DEQ Remediation and Redevelopment Division (RRD) District staff collected soil samples from additional residential flood plain properties located within and along the Tittabawassee River floodplain in Saginaw County. Preliminary analytical sampling results were received in February 2004 and revealed elevated levels of dioxin at 18 of the 22 properties sampled. These findings are consistent with the results of past DEQ floodplain soil samples which found high concentrations of dioxin in soils subject to frequent flooding by the Tittabawassee River downstream of Midland. Concentrations for the spring/summer/fall 2003 sampling ranged as high as 5,660 parts per trillion (ppt) of dioxin toxic equivalence (TEQ), well above 90 ppt TEQ, the level deemed acceptable for direct human contact for residential property in Michigan. The sampling data can be viewed from the DEQ web site: [www.michigan.gov/tittabawassee](http://www.michigan.gov/tittabawassee). The DEQ will share this information with the DCH for use in its pilot exposure investigation (PEI) (see PEI heading for additional information). In addition, Dow is required to conduct more extensive sampling in frequently flooded residential areas as an interim response activity, as required by the corrective action conditions of the license.
- Conditions XI.B.6-8 of the license established that the DEQ, with the assistance of the EPA will, as appropriate, investigate dioxin

contamination that has migrated from the Tittabawassee River into the sediments of the Saginaw River and Bay. The DEQ/WHMD is currently conducting these investigation activities in accordance with the license provisions.

- The Final Tittabawassee River Aquatic Ecological Risk Assessment (AERA) Report has been completed by Galbraith Environmental Services for the DEQ. Results of the assessment were presented to DEQ staff, the CAP, and to Dow consultants and staff during meetings held on October 7-8, 2003. The AERA report is available on the DEQ internet web page (<http://michigan.gov/tittabawassee>). For further information, refer to the Ecological Risk Assessment heading in this bulletin.
- The MDA has collected and analyzed samples from crops that are being grown on flood plain soil. No unacceptable dioxin impact has been identified to date. This work is continuing. The MDA is also conducting educational and outreach initiatives to provide agricultural interests with information regarding the proper agricultural practices that should and should not be conducted in dioxin impacted areas. For further information, please refer to the section on MDA Public Meeting & Other Initiatives.

### Ecological Risk Assessment

A Final Aquatic Ecological Risk Assessment report (AERA) was submitted by Galbraith Environmental Services, LLC (GES) to the DEQ/RRD in October 2003. The AERA used 1998 EPA guidelines to evaluate reproductive and life-cycle risks to fish-eating birds and mammals from dioxin and furan compounds that were known to be present in Tittabawassee River sediments downstream of the City of Midland. Dioxin data from Tittabawassee River sediment samples, fish samples, and waterfowl and chicken egg samples were used to complete the AERA. The final AERA includes a range of risk calculations for fish-eating wildlife that live on and obtain food from the Tittabawassee River and flood plain. These calculations show that even when it is assumed that the fish eating animals spend only a fraction of their time living and obtaining food from contaminated portions of the river and flood plain, unacceptable risk to wildlife is present. More realistic exposure and diet assumptions result in much higher estimates of risk. The findings and conclusions from the AERA also include the following:

- Dioxin and furan contaminated sediments in the Tittabawassee River downstream of Midland pose significant reproductive, embryo, and early life stage mortality risk to piscivorous (fish-eating) birds and mammals.
- Tittabawassee River aquatic ecological habitats are contaminated with dioxin and furans at levels that are likely to result in toxicological impacts to exposed wildlife species.
- The fish prey of fish-eating birds and mammals in the Tittabawassee River downstream of Midland are contaminated with dioxin and furans. The dioxin and furan concentrations measured in carp, catfish, shad, and bass are sufficiently high to pose serious risk of reproductive impairment to fish-eating birds and mammals.
- The concentrations of dioxin and furans in carp, catfish, shad, and bass collected from the Tittabawassee River are sufficiently high to pose risks of reproductive impairment to bird species that have been found by scientific study to be relatively insensitive to the presence of dioxin and furans, as well as to bird species that have been found to be very sensitive to the presence of dioxin and furan compounds.
- Risks of reproductive impairment to fish-eating birds and mammals resulting from dioxin contaminated sediments also exists within the Saginaw River and inner Saginaw Bay, based on the limited amount of sediment data that currently exists.
- Significant risks of reproductive impairment to fish-eating birds and mammals exist even if the unrealistic assumptions are made that: 1) carp, catfish, shad, and bass from the Tittabawassee River downstream of Midland represent a very small portion of their diet, and 2) that an alternate food source that is not contaminated by dioxin could be accessed. Because dioxin contamination is present in floodplain soil, sediments and shoreline areas from Midland to the inner portions of Saginaw Bay (approximately 50 miles), it is unlikely that fish-eating birds and mammals could consistently find a food source that is not contaminated by dioxin.
- Concentrations of dioxin and furans measured in waterfowl eggs collected from the Shiawassee National Wildlife Refuge, near the Tittabawassee River, were much higher than concentrations

