



## P u b l i c   W o r k s D e p a r t m e n t

K a r i   D u n c a n ,   W a t e r  
T r e a t m e n t   P l a n t  
M a n a g e r

# W a t e r   S u p p l y   i n   a n   E m e r g e n c y

P N W S - A W W A   S e c t i o n  
C o n f e r e n c e ,   M a y   8 ,   2 0 1 4

# Lake Oswego Water System

- Clackamas River Source
- 250 miles pipe
- 16 reservoirs
- 11 pump stations
- 50,000' pipeline between Intake and Waluga Reservoir
- 16 mgd treatment plant
- ~13,500 system connections



River Intake Pump Station (RIPS)



Waluga Reservoir



Water Treatment Plant



# Existing Water System

- Functions well now
- River Intake and WTP are seismically vulnerable
- WTP, Intake and Pipeline is 45 years

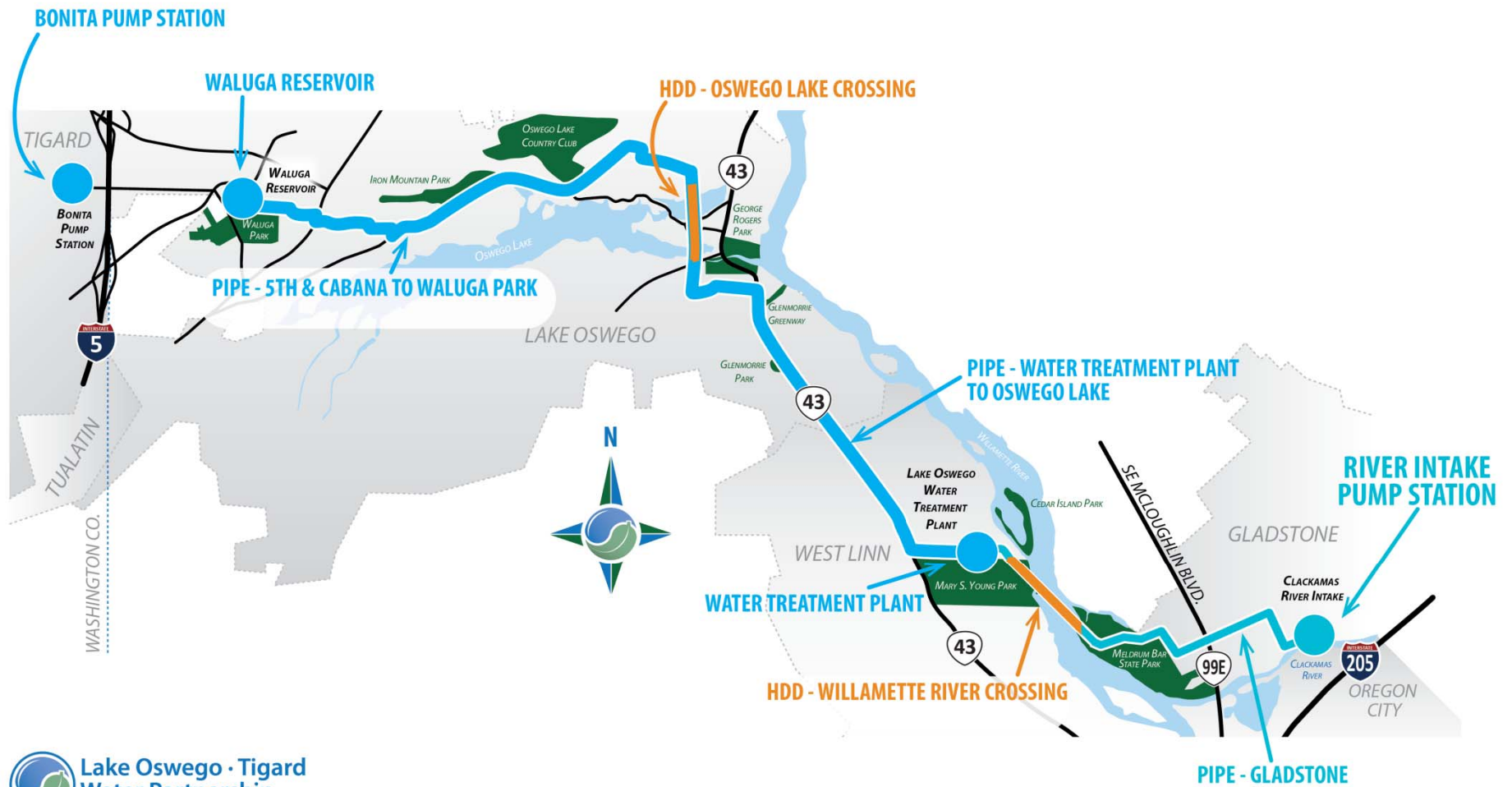
old



# Your typical ageing water system...

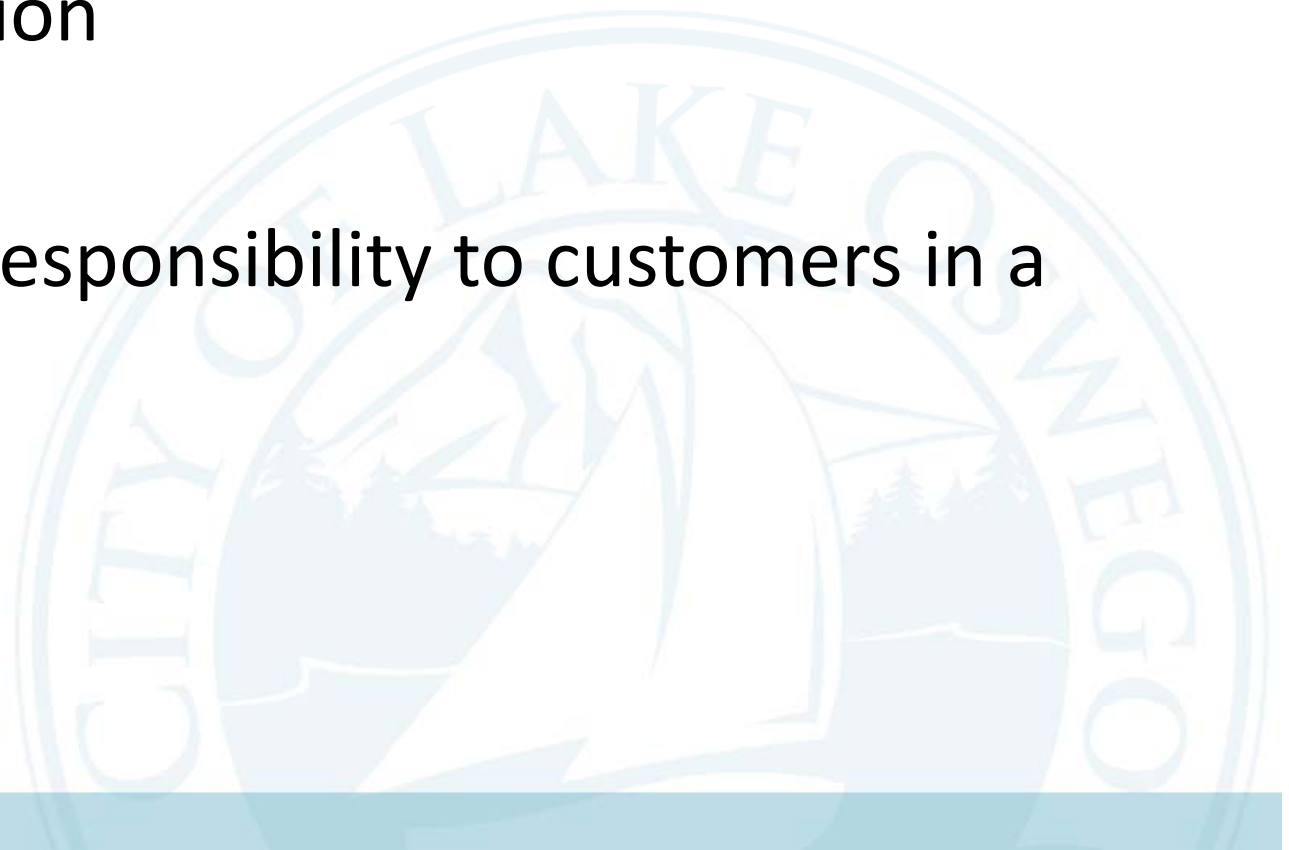


# Water Partnership Work Replaces “Backbone” of System



# Mission of Public Water Providers

- Provide a safe, reliable supply of water for drinking, sanitation, indoor/outdoor use and fire suppression
- What is our responsibility to customers in a disaster?



# Will I have water in an Emergency?

- Type of emergency
- Duration
- Availability of aid from neighboring communities

Conservation and curtailment of water use  
is critical in an emergency



# Will my water be safe to drink?

- Depends on the situation
- Water system will issue 'boil water' or 'do not drink' notice if the water is not safe
- 72 hours of food/water recommended

Or should it be 72 days??

Reference: Oregon Resiliency Plan





# Emergency Water Supply and Regional Partnerships

- Regional Water Providers Consortium (RWPC)
- Clackamas River Water Providers (CRWP)
- Oregon Water Agency Response Network (ORWARN)
- Emergency Water Interties



# Urban Areas Security Initiative

## Urban Areas Security Initiative (UASI)

**Purpose:** Nonprofit Security Grants Program (NSGP) provides funding support for hardening State Agencies against infrastructure vulnerabilities. The recipient must be located within one of the specific UASI-eligible urban areas.



