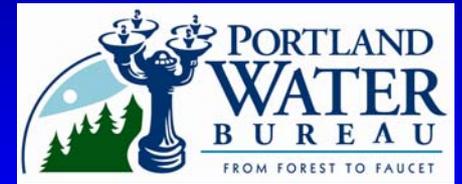
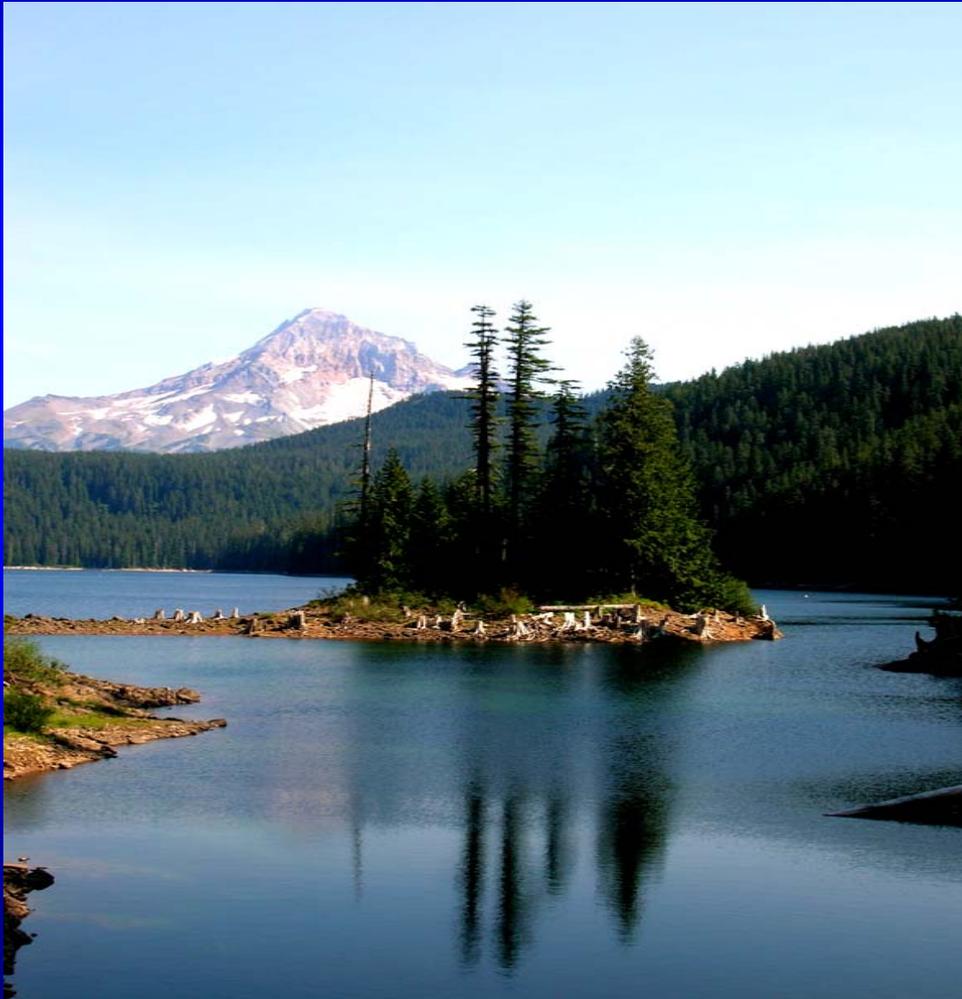


Portland Water Bureau

From Forest.....



