



**CONSIDERATIONS FOR THE DESIGN AND  
CONSTRUCTION OF A WATER STORAGE TANK**  
Shippensburg Borough Authority

**RETTEW**  
We answer to you.





# Look familiar?



# Agenda



▶ **QUANTITY**

▶ **QUALITY**

▶ **TYPE**



# Today's Challenge



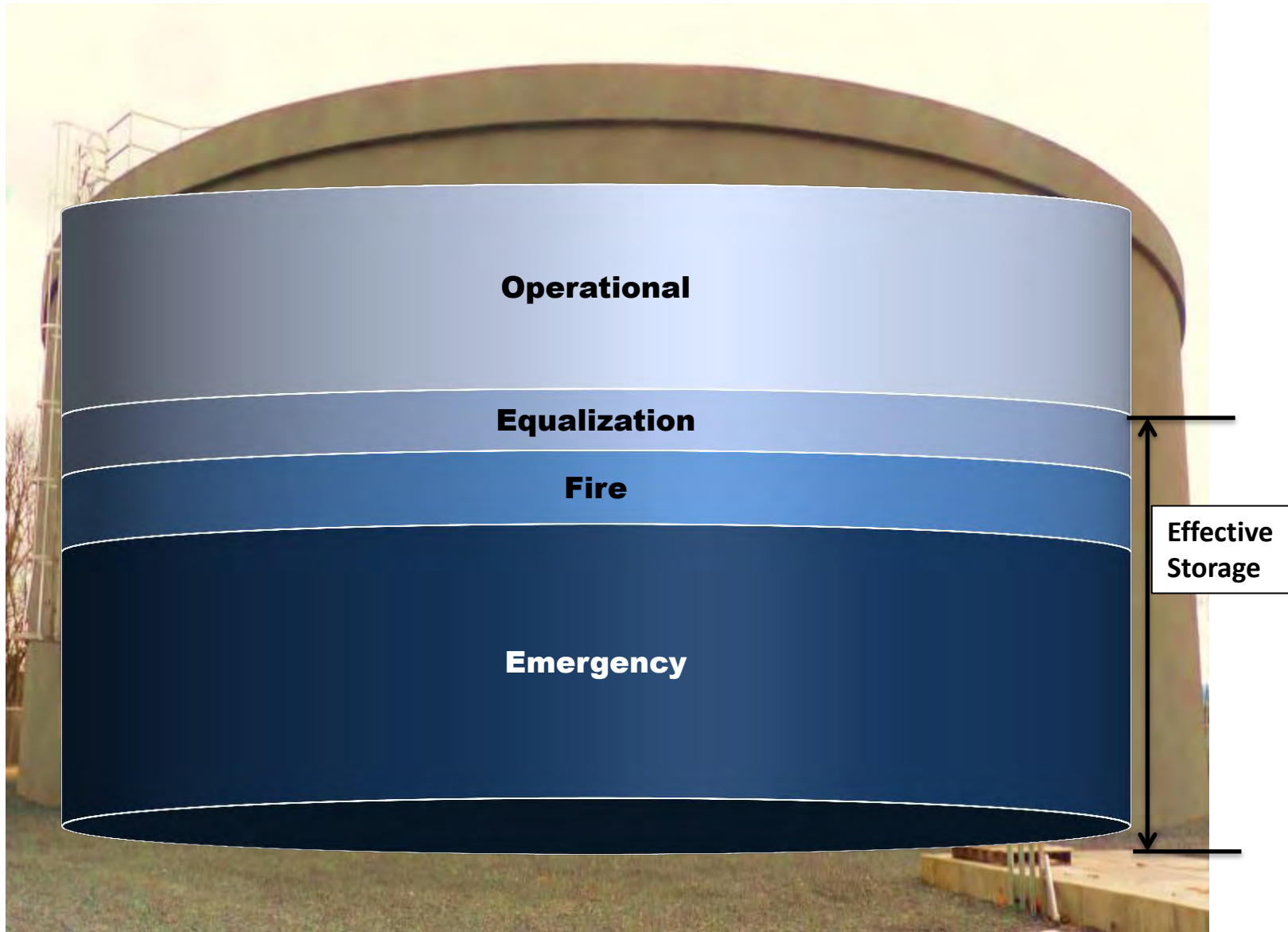
# Old School



# How many days of storage?



# Effective Storage





**Concrete D-110 by DN Tanks**

**3.0 Million Gallons**

**123' Inside Diameter**

**34' water column**

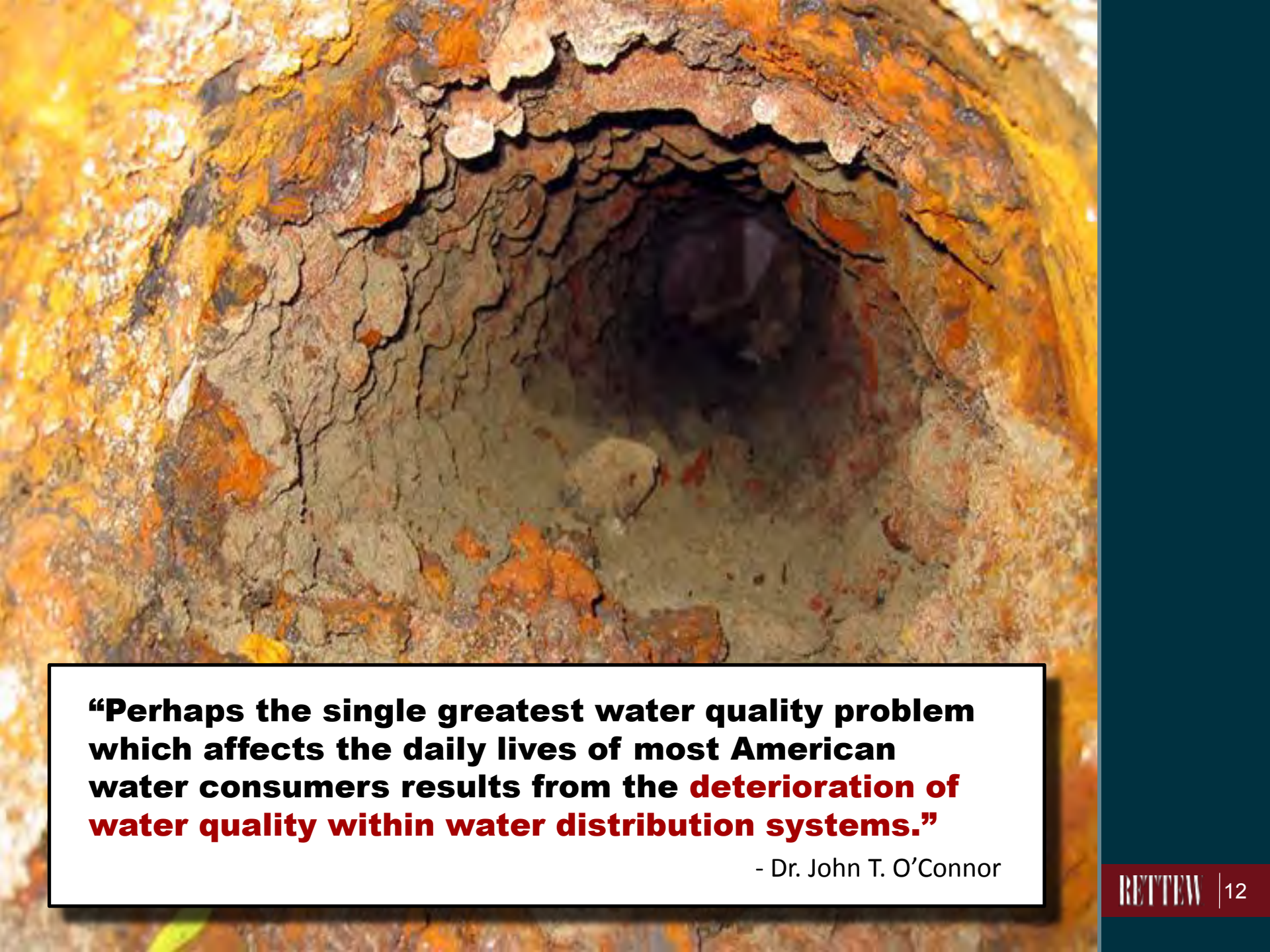


