Barry-Eaton District Health Department
Time of Sale or Transfer Program (TOST)
The First Three Years 2007-2010

Caring for the Community Since the 1930’s
Before viewing the pictures, let's review the sicknesses caused by sewage...

- **Bacteria;** E. coli O157:H7 and other shiga toxin producing E. coli, Campylobacter, Clostridium difficile, Listeria, Salmonella, Shigella, Vibrio (cholera)

- **Viruses;** Poliovirus (oral vaccine derived-only reported in unvaccinated community in Minnesota), Hepatitis A, Rotavirus, Norovirus, Coxsackie virus A and B (causes encephalitis, myocarditis)

- **Protozoa;** Giardia, Entamoeba histolytica (amebiasis), Toxoplasmosis (fetal damage if pregnant woman infected), Cryptosporidium

- **Worms;** Pinworms, Roundworms (ascariasis), Tapeworms

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Reason for Concern</th>
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<tr>
<td>Pathogens</td>
<td>Parasites, bacteria, and viruses can cause communicable diseases through direct/indirect body contact or ingestion of contaminated water or shellfish. Pathogens pose a particular threat when partially treated sewage pools on ground surfaces or migrates to recreational waters. Transport distances for some pathogens in surface or ground waters can be significant.</td>
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<tr>
<td>Nitrogen</td>
<td>Nitrogen is an aquatic plant nutrient that can contribute to eutrophication and depletion of dissolved oxygen in surface waters, especially in estuaries, and coastal embayments. Excessive nitrate-nitrogen in drinking water can cause methemoglobinemia in infants and pregnancy complications for humans. Livestock can also suffer health impacts from drinking water high in nitrogen.</td>
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<tr>
<td>Phosphorus</td>
<td>Phosphorus is an aquatic plant nutrient that can contribute to eutrophication of inland fresh waters and eventual depletion of dissolved oxygen.</td>
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</tbody>
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*Slide source Rod Frederick, EPA*
Septic 101

Typical Sewage System

- A typical septic system has 4 main parts:
- A PIPE from the home
- A SEPTIC TANK
- An absorption system (drainfield)
- And the SOIL
  - Microbes digest or remove most contaminants before it eventually reaches our surface waters (lakes, rivers, wetlands) or our groundwater.
Typical Septic Tank

- A watertight tank that separates solids from liquid & digests organic matter.
- Septic tanks remain full of liquid between uses. When water is used the same quantity of water is displaced out of the tank and flows to the absorption system.
After the sewage flows out of the septic tank it goes to an absorption system

• This is where the liquid portion of a home’s wastewater is dispersed
  – The typical drainfield contains perforated pipe placed in a layer of gravel/stone
  – Wastewater flows through the pipe and stone and into the soil.

Trench type system above. There are many types of absorption systems
Not a septic system...

- Illicit connections to the storm drain or to the river
- Bleeder lines or overflow lines from a sewage system to the storm drain, ditch or to the river
- A field tile is NOT a septic system
TOST Picture Album

Photo Courtesy of Midland County Health Department
Pictures are worth a 1000 words...

The following information and pictures, including aerial photographs, are all from sites where an evaluation of the water supply and/or sewage system was performed in Barry and Eaton Counties as part of the TOST program.
This is what the plumbing can look like when sewage backs up from a failed sewage system....
Failed drainfield connected to the creek
A closer look at the sewage connection to the creek from previous picture
This house had no sewage system--just a pipe discharging the sewage to the ground surface.
Sewage overflow pipe called a “Bleeder line” discharging to the road ditch

Health Department flushed tracer dye down the toilet. The dye showed up in the road ditch. See bright green dye below.
This failed drainfield had a “bleeder line” too. Where did that line go?....
The bleeder line went to the county drain. But there’s more…the neighboring site also had a failed drainfield found through TOST.
Leaking Septic Tank

Causes scum & solids to enter the drainfield when sewage rises high enough to overflow.

Bottom of sanitary tee

Water level below
These steel tanks were full of sewage and inverted on top of two failed seepage pits.

Contractor said: “I haven’t ever seen anything like this in 47 years.”
Sluggish Drains?
The sewage leaving this leaking septic tank discharged to the surface of the ground
Hopefully the home-run ball didn’t make it to the sewage....

Failed system with sewage flowing on the ground surface.
The black staining on the rim of this septic tank manhole shows evidence of sewage backup into the tank....
....and the area over the drainfield showed evidence of sewage surfacing to the ground....
...digging into the failed drainfield revealed sludged stone
Sewage discharging to the county drain, which then drains to the river
Inside a leaking septic tank where the pre-cast concrete baffle was completely corroded off and the tank outlet plugged.
Inside....
...Outside...
...and the septic tank lid was collapsing too!

Pictures showing the open hole from the collapsing septic tank
All in the neighborhood...

