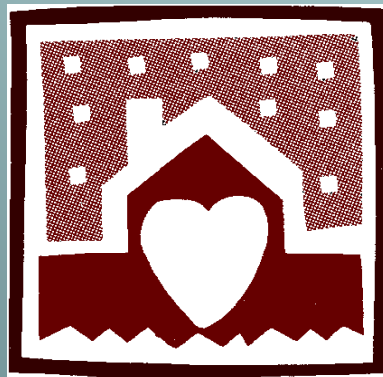


Barry-Eaton District Health
Department
Time of Sale or Transfer Program
(TOST)
The First Three Years
2007-2010



*Caring for the
Community Since the
1930's*

Before viewing the pictures, lets 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

References: Musher DM, Musher B. Acute contagious gastrointestinal infections. N Engl J Med 2004;351:2417 Koren H, Bisesi M. Public Health Aspects of Water Pollution. In: Handbook of Environmental Health, Vol 2. Boca Raton: Lewis Publishers 2003:570-583. Source: Dr. Robert Schirmer, MD, FACP, BEDHD Medical Director

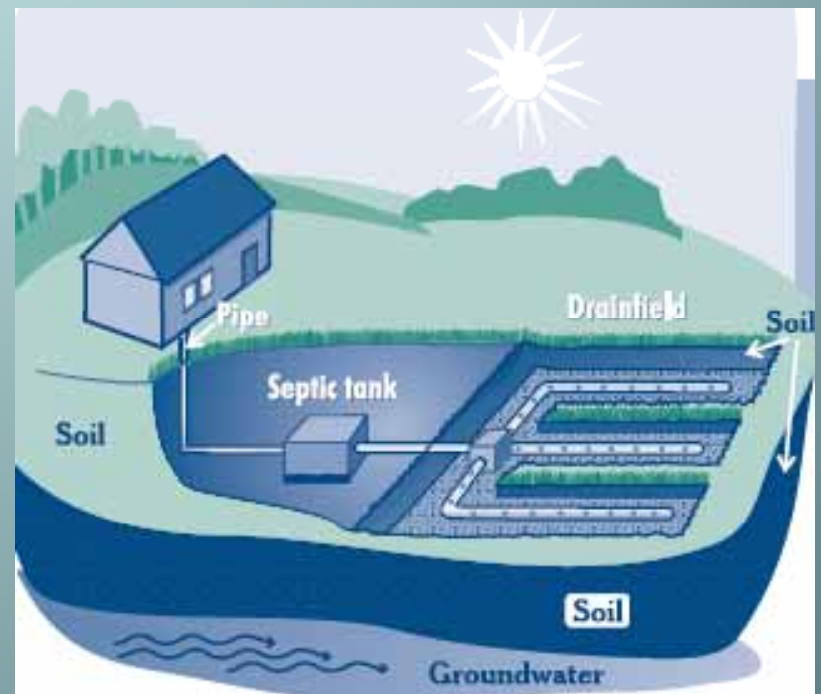
Septic System Pollutants of Concern

Pollutant	Reason for Concern
Pathogens	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.
Nitrogen	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.
Phosphorus	Phosphorus is an aquatic plant nutrient that can contribute to eutrophication of inland fresh waters and eventual depletion of dissolved oxygen.

Septic 101

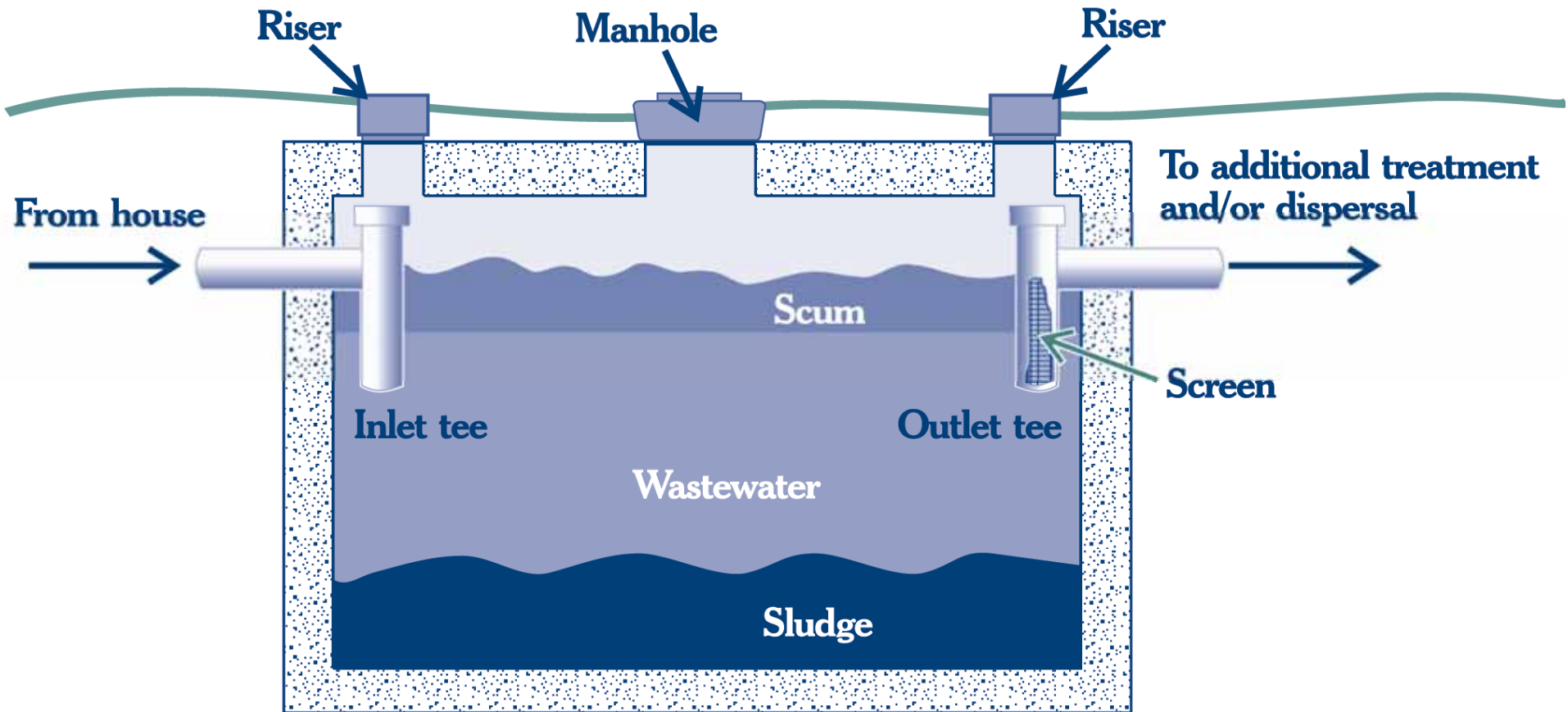
Typical Sewage System

- 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



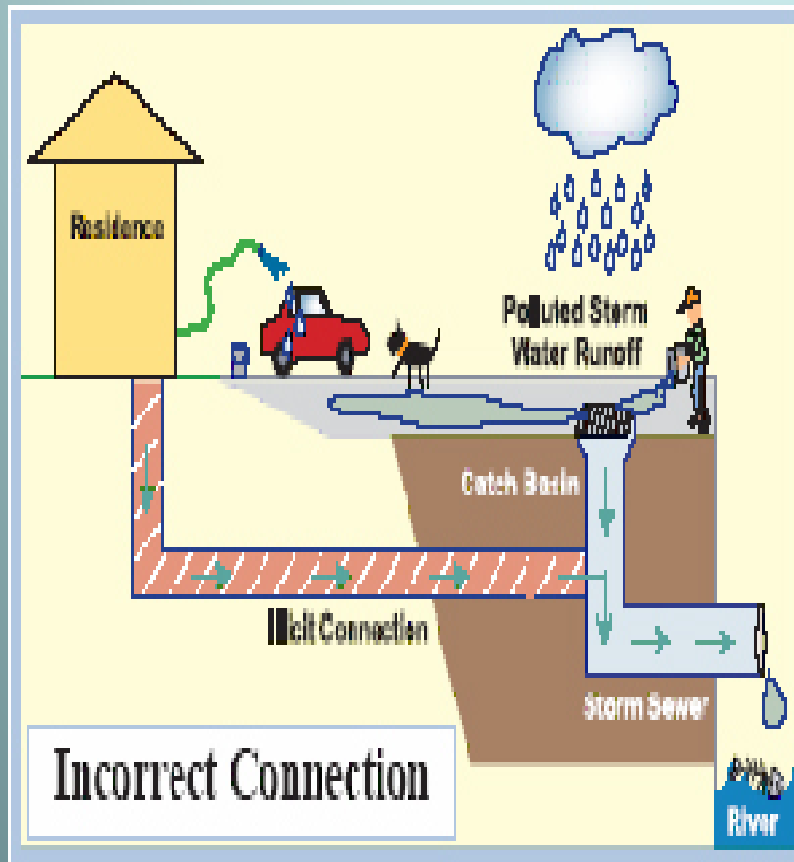
After the sewage flows out of the septic tank it goes to an absorption system

- 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

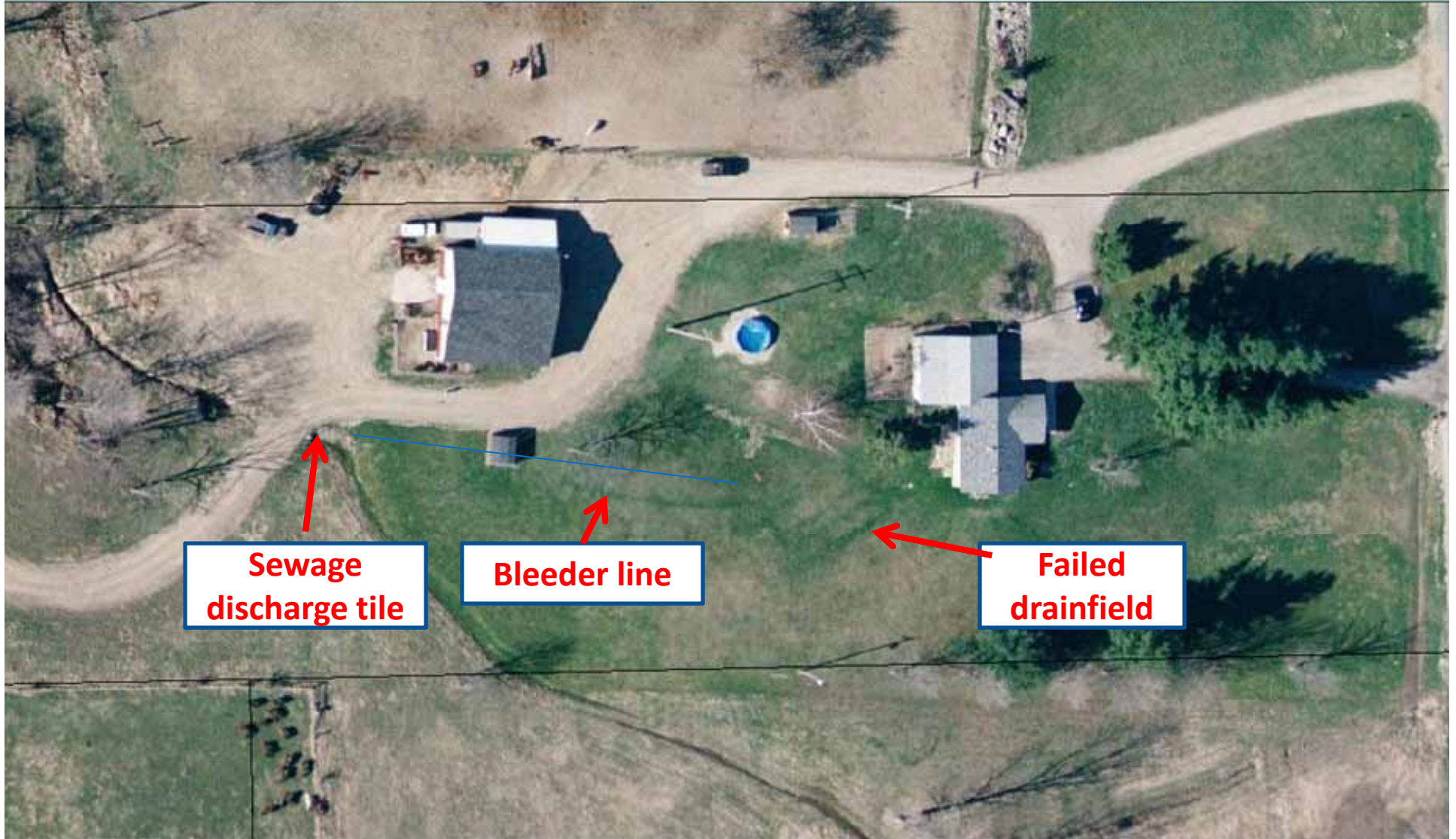
Pictures are worth a 1000 words...

