# “Monitoring wells are holes in the ground that tell you lies.”

*- Dr. John Wilson*

**Mark A. Toso**

**Minnesota Pollution Control Agency**

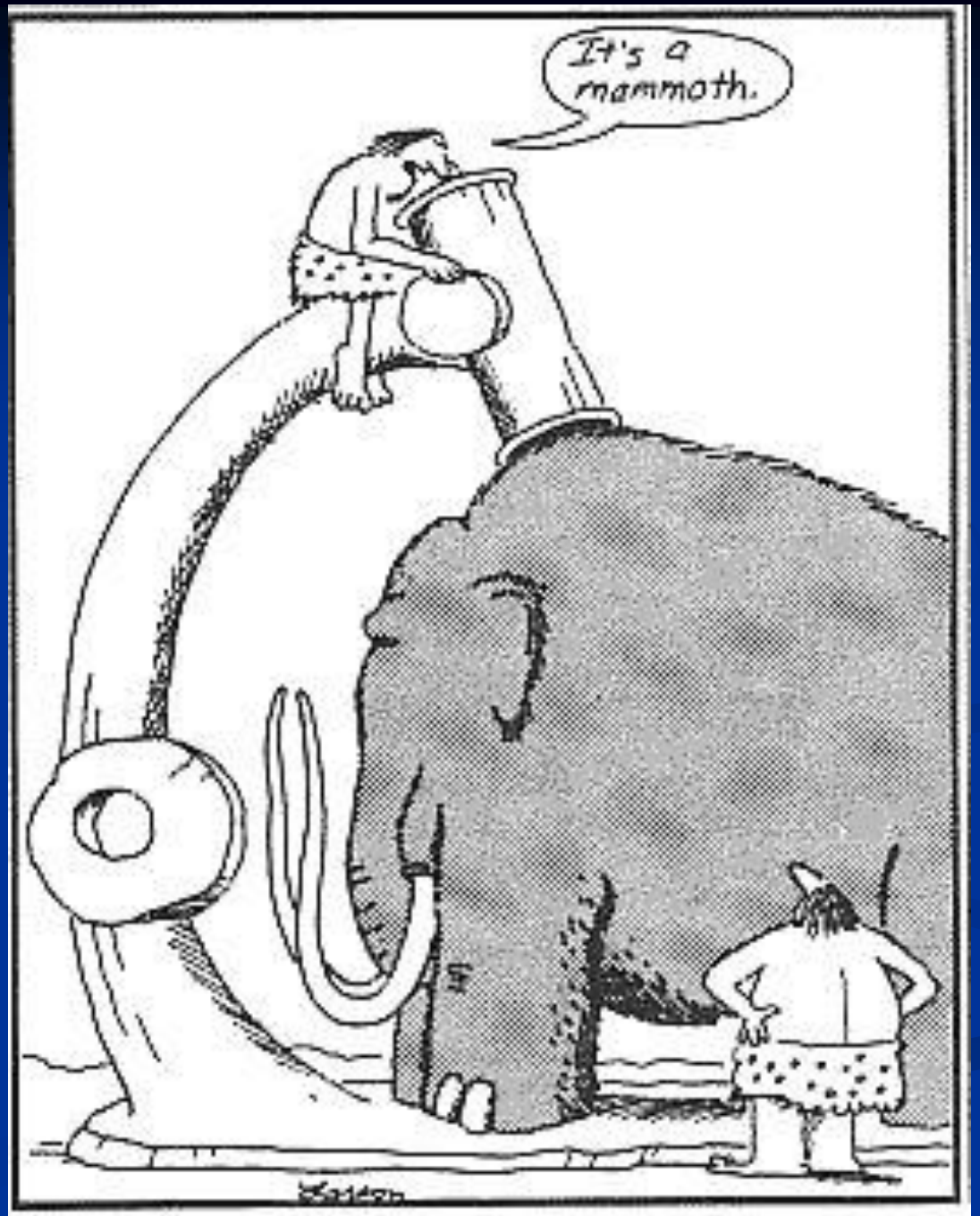
**MGWA 2018 Spring Conference**

# Disclaimer

*Opinions expressed are mine and do not necessarily reflect the official policy or position of the MPCA*

