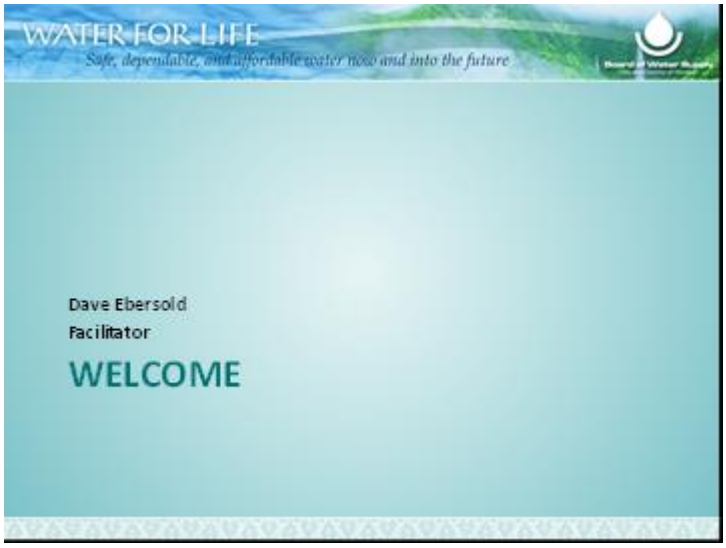
Slide 1


WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
Stakeholder Advisory Group
Meeting #5
Board of Water Supply
City & County of Honolulu
Tuesday, January 12, 2016

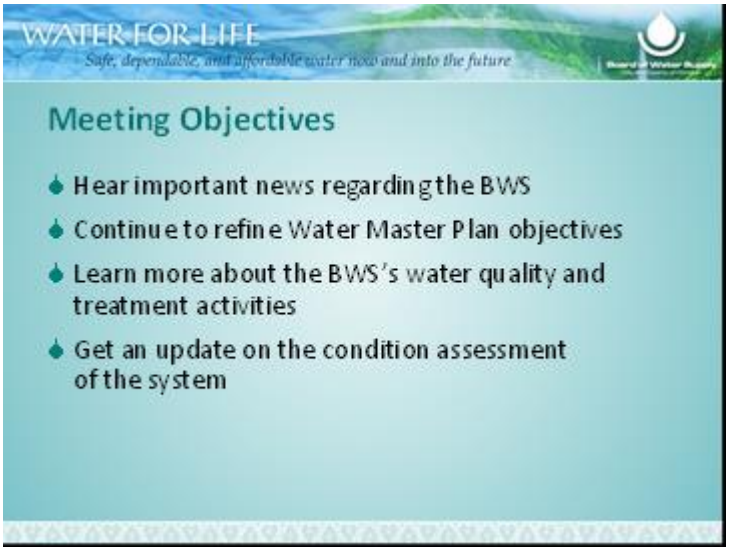
Slide 2


WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
Dave Ebersold
Facilitator
WELCOME

Slide 3


WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
Public Comments on Agenda

Slide 4


WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
Meeting Objectives
Hear important news regarding the BWS
Continue to refine Water Master Plan objectives
Learn more about the BWS's water quality and treatment activities
Get an update on the condition assessment of the system

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WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
Ernest Lau, P.E.
BWS Manager and Chief Engineer
BWS UPDATES

Slide 6


WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
The BWS can speak to your community, group, or organization about these or any other topics.

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Mahalo!
Questions & Answers
ENTRUSTED TO US TO
PRESERVE
FOR FUTURE GENERATIONS

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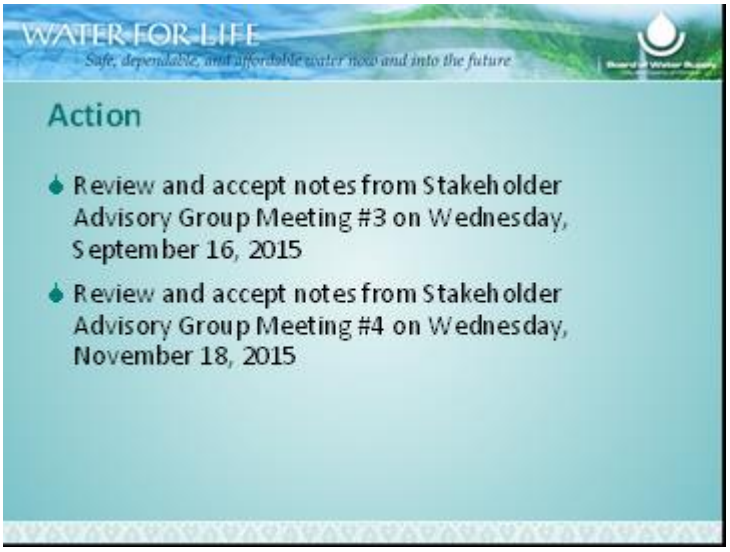
WATER FOR LIFE
Safe, dependable, and affordable water now and into the future
Action
Review and accept notes from Stakeholder Advisory Group Meeting #3 on Wednesday, September 16, 2015
Review and accept notes from Stakeholder Advisory Group Meeting #4 on Wednesday, November 18, 2015

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Safe, dependable, and affordable water now and into the future
Dave Ebersold
Facilitator
WATER MASTER PLAN OBJECTIVES

Slide 10

In Meeting 2, we began the process of focusing on framing objectives for the Water Master Plan (WMP). These are intended to articulate where we want to be in terms of five critical areas you had identified as priorities in our first meeting and in the preceding interviews and discussions.

We continued discussing these objectives during Meetings 3 and 4, and believe that we have achieved consensus on the first three.

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Now let's turn our attention to the remaining objectives.

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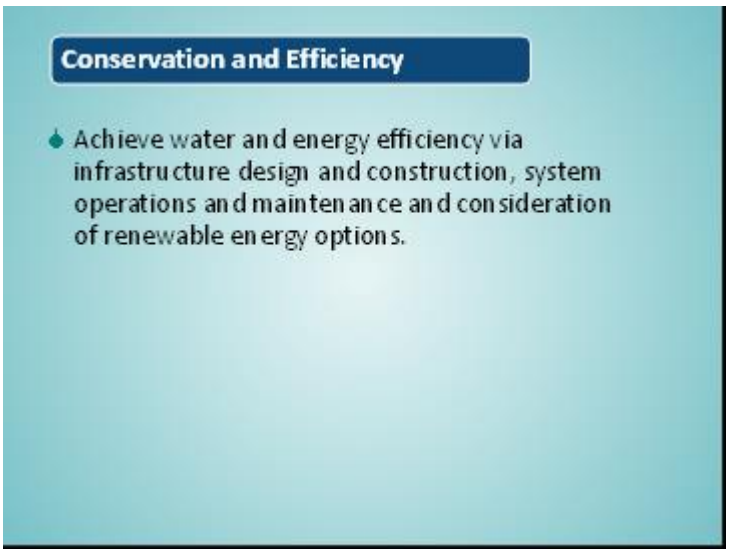

Today we will discuss the 4th objective and try to reach group consensus.

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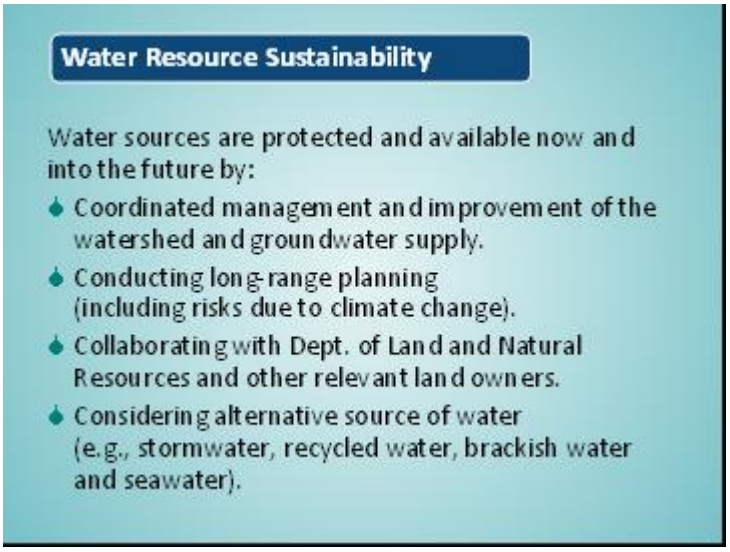

We will also address the 5th objective if time permits.