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



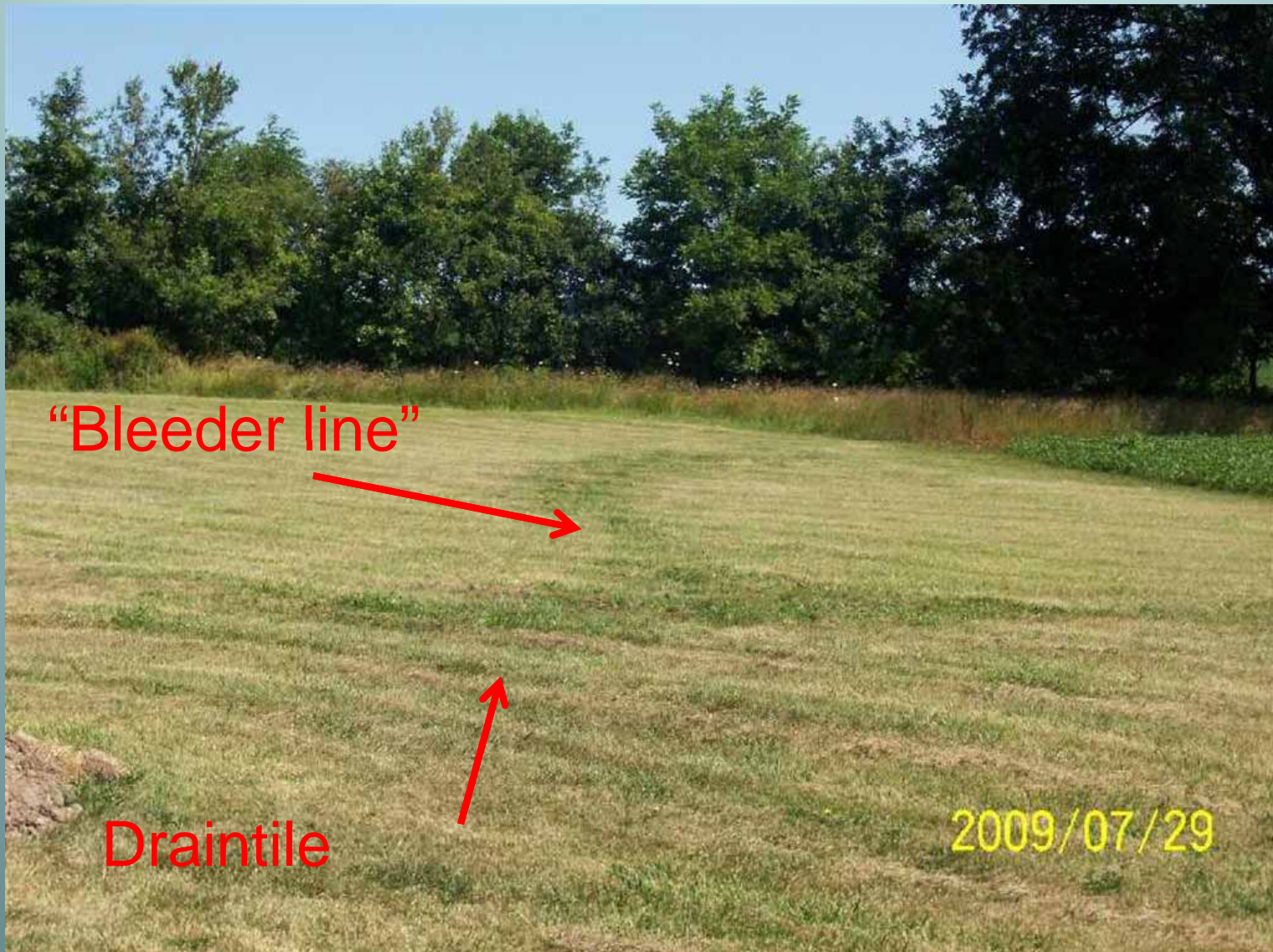
Sewage overflow pipe called a “Bleeder line” discharging to the road ditch



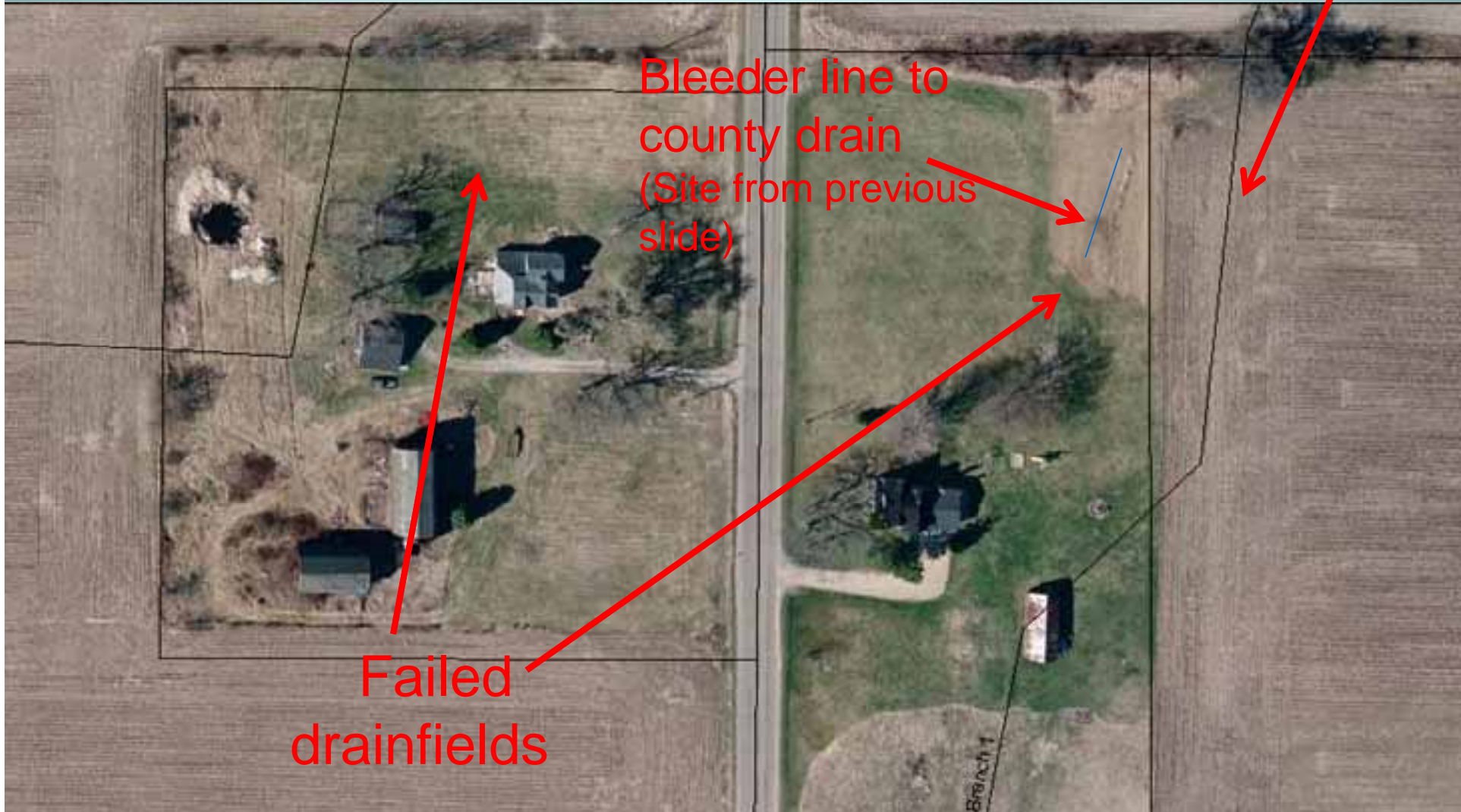
Health Department flushed tracer dye down the toilet . The dye showed up in the road ditch. See bright green dye below.



