

LITTLE TRAVERSE TOWNSHIP EMMET COUNTY, MICHIGAN



Wellhead Protection Program Plan

2012 Renewal

(Original WHPP: 2004)

#24263



FLEIS & VANDENBRINK
ENGINEERING, INC.

Offices in Michigan and Indiana

**LITTLE TRAVERSE TOWNSHIP
WELLHEAD PROTECTION PROGRAM PLAN
2012 RENEWAL**

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**LITTLE TRAVERSE TOWNSHIP
WELLHEAD PROTECTION PROGRAM PLAN
2012 RENEWAL**

EXECUTIVE SUMMARY

Throughout the State of Michigan, areas of polluted groundwater are present in almost every urbanized area. When contamination in groundwater becomes significant, human health and economic activities may be affected. As a result, communities have recognized the need for a systematic program of groundwater quality management. A Wellhead Protection Program (WHPP) develops long-term strategies to protect a community's drinking water supply. The long-term management of groundwater quality is endorsed at both the federal and the state level. Specifically, the federal Safe Drinking Water Act was amended in 1986 to include wellhead protection. Additionally, the State of Michigan provides financial and technical resources for communities to develop a wellhead protection program. Little Traverse Township's Wellhead Protection Plan (Plan) is a "living" document that details action being taken to ensure the long-term integrity of the Township's water supply system.

Several years ago, Little Traverse Township recognized the importance of protecting the two wellfields that supply drinking water to the Township residents. In 2002, the Township Water Committee selected Fleis & VandenBrink Engineering, Inc. (F&V) to assist in developing a formal Wellhead Protection Program based on guidelines provided by the Michigan Department of Environmental Quality (MDEQ). In 2012, the Township reviewed and revised their WHPP based on the MDEQ document "Checklist for Wellhead Protection Program Renewal".

Development of the Township's Wellhead Protection Program and subsequent MDEQ Program Renewals included public meetings which were held quarterly in 2002 through 2004 and again in 2011 through 2012. These meetings provided an opportunity for Township residents and elected officials to discuss the general nature of the Township's WHPP.

The overall goals of Township's program are included in this WHPP. Previous reports detail the collection of available information on the hydrogeology of the Little Traverse Township area, including the interpretation of numerous depth to water measurements and results from aquifer performance testing. The collected information was used to develop a groundwater model that was used to delineate the 10-year groundwater contribution zone for the Township's wellfield. This area is known as the Wellhead Protection Area (WHPA). Detailed explanations of the WHPA delineation and specific options in developing and implementing management strategies were discussed at public meetings during the development and the renewal of the Township's WHPP.

Upon defining the Wellhead Protection Areas, sites of environmental contamination listed on state and federal databases and located within the WHPA were identified. Documenting these sites is important for several reasons, including identifying immediate risk to drinking water. This documentation is referred to as a Contaminant Source Inventory.

Collected information was used to analyze the "sensitivity" and determine "susceptibility" of the Township's drinking water wells to potential sources of contamination. Collected information was used to analyze the "sensitivity" and determine "susceptibility" of the Township's drinking water wells to potential sources of contamination. After review of the 2004 Contaminant Source Inventory, the susceptibility of the Township's wells due to impact from surface contamination was determined by MDEQ to be "high" to "moderately high".

Based on the Township's goals, and on the delineated WHPA, the Township reviewed numerous options to manage the WHPA and surrounding areas. Options reviewed included both regulatory (e.g., ordinances, site review criteria, existing programs) and non-regulatory options (e.g., public education).

LITTLE TRAVERSE TOWNSHIP WELLHEAD PROTECTION PROGRAM PLAN 2012 RENEWAL

I. PURPOSE AND SCOPE

The purpose of the Little Traverse Township Wellhead Protection Program (WHPP) is to protect the Township's public water supply system from contamination. This protection is provided by determining the groundwater areas that contribute to the existing municipal wells. This area is called the wellhead protection area (WHPA). Once the WHPA is defined, existing and potential sources of groundwater contamination within the area are identified. Finally, methods to manage the WHPA and minimize the threat to existing and future private and municipal water supply wells are considered and implemented, if appropriate.

The MDEQ's WHPP was developed in response to the 1986 Amendments to the Federal Safe Drinking Water Act. Portions of this WHPP are voluntary and are implemented on a local level through coordination of a Wellhead Protection Team (Team) consisting of local, county and state representatives.

Guidelines have been established for the WHPP by the Water Resources Division of the MDEQ. The 2004 WHPP developed for Little Traverse Township was based on MDEQ guidelines in effect at that time.

MDEQ WHPP Renewal guidelines include the following major elements, which are further detailed in this written WHPP Plan (Plan):

- Introduction
- Roles and Responsibilities
- Wellhead Protection Area Delineation
- Contaminant Source Inventory
- WHPA Management Approaches
- Water Supply Emergency Contingency Plan
- Plan for New Wells
- Public Participation and Outreach/Education

The lead agency for the WHPP is Little Traverse Township. The Township has been actively pursuing wellhead protection activities since 2002, when a formal wellhead protection program was initiated by completing an investigation of its existing municipal wellfields, compiling data which described hydrogeologic conditions and groundwater flow directions, and identifying existing and potential sources of contamination upgradient of its existing wellfields location. In 2002, the Township completed the delineation of the two wellfields.

The location of the two Township municipal wells and the Wellhead Protection Area are illustrated in Figure 1. As illustrated in Figure 1, the WHPAs for the wellfields originate around the wells and extend to the north, into Pleasantview Township. A map of the WHPA is located at the MDEQ Water Division, Wellhead Protection Unit website (www.michigan.gov/deq and search for "Wellhead Protection Maps").

This written Plan also identifies several known and potential sources of contamination within and near the WHPA. Since the 10-year delineated wellhead protection area is primarily located in Pleasantview Township, the implementation and long-term success of the program will depend on the inter-governmental cooperation of Little Traverse and Pleasantview Townships, and on the voluntary assistance of land owners within the WHPA.

II. INTRODUCTION

The purpose of this section includes updating basic information about the public water supply system (PWSS) and the community. The Township is located in Emmet County in the northwest area of Michigan's lower peninsula. According to Township records, the 2010 census population served by the Township is 2,380. The Township operates four Type I wells. The wells have a total capacity of 2,295 gallons per minute (gpm) and a firm capacity (capacity with largest production well off-line) of 1,395 gpm.

This section also identifies the goals for the Township's WHPP. These goals and objectives are intended to develop a successful long-term program to protect Little Traverse Township's drinking water wellfield and to prevent groundwater pollution in the wellhead protection areas through public education and cooperative management by local government agencies.

Goal #1 To protect the public drinking water supply by preventing the pollution of surface and groundwater within the WHPA.

Objective is to maintain a safe drinking water supply and protect the Township's water infrastructure investment by preventing pollution from entering groundwater.

- Methods:
- Define the Wellhead Protection Area (WHPA)
 - Inventory actual and potential contamination within the WHPA
 - Ensure historical wells have been properly abandoned
 - Coordinate WHP activities with county and state agencies

Goal #2 To instill a sense of ownership of the wellfields and encourage the local community to recognize that wellhead protection is both worthwhile and necessary.

Objective is to develop local awareness and support for wellhead protection.

- Methods:
- Develop educational strategies
 - Notify property owners located near the wellfields

Goal #3 To clarify the roles and duties of agencies and individuals involved in wellhead protection.

Objective is to develop an effective WHP program.

- Methods:
- Assign municipal staff
 - Identify volunteers to assist with various aspects of the program

Goal #4 To promote inter-governmental and intra-governmental cooperation to assure protection of the water resources within the WHPA.

Objective is to address groundwater protection on a regional basis.

- Methods:
- Coordinate activities with the City of Harbor Springs

Goal #5 To promote the speedy and thorough cleanup of existing contamination within the WHPA.

Objective is to reduce the likelihood of contaminants migrating into the municipal water supply.

- Methods:
- Document known sites of contamination
 - Develop cleanup and priority and monitoring system

Goal #6 To plan and prepare for water supply emergencies.

Objective is to plan to respond to potential natural and man-made events including hazardous material spills, vandalism, power loss, etc.

- Methods:
- Develop program with local municipal leaders
 - Define program in a written plan

III. ROLES AND RESPONSIBILITIES

The purpose of this section includes updating information about the Team. The long-term success of the Township's WHPP depends largely on the effectiveness of the Team and the continuing education and awareness of groundwater issues within the local community. Most communities, including Little Traverse Township, have interested citizens and uniquely qualified individuals who have lived in the area for years and can contribute greatly to the long-term success of the WHPP.

Little Traverse Township's Team represents the "stakeholders" of the community. Members of the Team have provided input and guidance throughout the WHPP Renewal process. The Team also reflects the reality that the groundwater reaching the existing municipal wells does not recognize municipal boundaries, and a cooperative effort with other communities in the area is necessary to effectively manage land use and development within the wellhead delineation areas.

Team members and their representation are listed in Attachment A. The WHPP was last updated in 2012. No new organizations or agencies have become involved. Additional intergovernmental agreements or memoranda have not been implemented or updated.

As planned in the initial WHPP, members of the Team have been and will continue to be instrumental in future revisions or changes in the Township's WHPP. The Team will meet once a year to review the WHPP relative to changes or plans in the community, as resources permit. More frequent meetings will be scheduled if needed. The agenda of the annual Team meetings will minimally include a review/update of the contaminant source inventory and a review of the Township's water production. Additional items that may be addressed include:

- Current wellhead protection education/awareness efforts
- New wellhead protection education/awareness ideas and recommendations
- Other communities' WHP programs
- Review of any changes in MDEQ WHP guidance
- Abandoned well closures
- Review effectiveness of the WHP management options

The Little Traverse Township Plan is a written compilation of numerous concepts which, when implemented, are designed to protect the integrity of the Township's wellfield and distribution system. While several strategies have already been implemented, the development of this Plan has provided additional strategies that are discussed throughout this written Plan. The following Action Plan Summary (Table 1) is a quick-reference guide for the additional strategies listed in the Plan. The Action Plan Summary identifies roles and responsibilities for specific Team members, including responsibility for the periodic update of the Plan. Given the dynamic nature of wellhead protection, it is important to acknowledge that roles and responsibilities will change over time and that planning for this change is essential.

The Township Supervisor, Planning Commission, Zoning Administrator and the Water System Operator will have a key role in a successful and sustainable Wellhead Protection Program. Specifically, the Water System Operator, (in addition to other items referenced in the Action Plan Summary) will be asked to:

- ✓ Perform contingency procedures in the event of a water system or water supply emergency.
- ✓ Maintenance and operation of the water system.
- ✓ Monitor the quality of the Township's drinking water supplies.
- ✓ Work with MDEQ to support state Wellhead Protection Program requirements.

- ✓ Work with MDEQ to promote the incorporation of WHPP principles into the periodic evaluations and surveillance of public water supplies that are carried out by MDEQ personnel.
- ✓ Work with MDEQ to promote state enforcement of the regulatory programs listed above within the Wellhead Protection Areas.
- ✓ Search for funding sources for Wellhead Protection Program activities at the federal, state and local level.
- ✓ Work with MDEQ to insure the Township's WHPP meets or exceeds any state or federal WHPP requirements.
- ✓ Serve as custodian of the Wellhead Protection Program.
- ✓ Maintain the local Wellhead Protection Program and review of the program with the Wellhead Team.
- ✓ Work with County Road Commission and MDOT to encourage their consideration of road salt and sand application within the Township, and especially within the WHPA.
- ✓ Support MDEQ preparation of technical assistance materials for local units of government.

Additionally, the Township Supervisor will be asked (in addition to other items referenced in the Action Plan Summary) to:

- ✓ Observe best alternatives for future planning and zoning within the WHPA.
- ✓ Promote "best" wellhead management practices within both the WHPA and within the Township.
- ✓ Assist inspectors, builders, and earth moving contractors generating awareness of environmentally incompatible land activities or materials handling practices.

**TABLE 1
LITTLE TRAVERSE TOWNSHIP WELLHEAD PROTECTION PROGRAM ACTION
PLANSUMMARY**

Little Traverse Township Wellhead Protection Program Action Plan

| Item # | Action | Due Date | Frequency | Lead Team Member | Team Member Assistance |
|---------------|---|-----------------|------------------|-------------------------|-------------------------------|
| 1 | Provide copy of MDEQ approved WHPP Renewal to County. | 2012 | Once | SUP ² | CHD ⁴ |
| 2 | Review options to address abandoned home heating oil tanks | Ongoing | Review Annually | SUP | CONS ⁵ |
| 3 | Provide Wellhead Protection Plan Renewal for public review on Township's web site. | 2012 | Once | SUP | CONS |
| 4 | Prepare and distribute informational wellhead protection brochure. | 2012 | Review Annually | SUP | CONS |
| 5 | Contaminant Source Inventory Maintenance. | 2014 | Every 3 years | SUP | CONS |
| 6 | Review and update "Emergency Response Plan". | Ongoing | Every 3 years | SUP | OPER ¹ |
| 7 | Performance of contingency procedures in the event of a water system or water supply emergency. | Ongoing | Review Annually | OPER | SUP |
| 8 | Maintenance and operation of the water system. | Ongoing | Review Annually | OPER | SUP |
| 9 | Monitor the quality of the Township's drinking water supplies. | Ongoing | Review Annually | OPER | SUP |
| 10 | Link WHPP Plan to other Township Plans. | Ongoing | Review Annually | SUP | PLAN ³ |
| 11 | Observing best alternatives for future planning and zoning within the WHPA. | Ongoing | Review Annually | PLAN | CONS |
| 12 | Promotion of best wellhead management practices within both the Wellhead Protection Area and the Township. | Ongoing | Review Annually | PLAN | SUP |
| 13 | Proper siting and consideration of new production wells for water supply in a manner consistent with the conclusions of the WHPA delineation. | Ongoing | Review Annually | CHD | SUP |
| 14 | Continued support and promotion of the County's Used Oil Collection and Household Hazardous Waste Programs. | Ongoing | Review Annually | CHD | TEAM ⁶ |
| 15 | Search for funding sources for Wellhead Protection Program activities. | Ongoing | Review Annually | CONS | SUP |

Little Traverse Township Wellhead Protection Program Action Plan - Continued

| Item # | Action | Due Date | Frequency | Lead Team Member | Team Member Assistance |
|---------------|--|-----------------|------------------|-------------------------|-------------------------------|
| 16 | Work with MDEQ to insure the Township's WHPP meets or exceeds any state or federal WHPP requirements. | Ongoing | Review Annually | CONS | SUP |
| 17 | Abandoned Well Program. | Ongoing | Review Annually | SUP | CONS |
| 18 | Township/City coordination of leaking underground storage tank cleanups. | Ongoing | Review Annually | SUP | TWP ⁷ /CONS |
| 19 | Custodian of the Wellhead Protection Program. | Ongoing | Review Annually | OPER | SUP |
| 20 | Maintenance of the local Wellhead Protection Program and review of the program with the Wellhead Team. | Ongoing | Review Annually | SUP | CONS |
| 21 | Continued public education and awareness of the WHPP, including water and sewer issues. | Ongoing | Review Annually | SUP | TEAM |
| 22 | Assist inspectors, builders, and earth moving contractors, generating awareness of environmentally incompatible land activities or materials handling practices. | Ongoing | Review Annually | SUP | TEAM |
| 23 | Work with County Road Commission and MDOT to encourage their consideration of road salt application with priority placed on the WHPA. | Ongoing | Review Annually | SUP | CHD |
| 24 | Support MDEQ preparation of technical assistance materials for local units of government. | Ongoing | Review Annually | SUP | OPER |
| 25 | Work with MDEQ to support state Wellhead Protection Program requirements. | Ongoing | Review Annually | SUP | OPER |
| 26 | Work with MDEQ to promote incorporation of WHPP principles into the periodic evaluations and surveillance of public water supplies that are carried out by MDEQ personnel. | Ongoing | Review Annually | SUP | OPER |
| 27 | Work with MDEQ to promote state enforcement of the regulatory programs listed above within the Wellhead Protection Areas. | Ongoing | Review Annually | SUP | OPER |
| 28 | Periodic contact with County Sanitarians (wells Sanitarian and septic Sanitarian) in regards to water well and septic permits within the Township. | Ongoing | Review Annually | SUP | OPER |

Key to Acronyms:¹ OPER: Township Type I Well Operator³ PLAN: Township Planner⁵ CONS: Township Wellhead Protection Consultant (Consultant)⁷ TWP: Little Traverse, West Traverse, Pleasantview and Friendship Townships² SUP: Township Supervisor⁴ CHD: County Health Department⁶ TEAM: All Wellhead Protection Team members

IV. WELLHEAD PROTECTION AREA DELINEATION

The purpose of this section is to update information about the WHPA. The Federal Safe Drinking Water Act defines a WHPA as “...*the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move towards and reach such water well or wellfield*”. The entire WHPP is based on the results of this key element.

Between 2001 and 2002, Little Traverse Township completed a hydrogeological study to identify groundwater areas that move towards and reach the Township’s water supply wells. The study included reviewing existing background information on the regional geologic formations, surveying groundwater elevations to determine groundwater gradients and directions of flow and conducting an aquifer pump test and analysis. Computerized groundwater flow modeling and particle tracking was used to delineate the groundwater area surrounding the municipal wellfield through which contaminants could reasonably move towards and reach the municipal wellfields.

Since 2002, new geological data that will have a material impact on the current delineation has not been identified. Changes in well usage or flow rates in the current WHPA that would have a material impact on the WHPA have not been identified (e.g., well abandonment, new wells, etc.).

The MDEQ Guidelines for establishing a wellhead protection area are based on a groundwater time of travel of 10 years. This means that the area delineated for the WHPP needs to encompass groundwater areas which contribute to the Township’s wellfields at a distance of 10 years’ groundwater travel time. A 10-year time of travel is used to provide a reasonable length of time for addressing environmental problems within the wellhead protection area, while limiting the size to an area which can be reasonably managed by the Township’s existing water operations, land planning and zoning ordinances.

The 10-year WHPA delineation for Little Traverse Township is illustrated in Figure 1. This is unchanged from 2002. The previously completed Delineation Report includes the methodology used to develop the WHPA including maps, figures, and geological cross-sections used for the modeling. Since the original delineation, additional production wells have not been added to the Township’s water system.

V. CONTAMINATION SOURCE INVENTORY

The goal of this element is to identify existing and potential sources of contamination within the previously determined WHPA. Contamination has several possible pathways to reach groundwater including direct spills, interior floor drains which discharge into the ground, septic systems, leaking underground storage tanks, storm water runoff, or dry and abandoned wells. In certain hydrogeologic settings, even very small amounts of a hazardous substance can contaminate large areas of groundwater.

The federal Safe Drinking Water Act also requires that a WHPP “...*will identify within each wellhead protection area all potential anthropogenic sources of contaminants which may have any adverse effect on the health of persons*”. An anthropogenic source is any activity performed by or caused by human actions that is, or potentially could be, a source of contamination to groundwater, including human actions affecting natural contaminants. The releases can be either from *point* sources, such as leaking tanks or impoundments, or from *non-point* sources, such as the application of agricultural chemicals or releases from areas containing septic tank/leach field systems.

A contaminant is defined in this WHPP as an organic, inorganic or microbiological substance that is regulated under federal, state or local environmental programs.

Applicable federal and state-related environmental laws and hazardous material regulations to control the use of potential contaminants generally include the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA or "Superfund"), Safe Drinking Water Act (SDWA), Clean Water Act (CWA), Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Although these regulations have imposed controls on a wide range of industries and hazardous material treatment, storage and disposal practices, they tend to focus primarily on the larger manufacturing industries which manage the majority of hazardous wastes and hazardous materials in this country. Other smaller industries and businesses are not as stringently controlled (if controlled at all) due to the focus on industries that manage wastes or materials above a threshold amount or because the materials managed by the smaller industries are not considered "hazardous". As a result, materials and wastes that are not generally regarded or regulated as "hazardous" still have the potential to contaminate groundwater supplies.

Identifying the location and types of potential sources of contamination is essential in the development and implementation of effective management and public education strategies within the local WHPP.

A. CATEGORIES OF POTENTIAL CONTAMINATION SOURCES

As part of this WHPP, categories of sources or activities having the potential to contaminate groundwater have been identified in Table 2. The table is intended to provide a general overview of environmental risks associated with various activities. The categories have been grouped according to the type of activity (e.g., agricultural, residential, governmental, commercial and industrial) with which the source is commonly associated. The type(s) of contaminant(s) commonly associated with the various types of sources and the relative risk to groundwater quality are also provided.

**TABLE 2
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

AGRICULTURAL SOURCES (K)⁵

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|---|--|
| Animal feedlots (0006) ⁴ and burial areas (0007) | Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform ⁶ and noncoliform bacteria; viruses |
| Manure spreading areas (0008) and storage pits (0009) | Livestock sewage wastes; nitrates |
| Livestock waste disposal areas (0010) | Livestock sewage wastes; nitrates |
| Crop areas and irrigation sites (0011) | Pesticides; ⁷ fertilizers; ⁸ gasoline and motor oils from chemical applicators |
| Chemical storage areas and containers (0012) | Pesticide ⁷ and fertilizer ⁸ residues |
| Farm machinery areas (0013) | Automotive wastes; ⁹ welding wastes |
| Agricultural drainage wells (0014) and canals (0015) | Pesticides; ⁷ fertilizers; ⁸ bacteria; salt water (in areas where the fresh-saltwater interface lies at shallow depths and where the water table is lowered by channelization, pumping, or other causes) |

RESIDENTIAL SOURCES (D)

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|---|---|
| Common household maintenance and hobbies (0016) | <u>Common Household Products:</u> ¹⁰ Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides; ¹¹ ; photochemicals; printing ink; other common products; <u>Wall and Furniture Treatments:</u> Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers; <u>Mechanical Repair and Other Maintenance Products:</u> Automotive wastes; ⁹ waste oil; diesel fuel; kerosene; #2 heating oil; grease; degreasers for driveways and garages; metal degreasers; asphalt and roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes and polishes; rock salt; refrigerants |
| Lawns and gardens (0017) | Fertilizers; ⁷ herbicides and other pesticides used for lawn and garden maintenance ¹² |
| Swimming pools (0018) | Swimming pool maintenance chemicals ¹³ |
| Septic systems (0019), cesspools (0020), and sewer lines (0021) | Septage; coliform and noncoliform bacteria; ⁶ viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides; ^{11, 12} paints; paint thinner; photographic chemicals; swimming pool chemicals; ¹¹ septic tank/cesspool cleaner chemicals; ¹⁴ elevated levels of chloride, sulfate, calcium, pharmaceutical wastes, magnesium, potassium and phosphate |
| Underground storage tanks (0022) | Home heating oil |
| Apartments and condominiums (0023) | Swimming pool maintenance chemicals; ¹³ pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control; ^{11,12} wastes from on-site sewage treatment plants; household hazardous wastes ¹⁰ |

**TABLE 2 (cont.)
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

GOVERNMENT SOURCES (E)

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|---|--|
| Schools (0024) and government offices and grounds (0025) | Solvents; pesticides; ^{11,12} acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and heating oil from storage tanks; general building wastes ¹⁵ |
| Park lands (0026) | Fertilizers; ⁸ herbicides; ¹² insecticides ¹¹ |
| Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests (0027) | Pesticides ^{7,11} |
| Highways, road maintenance depots, and deicing operations (0028) | Herbicides in highway rights-of-way; ^{7,12} road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes ⁹ ; diesel fuel, gasoline from storage tanks. |
| Municipal sewage treatment plants and sewer lines (0029) | Municipal wastewater; sludge; ¹⁶ treatment chemicals ¹⁷ |
| Storage, treatment, and disposal ponds, lagoons, and other surface impoundments (0030) | Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants |
| Land areas applied with wastewater or wastewater byproducts (0031) | Organic matter; nitrate; inorganic salts; heavy metals; coliform and noncoliform bacteria; ⁶ viruses; nitrates; sludge; ¹⁶ nonhazardous wastes ¹⁸ |
| Storm water drains and basins (0032) | Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants |
| Combined sewer overflows (municipal sewers and storm water drains) (0033) | Municipal wastewater; sludge; ¹⁶ treatment chemicals; ¹⁷ urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants |
| Recycling/reduction facilities (0034) | Residential and commercial solid waste residues |
| Municipal waste landfills (0035) | Leachate; organic and inorganic chemical contaminants; wastes from households ¹⁰ and businesses; ¹⁵ nitrates; oils; metals |
| Open dumping and burning sites (0036), closed dumps (0037) | Organic and inorganic chemicals; metals; oils; wastes from households ¹⁰ and businesses ¹⁵ |
| Municipal incinerators (0038) | Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds |
| Water supply wells, monitoring wells, older wells, domestic and livestock wells (0039), unsealed and abandoned wells (0040), and test hole/wells (0041) | Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt |
| Sumps and dry wells (0042) | Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides; ⁷ and a wide variety of other substances |
| Drainage wells (0043) | Pesticides; ^{11,12} bacteria |
| Well pumping that causes interaquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc. (0044) | Saltwater; excessively mineralized water |
| Artificial groundwater recharge (0045) | Storm water runoff; excess irrigation water; stream flow; cooling water; treated sewage effluent; other substances that may contain contaminants, such as nitrates, metals, detergents, synthetic organic compounds, bacteria, and viruses |

**TABLE 2 (cont.)
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

COMMERCIAL SOURCES (C)

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|---|--|
| Airports (0046), abandoned airfields (0047) | Jet fuels; deicers; diesel fuel, aircraft fuel from aircraft and storage tanks; chlorinated solvents; automotive wastes; ⁹ heating oil; building wastes ¹⁵ |
| Auto repair shops (0048) | Waste oils; solvents; acids; paints; automotive wastes; ⁹ misc. cutting oils |
| Barber and beauty shops (0049) | Perm solutions; dyes; miscellaneous chemicals contained in hair rinses |
| Boat yards and marinas (0050) | Diesel fuels; oil; septage from boat waste disposal areas gasoline and diesel fuels from storage tanks ; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes ⁹ |
| Bowling alleys (0051) | Epoxy; urethane-based floor finish |
| Car dealerships (especially those with service depts.) (0052) | Automotive wastes; ⁹ waste oils; solvents; miscellaneous wastes |
| Car washes (0053) | Soaps; detergents; waxes; miscellaneous chemicals; waste grease, motor oil and fuel |
| Camp grounds (0054) | Septage; gasoline; diesel fuel from boats; pesticides for controlling mosquitoes, ants, ticks, gypsy moths, and other pests; ^{7,11} household hazardous wastes from recreational vehicles (RVs) ¹⁰ |
| Carpet stores (0055) | Glues and other adhesives; fuel from storage tanks if forklifts are used |
| Cemeteries (0056) | Leachate; lawn and garden maintenance chemicals ¹² |
| Construction trade areas and materials (plumbing, heating and air conditioning, painting, paper hanging, decorating, drywall and plastering, acoustical insulation, carpentry, flooring, roofing and sheet metal, wrecking and demolition, etc.) (0057) | Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes |
| Country clubs (0058) | Fertilizers; ⁸ herbicides; ^{7,12} pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests; ¹¹ swimming pools chemicals; ¹³ automotive wastes |
| Dry cleaners (0059) | Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate) |
| Funeral services and crematories (0060) | Formaldehyde; wetting agents; fumigants; solvents |
| Furniture repair and finishing shops (0061) | Paints; solvents; degreasing and solvent recovery sludges |
| Gasoline services stations (0062) | Oils; solvents; miscellaneous wastes |
| Hardware/lumber/parts stores (0063) | Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote |
| Heating oil companies, underground/above ground storage tanks (0064) | Heating oil; wastes from truck maintenance areas ⁹ |
| Horticultural practices, garden nurseries, florists (0065) | Herbicides, insecticides, fungicides, and other pesticides ¹² |
| Jewelry/metal plating shops (0066) | Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid |
| Laundromats (0067) | Detergents; bleaches; fabric dyes |
| Medical institutions (0068) | X-ray developers and fixers; ¹⁹ infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals |
| Office buildings (0069) | Building wastes; ¹⁵ lawn/garden maintenance chemicals; ¹² gasoline; oil |

**TABLE 2 (cont.)
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

COMMERCIAL SOURCES (C) - continued

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|---|---|
| Paint stores (0070) | Paints; paint thinners; lacquers; varnishes; other wood treatments |
| Photography shops, photo processing laboratories (0072) | Biosludges; silver sludges; cyanides; miscellaneous sludge |
| Print shops (0073) | Solvents; inks; dyes; oils; photographic chemicals |
| Railroad tracks and yards (0074) | Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties |
| Research laboratories (0075) | X-ray developers and fixers; ¹⁹ infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade; bleach); miscellaneous chemicals |
| Scrap and junk yards (0076) | Any wastes from businesses ¹⁵ and households; ¹⁰ oils |
| Sports and hobby shops (0077) | Gunpowder and ammunition; rocket engine fuel; model airplane glue |
| Aboveground and underground storage tanks (0078) | Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals |
| Pharmacies (0071) | Spilled and returned products |
| Transportation services for passenger transit (local and interurban) (0079) | Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes ⁹ |
| Veterinary services (0080) | Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade, bleach); x-ray developers and fixers ¹⁹ |

INDUSTRIAL SOURCES (B)

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|---|--|
| Material stockpiles (coal, metallic ores, phosphates, gypsum) (0081) | Acid drainage; other hazardous and nonhazardous wastes ¹⁸ |
| Waste tailing ponds (commonly for the disposal of mining wastes) (0082) | Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes ¹⁷ |
| Transport and transfer stations (trucking terminals and rail yards) (0083) | Fuel tanks; repair shop wastes; ⁹ other hazardous and nonhazardous wastes ¹⁷ |
| Aboveground and underground storage tanks and containers (0084) | Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes ¹⁸ |
| Storage, treatment, and disposal ponds, lagoons, and other surface impoundments (0085) | Hazardous and nonhazardous liquid wastes; ¹⁸ septage; sludge ¹⁶ |
| Chemical landfills (0086) | Leachate; hazardous and nonhazardous wastes; ¹⁸ nitrates |
| Radioactive waste disposal sites (0087) | Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium) |
| Unattended wet and dry excavation sites (unregulated dumps) (0088) | A wide range of substances; solid and liquid wastes; oil-field brines; spent acids from steel mill operations; snow removal piles containing large amounts of salt |
| Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells (0089) | Metals; acids; minerals; ¹⁸ sulfides; other sulfides; other hazardous and nonhazardous chemicals ¹⁸ |
| Dry wells (0090) | Saline water from wells pumped to keep them dry |
| Injection wells (0091) | Highly toxic wastes; hazardous/ nonhazardous wastes; ¹⁸ oil-field brines |
| Well drilling operations (0092) | Brines associated with oil and gas operations |

**TABLE 2 (cont.)
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

INDUSTRIAL PROCESSES (B) (PRESENTLY OPERATED OR TORN-DOWN FACILITIES)²⁰

| TYPE OF SOURCE | HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3} |
|--|---|
| Asphalt plants (0093) | Petroleum derivatives |
| Communications equipment manufacturers (0094) | Nitric, hydrochloric, and sulfuric acid wastes; heavy metal sludges; copper-contaminated etchant (e.g., ammonium persulfate); cutting oil and degreasing solvent (trichloroethane, Freon, or trichloroethylene); waste oils; corrosive soldering flux; paint sludge; waste plating solution |
| Electric and electronic equipment manufacturers and storage facilities (0095) | Cyanides; metal sludges; caustics (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs |
| Electroplaters (0096) | Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts |
| Foundries and metal fabricators (0097) | Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes |
| Furniture and fixtures manufacturers (0098) | Paints; solvents; degreasing sludges; solvent recovery sludges |
| Machine and metalworking shops (0100) | Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (TCE); metal marking fluids; mold-release agents |
| Mining operations (surface and underground) (0101) | Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides |
| Unsealed abandoned mines used as waste pits (0102) | Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals ¹⁸ |
| Paper mills (0103) | Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals; ¹⁸ organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide |
| Petroleum production and storage companies, secondary recovery of petroleum (0104) | Hydrocarbons; oil-field brines (highly mineralized salt solutions) |
| Industrial pipeline (0105) | Corrosive fluids; hydrocarbons; other hazardous and nonhazardous materials and wastes ¹⁸ |
| Photo processing laboratories (0106) | Cyanides; biosludges; silver sludges; miscellaneous sludges |
| Plastics materials and synthetics producers (0107) | Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc. |
| Primary metal industries (blast furnaces, steel works, and rolling mills) (0108) | Heavy metal wastewater treatment sludge; pickling liquor; waste oil; ammonia scrubber liquor; acid tar sludge; alkaline cleaners; degreasing solvents; salt; metal dust |
| Publishers, printers, and allied industries (0109) | Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals |
| Public utilities (phone, electric power, gas) (0110) | PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way |
| Sawmills and planers (0111) and gluing wastes | Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating |
| Stone, clay, and glass manufacturers (0112) | Solvents; oils and grease; alkalis; acetic wastes; asbestos; heavy metal sludges; phenolic solids or sludges; metal-finishing sludge |
| Welders (0113) | Oxygen, acetylene |
| Wood preserving facilities (0114) | Wood preservatives; creosote |

TABLE 2 (cont.)
CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION

Key to footnotes

- ¹In general, groundwater contamination stems from the misuse and improper disposal of liquid and solid wastes; the illegal dumping or abandonment of household, commercial, or industrial chemicals; the accidental spilling of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the improper siting, design, construction, operation, or maintenance of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from atmospheric pollutants, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed on this table are used and managed properly, groundwater contamination is not likely to occur.
- ²Contaminants can reach groundwater from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.
- ³This table lists most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in storm water runoff or research laboratory wastes.
- ⁴Contaminant WHPP Number.
- ⁵Facility WHPP Code.
- ⁶Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.
- ⁷Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides; many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (dacthal) and atrazine (EPA, 1990b), which EPA classifies as moderately toxic (class 3) and slightly toxic (class 4) materials, respectively (Meister Publishing Company, 1991).
- ⁸The EPA National Pesticides Survey (EPA, 1991) found that the use of fertilizers correlates to nitrate contamination of groundwater supplies.
- ⁹Automotive wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.
- ¹⁰Toxic or hazardous components of common household products are noted on the attached table (EPA 1990c).
- ¹¹Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worms, rats, and mice can contain active ingredients including naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.
- ¹²Common pesticides used for lawn and garden maintenance (e.g., weed killers, and mite, grub, and aphid controls) include such chemicals as 2,4-D; chlorpyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.
- ¹³Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algaecides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.
- ¹⁴Septic tank/cesspool cleaners include synthetic organic chemicals such as 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.
- ¹⁵Common wastes from public and commercial buildings include automotive wastes (see above definition); rock salt; and residues from cleaning products that may contain chemicals such as xlenols, glycol esters, isopropanol, 1,1,1-trichloroethane, sulfonates, chlorinated phenols, and cresols.