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Erwin Kawata
Water Quality Division Program Administrator
WATER QUALITY

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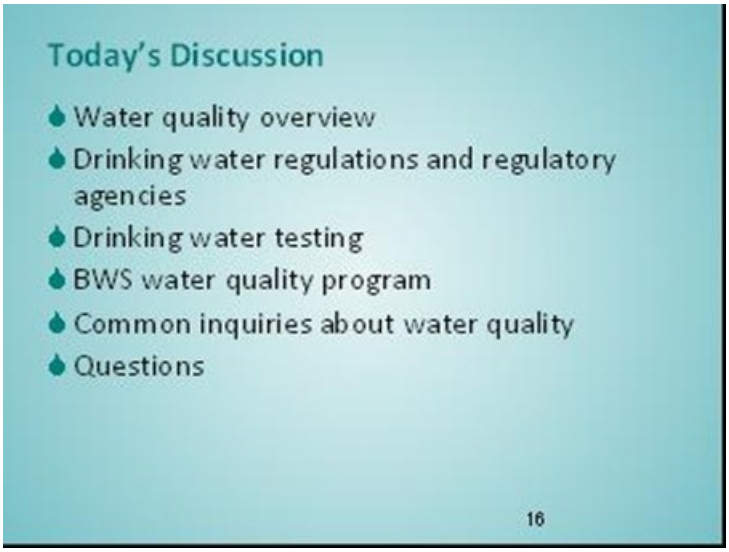
Today's Discussion
Water quality overview
Drinking water regulations and regulatory agencies
Drinking water testing
BWS water quality program
Common inquiries about water quality
Questions
16

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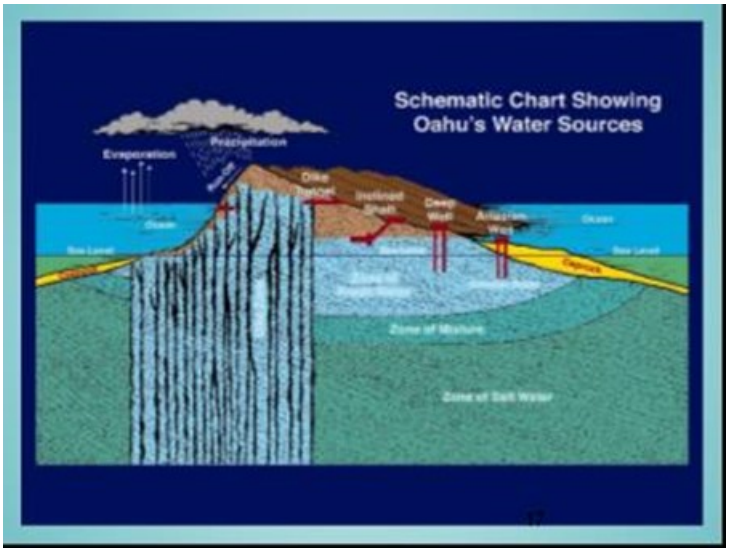
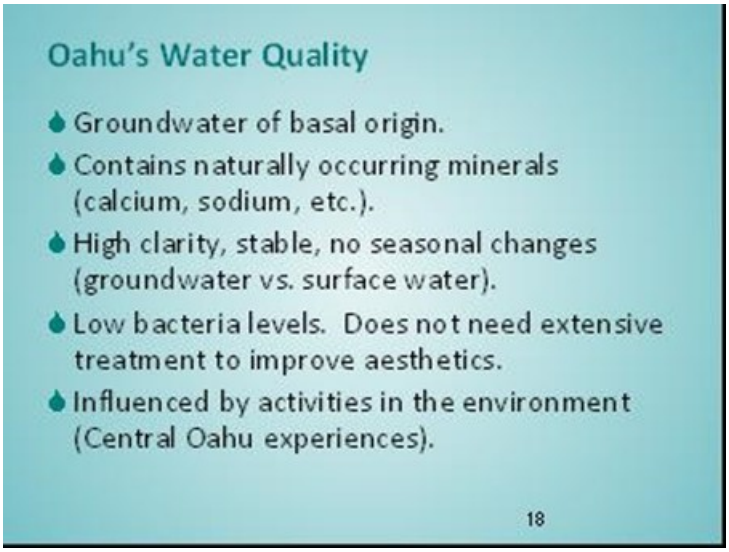

Schematic Chart Showing
Oahu's Water Sources
Evaporation
Precipitation
Dike
Inclined
Shaft
Deep
Well
Artesian
Well
Ocean
Sea Level
Caprock
Zone of Mixture
Zone of Salt Water

Slide 18


Oahu's Water Quality
Groundwater of basal origin.
Contains naturally occurring minerals (calcium, sodium, etc.).
High clarity, stable, no seasonal changes (groundwater vs. surface water).
Low bacteria levels. Does not need extensive treatment to improve aesthetics.
Influenced by activities in the environment (Central Oahu experiences).
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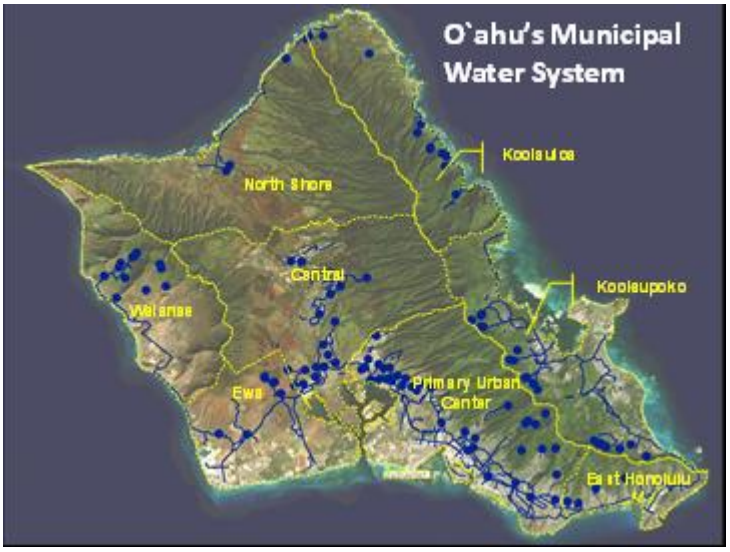
O`ahu's Municipal Water System
Koolauloa
North Shore
Central
Koolaupoko
Waianae
Ewa
Primary Urban Center
East Honolulu

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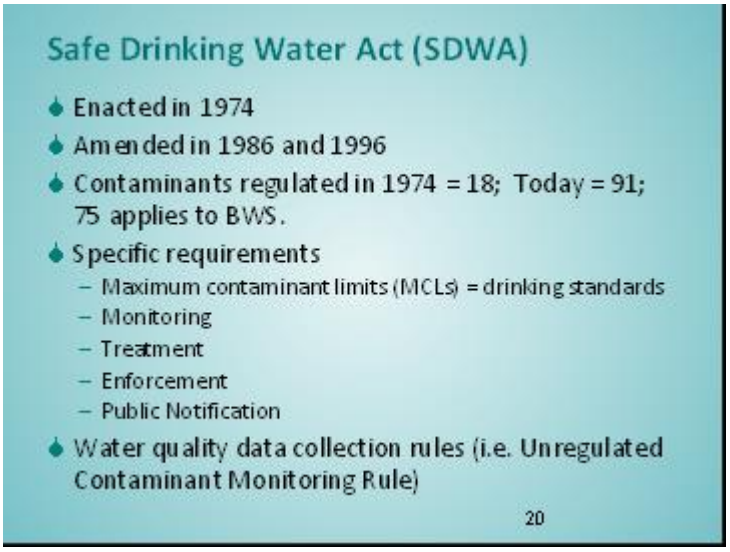
Safe Drinking Water Act (SDWA)
Enacted in 1974
Amended in 1986 and 1996
Contaminants regulated in 1974 = 18; Today = 91; 75 applies to BWS.
Specific requirements
Maximum contaminant limits (MCLs) = drinking standards
Monitoring
Treatment
Enforcement
Public Notification
Water quality data collection rules (i.e. Unregulated Contaminant Monitoring Rule)
20