**Total Funding Available in FY 2012:** \$10,000,000 (Has been funded for the last 5 fiscal years, funding no longer available to Portland Metro area)



# Reasons for the Emergency Response Equipment

- Compromised infrastructure due to Terrorist Attack or Natural Disaster
- Region may go several days before national aid is available
- Provide and distribute emergency water to community in containers (or provide filling stations for potable water)



# Typical Reasons to Deploy an Emergency Purification Unit

- Probable Oregon Natural Disasters
  - Floods
  - Landslides
  - Earthquakes
  - Volcanic Eruptions
  - Tsunamis



# Reasons to Deploy an Emergency Purification Unit

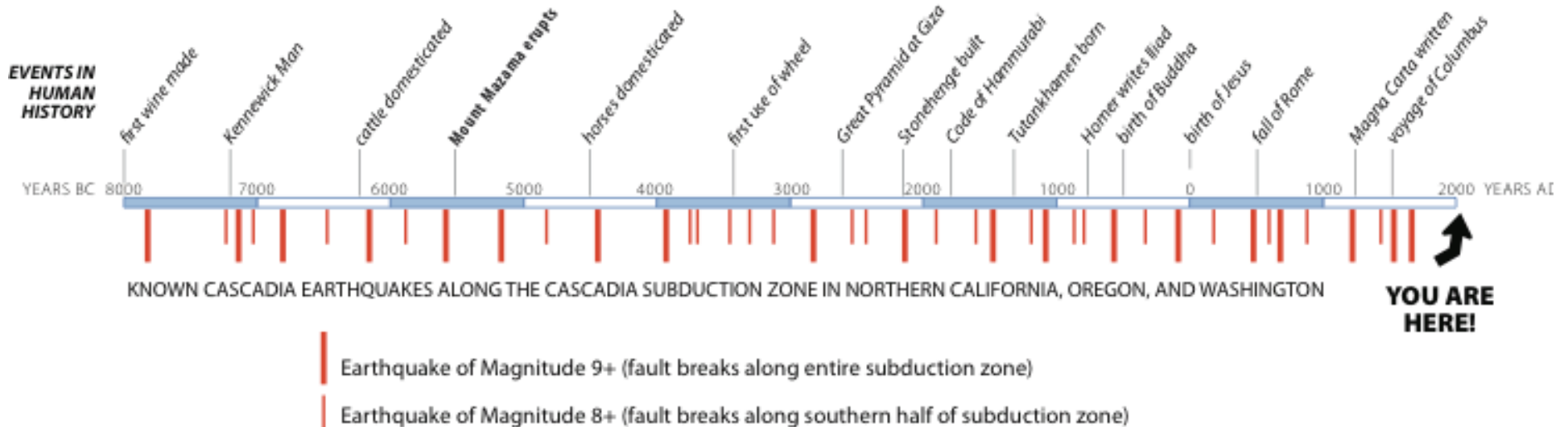
- Effects of Natural Disasters:
  - Loss of power to lift stations (Flood, Earthquake and Tsunamis)
  - Contamination of drinking water (Flood and Tsunamis)
  - Damage to aging infrastructure (Flood, Landslide, Earthquake, Volcanic Eruption, and Tsunami)



# Cascadia Subduction Zone



## CASCADIA EARTHQUAKE TIME LINE



Comparison of the history of subduction zone earthquakes along the Cascadia Subduction Zone in northern California, Oregon, and Washington, with events from human history. Ages of earthquakes are derived from study and dating of submarine landslides triggered by the earthquakes. Earthquake data provided by Chris Goldfinger, Oregon State University; time line by Ian P. Madin, DOGAMI.

