Your Local Hospital
A Critical Customer

Sam Perry

Water Treatment Engineer

Office of Drinking Water

PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND HEALTHIER WASHINGTON

Washington State Department of Health

Office of Drinking Water Mission

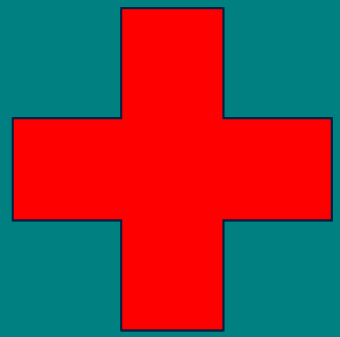
To protect the health of the people of Washington State by ensuring safe and reliable drinking water.

Today's Presentation

- Healthcare facilities are critical water system customers.
- Relevant healthcare emergency standards for water supply.
- Importance of local coordination.
- Examples of emergency water supply options.

Healthcare Facilities are Critical Facilities

- **Four critical water use areas:**
  1. **Potable water supply**
  2. **Firefighting**
  3. **Sanitation**
  4. **Healthcare facilities**



Courtesy of Gregory Welter, O'Brien & Gere. 2010

Healthcare Facilities are Critical Facilities (con't)

- Emergency response impacts, if you serve a hospital:
  - Prioritize notification
  - Prioritize service response
  - Include coordinated emergency response planning

Courtesy of Gregory Welter, O'Brien & Gere. 2010

Healthcare Facility - Emergency Water Supply Drivers

- Joint Commission (formerly JCAHO) Standards
  - Emergency Management in Health Care: An All-Hazards Approach (2009)
- Center for Medicare & Medicaid Services
  - Conditions for Participation/Conditions for Coverage (42 CFR 482.41)
- Realities
  - Hurricanes (Katrina, Ivan, Sandy), Ice Storms, Floods

Extreme Reality – New Orleans

- **August 31: Two days after landfall**

"With the storm over and the hospital functions leveling off, it was felt that the worst was over. Then, the city's water pumps ceased functioning. The problem with lack of city water was not that of hand cleaning or having enough drinking water, but rather that the hospital's air conditioning system would not function. The system uses 150,000 gallons of water per day to cool the chillers. There was an option to use Mississippi water to cool the chillers, but the impure water would soon clog the system.

At this point, Mr. Worley met with his staff, and the decision was made to evacuate Children's Hospital New Orleans."

Keith Perrin, MD, FAAP, President, Louisiana Chapter, American Academy of Pediatrics
("A First in this century: Closing and reopening of a children's hospital during a disaster." Pediatrics journal, 5/6/06)

Courtesy of Gregory Welter, O'Brien & Gere. 2010

Extreme Reality – New Orleans

- Evacuated neonates and other critical care patients one day after Katrina landfall from Louisiana State University Health Sciences Center by canoe and fan boat.