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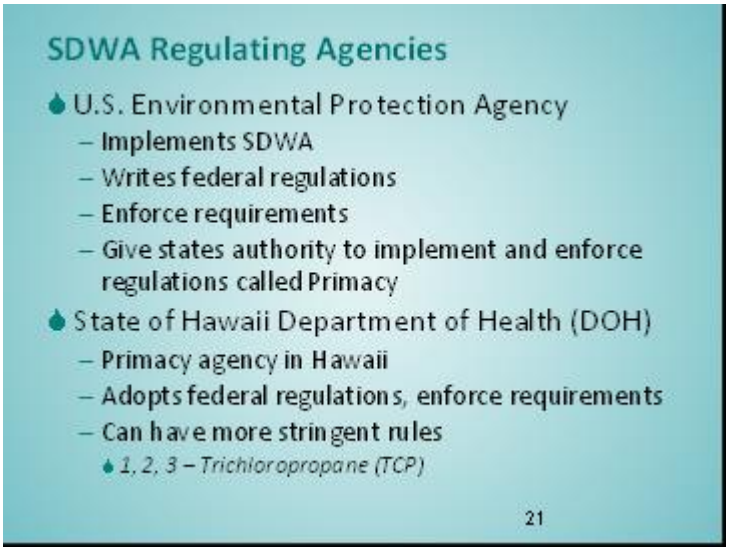
SDWA Regulating Agencies
U.S. Environmental Protection Agency
– Implements SDWA
– Writes federal regulations
– Enforce requirements
– Give states authority to implement and enforce regulations called Primacy
State of Hawaii Department of Health (DOH)
– Primacy agency in Hawaii
– Adopts federal regulations, enforce requirements
– Can have more stringent rules
1, 2, 3 – Trichloropropane (TCP)
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Drinking Water Regulations
National standard applying to all states.
Universal standard that defines safe DW.
Chemicals regulated based on EPA health studies, occurrence nationwide and amount found.
EPA reevaluates rules every 6 years and need for other contaminants to be regulated every 5 years.
Regulations in place today is regulating contaminants found in drinking water.
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Drinking Water Regulatory Testing
Department of Health
– 1974 – June 30, 2010
– Large water utilities (BWS) responsible from July 1, 2010
– All other utilities from January 1, 2011
BWS
– Chemical and Microbiological Laboratories
– Water treatment and resource monitoring
– SDWA Testing since July 1, 2010
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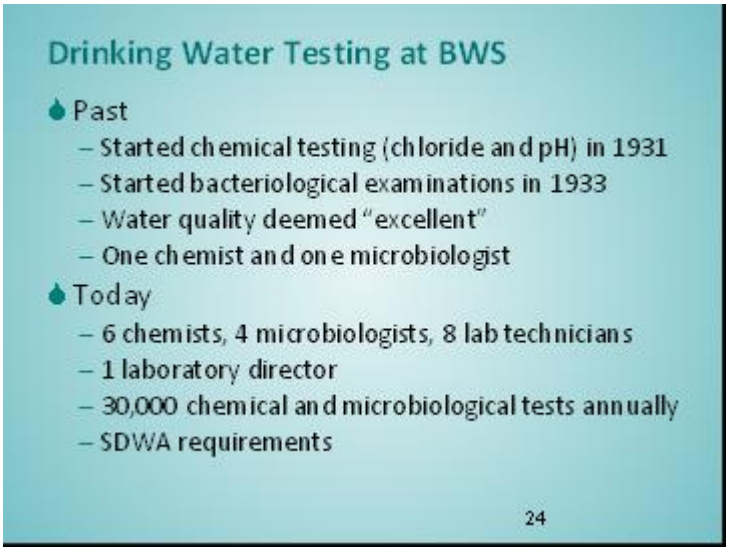
Drinking Water Testing at BWS
Past
– Started chemical testing (chloride and pH) in 1931
– Started bacteriological examinations in 1933
– Water quality deemed "excellent"
– One chemist and one microbiologist
Today
– 6 chemists, 4 microbiologists, 8 lab technicians
– 1 laboratory director
– 30,000 chemical and microbiological tests annually
– SDWA requirements
24

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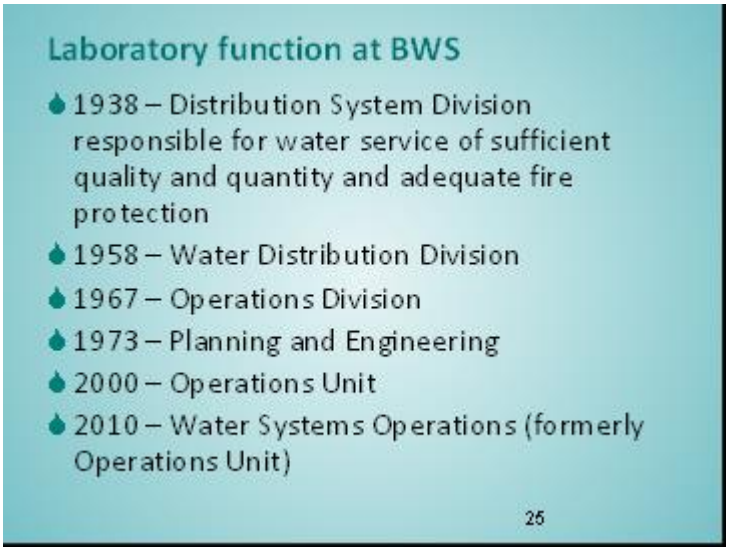
Laboratory function at BWS
1938 – Distribution System Division responsible for water service of sufficient quality and quantity and adequate fire protection
1958 – Water Distribution Division
1967 – Operations Division
1973 – Planning and Engineering
2000 – Operations Unit
2010 – Water Systems Operations (formerly Operations Unit)
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Water Quality Division
Created in 2013
Reporting to the Manager the independent auditing and monitoring of BWS water quality and related activities.
Responsible for all matters relating to the administration and compliance of the department's island-wide water system with all drinking water and environmental laws, rules, and regulations.
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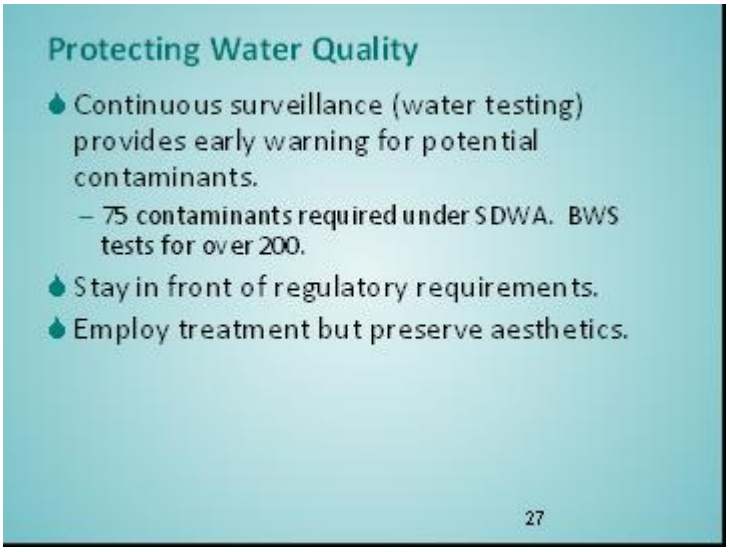
Protecting Water Quality
Continuous surveillance (water testing) provides early warning for potential contaminants.
– 75 contaminants required under SDWA. BWS tests for over 200.
Stay in front of regulatory requirements.
Employ treatment but preserve aesthetics.
27