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



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

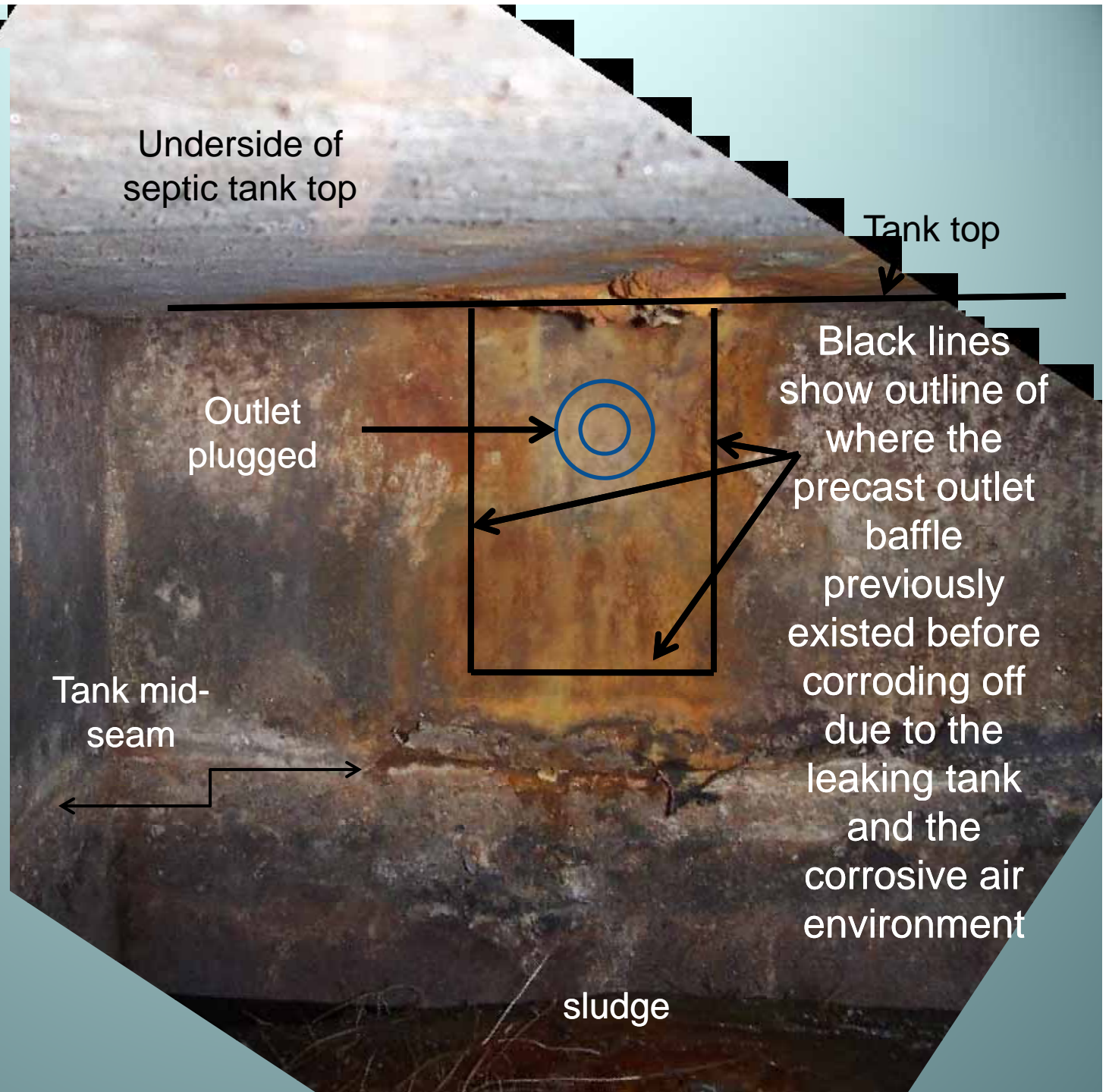


Slide 3 of 3

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!

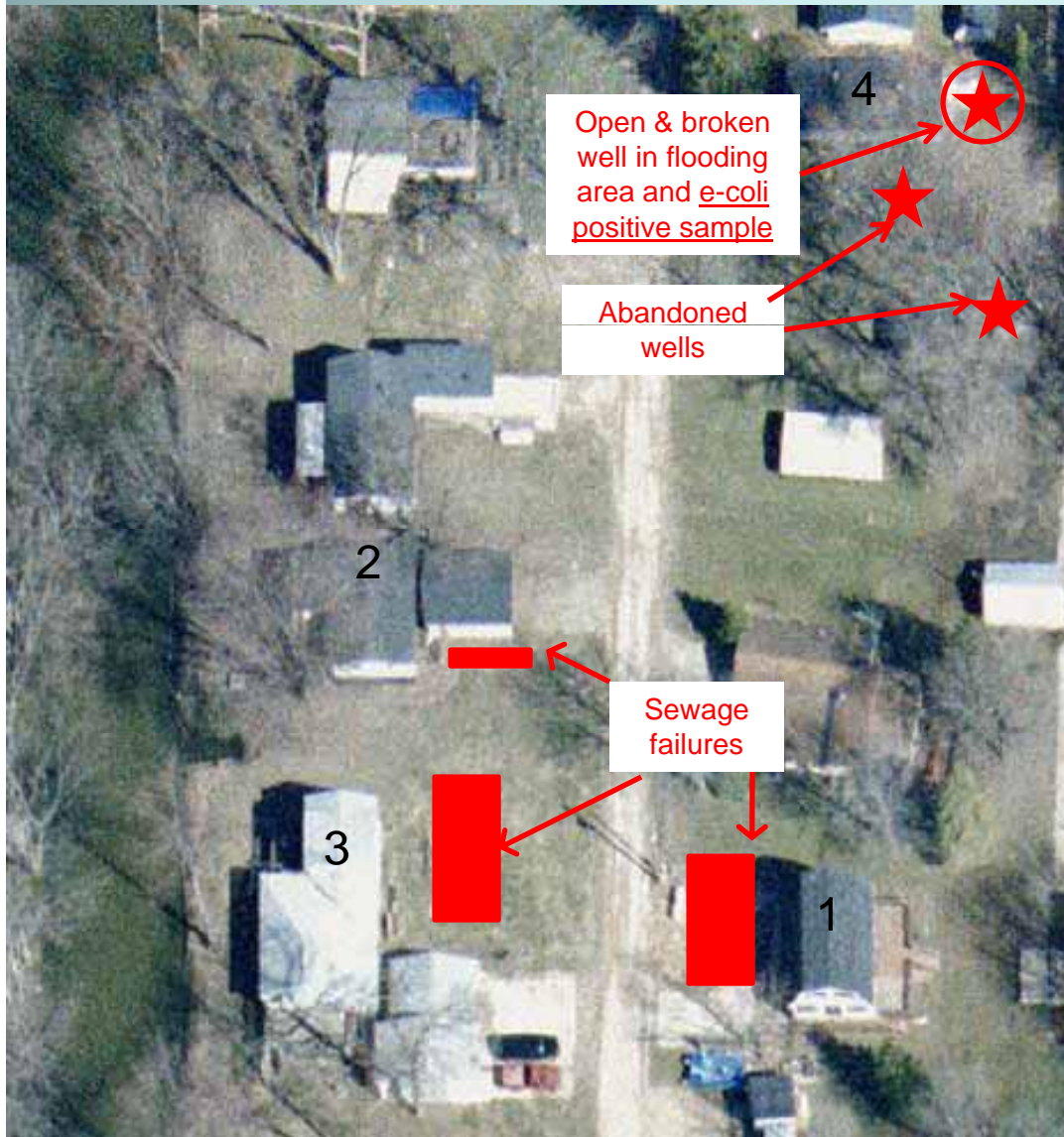


Pictures showing
the open hole from
the collapsing
septic tank



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!