**TABLE 2 (cont.)
POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION**

Key to footnotes (cont.)

¹⁶Municipal wastewater treatment sludge can contain organic matter; nitrates; inorganic salts; heavy metals; coliform and noncoliform bacteria (see above definition); and viruses.

¹⁷Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

¹⁸The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e., less than 220 pounds per month) discharged from businesses.

¹⁹X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, phenedone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

²⁰This table lists potential groundwater contaminants from many common industries, but it does not address all industries.

Source: Wyoming Department of Environmental Quality

B. CONTAMINATION SOURCE INVENTORY PROCESS

An initial inventory was completed in 2004. The purpose of this inventory was to develop and confirm a list of existing and potential sources of contamination within the WHPA.

The inventory was further developed in Spring of 2012. The identification of existing sources of contamination has been compiled using information from various state agencies as listed below:

- Sites of Environmental Contamination (201 sites), Remediation and Redevelopment Division (RRD), MDEQ (Part 201 of Act 451) (<http://www.deq.state.mi.us/part201ss/>)
- Underground Storage Tank List, Waste and Hazardous Materials Division, MDEQ (Part 213 of Act 451) (<http://www.deq.state.mi.us/sid-web/>)
- Leaking Underground Storage Tank Sites, Remediation and Redevelopment Division, MDEQ (Part 213 of Act 451) (<http://www.deq.state.mi.us/sid-web/>)
- Oil & Gas Contamination Sites, Geological and Land Management Division, MDEQ (Act 61) (<http://www.deq.state.mi.us/mir/>)
- Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ (Part 111 of Act 451) (<http://www.deq.state.mi.us/tsd/> & <http://www.deq.state.mi.us/wdsp/>)
- Groundwater Discharge Permits, Water Bureau, MDEQ (Part 31 of Act 451)
- Landfill/Solid Waste Disposal Site List, Waste and Hazardous Materials Division, MDEQ (Part 115 of Act 451) (<http://www.deq.state.mi.us/wdsp/>)
- Federal National Priorities List EPA, Region 5 (CERCLA and Superfund) (<http://www.epa.gov/superfund/sites/npl/npl.htm> & <http://www.deq.state.mi.us/spad/>)
- Federal permits for Class V wells (Underground Injection Control Program) (Optional)
- Other sites of concern
- Environmental Mapper <http://www.mcgi.state.mi.us/environmentalmapper/>

For this WHPP, '*existing*' sources are those which are known to have caused, or threaten to cause, groundwater contamination; regulatory agencies may have information pertaining to existing sources. '*Potential*' sources are those which may or may not have caused groundwater contamination but have the potential to do so; regulatory agencies may or may not have knowledge

and/or information available relating to potential sources. A copy of information used for the inventory and identified sites are included in Attachment B.

C. TRANSPORTATION ROUTES

No interstate highways are present within the Township's WHPA. However, state highway M-119 runs west-east through the southern, downgradient end of the WHPA, near the wellfields. Groundwater quality degradation may occur as the result of significant and sudden releases or spills of hazardous or polluting materials during transit along M-119.

D. SURFACE WATER SOURCES

The primary surface water source near the Township's wells is a number of small creeks, ponds and lakes. Surface water quality degradation within these surface water bodies can occur through both non-point and point source discharges. Groundwater quality degradation may occur when surface water of lesser quality recharges the aquifer by means of infiltration through the pond/lake/creek beds.

With point source discharges, the contaminant threat is dependent on the volume of the release, chemical/physical properties of the contaminant, and surface water velocity.

Non-point source contaminants are usually seasonally derived, resulting from such sources as fertilizer and pesticide applications in agricultural portions of the watershed and/or storm water runoff from urban areas.

E. ABANDONED WELLS

Abandoned wells can pose a threat to groundwater. Wells which are not properly closed can provide a direct conduit for surface run-off and contaminants to easily reach the groundwater. Abandoned wells may be from oil and gas drilling, water wells, irrigation wells, or dry wells.

The Michigan Department of Agriculture Groundwater Stewardship Program and the MDEQ offer technical and financial assistance in educating the public, especially farmers, on the importance of properly abandoning and plugging wells.

As part of the Contaminant Source Inventory completed for the Township's Wellhead Protection Program, MDEQ Geological Survey Division was contacted for records of oil and gas wells or listed contamination sites within Little Traverse Township area (refer to Attachment B).

F. HAZARDOUS PIPELINES

Based on records publicly available through the U.S. Department of Transportation's Pipeline and Hazardous Material Safety Administration natural gas, petroleum, and other hazardous material pipelines in the Village's WHPA were not identified.

G. SENSITIVITY ANALYSIS

The 1996 amendments to the federal Safe Drinking Water Act require that states analyze the "sensitivity" and determine "susceptibility" of a community's source of drinking water to potential sources of contamination.

Sensitivity is determined from the natural setting of the source water (raw water to the Township's wells), and indicates natural protection afforded the source water. Information from the Wellhead Protection Area delineation indicates that the aquifer from which the Township's wells obtain groundwater is "confined" or "leaky confined." This means the overlying drift and depth of the

Township's wells provide some protection from polluting materials that may be released into the ground surface. As such, MDEQ has determined the Township's geologic sensitivity to be "moderate."

H. SUSCEPTIBILITY DETERMINATION

Susceptibility identifies factors within the community's wellhead protection area that may pose a risk to the water supply. The susceptibility determination provides information with respect to listed facilities and land areas within the wellhead protection area that should be given greater priority and oversight in implementing a wellhead protection program. Collected information was used to analyze the "sensitivity" and determine "susceptibility" of the Township's drinking water wells to potential sources of contamination. After review of the 2004 Contaminant Source Inventory, the susceptibility of the Township's wells due to impact from surface contamination was determined by MDEQ to be "high" to "moderately high".

When considering sensitivity and susceptibility, it is important to understand that a system can have low sensitivity relative to some conditions (e.g., wells located a significant distance from potential contamination sources) and high susceptibility because of other conditions (e.g., the type of contaminant).

I. CONTAMINATION SOURCE INVENTORY MAINTENANCE

All data management systems require periodic maintenance. Data maintenance for the Township's Contaminant Source Inventory was initiated when the preliminary list of sites was compiled. Specifically, the preliminary site names and mapped locations were confirmed by members of the Team.

VI. WELLHEAD PROTECTION AREA MANAGEMENT APPROACHES

The goal of this element is to provide mechanisms which will prevent existing and potential sources of contamination from reaching the area's municipal water supply wells. Existing regulatory controls that can easily be adapted as WHPA management methods have been reviewed, and additional management methods were developed by the Team.

In developing the initial management strategy, it was acknowledged that it is highly improbable that all risks within the WHPA can be eliminated but, by applying one or more management tools, the likelihood of groundwater contamination impacting the municipal water supply in the future can be reduced. The WHPP Plan Renewal included review of the initial management strategies and also review of certain management activities identified by MDEQ in their WHPP Renewal guidance.

While some of the proposed management options refer to existing regulatory programs, it was recognized that protection of the WHPA can best be accomplished by developing partnerships with local businesses, industry, and the agricultural community and focusing on education/training and pollution prevention concepts. Additionally, it was recognized that the Township's WHPP will require regular review and updates to determine the effectiveness and appropriateness of the selected management options.

A. REVIEW OF MANAGEMENT STRATEGY OPTIONS

Review of the management options as part of the initial WHPP was completed by the Team in 2003. Table 3 outlines the options that were reviewed by the initial Team as well as the Team in place during the 2012 Renewal. The Table lists the advantages and limitations of each option. The management options MDEQ identified as needing to be addressed for Renewal approval are also included in Table 3 and denoted with bold text. The Team was assigned the lead responsibility to recommend what specific WHPA management options should be presented to the Little Traverse

Township Board, if any, for further consideration. Selected options, updates and changes since the original WHPP was approved, and a timetable for implementation, are discussed in the following sections of this Plan Renewal.

**TABLE 3
WELLHEAD PROTECTION AREA MANAGEMENT OPTIONS**

| Option | Advantages | Limitations |
|--|---|--|
| Overlay GW Protection Districts and General Zoning Ordinance Provisions for Wellhead Protection | <ul style="list-style-type: none"> • <i>Similar</i> to other overlay zoning methods familiar to planning commissions. • Targeted to specific wellhead protection areas. • Restricts certain high risk land uses in wellhead protection areas. • WHPA is identified on practical base/zoning map. | <ul style="list-style-type: none"> • Requires staff to develop overlay map. • Requires modifying existing zoning ordinance. • Inherent nature of zoning provides "grandfather" protection to pre-existing uses and structures. |
| Site Plan Review | <ul style="list-style-type: none"> • Requires developers to design facilities for groundwater protection. • Assurance/consistency with county and state permits. • Proactive-places community in process of protecting groundwater. | <ul style="list-style-type: none"> • Requires qualified staff or consultants. • Administrative cost higher. |
| Permits Checklist | <ul style="list-style-type: none"> • Alerts land owners to environmental permit requirements. • Helps community monitor environmental risks. | <ul style="list-style-type: none"> • Requires staff to develop system. |
| Prohibition of Various Land Uses | <ul style="list-style-type: none"> • Used within mapped WHPAs to prohibit known groundwater contaminants and processes that generate contaminants. | <ul style="list-style-type: none"> • Requires amendment to zoning ordinance. • Requires enforcement by both visual inspection and on-site investigations. |
| Special Permitting | <ul style="list-style-type: none"> • Used to restrict contaminant uses within WHPAs that may cause groundwater contamination. • Community adopts special permit "thresholds" for various uses and structures within WHPAs. Community grants special permits for "threshold" uses only if groundwater quality will not be compromised. | <ul style="list-style-type: none"> • Requires detailed understanding of WHPAs sensitivity by local permit granting authority. • Requires enforcement of special permit requirements and on-site investigations. • Requires case-by-case analysis to ensure equal treatment of applicants. |
| Transfer of Development Rights | <ul style="list-style-type: none"> • Used to transfer development from WHPAs to locations outside WHPAs. | <ul style="list-style-type: none"> • Cumbersome administrative requirements. • Not well-suited for small communities without significant administrative resources. |
| Cluster/PUD Design | <ul style="list-style-type: none"> • Allows for "point source" discharges that are more easily monitored by guiding residential development outside of WHPAs. | <ul style="list-style-type: none"> • Slightly more complicated to administer than traditional "grid" subdivision. • Enforcement/inspection requirements are similar to "grid" subdivision. |
| Growth Controls/Timing | <ul style="list-style-type: none"> • Community imposes growth controls in the form of building caps, subdivision phasing or other limitation tied to planning concerns which allows the community an opportunity to plan WHPA protection. | <ul style="list-style-type: none"> • Generally complicated administrative process. • Requires administrative staff to issue permits and enforce growth control ordinances. |
| Compliance With Existing Zoning Regulations and Plans | <ul style="list-style-type: none"> • Disseminates information to businesses. • Inexpensive/easy to enact and administer. • Places burden on applicants to obtain permits/approvals. | <ul style="list-style-type: none"> • Local groundwater may be vulnerable if other permit agencies fail to enforce compliance. |
| Regulating or prohibiting Underground Fuel Storage Systems | <ul style="list-style-type: none"> • Monitors or eliminates underground fuel storage systems (UST) within WHPAs. | <ul style="list-style-type: none"> • Prohibition of USTs requires little administrative support. • Regulating USTs require moderate amounts of administrative support for inspection follow-up and enforcement. |

**TABLE 3 (cont.)
WELLHEAD PROTECTION AREA MANAGEMENT OPTIONS**

| Option (continued) | Advantages | Limitations |
|---|--|--|
| Privately Owned Wastewater Treatment Plants (Small Sewage Treatment Plants) | <ul style="list-style-type: none"> Prohibit Small Sewage Treatment Plants (SSTP) within WHPAs. | <ul style="list-style-type: none"> Prohibition of SSTPs requires little administrative support. Regulating SSTPs require moderate amount of administrative support for inspection follow up and enforcement. |
| Prohibit Septic Cleaners Containing Solvent Compounds | <ul style="list-style-type: none"> Prohibits the application of certain solvent septic cleaners within WHPAs. | <ul style="list-style-type: none"> Difficult regulation to enforce even with sufficient administrative support. |
| Septic System Upgrades | <ul style="list-style-type: none"> Requires periodic inspection and upgrading of septic systems. | <ul style="list-style-type: none"> Significant administrative resources required for this option to be successful. |
| Toxic and Hazardous Material Handling Regulations | <ul style="list-style-type: none"> Promotes proper handling and disposal of toxic materials/waste. Community knows what is being used and where. Hazardous substance users may have incentive to reduce or eliminate use. | <ul style="list-style-type: none"> Requires administrative support and on-site inspections. |
| Drainage Requirements | <ul style="list-style-type: none"> Uses advanced engineering designs of subdivision roads within WHPAs to ensure that road drainage is directed outside of WHPAs. | <ul style="list-style-type: none"> Requires moderate level of inspection and enforcement by administrative staff. |
| Sale/Donation | <ul style="list-style-type: none"> Provides broad protection to the groundwater supply. | <ul style="list-style-type: none"> There are few administrative requirements involved in accepting donations or sales of land from the private sector. Administrative requirements for maintenance of land accepted or purchased may be substantial, particularly if the community does not have a program for open space maintenance. Legal consequences of accepting land for donation or sale from the private sector, mostly involving liability. |
| Strategic Monitoring Within the WHPA | <ul style="list-style-type: none"> Monitors groundwater quality within WHPAs. | <ul style="list-style-type: none"> Requires moderate administrative staffing to ensure routine sampling and response if sampling indicates contamination. |
| Contingency Plans | <ul style="list-style-type: none"> Provides appropriate response in cases of contaminant release or other emergencies within WHPAs. | <ul style="list-style-type: none"> Requires significant up-front planning to anticipate and be prepared for emergencies. |
| Hazardous Waste Collection | <ul style="list-style-type: none"> Reduces the accumulation of hazardous materials within WHPAs and the community at large. | <ul style="list-style-type: none"> Hazardous waste collection programs are generally sponsored by government agencies, but administered by a private contractor. |
| Public Education | <ul style="list-style-type: none"> Informs community residents of the connection between land use within WHPAs and drinking water quality. | <ul style="list-style-type: none"> Requires some degree of administrative support for programs, such as brochure mailing, to more intensive support for seminars and hazardous waste collection days. |
| Abandoned Well Search and Closure Program | <ul style="list-style-type: none"> Reduces conduits to transport surface contaminants to the lower drinking water aquifer. | <ul style="list-style-type: none"> Requires staff to manage program. Requires up-front planning to develop survey process. Funding to plug abandoned wells. |

**TABLE 3 (cont.)
WELLHEAD PROTECTION AREA MANAGEMENT OPTIONS**

| Option (continued) | Advantages | Limitations |
|--|--|--|
| Facility Inspections or a Hazardous Material Survey | <ul style="list-style-type: none"> • Informs property owners of the connection between hazardous material usage within WHPAs and drinking water quality. • Reduces the unsecured storage of hazardous materials within WHPAs and the community at large. • Provides a benefit to business owners by making them aware of potential violations before a federal or state inspection. | <ul style="list-style-type: none"> • May be perceived as over-bearing government policy. |
| Partnerships or Agreements With County or State Agencies Helping to Develop Program | <ul style="list-style-type: none"> • Increases coordination between agencies. • Increases the commitment to long-term success of the WHPP. | <ul style="list-style-type: none"> • May be perceived as reducing local control on land use/zoning issues. |
| Regional WHPA Districts | <ul style="list-style-type: none"> • Protects regional aquifer systems by establishing new legislative districts that often transcend existing corporate boundaries. • Provides for protection of areas outside an individual community. • Involves many stakeholders. • Efficient use of technical and administrative resources by reducing duplication of tasks. | <ul style="list-style-type: none"> • Difficult to develop due to several planning/governmental bodies. • May be perceived as reducing local control on land use/zoning issues. |
| Inter-Agency Coordination and Communication | <ul style="list-style-type: none"> • Increases coordination between communities. | <ul style="list-style-type: none"> • Staffing. • Ongoing communication agendas. |
| Land Banking | <ul style="list-style-type: none"> • Acquires and protects land within WHPAs. | <ul style="list-style-type: none"> • Land banks require significant administrative support if they are to function effectively. |

B. SELECTED MANAGEMENT STRATEGIES

After review and discussions of WHPA management options, the original Team recommended that several options be presented to the Township Board and/or the Township Planning Commission for implementation. At that time, the Team determined that some options were too complex, too expensive to administer or were otherwise not appropriate for the local area. Other regional options were perceived to be difficult due to the required coordination of activities between communities, especially in light of the differences in existing land use and zoning administration between the Townships that are included in the WHPA.

In 2012, the Team reviewed and reconsidered management strategies to reflect current concepts, thoughts and experiences from other communities. Going forward, the Team recognizes that ideas may change as new information becomes available. The Township plans to review these management strategies and continue to revise as appropriate. Overall, the Township has attempted to develop management strategies that can be measured. The development of measurable steps will continue into the future.

The following options were either previously implemented by the Township or are currently being pursued by the Team.

i. Inter-Agency Coordination and Communication

The Township will continue to rely on inter-agency coordination and communication with a variety of initiatives and existing regulatory programs:

Part 22 of PA 451, Michigan Natural Resources and Environmental Protection Act

Part 22 requires certain notifications be made for groundwater discharges located within a MDEQ approved wellhead protection area. Part 22 also specifies certain isolation distances from water supply wells. This program provides the Local Unit of Government notification of permitted groundwater discharges.

In the future, when a Part 22 related transmittal is received, the Township will contact MDEQ or the Township's Engineer to determine what action, if any, should be taken.

Part 213 of PA 451, Michigan Natural Resources and Environmental Protection Act

Part 213 requires notification be made to the Local Unit of Government if land use restrictions are being implemented as part of a leaking petroleum underground storage tank cleanup. This program will provide the Local Unit of Government notification of petroleum contaminated sites.

The Township will also continue the following:

County Partnerships

The Township had previously delivered a copy of the MDEQ approved delineated Wellhead Protection Area to the Petoskey office of the Health Department of Northwest Michigan. The Township will also provide a copy of the Wellhead Protection Program Plan Renewal document.

The County is responsible for issuing on-site septic and water well permits. The Township will request that the County consider the WHPA in future permitting decisions, as appropriate. This will include on-site septic inspections during property transactions. The Township will periodically contact the County to confirm that the Health Department inspector is aware of the location of the Township's WHPA. The intent of staying in contact is to minimize potential disruptions in WHPA inspections as the result of County personnel changes.

The Township will also partner with the County on future public education efforts (e.g., abandoned wells, small business pollution prevention or waste reduction). The combined Township/County efforts to inform small business owners could have a long-term positive impact on groundwater quality.

The Township will also work with the City of Harbor Springs and the Emmet County Planning, Zoning, and Construction Services Department (Department) to explore options for County-wide coordination and implementation of certain groundwater protection strategies. The Department includes the County Office of Planning and Zoning Resources Commission which promotes coordination and uniform development standards among the twenty-one townships and municipalities located in Emmet County. The Department also develops area-wide land use goals and efforts to conserve natural resources. The Emmet County Planning Commission maintains County-wide Site Plan Review criteria and Site Plan Checklist criteria, and conducts approval for non-single or two-family dwellings.

Township/Township Coordination of Leaking Underground Storage Tank Cleanups

Cleanup at leaking underground storage tank properties in Michigan is regulated under Part 213 of Michigan's Natural Resource and Environmental Protection Act. Part 213 allows environmental cleanups that leave certain concentrations of contaminants in soil and groundwater. Future land use at the contaminated site is restricted when this approach is taken. Additionally, this approach includes filing the form "Notice to Local Unit of Government of Land Use Restrictions" with the municipality where the restricted land use is being proposed.

If this form is filed for a property located within Little Traverse Township's portion of the WHPA, the Township (or their representative) will contact MDEQ to review the proposed cleanup approach. However, since the WHPA extends into Pleasantview Township, Little Traverse Township will need to work with Pleasantview Township to develop a mechanism to inform Little Traverse Township if a notification is received for property located within or near the adjacent Township's portions of the WHPA. Accordingly, the Little Traverse Township will work with Pleasantview Township to develop a system to notify the Township if a Part 213 of PA 451, Michigan Natural Resources and Environmental Protection Act "Local Unit of Government" notification of land use restrictions is being implemented as part of a leaking petroleum underground storage tank cleanup.

If the above notification is received, Little Traverse Township will contact the MDEQ Storage Tank Division, Cadillac District office, and inform them that the contaminated property is located within a Delineated Wellhead Protection Area. The Township will request that the MDEQ strongly consider the Wellhead Protection Area when reviewing proposed corrective action activities at the contaminated site.

A copy of form "Notice to Local Unit of Government of Land Use Restrictions" is included in Attachment B.

ii. Public Education

It is recognized that public education, awareness and regular maintenance of the WHPP Plan will be a key element of the long-term success of the WHPP. The Township's strategy is consistent with the County-wide strategy of public education being a long-term, continuous and repetitive process. Specific historical, current and future actions include:

- ✓ Distribution of an informational wellhead protection brochure. (2000)
- ✓ Identify and publicize used oil recycling centers. (2003)
- ✓ Consider installation of storm drain markers. (ongoing)
- ✓ Provide Township Offices with a copy of the Wellhead Protection Plan for public review.
- ✓ Consider partnering with the Harbor Area Regional Board of Resources, Inc. to provide the public with information and to increase awareness of the Wellhead Protection Area and efforts being conducted by the Township for water quality protection.
- ✓ Create 2-D map illustrating the WHPA, subsurface geology and aerial photographs of the Township.
- ✓ Use the annual Consumer Confidence Reports to re-introduce the concept of wellhead protection. Future efforts will provide detailed information on various aspects of WHPP (e.g., household hazardous waste disposal, water conservation, abandoned wells, etc.)

Some of the above activities may be completed by local community groups (e.g., Boy Scouts, Girl Scouts, schools, civic groups, church youth groups). This would both complete a measurable goal and also provide an opportunity for "hands-on" public education.

iii. Abandoned Well Search and Closure Program

Little Traverse Township is developing an Abandoned Well Search and Closure Program (referred to as a "Well Abandonment Program") to identify and plug abandoned wells. The Township will work closely with Emmet County which maintains a database, including coordinates, of wells registered within the Little Traverse Township area.

If reported, the Township will record the well location and owner. The Township will annually attempt to identify funding sources (e.g., County Groundwater Stewardship Program, MDEQ Abandoned Well Management Program) to have the wells properly abandoned.

The Township will address on-site wells when demolition permits are issued. The intent is to ensure abandoned wells are properly plugged prior to demolition activities, since it is difficult, if not impossible, to locate old wells after demolition activities have taken place.

iv. Environmental Permit Checklist

In considering the use of an Environmental Permit Checklist, the Team intent was to safeguard the public health, safety and welfare of citizens and institutions that are customers of the Little Traverse Township Water System by monitoring land development in and around the WHPA. Additionally, the intent of the Permit Checklist is to assist developers in complying with various state and county environmental permit requirements.

In 2002, the Little Traverse Township Zoning review process adopted an Environmental Permit Checklist. A copy of the permit checklist is included in Attachment D.

v. Contaminated Property Cleanup

The Township will request MDEQ updates on cleanup activities at certain contaminated properties located within or near the Wellhead Protection area.

vi. Encourage Local Compliance with Existing Pollution Prevention Programs

Existing federal and state programs require certain industries and businesses to prepare pollution prevention plans. Examples are Storm Water Pollution Prevention and Pollution Incidence Prevention plans.

These types of plans review operations and ensure that consideration is provided to the location and management of activities that could impact groundwater resources. Small businesses are often unaware they are required to compile these plans.

Additionally, while these types of plans are required, it is not always necessary to submit them to regulating authorities. However, these plans typically must be provided to the regulating authority upon request.

The Township will rely on the Environmental Permit Checklist to identify land use that may require compliance with existing pollution prevention programs. For those land uses, the Township will inquire if compliance is being addressed as part of the Township's site review process.

vii. Linking the WHPP to Other Township Plans

The Township recognizes that the long-term success of the Wellhead Program will depend, in part, on a large cross-section of individuals and groups understanding and recognizing the value in the programs goals. One way to accomplish this is to link the Wellhead Protection Program Plan to other Township plans (e.g., Master Plans, Policy Plans, Strategic Plans, Single-Issue Plans).

Future updates to the Township's Water Reliability Study will include consideration of the Wellhead Protection Program Plan. Specifically, the Water Reliability Study may be used to budget for long-term Wellhead Protection activities (e.g., public awareness, contaminant source inventory maintenance, contingency plan updates).

The Township recently updated its zoning regulations. Future zoning regulation updates will formally consider The Wellhead Protection Area.

VII. WATER SUPPLY EMERGENCY CONTINGENCY PLAN

The goal of this element of the Plan is to provide both short-term and long-term protection of the Township's water supply system by identification of personnel, testing equipment, procedures, and materials which can be used for rapid correction or elimination of environmental accidents which might constitute a water supply emergency. The contingency plan also addresses response protocols, notification procedures and methods of containment.

The existing contingency plan outlines the program for the rapid correction or mitigation of water supply emergencies. It contains an inventory of necessary stand-by personnel, equipment, chemicals, and other materials readily available for the correction of water supply problems, including emergency measures in the event of contamination of the municipal wells from an emergency spill within the wellhead protection areas. The means of notification of customers affected by an emergency is also provided, along with a description of the precautions and measures to be taken to protect the health of the affected system's water customers.

Township leaders understand that response to contaminated wells is not limited to technical measures. Indeed, when a municipal well becomes contaminated, it also becomes a technical problem requiring professional knowledge of hydrogeology, engineering and other disciplines. Additionally, financial, legal, public relations and risk assessment problems often occur. Often, the initial public questions include:

- What is the current water quality?
- What is the source of the contaminants?
- What are the effects of past water usage?
- What action is being taken?

When municipal wells become contaminated, it is usually a surprise. This is especially true for wells located in a Wellhead Protection community. While it is unlikely that any plan will prevent an adverse response from the Township's water customers, this Wellhead Protection Plan suggests:

- Inform residents the truth as soon as it is known.
- Inform residents immediately upon confirmation of contaminants in the water supply.
- Continue to inform residents of activities being undertaken.

If the wells become contaminated, the MDEQ would likely require that the Township immediately initiate activities to provide either a treated water system, or a new water supply. Once contamination is discovered, action may need to be taken before bonds or loans become available to address infrastructure needs. The Township's "Water System Emergency Response Plan and Contingency Plan for Response to Wellhead Protection Area Groundwater Contamination" addresses that scenario.

If the wells become contaminated, an invaluable resource would include a previously established, consistent and strong public education program. Such a program would likely provide Township officials with the "benefit of the doubt" when explaining cleanup concentrations goals, how clean is clean, projected schedules, costs and funding.

Two parts of the long-term contingency planning for the Township will be based on the results of the Contaminant Source Inventory. First of all, the Township may initiate a system of self-monitoring for certain contaminants that have been identified near the wells. Specifically, the Township may sample for petroleum contaminants at a greater frequency than required by state law. The frequency and tests will be determined upon review of the nearby leaking underground storage tank site files. Secondly, future updates to the Contaminant Source Inventory may identify other chemicals that should be tested for more frequently than required by law. The Township will work closely with

environmental professionals (state, county and private) to evaluate cost/benefit relationships of any testing beyond what is already completed by the Township.

New full-time DPW employees hired by the Township have received training on the emergency response protocol.

Since the Plan was last updated, the Township has not encountered any water supply emergencies.

VIII. PLAN FOR NEW WELLS

The goal of this element is to provide a mechanism for incorporating new wells or wellfields into the WHP program. In the future, the Township may find it necessary, as a result of either existing or projected increased water demand or as the result of a contamination threat, to explore the development of additional groundwater sources for drinking water. Wellhead protection provides a mechanism that can be used to help select the best site and to identify areas that should be protected now so that they will be able to provide quality drinking water in the future when they are needed. Additionally, it should be realized that the development of a new groundwater source in the vicinity of existing sources may modify the movement of groundwater in the subsurface, perhaps changing the shape and orientation of the existing WHPA. Evaluation of the significance of those changes is necessary in order to ensure that the management strategy in place will continue to protect the community's drinking water supply.

A new groundwater source is defined as either an additional groundwater source, or an existing groundwater source that has been modified in a manner to increase its capacity or discharge to the system. When the Township begins planning the development of a new groundwater source, several steps should be followed. First of all, the Township should conduct a “draft” delineation and preliminary potential contaminant source inventory for each site being considered. “Draft” delineation is defined as applying the existing WHPA delineation to the considered additional well sites.

If the “draft” delineation and potential contaminant source inventory indicate that the considered well site is favorable, the Township would determine the WHPA for the new well using current MDEQ delineation guidance. This may include obtaining sufficient information from existing data sources or from field measurements to complete the delineation using an MDEQ accepted analytical or numerical groundwater modeling method.

If more than one potential site is available for a new source, the Township should proceed in its evaluation of those sites according to the discussions above. If the Township develops a new well, or increases the capacity of an existing well that is within an already delineated WHPA, it is likely that the new or modified source will have a significant impact on the existing WHPA. In all cases, the effect of the new well on the existing WHPA geometry and orientation should be evaluated.

The groundwater models that were used to delineate the WHPA for the existing municipal production wells may also be used to develop a WHPA for a new well.

Any new or adjusted WHPA boundaries should be compared to the existing WHPA boundaries. If significant differences are observed, the Township should consider modifying the existing Wellhead Protection Plan to encompass the new delineation.

In summary, the following WHP program tasks would be completed when considering a new well:

- A “draft” WHPA delineation and contaminant source inventory would be completed using existing information.
- If the location is favorable, based on review of the “draft” information, a complete MDEQ WHPA delineation would be completed based on current MDEQ guidance.

- A contaminant source inventory of existing and potential sources of contamination within the WHPA would be completed.
- The processes, procedures and requirements set forth in existing MDEQ guidance and regulations must be applied in the location, selection, well design and system implementation of any new wells.

Currently, the Township does not anticipate an expansion of the public water supply system.

IX. PUBLIC PARTICIPATION AND OUTREACH/EDUCATION

In order for the WHPP to be successful, everyone within the community and especially those who live and conduct their businesses within the Wellhead Protection Area, need to be included in the planning process and continuing development and implementation of the Plan. The program developed for implementation by the Township has involved, and will continue to involve, public participation. Public education and awareness is a key element of the Township's WHPP.

The Team members represent a broad cross-section of the community. As a result, the Team will be relied upon to inform and educate area residents regarding the WHPP and groundwater awareness.

Specific public education items are referenced in Section IV.C.ii of this report.

The Township's WHPP will continue to encourage a program to maximize a "community effort" and a two-way communication with the public to foster community understanding of wellhead protection, and to identify and support the community leaders and volunteers in the implementation of the program.

X. SELECT REFERENCES

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Fleis & VandenBrink Engineering (2004). Little Traverse Township Wellhead Protection Area Delineation Report.

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Huron River Watershed Council (1997). Wellhead Protection Community Workbook.

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National Ground Water Association (1991). Wellhead Protection Thirteen Papers on Wellhead Protection Techniques and Strategies.

USEPA (1994). Ground Water and Wellhead Protection Handbook.

USEPA (1991). Guide for Conducting Contaminant Source Inventories for Public Drinking Water Supplies Technical Assistance Document.

USEPA (1985). Protection of Public Water Supplies From Ground-Water Contamination Seminar Publication.

USEPA (1997). State Source Water Assessment and Protection Programs Guidance Final Guidance.

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USEPA (2001 Draft). Region 5 – Water Division Source Water Protection 5-Year Strategy (2001 – 2005).

USEPA Web Page. (<http://www.epa.gov/safewater/>)

Michigan Department of Natural Resources (1991). Community Planning & Zoning for Groundwater Protection in Michigan: A Guidebook for Local Officials.

Wisconsin Geological and Natural History Survey (1987). A Guide to Groundwater Quality Planning and Management for Local Governments.

Wyoming Department of Environmental Quality. Web Page (<http://www.wrds.uwyo.edu/wrds/deq/whp/whpcover.html>)

Glossary of Terms

Aquifer

Permeable geologic material, such as rock, sand, or gravel, which contains water in sufficient quantities to supply a well.

