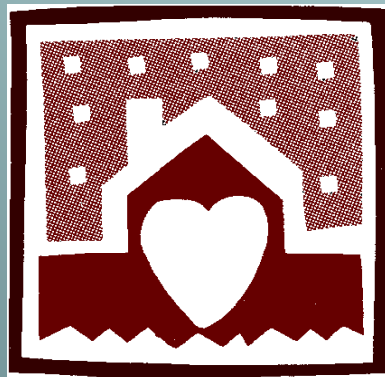


Barry-Eaton District Health  
Department  
Time of Sale or Transfer Program  
(TOST)  
The First Three Years  
2007-2010



*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

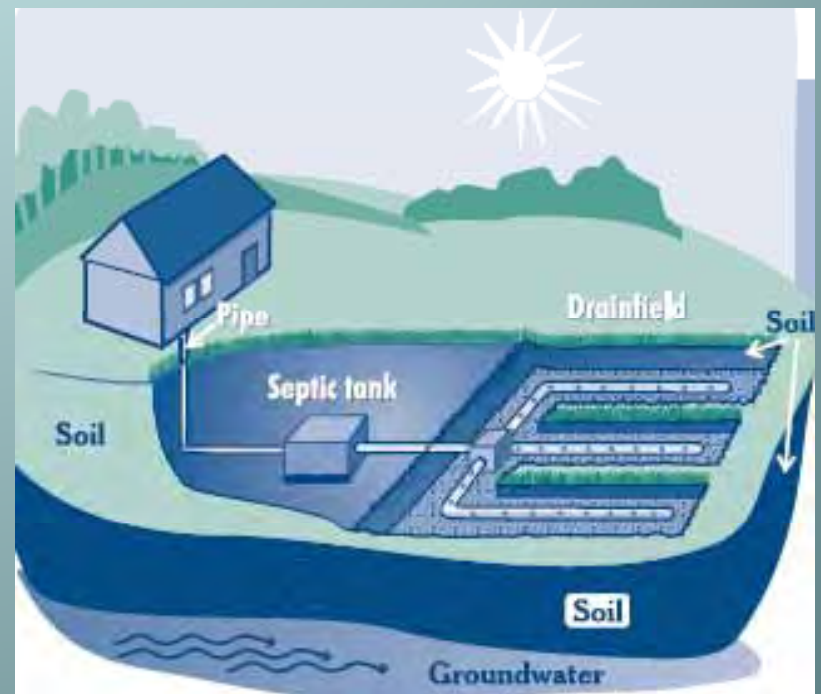
# Septic System Pollutants of Concern

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

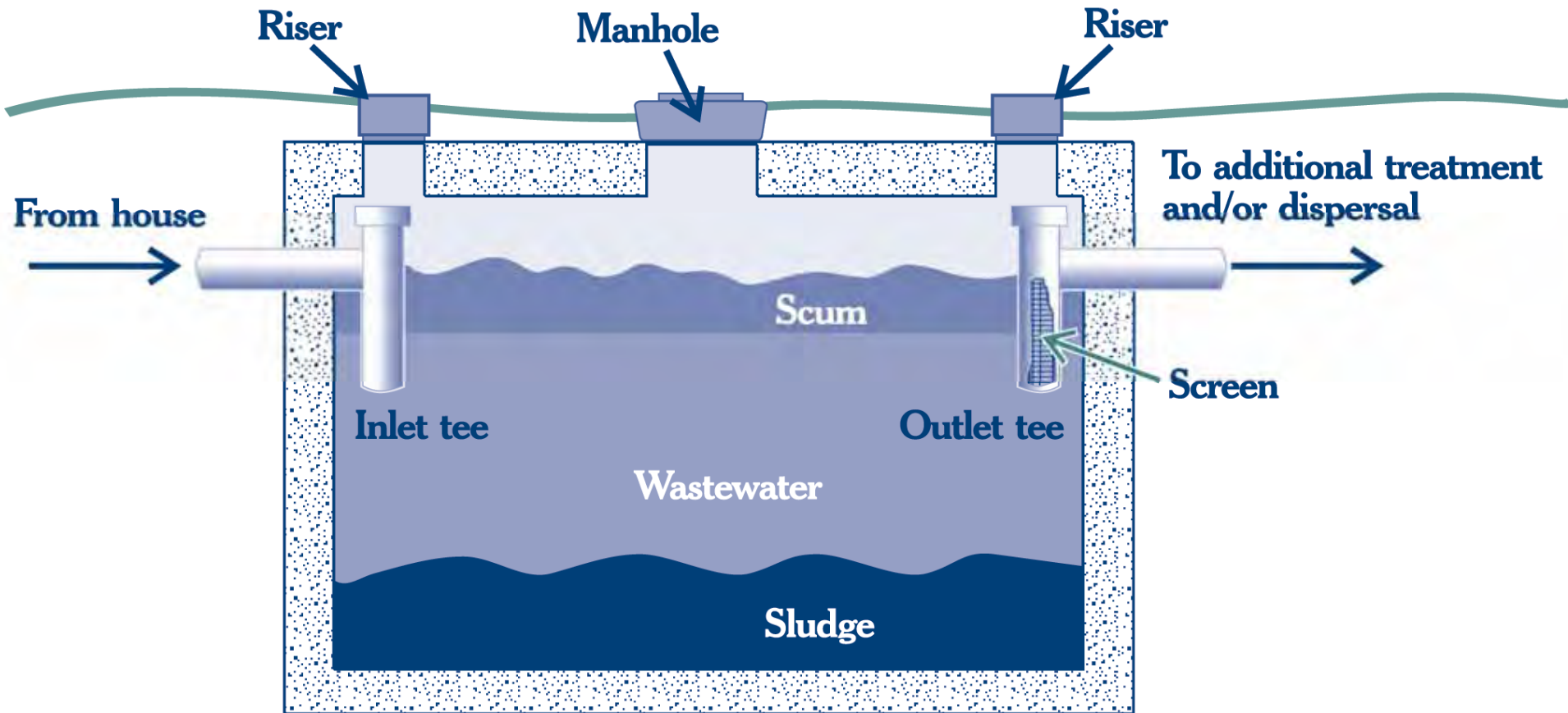
## Typical Sewage System

- 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





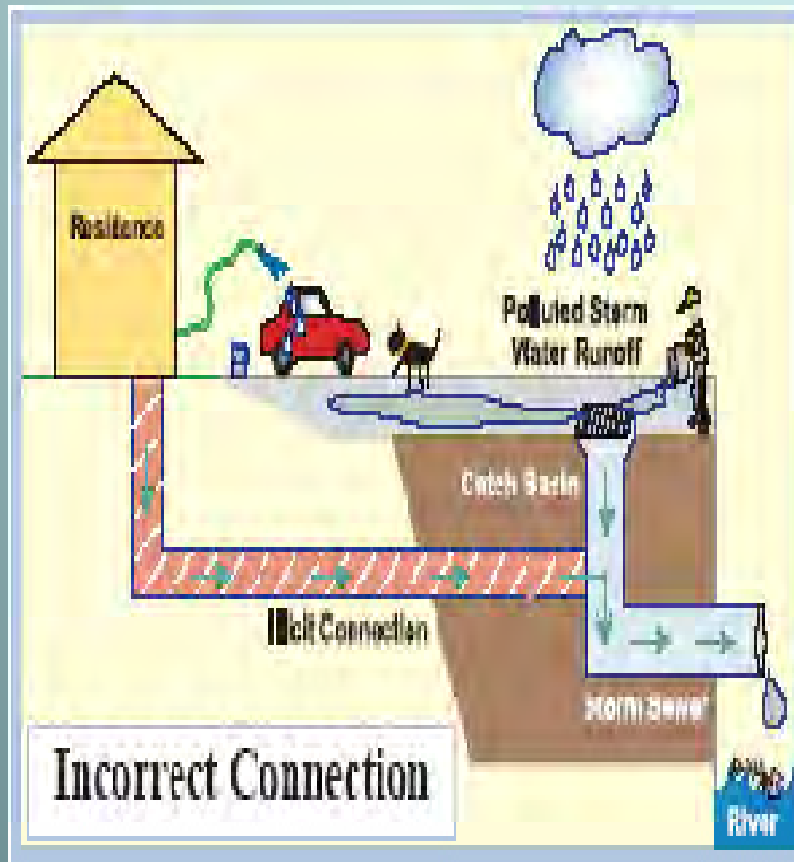
After the sewage flows out of the septic tank it goes to an absorption system