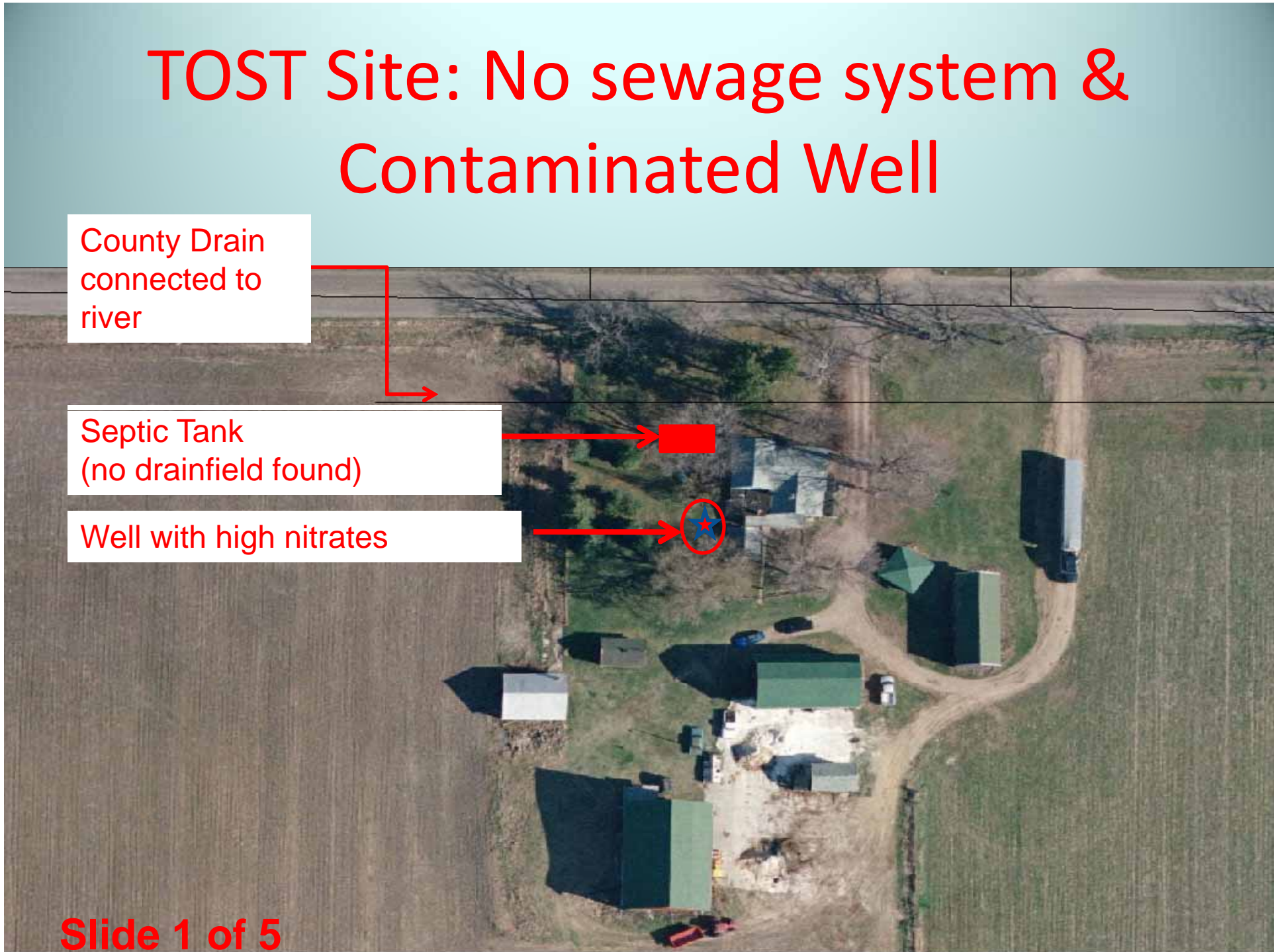


TOST Site: No sewage system & Contaminated Well

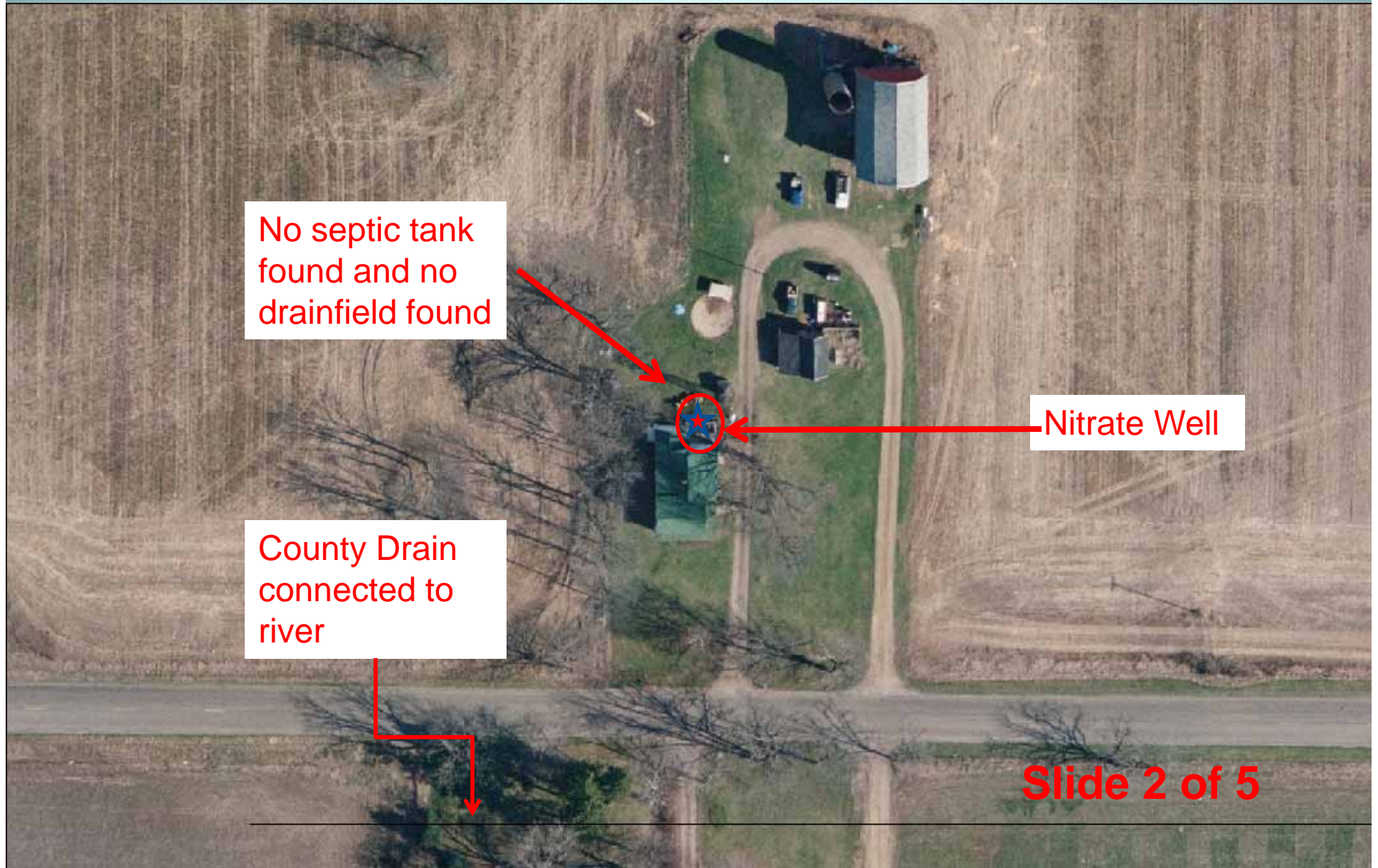
County Drain
connected to
river

Septic Tank
(no drainfield found)

Well with high nitrates



TOST Site: No sewage system & Contaminated Well



TOST Site: No sewage system- sewage drained to the river



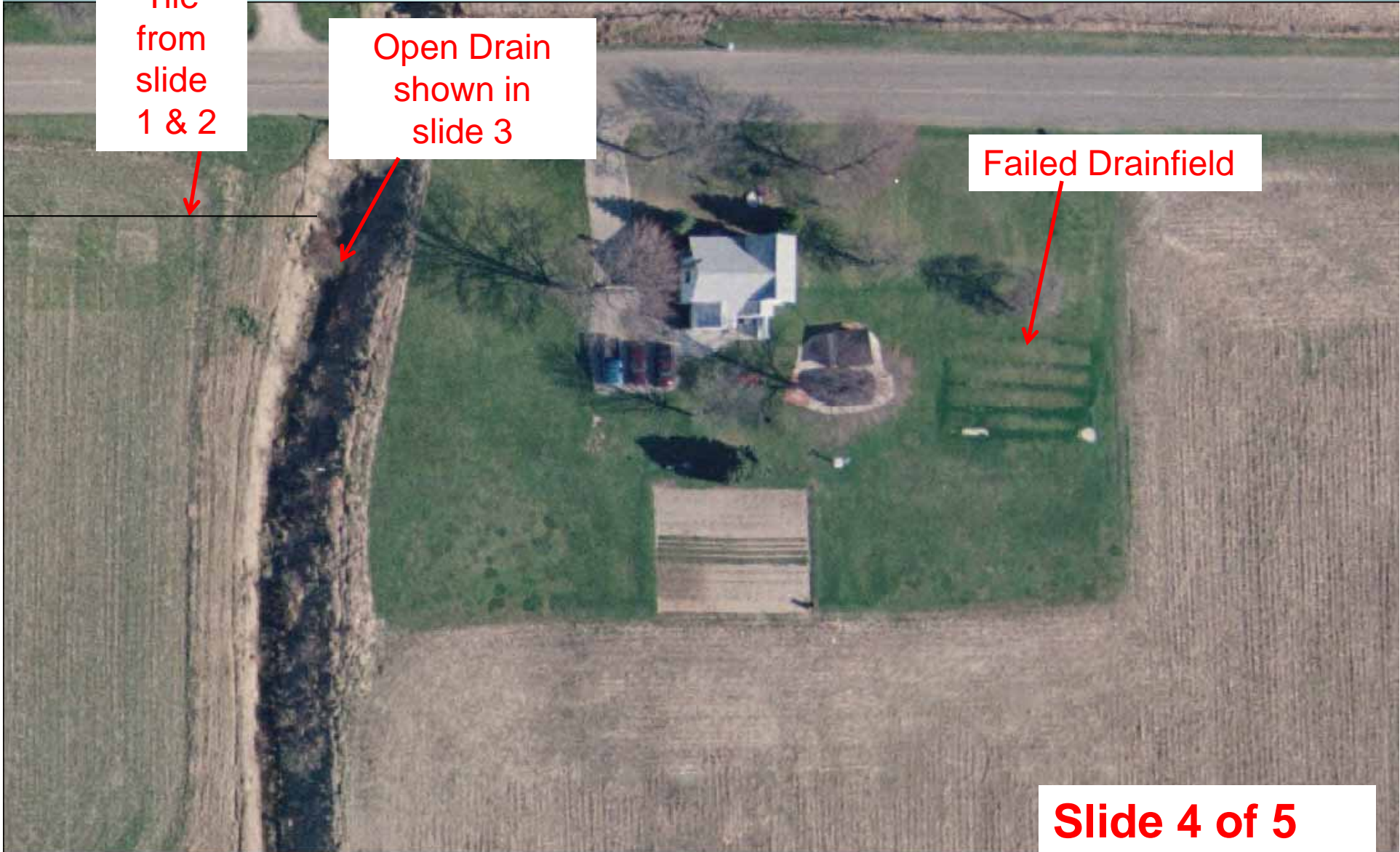
TOST Site: Failed drainfield

Drain Tile from slide 1 & 2

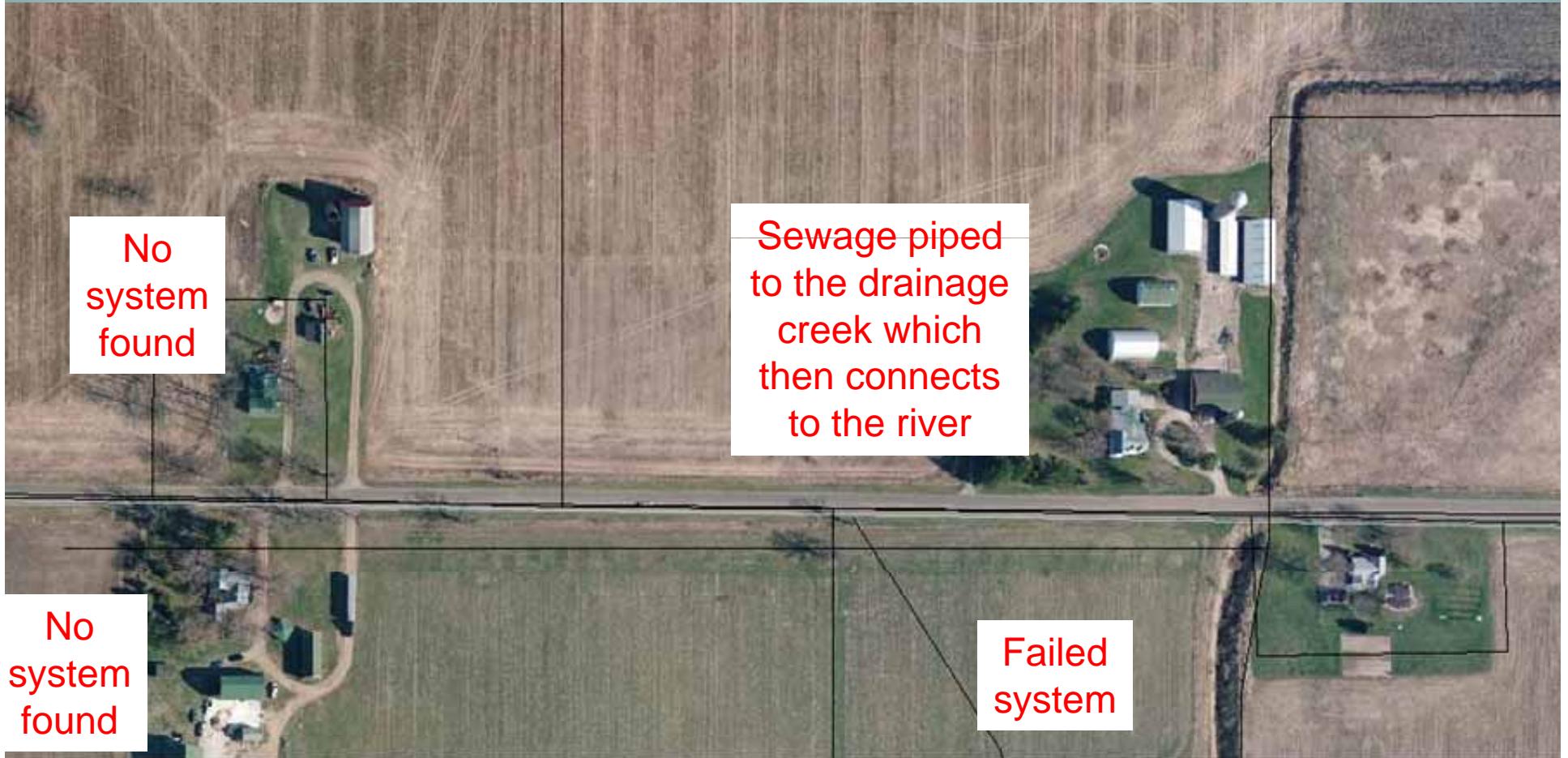
Open Drain shown in slide 3

Failed Drainfield

Slide 4 of 5



And they are all neighboring homes!