Confined Aquifer

1) An aquifer overlain and underlain by impermeable layers, such as clay; or 2) an aquifer in which the groundwater is under pressure greater than atmospheric pressure and which will rise in a well above the point at which it is first encountered.

Critical Materials

Substances that are listed in Michigan's "Critical Materials Register". The Register is a list of chemicals of high environmental concern. Facilities that store critical materials on site must submit a pollution incident prevention plan to the State, and they must provide secondary containment for the materials.

Groundwater Impact/Contamination

The result of the spillage or discharge of hazardous substances or polluting materials into an aquifer.

Delineation

The mapping out of the area through which groundwater moves to reach a drinking water supply well(s).

Environmental Regulations

State environmental laws have been codified into one Act, the Natural Resources and Environmental Protection Act (Act 451 of 1994) (NREPA). The following "parts" deal directly with groundwater protection:

Part 201 of NREPA, Environmental Remediation Section

The State's own "Superfund" law, this section oversees the cleanup of contaminated sites in Michigan. The section also provides for the listing and prioritization of contaminated sites.

Part 111 of NREPA, Hazardous Waste Management

Regulates the storage, treatment, and disposal of hazardous waste. Requires permits for facilities which store, treat, or dispose of hazardous waste. Those that generate more than 1000 kilograms/month of hazardous waste are termed "large quantity generators" (LQG). These generators must report their waste generation to the State and to the EPA, provide secondary containment for liquid wastes, and prepare emergency plans. Those generating between 100 and 1000 kilograms/month are termed "small quantity generators" (SQG). These generators must report their waste generation to the State and the EPA. Those generating under 100 kilograms/month are "conditionally-exempt small quantity generators." They must keep records of their operations.

Part 111 also regulates the siting and operation of hazardous waste landfills.

Part 115 of NREPA, Solid Waste Management

Regulates the siting and operation of solid waste landfills.

Part 31 of NREPA, Water Resources Protection

Mandates the protection and conservation of the water resources of the State, including groundwater. Regulates discharges of pollution to ground and surface water. Requires facilities handling "critical materials" to prepare spill response plans and to provide secondary containment. Requires facilities discharging polluting materials to the

groundwater (through floor drains or otherwise) to obtain a groundwater discharge permit. Regulates sanitary wastewater discharges of over 10,000 gallons per day.

Part 615 of NREPA, Supervisor of Wells

Regulates the drilling and operation of oil and gas wells, and the disposal of wastes created from such operations. Well drilling, operation, closure, and waste disposal must be carried out so that damage of fresh water supplies is prevented.

Part 211 of NREPA, Underground Storage Tank Regulations

Requires annual registration of underground storage tanks and compliance with leak detection requirements. Regulates response to discovered leaking tanks.

Part 83 of NREPA, Pesticide Control

Regulates the use of pesticides for agricultural uses.

State laws not codified into NREPA:

Public Health Code (Act 368 of 1978)

Regulates construction of private water wells. Part 127 requires that wells that are abandoned be properly plugged to prevent contamination.

Michigan Safe Drinking Water Act (Act 399)

Provides for the supervision and control of public water supplies and public health protection.

Relevant Federal laws:

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Often called the "Superfund Act," it oversees and funds cleanup of contaminated sites.

Underground Injection Control Program

Regulates the underground injection of toxic waste. Hazardous waste operators injecting waste into wells must obtain a permit from the EPA.

Safe Drinking Water Act (SDWA)

A Federal Act designed to protect drinking water. 1986 amendments require states to develop wellhead protection plans "to protect wellhead areas within their jurisdiction from contaminants which may have any adverse effects on the health of persons."

Superfund Amendments and Reauthorization Act (SARA), Title III, Community Right-to-Know

Requires facilities using certain amounts of hazardous substances to report their usage to the EPA and to the State. Facilities meeting certain criteria must also prepare emergency response plans.

Fire Fighter Right to Know Program

Requires Fire Fighters to survey and inspect all facilities in their community that handle hazardous substances.

Freedom of Information Act

States that all information gathered by public agencies must be made available to the public upon request.

Groundwater

Freshwater that fills the spaces between sand, gravel, and clay underground.

Hazardous Substance

A chemical or other material which is or may become injurious to the public health, safety, or welfare, or to the environment. You can find hazardous substances in small and large businesses, farms, and households.

Household Hazardous Waste

Products used in the household or home garage that, when used, stored, or disposed of improperly, may pose a threat of contamination to the environment.

Hydrogeology

The study of water and geology, and how the two interact.

Hydrogeologist

A person who studies hydrogeology.

Leaky Confined Aquifer

An aquifer that has a confining layer of clay over it that is noncontiguous, allowing for some recharge ("leakage") from the surface.

Secondary Containment

Providing a kind of structure around a storage tank or container so that, if there is a spill, the substance will be contained.

Site of Environmental Contamination

Sites where leakage, spillage, or other discharge of hazardous substances has contaminated the groundwater or soil; and that the State has placed on its list of contaminated sites, under the Environmental Remediation Section (Part 201) of the Natural Resources Environmental Protection Act, PA 451.

Superfund Site

A site listed as contaminated under the Federal Superfund law.

Topographic Maps

Maps produced by the U.S. Geological Survey that show roads, lakes, streams, wetlands, developed areas, municipal boundaries, elevation contours, and other features at a scale of 1:24,000.

Tritium

An isotope of water (a water molecule that has three hydrogen atoms instead of two). Atmospheric testing of nuclear weapons in the 1950's caused tritium levels in water supplies to increase. (Don't worry! Tritium is a harmless substance). Hydrogeologists test the level of tritium in water to measure the age of the water.

Unconfined Aquifer

An aquifer with the water table as its upper boundary. Because the aquifer is not under pressure, the water level in a well is the same as the water table outside the well.

Underground Injection Wells

Wells into which treated water and/or other wastes are injected for disposal.

Underground Storage Tanks

Tanks under the surface of the ground in which gasoline, fuel oil, and other substances are stored.

Water Table

The top of an unconfined aquifer where water pressure is equal to atmospheric pressure. The water table depth fluctuates with climate conditions on the land surface above and is usually gently curved, following a subdued version of the land surface topography.

Well Logs

Records that well drillers complete when they drill a residential or public drinking water well. Well logs contain information such as depth to water table, lithology, the type of well constructed, and the depth of the well.

Wellhead

The physical structure at the land surface through which groundwater is withdrawn from an aquifer.

Wellhead Protection Area (WHPA)

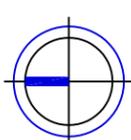
The surface and subsurface area surrounding a water well or wellfield through which contaminants are reasonably likely to move toward and reach such well or wellfield. The WHPA is the "catchment area" of concern for public water supplies dependent on groundwater.

Wellhead Protection Plan (WHPP)

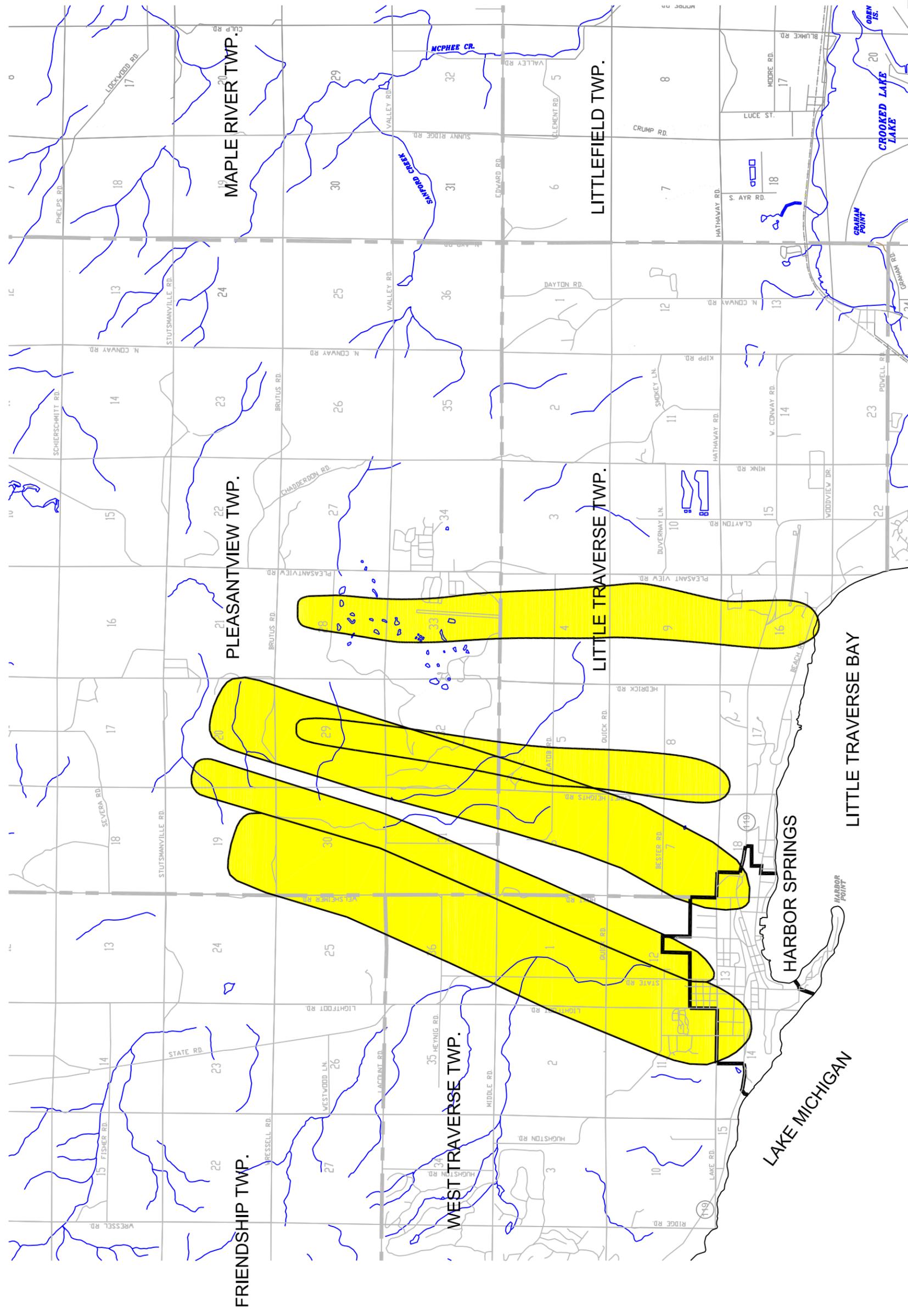
A plan developed by a community operating a public well water supply system that details how the community will work to protect their wells from contamination.

Adopted from: "*Wellhead Protection Community Guide*" Huron River Watershed Council, February, 1997 pg. 171 - 176.

FIGURES



NORTH
SCALE: 1"=5000'



LEGEND

-  CITY LIMITS
-  WELLHEAD PROTECTION AREA

CITY OF HARBOR SPRINGS AND LITTLE TRVERSE TOWNSHIP
EMMET COUNTY, MICHIGAN

WELLHEAD PROTECTION AREAS

ATTACHMENT A
WELLHEAD PROTECTION TEAM

2012
LITTLE TRAVERSE TOWNSHIP
WELLHEAD PROTECTION TEAM

| NAME | REPRESENTING |
|------------------|--------------------------------|
| Mike Smith | Harbor Springs Area SDA |
| William Dohm | Township Supervisor |
| Dan Begnoche | Emmet County Health |
| Richard Schiller | Harbor Springs Area Fire |
| James Luttrell | Owner, Luttrell Well Drilling |
| Clair Radle, Jr. | Agriculture |
| Charles MacInnis | North Central Michigan College |
| Randy Frykberg | Little/West Traverse Twps. |
| Rachel Smolinski | Harbor Area Regional Board |
| Shirley Snyder | Citizen-at-Large |
| Bill Weichmann | Pleasantview Township |

ATTACHMENT B

CONTAMINANT SOURCE INVENTORY

**Table 3
City of Harbor Springs - Little Traverse Township
Existing and Potential Sites of Environmental Impact**

| Map Reference Number | MAPPABLE SITES OF EXISTING IMPACT WITHIN CITY OF HARBOR SPRINGS WHPA | | | Open | Closed | Part 201 | Other |
|----------------------|---|-----------|---------|------|--------|----------|-------|
| | DEQ ID | Site Name | Address | LUST | LUST | | |
| N/A | | N/A | | | | | |

| Map Reference Number | MAPPABLE SITES OF EXISTING IMPACT WITHIN LITTLE TRAVERSE TOWNSHIP WHPA | | | Open | Closed | Part 201 | Other |
|----------------------|---|-----------------|------------------|------|--------|----------|-------|
| | DEQ ID | Site Name | Address | LUST | LUST | | |
| 33-5 | 6875 | Boyne Highlands | 600 Highlands Dr | 1 | 0 | | |

| Map Reference Number | MAPPABLE SITES OF POTENTIAL IMPACT WITHIN CITY OF HARBOR SPRINGS WHPA | | | Registered UST | | NPDES | Other |
|----------------------|--|----------------------------------|----------------------|----------------|---------|--------|-------|
| | DEQ ID | Site Name | Address | Current | Removed | Permit | |
| 12-16 | MINPTD004 | Crockery Creek Turkey Farms, LLC | 607 East Lake Street | | | X | |
| 13-6 | 7531 | Harbor Springs Oil Co Inc | 693 State St | 16 | 9 | | |
| 14-12 | 12128 | Matthews Nursery, Inc | 637 Ann St | 3 | 3 | | |
| 18-11 | 12125 | Renolda Greenhouse Inc | 692 E Lake Rd | 1 | 0 | | |

| Map Reference Number | MAPPABLE SITES OF POTENTIAL IMPACT WITHIN LITTLE TRAVERSE TOWNSHIP WHPA | | | Registered UST | | NPDES | Other |
|----------------------|--|------------------|---------------------|----------------|---------|--------|-------|
| | DEQ ID | Site Name | Address | Current | Removed | Permit | |
| 16-19 | 38832 | Frances Marlhugh | 7160 M 119 | 2 | 2 | | |
| 33-5 | 6875 | Boyne Highlands | 600 Highlands Dr | 16 | 16 | | |
| 33-6 | GW1810014 | Boyne Highlands | 600 Highlands Drive | | | X | |

Bold and italic entry indicates that site was not identified in Little Traverse Township's September 2004 CSI tables

LUST: Leaking Underground Storage Tank Sites (LUST list) Remediation and Redevelopment Division, MDEQ

Part 211: Sites of Environmental Contamination, Remediation and Redevelopment, MDEQ

Part 111: Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ

Part 115: Landfill/Solid Waste Disposal Site List, Waste and Hazardous Materials Division, MDEQ

UST: Underground Storage Tank List: Waste and Hazardous Materials Division, MDEQ

EXISTING IMPACT sites have documented contamination (e.g. laboratory sample analysis).

POTENTIAL IMPACT sites have current or historical land use that has the potential to result in environmental contamination.

Removed USTs or leaking UST sites remediated/closed are reported as POTENTIAL IMPACT.

Current or historical leaking UST sites are reported as EXISTING IMPACT.

Mappable area refers to City of Harbor Springs, sections 21-28 and 33-36 of Friendship Township; sections 1-4, 9-12, and 13-16 of West Traverse Township; sections 19-22, 27-30, and 31-34 of Pleasantview Township; sections 7-8 and 17-18 of Alanson Township

Refer to Table 2 for description of databases searched.

Table 3
City of Harbor Springs - Little Traverse Township
Existing and Potential Sites of Environmental Impact

| Map Reference Number | MAPPABLE SITES OF EXISTING IMPACT OUTSIDE OF CITY & TOWNSHIP WHPA | | | Open LUST | Closed LUST | Part 201 | Other |
|----------------------|---|-------------------------------|----------------------|-----------|-------------|----------|-------|
| | DEQ ID | Site Name | Address | | | | |
| 10-22 | 40056 | H.S.S.D.A Maintenance Garage | 699 E Hathaway Rd | 1 | 1 | | |
| 13-4 | 6252 | Irish Boat Shop | 400 E Bay St | 2 | 2 | | |
| 13-7 | 8748 | Reichert's Standard Service | Corner Spring & Main | 1 | 1 | | |
| 13-9 | 10816 | Mac Gregor Plumbing & Heating | 110 E Bay | 1 | 1 | | |
| 13-13 | 12833 | Main Street Building | 109 E Main St | 1 | 1 | | |
| 13-21 | 40027 | Former Bay Street Garage | 125-129 E Bay St | 1 | 0 | | |
| 13-23 | 40063 | Hsasda - Station #9 | 3704 US-31 | 1 | 0 | | |
| 13-24 | 50001490 | Harbor Springs Police | 349 E Main St | 1 | 1 | | |
| 15-3 | 5586 | Harbor Springs Airport | 1674 M-119 | 1 | 1 | | |
| 18-14 | 20287 | Oden State Fish Hatchery | 3377 1/2 Oden Road | 1 | 1 | | |
| 18-18 | 38597 | Wind Jammer Marina | 3654 Oden Road North | 2 | 1 | | |

| Map Reference Number | MAPPABLE SITES OF POTENTIAL IMPACT OUTSIDE OF CITY & TOWNSHIP WHPA | | | Open LUST | Closed LUST | Part 201 | Other |
|----------------------|--|----------------------------------|------------------------|-----------|-------------|----------|-------|
| | DEQ ID | Site Name | Address | | | | |
| 4-1 | GW1110311 | Birchwood Farms Clubhouse | 600 Birchwood Drive | | | X | |
| 10-22 | 40056 | H.S.S.D.A Maintenance Garage | 699 E Hathaway Rd | 2 | 2 | | |
| 10-23 | GW1810083 | Harbor Springs Area Sewage | 699 East Hathaway Road | | | X | |
| 12-16 | MINPTD004 | Crockery Creek Turkey Farms, LLC | 607 East Lake Street | | | X | |
| 12-17 | 37313 | State Road General Store | 7701 S State Rd | 3 | 0 | | |
| 13-1 | 1396 | Hollywood Party Store | 201 State St | 7 | 4 | | |
| 13-2 | MIS510390 | Walstrom Marine Incorporated | 501 Bay Street | | | X | |
| 13-3 | MIS510101 | Irish Boat Shop, Incorporated | 400 East Bay Street | | | X | |
| 13-4 | 6252 | Irish Boat Shop | 400 E Bay St | 3 | 3 | | |
| 13-6 | 7531 | Harbor Springs Oil Co Inc | 693 State St | 16 | 9 | | |
| 13-7 | 8748 | Reichert's Standard Service | Corner Spring & Main | 7 | 7 | | |
| 13-9 | 10816 | Mac Gregor Plumbing & Heating | 110 E Bay | 1 | 1 | | |
| 13-13 | 12833 | Main Street Building | 109 E Main St | 3 | 3 | | |
| 13-21 | 40027 | Former Bay Street Garage | 125-129 E Bay St | 1 | 1 | | |
| 13-23 | 40063 | Hsasda - Station #9 | 3704 US-31 | 1 | 1 | | |
| 13-25 | 50002574 | Harborside Inn | 266 E Main St | 1 | 0 | | |
| 14-8 | 9697 | AT&T Stutsmanville | Stutsmanville Rd | 1 | 1 | | |
| 14-12 | 12128 | Matthews Nursery, Inc | 637 Ann St | 3 | 3 | | |
| 15-3 | 5586 | Harbor Springs Airport | 1674 M-119 | 5 | 5 | | |
| 15-15 | 32909 | Harbor General Store | 510 W Conway Rd | 4 | 2 | | |
| 15-16 | 35229 | Harbor Springs Airport Authority | 8856 M-119 | 2 | 0 | | |
| 15-17 | MIS510652 | Cornillie Concrete | 710 West Conway Road | | | X | |
| 15-20 | GW1110585 | Conway Prowash | 8954/H8954 M-119 | | | X | |
| 17-1 | 2400004 | Littlefield Twp Dump Closed | Moore Rd | | | X | |
| 18-11 | 12125 | Renolda Greenhouse Inc | 692 E Lake Rd | 1 | 0 | | |
| 18-14 | 20287 | Oden State Fish Hatchery | 3377 1/2 Oden Road | 2 | 2 | | |
| 18-18 | 38597 | Wind Jammer Marina | 3654 Oden Road North | 4 | 4 | | |
| 34-20 | 39913 | Pleasantview Ez Mart | 5667 Pleasantview Rd | 2 | 0 | | |

Bold and italic entry indicates that site was not identified in Little Traverse Township's September 2004 CSI tables

LUST: Leaking Underground Storage Tank Sites (LUST list) Remediation and Redevelopment Division, MDEQ

Part 211: Sites of Environmental Contamination, Remediation and Redevelopment, MDEQ

Part 111: Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ

Part 115: Landfill/Solid Waste Disposal Site List, Waste and Hazardous Materials Division, MDEQ

UST: Underground Storage Tank List: Waste and Hazardous Materials Division, MDEQ

EXISTING IMPACT sites have documented contamination (e.g. laboratory sample analysis).

POTENTIAL IMPACT sites have current or historical land use that has the potential to result in environmental contamination.

Removed USTs or leaking UST sites remediated/closed are reported as POTENTIAL IMPACT.

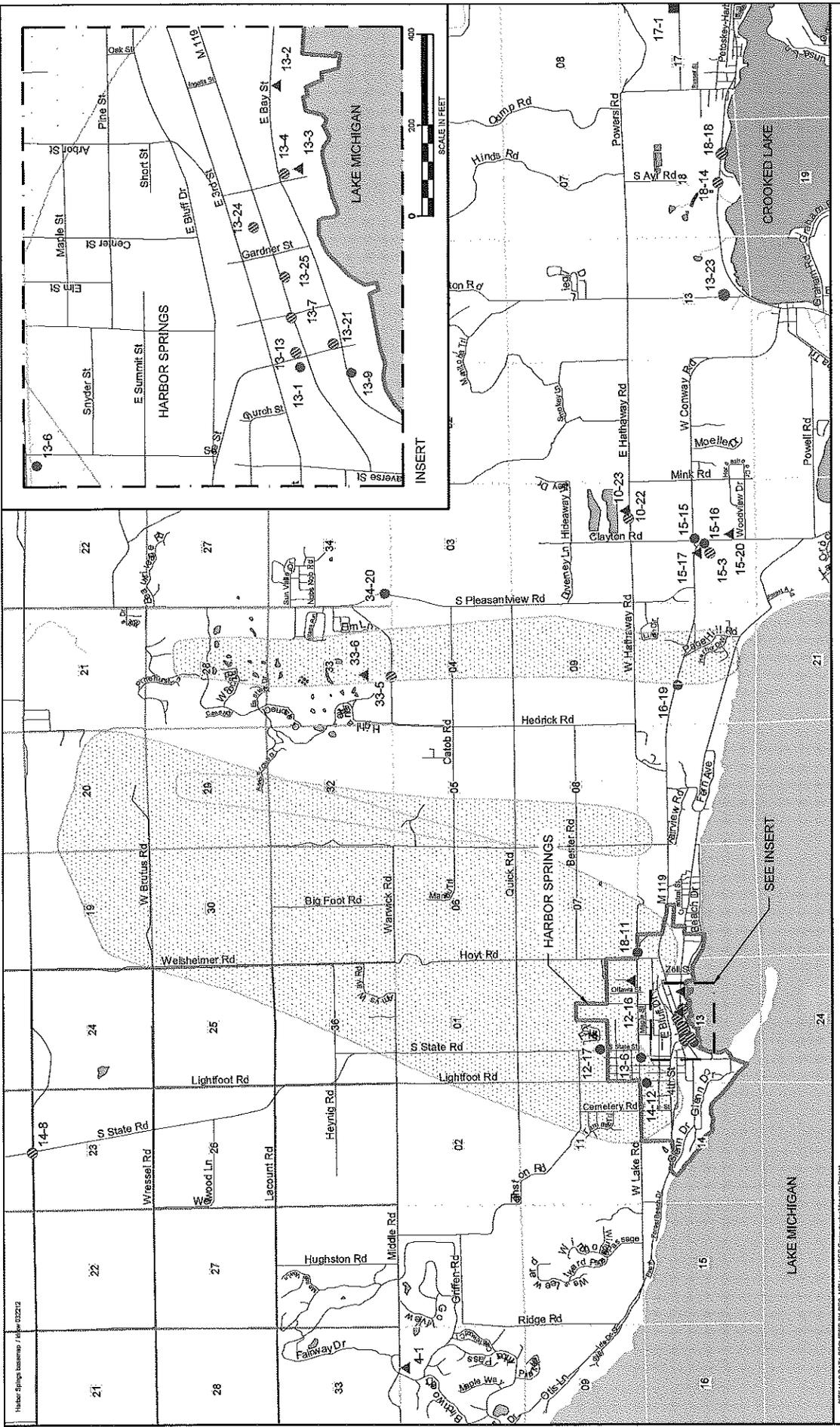
Current or historical leaking UST sites are reported as EXISTING IMPACT.

Mappable area refers to City of Harbor Springs, sections 21-28 and 33-36 of Friendship Township; sections 1-4, 9-12, and 13-16 of West Traverse Township; sections 19-22, 27-30, and 31-34 of Pleasantview Township; sections 7-8 and 17-18 of Alanson Township

Refer to Table 2 for description of databases searched.

Table 4
Small Quantity Generators
City of Harbor Springs

| Permit | Name | Address |
|--------------|---------------------|------------------------------|
| MID017117961 | Irish Boat Shop Inc | 400 E Bay St, Harbor Springs |



CITY OF HARBOR SPRINGS LITTLE TRAVERSE TWP.
EMMET COUNTY, MI

CONTAMINANT SOURCE INVENTORY
WITH WPPA

2012 24355A

LEGEND

- LUST SITE
- ▲ PART 201 SITE
- LUST SITE
- ▲ OTHER

SCALE IN FEET

0 1200 2400

NORTH

SCALE IN FEET

0 200 400

INSERT

FLEIS & VANDENBRINK ENGINEERING, INC.

SITE MAP DATA PROVIDED BY BGL, MEG, and USGS Greenwave Mapping Project

Table 2
Databases Used in 2012 Contaminant Source Inventory

| | |
|----------|--|
| PART 201 | Part 201 of Act 451 Sites of Environmental Contamination, Remediation and Redevelopment Division, MDEQ. (http://www.deq.state.mi.us/part201/) |
| UST | Underground Storage Tank List, Waste and Hazardous Materials Division, MDEQ. (http://www.deq.state.mi.us/sid-web/Default.aspx) |
| LUST | Leaking Underground Storage Tank Sites (LUST list), Remediation and Redevelopment Division, MDEQ. (http://www.deq.state.mi.us/sid-web/Default.aspx) |
| OIL/GAS | Oil & Gas Contamination Site List, Geological and Land Management Division, MDEQ. (http://ww2.deq.state.mi.us/mir/) |
| PART 111 | Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ. (http://www.deq.state.mi.us/wdspi/Home.aspx) |
| SQG | Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ. (http://www.deq.state.mi.us/wdspi/Home.aspx) |
| PART 115 | Landfill/Solid Waste Disposal Site List, Waste and Hazardous Materials Division, MDEQ. (http://www.deq.state.mi.us/wdspi/Home.aspx) |
| CERCLA | Federal National Priority List (Superfund), information from EPA, Region 5. (http://www.epa.gov/enviro/facts/rcrainfo/search.htm) |
| NPDES | Groundwater Discharge Permits, Water Division, MDEQ. (http://www.deq.state.mi.us/owis/Page/main/Home.aspx) |

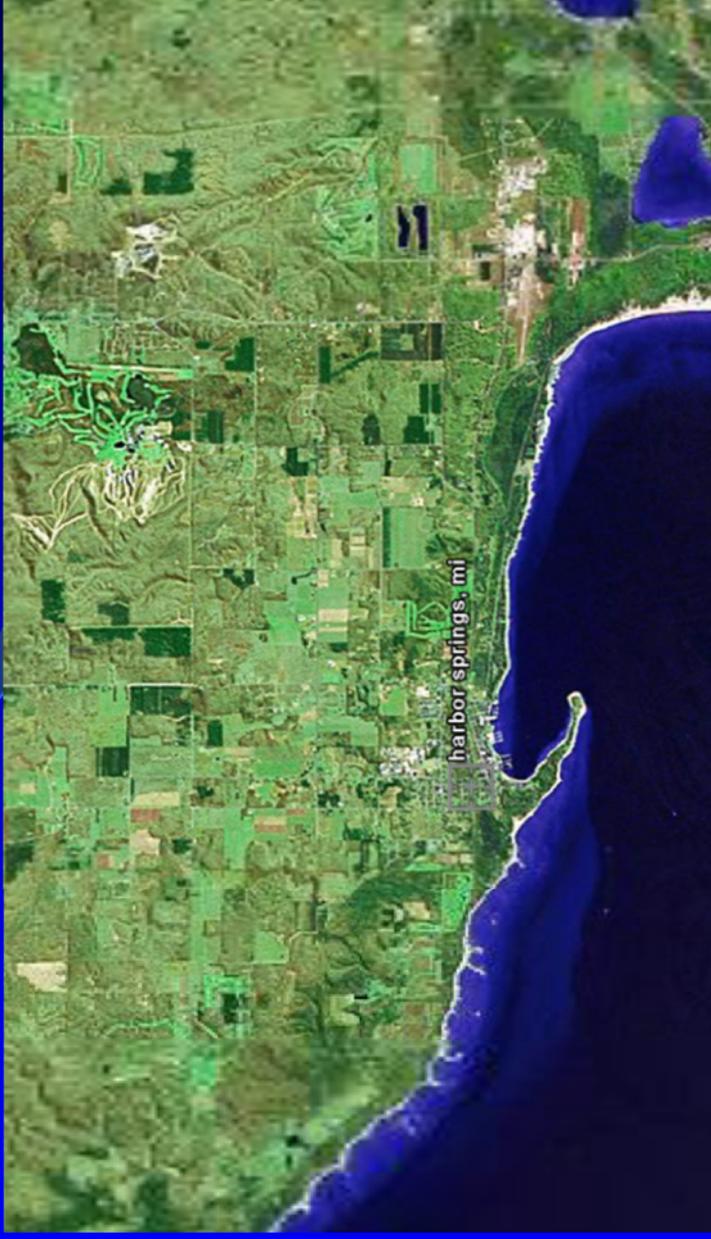
ATTACHMENT C

PUBLIC PARTICIPATION/EDUCATION

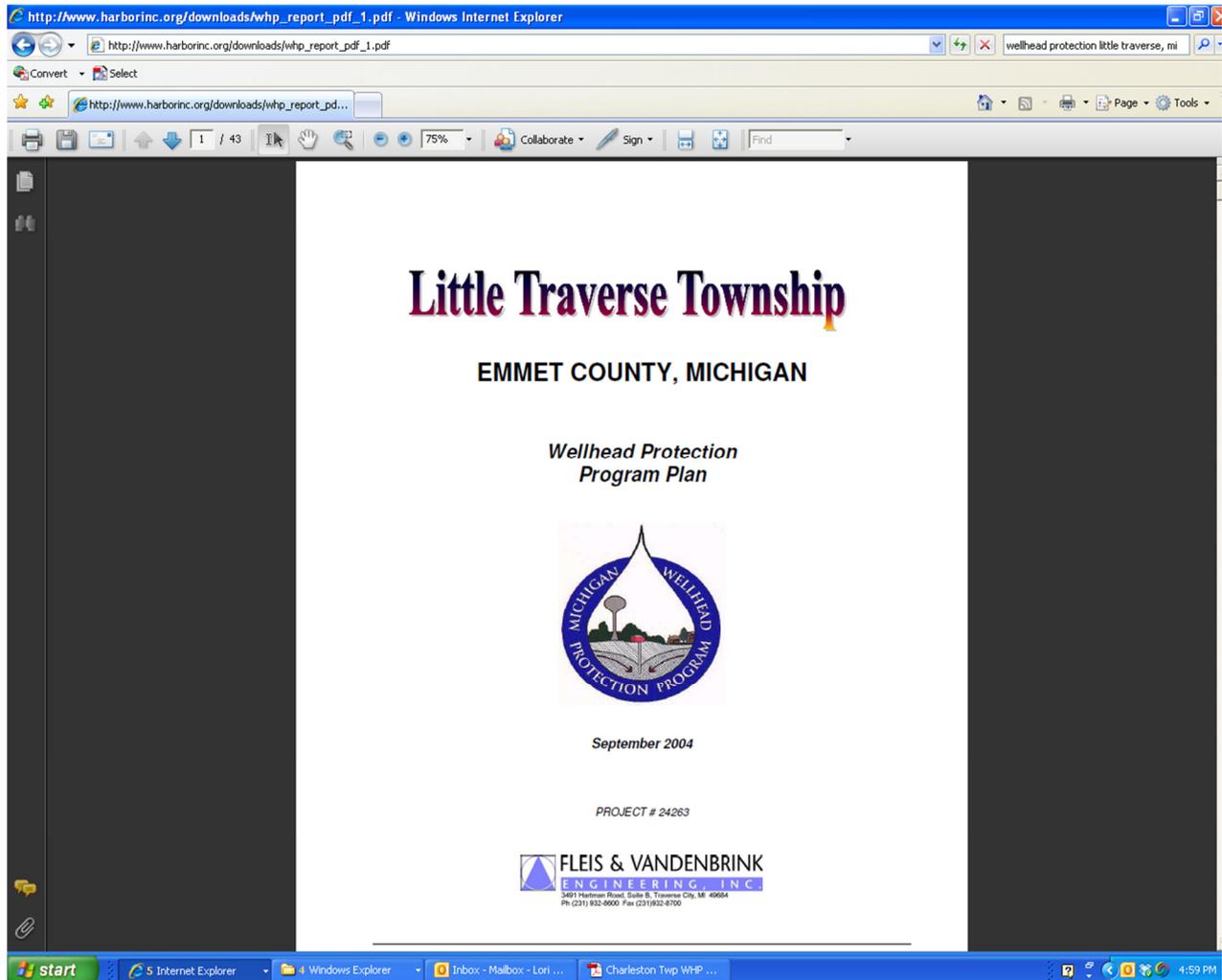
Wellhead Protection in the Harbor Springs Little Traverse Township Area

October 18, 2005

*Brian L. Rice, P.E. – Fleis & VandenBrink Engineering
Erik A. Johnson, P.E., C.P.G. – Fleis & VandenBrink Engineering*



Wellhead Protection Program Plan available online





No tote?