# Today's Challenge



# This is quality?





**“Perhaps the single greatest water quality problem which affects the daily lives of most American water consumers results from the **deterioration of water quality within water distribution systems.**”**

- Dr. John T. O'Connor

# How do we monitor quality?

- **Chlorine residual**
- **Chemical Contaminants**
- **Biological Contaminants**
- **Disinfection By-Products**
- **pH**
- **ORP (oxygen reduction potential)**
- **Temperature**
- **Turbidity**
- **Color**
- **Taste**
- **Odor**

# Keys to maintain quality

- **Chlorine residual**
- **Chemical Contaminants**
- **Biological Contaminants**
- **Disinfection By-Products**
- **pH**
- **ORP (oxygen reduction potential)**
- **Temperature**
- **Turbidity**
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# Keys to maintain quality

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**WATER “AGE”**

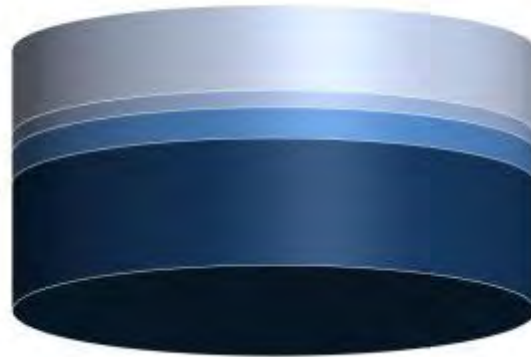
# Influence Age & Chlorine Residual

- ▶ Turnover (Design)
- ▶ Turnover (Operations)
- ▶ Baffling
- ▶ Separate Inlet/Outlet
- ▶ Mechanical Mixing
- ▶ Chlorine Boost