....To Faucet

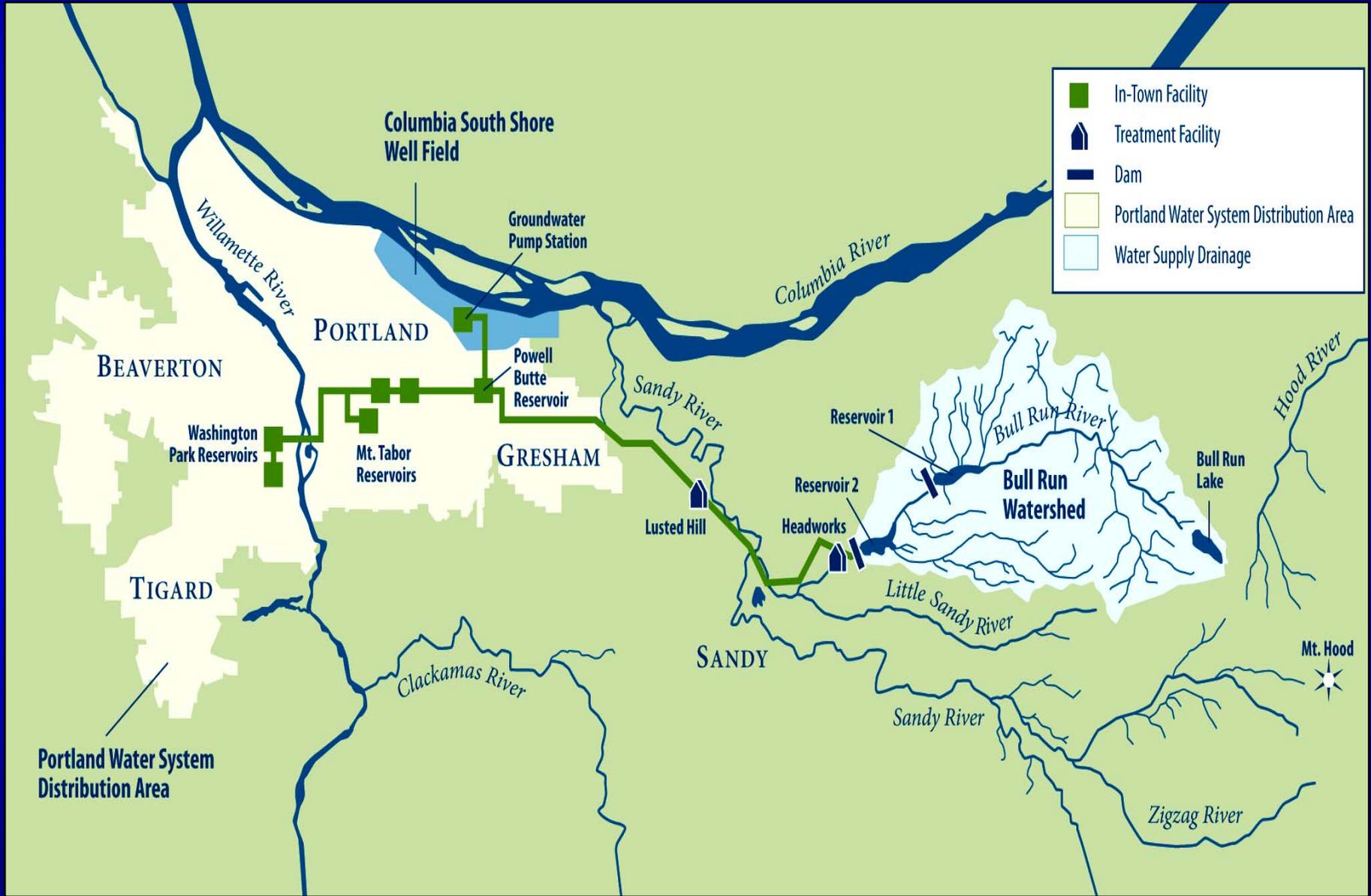




Presentation Overview

- Portland's Water System
- Water Treatment Overview
- Multiple Barrier Approach to Safe Drinking Water
- Future Challenges