Call Emmet County
Recycling at 348-0640

We'll bring you one FREE!

- New to curbside recycling?
- Need a replacement tote due to loss, theft, damage, or a move?

Give us a call. We'll deliver your new tote to your door within a week. The tote is FREE and curbside recycling service is provided by your community* at no additional cost to you.



Emmet County
Recycling

*Some restrictions apply. Call for details.

\$100 or
more!



Not recycling?
You're wasting \$100*
a year or more.

Recycle for **FREE**
and **SAVE!**



Emmet County
Recycling

www.EmmetRecycling.org
348-0640

*Estimate based on a two-person household generating the national average (4# of garbage/day), paying \$2/bag for garbage disposal, and recycling curbside materials only.



Emmet County

Recycling Guide



Recycle Your Cartons!

Did you know you can recycle paper cartons in your Container bins? You can! Cartons—for example milk cartons and juice boxes—were added to the Emmet County Recycling program last year as part of the “Recycle More, Sort Less” system.

The cartons you recycle supply Great Lakes Tissue (GLT) in Cheboygan (in the former Proctor and Gamble plant on Main Street). GLT makes them into products like paper towels and napkins.

In addition to cartons, Great Lakes Tissue can use paper cups and other similar containers like paper ice cream tubs, so you can recycle those too!

Want to “close the loop,” by buying and using their products? Great Lakes Tissue products are available locally at the KSS Enterprises showroom at 2861 US 31 N (between Petoskey and Alanson).

Recycle more, sort less

Drop Site and Curbside

Mixed Containers

Juice boxes, milk cartons and paper cups

- Please rinse and flatten.
- NO juice pouches or straws



Plastic bottles, jugs and jars

- All numbers: #1, #2, #3, #4, #5, #6, and #7
- NO Styrofoam
- NO motor oil jugs
- Please rinse and flatten.
There's no need to remove labels.
- NO toys, buckets, or durable dishes
- NO "biodegradable" or corn-based plastics (PLA)
- NO plastic bags. They belong with your Paper, Boxes and Bags.



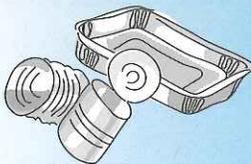
Plastic tubs, trays and cups

- All numbers: #1, #2, #3, #4, #5, #6, and #7
- NO Styrofoam
- Please rinse and flatten.
There's no need to remove labels.
- NO durable dishes, wash tubs, buckets, etc.
- NO "biodegradable" or corn-based plastics (PLA)
- NO plastic bags. They belong with your Paper, Boxes and Bags.



Metal cans, foil and trays

- Metal lids are okay.
- Aluminum, steel and tin
- Please rinse and flatten.
- NO aerosol cans or propane tanks



Glass bottles and jars

- Clear, green, brown, and blue
- Please rinse.
There's no need to remove labels.
- NO light bulbs, window glass, or glass dishes



Paper, Boxes and Bags

Cardboard and paper bags

- Boxes from frozen and refrigerated foods are okay.
- Boxboard—like cereal boxes and paper towel cores—is okay.
- Please remove packing materials and flatten.
- NO Styrofoam
- NO pet food bags
- Accepted at all drop sites.
- Curbside Only: Cardboard must fit entirely in your green tote.
- NO loose plastic bags. Please stuff all plastic bags into one bag and tie it shut.



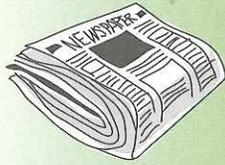
Plastic grocery and bread bags

- Stretchy bags only
- Clean, dry bags only
- Please put all of the bags into one bag and tie it shut.
- Shrink wrap—like around rolls of paper towels and cases of water bottles—is okay.
- NO cling wrap (*used to wrap food and cover dishes*)
- NO cereal box liners
- NO "crunchy" plastics—cellophane, pretzel bags, potato chip bags, etc.



Newspapers and inserts

- NO newspapers which have gotten wet and/or yellowed



Magazines, catalogs and books

- Hardcover, paperback, and phone books are okay.



Office paper

- Accepted at all drop sites
- Junk mail and envelopes
- Copy paper, writing paper, and file folders
- Shredded paper, too
Please put it in a transparent bag.
- NO construction paper or dark or bright copy paper
- NO padded, plastic, or Kraft (*gold paper*) envelopes



There's no need to remove

- rubber bands
- paper clips
- plastic windows from envelopes
- stickers
- sticky notes
- mailing labels
- staples
- tape

Still not sure
if it's recyclable?

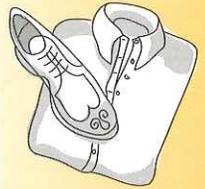
Visit us at
www.EmmetRecycling.org
or call 231-348-0640



Recycle even more—at the Drop-off Center

Clothing and bedding

- Clean and dry only, please.
- **FREE**



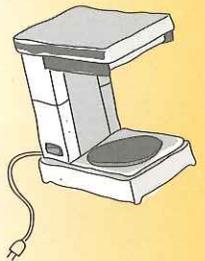
Shoes and work boots

- Please rubber band in pairs.
- **FREE**

Small appliances

(also see *Electronics*)

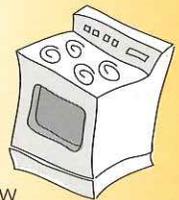
- Please throw away removable parts not made of plastic or metal—vacuum cleaner bags, glass carafes, wicks, microwave turntables, etc.
- **FREE**



Large appliances

(also see *Electronics*)

- \$5 per item handling fee
- Refrigerator, freezer, air conditioner or dehumidifier: If not tagged by a certified technician—as required by law before recycling or disposal—add \$25.



Electronics

ALL FREE* ALL THE TIME!

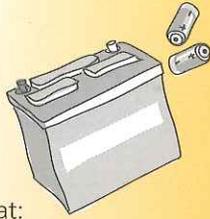
- All electronics from households and businesses with under ten employees are now accepted for **FREE!** Limit seven items per day.



* Businesses with over ten employees, please call for fee information.

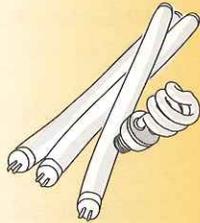
Batteries

- All kinds of vehicle and household batteries are **accepted at the Drop-off Center.**
- Household batteries may also be dropped off during business hours at:
 - Alanson**—W.W. Fairbairn & Sons
 - Harbor Springs**—Meyer Hardware & Preston Feather Building Center
 - Mackinaw City**—Coffman Hardware and the Village Hall
 - Pellston**—Cook's Hardware
 - Petoskey**—Fotchmann's CarQuest, Meyer Ace Hardware, and Radio Shack
- Batteries from home use **FREE**
Businesses \$1 per pound



Fluorescent light bulbs

- Compact fluorescent bulbs okay
- NO broken bulbs
- NO incandescent (*ordinary*) or halogen bulbs
- Bulbs from home use **FREE**
Businesses: please call 231-348-0640 for rates.



Tires

- On-the-rim is okay.
- \$2.⁵⁰ each for car and light truck tires
- Bike tires 4 for \$2.⁵⁰
- Call for other tire prices.



Motor oil plus

- Hydraulic fluid, fuel oil, automatic transmission fluid, lube oils, and diesel fuel are okay.
- NO gasoline or contaminated oil (*e.g., oil with gas or water*) To dispose of these call the Household Chemical Drop-off Program at 231-348-0660.
- **FREE**



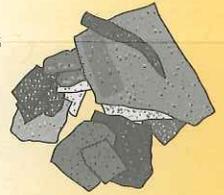
Antifreeze

- Both ethylene and propylene glycol-based products
- **FREE**



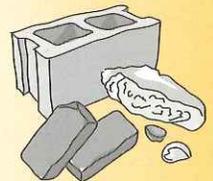
Asphalt shingles

- Can include nails, tar paper, and felt
- Shingles must be from a home. If from apartments or condominiums there must be 4 units or fewer in the building.
- Accepted seasonally from April 1 to November 1
- NO cedar shakes, roll roofing, roofing tiles or drip edge
- **SAVE!** \$10/cubic yard to recycle, \$22 to landfill



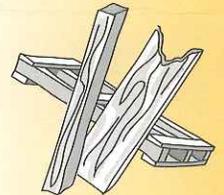
Rubble and ceramic fixtures

- Rocks, bricks, concrete, asphalt, ceramics and porcelain including toilets, sinks and bathtubs
- Rebar and wire mesh are okay.
- Please remove seats, faucets, etc. from plumbing fixtures.
- NO lead paint or asbestos
- **SAVE!** \$10/cubic yard to recycle, \$22 to landfill



Wood

- NO treated wood, plywood, or particle board
- Nails are okay.
- **SAVE!** \$10/cubic yard to recycle, \$22 to landfill



Scrap metal

- Steel, aluminum, copper, cast iron, and other metals
- NO propane tanks
- NO vehicle tanks
- **FREE**



Where to Recycle

The Drop-off Center

In addition to Paper, Boxes and Bags and Containers, you can recycle all of the materials on pages 3 & 4 here. *See article on back page.*

Harbor Springs
7363 Pleasantview Road
Open 8-4 weekdays, 8-3 Saturdays. *(Except major holidays)*

The Drop Sites

These Drop Sites are open 24/7 and accept Paper, Boxes and Bags and Containers. For a map showing the locations visit www.EmmetRecycling.org.

Alanson Area

Off Milton Avenue, in the Village
Public Works Yard

NEW!

Petoskey News-Review

In their parking lot at the corner of Howard
and Michigan Streets

Cross Village

Off Levering Road on Oak Drive, next to
the Firehouse

Petoskey South

Behind Dunham's in Bay Mall

Glen's North

In Glen's Plaza, at the west end near the
coin laundry

Robinson Road

Across from Jurek's Market

Harbor Springs Area

In the parking lot at the Harbor Springs IGA

Springvale Township

Behind the Township Hall off Mitchell Road

Mackinaw City

Behind the Schools and the Recreation
Complex, where Perrot Street meets Pond

State Road

At the Readmond Township Hall, just
off State Road on Wormwood Road

Pellston

At the corner of State Street and Zipf

Toski-Sands

Behind Toski-Sands Plaza on M-119

LIDS FOR SALE

*To fit the four-handled
recycling bins. \$3 each at
the Drop-off Center and the
County Building.*

Curbside Convenience

Curbside collection of recyclables is available FREE to most residents of the following:

Bear Creek Township

Little Traverse Township

Resort Township

Harbor Springs

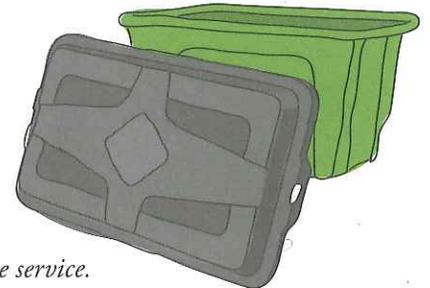
Petoskey

Bay Harbor

Bay View

**If you live in one of these communities,
but don't have 2 totes, call 348-0640.
We'll deliver to you within a week.**

For a low annual fee, businesses in these communities can also use the service.



This newsletter is printed on 100% post-consumer recycled paper.

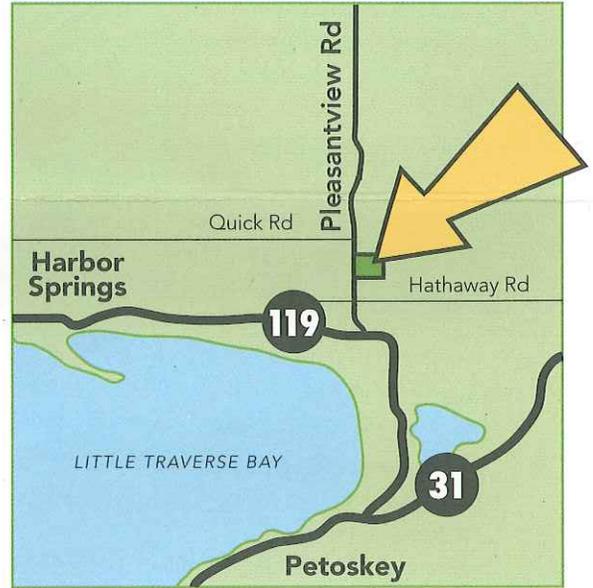
The Drop-off Center

Garbage, Recycling, Yard Waste

You can drop everything (*almost*) at the Center:

- Garbage for transfer to a landfill
- Yard waste to be composted
- Recyclables: Paper, Boxes and Bags and Containers
- More unusual materials to be recycled: tires, construction and demolition materials, hazardous recyclables, clothes and shoes.
(See pages 3 & 4 for details.)

Center personnel prepare the recyclables for transport to the factories that use them.



Open

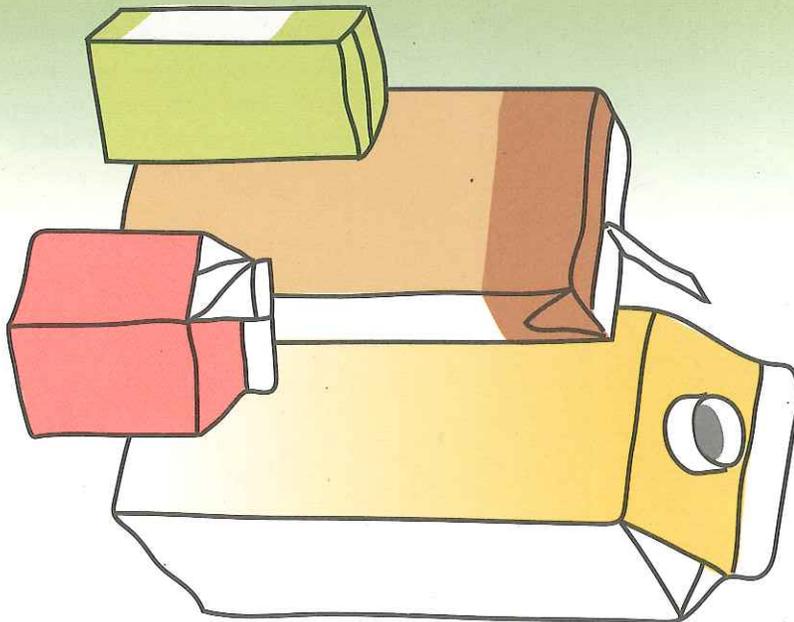
8 AM - 4 PM weekdays
8 AM - 3 PM Saturdays
except major holidays

7363 Pleasantview Rd
Harbor Springs, MI
231-526-2031 x3

www.EmmetRecycling.org
231-348-0640

*Emmet County Department of Public Works
200 Division Street, Suite G-76 Petoskey, MI 49770*

Recycle Your
Cartons!



Emmet County
Recycling
Guide



RAISING PUBLIC AWARENESS ABOUT GROUNDWATER PROTECTION THROUGH COMMUNITY-BASED INFORMATION & EDUCATION



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
RUSSELL J. HARDING, DIRECTOR

JANUARY 1997

LOCAL LEADERSHIP FOR GROUNDWATER PROTECTION

Groundwater protection at the local level can have a powerful effect when the entire community joins together to reduce hazards. Leadership to develop education, public information, and regulatory programs to address local needs is essential for a sustainable future.

COMMUNITIES THROUGHOUT MICHIGAN HAVE TAKEN STEPS TO PROTECT GROUNDWATER

- Genoa Township (Livingston County) and Springfield Township (Oakland County) were among the first communities to adopt groundwater protection policies and amend site plan review standards to include groundwater quality concerns.
- Oxford Village (Oakland County) used zoning and right-to-know inspections (carried out by the fire department) to reduce groundwater threats to the public water supply system.
- The City of Parchment and Cooper Township (Kalamazoo County) jointly developed a wellhead protection program and coordinated regulatory program.
- The City of Novi (Oakland County) through the fire marshal, administers a Hazardous Substance Ordinance which applies to new and existing businesses.
- Manistee County initiated a cooperative groundwater protection planning process with municipalities. Site plan review standards and overlay districts for wellhead protection are two of the zoning approaches being considered by individual municipalities.

For additional examples of local planning, education, wellhead protection, and groundwater protection programs, contact the MDEQ Office of Groundwater Planning and Special Services: 517/373-0014.

STEPS FOR EDUCATION PROGRAM DEVELOPMENT

Step #1: Organize a groundwater protection team to develop and help implement a public awareness campaign. Invite representatives from neighboring communities to participate. Make the group as diverse as possible by including business representatives, civic groups, environmental groups, teachers, fire department, planning commission, etc.

Step #2: Identify land uses and activities (existing and potential new development) which are potential sources of groundwater contamination. Ask questions and research answers. Take advantage of state, county, and university expertise.

Step #3: Identify options and opportunities for communicating with selected groups and the community as a whole. Search for ways to define the economic and communitywide importance of clean groundwater.

Step #4: Assess community resources and ways to connect groundwater protection with other ongoing activities such as economic development, household recycling/waste disposal, fire department right-to-know surveys, household hazardous waste collection programs, etc. Look for opportunities to add groundwater references into existing programs.

Step #5: Identify activities which will raise awareness about groundwater protection needs in the community. Assign responsibilities for carrying out the steps.

Step #6: Track progress and publicize successes. Give recognition and thanks to citizens, businesses, and organizations which take the lead with groundwater protection.



GROUNDWATER PROTECTION

PUBLIC INFORMATION METHODS

- Library displays.
- Cable television shows.
- Portable table display and outreach at community events.
- Articles for the local newspaper.
- Fact sheets prepared for businesses — with emphasis on low-cost ways to fill floor drains, provide secondary containment for hazardous substances, etc.
- Community newsletters.
- School science fair projects focusing on groundwater flows and groundwater protection.
- Public information reminders with the water bill.
- Information rack using fact sheets and flyers from various government agencies.
- Home lawn demonstration project.

EXAMPLES OF PRIVATE SECTOR PARTICIPATION AND SUPPORT

- Septic system service provides cost reduction for pumpouts during a specified time period.
- Well driller helps residents understand how they can safely fill and close out-of-service wells.
- Chamber of Commerce sponsors waste reduction seminars and/or awards.
- Business representatives participate in citizen advisory committee.

GROUNDWATER GUARDIAN: BUILDING TOWARD RESULTS

The Groundwater Foundation based in Nebraska, in cooperation with a group of Michigan-based advisors, invites local governments to "sign up" to become Groundwater Guardian Communities.



To achieve Groundwater Guardian status, a community must: (1) form a local Groundwater Guardian Team; (2) submit an annual entry; (3) work with community leaders to develop and implement "Result Oriented Activities," and (4) submit a progress report.



The Groundwater Guardian Team is the first and most important step for a program. The team must be organized before the community can enter the program, and should include representatives from the following sectors: (1) citizen organizations; (2) business and agriculture; (3) education; and (4) government. Each team is responsible for planning and carrying out three "result oriented" activities.

For further information about the Groundwater Guardian Program, contact Christine Spitzley, c/o Tri-County Regional Planning Commission, Lansing, 517/393-0342, or The Groundwater Foundation, PO Box 22558, Lincoln, Nebraska 68542; 1-800-858-4844.

Pursuant to Act 451 of 1994, as amended, total number of copies printed: 1,000; total cost: \$48.00; cost per copy: \$.048.

MICHIGAN GROUNDWATER PROTECTION STRATEGY GOALS

1. Protect public health and environment by preventing future degradation of groundwater and restoring to productive use groundwater that has already been contaminated;
2. Manage and protect groundwater as part of overall water management, recognizing the interrelationship between groundwater and surface water; and
3. Create a cooperative management environment for all levels of government, business and industry, and citizen organizations which encourages and rewards groundwater protection.



Office of Groundwater Planning and Special Services
Michigan Department of Environmental Quality
P.O. Box 30473
Lansing, MI 48909
Telephone: (517) 373-0014



HOUSEHOLD HAZARDOUS WASTE

HAZARDOUS WASTE IN MY HOME?

While much concern about hazardous waste has fallen on manufacturers, your own household may contain about 30 pounds of hazardous substances.

WHAT IS A HAZARDOUS WASTE?

There are four categories of hazardous substances; POISONS like pesticides, FLAMMABLE substances like gasoline and solvents, CORROSIVE chemicals like acids or drain cleaners, REACTIVE substances that may explode or cause a fire when they come in contact with another chemical.

HOW DO YOU DISPOSE OF YOUR HAZARDOUS WASTE?

Many insecticides, weed killers, automotive and cleaning products, paints and hobby supplies contain hazardous chemicals that can cause problems if used improperly and when the need for disposal arises. Dumping these chemicals on the ground, in the trash or down the drain may present a health hazard to you, your family, neighbors, and sanitation workers. The information provided on the inside of this pamphlet is a guide to the best disposal practices for common products. If you have questions on a particular product contact one of the references.

PREVENTION IS THE BEST SOLUTION

You can minimize the need for special disposal and the health hazard of having these chemicals around the house by following these guidelines:

- * Read the product label before buying.
- * Use a non-hazardous substitute product when possible. This may save you money and protect the environment. (Exp. vinegar for a cleaning solution)
- * Don't buy more hazardous products than you need. Why buy a gallon when a quart will do.
- * Use the product up but don't over apply. Read the directions on the label and if you have leftovers see if a friend can use it.

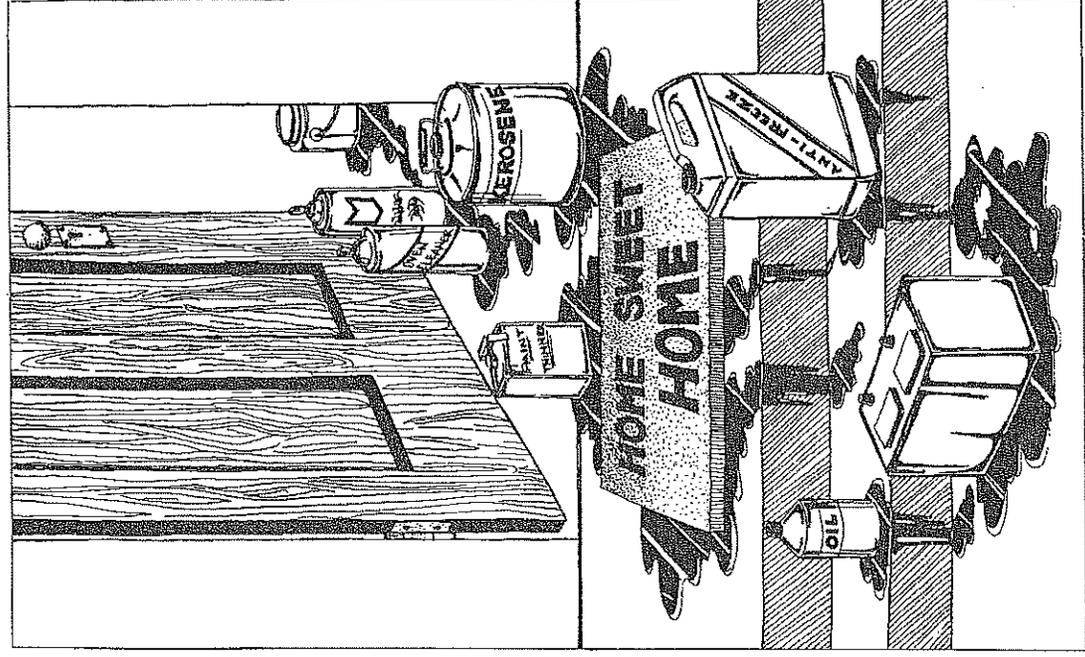
If you have questions call one of the references listed below.

Your local Health Department or County Cooperative Extension Service

D.N.R. Office of Waste Management
517/373-2730

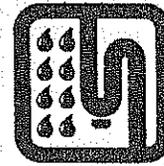
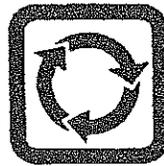
Center for Environmental Toxicology
517/353-6469

Center for Environmental Health Science
517/335-8350



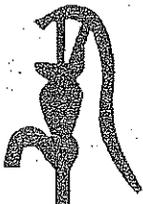


MANAGING HOUSEHOLD HAZARDOUS WASTES



| TYPE OF WASTE | RECYCLE THE WASTE Contact one of the references listed. | HOUSEHOLD HAZARDOUS COLLECTION PROGRAM Contact one of the references listed. | FLUSH DOWN DRAIN Use plenty of water. | PLACE IN TRASH Special handling may be required* or Follow Label Disposal Instructions |
|---|--|---|--|---|
| Aerosol cans: empty | NO | NO | NO | YES |
| full or partially full | NO | YES | NO | NO |
| Automotive products: oil, brake fluid, transmission fluid | YES | NO | NO | * |
| Antifreeze: small amounts | NO | NO | NO | YES |
| large amounts | NO | YES | NO | NO |
| Caustics: oven cleaner, drain cleaner, bleach | NO | YES | * | * |
| Cosmetics: nail polish, nail polish remover, perfume, after shave | NO | NO | NO | * |
| Flammables: acetone, alcohol, gasoline, lacquer, paint thinner | NO | YES | NO | NO |
| Oils: kerosene, heating oil | YES | NO | NO | NO |
| Pesticides | NO | YES | NO | * |
| Pesticides containers (empty) | NO | NO | NO | * |
| Paints: oil based or lead | * | YES | NO | NO |
| latex | * | NO | NO | SOLIDIFY |
| Medications | NO | NO | YES | * |

* Follow label instructions for use and disposal / Use up for intended purpose / Solidify liquids using sawdust or commercial absorbant.



ABANDONED WELLS AND CISTERNS: ELIMINATING AN UNNECESSARY RISK



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
RUSSELL J. HARDING, DIRECTOR

JANUARY 1997

PROTECTING MICHIGAN'S WATER RESOURCES

HAZARDS FROM ABANDONED WELLS AND CISTERNS

Abandoned wells, old dug wells, and cisterns are found throughout Michigan — especially in older communities and on farms. Abandoned wells pose health and safety hazards:

- People (especially children) and small animals may fall into open wells and be injured or killed. Large-diameter hand dug wells and cisterns are particularly a concern.
- Unsealed abandoned wells are routes for groundwater contamination. Runoff water carrying bacteria, sediment, fertilizer, pesticides and other chemicals may flow directly into the groundwater. The direct flow bypasses the natural filtering and degradation processes that take place when runoff infiltrates the soil.
- Abandoned wells may allow contaminated water to move between two aquifers.
- Open wells may be accidentally or intentionally used as waste disposal pits.

WHAT IS AN ABANDONED WELL?

Wells that are no longer in use or that are in such disrepair that they do not yield groundwater are called "abandoned wells." Wells that are contaminated and will no longer be utilized are also classified as abandoned wells.

Usually the term "abandoned well" refers to small-diameter drilled wells which were once used as a source of drinking water or water for lawns.

Hand-dug wells and cisterns are also called abandoned wells but are different in structure and do not have a standard well casing pipe. Dug wells are often 2 - 6 feet in diameter and between 10 - 30 feet deep. Such wells may be lined with brick, field stone, or cement corks.

Hand-dug wells may have been originally constructed as a source of drinking water. Such wells were also used as cisterns to store rainwater. Originally hand-dug wells and cisterns were an important asset to property — now they are a liability.

IDENTIFYING ABANDONED WELL LOCATIONS

Local governments and citizen organizations can help protect groundwater by searching for and mapping abandoned well locations. Finding abandoned wells often requires a deliberate, highly-visible effort. Communitywide publicity through newspaper articles or public meetings helps to raise awareness and initiate action.

Potential tragedies can be avoided simply by plugging abandoned wells and packing impermeable material from the bottom to the top.

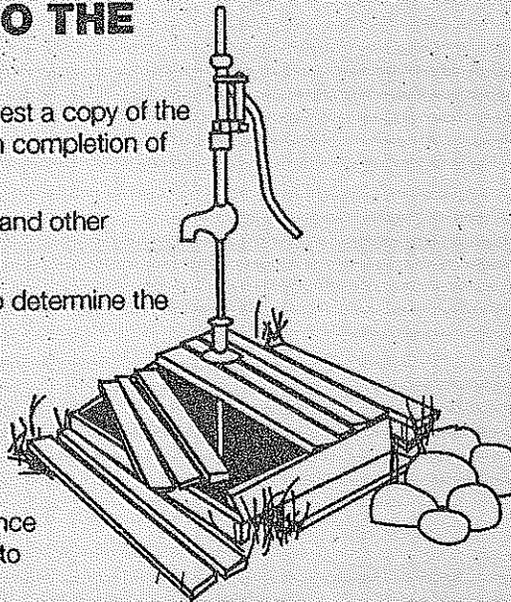
Materials used for plugging abandoned wells include impermeable swelling bentonite clay, neat cement (Portland cement and water), or concrete grout (Portland cement, sand, and water). For further information, refer to the Michigan Water Well Construction and Pump Installation Code or MSU extension Bulletin WQ 40.

Seek professional assistance from a well driller for the following types of wells:

- Drilled wells
- Flowing wells
- Wells greater than 100 feet deep
- Wells where water is seeping from around the casing
- Wells which produce gas
- Wells where pumping equipment is difficult to remove.

PROCEDURES COMMON TO THE PLUGGING OF ALL WELLS

1. Contact your local health department and request a copy of the well log — a record filed by the well driller upon completion of the well (required by state law since 1967).
2. Remove all pumping equipment, pipes, debris and other obstructions from the well.
3. Measure the well depth and casing diameter to determine the volume of plugging material needed.
4. Plug the well following procedures from the Michigan Water Well Construction and Pump Installation Code.
5. Remove or cut off the well casing at least 4 feet below ground level to eliminate interference with future site use. It is usually not necessary to remove the entire casing.
6. Mound and compact low-permeability soil over the plugged well to prevent ponding of surface water.
7. Contact the local health department to obtain the abandoned well reporting form required by state law. File a copy of the plugging report with the property deed.



CAN I PLUG THE WELL MYSELF?

Two types of wells can often be successfully plugged by well owners with a minimum of special equipment: (1) driven wells (pointed well screen attached to a steel pipe, less than 30 feet deep); and (2) large-diameter dug wells and cisterns.

Costs range from \$25 to \$150 or more, depending on the well depth, casing diameter, amount of plugging material used, and other factors. Before attempting to plug the well yourself, review state well plugging regulations and make sure that you understand all steps. It is costly to correct mistakes since the defective plug must be drilled out.

Dug wells and cisterns can be plugged by placing alternating layers of clean soil (not more than 10 feet thick) with layers of bentonite chips or pellets (at least 6 inches thick). The upper four feet of concrete crock, stone, or brick should be removed. After the top layer of bentonite chips or pellets has been placed, water should be added to expand the bentonite. The surface layer of soil should be mounded slightly at the top and compacted to help offset settling and drain water away from the site. For complete instructions, please refer to the Michigan Water Well Construction and Pump Installation Code and MSU Extension Bulletin WQ 40.

FOR FURTHER INFORMATION:

For information about state regulations and well abandonment procedures: contact Mr. Mike Gaber, Well Construction Unit, Michigan Department of Environmental Quality: 517/335-8304. Technical references, including MSU Bulletin WQ 40 and a public information video are available.

To locate a well drilling contractor near you: Check the telephone directory yellow pages under Water Well Drilling & Service; contact the Michigan Groundwater Association (formerly the Michigan Well Drillers' Association) at 313/428-0020; or call your local health department.

TECHNICAL REFERENCES:

1. "Plugging Abandoned Wells," Michigan State University Extension, Water Quality Series Bulletin WQ 40, February 1993, available through County MSU Extension offices; and
2. "Well Decommissioning for Groundwater Protection," Michigan Department of Agriculture, Groundwater Stewardship Program, Draft, August 1996. For copies, telephone: 517/335-6528.

MICHIGAN GROUNDWATER PROTECTION STRATEGY GOALS

1. Protect public health and environment by preventing future degradation of groundwater and restoring to productive use groundwater that has already been contaminated.
2. Manage and protect groundwater as part of overall water management, recognizing the interrelationship between groundwater and surface water; and
3. Create a cooperative management environment for all levels of government, business and industry, and citizen organizations which encourages and rewards groundwater protection.



Office of Groundwater Planning
and Special Services
Michigan Department of
Environmental Quality
P.O. Box 30473
Lansing, MI 48909
Telephone: (517) 373-0014

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How To Locate Abandoned Wells

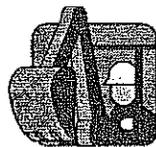
Authority: Part 127, 1978 PA 368



RECORDS SEARCH

Before beginning the physical search of the property, you may find the following sources useful:

- Water Well and Pump Record or Abandoned Well Plugging Record at the local health departments.
- Water well or sewage disposal permits at local health department.
- City, township, or county officials – zoning or building permits.
- Municipal water department - records on water line extensions to homes previously served by water wells.
- Old photographs of the property.
- Aerial photographs of the property (showing windmills, well houses).
- Owner's records (bills, receipts, deed easements) or information written on pressure tank, pump control box, etc.