Courtesy of Gregory Welter, O'Brien & Gere. 2010

Pacific Northwest Realities

Water Main Breaks

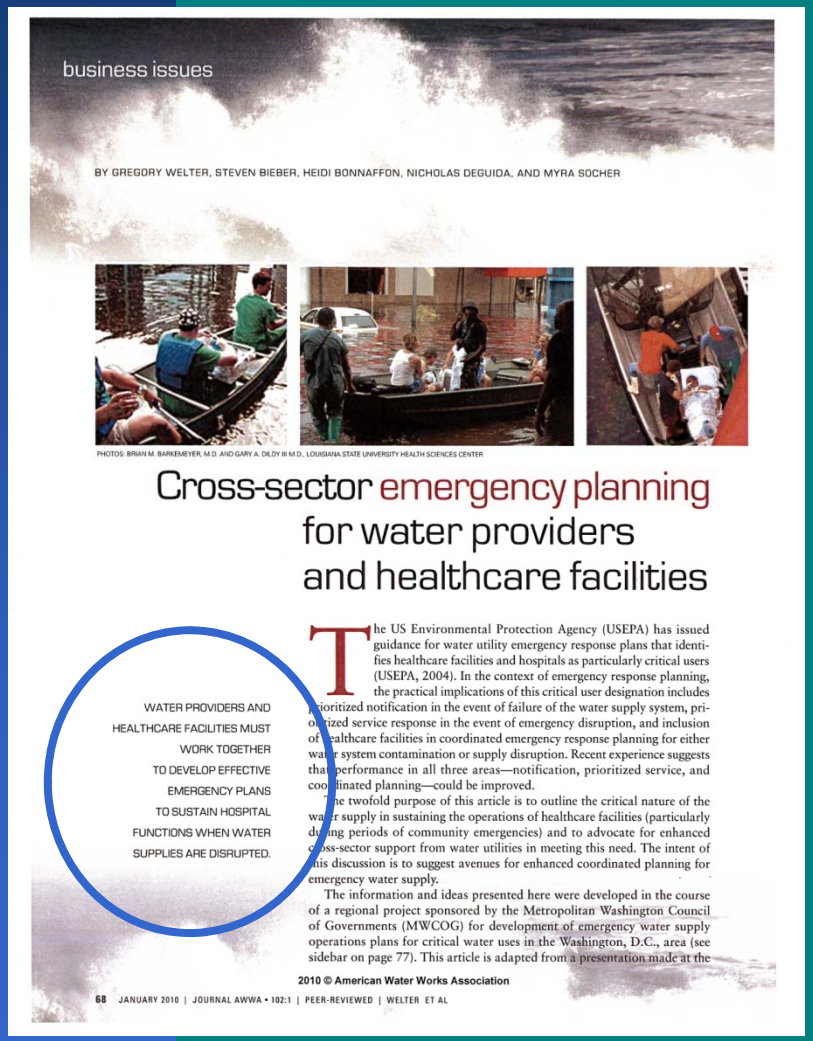
Volcanic Eruptions

Earthquakes

Floods

Wildfires

Water Utilities – Cross Sector Planning Encouraged Nationally



business issues

BY GREGORY WELTER, STEVEN BIEBER, HEIDI BONNAFFON, NICHOLAS DEGUIDA, AND MYRA SOCHER

PHOTOS: BRIAN M. BARKEMEYER, M.D. AND GARY A. DILDY III M.D., LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER

Cross-sector emergency planning for water providers and healthcare facilities

WATER PROVIDERS AND HEALTHCARE FACILITIES MUST WORK TOGETHER TO DEVELOP EFFECTIVE EMERGENCY PLANS TO SUSTAIN HOSPITAL FUNCTIONS WHEN WATER SUPPLIES ARE DISRUPTED.

The US Environmental Protection Agency (USEPA) has issued guidance for water utility emergency response plans that identifies healthcare facilities and hospitals as particularly critical users (USEPA, 2004). In the context of emergency response planning, the practical implications of this critical user designation includes prioritized notification in the event of failure of the water supply system, prioritized service response in the event of emergency disruption, and inclusion of healthcare facilities in coordinated emergency response planning for either water system contamination or supply disruption. Recent experience suggests that performance in all three areas—notification, prioritized service, and coordinated planning—could be improved.

The twofold purpose of this article is to outline the critical nature of the water supply in sustaining the operations of healthcare facilities (particularly during periods of community emergencies) and to advocate for enhanced cross-sector support from water utilities in meeting this need. The intent of this discussion is to suggest avenues for enhanced coordinated planning for emergency water supply.

The information and ideas presented here were developed in the course of a regional project sponsored by the Metropolitan Washington Council of Governments (MWCOG) for development of emergency water supply operations plans for critical water uses in the Washington, D.C., area (see sidebar on page 77). This article is adapted from a presentation made at the

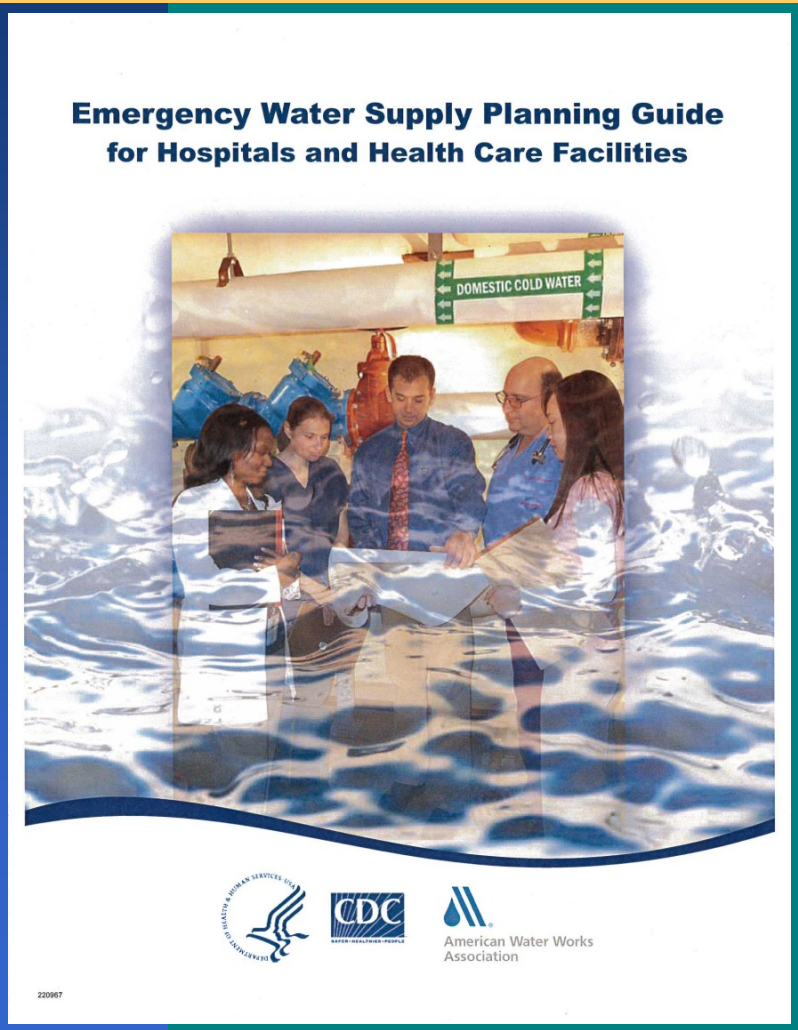
WATER PROVIDERS AND HEALTHCARE FACILITIES MUST WORK TOGETHER TO DEVELOP EFFECTIVE EMERGENCY PLANS TO SUSTAIN HOSPITAL FUNCTIONS WHEN WATER SUPPLIES ARE DISRUPTED.

Cross Sector Planning for Water Providers and Healthcare Facilities - Conclusions

- "Healthcare facilities' adverse experiences… demonstrated their critical dependence on community water supplies."
- "This study found … developing effective solutions will require active cooperation [involving] both healthcare facilities and water utilities."
- "Water utilities can take a proactive role by engaging hospital managers … to develop effective emergency operation plans."

Ref. Welter et al. (2010) – Journal AWWA

More National Coordination



Emergency Water Supply Planning Guide for Hospitals and Health Care Facilities

EPA United States Environmental Protection Agency

Water & Healthcare Sector Interdependencies:
Working Together Towards Resiliency

What are Water Sector Interdependencies?