- 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...**

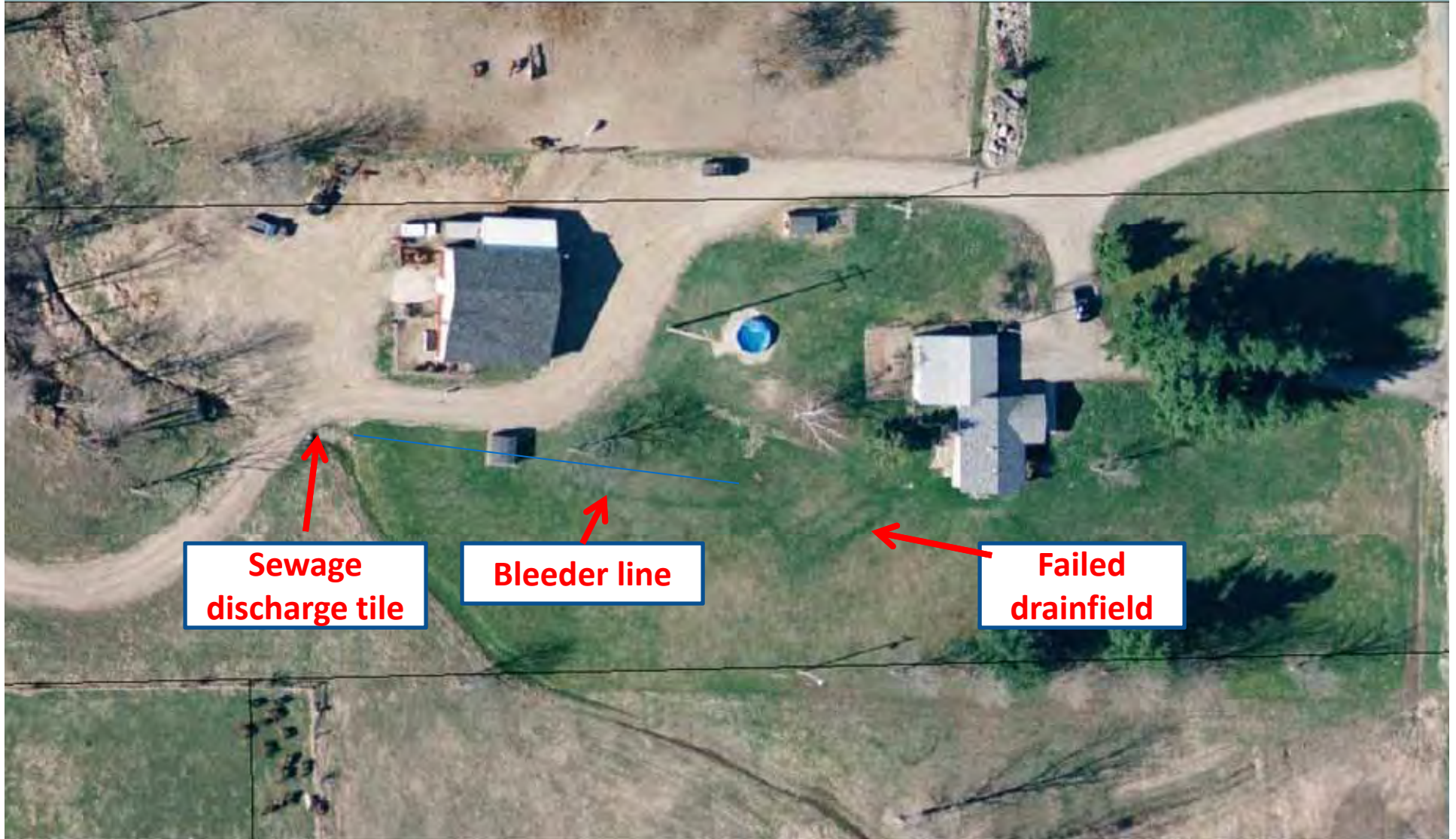
**The following information and pictures,  
including aerial photographs, are all  
from sites where an evaluation of the  
water supply and/or sewage system was  
performed in Barry and Eaton Counties  
as part of the TOST program.**

**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.



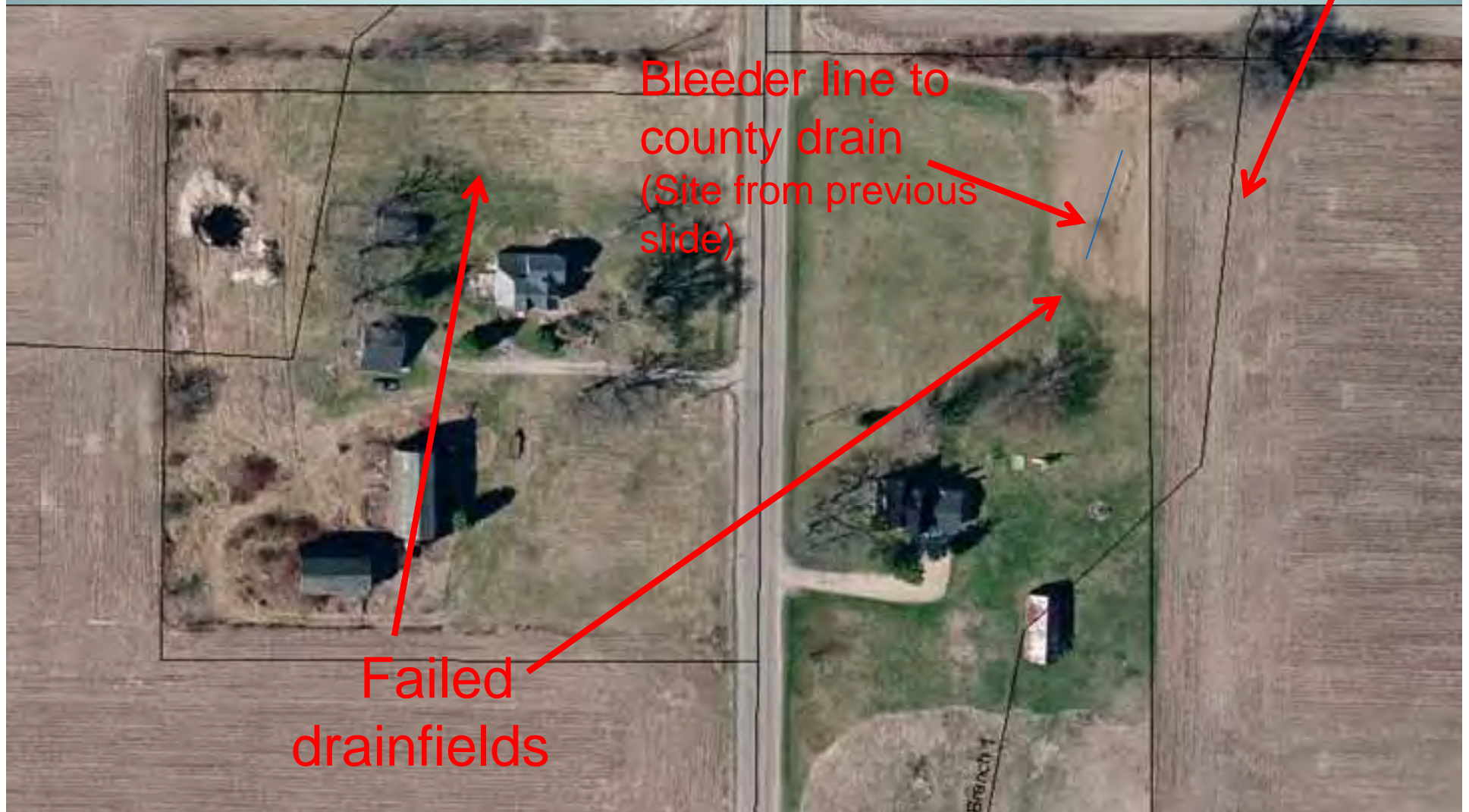


This failed drainfield had a “bleeder line” too. Where did that line go?....





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."*



10/21/20

# 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



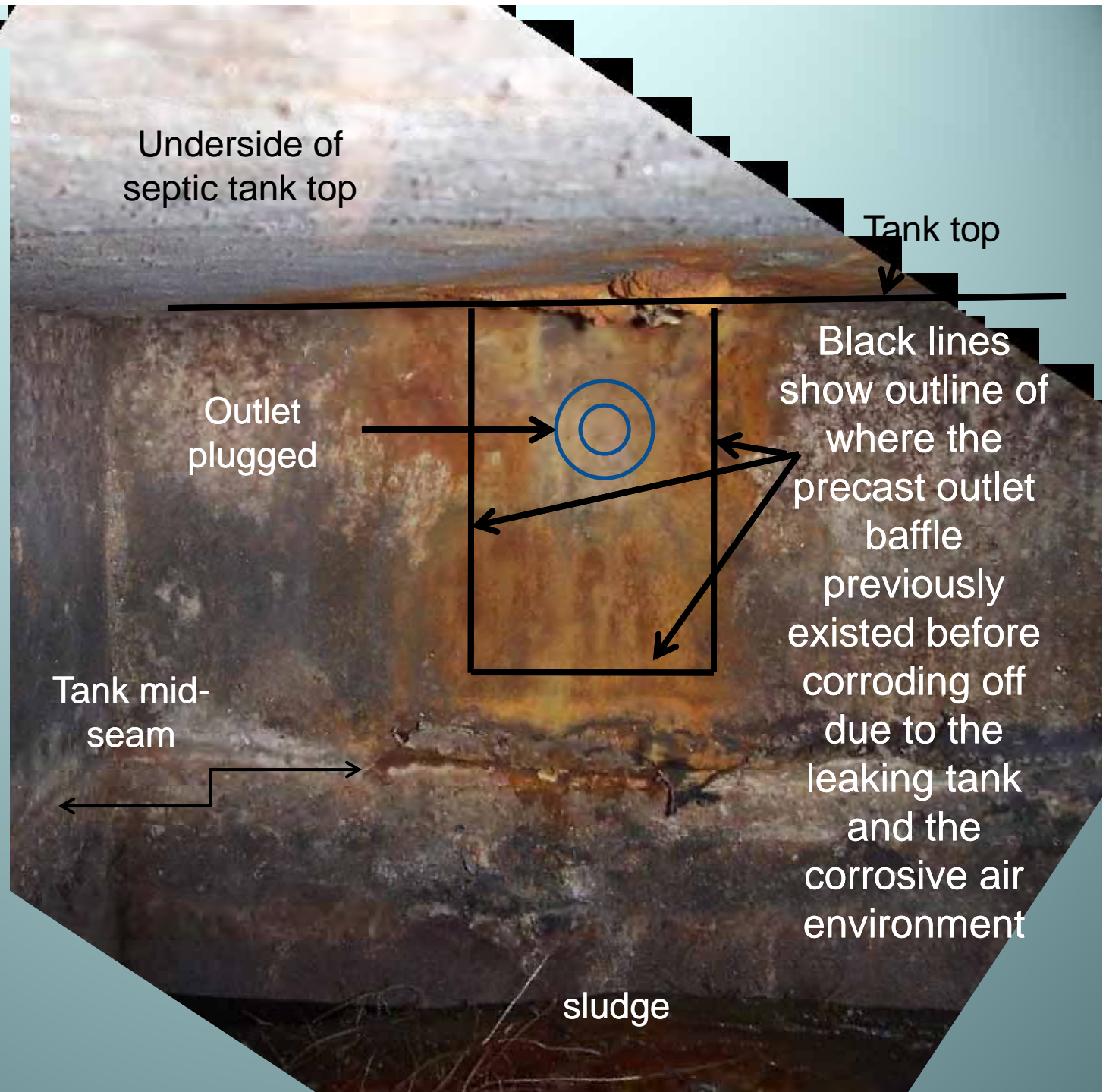


Sewage discharging to the county drain, which then drains to the river





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!