EQUIPMENT AND TOOLS

- Metal detector.
- Tape measure or "snake" to follow pipes out through walls.
- Digging equipment including shovels, hammers, chisels, backhoe.
- Magnetometer or electro-magnetic anomaly detectors (these are available through ground water consultants).



YOU FOUND IT, NOW WHAT?

To ensure proper plugging of the abandoned well, the following steps need to be taken:

1. Pumps, drop pipes, pump rods, packers, wire, check valves, and all other debris or obstructions must be removed from the well before plugging. Registered well drilling contractors have the knowledge and proper equipment to perform this important task.
2. The well diameter, depth, and site geology need to be determined. Different well types and different geologic formations have different well plugging requirements. Check the state code for further details.
3. Hire a registered water well drilling contractor to plug the well. While state law allows landowners to plug abandoned wells, the Michigan Department of Environmental Quality (MDEQ) advises against it and recommends that only registered well drilling contractors plug wells.
4. Complete an Abandoned Well Plugging Record and submit it to the local health department and to the DEQ. The well owner should attach a copy of the record to the deed for future reference.

FOR ASSISTANCE

Contact your local health department or the Department of Environmental Quality, Abandoned Well Management Program.

Michigan Department of Environmental Quality
Drinking Water and Radiological Protection Division
Ground Water Supply Section
3423 N. Martin Luther King Jr. Boulevard
PO Box 30630

Lansing, MI 48909-8130

Phone: 517/335-8857

Fax: 517/335-9434

Internet: www.deq.state.mi.us

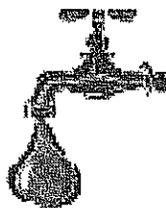
Environmental Assistance Center: 1-800-662-9278

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 Michigan Department of Environmental Quality

State of Michigan
John Engler, Governor

Department of Environmental Quality
Russell J. Harding, Director

How To Locate Abandoned Wells



FACT SHEET

Michigan Department of Environmental Quality
Drinking Water and Radiological Protection Division
Ground Water Supply Section



WHERE TO BEGIN

Abandoned wells that have not been plugged can be a safety hazard and an environmental threat. They serve as a direct conduit for contamination from the ground surface down into the drinking water. Landowners are obligated by state law to plug abandoned wells, but finding them can be a challenge in some cases. Your property may contain more than one abandoned well. Generally, there is one abandoned well per generation that the property has been occupied. Some abandoned wells are obvious because they stick above ground, above a basement floor, or a hand pump or a windmill remains attached to the well. Others terminate below ground, within structures known as well pits. A "well-trained-eye" can pick out signs of these structures. Many older abandoned wells were buried below the frost line (greater than 4 feet). Finding them requires metal detectors or other sophisticated electronic instruments followed by excavation. Some abandoned wells are under buildings or roadways and may never be found. When searching for abandoned wells, a landowner must take on the role of an investigator.

DID YOU KNOW ...

There are over one million abandoned wells in Michigan!



PHYSICAL EVIDENCE

- Windmills or handpumps.
- Casing (steel or plastic) visible above ground, concrete slab, or basement floor.
- Small outbuildings (may be well house).
- Pit in yard or basement.
- Basement offset (small room off of basement).
- Crock, brick, or stone structures.
- Manhole cover.
- Water system components (pressure tank, pump, control box).
- Waterline or patched hole through basement floor or wall.
- Circular ring in cement or patch in the floor.
- Patch in step or concrete (access for well below).
- Damp circular depression in yard.
- Additions, false walls, access panels which may "hide" well.
- Old building sites recognizable by an old foundation.
- Ornamental shrubs, flowers, or trees outlining old, home or farm sites.



TALK TO INDIVIDUALS

However, if there are no obvious clues to lead you to an abandoned well, talking to others may help. Here are some suggestions:

- Previous owner(s).
- Relatives or acquaintances who may know about the property.
- Neighbors (neighboring wells may give a clue as well location, depth, etc.).
- Contractors (well drillers, plumbers, builders) who have worked on the property or in the area.
- Inspectors (well, plumbing, building, septic system).
- Current or former employees or maintenance personnel.



POLLUTION PREVENTION AT SMALL COMMERCIAL & INDUSTRIAL FACILITIES



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
JOHN ENGLER, GOVERNOR RUSSELL J. HARDING, DIRECTOR

JANUARY 1998

SMALL BUSINESSES AND ENVIRONMENTAL CONTAMINATION

As of September 1996, 2600 sites of environmental contamination and over 6500 leaking underground storage tank sites were identified on Michigan's inventory lists. About 20% - 25% of the environmental contamination sites and about 90% of the leaking underground storage tank sites involve small businesses.

Hazardous substances which are of concern include materials such as fuels, oils, degreasers, acids, reactive materials, and toxic chemicals. These materials can reach

groundwater through floor drains, septic systems, stormwater runoff, and leaking tanks and pipelines - as well as by direct spills.

Many of these pathways to groundwater can be eliminated or blocked through common-sense management practices. Local governments, county health departments, nonprofit organizations, and state agency representatives are working together to alert and inform small businesses about potential hazards, environmental impacts, and costs.

LAND USES AND HAZARDOUS SUBSTANCES

A wide range of businesses use hazardous substances in their daily operations and may pose threats to groundwater quality. The types of businesses listed below are examples of operations that typically use fuels, degreasers, oils, acids, and other hazardous substances:

- Automotive sales and service
- Vehicle maintenance garages — public and private
- Gasoline service stations
- Manufacturing firms which use solvents or other chemicals
- Transportation terminals
- Airport operations
- Furniture repair and refinishing
- Laundries and dry cleaners
- Laboratories
- Metal products
- Warehouse operations for paints, solvents, and chemicals
- Junk yards; salvage yards; resale/refinishing shops
- Food processing and food products
- Lawn care businesses; pest control
- Lumber and wood production
- Auto body and repair shops
- Apparel and textile products
- Printing and publishing; silkscreening
- Stone, clay, and glass products
- Other manufacturing which uses solvents and oils
- Chemicals and paint manufacturing
- Petroleum and coal product storage
- Power washing for buildings
- Electronic and other electrical equipment
- Engine and electrical repair
- Paper and allied products
- Fuel oil dealers
- Pest control services
- Leather processing

UNDERGROUND STORAGE TANKS AND PIPING

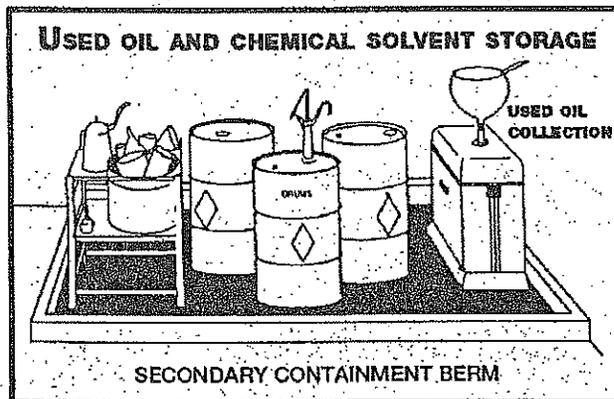
Underground storage tanks, whether new or old, can pose a risk to groundwater. Secondary containment (such as double-walled tanks) and other groundwater protection measures are good investments and may be required by state regulations.

SECONDARY CONTAINMENT FOR ABOVEGROUND STORAGE OF HAZARDOUS SUBSTANCES

Secondary containment is a second barrier or an outer wall of a double enclosure which will contain any leak or spill from a storage container. Depending on the type of facility and substance stored, secondary containment may be required. Businesses and public agency facility managers should review regulatory requirements carefully before completing site plans.

Secondary containment structures vary in design and cost. Options include small sheds (with proper ventilation), drum holding areas with berms and impervious floors, double-walled tanks, and solvent storage rooms without floor drains.

Two common construction materials for outdoor secondary containment areas are (1) poured concrete; and (2) block-type structures using re-bar, in combination with grouting to enhance strength. Concrete block is low-cost and may be adequate inside buildings. Concrete block is rarely recommended for outdoor locations, however, because it can easily crack and doesn't weather well. Sealants or liners should be used with concrete block to assure proper containment. Other materials used for secondary containment include metal, fiberglass, and other plastics.

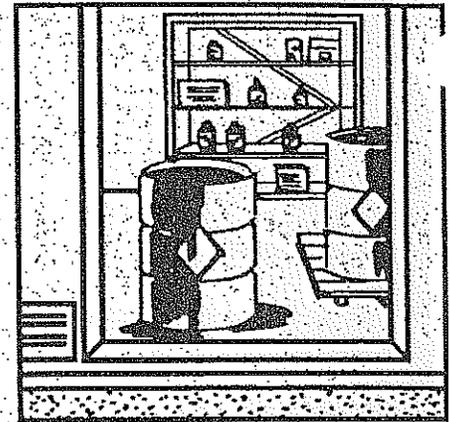


Source: Clinton River Watershed Council, modified by MDEQ

The following publications from Waste Management Division, Michigan Department of Environmental Quality provide additional information:

1. Waste Management Guidance, "Secondary Containment", Sept. 1997 (6 pp.)
2. "Guide to Understanding Secondary Containment Requirements in Michigan", (31 pp.)

Telephone 517-335-6610 (Lansing office, MDEQ Waste Management Division) for free copies. Waste management guidance documents concerning used oil and spent filters, antifreeze, and small quantity hazardous waste management are also available.



Indoor storage room for hazardous substances.

INDOOR STORAGE AND USE AREAS

From a groundwater protection standpoint, indoor storage of hazardous substances is usually preferable to outdoor storage. Indoor storage avoids weathering of containers, direct spills to the ground, and the accumulation of precipitation.

An interior room which serves as a secondary containment area is a logical, low-cost approach to safe storage. Examples include:

- Turning a work room into a secondary containment room by blocking general purpose floor drains.
- Using a cutoff room with a "silltype" entrance. (The room is "cut off" from the main building by a fire-rated wall).
- Creating a permanent secondary containment area within a larger work room by building a berm around existing tanks or a drum storage area.

Note: Indoor storage may increase fire hazards! Fire safety and environmental protection regulations should be reviewed before indoor secondary containment facilities are designed.

GROUNDWATER HAZARDS FROM FLOOR DRAINS

The risk of soil and groundwater contamination due to improper floor drains is substantial. When wastewater and washwater carrying solvents, oils, and other pollutants are washed into the ground, concentrations of pollutants can build up. Very small amounts of contaminants can pollute large amounts of groundwater.

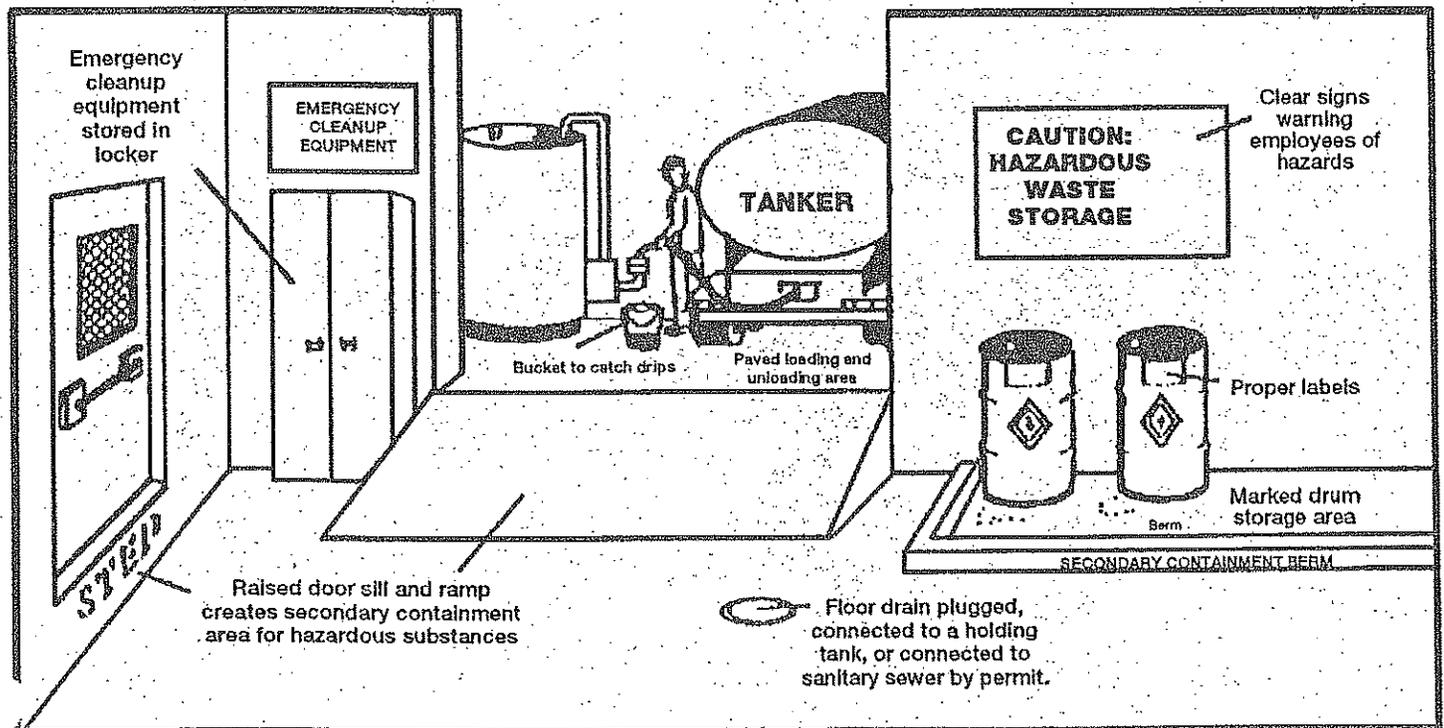
An estimated 5,000 - 6,000 facilities in Michigan have improper floor drains discharging to the ground or groundwater. General purpose floor drains should not be connected to septic systems, dry wells, streams, ditches, or the ground.

According to Michigan laws and regulations, businesses and government facilities may use general purpose floor drains to dispose of liquid wastes only if one of the following is in place:

1. The floor drain connects to a municipal wastewater treatment plant and approval to discharge has been received from the wastewater treatment plant operator;
2. The floor drain discharges to a closed holding tank from which the wastewater is subsequently collected by a licensed hauler for disposal at an approved facility; or
3. The discharge to ground or surface water is permitted or exempted by the Michigan Department of Environmental Quality under Part 31 of the Natural Resources and Environmental Protection Act (NREPA).

Businesses and government agencies are urged to close off general purpose floor drains in their facilities. Even when a business does not directly discharge wastewater to floor drains, the presence of the drain creates a potential environmental hazard since wastewater or chemicals may be inadvertently poured into the drain.

AN INTERIOR WORK AREA OR STORAGE ROOM CAN BE DESIGNED FOR GROUNDWATER PROTECTION

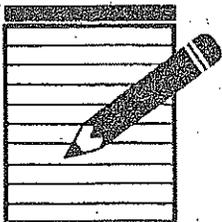


Source: Waste Systems Institute of Michigan, Inc. Modified by Clinton River Watershed Council



HAZARDOUS WASTE REDUCTION CHECKLIST FOR SMALL BUSINESSES

AN INVENTORY AND ASSESSMENT OF A BUSINESS WORKPLACE FOR PURPOSES OF IDENTIFYING WAYS TO REDUCE WASTE AND PREVENT POLLUTION CAN SAVE COSTS AND IMPROVE EFFICIENCIES. MOST IMPORTANTLY, ON-SITE MANAGEMENT BY BUSINESS OWNERS THEMSELVES CAN HELP ASSURE GROUNDWATER PROTECTION FOR THE FUTURE.



INVENTORY OF HAZARDOUS SUBSTANCES AND POLLUTING MATERIALS

- What types of chemicals, hazardous materials, petroleum products, and/or hazardous wastes are used, stored or generated at the facility? (A list should be submitted to the local fire department in accordance with Firefighter Right-to-Know Requirements.)
- What quantities of each type of substances are used, stored, or generated?
- Are containers labeled according to their hazardous characteristics? (e.g., flammable, corrosive, toxic, and/or reactive)
- Are record-keeping procedures in place so that the quantities of hazardous substances entering and leaving the facility are known?
- Are material Safety Data Sheets (MSDSs) kept on file?

PREVENTING GROUNDWATER CONTAMINATION THROUGH SAFE STORAGE AND HANDLING

- Are storage containers sealed and leak-proof? (primary containment)
- Are hazardous substances stored inside or in a structure protected from weather and vandalism? If not, secondary containment will be extremely important.
- Are there locations (such as loading docks or other outdoor locations) where leaks of hazardous substances could reach the ground or groundwater? If yes, secondary containment structures should be provided.
- Do floor drains in general purpose work areas meet one of the following specifications:
 - 1. Connect to a wastewater treatment plant (with permission from the operator)
 - 2. Connect to a closed holding tank (so that wastewater can be safely disposed)
 - 3. Function in accordance with a state groundwater discharge permit (and/or an EPA Class 5 Well permit)
- Are floor drains in work areas blocked so as to prevent the flow of wastewater or hazardous substances into septic systems, dry wells, the ground or groundwater?
- Are drums stored in a designated, curbed location, where they will not be accidentally tipped over or punctured?
- Has a spill prevention plan been prepared? Has a Pollution Incident Prevention Plan (PIPP) been prepared and reviewed with employees?
- Are employees trained to handle hazardous substance emergencies? Are emergency telephone numbers prominently posted? Is a spill cleanup and containment kit available?
- Are drums and storage areas properly labeled?

HAZARDOUS WASTE MANAGEMENT AND DISPOSAL

- Is any hazardous substance or waste (even diluted waste) allowed to enter the sanitary sewer? If yes, permission from the wastewater treatment plant operator should be obtained.
- Is the facility a small quantity generator of hazardous waste? Is the facility a conditionally-exempt generator of hazardous waste?
- If the facility is a regulated generator of hazardous waste, has an EPA identification number been obtained?
- Does the hazardous waste transporter have an EPA identification number?
- Are hazardous waste manifests (shipping papers) retained for at least three years?
- Do you have on file the locations and facilities that will receive the hazardous waste?

RECYCLING AND WASTE REDUCTION

- Are solvents, used oil, antifreeze, automotive batteries, etc. recycled?
- Are there alternative materials which are less hazardous (or nonhazardous) which could be substituted for hazardous substances?
- Could basic changes in manufacturing, parts cleaning, or processing reduce quantities of hazardous waste generated?
- Could small quantities of chemicals be purchased? Although the unit price of chemicals may be relatively high in small quantities, waste resulting from expired or unused chemicals is avoided.

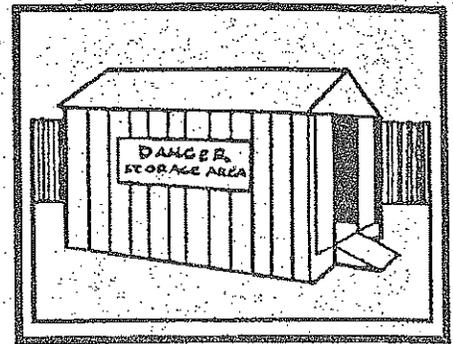
CONTACT THE ENVIRONMENTAL ASSISTANCE CENTER FOR WASTE REDUCTION & RECYCLING INFORMATION

1-800-662-9278

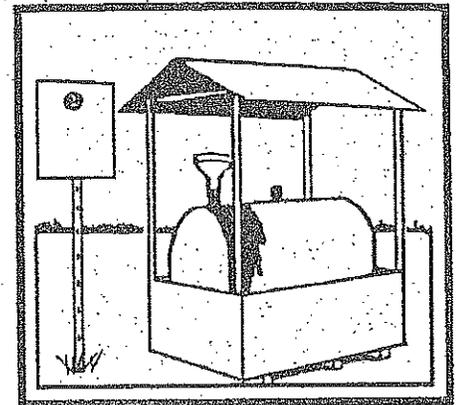
Service from the Environmental Assistance Division, Michigan Department of Environmental Quality include: telephone consultations; on-site, confidential technical assistance; access to national pollution prevention/waste reduction resources; publications; workshops; and information on vendors of waste reduction/pollution prevention goods and services.

For a listing of waste reduction tips related to specific types of businesses, request the 1993 fact sheet titled "Preventing Groundwater Contamination" (8 pages).

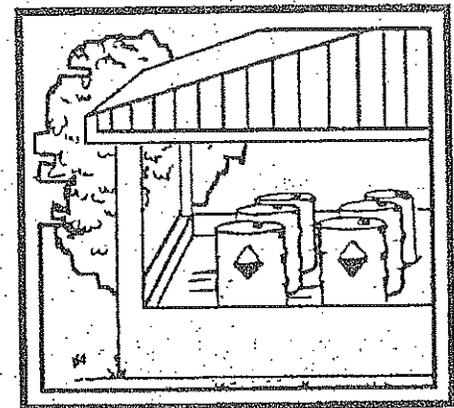
Secondary Containment



Outdoor shed



Fabricated metal



Pole shed

Source: Modified from "Small Business Guide to Secondary Containment", Secondary Containment Work Group, Clinton River Watershed Council, 1990.

Drinking Water and Radiological Protection Division
Michigan Department of Environmental Quality
P.O. Box 30630
Lansing, MI 48909-8130
Telephone: 517-335-9054
Internet: <http://www.deq.state.mi.us>

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Michigan Department of Environmental Quality

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POTENTIAL LEGAL LIABILITY AND CLEANUP INFORMATION

Under Michigan law, property owners and facility operators are required to clean up environmental contamination which results from their activities. Remedial action always requires considerable time and money.

For information about legal liability and responsibilities, contact the Michigan Department of Environmental Quality (MDEQ). The MDEQ Environmental Response Division is responsible for sites of environmental contamination. The MDEQ Underground Storage Tank (UST) Division is responsible for underground storage tank registration, inspections, and cleanup. Contact the following Lansing offices to obtain the telephone number of the district office closest to you:

MDEQ Environmental Response Division: 517/373-9837

MDEQ Underground Storage Tank Division: 517/373-8168

Spills of hazardous substances should be reported to the Pollution Emergency hotline: **1-800-292-4706.**

SEARCH FOR POLLUTION PREVENTION OPPORTUNITIES

Each business operation is unique. As a result, the waste reduction and pollution prevention practices that are economical and useful at one facility may not work for others. Managers are encouraged to complete a waste reduction and pollution prevention audit at each facility.

Employees can be a valuable resource when considering pollution prevention activities. It may be useful to include employees in the planning process and to provide economic incentives to reduce waste.

For facility-specific information on recycling and waste reduction options, contact the Environmental Assistance Center of the Michigan Department of Environmental Quality: P.O. Box 30457, Lansing, MI 48909; Telephone: 1-800-662-9278 or 517-373-9400.

For assistance with environmental permit requirements, contact the Permit Coordinator, Environmental Assistance Division at 517-335-4235. County and local regulations may also apply.



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MICHIGAN GROUNDWATER PROTECTION STRATEGY GOALS

1. Protect public health and environment by preventing future degradation of groundwater and restoring to productive use groundwater that has already been contaminated.
2. Manage and protect groundwater as part of overall water management, recognizing the interrelationship between groundwater and surface water; and
3. Create a cooperative management environment for all levels of government, business and industry, and citizen organizations which encourages and rewards groundwater protection.

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EQC 2036a (8/98)

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LETTERS STATEMENT DIRECT PRELIMINARY TO GO

STORM WATER INFILTRATION TO GROUNDWATER: CONSIDERATIONS FOR MICHIGAN COMMUNITIES



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
JOHN ENGLER, GOVERNOR

NOVEMBER 2000

RUSSELL J. HARDING, DIRECTOR

SCOPING THE ISSUES

When rainwater and melting snow gradually infiltrate into the ground, many problems related to storm water runoff can be avoided.

As urban development occurs, however, the natural landscape changes, storm water runoff velocities increase, and storm water pollutants begin to harm lakes and streams. If storm water from parking lots and development sites remains untreated and infiltrates to groundwater, drinking water supplies may also be harmed.

In order to identify issues and opportunities in Michigan, an advisory work group was convened by the Michigan Department of Environmental Quality, Drinking Water and Radiological Protection Division, in June 2000. Project advisors are listed on page 4 of this bulletin.

Should infiltration of storm water be encouraged at development sites? Advisory group members answered this question with the statement, "it depends." In nearly all cases, small amounts of storm water which naturally infiltrate into the ground are not a cause for concern. However, large quantities of storm water collected through pipes and engineered retention/detention facilities can create impacts – even if infiltration is encouraged through the storm water best management practices designed into the site.

Where soils are very permeable, low-density residential developments should be encouraged to consider storm water infiltration for at least a portion of the volume expected. Above ground treatment may be needed for very porous soils.

In commercial and industrial areas, potential contamination sources should be considered carefully in selecting storm water management options. Infiltration should only be selected when ground water quality protection can be reasonably assured. Industrial contaminants should not be allowed to enter the storm water regardless of whether it is discharged to the ground water or the surface water.

MICHIGAN COMMUNITY EXPERIENCE WITH STORM WATER INFILTRATION

Very few development sites in southern Michigan have been built with engineered storm water infiltration systems. In northern Michigan, with extensive areas of permeable, sandy soils, infiltration of storm water occurs even when it is not planned. Even in northern Michigan, however, engineered storm water detention and retention systems typically direct storm water runoff to lakes and streams – not to groundwater.

Some Michigan communities, however, have had substantial experience in designing aboveground storm water retention or detention systems that combine the goals of volume control, water quality improvement, and aesthetics. A storm water management system which includes a number of individual best management practices combined together ("treatment train" concept) can be effective. Generally, system performance is enhanced when a series of individual practices are linked together. Experience with storm water best management practices, as well as on-site maintenance, will help support additional innovation.



THE IMPACT OF IMPERVIOUS SURFACES ON INFILTRATION

Paved roads, driveways, parking lots, and roofs are impervious surfaces that block the infiltration of rainwater and snow melt. Even low-density residential areas will typically prevent 50% of the rainfall from naturally infiltrating into the ground.

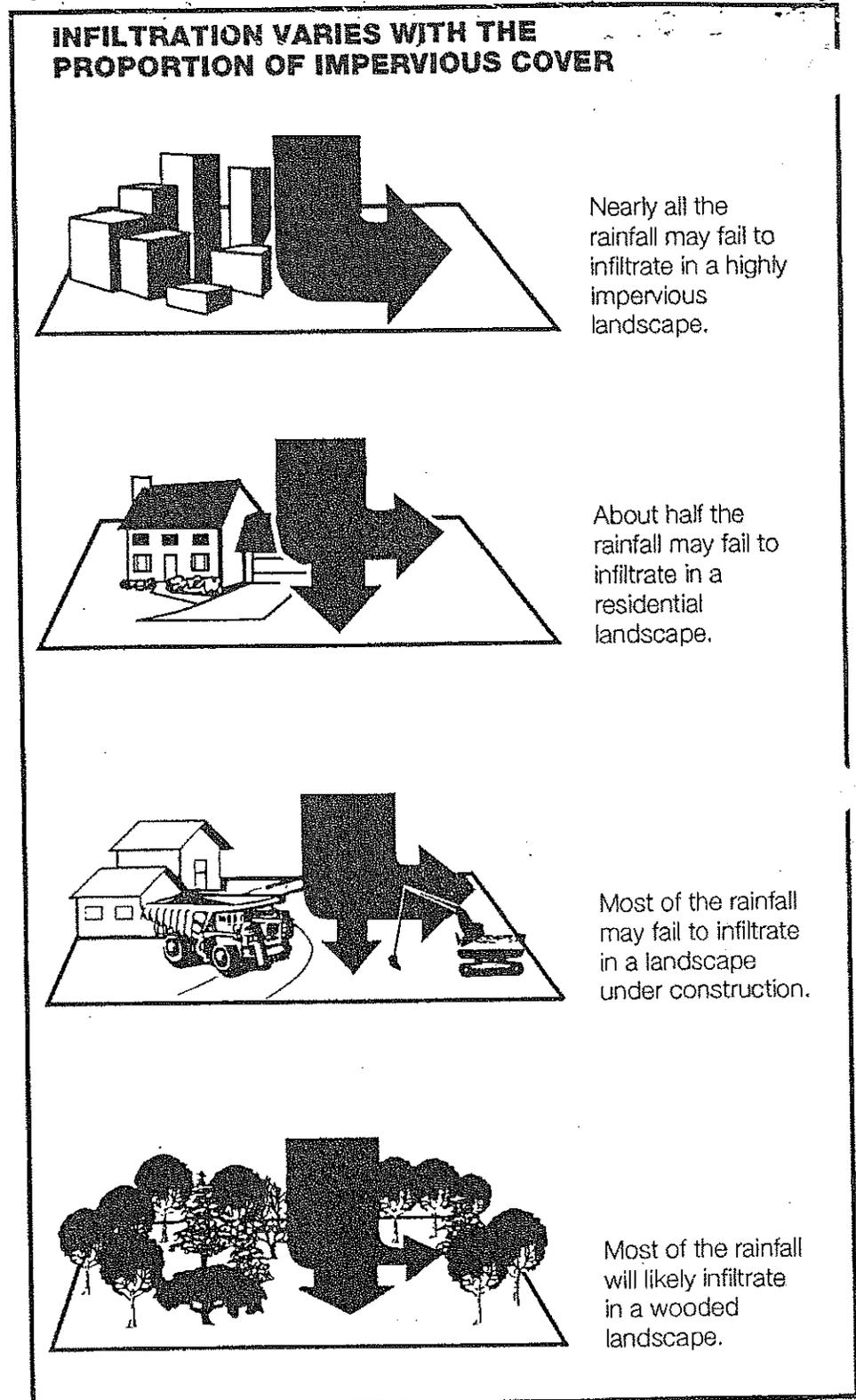
Degradation of surface streams and groundwater gradually takes place as the natural landscape is developed. Pollutants washed from impervious surfaces include sediments, pathogenic organisms, hydrocarbons (including oil and grease), trace metals, toxic chemicals, chlorides or salts, and nutrients. Nearly all of these pollutants are potential groundwater contaminants.

Costs to the developer, future property owners and the entire community can be minimized if the following principles are followed in development projects:

- Minimize the amount of impervious surface;
- Maintain the natural hydrologic cycle by retaining wetlands, depressions, and other naturally-occurring land features that hold water on-site; and
- Maintain trees, wetlands, and vegetative covers that encourage natural infiltration and natural absorption of pollutants.

Creative design and clustering to maintain open spaces can provide many of these benefits. Incentives can be added to local ordinances to make conservation development attractive to developers and community residents.

Figure 1



Source: *Planning & Zoning News*, November 1997. Reprinted with permission. September 2000.

EXAMPLES OF STORM WATER INFILTRATION SYSTEMS

Engineered infiltration systems retain storm water on-site, allowing it to soak into the ground or evaporate. Examples include infiltration basins, infiltration trenches (rock-filled trenches), perforated pipe with gravel envelope (exfiltration trenches), swales (shallow, grassed conveyance systems), and porous pavement.

INFILTRATION BASINS - MICHIGAN EXPERIENCE

Infiltration basins for storm water detention are feasible when soils are permeable and the watertable and bedrock are below the soil surface. In other states, infiltration basins have been most successful when used in residential or other low-density areas.

Pretreatment facilities connected with infiltration basins and trenches are usually essential for effective basin functioning. Filtration systems such as sand filters or properly designed catch basin filtration systems are two examples of effective pretreatment measures.

Very few infiltration basins have been constructed and successfully maintained in Michigan. Two types of problems have been experienced: (1) clogging of the basin caused by sediment; and (2) structural failure of the infiltration basin.

THE IMPORTANCE OF MAINTENANCE

Maintenance of infiltration systems is extremely important. In studies of infiltration systems in Maryland, only $\frac{1}{2}$ to $\frac{2}{3}$ of the facilities studied were functioning properly after two years. Problems included clogging

from sediments, poor design, and structural failure. When infiltration systems are designed, responsibilities for maintenance and ongoing management need to be determined.

VEGETATIVE PRACTICES

Vegetative practices, such as retention basin landscaping, filter strips, grassed swales, and reforestation can be used to decrease the velocity of storm water runoff and provide some water quality benefits. Pollutants such as organic material, nutrients, and trace metals can be removed by the filtering action of the grass, deposition in low-velocity areas, or by infiltration into the subsoil. Field monitoring has yielded mixed results regarding pollutant removal.