Portland's Service Area

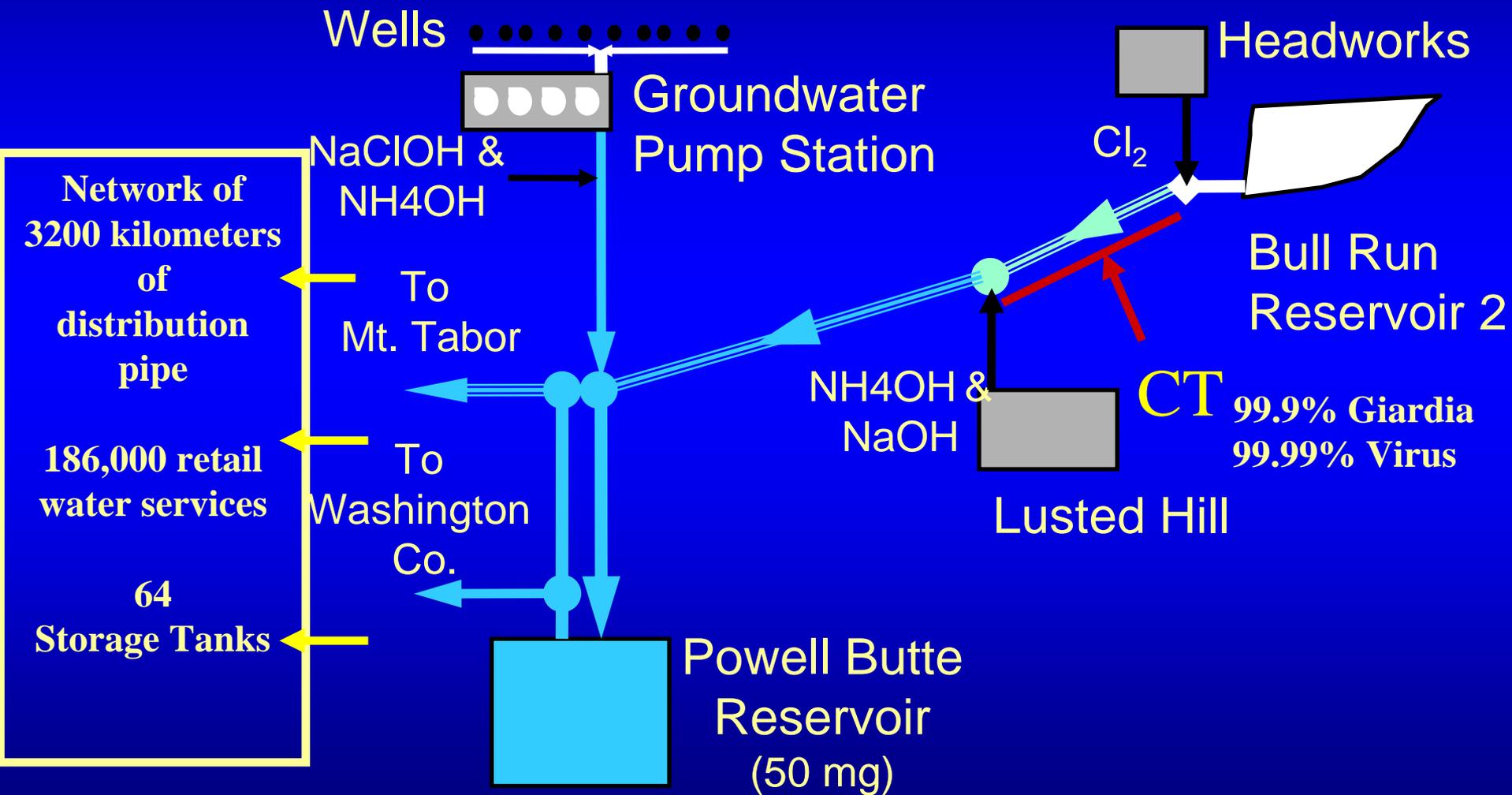


PWB Service Area



- 495,000 retail customers
- 345,000 wholesale customers
- 420 million liters per day average

Supply System Overview





Portland's Water

- **Bull Run**

- Primary Source
- Unfiltered
- Very high raw water quality
- No human activity to degrade wq
- Very soft (.3 grains per gallon)
- Color can vary seasonally

- **Columbia South Shore Wellfield**

- Back-up & Supplemental Supply
- High quality

The Bull Run Watershed

- Unfiltered surface water supply
- 265 square kilometers
- Rain dominated system: 175 – 430 cm of precipitation / year
- Closed to public access
 - No residents
 - No logging
 - No recreation
- Managed by USFS in cooperation w/City



Bull Run Lake



Gravity fed delivery to town



Three conduits with a maximum capacity of 850 million liters carry Portland's water the 40 kilometers from Bull Run to Portland.