Water is a basic human need, fundamental to the well-being of individuals and society; and the protection of our nation's drinking water and wastewater supplies is vital to human health. In addition, all other critical infrastructure sectors rely on water services to operate and the Water Sector relies on these other sectors in order to provide safe, reliable drinking water and wastewater services. This relationship is known as an *infrastructure interdependency*.

The Water and Healthcare Sectors have both been designated by the U.S. Department of Homeland Security (DHS) as Critical Infrastructure/Key Resource (CI/KR) sectors. The protection of these critical infrastructures is a top priority for DHS and the Sector-Specific Agency (SSA) responsible for overseeing each sector's critical resources. Recognizing the interdependencies between CI/KR sectors, such as those between the Water and Healthcare Sectors, can help to strengthen the overall resiliency of a community in the face of all-hazards threats, including natural and man-made disasters, crimes, and acts of terrorism.

Overview of Healthcare Infrastructure

The healthcare sector consists of over 6,600 hospitals, 492,000 ambulatory care facilities, and 70,000 nursing and residential care facilities. Other healthcare-related facilities include pharmacies, blood and organ banks, pharmaceutical manufacturing sites, and public health laboratories. The Healthcare Sector relies on drinking water and wastewater for a variety of services and functions, including:

- Infection control
- Renal dialysis
- Heating and air conditioning
- Manufacturing and storage of pharmaceuticals
- Sterilization
- Maintenance of blood and organ banks
- Drinking water for patients and staff
- Transportation of supplies and equipment

Local Coordination King County

KING COUNTY Healthcare Coalition
Prepare. Respond. Recover.

- Emergency water planning meeting
  - Date: April 12, 2012
  - Objectives included:
    - Facilitate cross sector dialogue
    - Identify responses to water supply disruptions
  - Presenters:
    - Cynthia Dold: Public Health - Seattle & King County
    - Allen Alston: King County Wastewater Division
    - Steve Deem: Washington State DOH
    - Ned Worcester: Seattle Public Utilities
    - Palmer Pollock: Northwest Kidney Centers
    - Danica Little: King County Healthcare Coalition

Local Coordination
Spokane Area (Region 9)

- Health Care Coalition Meeting
  - Date: April 26, 2012
  - Portion of the meeting on water
  - Objectives included:
    - Emergency water supply planning
    - Emergency water supply operations
  - Presenters:
    - Ed Dzedzy: Lincoln County Health Department
    - Jeff Johnson & Dorothy Tibbetts: Washington State Department of Health
    - Dan Kegley & Bill Rickard: City of Spokane Water Department

Local Examples – Good coordination

- City of Issaquah, WA - Swedish Medical
  - Swedish Issaquah – Drilled well
  - Cross-connection issues
  - Agreement developed; highly reliable service
  - Well abandoned
- City of Bremerton, WA - Harrison Medical
  - Major reservoir sits near hospital
  - Developed agreement in mid-2000's
  - Retrofitted reservoir with seismic for increased reliability