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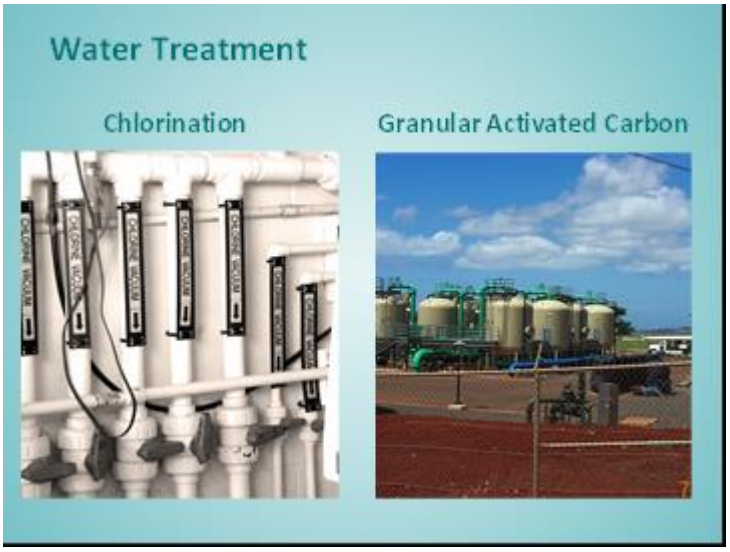

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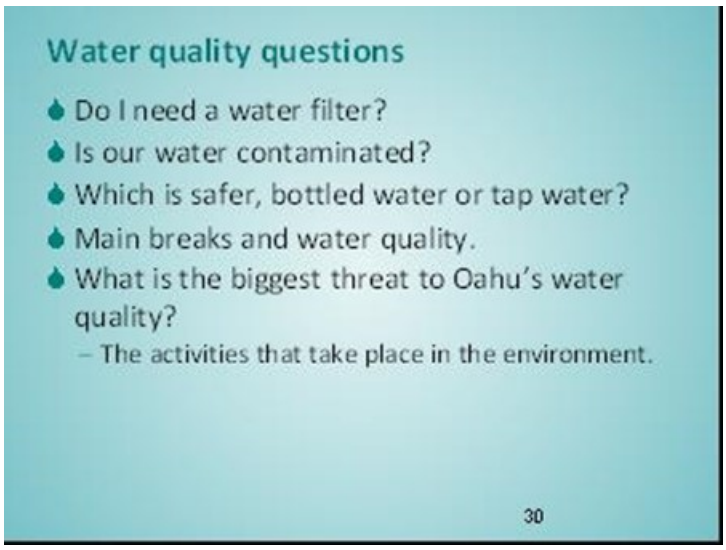
Central Oahu Experiences

- Pesticide contamination
- Surface activities can impact quality.
- Soils retain some contaminants and pass others.
- Proper application and waste disposal key to water quality.

Slide 30


Water quality questions
Do I need a water filter?
Is our water contaminated?
Which is safer, bottled water or tap water?
Main breaks and water quality.
What is the biggest threat to Oahu's water quality?
– The activities that take place in the environment.
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Mahalo!
Questions & Answers
ENTRUSTED TO US TO
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Safe, dependable, and affordable water now and into the future
Jon Toyoda, P.E.
Consultant Project Manager for the Water Master Plan
CONDITION ASSESSMENT
OF RESERVOIRS

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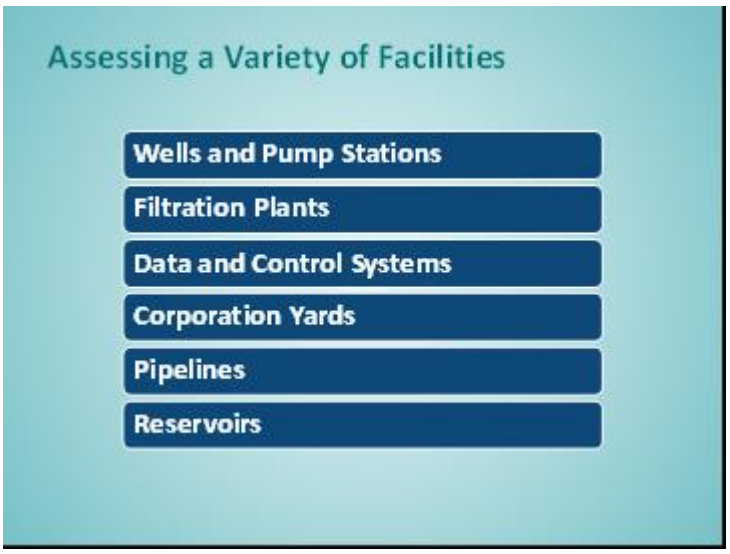

Today we will discuss the condition assessment of the BWS's reservoirs.

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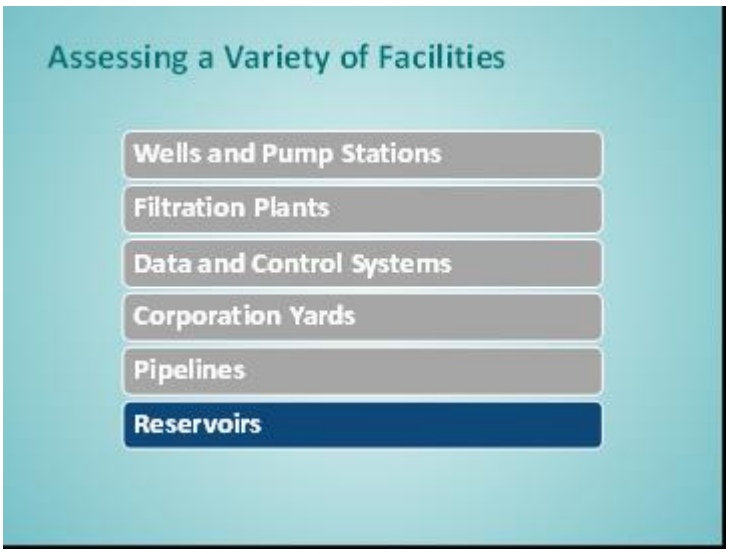

Reservoirs are critical facilities in the water system.

In some cases, major repairs or replacement to reservoirs can take two years or longer to implement.

The BWS routinely performs comprehensive reservoir assessments on a 10-year cycle. The results will help identify and prioritize projects for the 30-year Capital Improvement Program (CIP).

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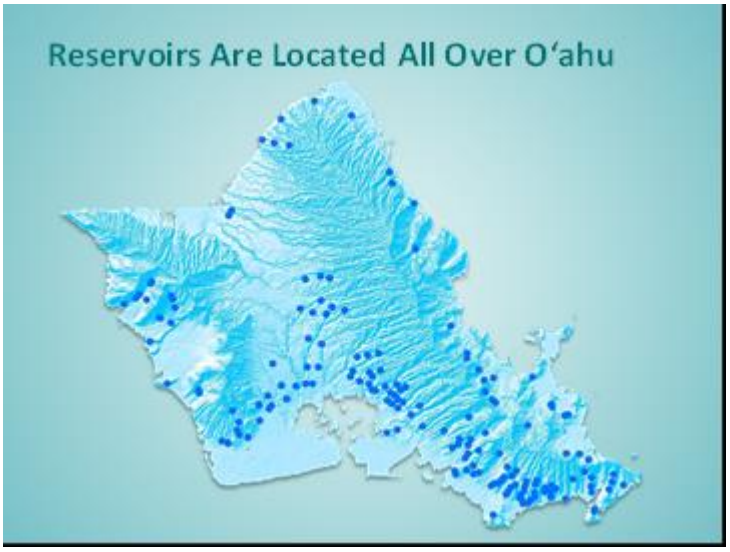

Reservoirs are located wherever the BWS has customers.