*The MPCA does not endorse specific products or companies*

# In the beginning




Early microscope

# 30 years ago

EDITORIAL

Reprinted from the 1988 Summer issue of *Ground Water Monitoring Review*

## There's No Such Thing as a Representative Ground Water Sample

*by James D. Pennino*

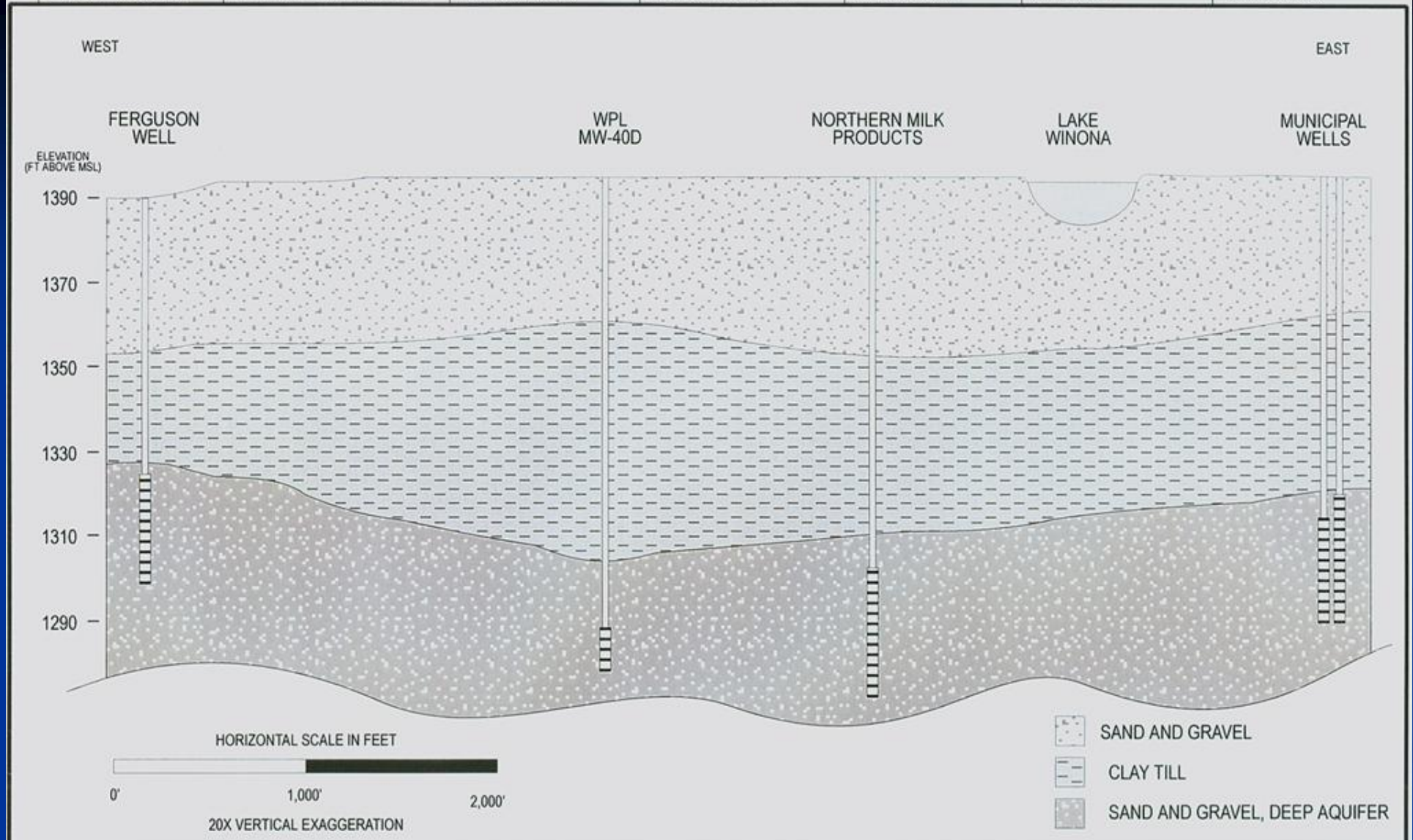
We are all familiar with the difficulties of obtaining a representative sample of ground water for water-quality analysis. Some workers believe that a representative sample is obtained after a certain number of well casing volumes have been evacuated from the well. Others believe that the sample should be obtained when the temperature, conductivity, and pH of the water being removed from the well has become stabilized in terms of constant or nearly constant readings of these three parameters. Still others have proposed using a flow-through well design (Schmidt 1986) where the water is sampled as it stands in the well without any prepurging.

Any approach to purging and sampling of wells must account for the changes in the ground water and contam-

all sorts of things went down the holes: tools and screens that were steam cleaned but still had visible bits of mud on them or bits of topsoil and grass where the screen touched the ground as it was being maneuvered into the hole, acetone mist that drifted over the open hole as screens were being carefully degreased 20 feet from the hole, bits of contaminated or uncontaminated topsoil inadvertently kicked down the hole as people worked around it, lubricants and hydraulic fluids that dripped off the rig as it stood over the hole — a rig that had been steam cleaned prior to setup over the hole — gasoline on driller's gloves after filling the rig tanks from a field service truck and then handling drilling tools and casings with the same gloves, exhaust fumes from generators and