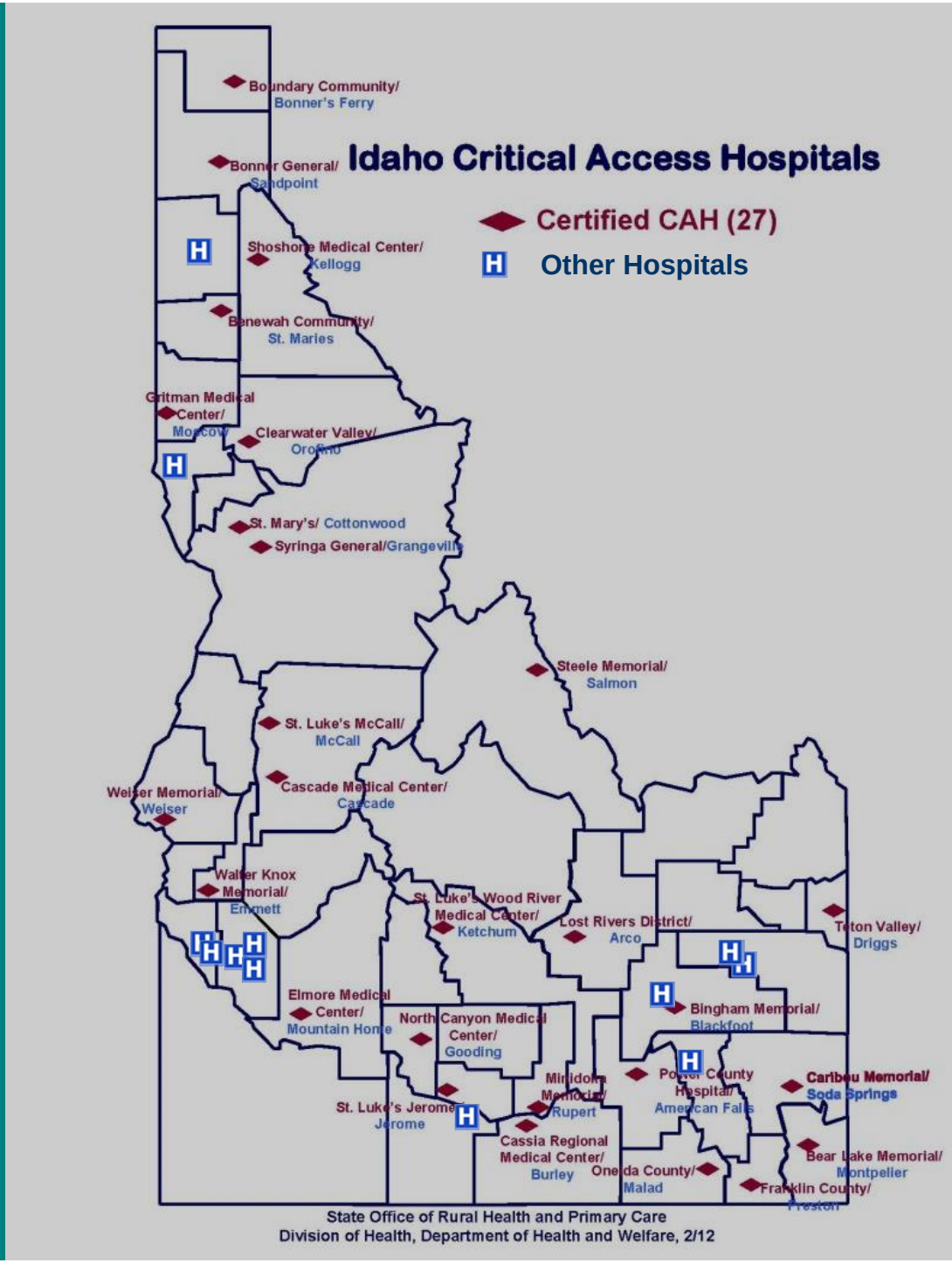
Local Examples – Poor coordination

- Children's Hospital - Seattle
  - Drilled well (Spent $1.5 million)
  - Conversation with emergency management
  - Main break in the area
  - Still no design approval
- University of Washington Medical Center
  - Considered using nearby surface water as emergency source
  - Purchased equipment
  - After conversation with Department of Health staff – Did not install

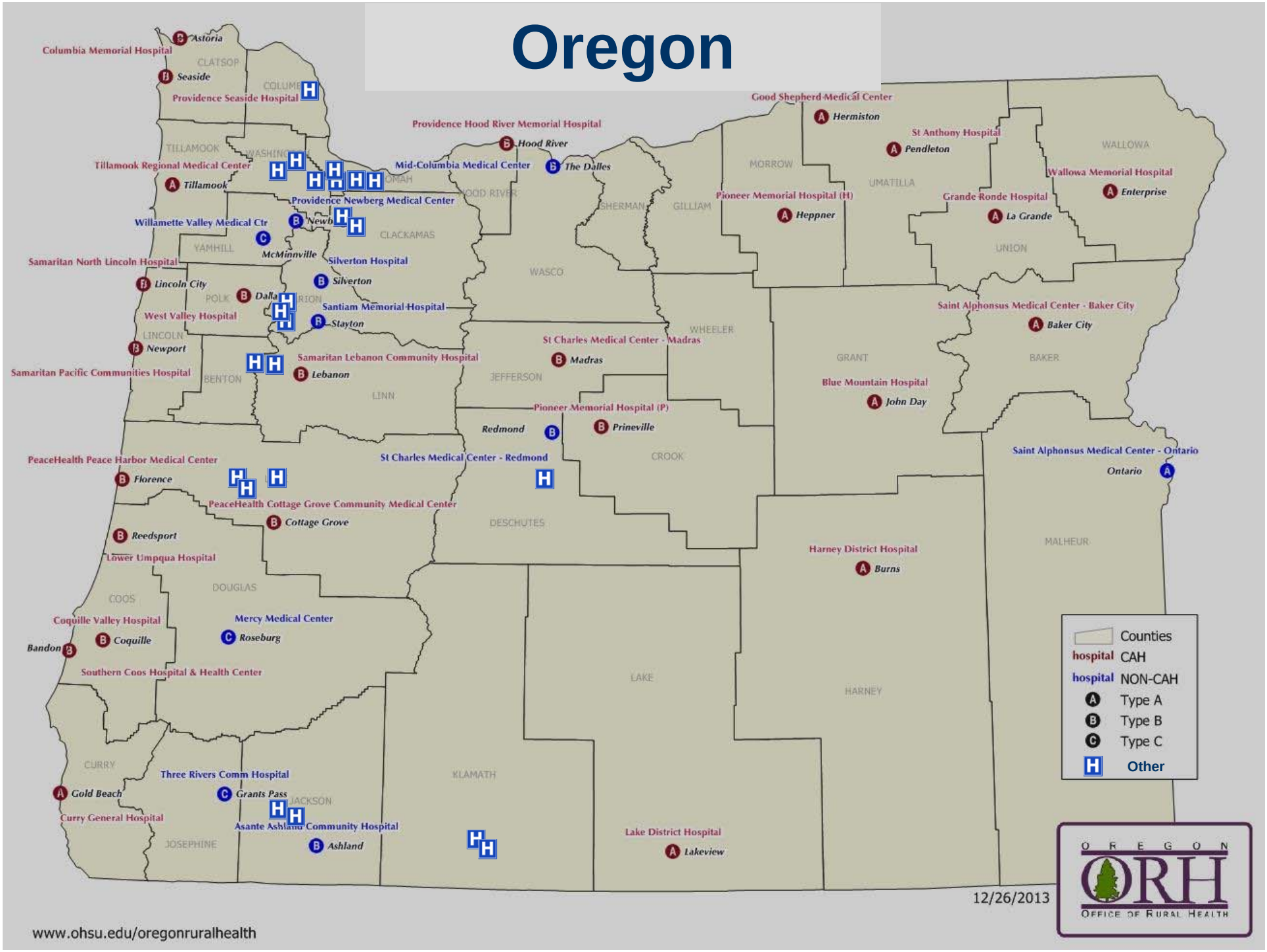
Hospitals in the PNWS (Appx.)