# Why Are Water Systems Vulnerable?

## ◆ Connections to structures



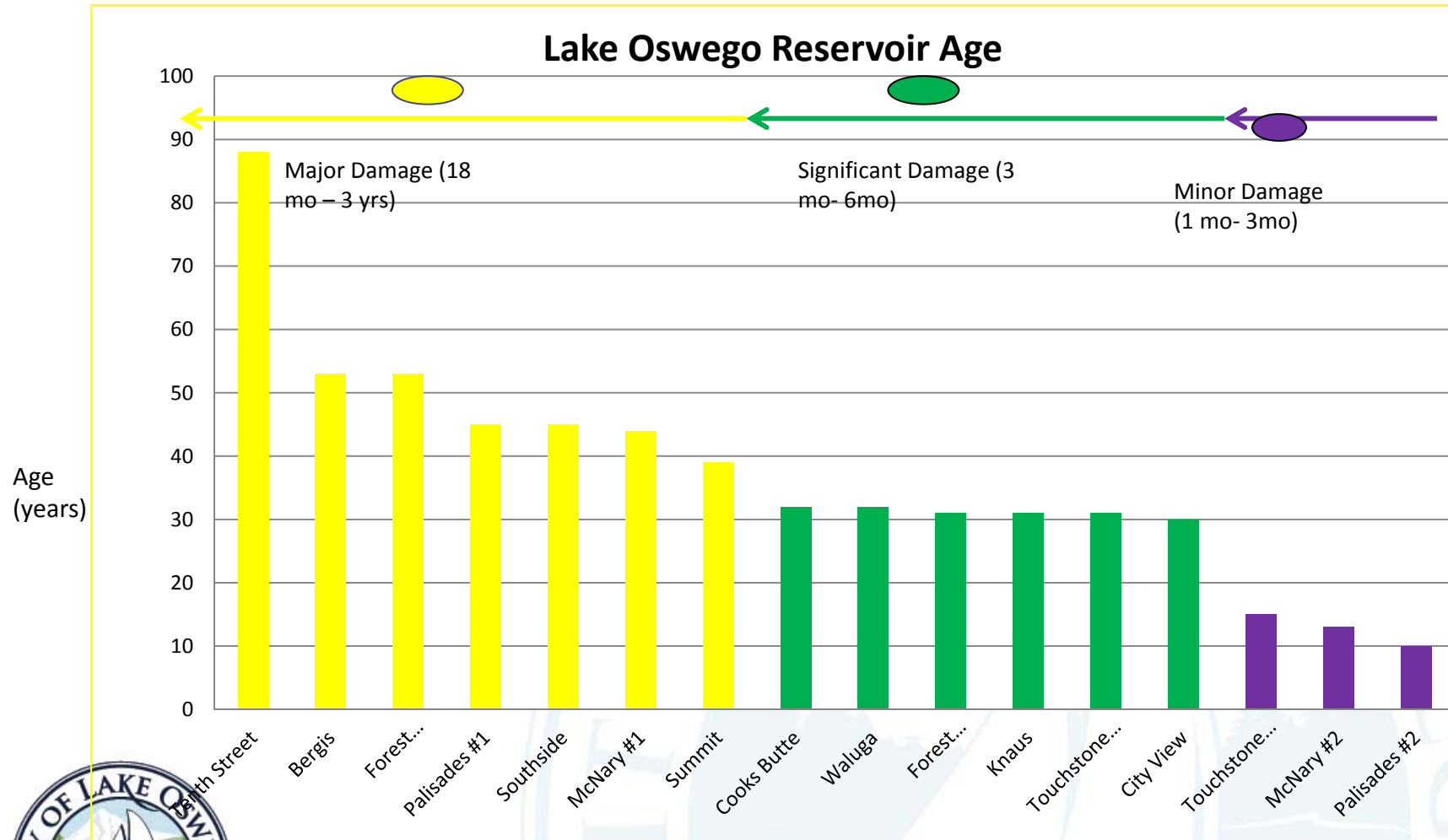
# Why Are Water Systems Vulnerable?