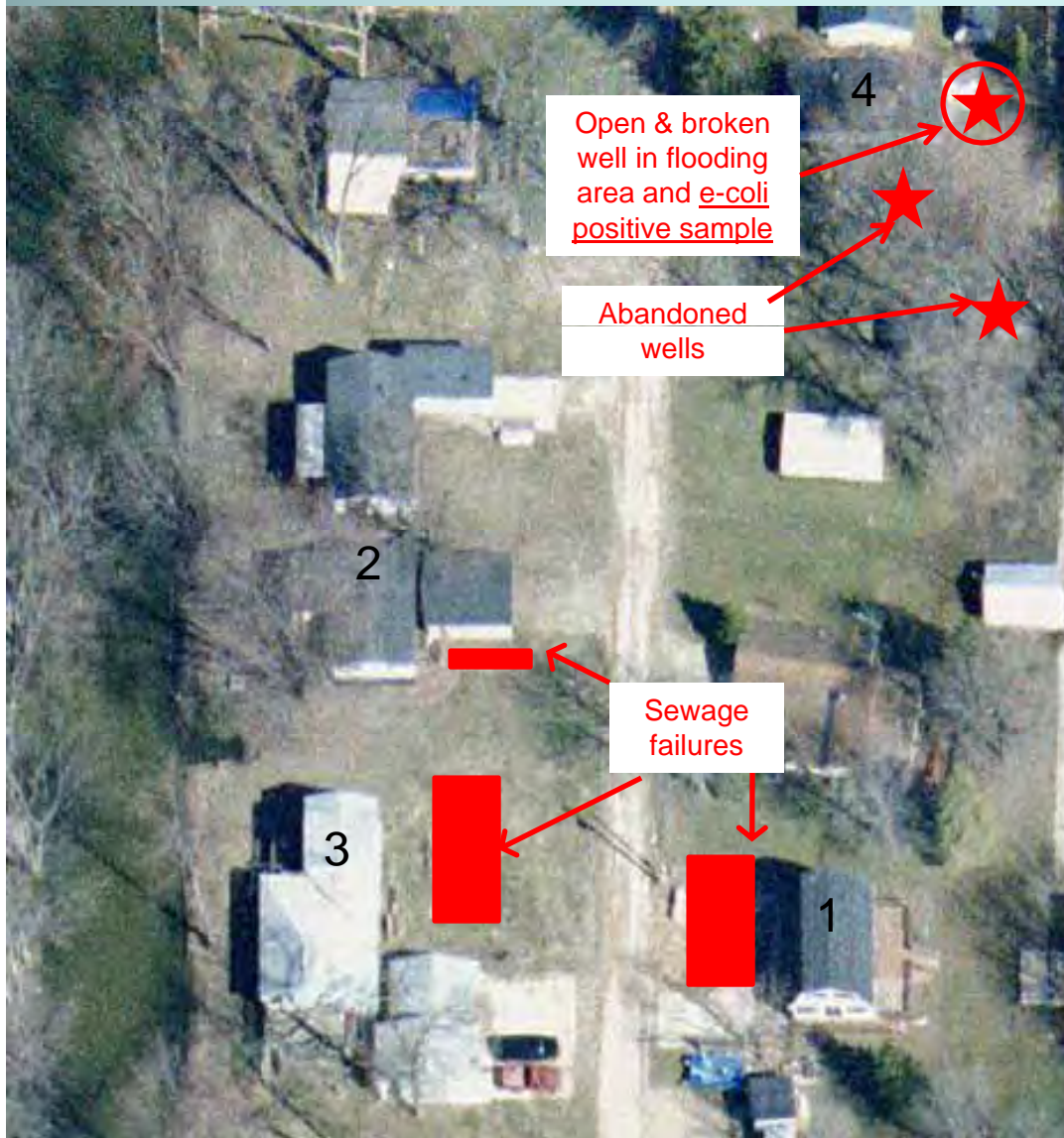
Pictures showing  
the open hole from  
the collapsing  
septic tank





# 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

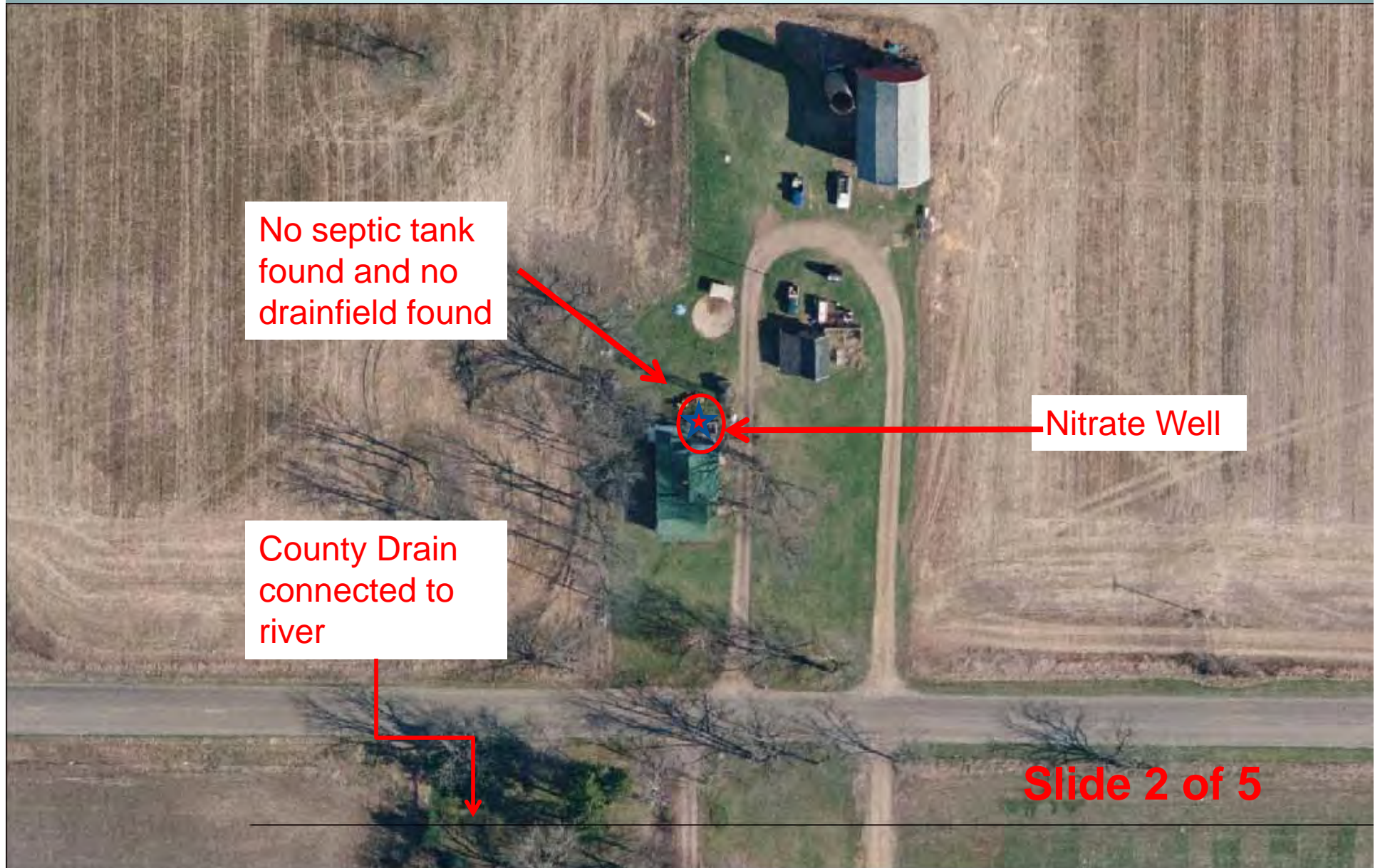
Septic Tank  
(no drainfield found)