Septic tank
with
unsafe cover



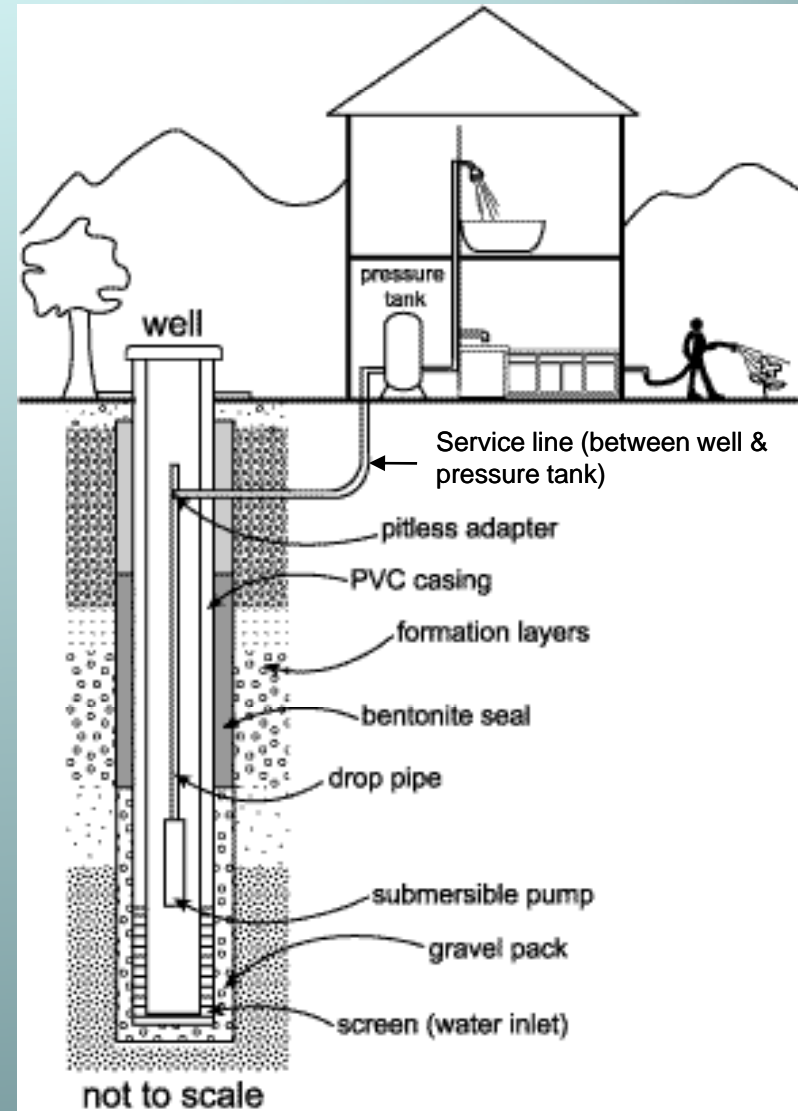
Three TOST sites in a row with not one drainfield...