The Columbia South Shore Wellfield



- Emergency and back-up supply
- Peak demands
- Seasonal augmentation
- Capacity: 360 million liters
- Vital to Bull Run Filtration Exemption



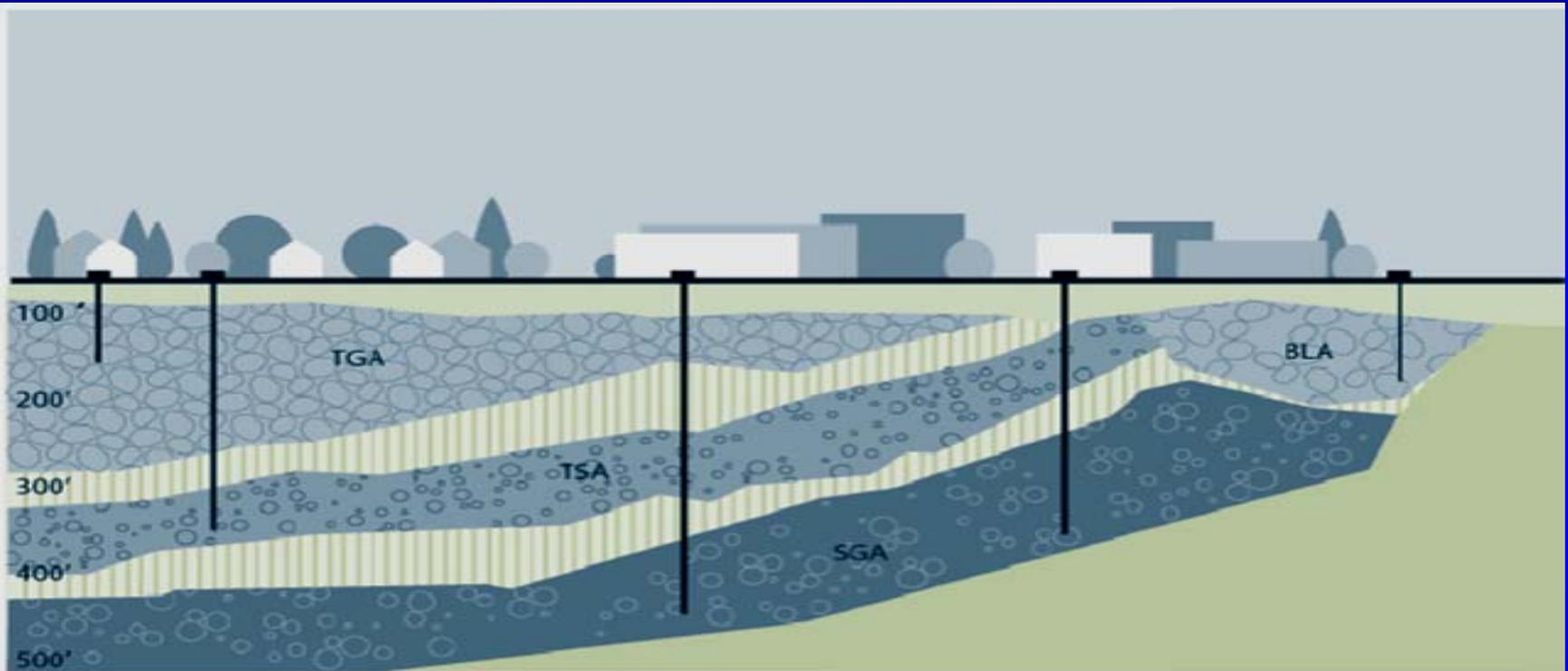
Groundwater Supply

- High quality
- Award winning groundwater protection program
- On-going containment and inspection programs for businesses
- Monitoring well network to ensure quality