Well with high nitrates





# TOST Site: No sewage system & Contaminated Well





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





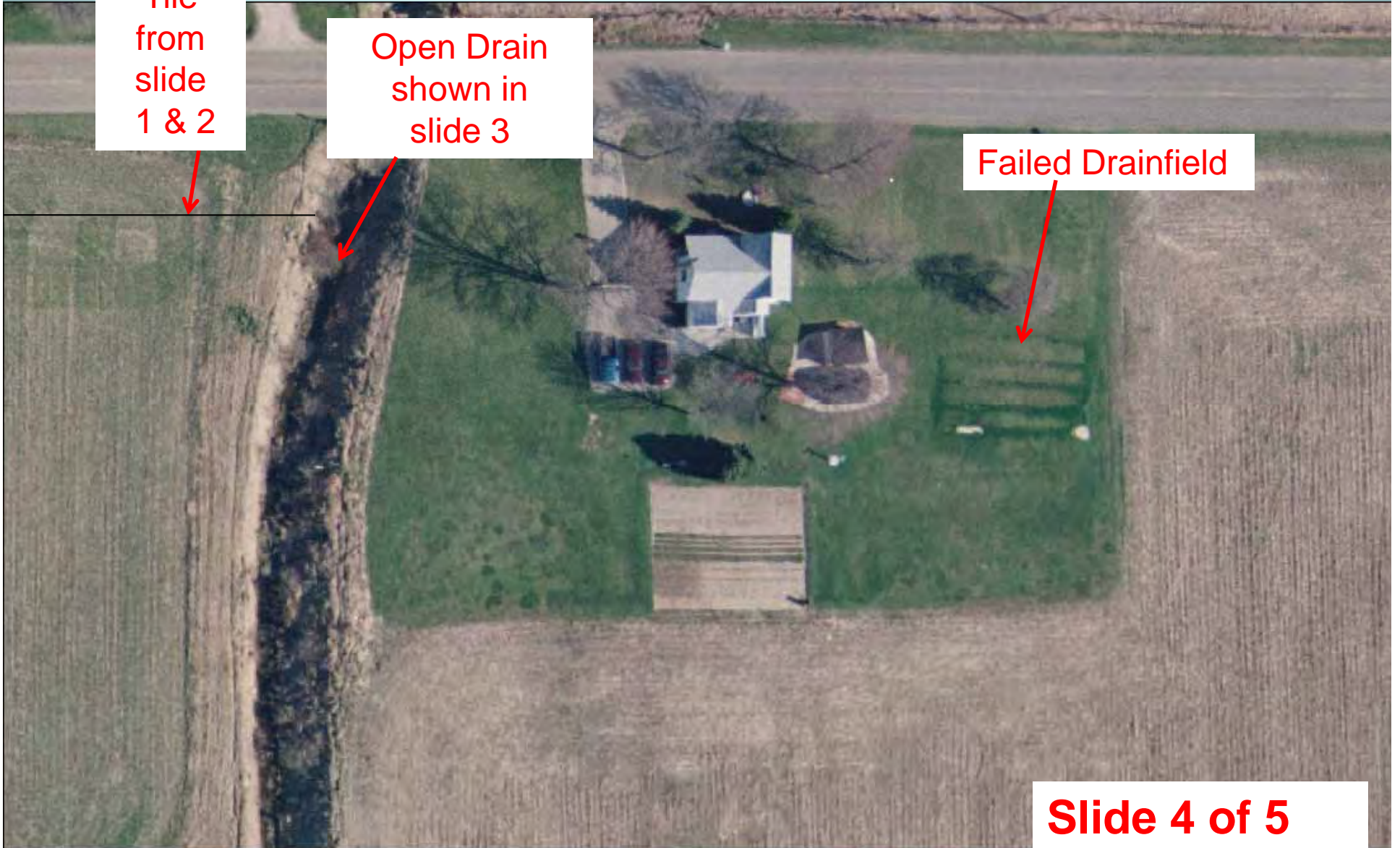
# TOST Site: Failed drainfield

Drain  
Tile  
from  
slide  
1 & 2

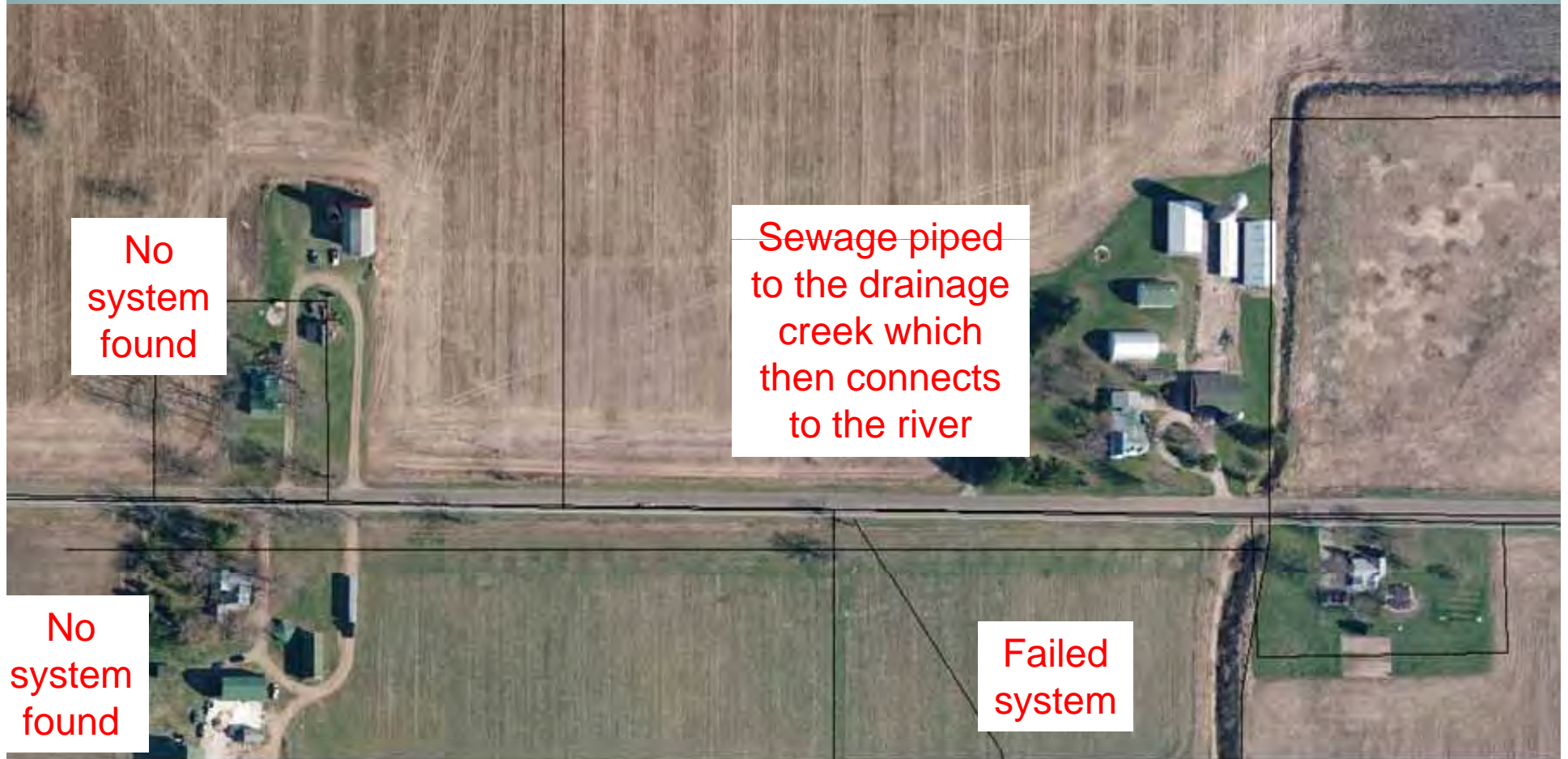
Open Drain  
shown in  
slide 3

Failed Drainfield

Slide 4 of 5



# And they are all neighboring homes!



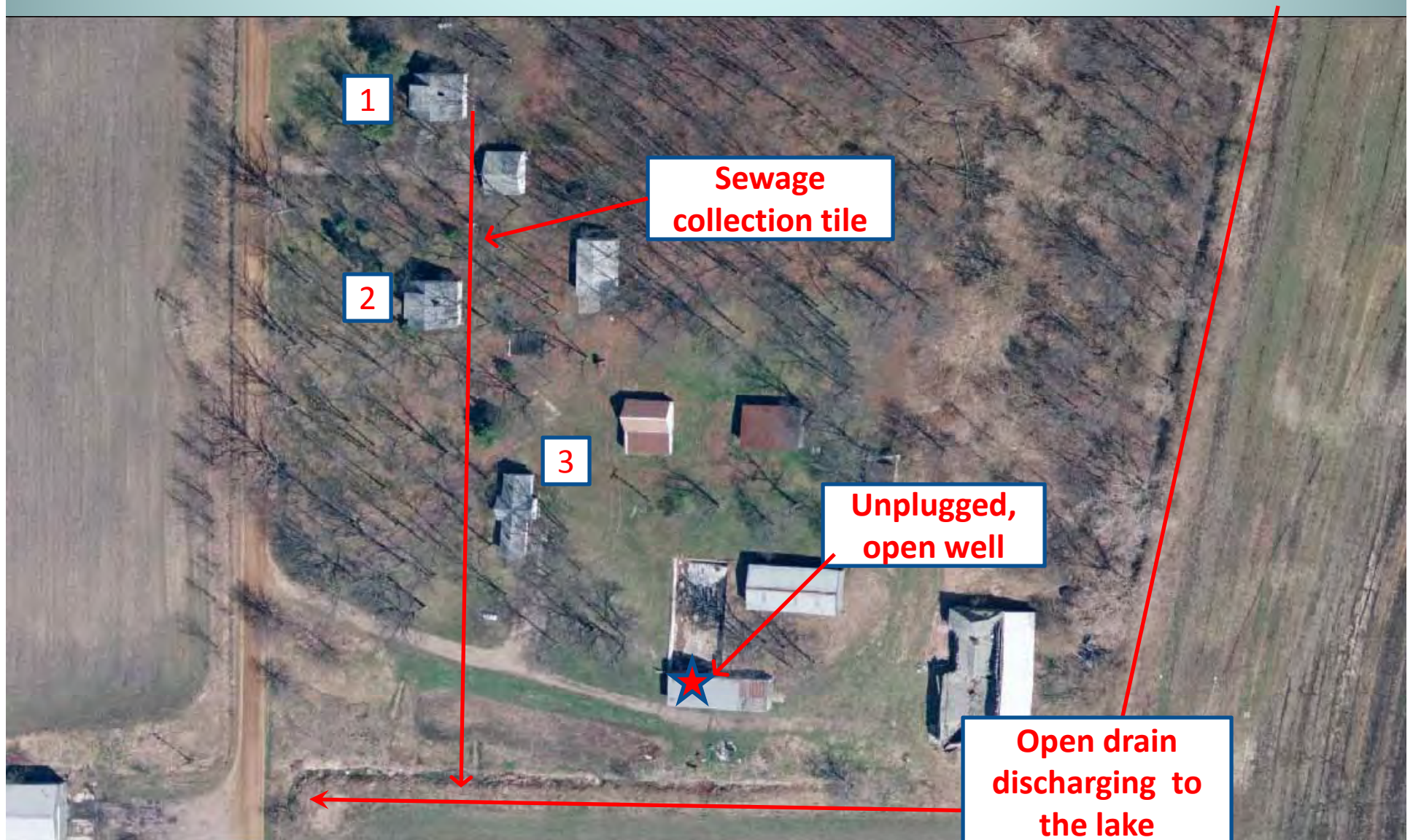