- ◆ Pipelines vulnerable to ground deformation





# Cascadia Earthquake: Evaluating Lake Oswego Facility Performance



# City of Lake Oswego Emergency Water Treatment Trailer



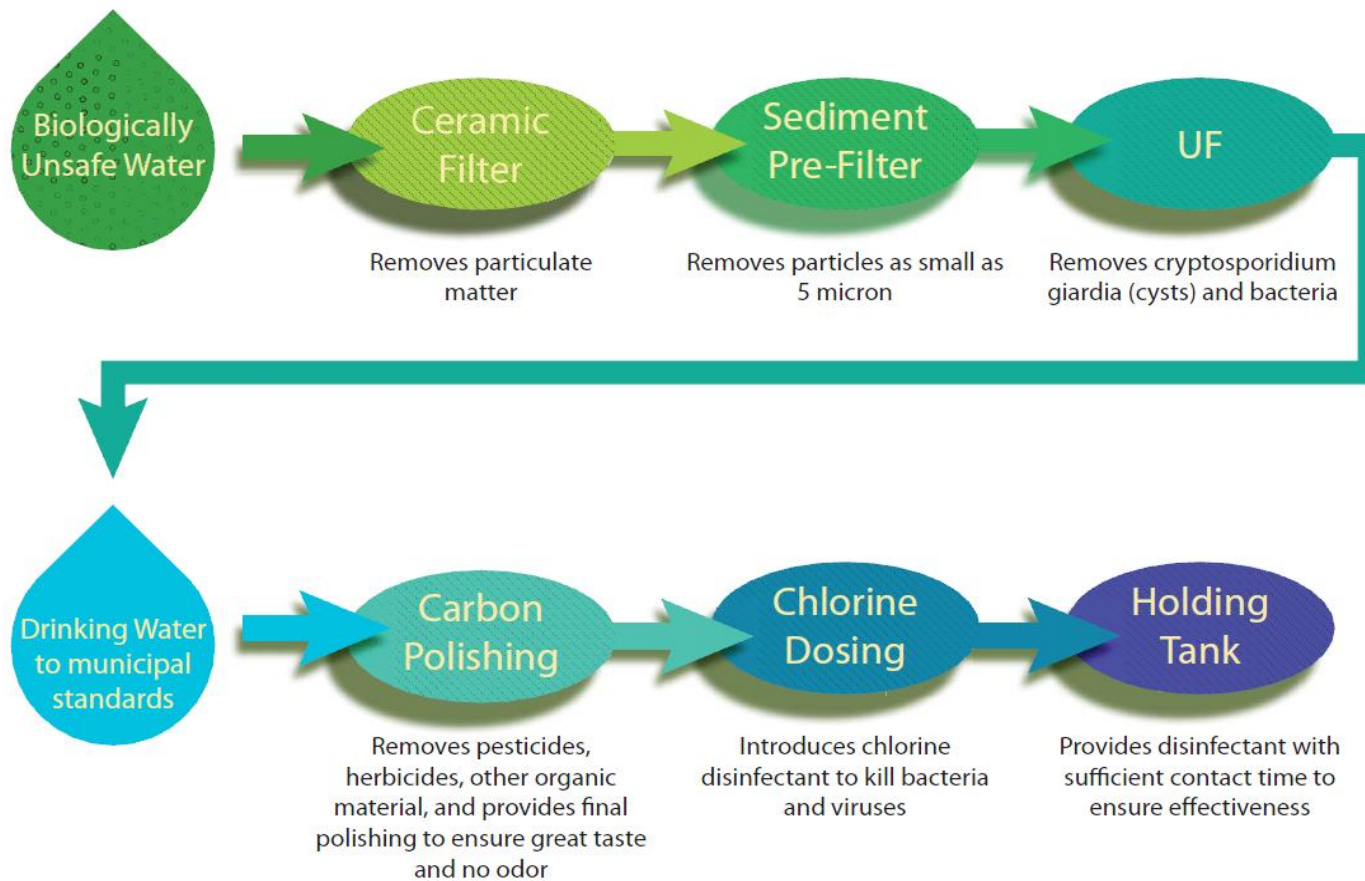
# Stats:

- Capacity: 30,000 Gallons Per Day
- Will treat fresh water sources to drinking water quality;
- Diesel Generator and Diesel Pumps (self sufficient)
- Limitations: will not treat sea water or heavily polluted water (eq. high level of heavy metal)



# Overall Conceptual Design

## WATER TREATMENT PROCESS MAP



# EMERGENCY WATER PURIFICATION TRAILER DEPLOYMENT

ALTERNATIVE WATER SOURCE



EMERGENCY WATER PURIFICATION TRAILER



TSURUMI DIESEL PUMP



TSURUMI DIESEL PUMP



PILLOW TANK



TAP STAND

KEY:

- Relief Discharge Line
- Raw Water Supply Line
- Purified Water Supply Line



# Section 1 : Pre-filter



Ceramic Filters 20 micron



# Pre-filter



5 Micron Filter



# Ultra-Filtration



Ultra Filter Array

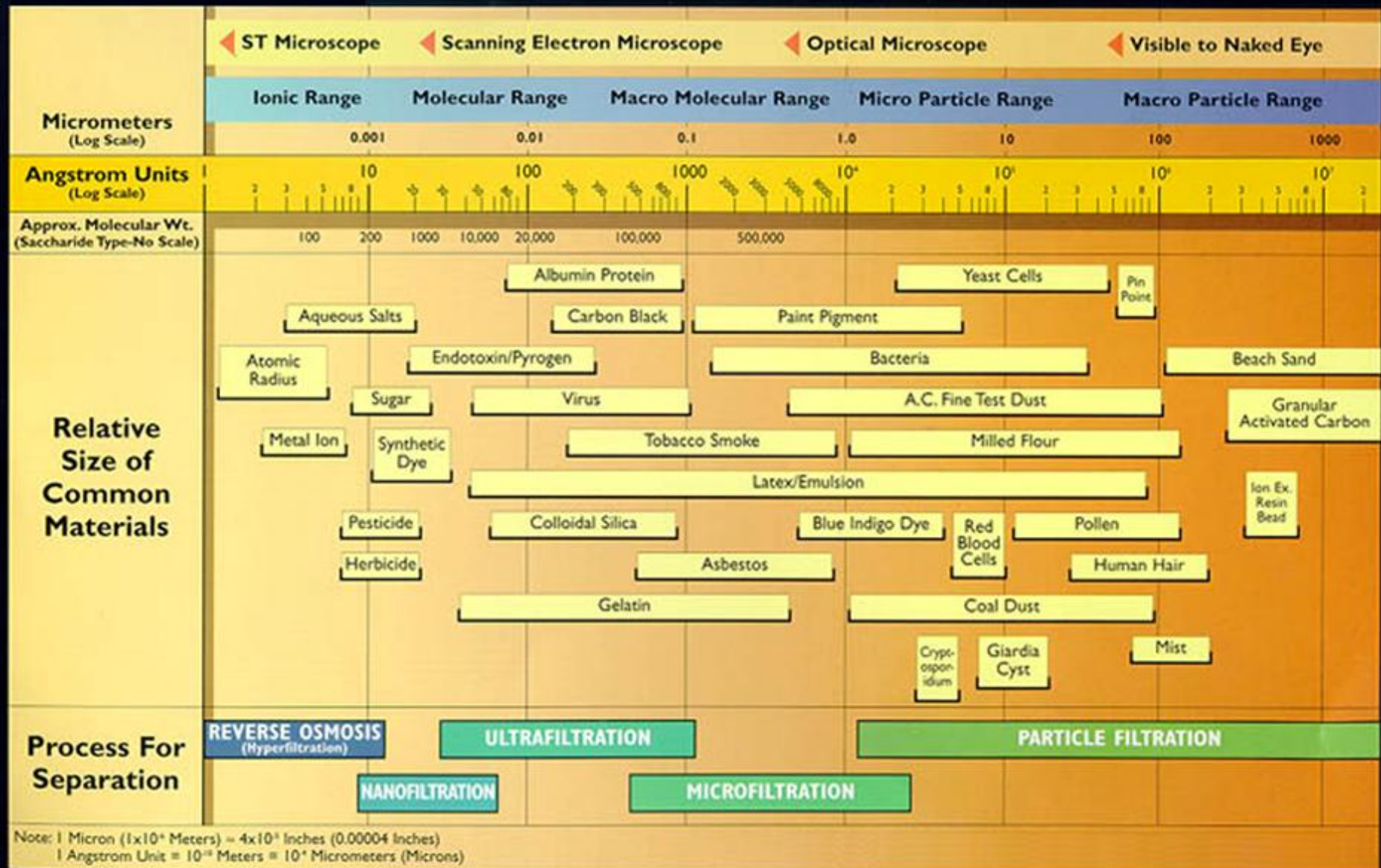


Single Ultra Filter





# The Filtration Spectrum



# System Controls



- Ultrafiltration (Normal Operation)
  - Under normal operation the system will backwash one ultra filter at a time, for 20 minutes each.
- Manual Backwash Button
  - Used to flush the preservatives out of the ultrafilters.