They regulate system water pressure in the vicinity.

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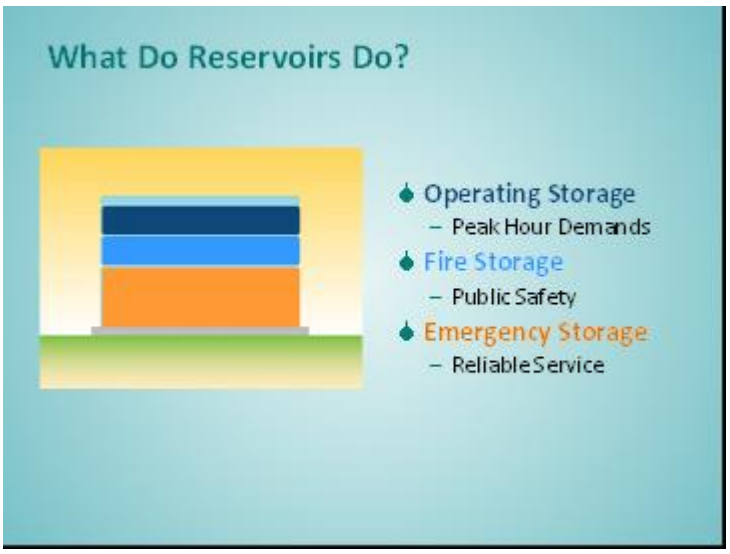
What Do Reservoirs Do?
Operating Storage
– Peak Hour Demands
Fire Storage
– Public Safety
Emergency Storage
– Reliable Service

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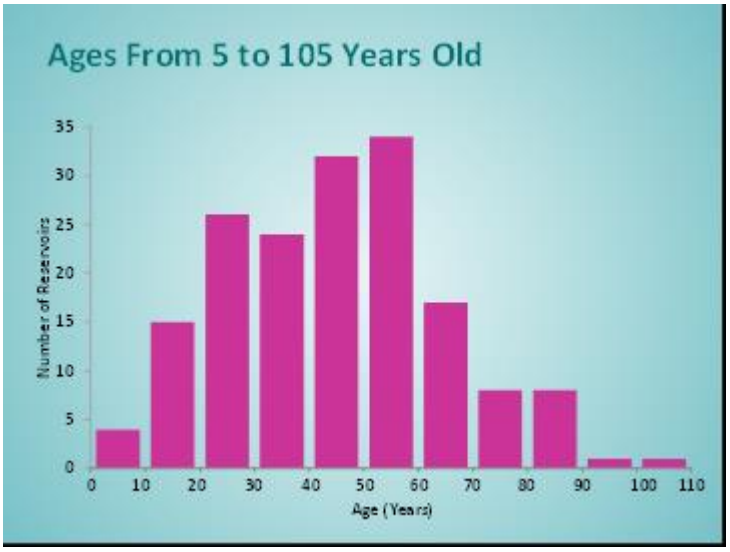
Slide 38



The oldest reservoir owned by the BWS was built in 1911 and has the capacity to hold 300,000 gallons of water.

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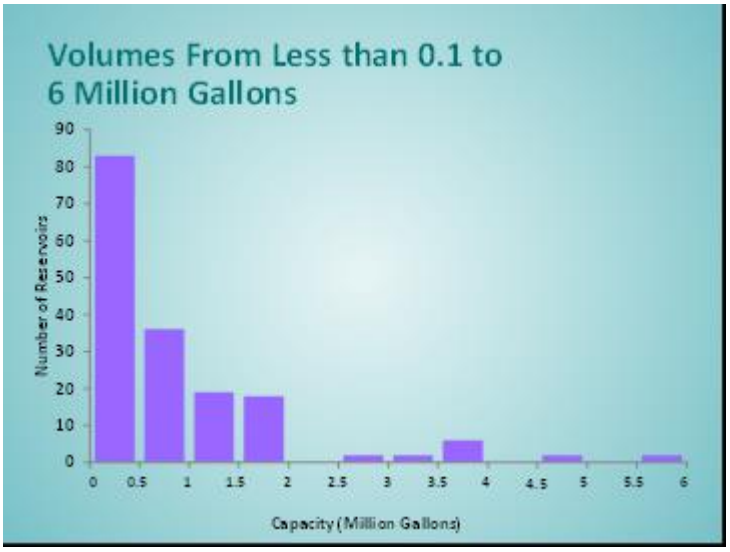
Volumes From Less than 0.1 to 6 Million Gallons
Number of Reservoirs
90
80
70
60
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
Capacity (Million Gallons)

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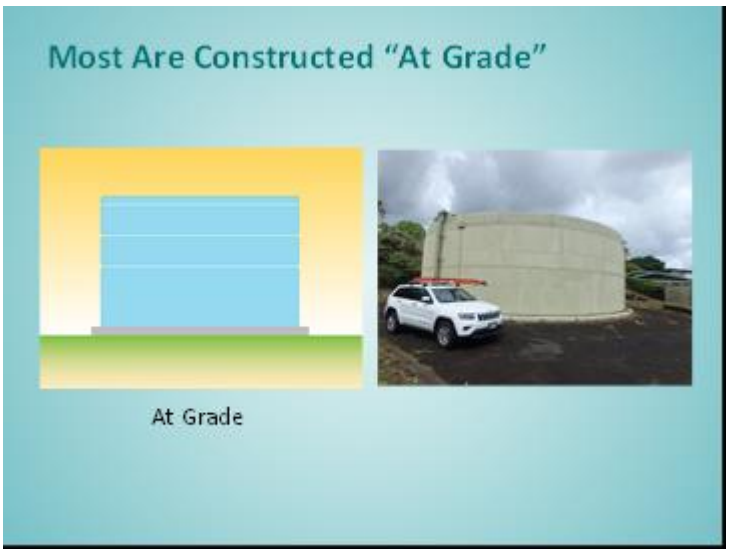

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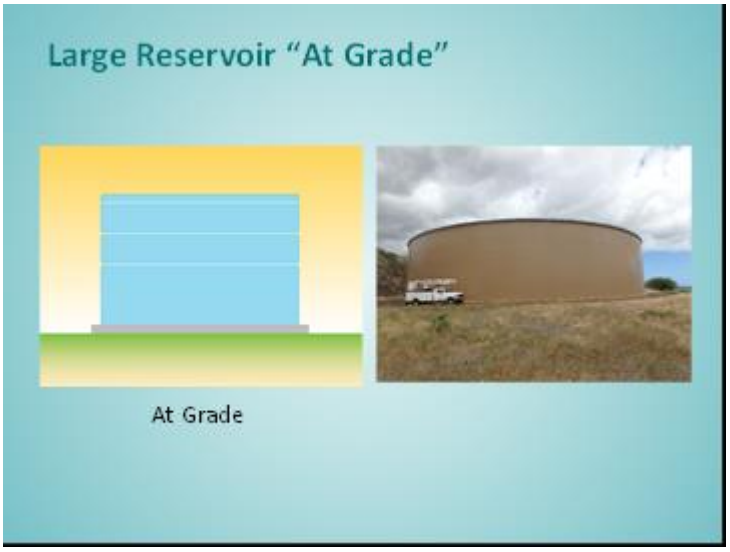