Columbia South Shore

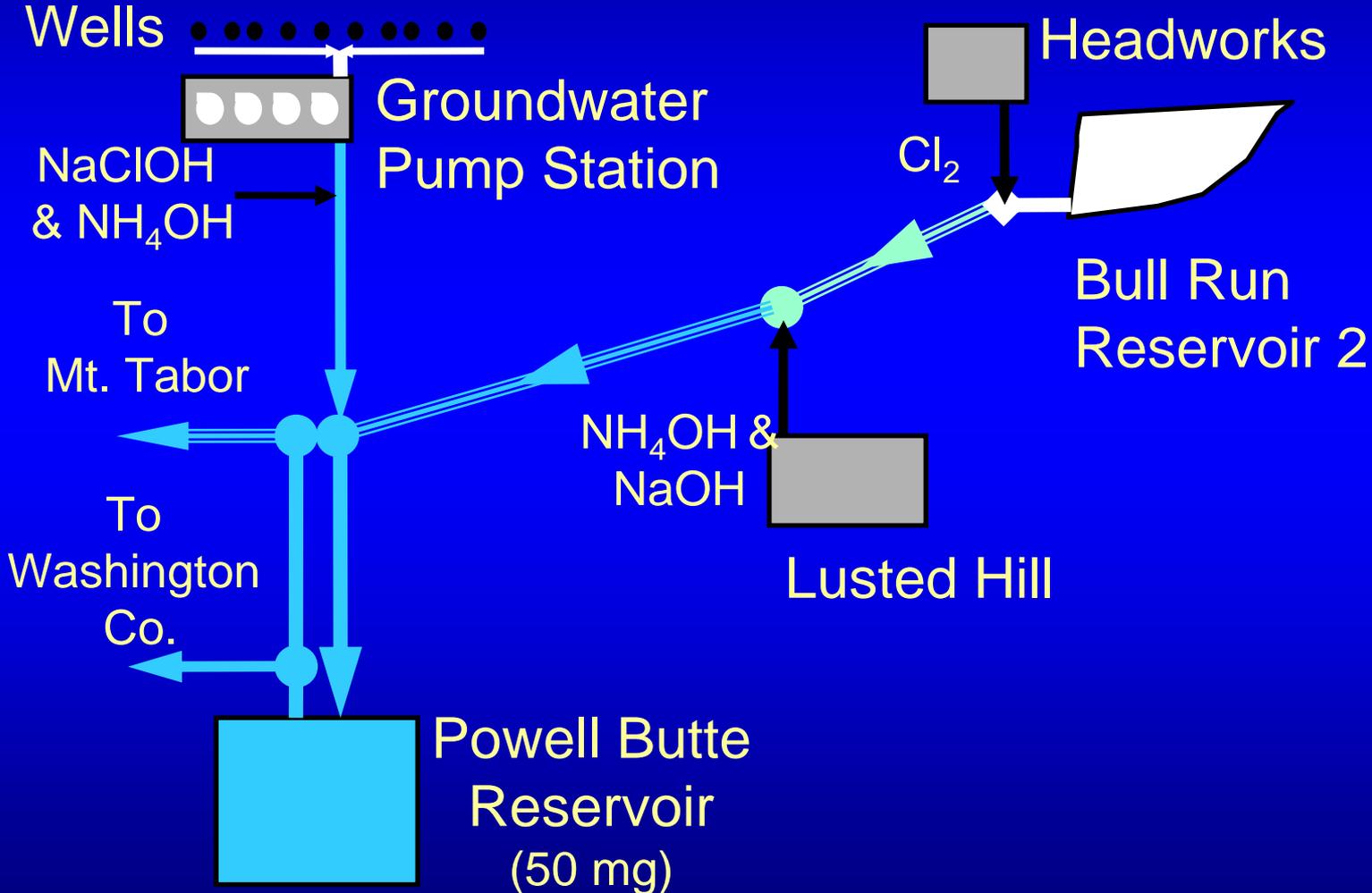


Columbia South Shore Wellfield



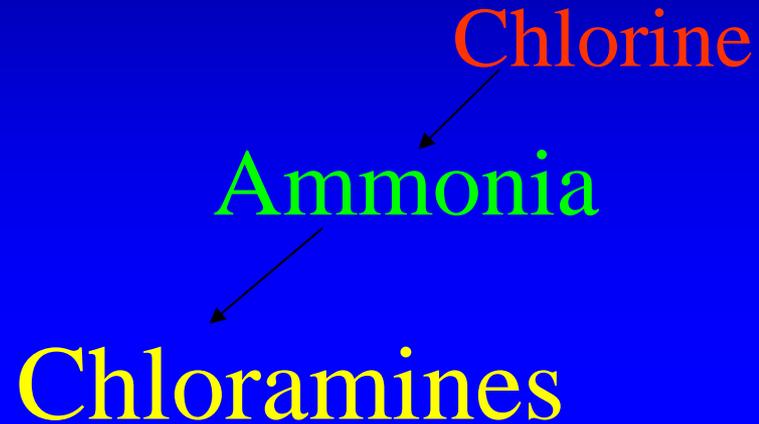
- = Troutdale Gravel Aquifers (TGA)
- = Blue Lake Aquifers (BLA)
- = Troutdale Sandstone Aquifer (TSA)
- = Sand and Gravel Aquifer (SGA)
- = Confining layers (Clay)

Supply System Overview



Treatment Summary

- Chlorine added at Headworks