- Idaho
  - 31 acute care hospitals
  - 34 total (includes state psychiatric, VA)
- Oregon
  - 58 acute care hospitals
  - 66 total (includes state, VA, DOD)
- Washington
  - 97 acute care hospitals
  - 110 total (includes state, VA, DOD)

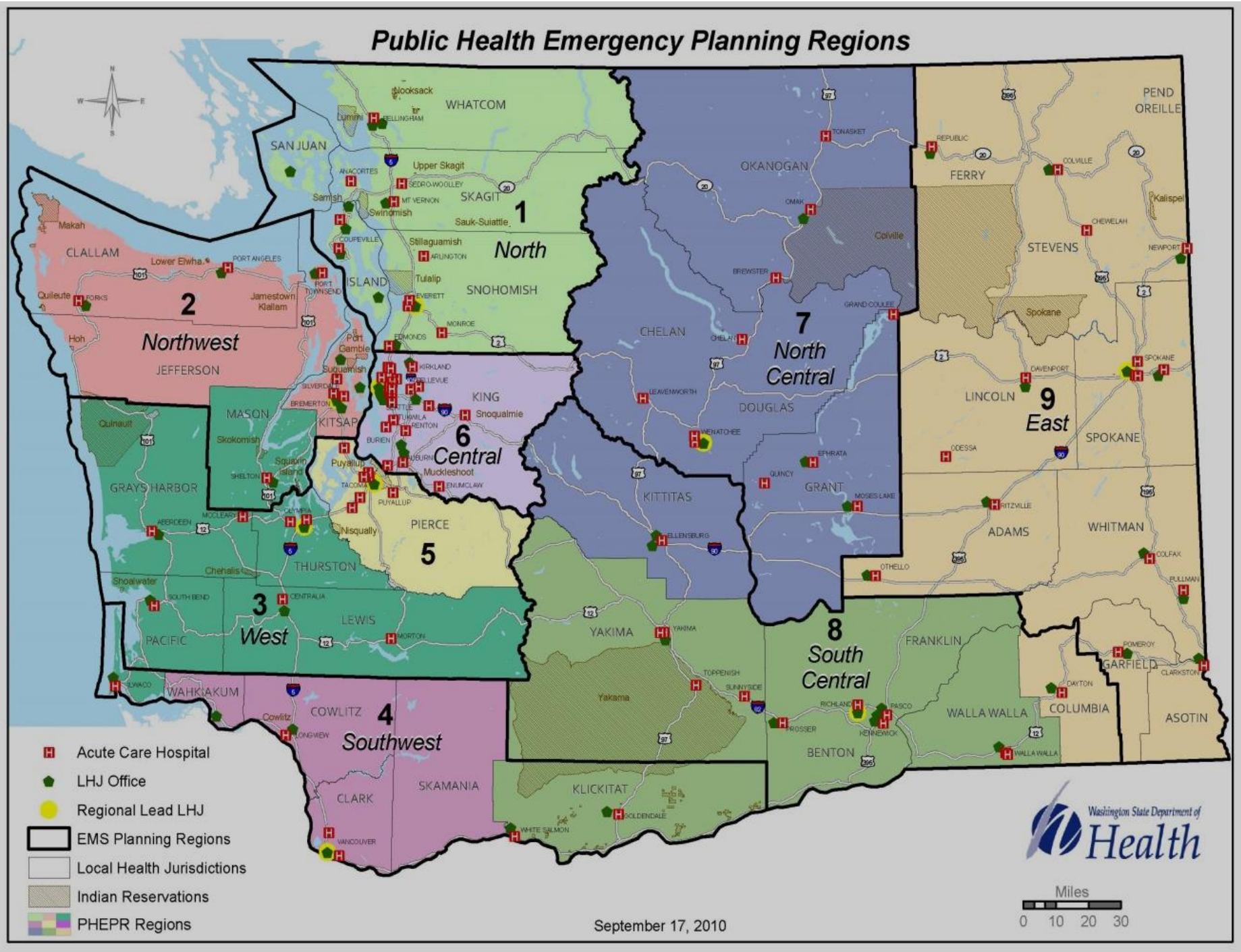
Idaho


Idaho Critical Access Hospitals
Certified CAH (27)
Other Hospitals
Boundary Community/ Bonner's Ferry
Bonner General/ Sandpoint
Shoshone Medical Center/ Kellogg
Benewah Community/ St. Maries
Gritman Medical Center/ Moscow
Clearwater Valley/ Orofino
St. Mary's/ Cottonwood
Syringa General/Grangeville
Steele Memorial/ Salmon
St. Luke's McCall/ McCall
Cascade Medical Center/ Cascade
Weiser Memorial/ Weiser
Walter Knox Memorial/ Emmett
St. Luke's Wood River Medical Center/ Ketchum
Lost Rivers District/ Arco
Teton Valley/ Driggs
Elmore Medical Center/ Mountain Home
North Canyon Medical Center/ Gooding
Bingham Memorial/ Blackfoot
Minidoka Memorial/ Rupert
Power County Hospital/ American Falls
Caribou Memorial/ Soda Springs
St. Luke's Jerome/ Jerome
Cassia Regional Medical Center/ Burley
Oneida County/ Malad
Bear Lake Memorial/ Montpelier
Franklin County/ Preston
State Office of Rural Health and Primary Care
Division of Health, Department of Health and Welfare, 2/12