measured in waterfowl eggs collected from the relatively unimpacted reference area near Lansing.

- The concentrations of dioxin and furans confirmed to be present in fish tissue and in waterfowl eggs provide empirical and site-specific information that support the findings and conclusions of the AERA.

The AERA, along with full color versions of the sediment risk maps that are presented in the report, is now available on the DEQ web page: <http://michigan.gov/tittabawassee>; select "Aquatic Ecological Risk Assessment". A limited number of copies of the AERA are also available at the DEQ Saginaw Bay District Office, 503 N. Euclid, Bay City, Michigan; or contact Mr. Allan Brouillet of the DEQ/RRD at 989-686-8025, ext. 8305.

### DCH Pilot Exposure Investigation

Independent from the Dow corrective action activities regulated by the DEQ, the DCH in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR) and the DEQ, will conduct a Pilot Exposure Investigation (PEI) of dioxin levels in 25 people that are currently living on the flood plain of the Tittabawassee River. The purpose of the PEI is to provide information on the levels of dioxins in soil, indoor dust, and blood samples for 25 adult residents of the Tittabawassee River flood plain. The PEI will also provide information on how to conduct a future exposure investigation that could include several hundred people from the city of Midland, the Tittabawassee River flood plain, and a comparison community. During June, July, November and December 2003, the DEQ collected soil samples from the residential flood plain properties as a follow-up to its Phase II investigation activities. The DCH will use these soil data to determine who will be asked to provide blood samples for dioxin analysis. Only adults currently living on the properties sampled by the DEQ will be considered for inclusion in the PEI. Blood sampling is expected to begin in Spring 2004.

### Steps You Can Take to Reduce Exposure

The DEQ, DCH, and MDA recommend the following steps be taken to reduce exposure to dioxins from the identified areas of contamination:

- Avoid contact with soil or sediment that is contaminated with dioxin
- Avoid activities in dioxin contaminated soil that produce dust, or wear a dust mask when exposed to contaminated dust
- Wash hands after activities that may have exposed you to dioxin, particularly before eating
- Follow the DCH fish advisories when eating fish from the Tittabawassee River and Saginaw River and Bay
- Avoid soil track into your home from people and pets exposed to soil or sediment contaminated with dioxin
- Trim fat from meat
- Cook foods in ways that decrease the fat content
- Choose low fat cheese and dairy products.

### MDA Public Meeting & Other Initiatives

The Michigan Department of Agriculture (MDA), with assistance from the local Michigan State University Extension (MSUE), has continued to take agricultural commodities samples for dioxin testing within the Tittabawassee flood plain area. These efforts are part of an ongoing food safety assurance survey to determine if there is uptake of dioxin into crops grown on dioxin-contaminated soils. Previous samples taken prior to and during 2003 of the principal crops grown in the area - wheat, soybeans and corn - did not reveal any dioxin contamination. Results have just come in from an additional four corn and soybean samples taken at different locations in the fall of 2003. Three of the samples were at the non-detect level, with one sample testing slightly above this non-detect level. While this doesn't appear to pose any food safety risk, the MDA will target additional crops for sampling next year, particularly root crops such as sugar beets.

Additionally, MDA and MSUE hosted a meeting on December 11, 2003, specifically for agricultural producers in the tri-county Tittabawassee Flood Plain area to help address dioxin-related issues and provide farming and agricultural practice risk reduction recommendations. The meeting featured experts from MDA, MSU and the U.S. Department of Agriculture. Topics included plant and animal uptake of dioxin from contaminated soils, movement of soils, food safety, and land enrollment options in the Conservation Reserve (CRP) and Conservation Reserve Enhancement (CREP) Programs. The MDA continues to recommend the following practices:

- Do not consume, sell, or purchase any animal or animal products raised/grown on the Tittabawassee River floodplain.