- Ammonia at Lusted forms Chloramines
- pH raised with Sodium Hydroxide



Why Chloramines?

- More stable & longer lasting- Carries through to the end of the distribution system (open reservoirs & 3,200 kilometers pipe!)
- Reduces DBPs (Disinfection byproducts)

Ours are low

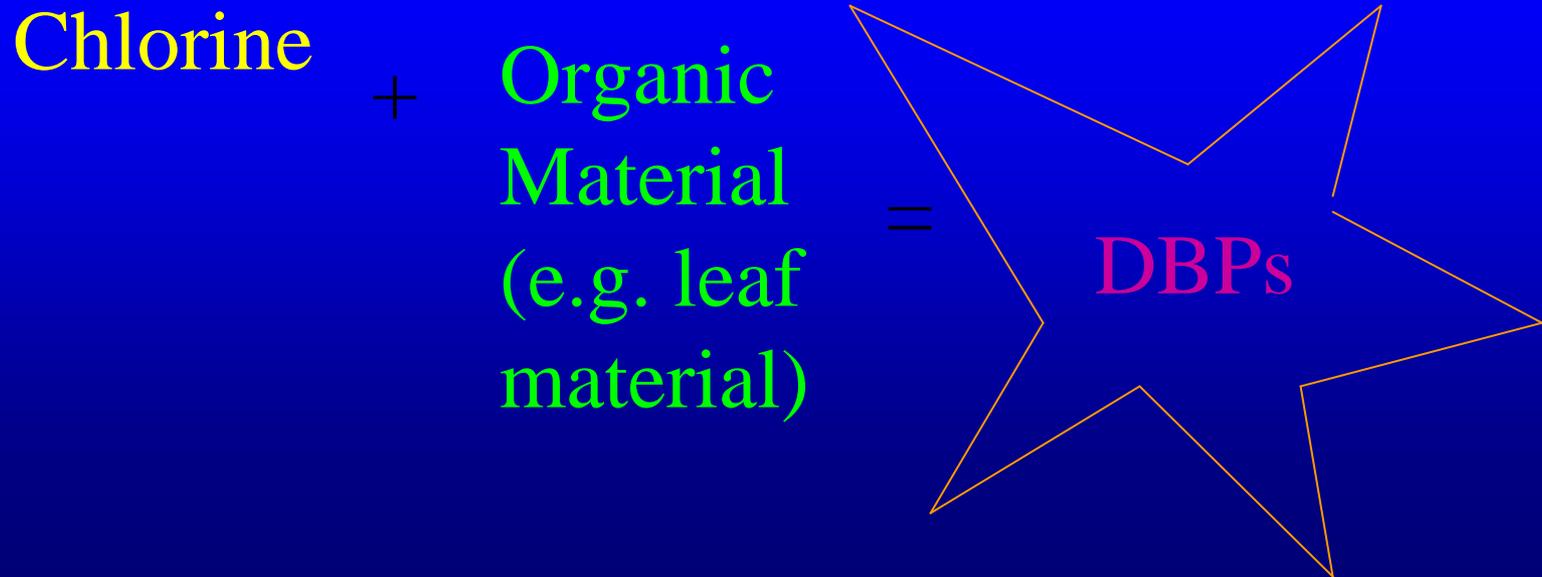
Chlorine

+

Organic
Material
(e.g. leaf
material)