Oregon



www.ohsu.edu/oregonruralhealth


Public Health Emergency Planning Regions
1 North
2 Northwest
3 West
4 Southwest
5
6 Central
7 North Central
8 South Central
9 East
WHATCOM
SAN JUAN
SKAGIT
Upper Skagit
Sauk-Suiattle
Stillaguamish
SNOHOMISH
ISLAND
CLALLAM
JEFFERSON
Makah
Lower Elwha
Quileute
Hoh
Jamestown Klallam
KING
KITSAP
MASON
Skokomish
Squaxin Island
Suquamish
Port Gamble
Snoqualmie
Muckleshoot
Puyallup
Nisqually
PIERCE
GRAYS HARBOR
Quinault
THURSTON
Chehalis
Shoalwater
LEWIS
PACIFIC
WAHKIAKUM
COWLITZ
Cowlitz
CLARK
SKAMANIA
OKANOGAN
Colville
CHELAN
DOUGLAS
KITTITAS
GRANT
YAKIMA
Yakama
FRANKLIN
BENTON
KLICKITAT
PEND OREILLE
FERRY
STEVENS
Kalispel
Spokane
LINCOLN
ADAMS
WHITMAN
GARFIELD
COLUMBIA
WALLA WALLA
ASOTIN
Acute Care Hospital
LHJ Office
Regional Lead LHJ
EMS Planning Regions
Local Health Jurisdictions
Indian Reservations
PHEPR Regions
September 17, 2010
Washington State Department of Health
Miles
0 10 20 30

Developing an Emergency Water Supply Plan (CDC/AWWA Guide)

1. Assemble the team.*
2. Understand water usage.
3. Analyze emergency water supply alternatives.*
4. Develop Emergency Water Supply Plan (EWSP).*
5. Exercise the EWSP.

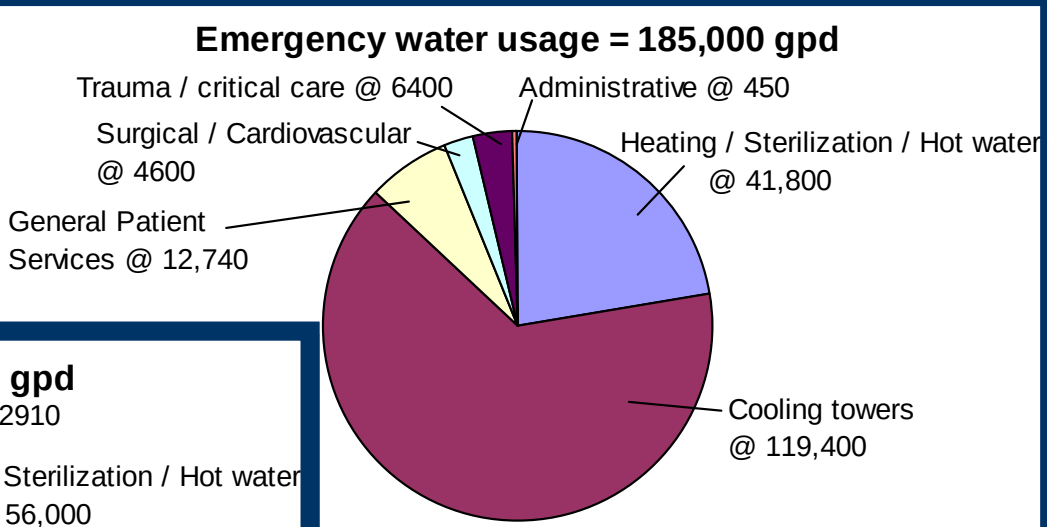
*Hospital should involve your water utility

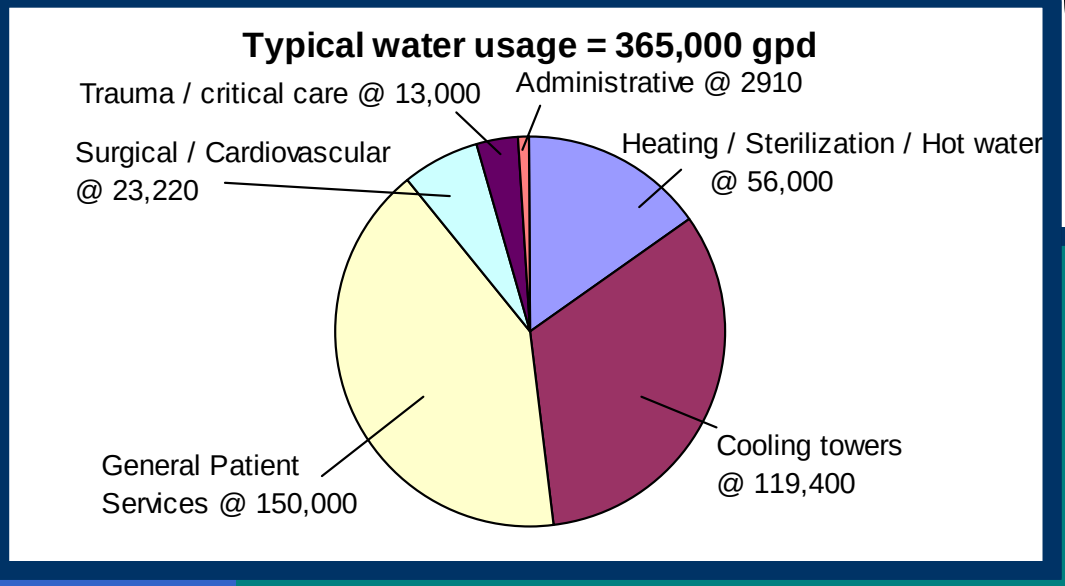
Emergency Water Supply Plan
Step 1: Assemble the Team