# Where it went wrong

- Hydrogeology was developed to understand water supply
  - How much water can we pump out of the ground?
- Parameters are based on bulk properties (K, S, V)
- With contaminate hydrogeology flow pathways are important
- The location and depth of wells are much more critical




ARCADIS
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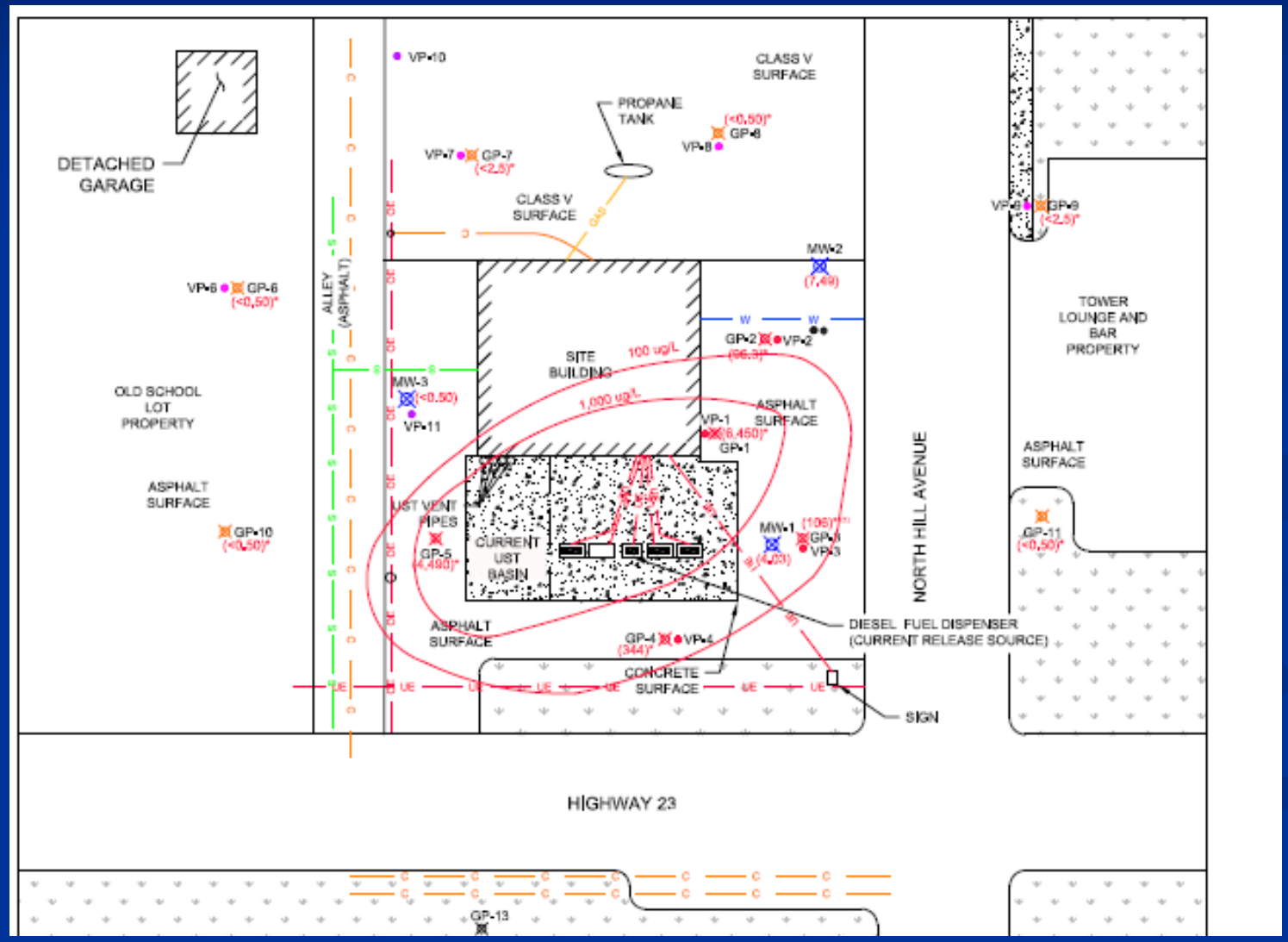
**AREA CROSS SECTION**

WILLIAMS PIPE LINE FACILITY
ALEXANDRIA, MINNESOTA

FIGURE
8

# Typical LUST Site Investigation



# Groundwater flow and contaminant transport are NOT the same!

- Groundwater velocity calculated with wells is an *average*
  - Velocities vary by orders of magnitude within the same "aquifer"
  - Some confining units have very high contaminant migration rates
- HRSC methodology is vastly superior to wells for site characterization
- 90% of dissolved phase contamination migrates through 10% of the aquifer!