=

DBPs



Turning *Raw Water* into *Finished Water*

How we ensure
potable water:

Multiple Barrier
Approach



Portland Water Bureau Lab, Gatehouse, circa 1920s

Turning *Raw Water* into *Finished Water*

How we ensure
potable water:

Multiple
Barrier
Approach



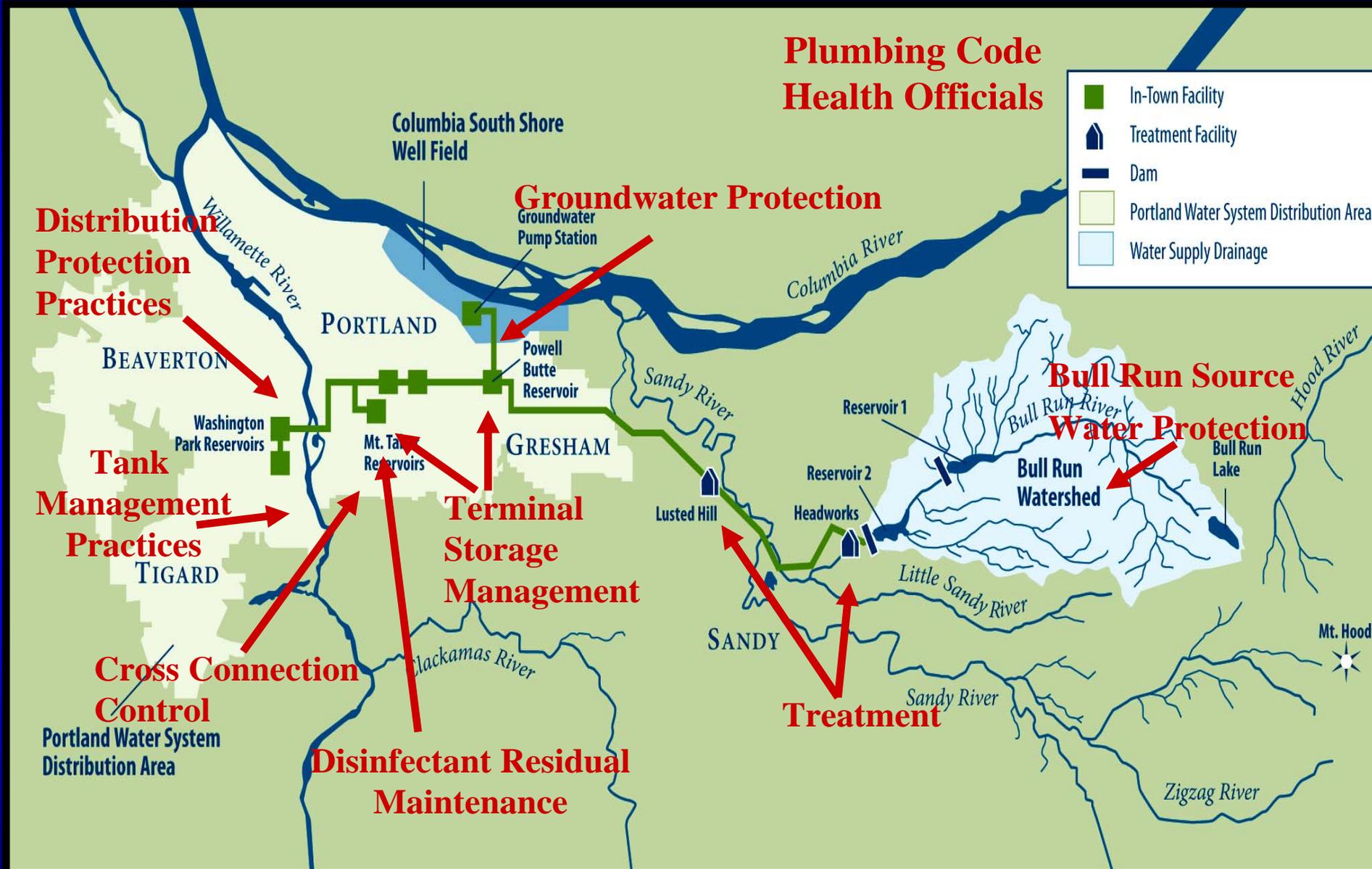
Portland Water Bureau Lab, Gatehouse,
circa 1920s