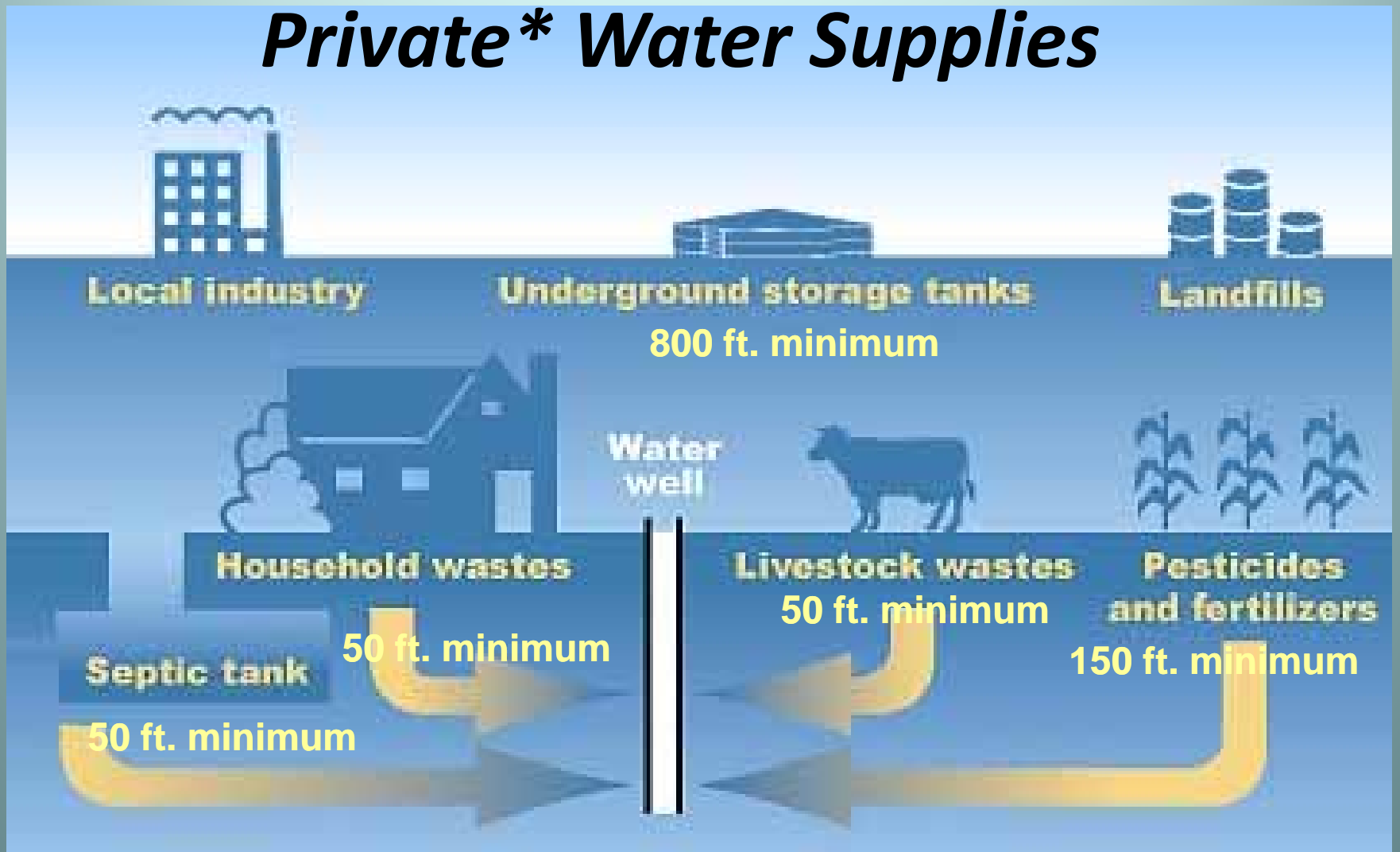
On-site Water Well System 101

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*

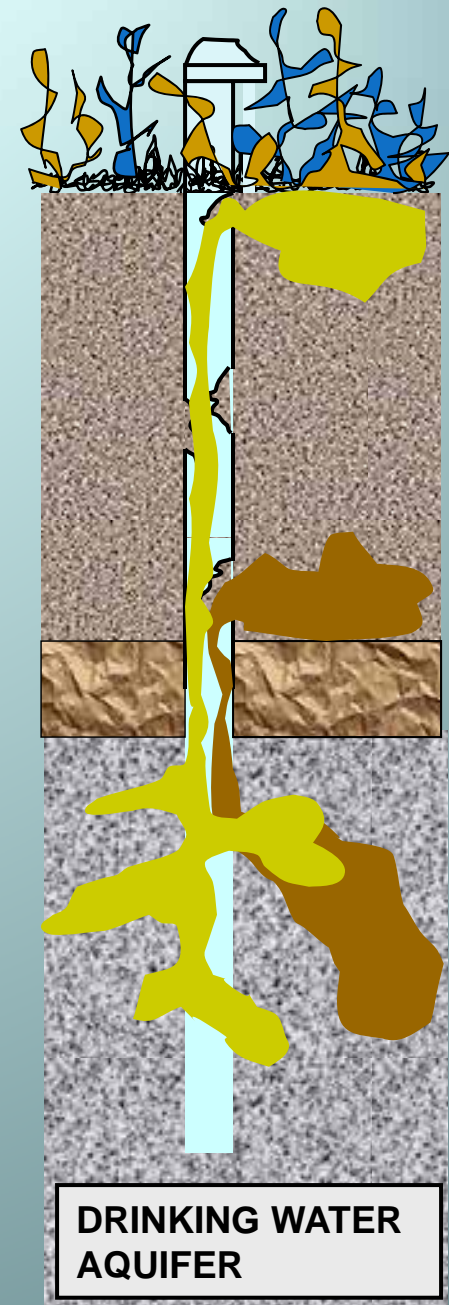


*NOTE: Public wells require greater isolation distances

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



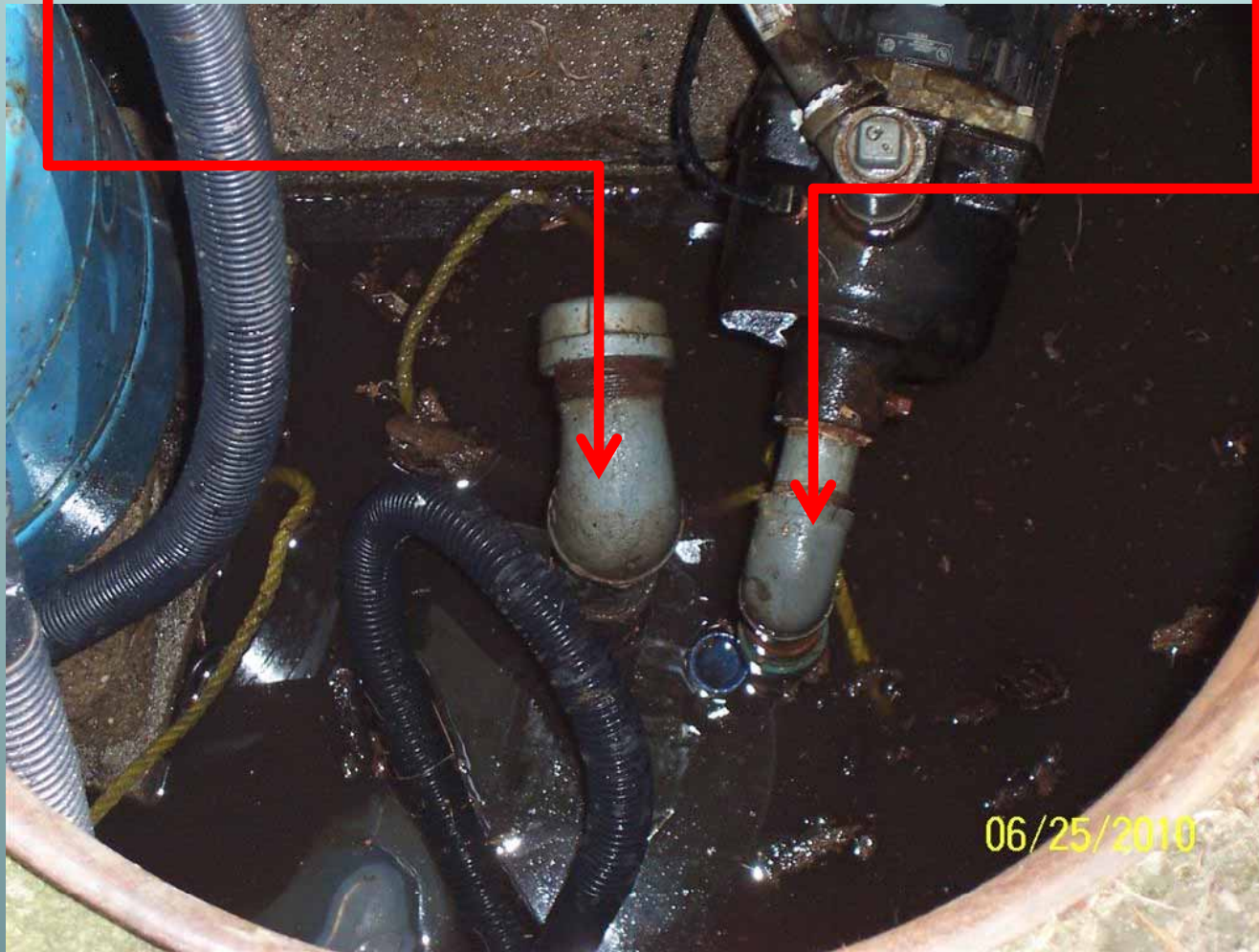
Abandoned, unplugged well



Abandoned, unplugged well

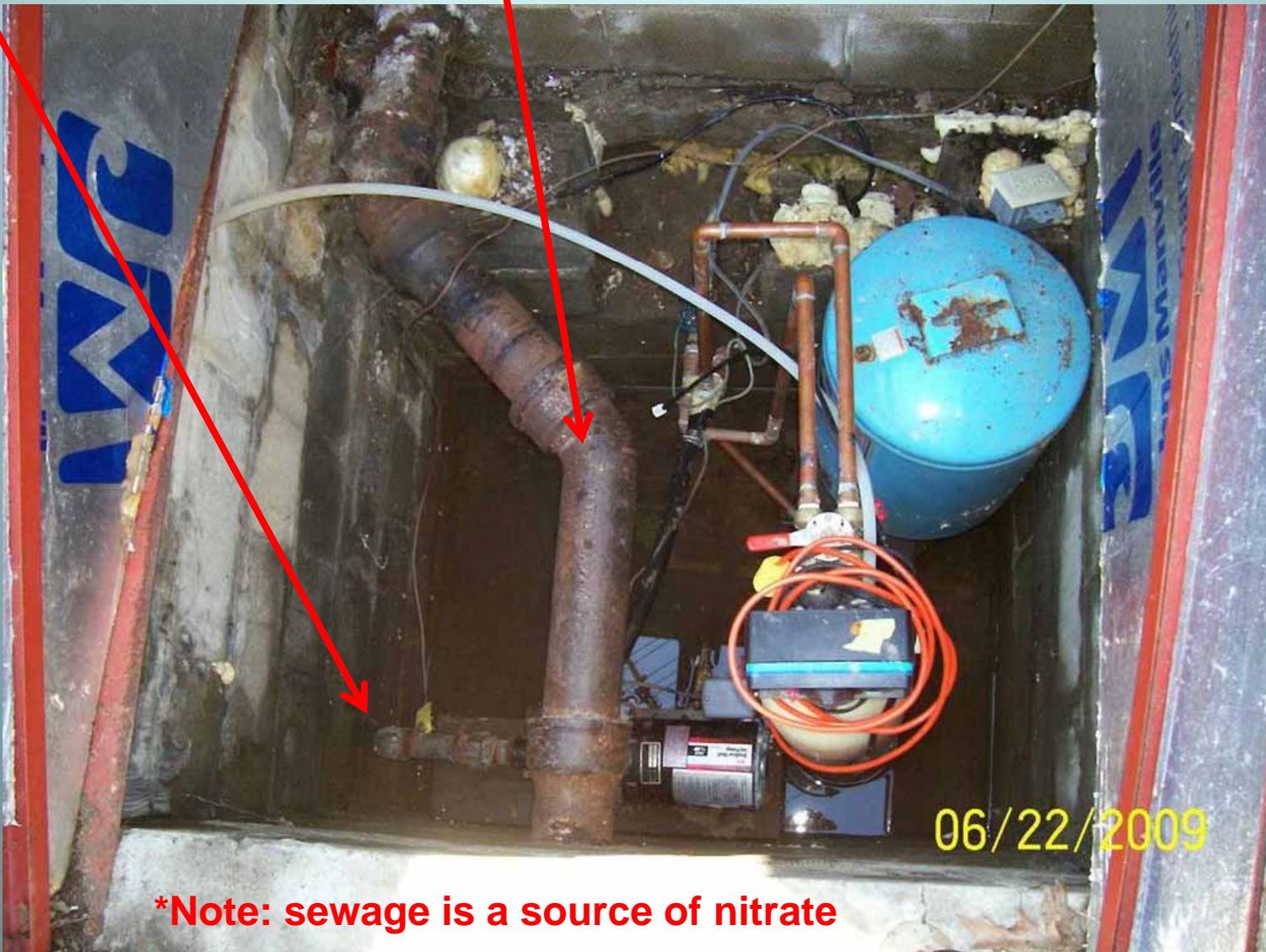


Unplugged wells*, next to a 13' “well” in a flooded pit



***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



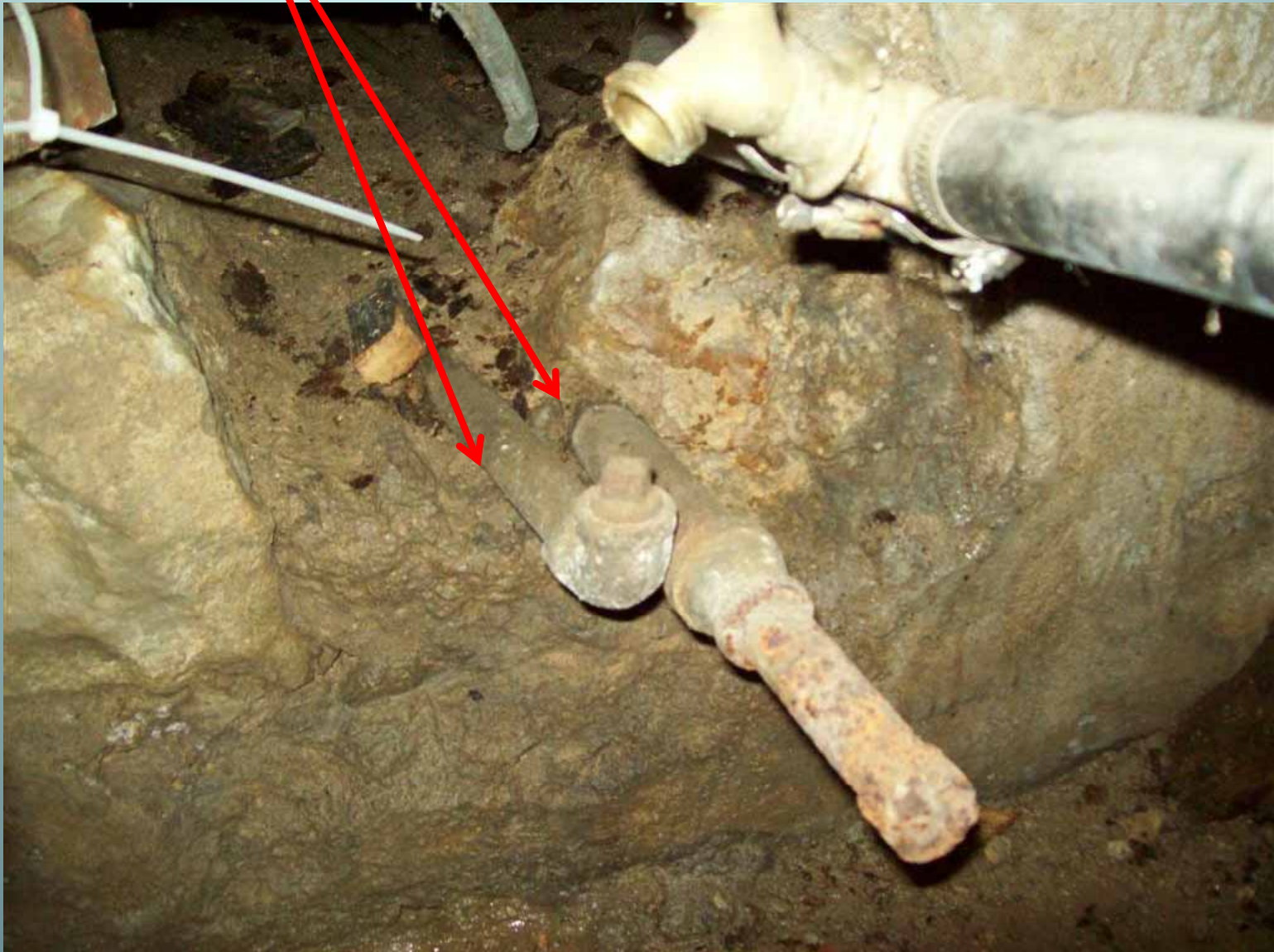
Broken well cap, unplugged well and 30' from fuel oil tank