# Polishing



Carbon Block Cartridge Filters



Chlorine Dosing Pump and Tank

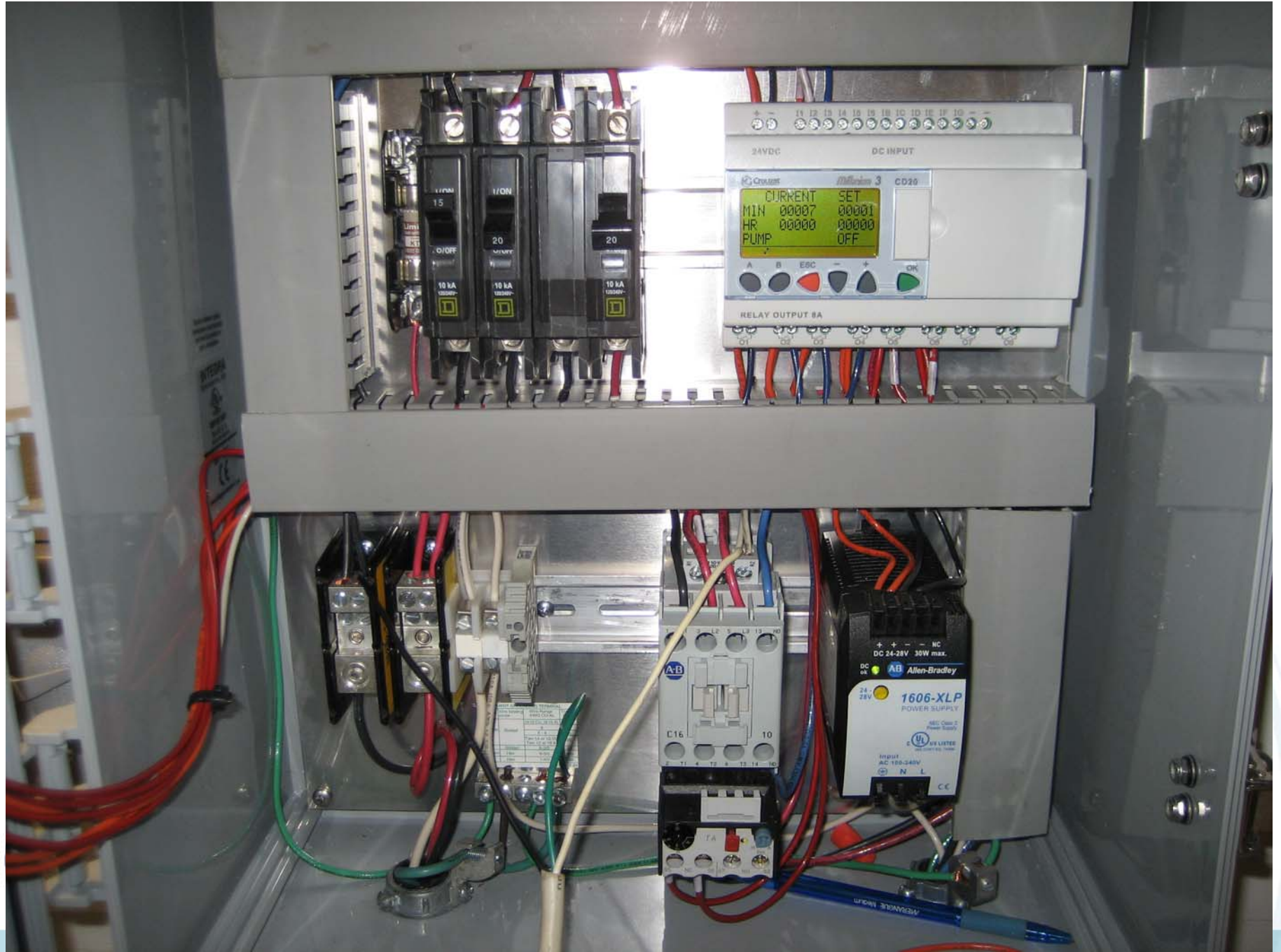


# Practice makes perfect...









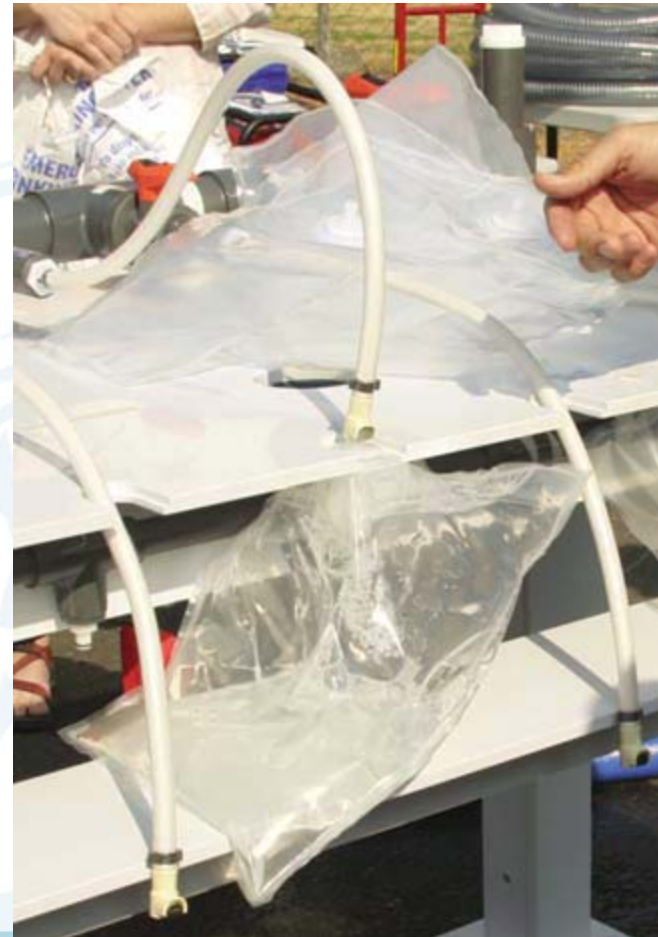




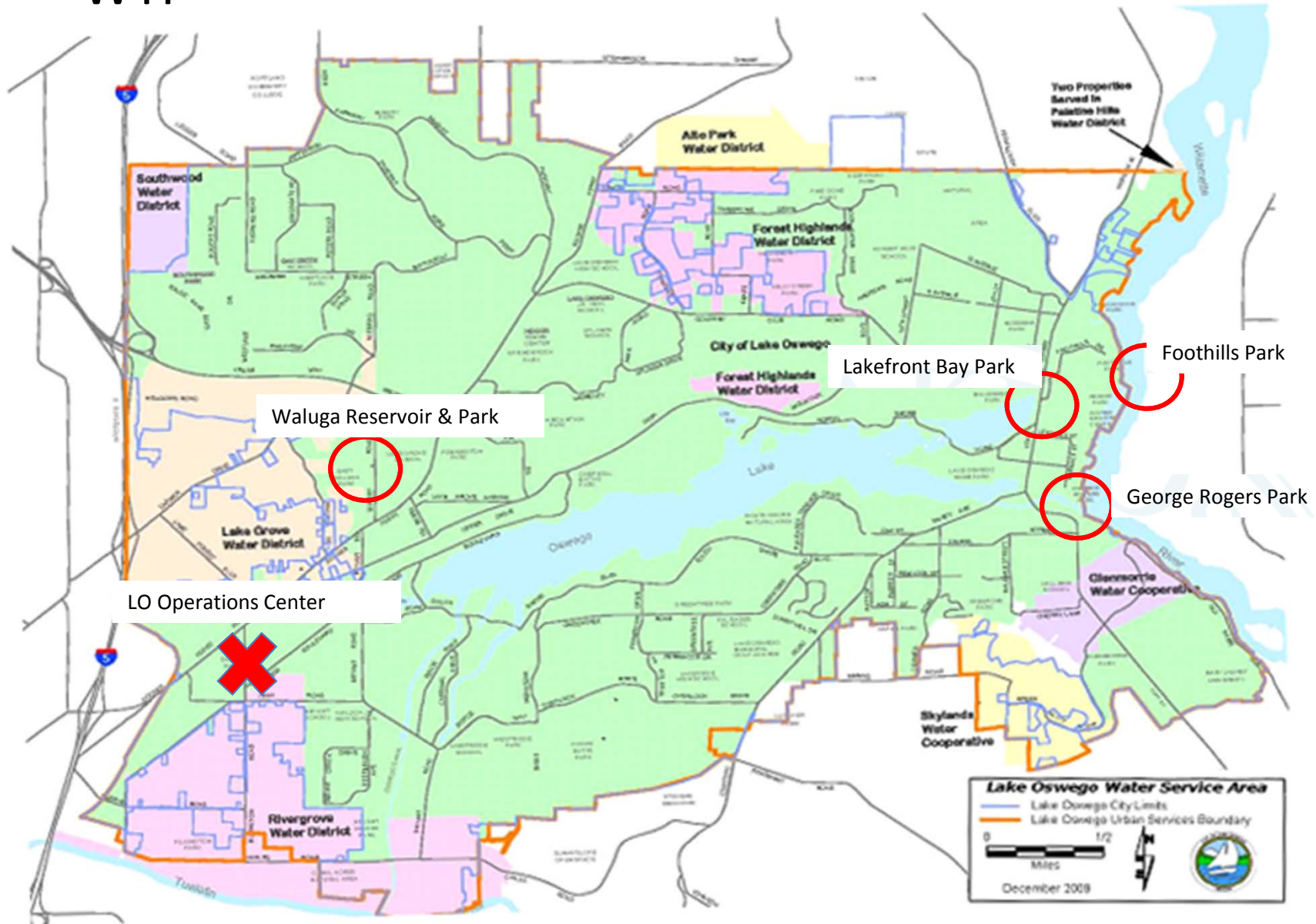


# Deployment

- Integrate with the Emergency Water Distribution System (EWDS)



# Storage Location and Potential Staging of Mobile WTP



# Equipment can be Shared Through:

- Urban Area Security Initiative (5 county)
  - Multnomah, Columbia, Clackamas, Washington, Clark
- Mutual Aid Agreements:
  - Oregon Water Agency Response Network ORWARN
  - Cooperative Public Agencies of Washington County (CPAWC)
  - Portland Metropolitan Area Transportation (?)
  - Pacific Northwest Interagency Cooperative (?)



# We almost deployed the system twice in 2013...

- Cryptosporidium Contamination
  - Baker City, Summer 2013,
- Small, isolated water system with equipment breakdown
  - Row River Water District, Spring 2013

Maybe the need for this type of system is more prevalent than anticipated...



# Shared Regional Response Equipment: Portland Metro Area

- Generators
- Response Vehicles
- Light Trailers
- Emergency Water Distribution System (EWDS)
- Emergency Mobile Water Treatment Plants



# Emergency Water Distribution Systems



MEGO





# Water distributed in 6L bags



# Other Treatment Systems



# “Backpack Water Treatment”



# Be Prepared....so you can rest easy



## Questions?

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