

# East Side Water Supply Plan Water Quality Considerations



## Objectives

- Evaluate existing and potential future water quality
- Provide information needed for evaluation of water quality improvements
  - Treatment
  - Operational or well construction changes

## Agenda

- Review well specific hydrogeology
- Source of groundwater to unit wells
- Review of existing water quality
- Identify opportunities to manage water quality

## Hydrogeology

- Lakes
- Glacial deposits
- Shallow sandstone aquifer
- Eau Claire Shale – confining layer
- Lower sandstone aquifer (Mt. Simon Fm)



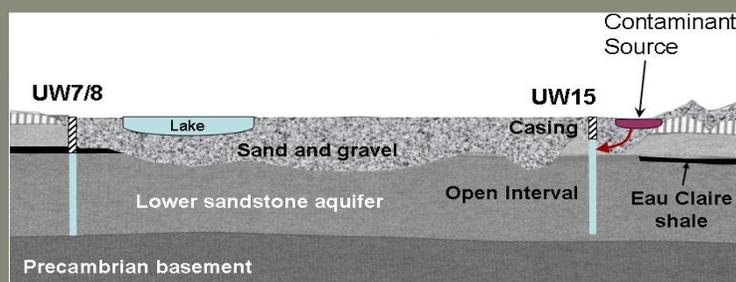
## Source of Groundwater

- Source of groundwater to the wells depends on:
  - Presence of shale – continuity and extent
  - Is the well sealed into the shale?
  - UW15 – No shale present in well log
  - UW7 and UW8 – Shale present, not extensive



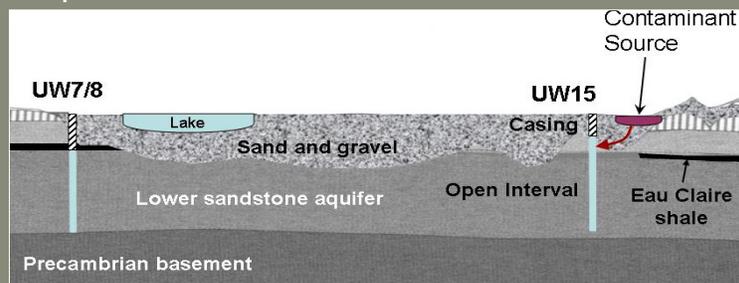
## Source of Groundwater

- UW7 and UW8
  - Water from lower sandstone
  - Recharge around shale from nearby shallow sandstone and lakes



## Source of Groundwater

- UW15
  - Water from lower sandstone and shallow sandstone
  - No shale present to limit flow from shallow aquifer and surficial contaminant sources



## Water Quality Review

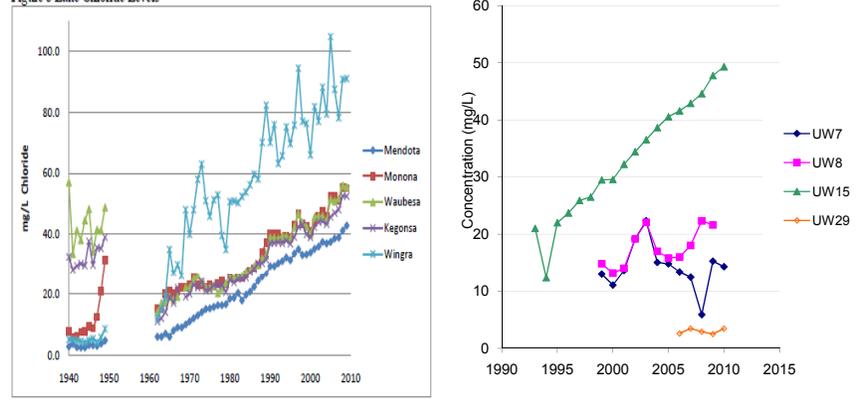
- Data available
  - Water Utility data from routine monitoring
- Identified constituents of concern
  - Iron
  - Manganese
  - VOCs
  - Sodium
- Chloride – an indicator of the source of water

# Chloride

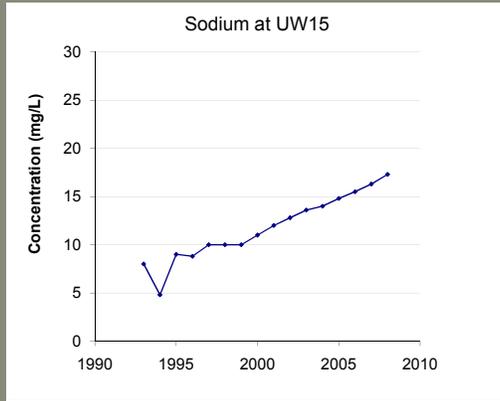
- Road salt is a source of sodium and chloride at the surface
- Chloride concentrations in the wells indicate varying degrees of shallow groundwater
  - Potential for surface contaminants