Unplugged
well

07/13/2009

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

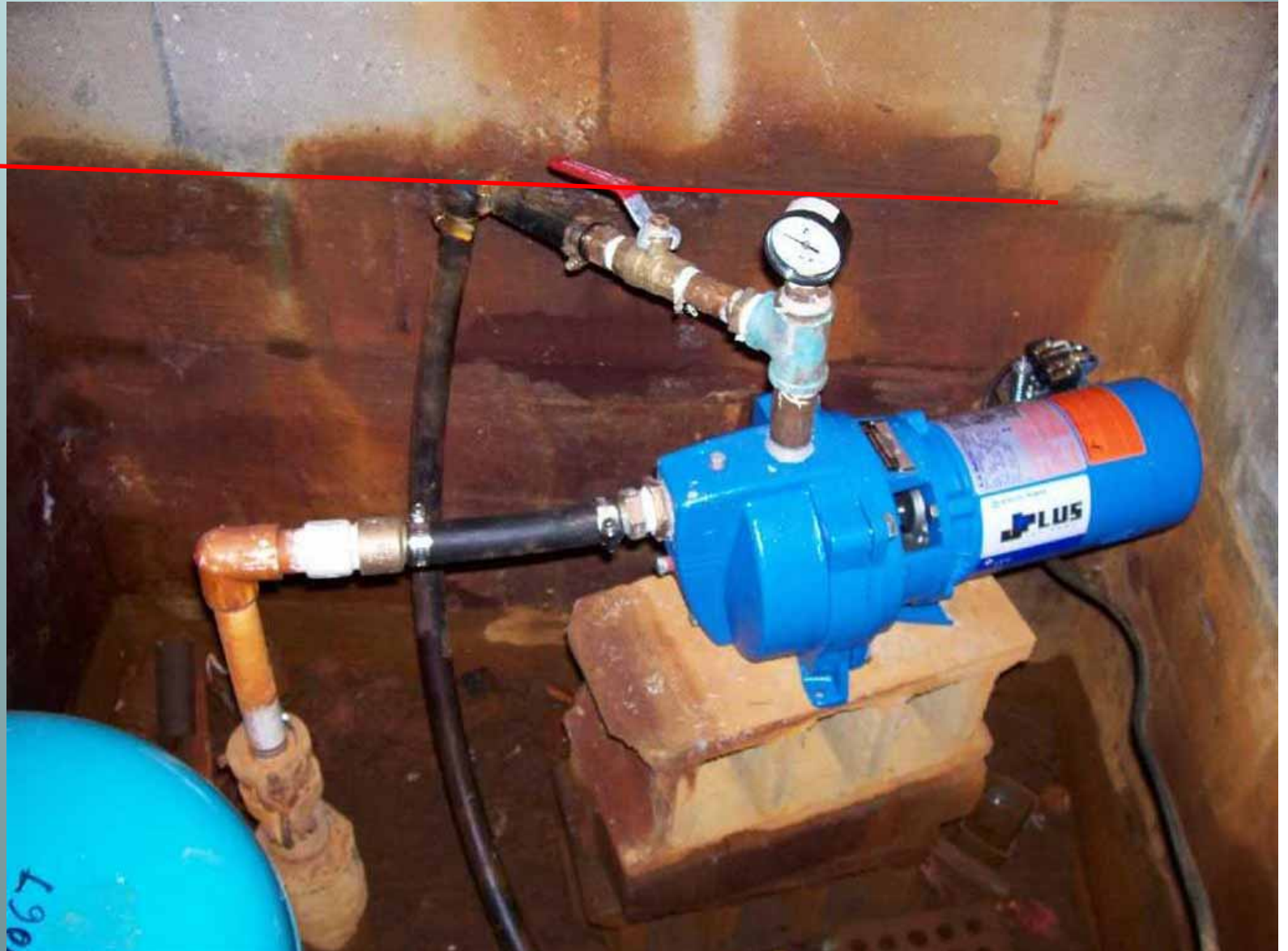
And this one was 13' deep



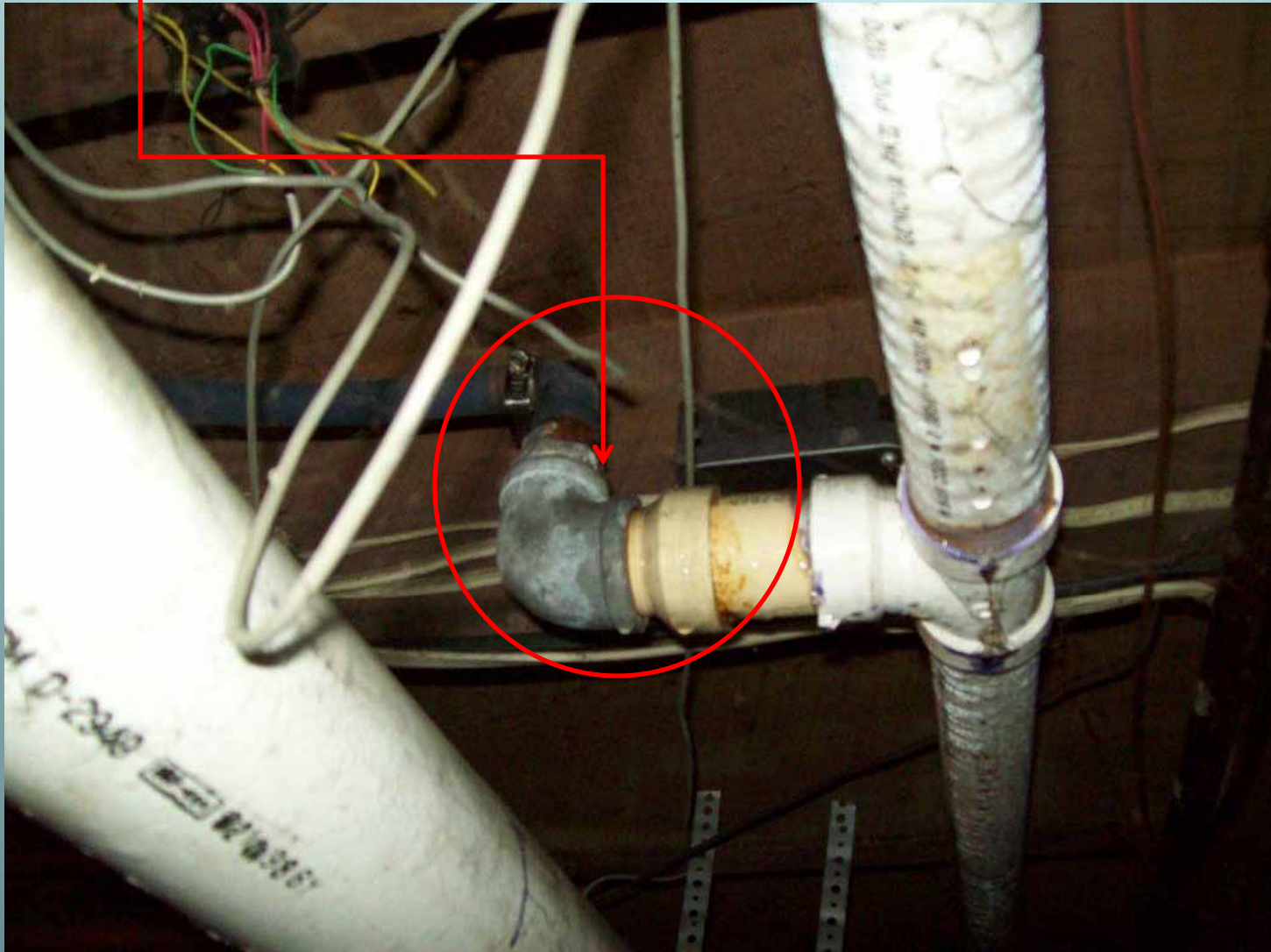
05/05/2010

Flooded well

Flood line

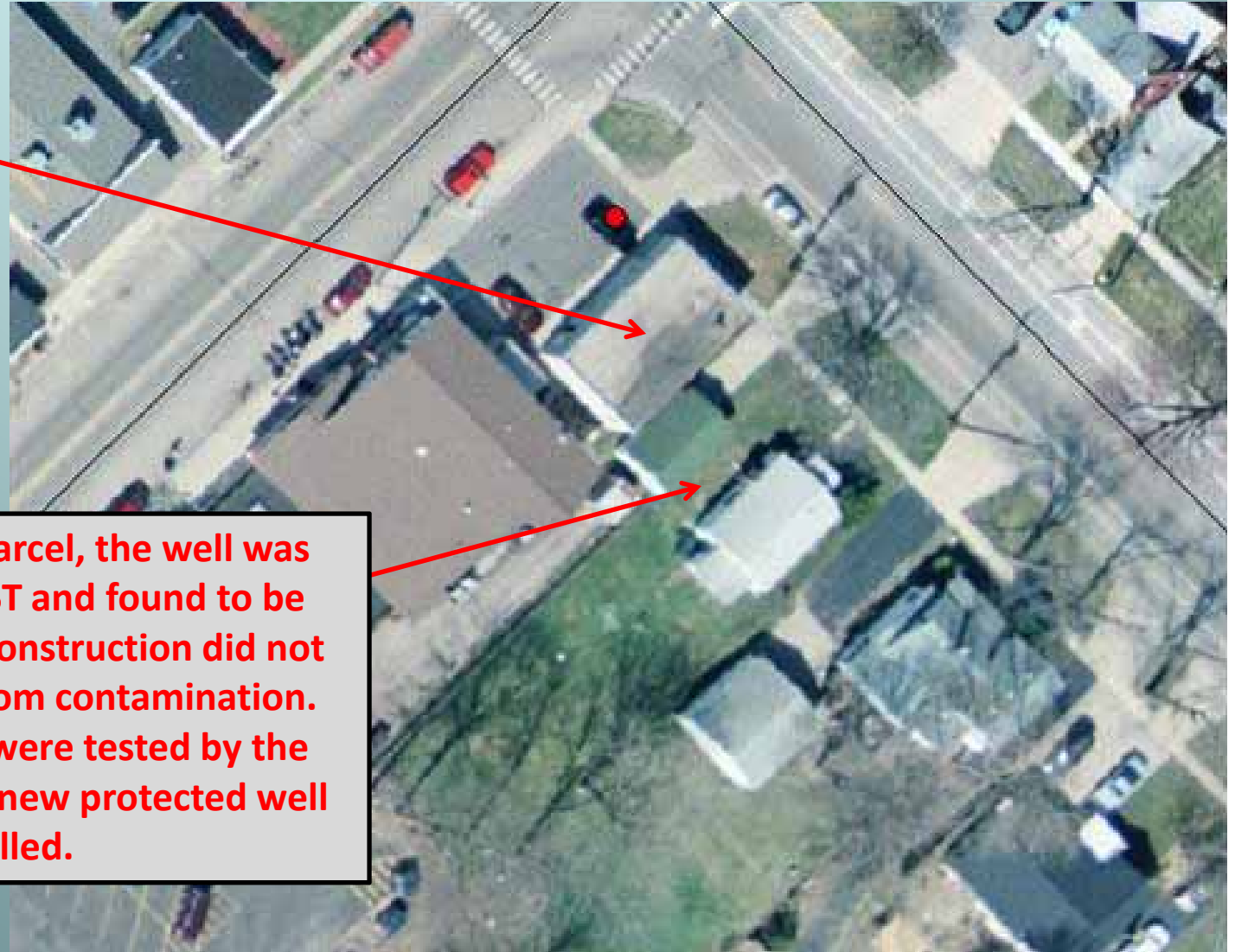


Water system cross connected to the sewer line



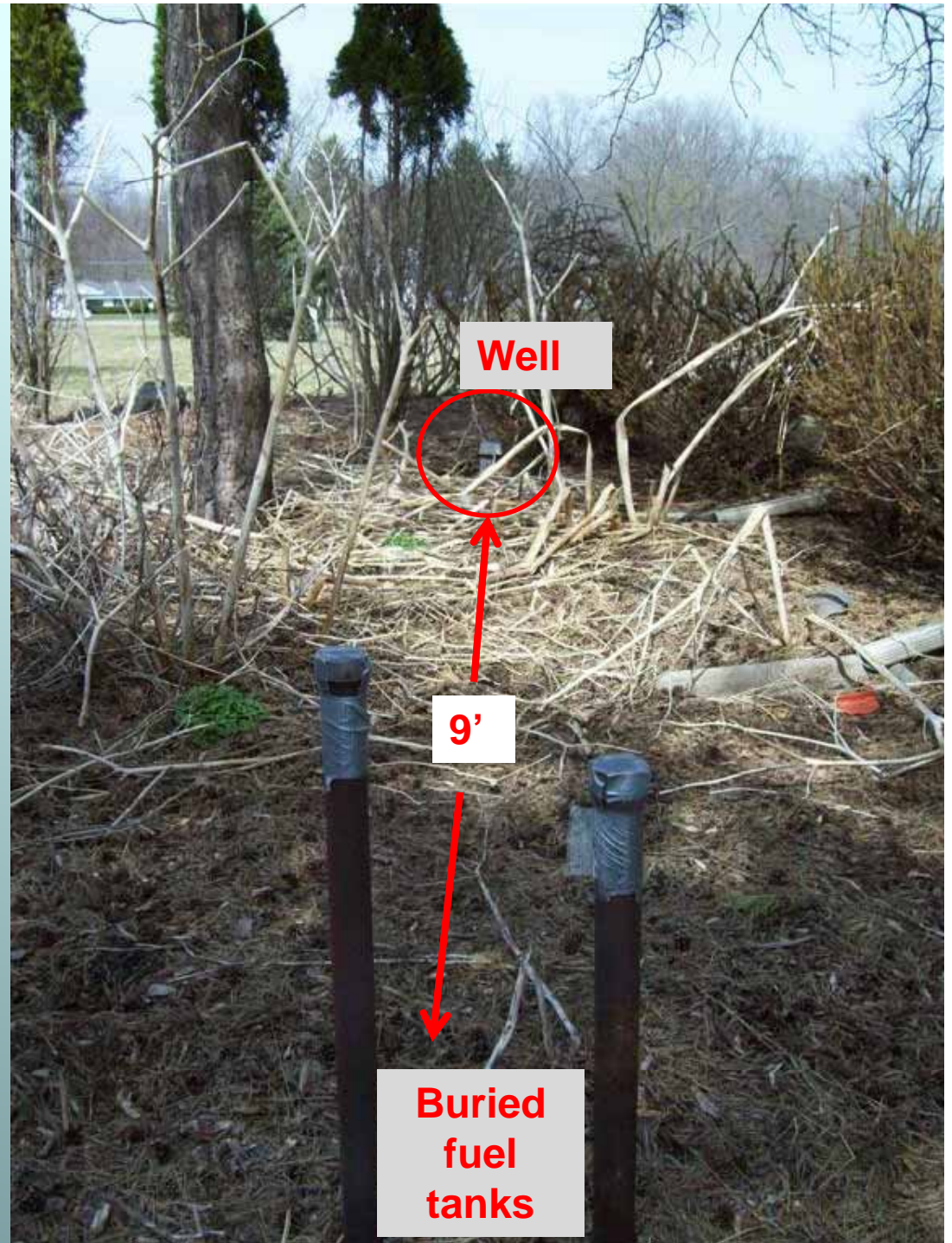
Leaking Underground (gasoline) Storage Tank Site

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...