Septic tank  
with  
unsafe cover





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

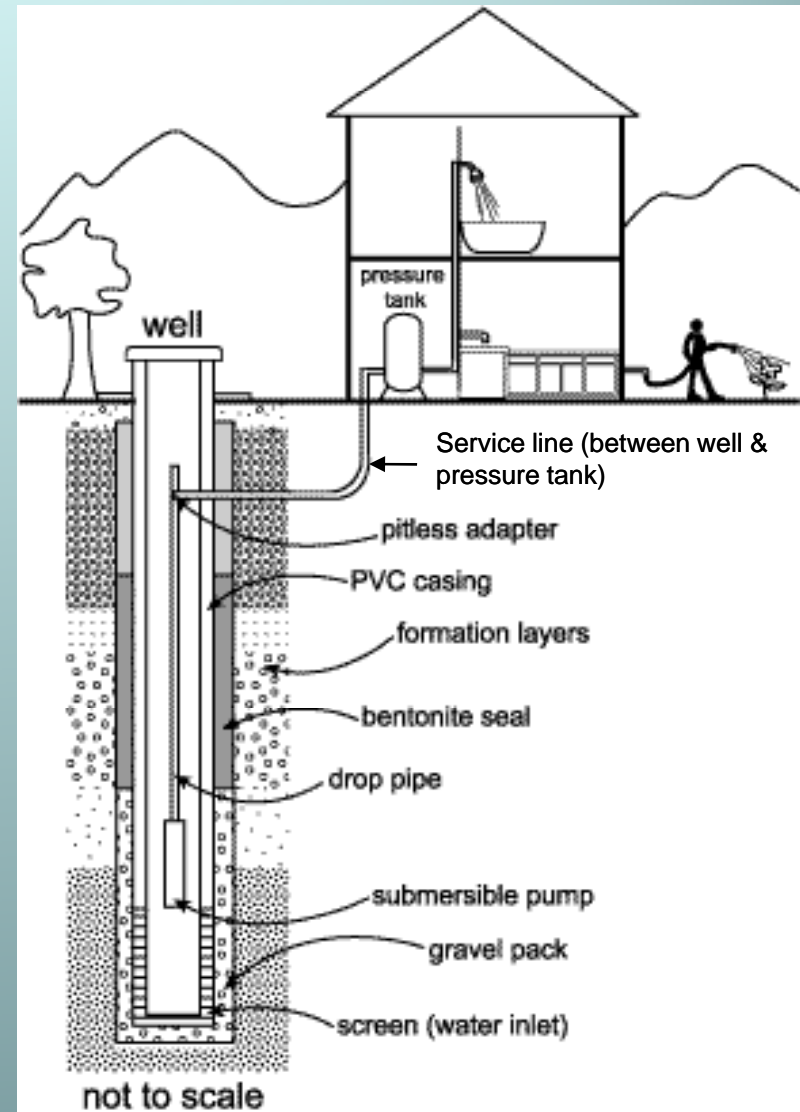




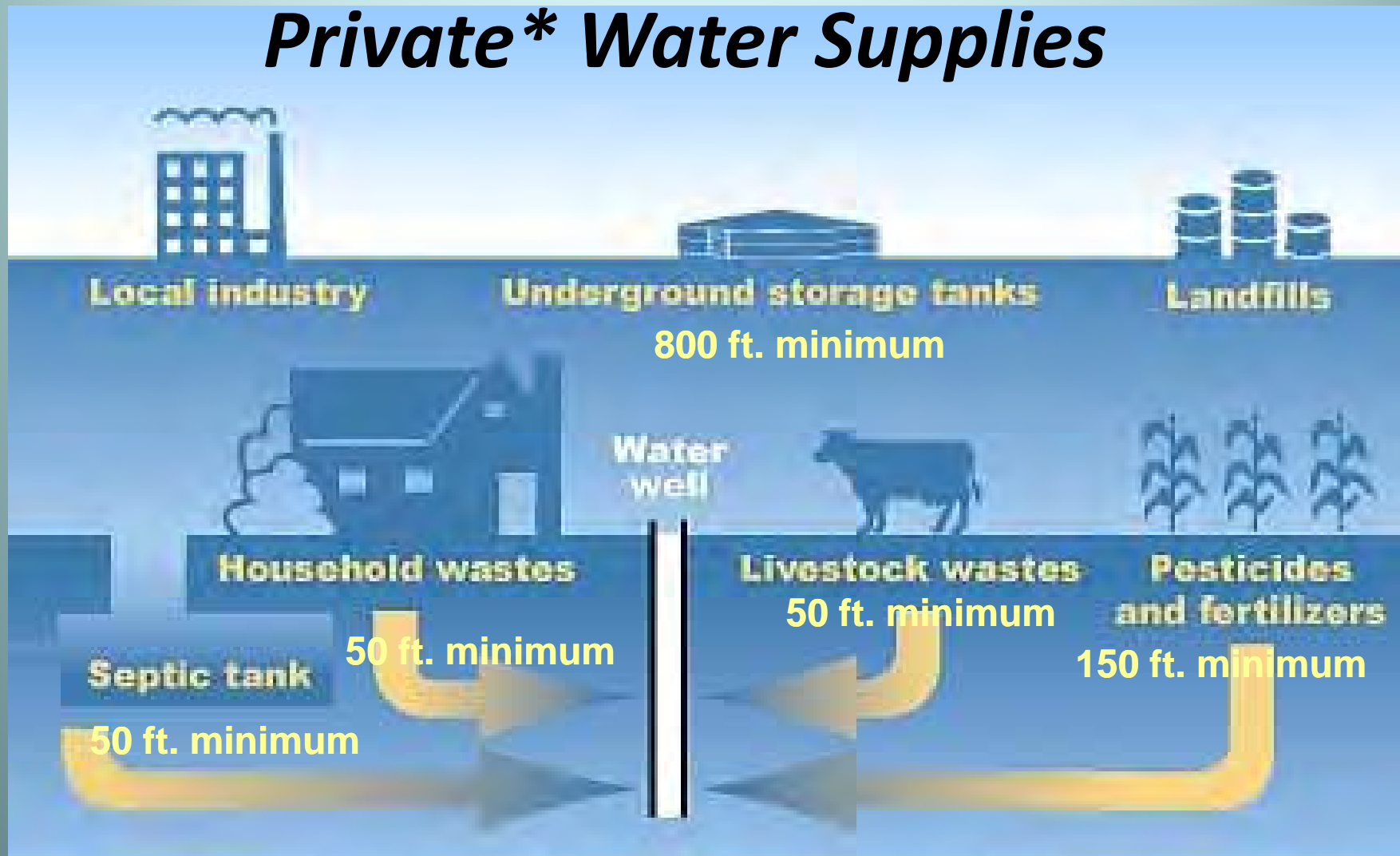
# On-site Water Well System 101

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*



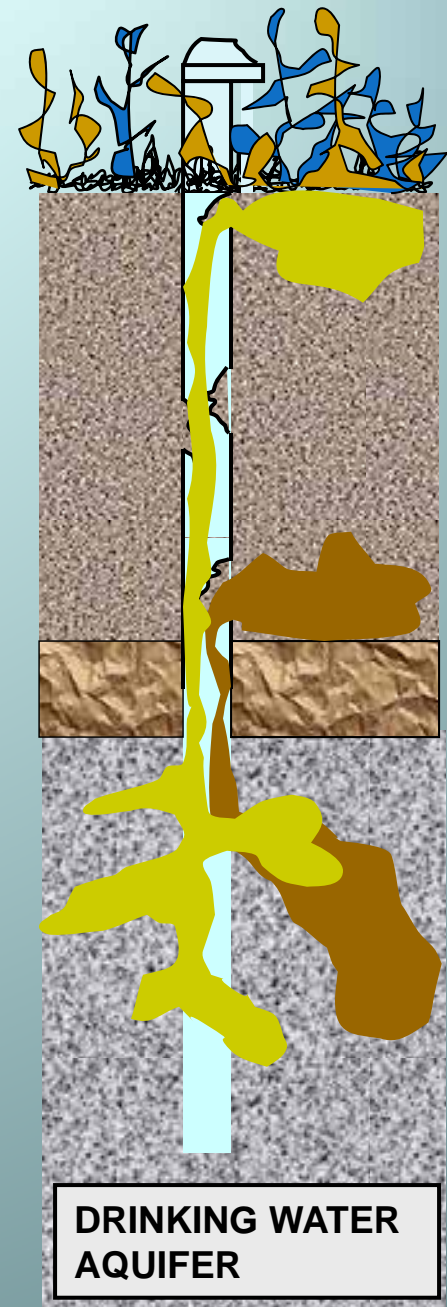
\*NOTE: Public wells require greater isolation distances