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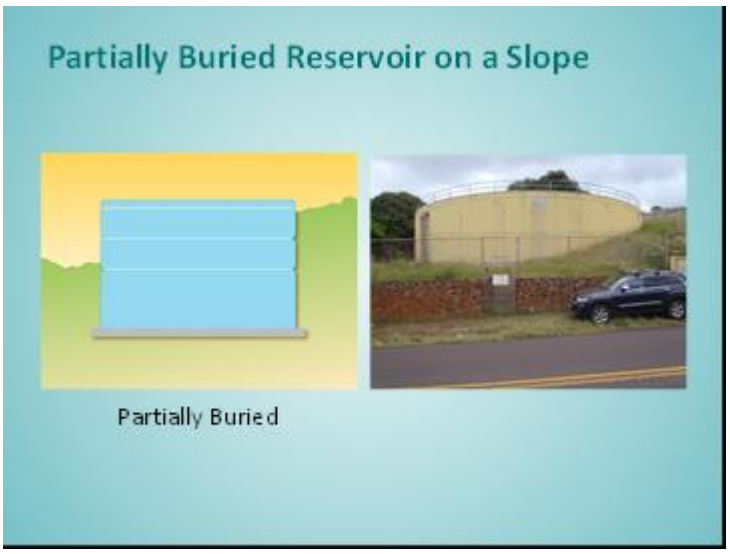

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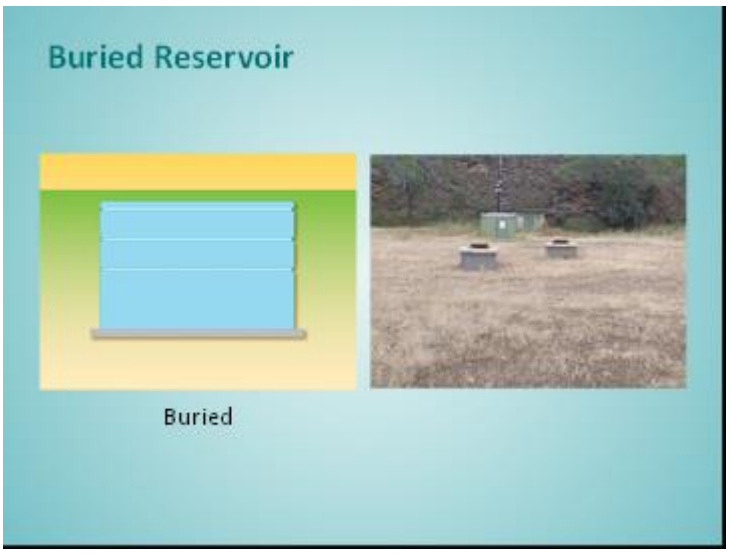

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Slide 45

Three-quarters of the BWS reservoirs are conventionally reinforced. Of these, about two-thirds were constructed after 1961.

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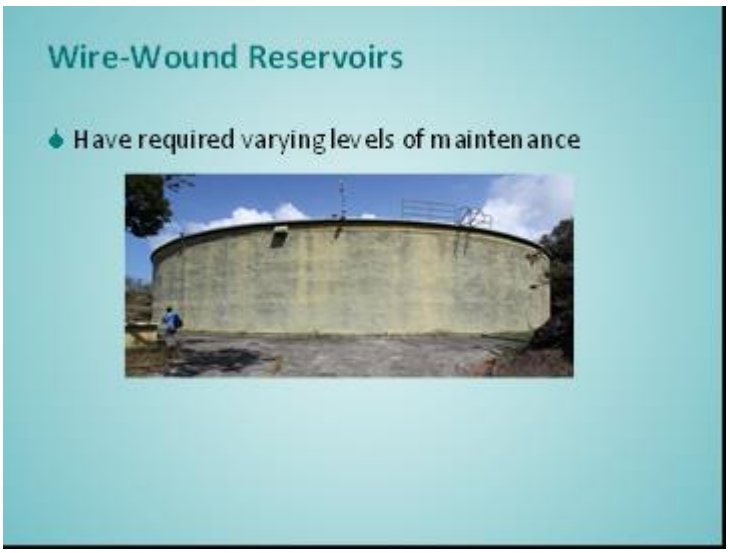
- Conventional reinforcement protects the body of the reservoir from cracking and leaks.
- This type of reservoir has a long track record of success with minimal maintenance.
- However, this type of reinforcement is less efficient for larger reservoir capacities.



- Tanks built in 1950s – 1960s have required varying levels of maintenance.
- Pre-stressed wires were applied to the exterior and covered with pneumatic mortar.

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- Wire-wound tank repairs maintain and extend the surface life of reservoirs.
- Post-tensioned strands of wire were applied to exteriors of some of the BWS's tanks.
- External post-tensioned reservoirs can pose some maintenance, corrosion, and security concerns.

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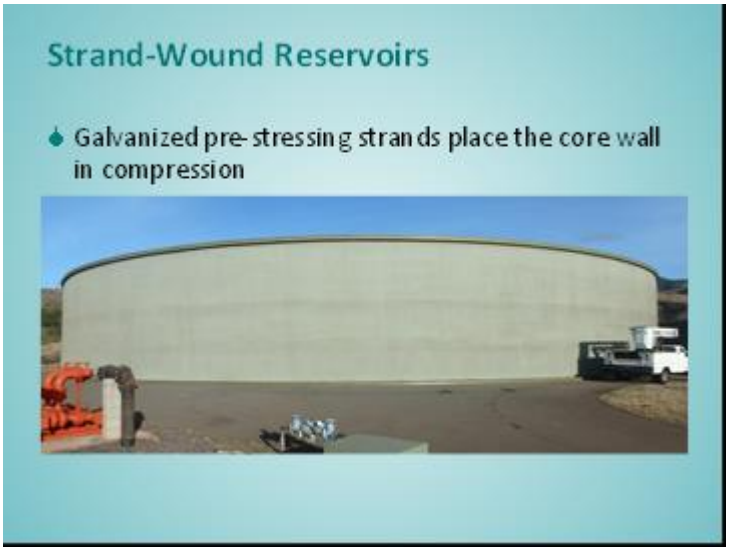

- The majority of the BWS reservoirs are the strand-wound type.
- This is considered the state-of-the-art design for the construction of new tanks.
- This design is appropriate for tanks of larger capacities.
- Concrete protects the wire from corrosion.

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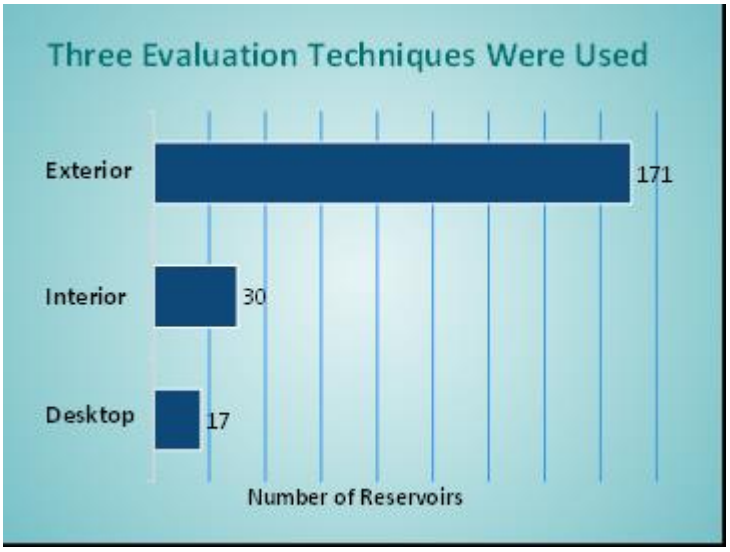

1. Exterior Visual inspections were conducted on all 171 reservoirs

2. Interior inspections, using Remote Operated Vehicles, were conducted on 30 reservoirs that are more than 40 years old or those that have not had their interiors inspected before.

3. Desktop analysis was used to inspect 17 reservoirs. Data samples from different designs and materials were evaluated numerically with respect to how they would fare in hurricane or earthquake conditions.