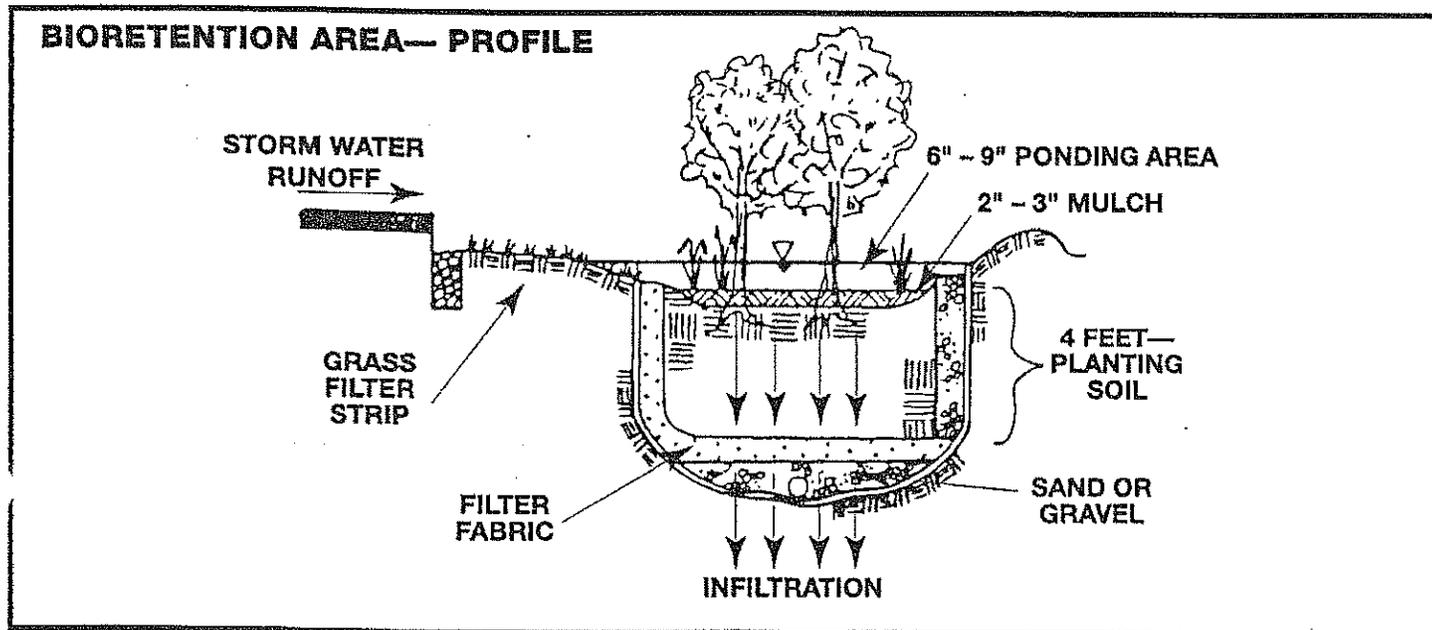
BIORETENTION FILTER

Bioretention uses soils and plants to remove pollutants from storm water runoff and to reduce peak storm flow rates through retention, infiltration, and evapotranspiration. Runoff is conveyed as sheet flow to the treatment area, which consists of a grass buffer, ponding area with soils and plants, and underlying bed of sand or gravel. The sand bed may contain an underdrain if the native soils lack permeability.

Bioretention is particularly well-suited to median strips and swales and is being demonstrated in Maryland and Virginia. Concerns include possible clogging from sediment loads and freezing in cold weather.

Note: For up-to-date storm water technology fact sheets: (<http://www.epa.gov/owm/mtbfact.htm>). Topics include infiltration drainfields, sand filters, storm water wetlands, porous pavement, vegetative covers, vegetative swales, etc.

Figure 2



Source: Based on *Design of Stormwater Filtering Systems*, Center for Watershed Protection, 1996.

STORM WATER POLLUTANTS AND THREATS TO GROUNDWATER QUALITY

The potential for groundwater contamination from storm water is significant – especially if industrial and commercial land uses are nearby and if there is no pretreatment of storm water. National experts urge extreme caution in such cases.

Extreme care in handling storm water should be used in wellhead protection areas and other areas where groundwater is used for drinking.

For all types of land uses, careful removal of storm water residuals and sediments is recommended for

storm water systems, including infiltration systems. Maintenance of infiltration facilities, including all sections of the "treatment train" is an essential and continuing need.

Storm water pollutants of most concern for groundwater quality are listed on the table below.

Figure 3:

| STORM WATER POLLUTANTS OF CONCERN FOR GROUNDWATER QUALITY | | | |
|---|---|--|--|
| Pollutants | Compounds | Source | Potential for Groundwater Contamination ¹ |
| Nutrients | Nitrate | lawn fertilizers, agricultural lands, etc. | Low to moderate |
| Pesticides | Vary | | Low to moderate |
| Other organics | Volatile organic including hydrocarbons | industrial and commercial facilities, vehicle maintenance establishments | High |
| Pathogens | Enteroviruses | most likely sanitary sewage | High (if sanitary sewage is present) |
| Heavy Metals ² | Nickel and Zinc Chromium and Lead | ----- | Low to high Low to moderate |
| Salts | Chloride from road salts | primarily in the north | High |

¹ This chart assumes surface infiltration without treatment.
² All metals would likely have a low groundwater contamination potential if sedimentation pretreatment were part of the system design.

Source: Robert Pitt, Shirley Clark, and Keith Parmer "Potential Groundwater Contamination from Intentional and Nonintentional Stormwater Infiltration", Report for US EPA, EPA/600/R-94/051, May 1994.

AGENCY RESPONSIBILITIES FOR STORM WATER MANAGEMENT IN MICHIGAN

Storm water management in Michigan is substantially a local initiative. In practice, storm water management programs vary among counties and municipalities.

In some counties, the county drain commissioner reviews development proposals as well as discharges to county drains. In other counties, the drain commissioner's role is very restricted.

At the federal and state levels, regulations are expanding to include storm water management (e.g., Phase I and II storm water regulations, soil erosion and sedimentation control requirements, and others.) Responsibility for the site specific review and approval process, however, will remain at the local level.

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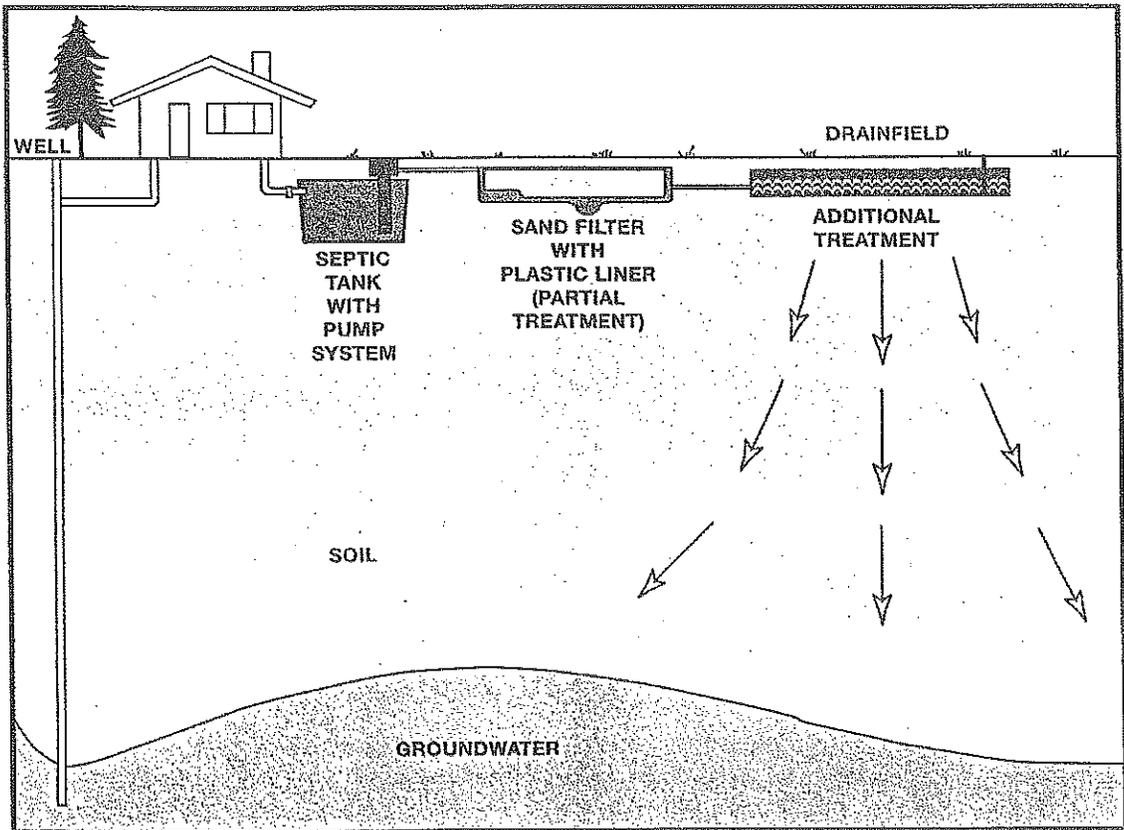


ON-SITE WASTEWATER SYSTEMS WITH SAND FILTERS: MAINTENANCE NEEDS FOR GROUNDWATER PROTECTION



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
JOHN ENGLER, GOVERNOR

RUSSELL J. HARDING, DIRECTOR
APRIL 1998



SAND FILTER SYSTEMS HELP PROTECT GROUNDWATER

When properly designed, installed, and maintained, on-site wastewater treatment systems can provide effective treatment of wastewater.

Sand filter systems, incorporated into the on-site wastewater treatment system design, have worked well in some tight (clay) soil conditions, and have also helped to improve the operation of existing septic systems in Michigan. Sand filters provide a high quality effluent that minimizes or eliminates the impact of the septic system on groundwater beyond the property boundary — provided that proper siting, operation and maintenance take place.

SAND FILTER BEDS REQUIRE MAINTENANCE

Proper maintenance of sand filters is *absolutely essential*. Without routine maintenance, sand filters will eventually fail — costing the property owner and the community time, trouble and cleanup funds.

Property owners are responsible for the maintenance of on-site systems which they own. Trained wastewater professionals can be hired to provide basic maintenance services once or twice a year, as needed. County and/or local agencies may provide technical assistance or oversight of maintenance activities. Public agencies also enforce standards to protect groundwater, surface water, and public health.

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GOVERNMENT RESPONSIBILITIES FOR ASSURING ON-SITE SYSTEM MAINTENANCE

On-site wastewater treatment systems (including systems with sand filters and drainfields) are appropriate systems for use in rural, **low-density** areas. When properly sited, designed, operated, and maintained, on-site systems provide for long-term wastewater disposal without threatening water quality.

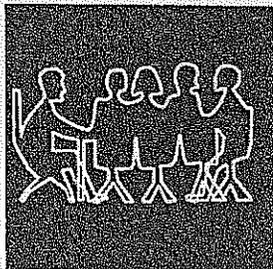
Property owners and local officials sometimes think that county and district environmental health agencies are responsible for maintaining septic systems and assuring groundwater protection — this is not a correct assumption. Property owners are responsible for maintaining their own on-site wastewater treatment systems in conformance with county code requirements.

LAND USE PLANNING FOR SITE DEVELOPMENT LOCATIONS

Local land use planning that incorporates protection of natural features, groundwater, and surface water is important for maintaining the quality of these resources and for long-term enjoyment of low-density areas served by on-site systems.

Areas where soils, topography, and drainage are generally suitable for on-site wastewater treatment systems can be identified as part of a land use planning process. On-site wastewater treatment systems, including sand filter systems, are suitable for low-density areas. Centralized wastewater treatment systems are useful for moderate and high-density development.

Local governments are responsible for anticipating development pressures and guiding the development in ways which help achieve local objectives. County health departments can assist as technical advisors in the land use planning process.



RESPONSIBILITIES OF TOWNSHIPS, VILLAGES, AND CITIES

Under Michigan law, townships, villages and cities are responsible for cleanup and remediation if sewage disposal facilities fail. The law specifying these requirements is Part 31 of the Natural Resources and Environmental Protection Act (NREPA). Local governments in Michigan have, in several cases, been forced to pay for sewer extensions when failing septic systems created water quality problems.

Local governments can also help protect groundwater in the following ways:

- By incorporating groundwater protection into local planning and zoning;
- By providing fact sheets about on-site wastewater treatment system maintenance to residents;
- By assuring that maintenance for sand filters is specified when the master deed for a condominium or subdivision association is approved; and/or
- By working with county health departments to develop fee-based governmental programs to assure inspections and maintenance.

When public wastewater treatment systems are constructed, public agencies are responsible for assuring system operation and maintenance. Public agencies sometimes contract with private wastewater professionals to provide this service.

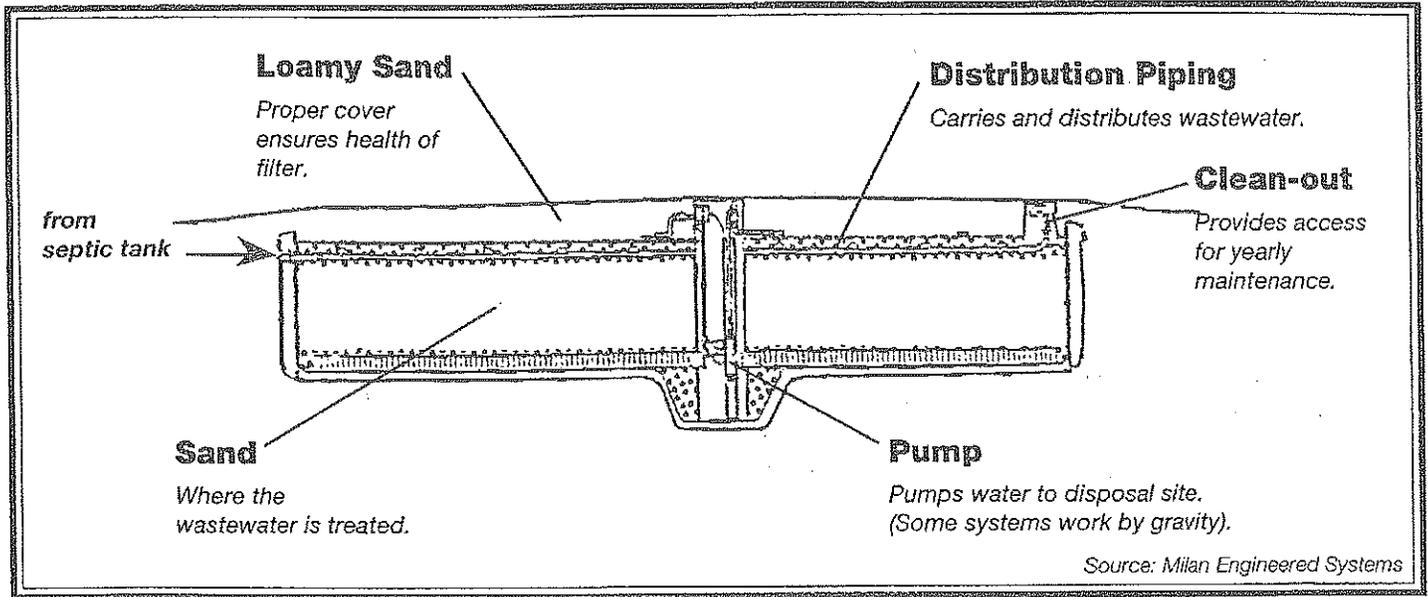
COUNTY HEALTH DEPARTMENT RESPONSIBILITIES

County and district health departments, in cooperation with local boards of health and county commissioners, can update their sanitary codes to allow technology which will provide adequate on-site wastewater treatment. Because sand filter technology has been proven effective for statewide use, some counties are updating their sanitary codes to allow for sand filter systems.

County and district health departments can also work cooperatively with local governments to identify options for assuring sand filter maintenance and financing. Options for assuring maintenance include requirements for maintenance contracts, deed restrictions, fees to homeowner associations, and/or fees to government agencies to assure periodic inspections and maintenance.

County health departments are viewed by local officials as the knowledgeable source of information about environmentally-safe methods for on-site wastewater treatment and disposal. It is the responsibility of county health department staff to keep informed about advances in technology and making these options available to developers and residents.

INTERMITTENT SAND FILTER DESIGN FOR HOUSEHOLD WASTEWATER



WHAT IS A SAND FILTER?

A sand filter is a constructed bed of sand or other suitable material (usually 2 - 3 feet deep) into which pretreated waste from the septic tank is discharged. The sand filter may be above ground, below ground, open, or covered. A plastic liner is usually installed to contain the sand filter media and prevent infiltration of groundwater. The main purpose of the liner is to keep shallow groundwater out of the bed.

Partially treated wastewater from the septic tank is applied in small doses to a bed of specified sand. Wastewater is treated through filtering and biological action as it slowly trickles through the sand media. Bacteria in the sand bed break down the organic materials in the wastewater, resulting in water that is substantially cleaner. Wastewater is then discharged to a drainfield for further treatment.

In a standard on-site sewage disposal system, final wastewater treatment takes place in the drainfield. In areas with a high groundwater table or areas where the receiving soil is excessively permeable, there is a potential for wastewater to reach sensitive areas before treatment is complete. The addition of a sand filter to an on-site sewage system provides for greater treatment before discharge to the soil — hence enhancing protection of groundwater and public health.

Sand filter options, including intermittent sand filters and recirculating sand filters, make it possible to install systems to meet the needs of specific sites.

CHECKLIST FOR SEPTIC TANK AND SAND FILTER MAINTENANCE

The following items are recommended to be included in a routine septic tank and sand filter inspection:

Septic tank: Schedule septic tank pumpouts every 3-5 years.

Septic tank effluent pump system: Check pumps, timer settings, float switches, and valves. Repair or replace, as needed. If meters are present, record and evaluate pump cycles and pump run time.

Distribution pipe cleanout: Flush the manifold laterals to remove accumulated solids and to keep holes clear. Failure to flush laterals will eventually lead to clogging of the distribution piping.

Pressure check distribution system: Pressure should be measured in the distribution pipe network. Higher than normal pressures indicate partial clogging of distribution holes.

Check observation sumps: Check for partial clogging of the sand and drainage system.

These maintenance tasks can be carried out by a trained technician and do not typically require the expertise of an engineer. One or two inspections a year are usually recommended.

PROPERTY OWNER RESPONSIBILITIES FOR SAND FILTER MAINTENANCE

Property owners are responsible for sand filter maintenance. Depending on county and local program options, property owners may pay a fee to a homeowners association, contract directly with a septic system maintenance company, or pay a governmental agency to provide the service.

ARE SAND FILTER SEPTIC SYSTEMS COST-EFFECTIVE?

Sand filter septic systems are often a cost-effective approach to on-site wastewater treatment. Although more expensive to install than a standard septic system, sand filters are often a cost-effective solution for difficult sites. Systems in Michigan are being installed at a cost of \$8,000 - \$12,000 — although specific costs vary with land costs and with technology.

Maintenance costs of \$100 - \$150 per year for a sand filter system are typical. If the sand filter media needs to be replaced, costs are higher. However, with regular inspections, the need for expensive maintenance can often be avoided. In the long run, maintenance is lower for sand filter systems because the sand filter minimizes the potential for clogging of the drainfield — a problem which leads to costly drainfield replacement.



For further information about septic system and sand filter requirements, contact your county or district health department.

Special appreciation is extended to the following individuals who served as advisors to this project:

Rich Badics, Washtenaw County Department of Environment & Infrastructure Services

Glen Beers, Shiawassee County Environmental Health

Jon Caterino and Ric Falardeau, Drinking Water and Radiological Protection Division, Michigan Department of Environmental Quality

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Ted Loudon, Department of Agricultural Engineering, Michigan State University

Robert Long and William Carlson, Oakland County Environmental Health

Diane McCormick, Livingston County Environmental Health

Dan Milan*, Milan Engineered Systems, Mt. Pleasant, Michigan

*Contacts for the Michigan On-Site Wastewater Recycling Association.

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FACTS TO KNOW
regarding
SEPTIC SYSTEMS IN WELLHEAD PROTECTION AREAS
for
LOCAL GOVERNMENT OFFICIALS

Rough level of understanding of how septic systems work

Septic systems consist of a septic tank followed by a drainfield (or soil absorption system)

Septic tanks remove solids, oil and grease

Septic tanks accumulate solids slowly

- 60—80% of the removed solids digest in the tank to gases and water.
- Septic tanks need to be pumped periodically to remove nondegraded solids
- If tanks are not pumped as needed, solids wash out into the drainfield and clog the field
- Clogged fields result in surfacing of effluent to direct connections to surface waters

Drainfields allow septic effluent to percolate into the underlying soils

- Soils treat wastewater as it percolates through
- Treatment means removal of pathogens, organic matter and nutrients
- Some soils are more effective at treatment than others
- With time, a biomat (or clogging layer) forms in the drainfield and helps filter and treat the effluent as it moves through the mat into the soil
- Eventually, the biomat may become so resistant to flow that the system will not accept all the wastewater and "failure" (surfacing of effluent or back-up into the home) occurs
- If sufficient air can enter the soil around the system, it may never fail
- A nearly failed system provides the best treatment from a groundwater perspective

Efficiency of Treatment

- All soils will remove organic matter within a few inches
- Most soils will remove pathogenic bacteria within 2 feet
- Most soils will remove viruses within 2 feet if the flow is slow (i.e. if the system is lightly loaded)
- Sandy soils that are subjected to a faster flowrate will require more depth to remove viruses

- Most soils will remove nutrients of concern within 2 feet except nitrate-nitrogen
- Nitrate nitrogen under septic systems results from conversion of ammonium-nitrogen to nitrate-nitrogen
- Nitrate is soluble and moves with the percolating water unless it encounters a saturated zone containing some biologically available carbon
- And this happens in all but the sandy soil profiles
- Where there is a clay layer several feet in thickness (10 ft or so) nitrate from septic systems is seldom found under this layer
- The best soils for all aspects of treatment are the most shallow – the topsoil and the shallow subsoil

Implications for wellhead protection

- Septic systems in sandy soils over “unprotected aquifers” contribute nitrate to groundwater
- Nitrate concentrations leaving the soil under a septic system may be as high as 40 mg/L but will probably be less – more like 20-30 mg/L on average
- Dilution by rainwater, the flow of groundwater, and mixing in the groundwater will reduce this concentration
- Septic systems on contiguous half acre lots (i.e. one system per half acre) will contribute about the same amount of nitrate-nitrogen to groundwater as a “well managed” corn field on the same site
- The risk of groundwater contamination is greatly reduced in soils with finer textures and where there is a clay layer above usable groundwater

Methods of mitigating groundwater impact from septic systems

- Require pretreatment beyond the septic tank prior soil dispersal to reduce nitrogen in sandy soil areas with unprotected aquifers
 - Aerobic treatment units
 - Sand filters
 - Constructed wetlands (preferably with pre-nitrification)
 - Other packed bed filters (proprietary systems)
 - Advantex geofabric filter
 - Waterloo biofilter
 - Peat filters
- *NOTE: All the above pretreatment systems require a mandated maintenance program which must be overseen by a regulatory agency. All of the above pretreatment systems will remove 10 – 50% of the nitrogen in septic tank effluent. With recirculation of 50-70% of the effluent back through the septic tank, all can achieve up to 70% nitrogen removal and some can do better.*

- Reduce development density on sandy soils with unprotected aquifers
- Require shallow placement of dispersal systems
- Require pressure distribution or drip irrigation for dispersal systems
- Cluster and provide centralized management of decentralized treatment systems that are designed to provide enhanced removal of nitrogen

Summary:

- Risk is reduced where septic systems are in finer textured soils
- Risk is reduced where there is a clay layer over the aquifer
- Risk is reduced where housing density is less
- Risk is reduced by providing pretreatment to remove nitrogen prior to soil dispersal
- Risk is reduced by shallow, at-grade and mounded soil dispersal systems

Ted Loudon
Agricultural Engineering Dept.
Michigan State University
January 23, 2002

ATTACHMENT D

ENVIRONMENTAL PERMIT CHECKLIST

LITTLE TRAVERSE TOWNSHIP STATE & COUNTY ENVIRONMENTAL PERMITS CHECKLIST

Name of Occupant:

Mailing Address:

Telephone:

Fax:

Type of Occupancy (e.g., Residential / Commercial / Agricultural / Industrial):

Facility Owner or Operator:

Date:

Signature:

For residential, commercial, industrial and/or agricultural properties, issuance of certain building permits require completion of the Little Traverse Township State & County Environmental Permits Checklist. For each of the following 27 items, circle YES or NO (Y/N) as applicable for the proposed property use. Circle items NO (N) if that item does not pertain to your project or facility. Circle items YES (Y) if that item may pertain to your project or facility; then contact the office(s) listed to determine if a permit, approval or other specific requirements apply to your project or facility. Return a copy of this checklist to the municipality as part of your site plan submittal -- even if state and county approvals have not yet been obtained. An updated copy is to be submitted prior to occupancy.

For items circled YES (Y), if it is determined that a permit or approval is required, provide a copy of the regulating agency's approval letter.

For items circled YES (Y), if it is determined that a permit or approval is not required, provide a letter detailing which agency, phone number and individual name(s) were contacted to confirm no permit or approval is required.

This checklist includes the most common county/state permits and approvals related to waste, water quality, and air quality. Other permits and approvals, including local, county, state and federal approvals may also be needed. Issuance of a building permit by the Township does not eliminate an applicant's responsibilities for complying with permits and approvals. All permit and approval conditions are the responsibility of the applicant.

For ALL Properties, answer the following questions.

1. Y N Will the project involve the installation, operation, or removal of an underground or aboveground storage tank containing a petroleum product or a hazardous substance?
Contact: Mi. Dept. of Environmental Quality, Waste & Hazardous Materials Division, 517/335-4035.
2. Y N Will the project involve liquefied petroleum gas storage tanks or container filling locations?
Contact: Mi. Dept. of Environmental Quality, Waste & Hazardous Materials Division: 517/335-4035.
3. Y N Will the project involve any man-made change in the natural cover or topography of land, including cut and fill activities which may contribute to soil erosion and sedimentation? Will the earth change disturb an area of one acre or more, or occur within 500 feet of a lake or stream? If the answer to both of these questions is yes, a soil erosion and sedimentation control permit is required.
Contact: Emmet County Drain Commission, 231/348-1744.
4. Y N Will the project involve dredging, filling, or construction in, across or under (1) a river, stream, creek, ditch, drain, lake, pond or swamp? (2) wetlands? (3) floodplain (area that may have or ever had either standing or flowing water)?

Contact: Mi. Dept. Environmental Quality, Geological and Land Management Division, 517/335-3471.

5. Y N Will the project involve any dredging proposed within 500 feet of a lake, river, stream, creek or ditch?
Contact: Mi. Dept. Environmental Quality, Geological and Land Management Division: 517/335-3471.
6. Y N Will the project involve an earth change activity within 500 feet of a lake or stream or will the project disturb an area greater than one (1) acre in size?
Contact: Mi. Dept. of Environmental Quality, Geological and Land Management Division, 517/335-3471.
7. Y N Does the project involve any construction or land alteration within 400 feet of a designated natural river or tributary?
Contact: Mi. Dept. of Environmental Quality, Fisheries Division – Steve Sutton, 517/241-9049.
8. Y N Does the project involve construction of a building or septic system in a designated great lakes high-risk erosion area?
Contact: Mi. Dept. of Environmental Quality, Geological & Land Management Division, 517/373-1952.
9. Y N Does the project involve dredging, filling, grading or other alteration of the soil, vegetation or natural drainage, or placement of permanent structures in a designated environmental area?
Contact: Mi. Dept. Environmental Quality, Geological and Land Management Division, 517/335-3471.
10. Y N Does the project involve development, silvicultural activities or contour alterations within a designated critical dune area?
Contact: Mi. Dept. Environmental Quality, Geological and Land Management Division, 517/373-1952.
11. Y N Will an on-site wastewater treatment system or septic system be installed?

For subsurface sanitary sewage disposal in quantities of 10,000 gallons per day or less (typical for single family residential use) -
Contact: Emmet County Health Dept., 231/347-6014.

For any subsurface discharge of sanitary sewage in quantities equal to or greater than 10,000 gallons per day.-
Contact: Mi. Dept. of Environmental Quality, Water Division, 517/241-1300.

For subsurface disposal of sanitary sewage in quantities of 6,000 to 10,000 gallons per day -
In addition to obtaining a construction permit from the county or district environmental health department, submit a state wastewater discharge notification form. Flow monitoring and reporting are required.
Contact: Mi. Dept. of Environmental Quality, Water Division, 517/241-1300.

For industrial or commercial wastewater (other than sanitary sewage) in any quantity -
Contact: Mi. Dept. of Environmental Quality, Water Division, 517/241-1300.
12. Y N Will the project involve the construction of a water supply well?
Contact: Emmet County Health Dept., 231/347-6014.
13. Y N Are there out-of-service wells, abandoned wells, or cisterns on the site? (drinking water, irrigation, & monitoring wells)
Contact: Emmet County Health Dept., 231/347-6014.
14. Y N Will the project involve a subdivision or site condominium project utilizing individual on-site subsurface disposal systems or individual wells?
Contact: Emmet County Health Dept., 231/347-6014.

15. Y N Will the project involve the on-site storage of sanitary sewage prior to transport and disposal off-site (pump and haul)?
Contact: *Mi. Dept. of Environmental Quality, Water Division, 517/241-1300.*
16. Y N Has the property or facility ever been subject to a remedial action, limited closure, or other environmental cleanup response under Part 201, Natural Resources and Environmental Protection Act (NREPA)? Is the property currently subject to a response action? Has a Baseline Environmental Assessment (BEA) been completed for the property?
Contact: *Mi. Dept. of Environmental Quality, Remediation & Redevelopment District Office, 231/775-3960 and/or Mi. Dept. of Environmental Quality, Water Division, 517/241-1381.*

For Commercial, Industrial and Agricultural properties, answer the following questions (these questions do not apply to Residential properties).

17. Y N Will the project involve the discharge of any type of wastewater to a storm sewer, drain, lake, stream, wetland or other surface water?
Contact: *Mi. Dept. of Environmental Quality, Water Division. Permits Section: 517/241-1300.*
18. Y N Will the project involve the direct or indirect discharge of waste, waste effluent, wastewater, pollutants, and/or cooling water into the groundwater or on the ground?
Contact: *Mi. Dept. of Environmental Quality, Water Division, Permits Section: 517/241-1300.*
19. Y N Will the project involve construction or alteration of any sewage collection or treatment facility?
Contact: *Mi. Dept. of Environmental Quality, Water Division, District Office: 231/775-3960.*
20. Y N Will the project or facility store or use chemicals, petroleum products, or salt? Depending on the type of substance, secondary containment and a Pollution Incident Prevention Plan (PIPP) may be required.
Contact: *Mi. Dept. of Environmental Quality, Water Division (District Office) 231/775-3960.*
21. Y N Does the project involve the installation of a compressed natural gas dispensing station with storage?
Contact: *Mi. Dept. of Environmental Quality, Waste & Hazardous Materials Division: 517/335-4035.*
22. Y N Will the project involve the generation of hazardous waste?
Contact: *Mi. Dept. of Environmental Quality, Waste & Hazardous Materials Division: 517/373-9875.*
23. Y N Will the project involve the on-site treatment, storage or disposal of hazardous waste?
Contact: *Mi. Dept. of Environmental Quality, Waste & Hazardous Materials Division, 517/373-9875.*
24. Y N Will the project involve the transport of hazardous waste or non-hazardous liquid industrial waste?
Contact: *Mi. Dept. of Environmental Quality, Hazardous Waste Program Section (Barbara Stevens – Transportation Unit, SE Michigan District): 734/432-1256.*
25. Y N Will the project involve land filling, transferring or processing solid non-hazardous wastes on-site?
Contact: *Mi. Dept. of Environmental Quality, Waste & Hazardous Materials Division: 517/373-9875.*
26. Y N Will the project involve the installation, construction, reconstruction, relocation, or alteration of any process or process equipment (including air pollution control equipment) which has the potential to emit air contaminants? **Contact:** *Mi. Dept. of Environmental Quality, Air Quality Division, 517/373-7045.*
27. Y N Will the project or facility involve the storage, mixing or distribution of pesticides or fertilizers in bulk quantities? **Contact:** *Mi. Dept. of Agriculture, Pesticide and Plant Pest Management Division, 517/373-1087.*

Revised April 17, 2000, MDEQ
Revised March 29, 2004, FVENG



NOTICE TO LOCAL UNIT(S) OF GOVERNMENT OF LAND USE RESTRICTIONS

This information and form is required under Sections 21310a(5) and 21316 of Part 213, Leaking Underground Storage Tanks (LUST), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Failure to comply with the provisions of this Act may result in civil fines not to exceed \$10,000 for each day the violation continues or failure to comply continues.

Instructions: (1) Use this form to provide notice of land use restrictions that are part of the corrective action plan to the Local Unit(s) of Government (LUG). (2) If corrective action is based on the use of institutional controls regarding off-site migration of regulated substances, submit a draft copy of this notification with the corrective action plan and wait for Remediation & Redevelopment Division (RRD) approval before providing notice to the LUG. If the institutional controls are for on-site contamination, the owner/operator may proceed with providing notice to the LUG. (3) Send the notice to the city, village or township clerk. Provide a copy to the County/District Health Department if groundwater exceeds Tier 1 residential criteria. (4) Submit a copy of the notice and proof of providing the notice with the Closure Report (EQP 3843) to the appropriate RRD District Office in form EQP4410. This notice does not constitute a warranty or representation of any kind by the State of Michigan that the corrective actions performed in accordance with this notice will result in the achievement of the remedial criteria established by Law, or that the property is suitable for any particular use.

 Name of Local Unit of Government

 Name of Local Unit of Government

Notice to the Local Unit of Government Receiving this Form:

A corrective action plan for the site named below has been developed as a result of a release from an underground storage tank. This form and the attachments are to provide the local unit(s) of government notice of the land use restrictions that are part of the corrective action plan. A copy of the institutional control mechanism(s) in the form of a Corrective Action Notice to Register of Deeds, and/or Restrictive Covenant, and/or alternate mechanism is/are attached. The attached institutional control mechanism(s) describe the land use restrictions and the land where the restrictions apply.