# Groundwater data is EVERYTHING!

- Least experienced staff collecting the most valuable data
- Push probe sampling – where's the QA/QC?
- Notes from a recent field audit:
  - Temporary well was not purged before sampling
  - Field parameters were not recorded
  - VOC samples were collected using a peristaltic pump
  - Purged water entered well during sample collection
  - Samples were not stored on ice

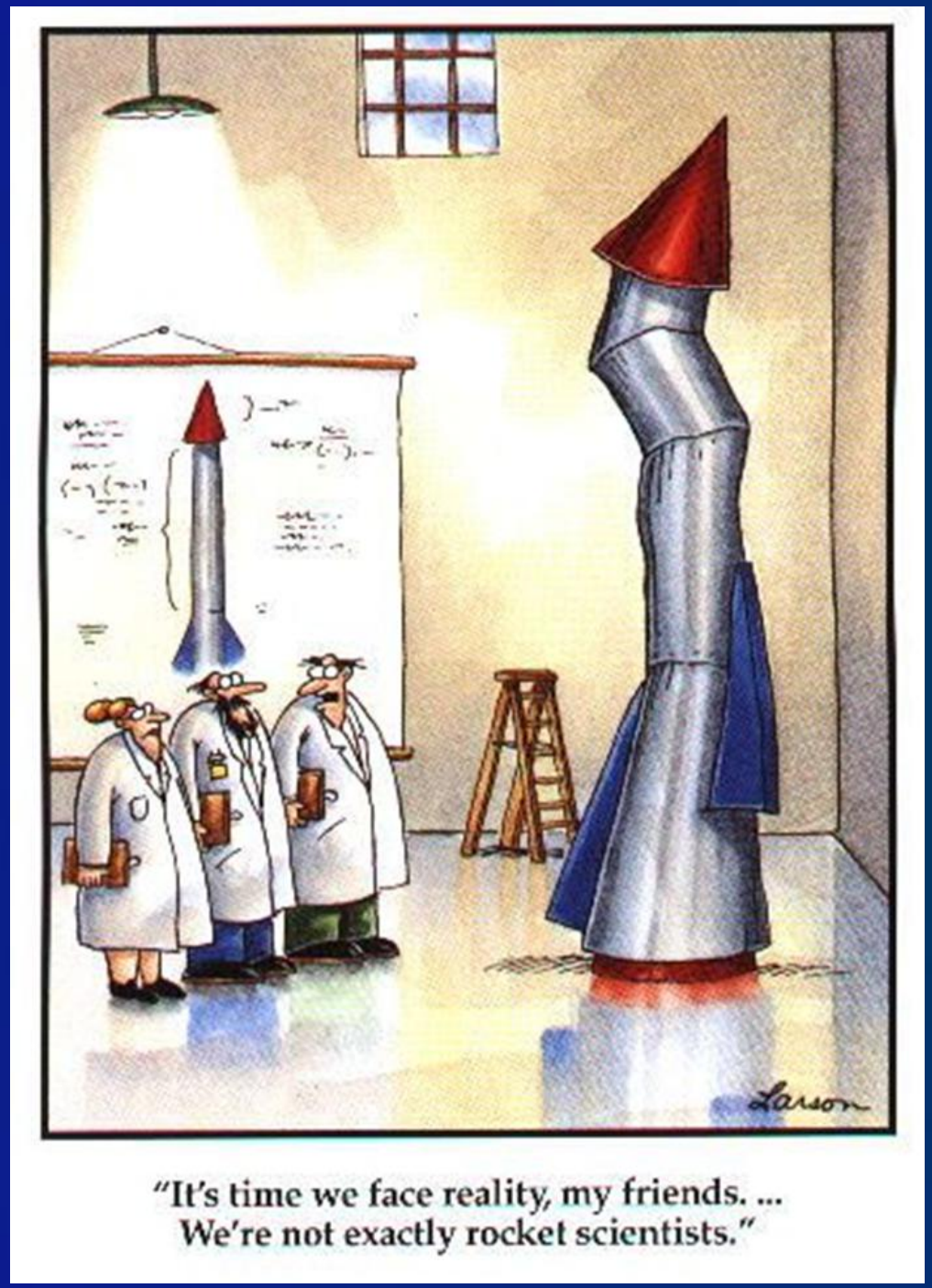
# But…

- MPCA still evaluates groundwater risk using travel times calculated from grain size analysis or pump test data
  - Accuracy (IMO) <1%

- Environmental investigations have become a commodity. Is due diligence just going though the motions?

# 30 years of experience

- A “dirty” monitoring well says something
- A “clean” well doesn’t really mean anything
- Is it time to abandon monitoring wells for risk assessment altogether?
  - 30 years, a million borings.  Why don’t we use what we already have? (yeah but where’s the data…)




# Questions?

**Mark Toso**

*mark.toso@state.mn.us*

651-757-2158