# 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



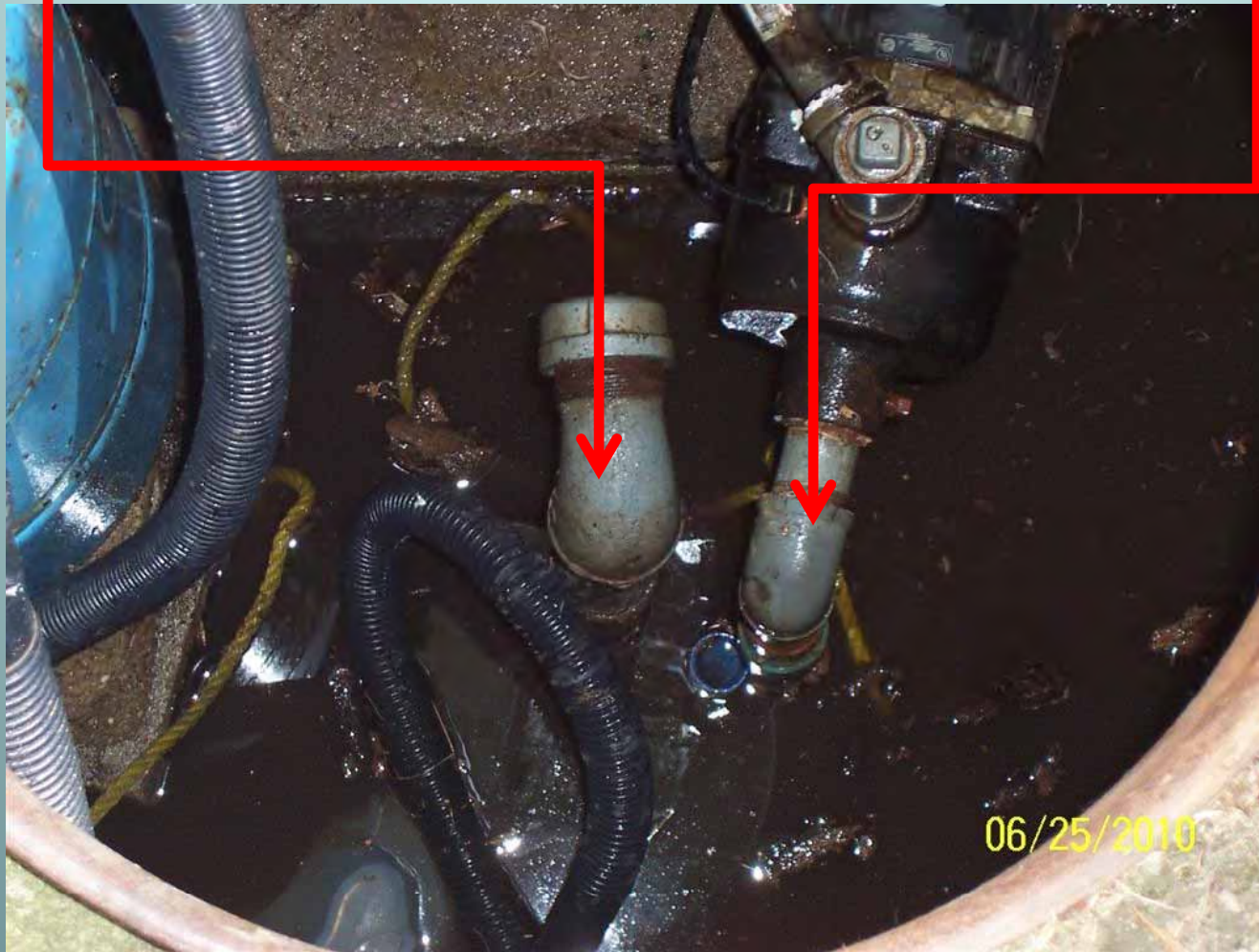


# Abandoned, unplugged well



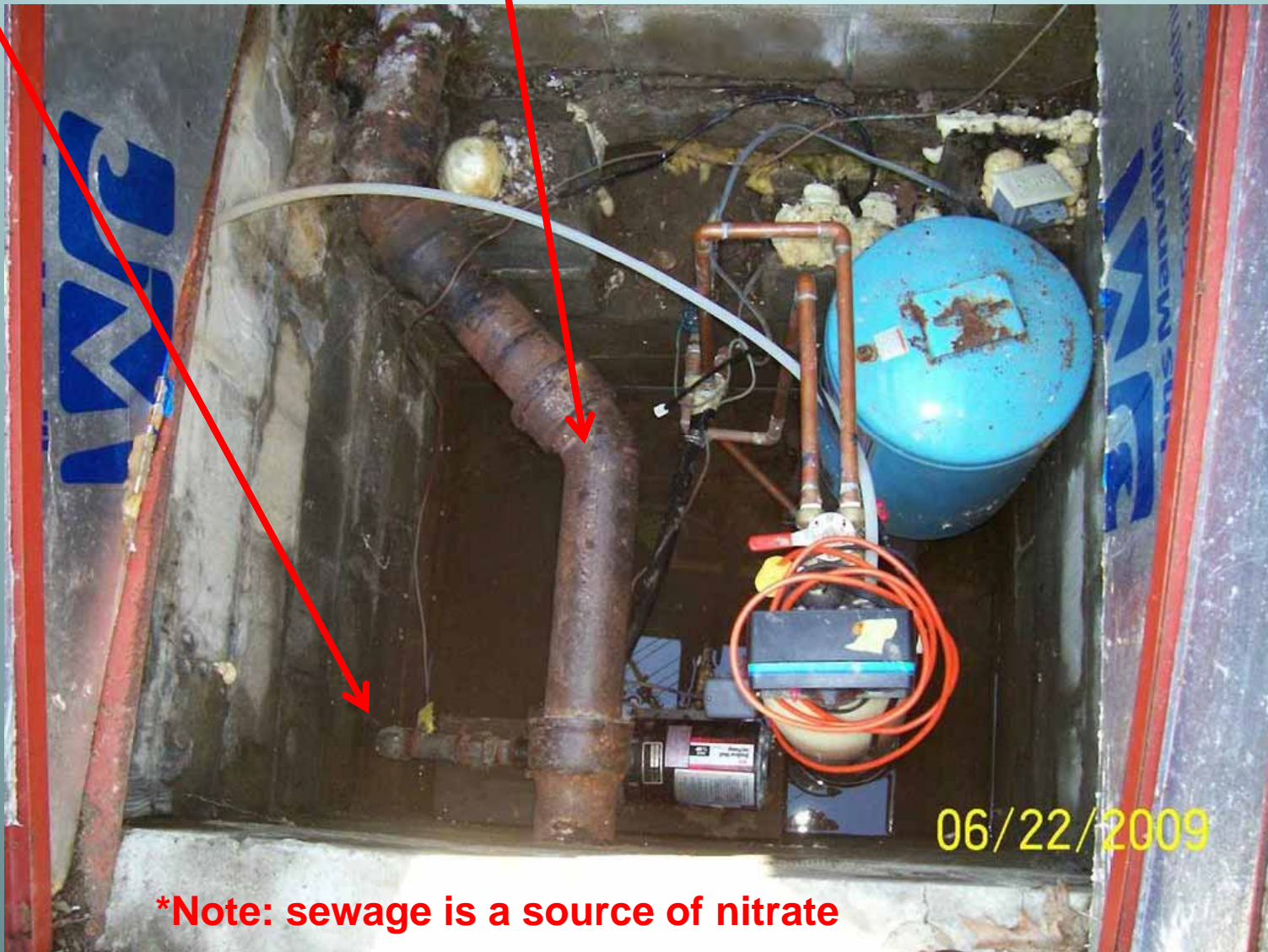


# Unplugged wells\*, next to a 13' "well" in a flooded pit



**\*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





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...