# Three Fold Strategy



**Turnover**



**Mechanical Mixing**



**Chlorine Boost**

# PAX Mixer



**Turnover:  
2.3 hours**



# Chlorine Booster



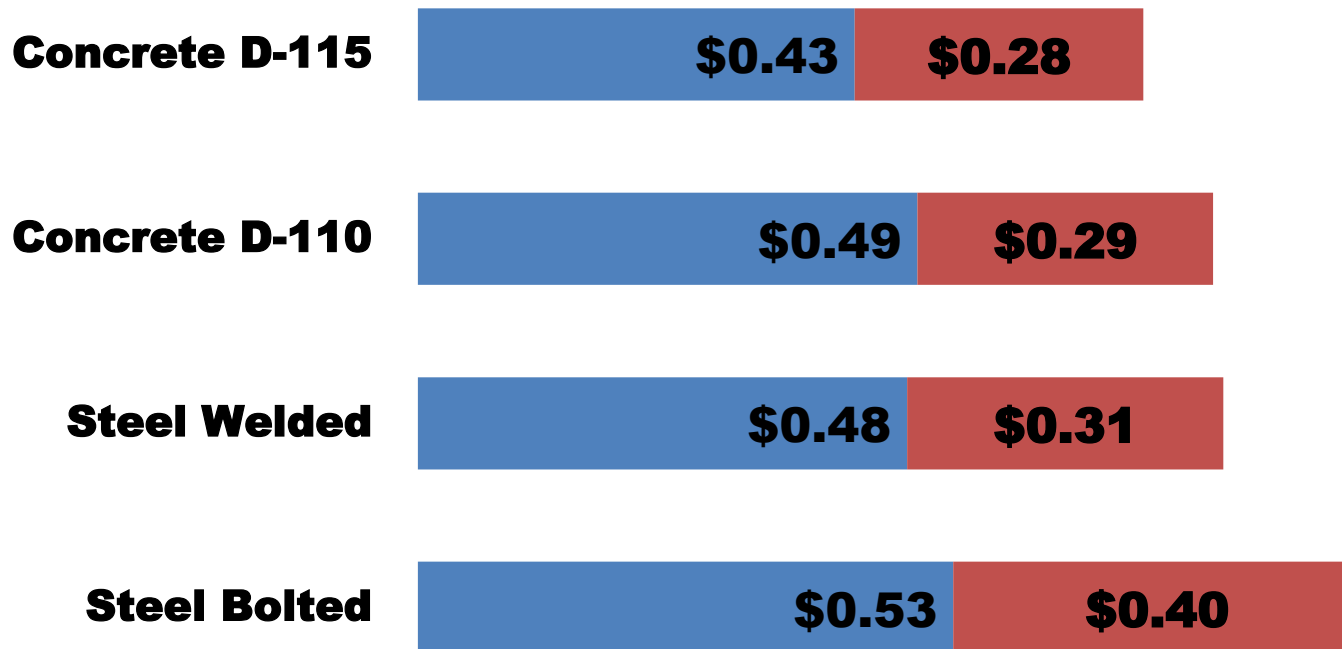
# Type of Tank



# Upsize from 2 MG to 3 MG Cost Per Gallon

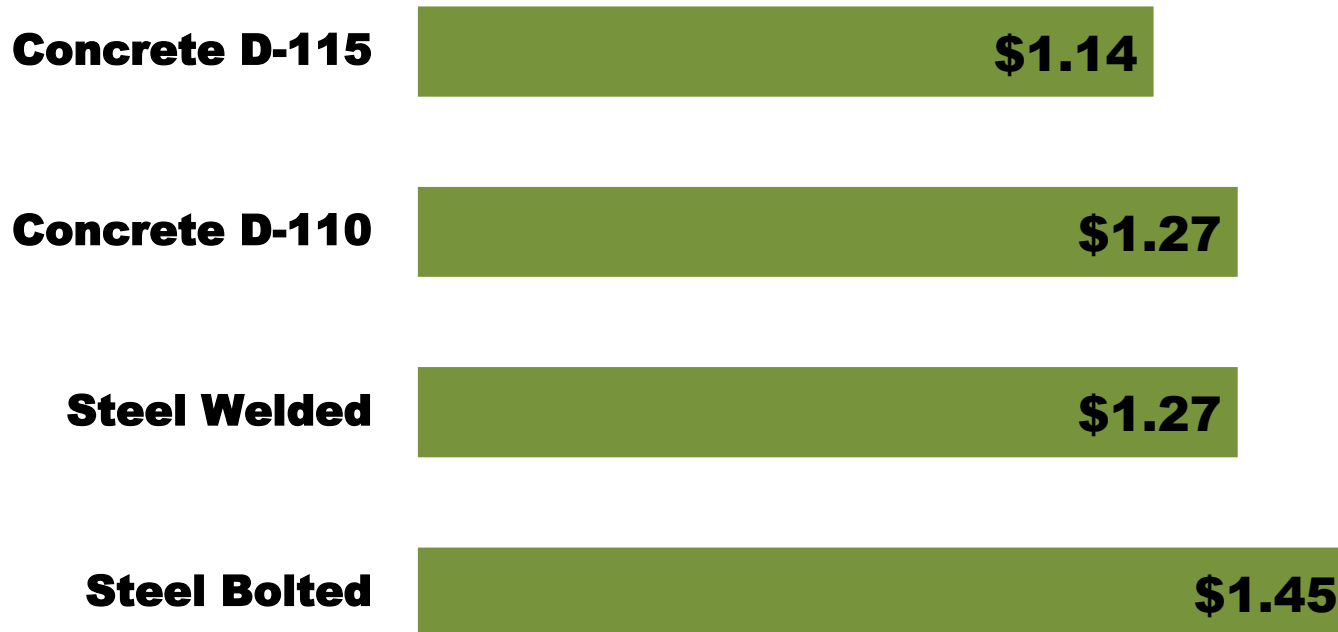
■ **Cost Per Gallon for first 2 MG**

■ **Cost Per Gallon to Upsize from 2 to 3 MG**