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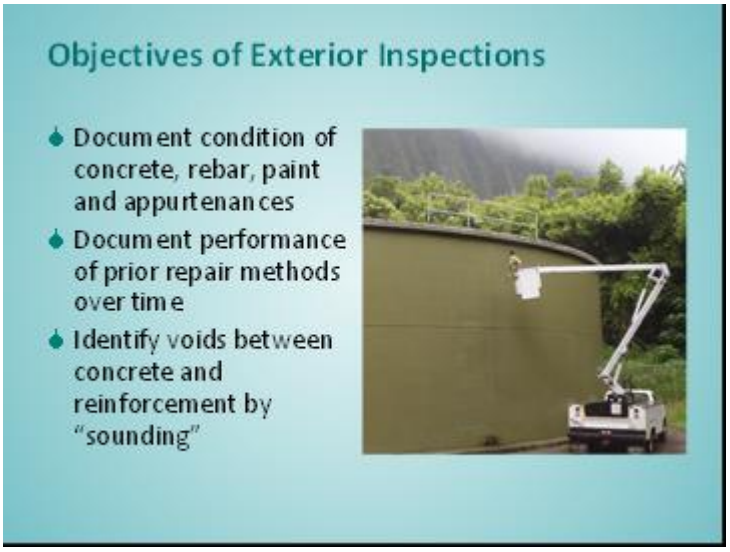

Exterior appurtenances inspected included vents, guardrails, ladders, and security cameras.

Sounding is a method of inspection utilized to assess the performance or repairs of reservoirs. Crackling noises indicate spacing within the concrete. A hammer is used to determine the extent of the void and the types of repairs that are needed.

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Inspected Upper and Lower Seals and Walls

Upper and Lower Seals

- Leaks, gaps and vegetation

Walls

- Leaks, spalled concrete and large cracks
- Sound entire wall surface
- Coating system

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Inspected Roofs

- Ponding
- Deterioration
- Cracks
- Access Hatches

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Inspected Reservoir Sites
Vegetation
Landscaping
Roadways
Fences

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The Remote Operated Vehicle allows the inspection of components that are usually submerged in water, without having to take the reservoir out of service, drain it, or use a human diver.

The Remote Operated Vehicle is about the size of a water cooler:

- 26” x 15” x 10”
- 39 lbs.

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This reservoir, built in 1957, is a special case.

It is wire-wound with a retrofit of external cables encased in shotcrete. Inspections in 2005 and 2014 show a change in hollow areas as noted above.

We know that the cables are large in diameter, so some of the hollow areas are not necessarily indicative of major issues.

We recommend routine investigations to inspect the condition of the cables, which can change quickly.

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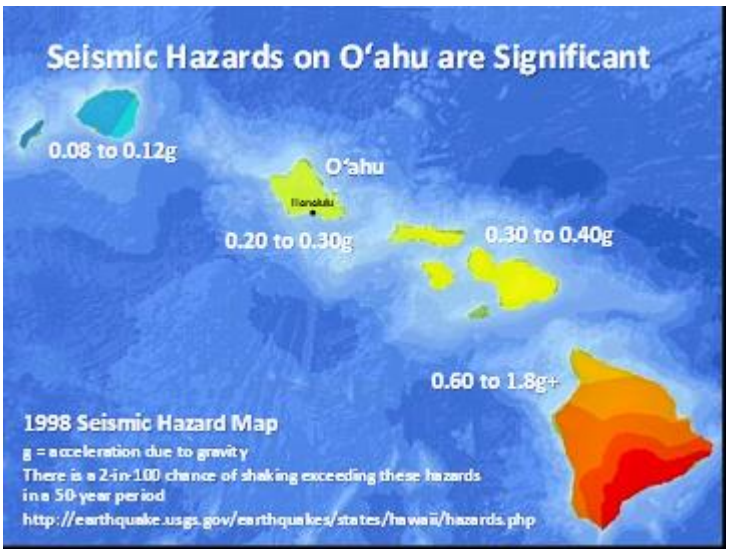

Seismic hazards are described as an amount of shaking, expressed as a percentage of "g", the acceleration due to gravity. They range from around 0.1 g in Kauai to 1.0 g at Big Island.

According to this map, the seismic hazard ranges from approximately 0.2 to 0.3 g on O 'ahu, which is classified as a high seismic zone. This is the reason we performed these numerical analyses.

The last large earthquake that caused extensive damage on O 'ahu was 6.8 on the Richter Scale and was centered 65 miles SE of Honolulu in 1871.

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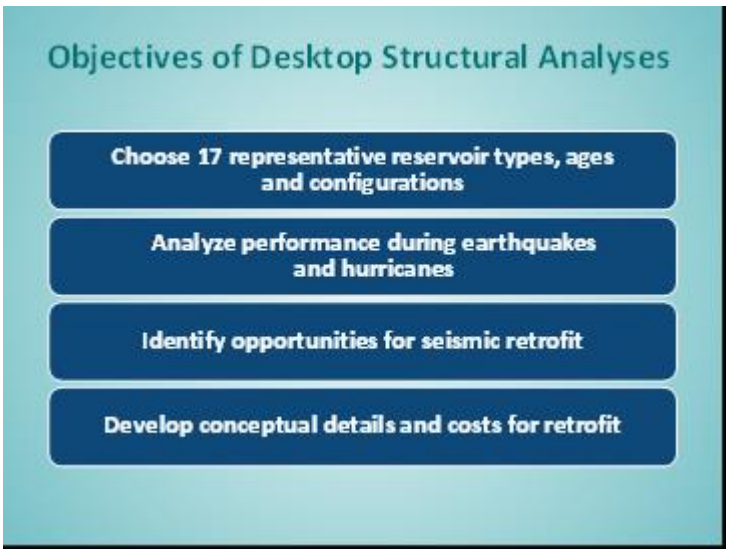
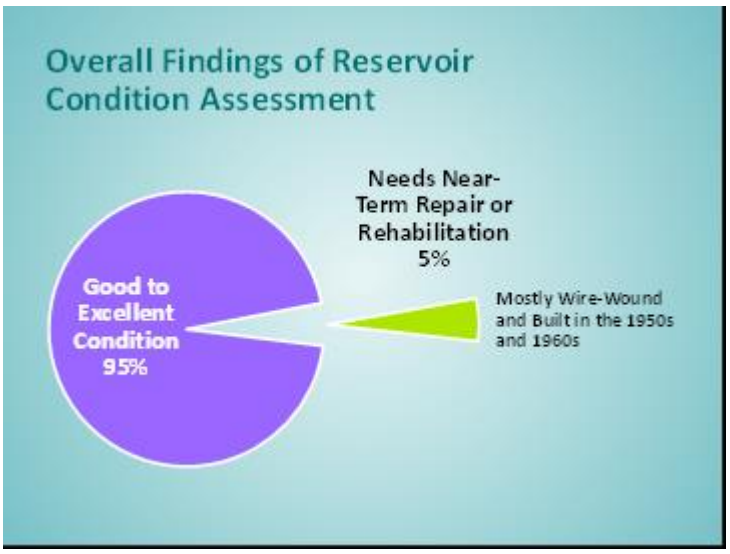


There is no code requirement to upgrade the existing reservoirs. Our scope was to evaluate reservoirs to consider their seismic performance.

Slide 60



Approximately 8 tanks need near-term repair or rehabilitation.