Multiple Barrier Approach to Safe Drinking Water

- Complex & multifaceted
- Potable water is a perishable product
- Based on best practices
- Based on industry standards: American Water Works Association (AWWA)
- Based on the science of drinking water production and delivery
- Multi-jurisdictional
- Not just pathogens

Multiple Barrier Approach to Safe Drinking Water





Meeting Future Challenges

Aging Infrastructure: Parts of the system are 100 years old



Asset Management Approach

Portland's drinking water is
not filtered.

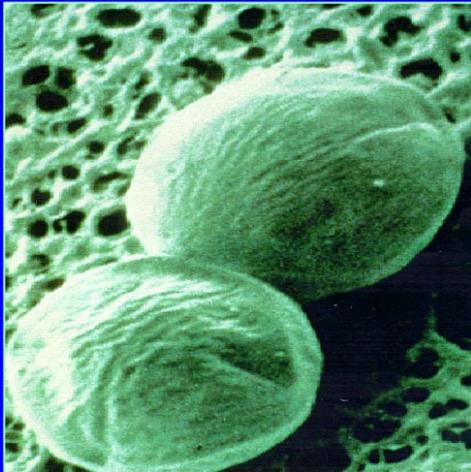


Turbidity Events

- Events — 13 since 1972
- Duration — varied from 4-27 days
- NTUs — varied from 4.9–120+



Treatment & LT2



- Evolving needs have resulted in significant changes in treatment requirements over time
- Major Challenge:
 - Treatment requirements for *Cryptosporidium*
- Three Pronged Approach:
 - Compliance
 - Variance
 - Congressional

Open Reservoir Replacement Project



- Scenic beauty
- Historical legacy
- Recreation sites
- Threat targets
- Contamination potential
- EPA Approved Plan

Meeting Supply Needs

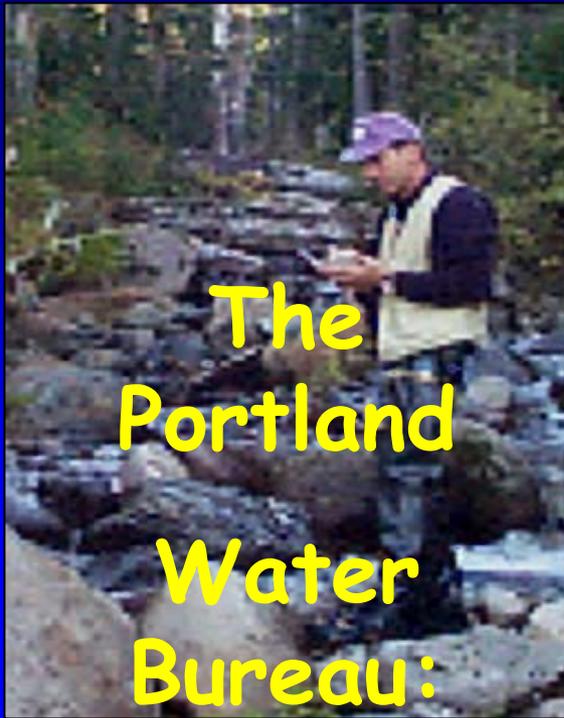
- System Expansion
 - Supply adequate for decades
- Water for fish
 - Flow releases for habitat
 - Temperature management



Understanding Vulnerabilities



- Floods and landslides
- Wind and fire
- Volcanic hazards



The
Portland
Water
Bureau:



Serving our
customers
24/7 for more
than 100
years



“From Forest to Faucet”