07/29/2010

This one was 8' deep

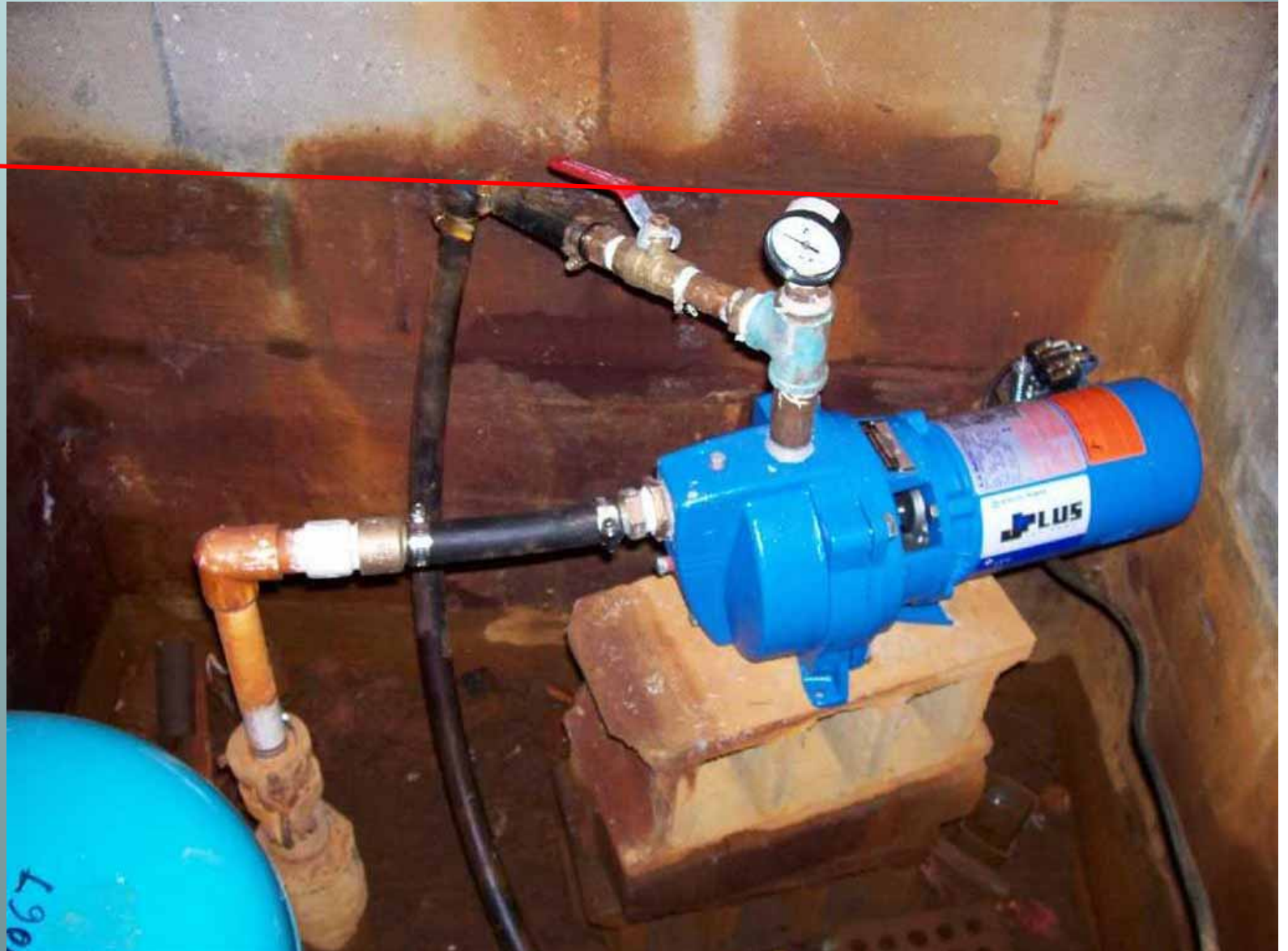


And this one was 13' deep



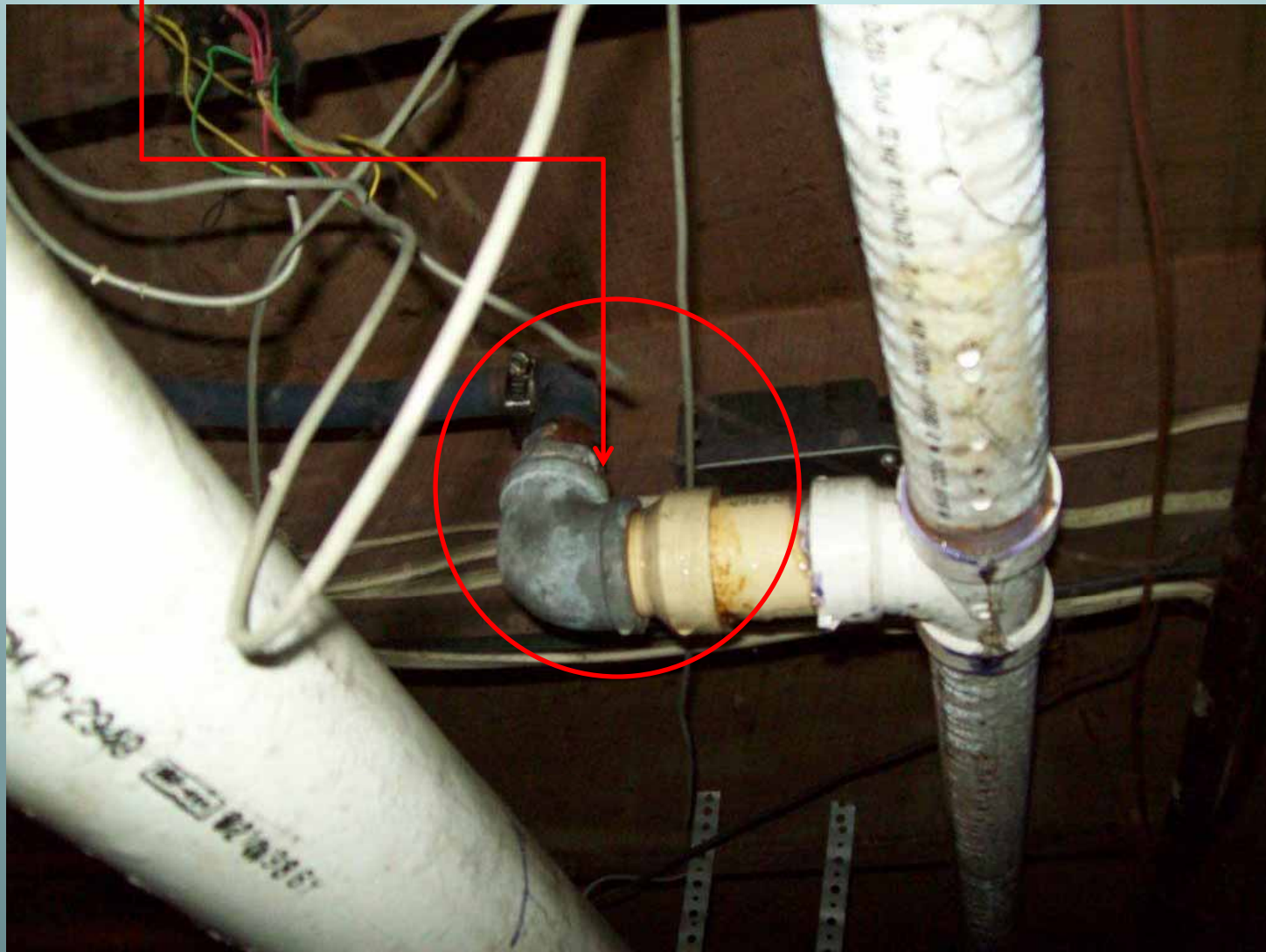
# Flooded well

Flood line





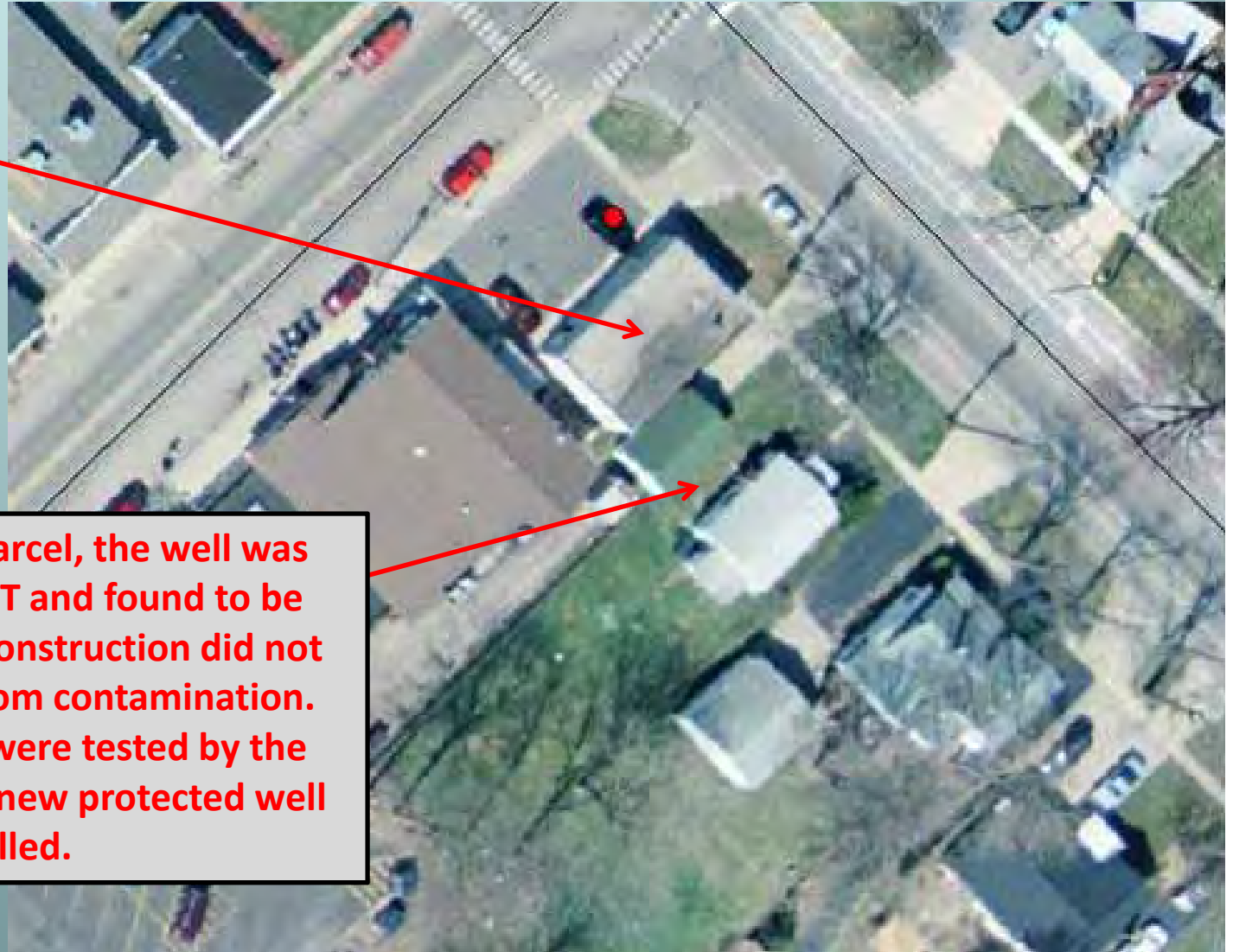
Water system cross connected  
to the sewer line