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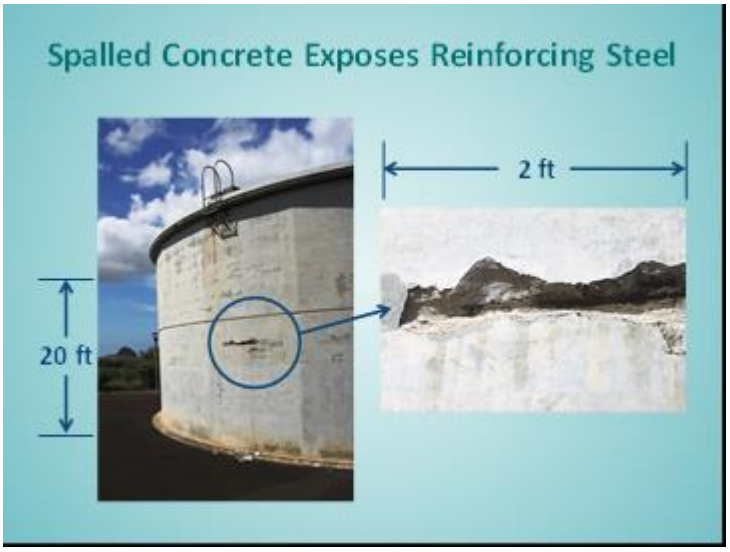

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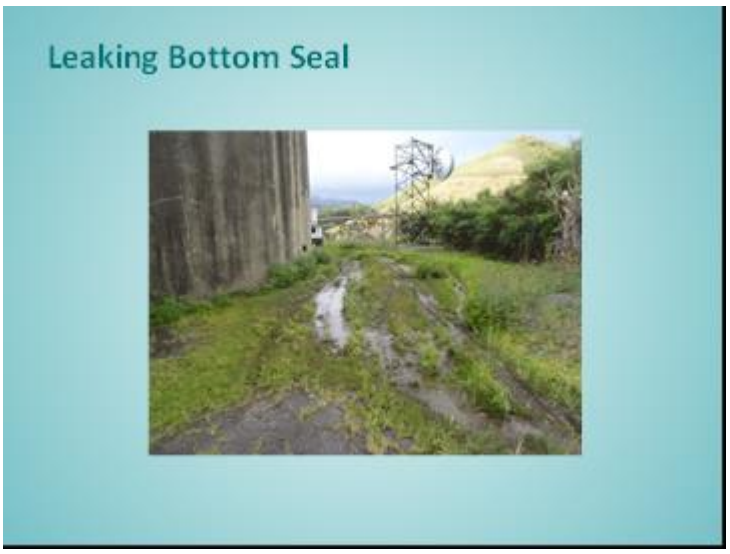

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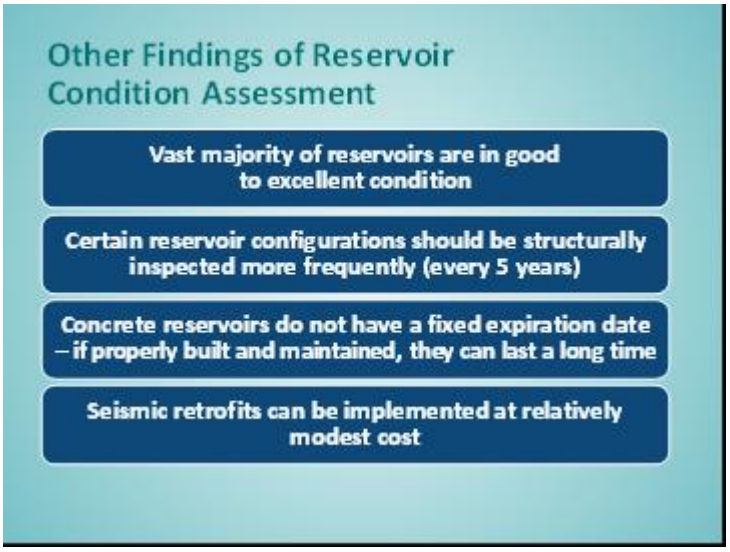
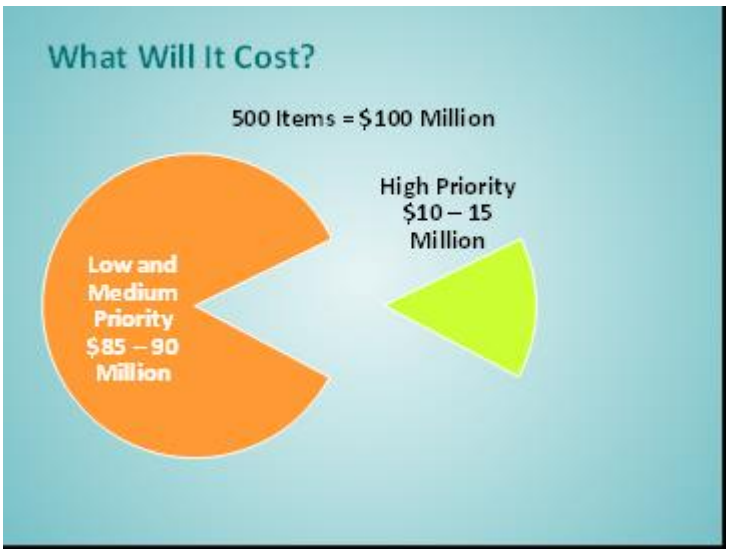
Slide 64


Other Findings of Reservoir Condition Assessment
Vast majority of reservoirs are in good to excellent condition
Certain reservoir configurations should be structurally inspected more frequently (every 5 years)
Concrete reservoirs do not have a fixed expiration date – if properly built and maintained, they can last a long time
Seismic retrofits can be implemented at relatively modest cost

Slide 65



Based on internal and external inspections:

- 500 projects are needed to repair and upgrade BWS reservoirs.
- The cost is estimated at $100 million.
- Each project has been prioritized as High, Medium, or Low.
- The projects that were designated as High Priority would cost between $10 and $15 million.

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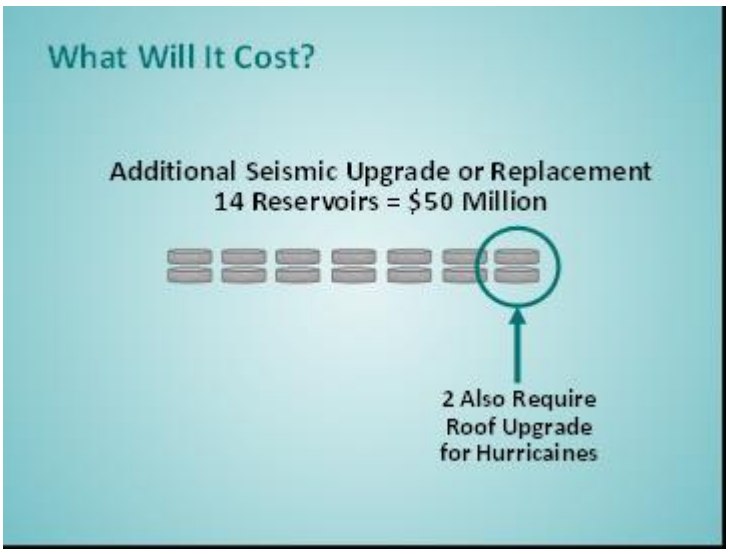

With respect to the note above about two reservoirs requiring roof upgrades for hurricanes, we are recommending replacing the reservoirs entirely for seismic adequacy.

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How the Findings Will Be Used
Methods and results will be documented in the Water Master Plan
Results will be used to prioritize repair and retrofit projects
Prioritized projects with cost estimates will be included in the 30-year Capital Improvement Plan
Highest-priority projects are already being addressed

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Mahalo!
Questions & Answers
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Dave Ebersold
Facilitator
SUMMARY AND NEXT STEPS

Slide 70

Tour of Hālawa Shaft

- Saturday, February 20, 2016
- 9 am to 12 pm
- Not open to the general public
- Designated an American Water Landmark by American Water Works Association
- Plus:
  - Take a tour of the Halawa Xeriscape Garden
  - Attend a Rain Barrel Catchment Workshop
  - Participate in a xeriscape activity
- More details to come!

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Stakeholder Advisory Group Meeting 6
Wednesday, March 16, 2016
4:00 pm to 6:30 pm
Neal Blaisdell Center
Hawaii Suites

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