Owner or Operator: _____

Site Name: _____

Site Address: _____ City: _____ State: _____ Zip: _____

Contact Person: _____ Phone Number: _____

Mailing Address: _____ City: _____ State: _____ Zip: _____

Qualified Underground Storage Tank Consultant : _____

Address: _____ City: _____ State: _____ Zip: _____

Contact Person: _____ Phone Number: _____

I hereby attest to the accuracy of the statements in this document and all attachments. I further certify that the language on this form has not been modified.

 Owner or Operator's Signature

 Date



NOTICE TO IMPACTED PARTIES OF CORRECTIVE ACTION

This information is required under Sections 21309a(3) of Part 213, Leaking Underground Storage Tanks (LUST), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Failure to comply with the provisions of this Act may result in civil fines not to exceed \$10,000 for each day the violation continues or failure to comply continues.

Instructions: (1) Use this form to notice owners of property whose soil or groundwater exceed Tier 1 unrestricted residential Risk-Based Screening Levels when the corrective action plan indicates that this level of contamination exists on property owned or operated by another person. Owners of property include, but are not limited to, easement holders, tenants, utilities, and highway authorities. (2) Send the notice to the impacted parties described above before submitting the corrective action plan to the Remediation & Redevelopment Division (RRD). Record that notification was made on the appropriate report cover sheets (Final Assessment Report, EQP 3842 and Closure Report, EQP 3843). (3) The RRD may request a copy and/or proof of providing this notice as part of an audit. This notice does not constitute a warranty or representation of any kind by the State of Michigan that the corrective actions performed in accordance with this notice will result in the achievement of the remedial criteria established by Law, or that the property is suitable for any particular use.

Owner or Operator: _____

Site Name: _____

Site Address: _____ City: _____ State: _____ Zip: _____

Contact Person: _____ Phone Number: _____

Mailing Address: _____ City: _____ State: _____ Zip: _____

Qualified Underground Storage Tank Consultant : _____

Address: _____ City: _____ State: _____ Zip: _____

Contact Person: _____ Phone Number: _____

A corrective action plan for the above site has been developed as a result of a release from an underground storage tank. The corrective action plan indicates:

- The groundwater at the property listed below is contaminated.
- The soils at the property listed below are contaminated.

Property(ies) directly impacted by the release include(s):

Address: _____ City: _____ State: _____ Zip: _____

Property Name: _____

or See attached list.

I hereby attest to the accuracy of the statements in this document and all attachments. I further certify that the language on this form has not been modified.

 Owner or Operator's Signature Date

To obtain a copy of the corrective action plan, contact the owner/operator listed above or the Remediation & Redevelopment Division District Office located at

STATE & COUNTY ENVIRONMENTAL PERMITS CHECKLIST:

AN ADMINISTRATIVE TOOL FOR INTERGOVERNMENTAL COMMUNICATION



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 JOHN ENGLER, GOVERNOR RUSSELL J. HARDING, DIRECTOR

OCTOBER 2000

WHY A CHECKLIST?

What are the current state and county laws and regulations? How do they apply to proposed developments? How can developers and land owners know who to contact? The State & County Environmental Permits Checklist answers these questions in a simple, yet accurate fashion.

The Checklist identifies state and county environmental permits and approvals that are potentially involved in common development situations. It is not designed as a comprehensive listing of all necessary permits for every development.

Regulatory concerns that are the focus of the Checklist include:

- Water quality - including surface water, groundwater, and wetlands concerns
- Management of hazardous materials, petroleum products, and wastes
- On-site sewage disposal and drinking water wells

Air quality, sand dune protection, remedial response, and other topics are also included. Because the Checklist takes a comprehensive approach to environmental permits (rather than focusing just on a single medium such as air or water), it is particularly useful at the local government level.

Counties and municipalities are encouraged to prepare their own local version of the Checklist. To do so, simply identify all relevant permits and add the necessary telephone numbers.

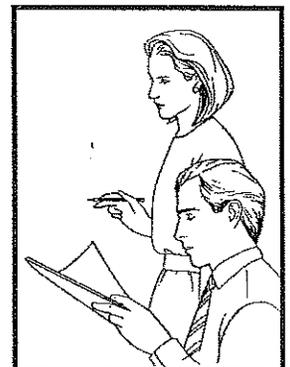
To obtain an electronic version of the list, contact the Wellhead Protection Unit, Drinking Water and Radiological Protection Division, Michigan Department of Environmental Quality: 517/335-9505 or the website:

www.deq.state.mi.us/dwr/wpu/wpu.html.

USING THE CHECKLIST FOR GROUNDWATER PROTECTION AND LOCAL SITE PLAN REVIEW

Because of the large number of state and county environmental permits, the Checklist is a useful reference for all parties involved with plan reviews. The Checklist is particularly useful for groundwater protection, because Michigan does not have a single agency that administers all of the regulations that help protect groundwater quality.

The Checklist can be easily incorporated into a local zoning and site plan review process. Some communities require applicants to submit the Checklist at the time of site plan review. Other communities use the Checklist selectively, such as when large-scale projects are proposed. In all cases, the responsibility for applying for and obtaining specific permits and approvals lies with the applicant - not with the local or county agency.



STEPS FOR USING THE CHECKLIST AS PART OF THE SITE PLAN REVIEW PROCESS

Under Michigan's zoning laws, local decisions on proposed site plans should take into account state and federal laws, as well as the requirements of the zoning ordinance, other applicable local ordinances, and planning documents. The Checklist helps local officials meet this requirement. Local officials can use the Checklist as a basis for discussion during site plan review meetings.

To use the Checklist, follow these steps:

1. Provide the Environmental Permits Checklist to each applicant requesting site plan approval.
2. Ask the applicant to fill out the Checklist and return it to the local agency. The Environmental Permits Checklist can then be used by local planners and officials during site plan discussions.
3. If you wish, ask the applicant to resubmit the Checklist prior to building occupancy, thereby providing an administrative tool for making sure that the permit list is correct for the development in question.
4. Update the Checklist every 12-18 months.

If questions concerning state permits arise, assistance may be requested from Jim Henderson, State Permit Coordinator, Environmental Assistance Division, Michigan Department of Environmental Quality (Tel: 517/335-4235).

For Additional Information

Local or county agencies can also access specific information from the Michigan Department of Environmental Quality's web site at www.deq.state.mi.us or by calling the Environmental Assistance Center at 1-800-662-9278.

The attached Checklist is the result of an interagency review process facilitated by the Michigan Department of Environmental Quality, Drinking Water and Radiological Protection Division. The following agency representatives participated in the review process:

Larry AuBuchon: MDEQ Waste Management Division, Southeast Michigan District

Elizabeth Browne: MDEQ Waste Management Division, Shiawassee District

Ben Darling: Michigan Dept. of Agriculture, Pesticide & Plant Pest Management Division

Ric Falardeau: MDEQ Drinking Water & Radiological Protection Div., Environmental Health Section

Mike Gabor: MDEQ Drinking Water & Radiological Protection Div., Well Construction Unit

Jim Henderson: MDEQ Environmental Assistance Division (permits coordinator)

Mike Kadri: MDEQ Storage Tank Division

Lonnie Lee: MDEQ Waste Management Division, Groundwater Program Section

Lynelle Marolf: MDEQ Environmental Response Division

Bill McCracken: MDEQ Surface Water Quality Division, Permits Section

Steve Miller: MDEQ Drinking Water & Radiological Protection Division, Wellhead Protection Unit

Scott Ross: MDEQ Waste Management Division, Groundwater Program Section

Les Thomas: MDEQ Land & Water Management Division, Permit Consolidation Unit

Prepared and distributed by:

Drinking Water &
Radiological Protection Division
Mi. Dept. of Environmental Quality
P.O. Box 30630
Lansing, MI 48909-8130
Telephone: 517-335-9054

Internet: <http://www.deq.state.mi.us>

EQC 2079 (11/2000)

Printed on recycled paper



STATE INFORMATION PROGRAMS:

For facility-specific information on recycling and waste reduction options, contact the Environmental Assistance Center of the Michigan Department of Environmental Quality; P.O. Box 30457, Lansing, MI 48909; Telephone: 517/373-9400.

For assistance with environmental permit requirements, contact the Permit Coordinator, MDEQ Environmental Assistance Division; Telephone: 517/335-4235. County and local regulations may also apply.

For information about groundwater protection and wellhead protection programs, contact the Wellhead Protection Unit, MDEQ Drinking Water & Radiological Protection Division; Telephone: 517/335-9505.

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DEQ Michigan Department of Environmental Quality

The Michigan Department of Environmental Quality (MDEQ) will not discriminate against any individual or group on the basis of race, sex, religion, age, national origin, color, marital status, disability or political beliefs. Questions or concerns should be directed to the MDEQ Office of Personnel Services, P.O. Box 30473, Lansing, MI 48909.

STATE & COUNTY ENVIRONMENTAL PERMITS CHECKLIST FOR (municipality and/or county) _____

Name of Business: _____

Mailing Address: _____

Telephone: _____ Fax: _____

Type of Business: _____ Facility Owner or Manager: _____

Date: _____ Signature: _____

Note: For assistance with permits and approvals from the Michigan Department of Environmental Quality, including permit coordination among MDEQ divisions, contact the Permit Coordinator, 517/335-4235.

Circle (Y/N) the items that may pertain to your project or facility; then contact the office(s) listed to determine specific requirements. Return a copy of this checklist to the municipality as part of your site plan submittal – even if state and county approvals have not yet been obtained. An updated copy should be submitted prior to occupancy.

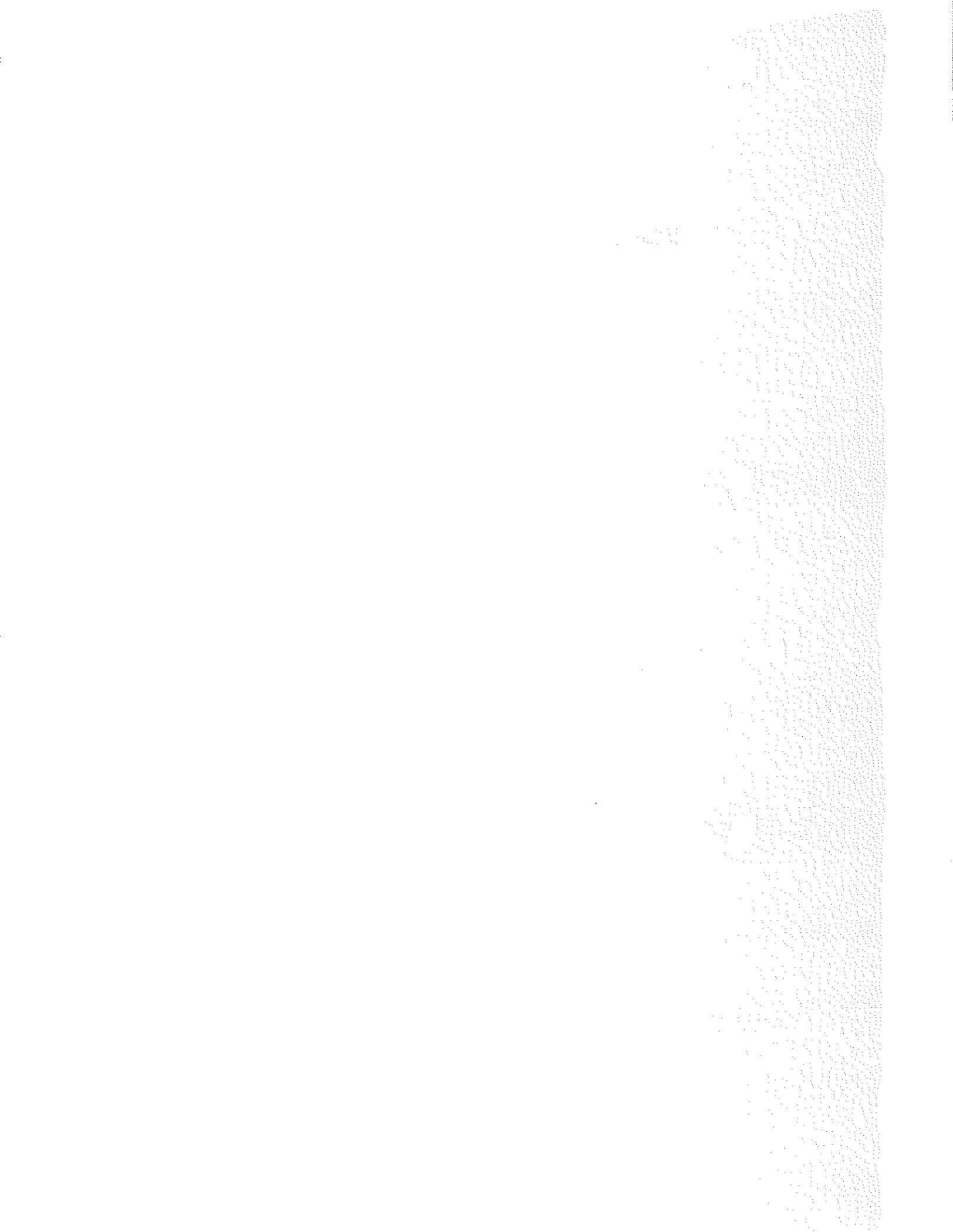
This list includes the most common permits and approvals related to waste, water quality, and air quality. Other permits and approvals, including local approvals, may also be needed.

1. Y N Will the project involve the discharge of any type of wastewater to a storm sewer, drain, lake, stream, wetland or other surface water? *Contact: Mi. Dept. of Envir. Quality, Surface Water Quality Div., Permits Section: 517/373-8088.*
2. Y N Will the project involve the direct or indirect discharge of waste, waste effluent, wastewater, pollutants, and/or cooling water into the groundwater or oil the ground? *Contact: Mi. Dept. of Environmental Quality, Waste Management Div., Groundwater Program Sect.: 517/373-8148.*
3. Y N Will the project involve construction or alteration of any sewage collection or treatment facility? For facilities discharging to surface waters, *contact the Mi. Dept of Environmental Quality, Surface Water Quality Division, District Office: _____* For facilities discharging to groundwater, *contact the Mi. Dept. of Environmental Quality, Waste Management Division, District Office: _____*
4. Y N Will the project or facility store or use chemicals, petroleum products, or salt? Depending on the type substance, secondary containment and a Pollution Incident Prevention Plan (PIPP) may be required. *Contact: Mi. Dept. of Environmental Quality, Waste Mgmt. Division, District Office: _____*
5. Y N Will the project involve the installation, operation, or removal of an underground or aboveground storage tank containing a petroleum product or a hazardous substance? *Contact: Mi. Dept. of Environmental Quality, Storage Tank Division: 517/373-8168.*
6. Y N Will the project involve liquified petroleum gas storage tanks or container filling locations? *Contact: Mi. Dept of Environmental Quality, Storage Tank Division: 517/373-8168.*
7. Y N Will the project involve the installation of a compressed natural gas dispensing station with storage? *Contact: Mi. Dept. of Environmental Quality, Storage Tank Division: 517/373-8168.*
8. Y N Will the project involve the generation of hazardous waste? *Contact: Mi. Dept. of Environmental Quality, Waste Mgmt. Div., District Office: _____*
9. Y N Will the project involve the on-site treatment, storage or disposal of hazardous waste? *Contact: Mi. Dept. of Environmental Quality, Waste Mgmt. Div., Hazardous Waste Permit Unit: 517/373-9875.*
10. Y N Will the project involve the transport of hazardous waste or non-hazardous liquid industrial waste? *Contact: Mi. Dept. of Environmental Quality, Waste Mgmt. Div., Hazardous Waste Program Section: 517/373-9875.*
11. Y N Will the project involve landfilling, transferring or processing solid non-hazardous wastes on-site? *Contact: Mi. Dept. of Environmental Quality, Waste Mgmt. Div.; District office telephone: _____*
12. Y N Will the project involve the installation, construction, reconstruction, relocation, or alteration of any process or process equipment (including air pollution control equipment) which has the potential to emit air contaminants? *Contact: Mi. Dept. of Environmental Quality, Air Quality Div., Permit Section. 517/373-7023.*

13. Y N Will the project or facility involve the storage, mixing or distribution of pesticides or fertilizers in bulk quantities? *Contact: Mi. Dept. of Agriculture, Pesticide and Plant Pest Management Division: 517/373-1087.*
14. Y N Will the project involve any man-made change in the natural cover or topography of land, including cut and fill activities which may contribute to soil erosion and sedimentation? Will the earth change disturb an area of one acre or more, or occur within 500 feet of a lake or stream? If the answer to both of these questions is yes, a soil erosion and sedimentation control permit is required. *Contact: County Drain Commissioner (or other responsible office): _____*
15. Y N Will the project involve dredging, filling, or construction in, across or under (1) a river, stream, creek, ditch, drain, lake, pond or swamp? (2) wetlands? (3) floodplain (area that may have or ever had either standing or flowing water)? *Contact: Mi. Dept. Environmental Quality, Land and Water Mgmt. Div. Permit Consolidation Unit, 517/373-9244.*
16. Y N Will the project involve any dredging proposed within 500 feet of a lake, river, stream, creek or ditch? *Contact: Mi. Dept. Environmental Quality, Permit Consolidation Unit, Land and Water Mgmt. Div., 517/373-9244.*
17. Y N Will the project involve an earth change activity within 500 feet of a lake or stream or will the project disturb an area greater than one (1) acre in size? *Contact: Mi. Dept. of Envir. Quality, Land & Water Mgmt. Div., Soil Erosion & Sedimentation: 517/373-3178.*
18. Y N Will the project involve any construction or land alteration within 400 feet of a designated natural river or tributary? *Contact: Mi. Dept. of Natural Resources, Forest Mgmt. Div., Natural Rivers Program Unit, 517/373-1275*
19. Y N Will the project involve construction of a building or septic system in a designated great lakes high risk erosion area? *Contact: Mi. Dept. of Environmental Quality, Land and Water Mgmt. Div., Great Lakes Section, 517/373-1950.*
20. Y N Will the project involve dredging, filling, grading or other alteration of the soil, vegetation or natural drainage, or placement of permanent structures in a designated environmental area? *Contact: Mi. Dept. Environmental Quality, Land and Water Management Div., Great Lakes Section: 517/373-1950.*
21. Y N Will the project involve development, silvicultural activities or contour alterations within a designated critical dune area? *Contact: Mi. Dept. Environmental Quality, Land and Water Management Div., Great Lakes Section: 517/373-1950.*
22. Y N Will an on-site wastewater treatment system or septic system be installed?
For sanitary sewage in quantities of 10,000 gallons per day or less: - County or District Environmental Health _____, For any subsurface discharge of sanitary sewage in quantities equal to or greater than 10,000 gallons per day. *Contact: MDEQ Waste Management Div.: 517/373-8148.*
For sanitary sewage in quantities of 6,000 to 10,000 gallons per day - In addition to obtaining a construction permit from the county or district environmental health department, submit a state wastewater discharge notification form. Flow monitoring and reporting are required. - *Mi. Dept. of Environmental Quality, Waste Management Division, Groundwater Permits Unit: 517/373-8148.*
For industrial or commercial wastewater in any quantity (other than sanitary wastewater) - *Mi. Dept. of Environmental Quality, Waste Management Division, Groundwater Permits Unit: 517/373-8148.*
23. Y N Will the project involve the construction of a water supply well or the extension of a water supply service from an existing water system? *Contact: Mi. Dept. Environmental Quality, Drinking Water Program, appropriate District office, and County or District Environmental Health: _____*
24. Y N Are there out-of-service wells, abandoned wells, or cisterns on the site? (drinking water, irrigation, & monitoring wells). *Contact: County or District Environmental Health _____*
25. Y N Will the project involve a subdivision or site condominium project utilizing individual on-site subsurface disposal systems or individual wells? *Contact: County or District Environmental Health Dept. _____*
26. Y N Will the project involve the on-site storage of sanitary sewage prior to transport and disposal off-site (pump and haul)? *Contact: Mi. Dept. of Environmental Quality, Waste Management Div., Groundwater Program Sect.: 517/373-8148.*
27. Y N Has the property or facility ever been subject to a remedial action, limited closure, or other environmental cleanup response under Part 201, Natural Resources and Environmental Protection Act (NREPA)? Is the property currently subject to a response action? Has a Baseline Environmental Assessment (BEA) been completed for the property? *Contact: Mi. Dept. of Environmental Quality, Environmental Response Division: 517/373-9893 and/or Mi. Dept. of Environmental Quality, Storage Tank Division: 517/373-8168.*

ATTACHMENT E

**WATER SUPPLY
EMERGENCY RESPONSE PLAN**



**LITTLE TRAVERSE TOWNSHIP
WSSN 03927
DRINKING WATER DISTRIBUTION SYSTEM
SECURITY and EMERGENCY RESPONSE PLAN**

PURPOSE:

To provide basic security measures that ensure safe drinking water distribution system operations under normal conditions, and emergency procedures necessary to respond to a local water system crisis or national security alert.

AUTHORITY:

This Security and Emergency Response Plan (ERP) meets the requirements of the United States Environmental Protection Agency and complies with Section 1433 (b) of the Safe Drinking Water Act and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Public Law 107-188 Title IV) adopted on this day July 11, 2007.

Revised:

March 20, 2008

May 4, 2010

June 4, 2012

September 21, 2012

Prologue

Little Traverse Township contracts with the Harbor Springs Area Sewerage Disposal Authority to operate and maintain their Drinking Water Production, Storage and Distribution system. The following pages contain the contact persons/companies, pumping/distribution facilities and map, bacteriological sampling locations, listing of media outlets, Homeland Security issued Colored Threat Levels and associated operational procedures, common drinking water event procedures and sample Tier Notice Templates that can assist the Township in the handling and correction of Drinking Water Events/Emergencies.

This Security and Emergency Response Plan is intended to assist involved personnel to locate and contact the appropriate person/companies to provide services to mitigate any event that will interrupt the drinking water supply and pose a possible public health threat. It should be noted that the Emergency Management Coordinator is only involved by authority of the Township Supervisor or by direction of the Township Board in the event of the absence of the Supervisor.

The Emergency Management Coordinator will act as the spokesperson on behalf of the Township with media outlets and coordinate any support needed to mitigate a major drinking water event.

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Section 1 Chain of Command/Staff

Little Traverse Township

8288 S. Pleasantview Rd.

| | | | |
|-----------------|---------------------|----------------|----------------------|
| William Dohm | Township Supervisor | (231) 526-0351 | cell# (231) 590-4568 |
| 3198 Heydey St. | home# | (231) 347-9686 | |

Operators/Staff

H2O in Motion

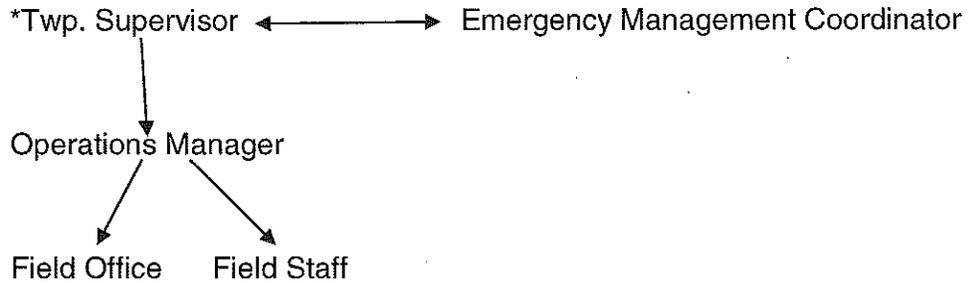
8288 S. Pleasantview Rd.

| | | |
|--------------|----------------|---------------------|
| Local Office | (231) 242-0069 | fax# (906) 553-7638 |
|--------------|----------------|---------------------|

| | | | |
|---------------|----------|----------------------|----------------------|
| Michael Smith | Manager | home# (231) 369-4262 | cell# (231) 570-0376 |
| Robert Taylor | Operator | home# (231) 526-7640 | cell# (231) 838-2165 |
| Tim Mylloja | Operator | home# | cell# (231) 881-0333 |

After Hours Emergency# (231) 242-0069

Chain of Command



* The Township Supervisor ,or in his/her absence, the Administrative Assistant are the only authorized person(s) to contact the Emergency Management Coordinator.

Section 3 Drinking Water Pumping Facilities/Storage/Standby Power

There are two well fields with a total of four wells. Current capacities and specifications are:

Harbor Cove Well #1 (C501) - 381 Harbor Drive West

10 inch diameter casing

360 feet deep

Verticle Turbine

60 hp motor

700 gpm @ 228 feet of Total Dynamic Head

Harbor Cove Well #2 (C501) Standby Status - 381 Harbor Drive West

8 inch diameter casing

360 feet deep

Verticle Turbine

15 hp motor

80 gpm @ 175 feet of Total Dynamic Head

Emmet Heights Well #1 (C505) - 7965 Emmet Heights Rd.

8 inch diameter casing

348 feet deep

Submersible Pump/Motor

50 hp motor

530 gpm @ 230 feet of Total Dynamic Head

Emmet Heights Well #2 (C505) - 7965 Emmet Heights Rd.

10 inch diameter casing

355 feet deep

Submersible/Pump/Motor

100 hp motor

1000 gpm @ 310 feet of Total Dynamic Head

Storage - 7965 Emmet Heights Rd.

A 100,000 gallon two cell buried reservoir is located at the Emmet Heights Well Field location.

Standby-Power

A stationary Stand-by on-site generation unit is located at the Emmet Heights Rd. Well Field location:

Onan generator set with 225 kW capability powered by a diesel motor.

A portable trailer mounted 105 kW generator set powered by a diesel motor is also available for use that is normally parked at the Harbor Springs Area Sewage Disposal Authority Waste Water Treatment Plant which is located at 709 East Hathaway Rd.

Interconnections (see General Water System insert)

M-119

Lake Street

Beach Drive

Contact Joel Clark, City of Harbor Springs Water Department (231) 526-0604

Emergency: (231) 526-2091

General Water System Map (see back of binder)

Section 4 Public Communication Outlets

Newspapers:

| | |
|---------------------|----------------|
| Petosky News-Review | (231) 347-2544 |
| Harbor Light | (231) 526-2191 |

Radio:

| | |
|--------------|----------------|
| WTCM Petosky | (231) 348-1097 |
| WKHQ Petosky | (231) 347-8713 |
| WJLM Petosky | (231) 347-5000 |

Television:

| | | |
|---------------------|---------|----------------|
| WWTV-WWUP TV 9 & 10 | Office# | (231) 947-7533 |
| | fax# | (231) 775-2731 |
| WPBN-WTOM TV 7 & 4 | Office# | (231) 947-7770 |
| | fax# | (231) 947-0354 |
| WGTU-WGTO TV 29 & 8 | Office# | (231) 946-2900 |
| | fax# | (231) 946-1600 |

Note: For major Drinking Water Interruption Events, only the Emergency Management Coordinator is authorized by the Township Supervisor to address the media outlets.

Section 5 Critical Water Customers

Wequetonsing Association

2433m Pennsylvania Ave.

Greg Volker, Manager

Office# (231) 526-2991

Home# (231) 526-6059

Cell# (231) 645-3960

Wequetonsing Land Owners Assn.

2670 Pennsylvania Ave.

Shirley Snyder

Office# (231) 526-7033

Home# (231) 526-7033

Harbor Cove

8769 Page Hill Rd.

Office# (231) 526-6021

Harbor Springs Public Schools

174 Lake St.

Office# (231) 526-4545

Wequetonsing Golf Club

5657 M-119

Dominic Briggs, Grounds Keeper

Office# (231) 526-5351

(231) 526-3233

Schiller Funeral Home

5505 M-119

Richard Schiller, Owner

Office# (231) 526-2581

Home# (231) 526-2984

Watermain Parts Supplier:

| | |
|------------------------|----------------|
| Etna Supply | 1-800-632-4576 |
| Michigan Pipe & Valve | (231) 946-8381 |
| East Jordan Iron Works | 1-800-874-4100 |

Towing Services:

| | |
|---------------------------|----------------|
| Festerling's Auto Service | (231) 347-6251 |
| M & M Service | (231) 347-7860 |
| Conway Towing | (231) 347-2441 |
| Petosky Towing | (231) 347-1803 |

Water Haulers:

| | |
|------------------------|----------------|
| Luttrell Well Drilling | (231) 526-2164 |
|------------------------|----------------|

Alternate Water Suppliers:

| | |
|-------------------------|----------------|
| Pepsi Cola Bottling Co. | (231) 347-6663 |
| Culligan | (231) 347-2153 |

Section 7 National/State Security Threat/Major Drinking Water Event Procedures

Homeland Security has two threat levels, Elevated and Imminent. The following pages are the guidelines as of July 13, 2011.



Alert

U.S. Department of Homeland Security

SUMMARY

The Secretary of Homeland Security informs the public and relevant government and private sector partners about a potential or actual threat with this alert, indicating whether there is an "imminent" or "elevated" threat.

DURATION

An individual threat alert is issued for a specific time period and then automatically expires. It may be extended if new information becomes available or the threat evolves.

DETAILS

- This section provides more detail about the threat and what the public and sectors need to know.
- It may include specific information, if available, about the nature and credibility of the threat, including the critical infrastructure sector(s) or location(s) that may be affected.
- It includes as much information as can be released publicly about actions being taken or planned by authorities to ensure public safety, such as increased protective actions and what the public may expect to see.

AFFECTED AREAS

- This section includes visual depictions (such as maps or other graphics) showing the affected location(s), sector(s), or other illustrative detail about the threat itself.

HOW YOU CAN HELP

- This section provides information on ways the public can help authorities (e.g. camera phone pictures taken at the site of an explosion), and reinforces the importance of reporting suspicious activity.
- It may ask the public or certain sectors to be alert for a particular item, situation, person, activity or developing trend.

STAY PREPARED

- This section emphasizes the importance of the public planning and preparing for emergencies before they happen, including specific steps individuals, families and businesses can take to ready themselves and their communities.
- It provides additional preparedness information that may be relevant based on this threat.

STAY INFORMED

- This section notifies the public about where to get more information.
- It encourages citizens to stay informed about updates from local public safety and community leaders.
- It includes a link to the DHS NTAS website: <http://www.dhs.gov/alerts> and <http://www.dhs.gov/NTASAlerts>

"If You See Something, Say Something" Report suspicious activity to local law enforcement or call 911.

This notice is intended to provide information about a potential or actual threat to the public and relevant government and private sector partners. It is not intended to provide instructions on how to respond to a threat. For more information, visit www.dhs.gov/alerts.

DRINKING WATER SUPPLY SECURITY BREACH PROCEDURES

The following steps are guidelines as to how to respond to a security breach of the Little Traverse Township Drinking Water Supplies:

DISCOVERY OR RECEIPT OF A THREAT

- Take any suspicious activity or evidence of vandalism seriously
- Do not disturb any evidence
- Document what you see or hear (if over the telephone, use the form on the next page)
- Contact the local law enforcement (911)
- Contact the City Manager and Township Supervisor
- Contact the MDNRE District Office
- Follow the contacts and chain of command as outlined in Section 1 of this document

BREAK-IN, DAMAGE OR THREAT

- Inventory physical evidence, such as containers or materials that are normally not in the area of the break-in.
- Check Chlorine Residuals in the drinking water distribution system. MDNRE may order an increase in chlorination, please refer to the inventory of the chlorination equipment in this section.
- Check the drinking water immediately downstream of the break-in and throughout the water distribution system for ph, color, turbidity, smell and odor.

Local law enforcement and MDNRE will determine if the break-in, damage or threat is a prank. If the threat, break-in or damage is not a prank, MDNRE will notify the Federal Bureau of Investigation (FBI) and will advise what course of action the City/Township will take. This may range from immediate increase in chlorination, water system flushing, sampling to a full scale Boil Water Order.

Water samples will be collected by, or directed to be collected by MDNRE, and when the MDNRE is satisfied that all results are negative, the drinking water system will be returned to normal operations.

THREAT IDENTIFICATION Checklist

Water System Telephone Threat Identification Checklist

In the event your water system receives a threatening phone call, remain calm and try to locate the caller on the line. Use the following checklist to collect as much detail as possible about the nature of the threat and the description of the caller.

| | | |
|---|---|--|
| 1. Types of Tampering/Threats: | | |
| <input type="checkbox"/> Contamination | <input type="checkbox"/> Threats to tamper | |
| <input type="checkbox"/> Biological | <input type="checkbox"/> Bombs, explosives, etc. | |
| <input type="checkbox"/> Chemical | <input type="checkbox"/> Other (explain): | |
| 2. Water System Identifications: | | |
| Name: | _____ | |
| Address: | _____ | |
| Telephone: | _____ | |
| WWS Owner or Manager's Name: | _____ | |
| 3. Alternate Water Source Available? Yes/No If yes, give name and location: | | |
| _____ | | |
| 4. Location of Tampering: | | |
| <input type="checkbox"/> Distribution Pipe | <input type="checkbox"/> Water Storage Facilities | <input type="checkbox"/> Wastewater Plant |
| <input type="checkbox"/> Low Water Sources | | <input type="checkbox"/> Treatment Chemicals |
| <input type="checkbox"/> Other (explain): | | |
| 5. Contaminant Source and Quantity: | | |
| _____ | | |
| 6. Date and Time of Tampering/Threat: | | |
| _____ | | |
| 7. Caller's Home/Office, Address and Telephone Number: | | |
| _____ | | |

8. Is the Caller (check all that apply):

Male
 Female
 Foul
 Illiterate
 Well-Spoken
 Irrational
 Incoherent

9. Is the Caller's Voice (check all that apply):

Soft
 Calm
 Angry
 Slow
 Rapid
 Shamed
 Loud
 Laughing
 Crying
 Nervous
 Deep
 Hoarse
 Clear
 Lispering
 Stuttering
 Old
 High
 Crackling
 Excited
 Young
 Familiar (who did it sound like?)
 Accented (which nationality or region?)