- **Internal Team Members:**
  - **Facility Specific**
    - **Management,**
    - **End Users, and**
    - **Physical Plant Staff**
- **Representative from External Partners:**
  - **Water Utility Manager or Account Rep**
  - **IDEQ, OHA, WSDOH – Regional Engineer**
  - **Local Health Jurisdiction**
  - **Local Fire Department**
  - **Local Emergency Management**

Emergency Water Supply Plan
Step 2: Conduct a Water Audit

- **Example: Model emergency water usage audit study at the Fairfax Inova Hospital.**





Courtesy of Gregory Welter, O'Brien & Gere. 2010

Emergency water requirement ~half normal usage

Emergency Water Supply Plan
Step 3: Alternatives

1. **Multiple points of service from your public water system**
   - Different water mains - same or separate pressure zones
2. **Storage**
   - Hospital owned
   - Hospital dedicated
   - Temporary
3. **Hospital's own emergency supply**
   - Nonpotable
   - Potable (drinking, hygiene, food service)
4. **Trucked water**

Public Water System - Defined

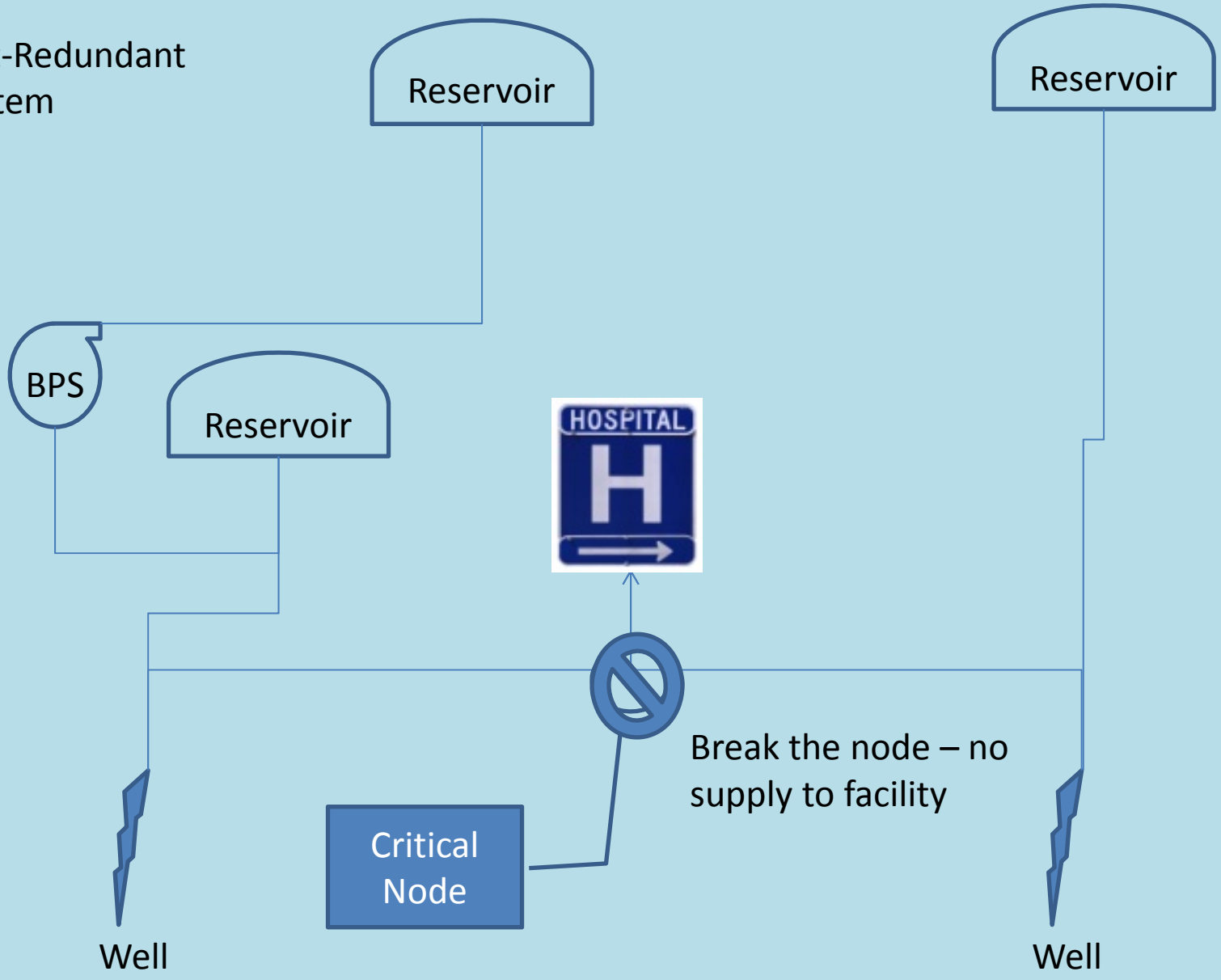
- **Safe Drinking Water Act**
  - **Applies to any water system that serves water to an average of more than 25 people for at least 60 days, unless the water system:**
    - **Consists only of distribution and storage facilities (no sources or treatment).**
    - **Gets all its water from, but is not owned or operated by, a public water system.**
    - **Doesn't sell water to any person.**

Alt. 1: Redundant services from your local water system

- Likely to be simplest and cheapest option.
- Protects against local service disruptions such as main breaks.
- Doesn't provide against system-wide issues such as major quake.
- Work with your water system.