# Chloride

Figure 3 Lake Chloride Levels

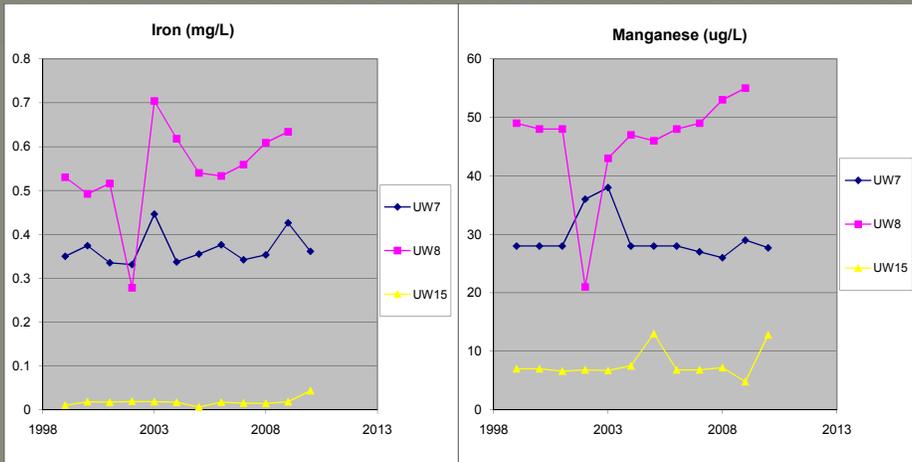


# Sodium



- EPA health advisory = 20 mg/L
- UW15 at 18 mg/L

# Iron and Manganese



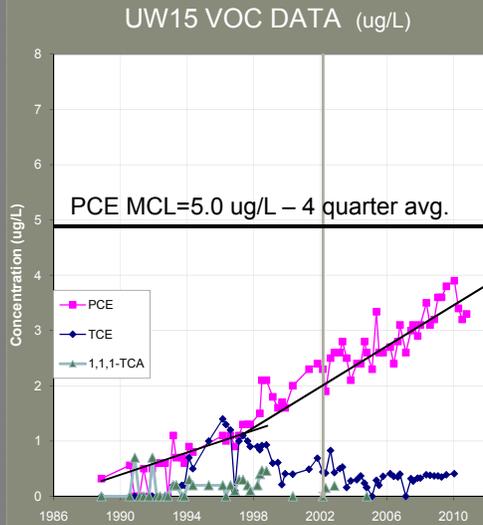
## Iron and Manganese

- Source of iron and manganese
  - Naturally occurring in the bedrock
  - Released due to groundwater chemistry (reducing conditions)
- UW7 & UW8 - Why reducing conditions?
  - Recharge from lake bottom sediments?
  - Other organic sources?
- UW15
  - Low concentrations due to aerobic surficial groundwater recharge

## UW29 Observations

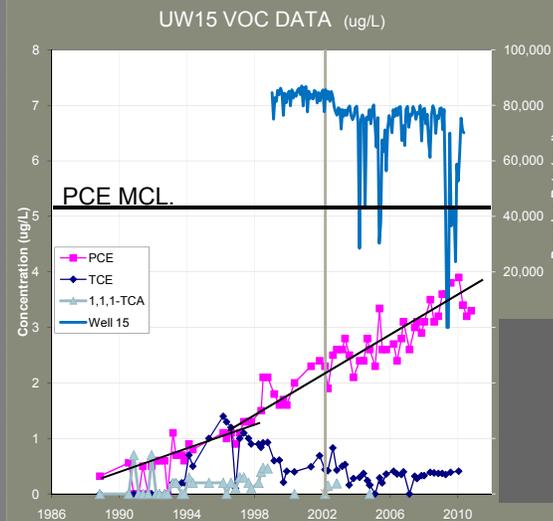
- New filtration provides high quality water
- Pumping limited to 50% of capacity due to concerns of nearby Sycamore landfill
- New data from a sentry well suggests the shale provides more protection than earlier estimates
- If true, may be able to safely increase UW29 pumping rate

# UW15 VOCs



- Apparently no confining layer to protect water quality at UW15
- TCE and 1,1,1 TCA follow similar trend
- Separate sources of TCE and PCE
- Sources:
  - TCE & TCA – metal shop
  - PCE – dry cleaner or metal shop

# UW15 VOCs



- Decrease in pumping rate at UW15 may result in increase in PCE.
- Source may be close
- PCE is entering from shallow aquifer

## Conclusions – UW7 and UW8

- Sealed through shale
- Shale missing below the nearby lakes
- Iron and manganese concentrations caused by:
  - Reducing conditions
  - Due to recharge through organic lake sediment?
- Aquifer Management Strategies:
  - Extending casing would probably have limited benefit

## Conclusions UW15

- PCE at UW15
  - Increasing trend, approaching the MCL
  - Source is likely a nearby PCE use
  - Unclear if shale is present – but affording no protection
- Aquifer Management Strategies
  - Remediate or control source
  - Extend casing deeper
  - Dilute with high pumping rates