10. Is the Connection Clear? (Could it have been a wireless or cell phone?)

11. Are There Background Noises?

Street noises (what kind?) _____
 Machinery (what type?) _____
 Voices (describe) _____
 Children (describe) _____
 Animals (what kind?) _____
 Computer keyboard, office _____
 Meters (describe) _____
 Music (what kind?) _____
 Other _____

12. Call Received by (Name, Address and Telephone Number):

Data Call Received:

Time of Call:

13. Call Reported Loc: _____ Date/Time: _____

14. Action(s) Taken Following Receipt of Call:

Procedures for Interruption of the Drinking Water Supply

The Township Supervisor has the authority to contact the Emergency Management Coordinator to facilitate media announcements and perform duties as the Township's spokesperson.

Low water pressure

- Determine the affected area
- Notify water customers of pressure problems and restrict water usage until problem is resolved (Tier II Boil Water Advisory)
- Notify MDNRE District Engineer
- Begin application of Chlorine not to exceed 1 part per million of free chlorine
- Flush the water distribution system the best that you can (**see alternate below). Maintain at least 0.5 ppm free chlorine residual at all portions of the water distribution system
- Goal is to flush the entire water system within 8 hours of the low water pressure event starting in the area that experienced the low water pressure
- Continue to monitor the chlorine residuals throughout the water distribution system until two consecutive sets of at least five bacteriological samples (minimum of 24 hours apart) have been collected and the safe results have been determined by the laboratory
- Notify the water customers in the affected area, include a brief summary of problem, what was done to correct, and to restore the water distribution system to a safe operating condition.

**If system failure is causing low water pressure and you have no means to flush the system, issue a Precautionary Boil Water Advisory until adequate pressure can be restored and at least five bacteriological samples (minimum of 24 hours apart) have been collected and the safe results have been determined by the laboratory.

Complete loss of drinking water pressure

- Determine the affected area
- Notify MDNRE immediately (Tier I Notice - Boil Drinking Water Order)
- Notify water customers of problem, restrict water usage until problem is resolved and issue a Boil Water Order to the entire affected area
- Begin application of Chlorine not to exceed 1.5 parts per million of free chlorine
- Flush the water distribution system the best that you can. Maintain at least 0.7 ppm free chlorine residual at all portions of the water distribution system
- Goal is to flush the entire water system within 8 hours of the low water pressure event starting in the area that experienced the low water pressure
- Continue to monitor the chlorine residuals throughout the water distribution system until two consecutive sets of at least five bacteriological samples (minimum of 24 hours apart) have been collected and the safe results have been determined by the laboratory
- Notify MDNRE of safe Bacteriological sample results

(Continued on next page)

- Issue a Cancellation of Boil Water Order in the in the affected area, include a brief summary of problem, what was done to correct, and what was done to restore the water distribution system to a safe operating condition.

Determining the Chlorine application at the Emmet Heights Well House

Since one well pump is capable of 1000 gpm and the other is 530 gpm, the question is, can we operate on one well pump during an Emergency Chlorination Event? We'll presume that we can and the calculations are for a 1.6 gallon per day LMI Chlorine Pump:

ppm applied = pounds chemical/million pounds H₂O

1000 gallons per minute times 1440 minutes in a day divided by 1,000,000 times 8.34 times 1 part per million of Cl₂ divided by 12% divided by 100) times 10 (weight of Cl₂ per gallon) = 15 pounds of Sodium Hypochlorite (chlorine).

Cl₂ pump = 1.6 gallon per day or 10 pounds (weight of liquid compound per gallon) times 1.6 equals 160 pounds per day at 100 speed/stroke settings on the LMI Pump.

LMI Chlorine Pump Settings:

160 times .50 = stroke setting of **80**

80 times .20 (speed setting of **20**) = 16 pounds per day of 12.5% sodium hypochlorite compound for a 1000 gpm well pump to apply 1.5 parts per million.

Emergency Isolation of Reservoir

- Notify Township Supervisor and MDNRE District Engineer
- Utilizing the fire hydrant(s) at the lowest elevation in the water distribution system, set the hydrant relief valve (make sure the valve can relieve the same amount of water that will be pumped per minute into the closed distribution system, several may be needed) to open just above the normal operating distribution system operating pressure. Make sure the area can drain adequately.
- At the Well House, turn all pump motor "H-O-A"s to the OFF position. Manually start one pump and ramp up the VFD Hertz until a moderate stream of water is flowing out the lowest hydrant relief valve. If there is no VFD, throttle the pump flow by using a valve in the Well House.
- At the same time, isolate the reservoir.
- Adjust the VFD or valve to reduce the amount of water being wasted but still maintain the normal system pressure.
- Drain the reservoir.

(Continued on next page)

Filling the Reservoir

- Slowly open the reservoir isolation valve while the well pump FVD Hertz is slowly increased, yet still maintaining normal system operating pressure.

(Follow the MDNRE procedures for chlorination and bacteriological sampling of reservoirs)

WATER SHORTAGE EMERGENCY RESPONSE PROCEDURES

WATER USE RESTRICTIONS:

Due to drought conditions or a loss of production due to a well pump malfunction or repairs, the following procedures are to be followed in the affected areas of the water distribution system (refer to Section #2 for the contact telephone numbers):

- Notify the MDEQ District Engineer and request that they notify the Michigan Department of Agriculture so they can notify the convenience stores that are connected to the water supply.
- Notify Emergency Response Services
- Notify critical water customers of the water use curtailment.
- If necessary, request that car wash facilities temporarily close and all water customer lawn watering activities be curtailed by either by odd/even address per odd/even date or NO IRRIGATION at all.

Due to no available water in either a partial shutdown or complete loss of water (refer to Section #2 for the contact telephone numbers):

- Notify the Emergency Response Services.
- Notify the MDEQ District Engineer and request that they notify the Michigan Department of Agriculture so they can notify the convenience stores that are connected to the water supply.
- Notify critical water customers of the potential or actual loss of water.
- Follow procedures outlined in the Loss of drinking water pressure procedures.

Section 8 Bacteriological Monitoring/Public Notification Requirements/Sample Notices

WSSN: 03927

| Site# | Address | Frequency | Upstream Site | Downstream Site |
|---------|------------------------|-----------|--|-----------------|
| D1 | 2433 Pennsylvania Ave. | Monthly | <i>(Within five service connections)</i> | |
| D2 | 8769 Page Hill Rd. | Monthly | <i>(Within five service connections)</i> | |
| Well #1 | | Monthly | NA | NA |
| Well #5 | | Monthly | NA | NA |
| Well #6 | | Monthly | NA | NA |

Notification Requirements

TIER I Advisories/Orders Public Notice

Required when at least one routine sample and at least one resample are total coliform positive. ANY of the total coliform positive samples is also fecal coliform positive.

Requirements:

- Notice by electronic media within 8 hours
- Notice by newspaper within 8 hours
- Notice by hand delivery, direct mail or water bill to each customer within 8 hours

TIER II Public Notice

Required when a system fails to monitor or fails to collect the required number of samples during any month.

Requirements;

- Notice by newspaper within 30 days
- Notice by direct mail, hand delivery, or water bill to each customer within 30 days

(Continued on next page)

TIER NOTICES

Tier I Boil Water Order

- Distribution/Pumping Failure
- Exceeds Maximum Contaminant Level (immediate health threat)
- E. Coli or Fecal Coliform
- Nitrate, Nitrite, or Total Nitrate and Nitrite
- Chlorine Dioxide (MCL Violation)
- Turbidity/Treatment techniques
- Waterborn Disease Outbreak
- Monitoring Violations

Tier II Boil Water Advisory

- Loss of Water Pressure
- Planned water system repairs that may cause low water pressure
- Two Total Coliform Positive Samples

Tier III System Violation of a Drinking Water Standard

- Exceeds Maximum Contaminant Level (for Chlorine)
- Monitoring or Testing Violation (directed by MDEQ)
- Failure to comply with a variance or exemption

TO:

Newspapers

| | |
|---------------------|----------------|
| Petosky News-Review | (231) 347-2544 |
| Harbor Light | (231) 526-2191 |

Radio

| | |
|--------------|----------------|
| WTCM Petosky | (231) 348-1097 |
| WKHQ Petosky | (213) 347-8713 |
| WJLM Petosky | (231) 347-5000 |

Television

| | | |
|---------------------|---------|----------------|
| WWTV-WWUP TV 9 & 10 | Office# | (231) 947-7533 |
| | fax# | (231) 775-2731 |
| WPBN-WTOM TV 7 & 4 | Office# | (231) 947-7770 |
| | fax# | (231) 947-0354 |
| WGTV-WGTO TV 29 & 8 | Office# | (231) 946-2900 |
| | fax# | (231) 946-1600 |

DATE:

TIME:

EMERGENCY NEWS RELEASE

A watermain break has occurred on _____ near _____.

As a precaution, all water customers of **Little Traverse Township in the affected area** are **advised to boil their drinking water** that will be used for drinking and cooking. The water should be boiled for at least five minutes, and allowed to cool prior to consumption. Bottled water may be used as an alternative to boiling.

You will be notified when the drinking water is safe to drink. We apologize for any inconvenience this may cause and thank you for your cooperation. If you have any questions, please call the HSASDA Office at : 526-6682 or the Little Traverse Township Office at: 526-0351.

TO:

Newspapers

| | |
|---------------------|----------------|
| Petosky News-Review | (231) 347-2544 |
| Harbor Light | (231) 526-2191 |

Radio

| | |
|--------------|----------------|
| WTCM Petosky | (231) 348-1097 |
| WKHQ Petosky | (213) 347-8713 |
| WJLM Petosky | (231) 347-5000 |

Television

| | | |
|---------------------|---------|----------------|
| WWTV-WWUP TV 9 & 10 | Office# | (231) 947-7533 |
| | fax# | (231) 775-2731 |
| WPBN-WTOM TV 7 & 4 | Office# | (231) 947-7770 |
| | fax# | (231) 947-0354 |
| WGTV-WGTO TV 29 & 8 | Office# | (231) 946-2900 |
| | fax# | (231) 946-1600 |

DATE:

TIME:

NEWS RELEASE

The Boil Water Order for the Water Customers in Little Traverse Township issued on _____, 200_ has been **CANCELLED** effective immediately. Water Samples were negative for any coliform bacteria. Thank you for your patience and cooperation during this Drinking Water event.

LITTLE TRAVERSE TOWNSHIP PUBLIC WATER SUPPLY

PRECAUTIONARY BOIL WATER ADVISORY

DUE TO A WATERMAIN REPAIR and
LOSS OF WATER SYSTEM PRESSURE

(DATE)

As a precaution, all water customers in the affected area are **advised to boil their drinking water** that will be used for drinking and cooking. The water should be boiled for at least five minutes, and allowed to cool prior to consumption. Bottled water may be used as an alternative to boiling.

PLEASE continue the use of boiled or bottled water until further notice.

Your assistance may be required to quickly restore the water system, this may come as a request to reduce or not to use water for short periods of time.

Pursuant to the Michigan Safe Drinking Water Act , 1976, PA 399, as amended, this advisory is in effect for Little Traverse Township residents within the affected area.

CERTIFICATION:

I certify that this water supply has fully complied with the public notification regulations in the Michigan Safe Drinking Water Act, 1976, PA 399 as amended.

Signature: _____ *Title:*

Date:

NOTICE

CANCELLATION OF PRECAUTIONARY BOIL WATER ADVISORY

(date)

Effective immediately, the Boil Water Order for the Water Customers in Little Traverse Township issued on _____, 200_ has been **CANCELLED**. Water Samples were negative for any coliform bacteria. Thank you for your patience and cooperation during this Drinking Water event.

TIER I

**PUBLIC
NOTICES**

LITTLE TRAVERSE TOWNSHIP PUBLIC WATER SUPPLY

BOIL WATER NOTICE

(DATE)

As a precautionary measure, all residents are advised to boil their water that will be used for drinking or cooking. The water should be boiled for at least five minutes, and allowed to cool. Bottled water may be used as an alternative to boiling. Please continue the use of boiled or bottled water until further notice. Your assistance may be requested to quickly restore the water system, this may come as a request to reduce or not use water for a short period of time.

(Use one of the following for the message)

THIS:

Coliform bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliform were found in more samples that allowed and this was a warning of potential problems.

OR THIS:

Fecal coliforms and E. coli are bacteria whose presence indicated that the water may be contaminated with human or animal wastes. microbes in these wastes can cause short-term side effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

Remedial measures including chlorination may be taken. Additional monitoring will be conducted and you will be notified when acceptable sample results are obtained. If you have any questions, you may contact the Little Traverse township office at (231) 526-0351, or the Michigan Department of Environmental Quality at (231) 775-3960, Extension 6392.

Pursuant to PA 399, A Boil Water Notice is in effect immediately. This notice is in effect until further notice for Little Traverse Township water users. Corrective measures are currently being undertaken to correct the situation.

CERTIFICATION

I certify that this water supply has fully complied with the public notification regulations in the Michigan Safe Drinking Water Act, PA 399, 1976 as amended, Administrative Rules.

Signature: _____ Title: _____ Date: _____

Note: Forward a copy of this statement to Michigan Department of Agriculture and Emmet County Health Department.

TIER II

**PUBLIC
NOTICES**



TIER III

**PUBLIC
NOTICES**

ATTACHMENT F
CORRESPONDENCE



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



DAN WYANT
DIRECTOR

November 7, 2012

Mr. William Dohm
Supervisor
Little Traverse Township
8288 Pleasantview Road
Harbor Springs, Michigan 49740

WSSN: 03927
Emmet County

Dear Mr. Dohm:

Congratulations! We would like to commend you for your efforts in updating the Little Traverse Township Wellhead Protection Plan.

We encourage you to keep the program viable by continuing to update it as changes occur within the wellhead protection area. If you have any questions or need assistance implementing the program, please contact Jean Shekter, Environmental Quality Analyst, Community Drinking Water Unit, at 517-241-1246; shekterj@michigan.gov; or by mail at Department of Environmental Quality (DEQ), Office of Drinking Water and Municipal Assistance, P.O. Box 30241, Lansing, Michigan 48909-7741. She would be happy to assist you.

Again, congratulations on updating your program.

Sincerely,

Carrie Monosmith, Chief
Environmental Health Section
Office of Drinking Water and Municipal
Assistance
517-241-2853

JS:DLR

cc: Mr. Brian L Rice, P.E., Fleis & Vandenbrink Engineering, Inc. ✓
Mr. Brian Thurston, Cadillac District Office, DEQ



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHIESTER
DIRECTOR

July 30, 2004

Mr. William P. Dohm
Little Traverse Township
8288 Pleasantview Road
Harbor Springs, Michigan 49740-9568

Dear Mr. Dohm:

WSSN: 3927

This letter is in regard to the "Little Traverse Township Wellhead Protection Area Delineation Report," which was submitted on your behalf by Fleis & VandenBrink Engineering, Inc. (F&V). The report identifies wellhead protection areas (WHPAs) for the township of Little Traverse (Township) public water supply wells. The designation criteria have been met, and the protection areas are approved as revised in a submittal from F&V dated July 8, 2004. For your reference, the approved WHPAs are identified on the enclosed map.

As you are aware, the Township owns and operates two production wells (#5 and #6) in the Emmet Heights well field, and two production wells (#1 and #2) in the Harbor Cove well field, both of which are located just east of the city of Harbor Springs. The municipal wells are all completed in a sand and gravel aquifer with excellent ability to yield groundwater. Hydrogeologic information from the delineation report has been reviewed to establish a geologic sensitivity for the Township wells. Geologic sensitivity may be considered a "qualitative" characterization of the protection provided the aquifer by the overlying lithology. The three categories of geologic sensitivity most often identified are low, moderate, and high, with the order reflecting a decreasing level of protection. The aquifer appears to be confined as indicated by the fact that at least one of the Township wells is a flowing artesian well. However, aquifer test data indicates the aquifer responds as though it is "leaky-confined" (i.e., the clay confining layer is not continuous across the area). Therefore, the Township's wells obtain groundwater from an aquifer hydraulically characterized as "leaky-confined," with modest protection provided by the overlying semiconfining clay layer, and depth of the wells. Accordingly the aquifer in which these wells are completed possesses a "moderate" geologic sensitivity.

We are pleased the Township is progressing in the development and implementation of a local Wellhead Protection Program (WHPP). However, it is important to realize that WHPA delineation is only a first step in developing a comprehensive local protection program. Management of the WHPAs will be particularly critical. Portions of the approved WHPAs extend into adjacent Pleasantview Township, and a portion of the Emmet Heights delineation actually overlaps the approved WHPA for the city of Harbor Springs. Accordingly, cooperation with the abutting township and city will be a necessary component of your local WHPP.

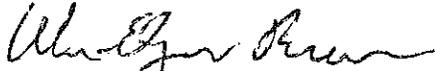
Mr. William P. Dohm

Page 2

July 30, 2004

In closing, we commend you and the other members of the wellhead protection team, along with the Township for the progress being made in the development and implementation of your local WHPP. If you have any comments or questions with regard to wellhead protection, please contact Mr. Wayne Kukuk, Geologist, at 517-241-1434, or Mr. Brant Fisher, Environmental Engineer Specialist, at 517-241-1415, Wellhead Protection Unit, Groundwater Section, Water Division.

Sincerely,



Wm. Elgar Brown, P.E., Chief
Groundwater Section
Water Division
517-241-1359

Enclosure

cc: Mr. Erik Johnson, F&V
Mr. Scott Ross, DEQ
Mr. Brant Fisher, DEQ
Ms. Ruth Kline-Robach, DEQ
cc/enc: Mr. Brian Thurston, DEQ
Mr. Wayne Kukuk, DEQ

RECEIVED

AUG 04 2004

FLEIS & VANDENBRINK
ENGINEERING, INC.



Michigan Department of Environmental Quality
Drinking Water and Radiological Protection Division

COPY

Wellhead Protection 2005 Grant Application

Water Supply Name: Little Traverse Township WSSN 03927

Address: 8288 Pleasantview Rd, Harbor Springs, MI 49740-9568

Contact: William P. Dohm Title: Township Supervisor Date 6/9/04

Contact's Address: (See above) Phone 231-526-0351

Contact's e-mail address: ltwp@freeway.net Fax Number: 231-526-0352

Tax identification number: 38-2147086 County: Emmet

Population served by public water supply 1200 (560 service connections) Number of wells: 6

Source of population data: MDEQ Database

- I. Grant assistance based on population served a. 15,000
 Supplemental assistance based on number of wells b. 10,000
 Total grant assistance based on population and wells (add lines a and b) c. 25,000
 Total previous expenditures to date (table 1) d. 0
 Amount of grant assistance requested this application e. 5,750

f. Amount of grant assistance awarded on previous Wellhead Protection Grant contracts.

| | | | |
|---------------------------|-----|--------------------------|----------|
| Round One (winter 1999) | \$0 | Round Four (spring 2001) | \$0 |
| Round Two (spring 1999) | \$0 | Round Five (spring 2002) | \$16,500 |
| Round Three (spring 2000) | \$0 | Round Six (spring 2003) | \$8,500 |

- II. Demonstrate that funds have been committed to wellhead protection and attach documentation of the dedication of funds to the grant eligible activities for which grant assistance is being requested. Provide proof of the dedication of funds to grant eligible activities in the form of receipts for previous expenditures, proof of a written agreement, or proof of the funds as a local budget item. Please complete attached Table 1: Previous Expenditure Tabulation 2005, to document all previous expenditures. Include all documentation for this section as Appendix A. (Maximum 6 Points)
Re-applicants please see "Notes to Re-applicants" at the beginning of the instructions.
- III. For completion of this section, please refer to the attached Table 2: Grant Assistance Tabulation. The tabulation is completed to identify previous expenditures that can be utilized as a local match, identify projected project costs, and define the distribution of grant assistance to the grant eligible activities for which assistance is being requested.
1. Identify in column C, Activity Cost, and in column E, Previous Expend. subcolumn, the amount of previous expenditures to be used this contract period. Column C will equal column E in the first row.
 2. Identify in column A the grant eligible activities to be completed for which you are requesting grant assistance. A breakdown of the grant eligible activities is important if you will be requesting a partial distribution of grant funds.
 3. In column B, Deliverable, identify the "deliverable" related to the grant eligible activities.
 4. In column C, Activity Cost, enter the projected cost for completion of the grant eligible activities identified in column A.
 5. In column D, Amount Requested for the Activity, enter the amount of grant assistance you are requesting for the grant eligible activity identified in column A.
 6. In Column E, Local Match, you will designate the amount of your local match which will be provided through previous expenditures and/or local funds.

When the table is properly completed, the Total for column C, Activity Cost, will be the sum of column D, Requested Grant Assistance, and the combined totals of the Local Funds and Previous Expend. Sub-columns in column E, Local Match. Column D will be 50 percent of column C. Include Table 2: Grant Assistance Tabulation 2005 at the end of Appendix A.

Table 3: Grant Activity schedule of completion must be completed with the start date and completion date of the activities listed on Table 2. Start and completion dates must be within the period October 1, 2004 through September 30, 2005. No extensions beyond this date will be granted. Include Table 3 in Appendix A.

- IV. Establishment of a local team consisting of at least 3 individuals is required for a public water supply to be considered for grant assistance. The local team must meet quarterly during the contract period as a minimum requirement and a quarterly report submitted to Michigan Department of Environmental Quality (DEQ) after each meeting. The local team must include the PWSS superintendent and representation from the municipality or owner of the PWSS. Identify members of the local team by completing the following table. All team members must complete a New Wellhead Protection Team Participation Agreement Form to be included with the application to be eligible for a maximum of 5 points. Adjacent municipality representation is worth 2 additional points. Include all documentation for this section as Appendix B.

| <u>Local Team Representative</u> | <u>Name</u> | <u>Representing</u> |
|----------------------------------|----------------|-------------------------------------|
| PWSS Superintendent | Bob Morris | HSASDA |
| Municipality | William Dohm | Little Traverse Township |
| Local Health Department | Dan Bagnoche | Env. Health Dept. Supervisor |
| Local Fire Department | Dick Schiller | Fire Chief |
| Business and Industry | Peter Pallas | Northern Diecast Corp. |
| Agriculture | | |
| Education | | |
| Planning | Joe Chattaway | Zoning Board, Little Traverse Twp. |
| Environmental Organization | Danna Widmar | Harbor, Inc. |
| General Public | Frederick Ward | Water & Street Supt. Harbor Springs |
| Adjacent Municipality (2 pts) | Ron McRae | City Clerk, Harbor Springs |

- V. Demonstrate a long-term commitment to the development, implementation, and maintenance of a Wellhead Protection Program. Attach documents, as applicable, to demonstrate your long-term commitment to wellhead protection. Include all documentation for this section as Appendix C.

- Attachment 1: Local Ordinance or Resolution related to wellhead protection (Maximum 3 Points)
- Attachment 2: Schedule of Completion for local Wellhead Protection Program (Maximum 3 Points)
- Attachment 3: Evidence of incorporating wellhead protection into Master Plan or other land use planning programs (Maximum 3 Points)
- Attachment 4: Public Outreach and Education (Maximum 3 Points)

- VI. I certify that all information in this application is true and complete. I understand any misstatement of facts may result in forfeiture of grant assistance eligibility.

SIGNATURE:



DATE

6-12-07

TITLE: William P. Dohm, Township Supervisor

Mail completed application and attachments to:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 WATER DIVISION - GROUNDWATER SECTION
 WELLHEAD PROTECTION UNIT
 ATTENTION RUTH KLINE-ROBACH
 PO BOX 30630
 LANSING MI 48909-5130



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHESTER
DIRECTOR

July 30, 2003

Mr. Erik A. Johnson
Fleis & VandenBrink Engineering, Inc.
3491 Hartman Road, Suite B
Traverse City, Michigan 49684-8836

Dear Mr. Johnson:

SUBJECT: Little Traverse Township (Emmet County) – WHPA Delineation WSSN: 3927

This letter has been sent to confirm our meeting on June 16, 2003, wherein the methodology for delineating wellhead protection areas (WHPAs) for the Little Traverse Township (Township) well fields was discussed. Participating in this "conceptualization" meeting were you, Mr. Brian Rice and Mr. Eric Walters representing Fleis & VandenBrink Engineering, Inc. (F&VE), and me representing the Wellhead Protection Unit (WPU), Water Division, Department of Environmental Quality (DEQ). Based upon a review of information provided in the meeting, it is recommended you complete WHPA delineation activities for the Township.

The Township maintains three well fields, each composed of two wells. The three well fields are east of the city of Harbor Springs, and are a mile or less from one another. The well fields are as follows:

- ◆ Emmet Heights Well #5 and Well #6
- ◆ Breakers East Well #1 and Well #2
- ◆ Harbor Cove Well #1 and Well #2

The wells at Emmet Heights and Breakers East well fields are screened at roughly the same depth, while the wells at Harbor Cove are completed roughly 200 feet deeper than the aforementioned wells.

In the meeting a packet of information was provided relating to construction of groundwater flow modeling to be used in identifying the WHPAs. The information included a summary of well data, a summary of aquifer hydraulic characteristics, an overview of the delineation method, and a summary of the model input parameters. The packet of information also contained regional and topographic maps of the area, a view of the Harbor Springs WHPA map, a depiction of the "initial" regional potentiometric surface, and confirmed potentiometric surface maps, a map depicting cross-section lines, and three cross-sections depicting the subsurface geology. Also included were copies of water well records for wells at the Township well fields, copies of water well records for wells used in construction of the geologic cross-sections, and a table of static water elevation data from the 2002 Harbor Springs WHPA delineation.

There is essentially no aquifer characteristic information on the Harbor Cove wells. It is unknown if these wells are hydraulically connected to other Township municipal wells. Therefore, the WPU recommends that an aquifer performance test be completed on the Harbor Cove well field, to be conducted according to the DEQ Policy and Procedure DWRP-03-003, *Aquifer Test Requirements for Public Water Supply Wells, December 1, 1997 (Rev. #1-6/2002)*.

Mr. Erik Johnson

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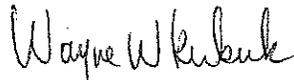
July 30, 2003

An aquifer performance test was completed at the Emmet Heights well field site in 2000. Additionally, an aquifer test was also completed at the nearby city of Harbor Springs well field in 2002. Available information indicates that the Emmet Heights and Breakers East production wells are completed in what has been characterized as a "leaky-confined" glacial drift aquifer that is ~22 to 100 feet thick. Aquifer characteristics indicate that the subsurface has a very good ability to yield groundwater to wells. Staff of WPU feels the information presented in the two reports is adequate for the purposes of WHPA delineation for Emmet Heights and Breakers East well fields. Please note, however, that our approval of this information is intended for WHPA development purposes only, and should not be construed as an endorsement of the reports' conclusions in regard to issues of capacity, yield, or water quality of the production wells.

Upon successful completion of the aquifer performance test on the Harbor Cove well field, a sufficient amount of information should be available to complete the delineation of the Township's well fields. You have identified the use of software such as SURFER®, WinFlow™, and the GPTRAC module of WHPA™ for the groundwater modeling effort, which should provide a reasonable protection area delineation.

Completion of the WHPA delineation phase will continue the development of a comprehensive wellhead program for Little Traverse Township. We look forward to working with you in the future. If you have any questions or comments with regard to wellhead protection, please contact Mr. Brant Fisher, WPU, Groundwater Section, Water Division at 517-241-1415, or you may contact me.

Sincerely,



Wayne W. Kukuk, Geologist
Wellhead Protection Unit
Groundwater Section
Water Division
517-241-1434

WWK:ckp

cc: Mr. William P. Dohm, Little Traverse Township
~~Mr. Brian Rice, F&VE~~
Mr. Scott Ross, DEQ
Mr. Brian Thurston, DEQ
Mr. Brant Fisher, DEQ
Ms. Ruth Kline-Robach, DEQ



CHECKLIST FOR WELLHEAD PROTECTION PROGRAM RENEWAL

Local wellhead protection plans submitted to the Michigan Department of Environmental Quality for renewal should include the sections listed below. Example items for each section are listed below.

INTRODUCTION

- Update basic information about the public water supply system (PWSS) and community, such as:
 - Community location and population
 - Present service area (geographic area and population served by the PWSS)
 - Number of wells and capacity
 - Local program goals for wellhead protection

ROLES AND RESPONSIBILITIES

- Update information about the local wellhead protection team including:
 - Roles and responsibilities of each new team member
 - New organizations or agencies involved
 - Intergovernmental agreements or memoranda have been updated or initiated
 - Person or agency responsible for the periodic update of the local plan
 - Date the plan was last updated

WELLHEAD PROTECTION AREA DELINEATION

- Update information about the Wellhead Protection Area (WHPA) including:
 - New geological data that should be incorporated into the current WHPA
 - Other updates made to the current WHPA
 - Updated map of the current WHPA that includes the wellfield location, municipal boundaries, and topographic contours
 - Changes in well usage or flow rates in the current WHPA (i.e. well abandonment, new wells, etc.)
 - Installation of new well/s that have been delineated (include new WHPA and map)
 - Installation of new well/s that have not been delineated (include timetable for delineating the new well/s)
 - Changes and/or updates to watershed boundaries and/or surface water runoff patterns (optional)
 - Changes and/or updates to storm water drainage system and facilities, including storm water basins (optional)

CONTAMINANT SOURCE INVENTORY

- Update information about the Contaminant Source Inventory, including:

- Date that the Contaminant Source Inventory was last updated
- Updated map which displays all potential and existing sources of contamination within the WHPA

- Review the following lists to determine if changes have been made within the WHPA.

- Sites of Environmental Contamination (201 sites), Remediation and Redevelopment Division (RRD), MDEQ (Part 201 of Act 451) (<http://www.deq.state.mi.us/part201ss/>)
- Underground Storage Tank List, Waste and Hazardous Materials Division, MDEQ (Part 213 of Act 451) (<http://www.deq.state.mi.us/sid-web/>)
- Leaking Underground Storage Tank Sites, Remediation and Redevelopment Division, MDEQ (Part 213 of Act 451) (<http://www.deq.state.mi.us/sid-web/>)
- Oil & Gas Contamination Sites, Geological and Land Management Division, MDEQ (Act 61) (<http://www.deq.state.mi.us/mir/>)
- Hazardous Waste Generators, Waste and Hazardous Materials Division, MDEQ (Part 111 of Act 451) (<http://www.deq.state.mi.us/tsd/> & <http://www.deq.state.mi.us/wdsp/>)
- Groundwater Discharge Permits, Water Bureau, MDEQ (Part 31 of Act 451)
- Landfill/Solid Waste Disposal Site List, Waste and Hazardous Materials Division, MDEQ (Part 115 of Act 451) (<http://www.deq.state.mi.us/wdsp/>)
- Federal National Priorities List EPA, Region 5 (CERCLA and Superfund) (<http://www.epa.gov/superfund/sites/npl/npl.htm> & <http://www.deq.state.mi.us/spad/>)
- Federal permits for Class V wells (Underground Injection Control Program) (Optional)
- Other sites of concern
- Environmental Mapper <http://www.mcgi.state.mi.us/environmentalmapper/>

MANAGEMENT APPROACHES FOR LOCAL WELLHEAD PROTECTION

- List the management activities identified in your Wellhead Protection Program Plan:

- Abandoned well search and closure program
- Zoning ordinance provisions for wellhead protection
- Facility inspections or a hazardous material survey
- Disseminated information to businesses
- Environmental Permit Checklist for new business
- Strategic monitoring within the WHPA
- Inter-agency coordination and communication
- Partnerships or agreements with county or state agencies helping to develop program
- Timetable for management program implementation
- Other management approaches

- Explain the current implementation status of the management activities listed above
- Describe updates and changes that have been made to the management activities listed above
- Explain other management activities that your community has decided to implement

CONTINGENCY PLAN

- Update information about the policies and administrative procedures for water supply emergency response, including:
 - Changes and/or updates to contacts in the Contingency Plan
 - Changes and/or updates to the response protocol in the event of a hazardous substance spill or other emergency
 - Changes in emergency water suppliers (bottled, bulk, etc.)
 - Changes and/or updates to the policies and procedures related to water supply replacement
 - New employee training on the response protocol
 - Water supply emergencies that have occurred since the plan was last updated
 - Other items to incorporate that have been learned since the plan was last updated

PLAN FOR NEW WELLS

- If expansion of the public water supply system (PWSS) is anticipated, include:
 - Identification of the proposed location, depth, and other descriptive information about the new wells
 - Proposed method for incorporating new wells into the wellhead protection program plan
 - Determination of the WHPA or the timetable for the WHPA delineation
- If expansion of the PWSS was previously anticipated and discussed in the plan, update the plan to include:
 - Expansion activities that occurred since the plan was last updated
 - Timetable that the expansion activities will or have occurred

PUBLIC PARTICIPATION AND OUTREACH/EDUCATION

- List the public education and outreach activities identified in your WHPP Plan:
 - Local meetings
 - Newsletters
 - Newspaper articles
 - Other media outlets _____
 - School presentations
 - Brochures
 - Website
 - Wellhead protection signage
 - Hazardous waste collection activities
 - Other _____
- Explain the current implementation status of the public education and outreach activities listed above
- Describe updates and changes that have been made to the public education and outreach activities listed above
- Explain other public education and outreach activities that your community has decided to implement