- Avoid growing feeds and forages on the floodplain
- Practice no or minimum till as a dust/soil movement reduction practice
- Wash, pare, or peel any produce grown in contaminated soils
- Consume a diet low in fats of animal origin.

### Public Access

It may be necessary for the DEQ to gain access to private property to implement future investigation activities. The DEQ will always contact landowners beforehand to obtain permission to access the property before collecting soil samples or other needed information.

### Glossary

**Dioxins:** Dioxins is the generic term given to a specific group of chemicals that are formed as unwanted by-products of chemical production processes, industrial manufacturing methods, and burning/incineration activities. In samples collected to date from Tittabawassee River flood plain soil and sediment, Saginaw River, and Saginaw Bay shipping channel sediments, it is the group of dioxin-like compounds known as "furans" that contribute the vast majority of dioxin TEQ.

**Total "Toxic Equivalent" (TEQ):** toxic equivalency factors (TEF) have been developed to compare the relative toxicity of other dioxins and dioxin-like compounds to that of 2,3,7,8-tetrachlorodibenzo-para-dioxin (2,3,7,8-TCDD), the most toxic chemical in the dioxin group. The concentrations of other dioxin-like compounds are multiplied by a TEF to produce a 2,3,7,8-TCDD TEQ. The TEQs for all dioxin-like compounds in a sample are then added together to determine the total TEQ for that sample. This method provides information on the combined toxicity of multiple dioxin congeners and provides a useful comparison of the relative congener concentrations at different sample locations (congener profiles). In samples collected to date from Tittabawassee River flood plain soil and sediment, Saginaw River, and Saginaw Bay shipping channel sediments, it is the group of dioxin compounds known as "furans" that contribute the vast majority of dioxin TEQ.

**Residential Direct Contact Criteria (RDCC):** a soil concentration that is safe for direct contact at a residential use property in Michigan; in other words, a concentration that is protective against adverse health effects due to long-term incidental ingestion of and/or dermal (skin) exposure to contaminated soil for residential land uses. The vast majority of soil samples collected from within the Tittabawassee River flood plain downstream of the City of Midland identify dioxin total toxic equivalent (TEQ) concentrations above the RDCC of 90 parts per trillion (ppt) TEQ, established under Part 201, Environmental Remediation of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

### For More Information

**Environmental sampling/analysis:**  
 DEQ Remediation and Redevelopment Division  
 Sue Kaelber-Matlock, Project Manager  
 Saginaw-Bay District Office  
 503 North Euclid Avenue, Suite 9,

Bay City, MI 48706  
 989-686-8025/ext. 8303; [matlocks@michigan.gov](mailto:matlocks@michigan.gov)

**Hazardous waste facility license and Tri-County Project Coordination Plan:**  
 DEQ, Waste and Hazardous Materials Division  
 Cheryl Howe, Permit Engineer  
 P.O. Box 30241, Lansing, MI 48909  
 517-373-9881; [howec@michigan.gov](mailto:howec@michigan.gov)

**Public health and ATSDR:**  
 Department of Community Health (DCH)  
 Dr. Linda Dykema, Toxicologist  
 Environmental & Occupational Epidemiology  
 P.O. Box 30195, Lansing, MI 48909  
 1-800-648-6942; [dykemal@michigan.gov](mailto:dykemal@michigan.gov)

**Residential/commercial agriculture/gardening:**  
 Department of Agriculture (MDA)  
 Dr. Brian Hughes, Toxicologist  
 Pesticide & Plant Pest Management  
 P.O. Box 30017, Lansing, MI 48909  
 517-241-3267; [hughesb9@michigan.gov](mailto:hughesb9@michigan.gov)

**Information repository:**  
 DEQ Remediation and Redevelopment Division  
 Saginaw-Bay District Office  
 503 North Euclid Avenue, Suite 9,  
 Bay City, MI 48706  
 989-686-8025

**DEQ dioxin web site:**  
[www.michigan.gov/tittabawassee](http://www.michigan.gov/tittabawassee)

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