Four TOST Sites with

• Three failed sewage systems

• Unplugged wells

• E-coli bacteria detected in the open, broken well system located in this flood prone area
This site had a damaged well and....
...a failed drainfield and bleeder line discharging sewage next to the lake!
TOST Site: No sewage system & Contaminated Well

- County Drain connected to river
- Septic Tank (no drainfield found)
- Well with high nitrates
TOST Site: No sewage system & Contaminated Well

- No septic tank found and no drainfield found
- County Drain connected to river
- Nitrate Well
TOST Site: No sewage system - sewage drained to the river
TOST Site: Failed drainfield

- Drain Tile from slide 1 & 2
- Open Drain shown in slide 3
- Failed Drainfield

Slide 4 of 5
And they are all neighboring homes!

Sewage piped to the drainage creek which then connects to the river

No system found

Failed system
Septic tank with unsafe cover
Three TOST sites in a row with not one drainfield...

1. Sewage collection tile
2. Unplugged, open well
3. Open drain discharging to the lake
On-site Water Well System 101

The typical well system has four basic parts:

• Well
• Pump
• Pressure Tank
• Plumbing or distribution system
Isolation Distances from potential sources of contamination for Private* Water Supplies

*NOTE: Public wells require greater isolation distances
Abandoned Wells:
Old, unplugged wells can bypass natural protective geological features and provide a pathway for contaminants to flow directly into our drinking water aquifers.

Courtesy of the MDNRE.
Abandoned, unplugged wells
Abandoned, unplugged well
Abandoned, unplugged well
Unplugged wells*, next to a 13’ “well” in a flooded pit

*Note: a 3rd abandoned well was also found when these wells were plugged by a licensed well driller
Well with nitrate* contamination found in a flooded pit with a sewer line running through it

*Note: sewage is a source of nitrate
Buried open well casing
Stab point “well” less than 25’ deep & 18’ away from leaking septic tank
Broken well pit cover at the back door
Broken well cap, unplugged well and 30’ from fuel oil tank
These pipes are leading to an old buried unplugged well.
Bottles of bleach around a well contaminated with coliform bacteria
Broken well with bacteria contamination

Register Evaluator submitted this picture using TOST’s web-based reporting system
Damaged Wells....Broken caps, no caps, duct tape?!
Wells are supposed to be at least 25’ deep. This one is 12’ deep...
This one was 8’ deep
And this one was 13’ deep
Flooded well

Flood line
Water system cross connected to the sewer line
Leaking Underground (gasoline) Storage Tank Site

The gas contamination found in the shallow groundwater at this site has not been cleaned up.

Prior to selling this parcel, the well was evaluated under TOST and found to be shallow & the well’s construction did not provide protection from contamination. After the area wells were tested by the health department, a new protected well was drilled.
Wells should be isolated 50’ minimum from fuel oil tanks....this well was just 9’ from the buried tank.
These fuel oil tanks were located just 12’ from the well.
Cross Connection between water system and sewer line...
Looking down at what was a 5” PVC well
The abandoned unplugged well for this site was thought to be here buried in an old pit...

... but it was found buried by the house & just a few feet from the septic tanks!!!!!
TOST Results

The purpose of the program is to protect the quality of water resources, to protect on-site water supplies and the natural environment, and to protect public health...

• In the first 3 years of the program there have been 2,804 sites evaluated for on-site well and/or on-site sewage system hazards

• Sites with failure conditions such as those you just viewed are now being “found and fixed”
*Note: There may be more than one reason for failure on an individual site. Thus there are more total reasons for well failure (755) than the total number of sites with well failures (601)
TOST Results

Chart 2 Identified Public Health Hazards
Sewage Failure Reasons*

- Illicit connection, no absorption system (136)
- Septic Tank Failure (251)
- Backup (72)
- Dilapidation, Maintenance (54)
- Discharging on the ground surface (80)
- Other (24)
- Unrecognizable system (114)

*Note: There may be more than one reason for failure on an individual site. Thus there are more total reasons for failure (731) than the total number of sites with sewage failures (602).
TOST Results

Thus far and under the oversight of BEDHD the TOST program has:

• Found 136 illicit connections (including sites with no sewage system)
  – Stopping the illegal discharge of sewage from these sites alone equates* to a reduction of 26.7 million gallons of sewage -- sewage that is no longer flowing improperly into our lakes, streams, rivers and wetlands.

*136 sites x 2.56 persons per site x 70 gallons/ day x 365 days x 3 years=26.7 million
TOST Results

• Found over 117 unused, abandoned wells---once plugged these old wells can no longer serve as a conduit to contaminate our groundwater aquifers

• And much more...
  – For more information on the TOST findings go to www.barryeatonhealth.org to read the full report to the community – TOST, The First Three Years