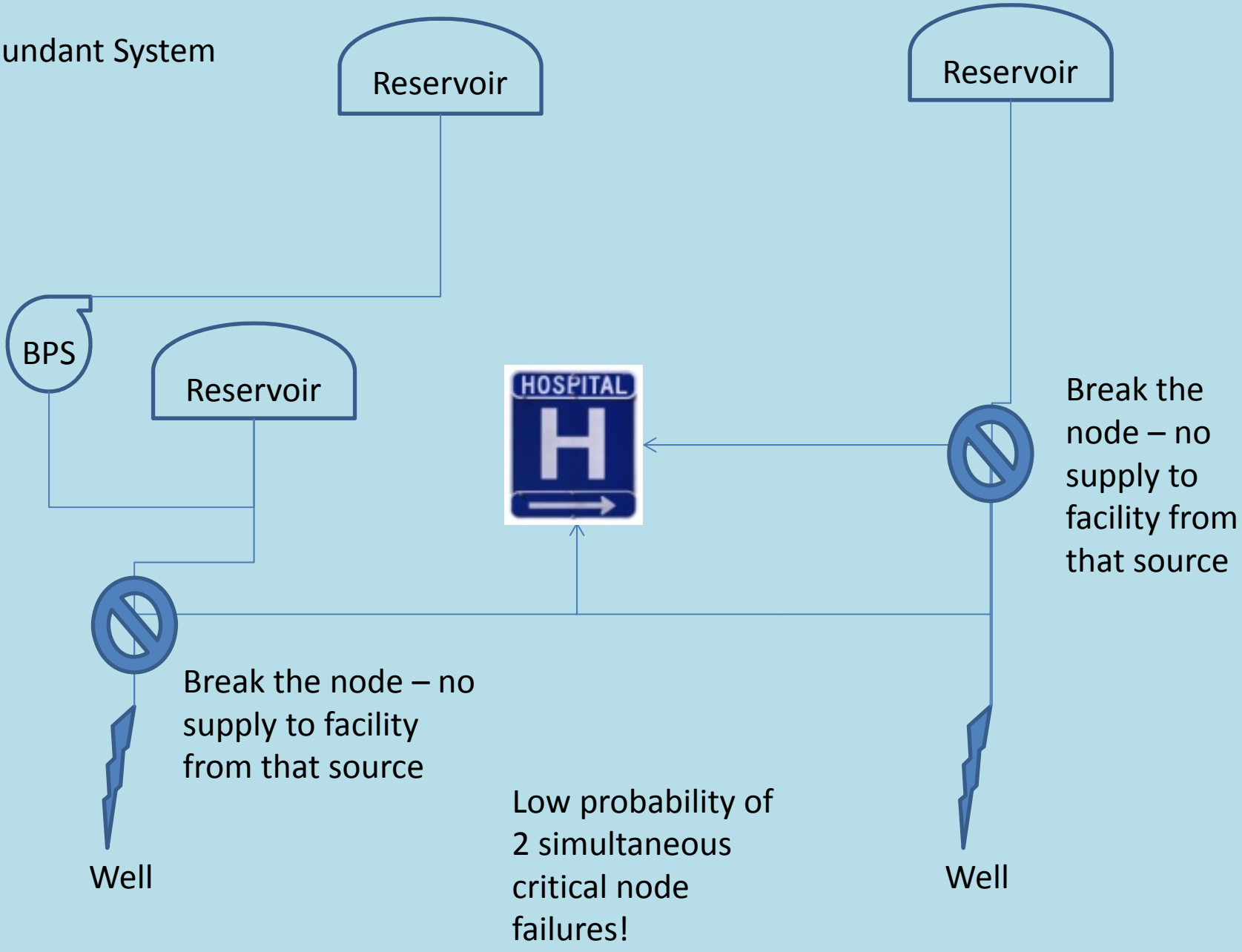
Redundant Sources

Not-Redundant System



Redundant Sources

Redundant System



Alt. 2: Storage

- Volume of storage
  - Duration
  - Demand
- Types of storage
  - Temporary (buckets, pillow tanks)
  - Bottled water
  - Hospital owned reservoir
  - Hospital dedicated reservoir

Storage Issues

- Water quality declines with age
  - Loss of chlorine residual
  - Thermal stratification
  - Rule of thumb: five-day max residence time
- Reservoir maintenance
- Reservoir intrusion or failure
- Accidental contamination (bottles)

Alt. 3: Dedicated Emergency Source (Well)

- Types of demand
  - Nonpotable (HVAC)
  - Potable (drinking, hygiene, food service)
- Supply scenarios
  - Hospital owned
  - Hospital dedicated (water system maintained)

Messages to Hospitals on Emergency Sources

- **Know before you drill**
  - **Well site inspection**
  - **Hydrogeology**
  - **Water rights**
  - **Maintenance and risks**
  - **Backflow prevention**

Message to Hospitals on Emergency Sources (con't)

- The source and system may fall under the Safe Drinking Water Act
  - Nonpotable
  - Potable (drinking, hygiene, food service)
- "When an institutional building becomes a water system" (Department of Health Pub. 331-488)

High Reliability Organizations

- Concepts
  - Developed from nuclear power industry, air traffic control
- Characteristics
  1. Preoccupation with failure
  2. Reluctance to simplify interpretations
  3. Sensitivity to operations
  4. Commitment to resilience
  5. Deference to technical expertise

Summary

- Hospitals are critical water users that need highly reliable supplies.
- If a hospital develops a source, it is a public water systems under the Safe Drinking Water Act.
- Minimize single points of failure.
- Involve local public health partners.
- Start the conversation with hospitals to avoid uncomfortable surprises.

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  - Bob James, Dorothy Tibbetts, Ed Parry, Scott Torpie, Steve Deem

Questions & Comments

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Washington State Department of Health

For More Information

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Resources:

- **State hospital associations**
- **State and local health agencies**
- **Local relationships**