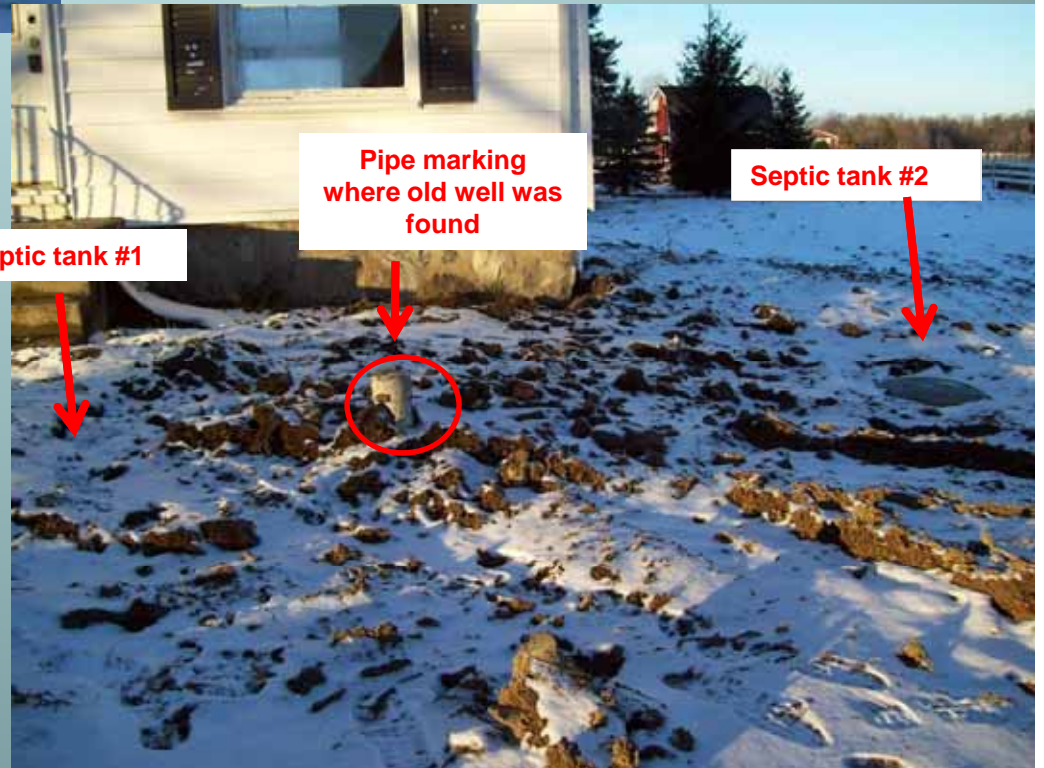
Looking down at what
was a 5" PVC well





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!!!!



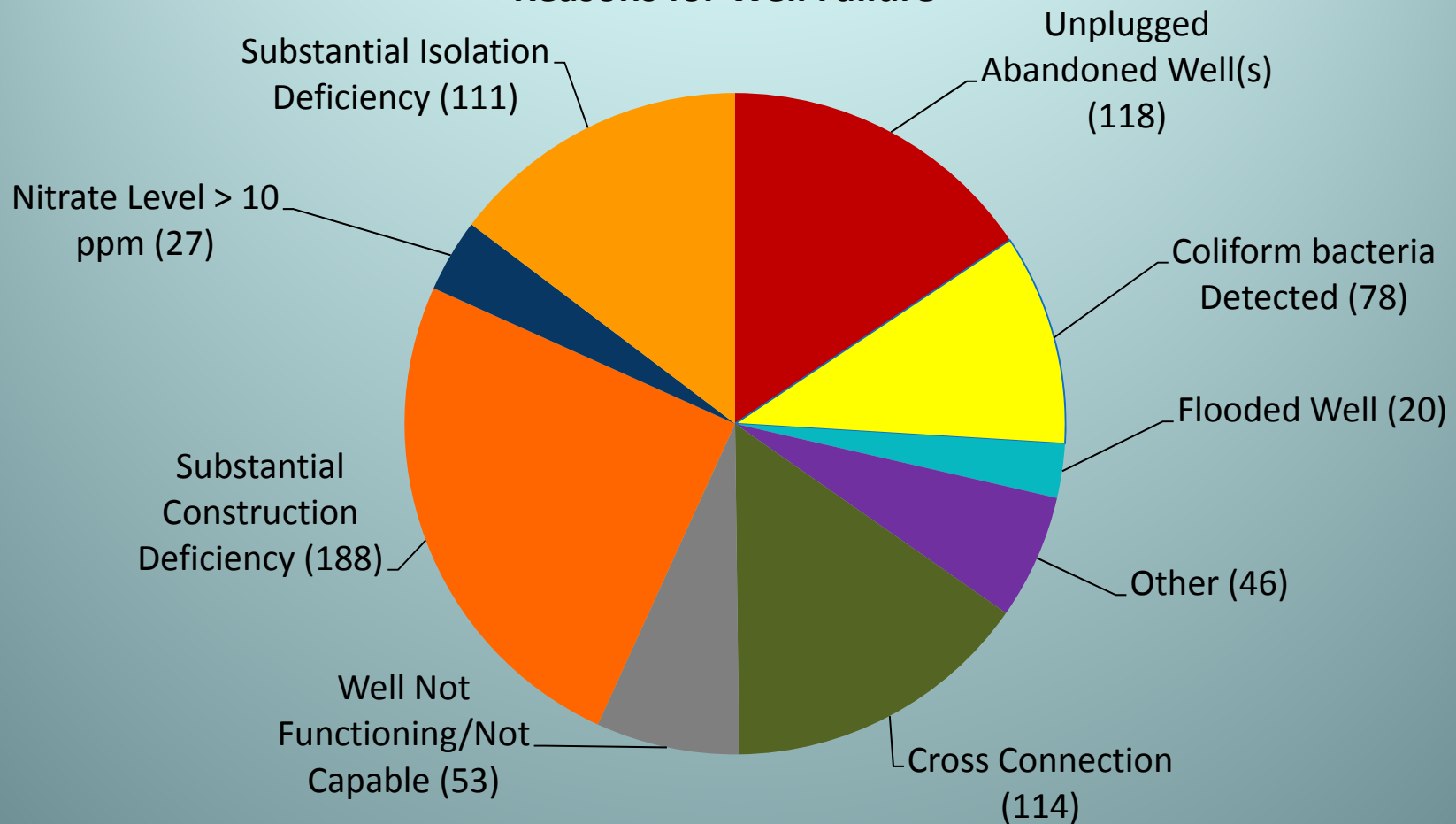
TOST Results

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”

TOST Results

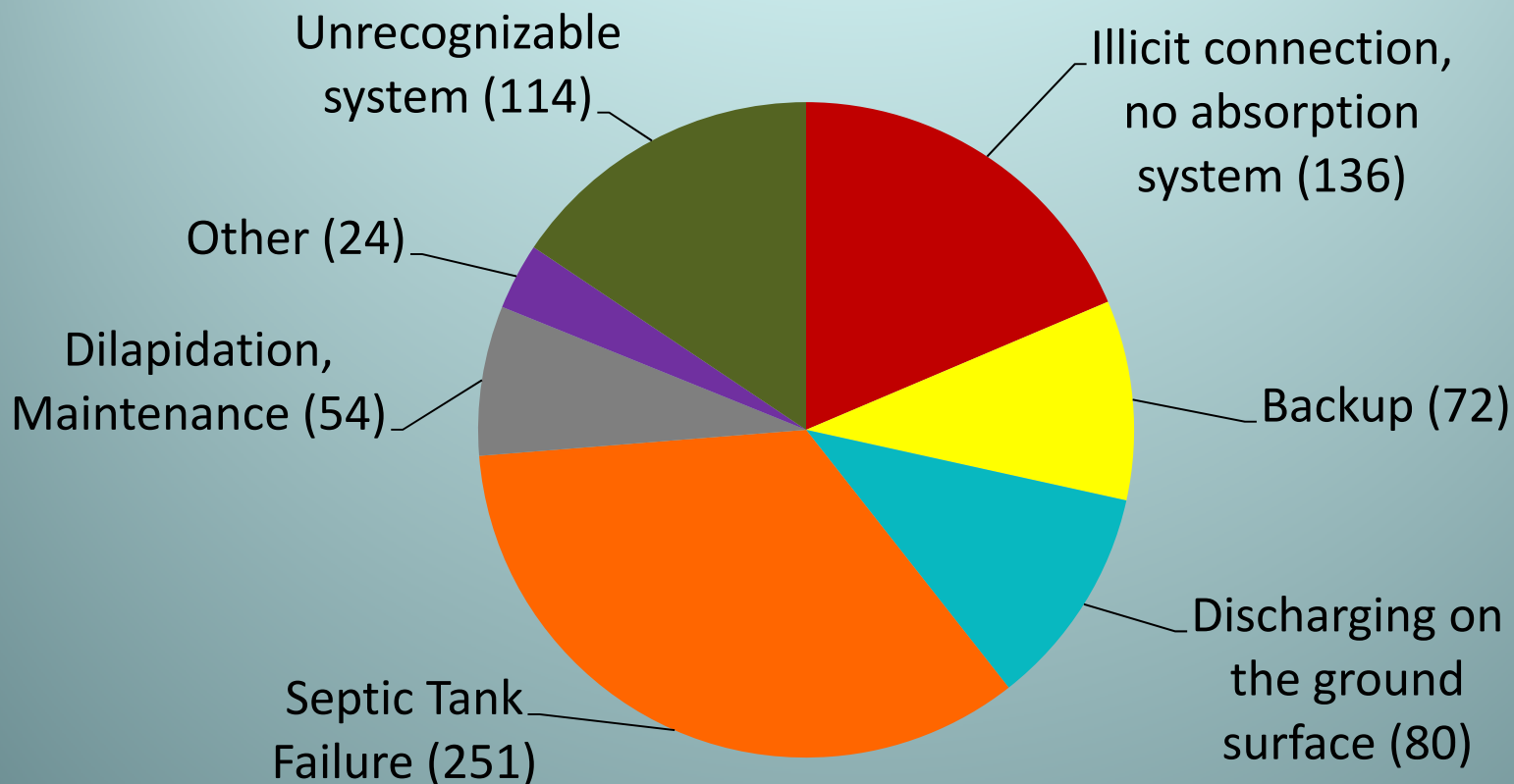
**Chart 1 Identified Public Health Hazards
Reasons for Well Failure***



*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*



*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*