# Leaking Underground (gasoline) Storage Tank Site

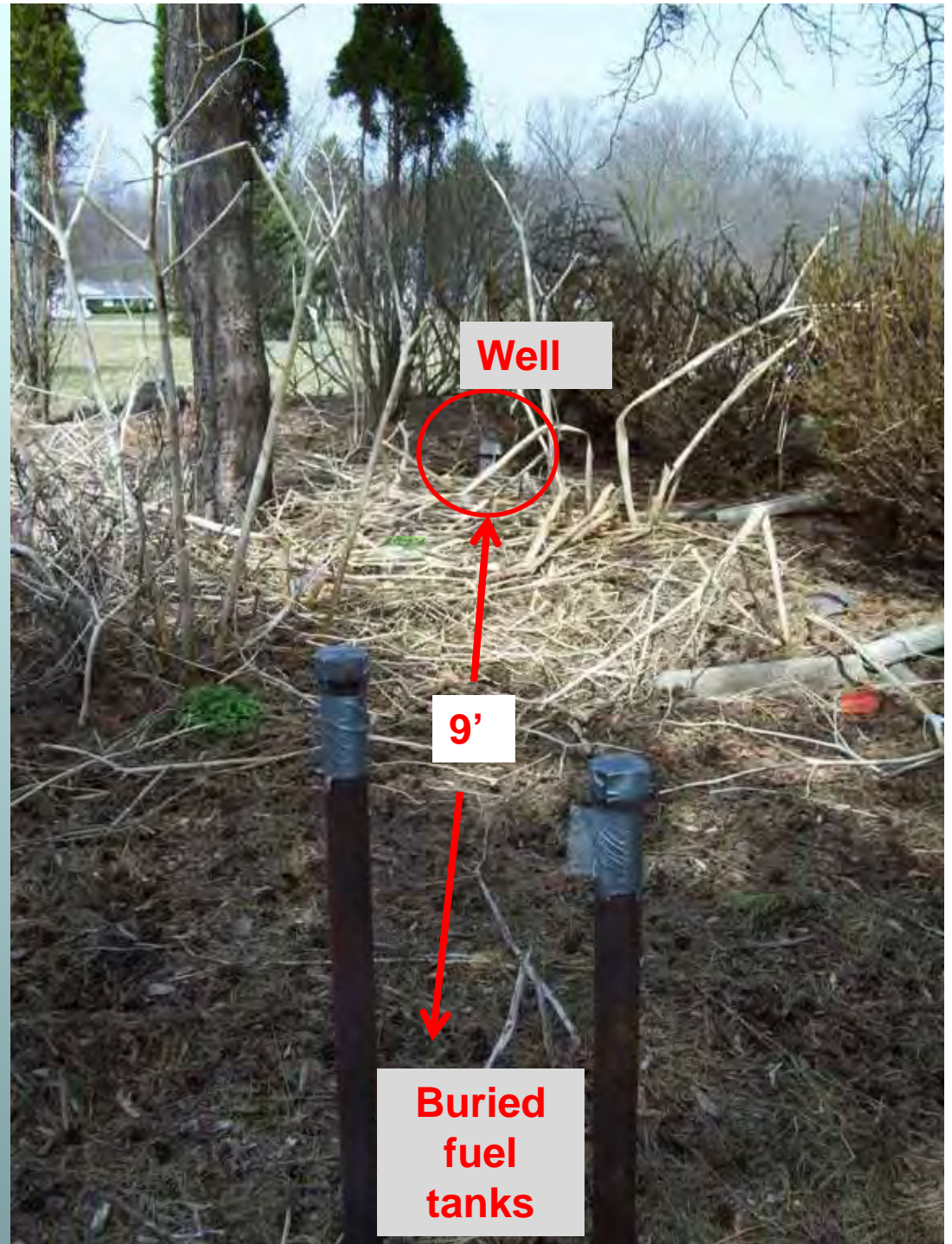
The gas contamination found in the shallow groundwater at this site has not been cleaned up.

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...



07/14/2009



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

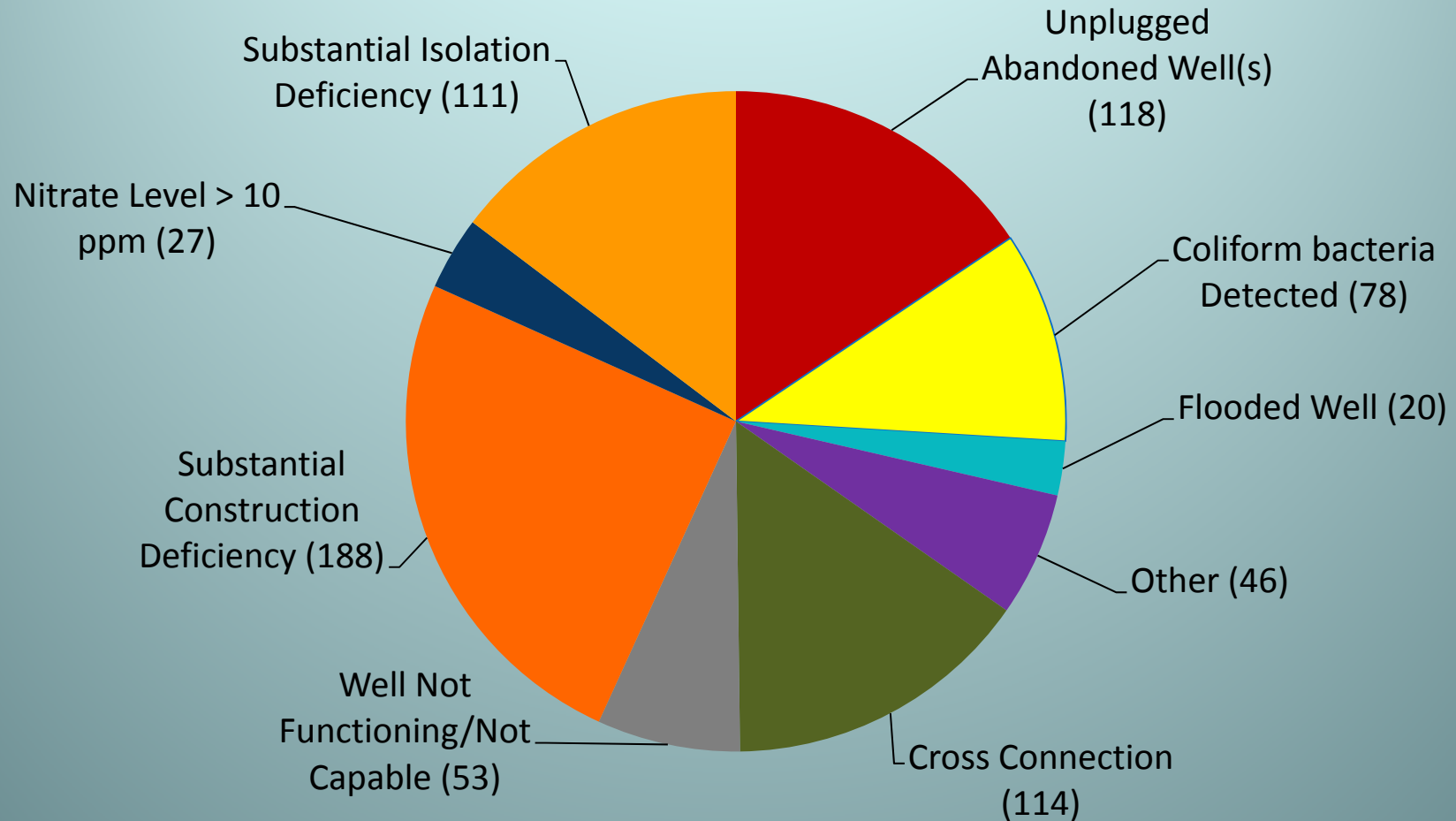
The purpose of the program is to protect the quality of water resources, to protect on-site water supplies and the natural environment, and to protect public health...

- 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

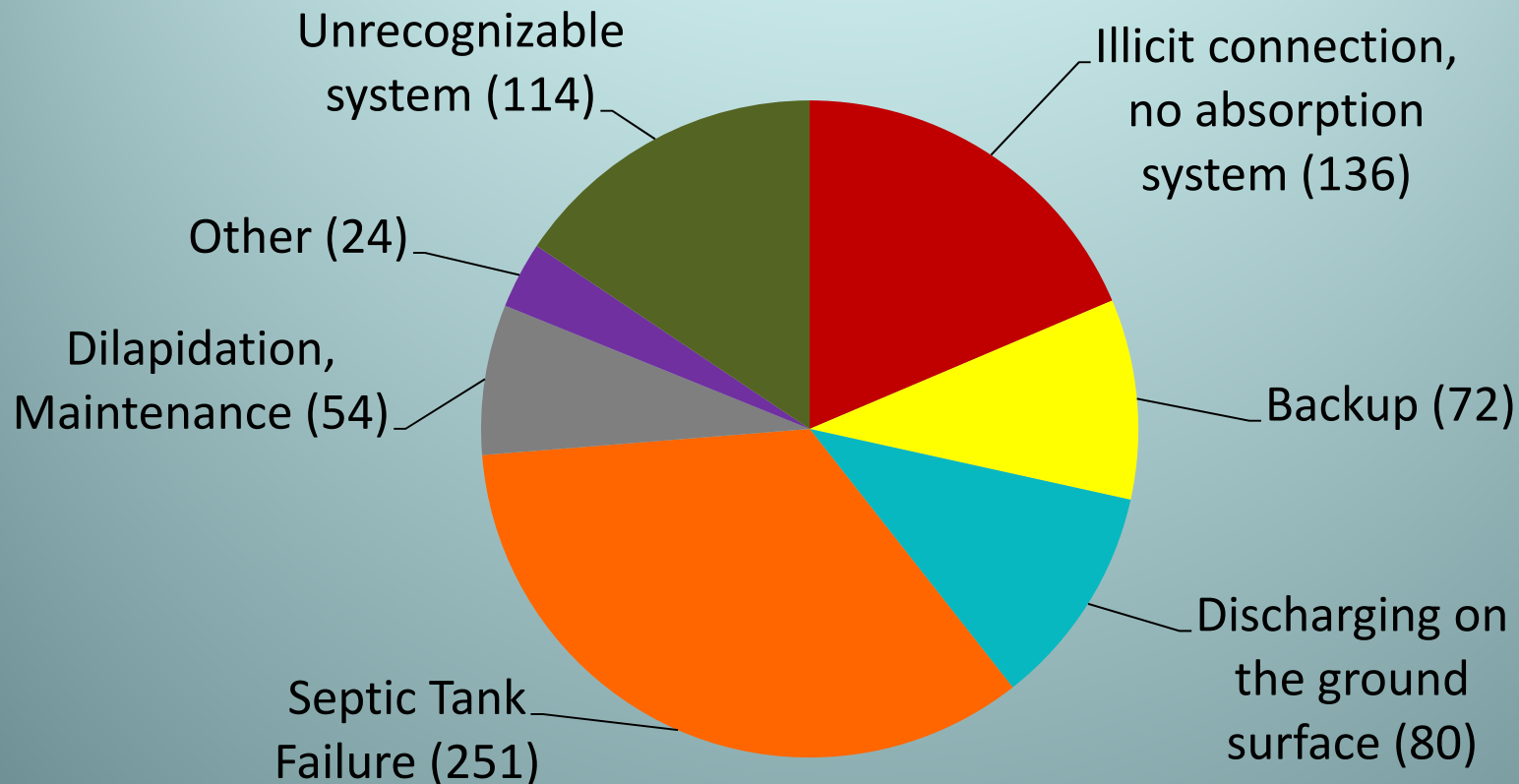
**Chart 1 Identified Public Health Hazards  
Reasons for Well Failure\***



\*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](http://www.barryeatonhealth.org) to read the full report to the community – *TOST, The First Three Years*