# Capital Budget Cost 3 MG Tank

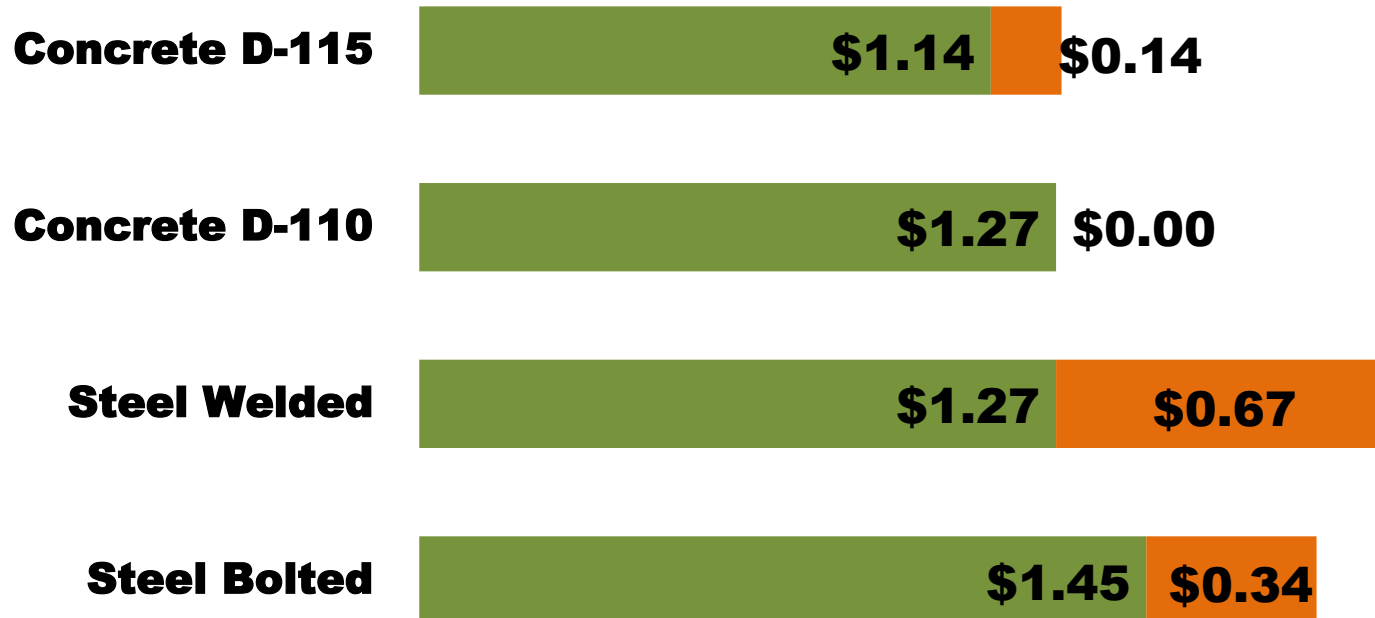
## ■ 3 MG Tank Capital Cost in Millions of Dollars



# Life Cycle Cost

## 40 Year Present Value for 3 MG Tank

■ Capital Cost   ■ 40 Year Present Value Cost



# Summary



**3 MG of Storage  
DN Tanks Concrete AWWA D110 Tank**



**Active Mixing with Chorine Boost**



**3,200 LF of 16" DICL  
6,500 LF of 12" DICL**



# Questions?



