

September 28, 2011
DRAFT

Guidelines for Developing Best Practices to Assist California Hospitals in Preparing for and Responding to a Water Disruption

Purpose

The purpose of this document is to present guidelines hospitals can use in preparing for and responding to a water disruption. It is being published as a draft to be considered by hospitals for use in preparing for the November 17, 2011 California Statewide Medical and Health Training and Exercise Program. Following the November 17 exercise, we will solicit your feedback on the usefulness of this document, as well as your suggestions for additions to this document. California Hospital Association's Hospital Preparedness Program (HPP) intends to maintain this as a "living document" and will periodically update it.

The importance of water disruption planning for hospitals is evident throughout California. Water is a scarce resource throughout the state. The Los Angeles area has 85 percent of its water imported. Much of this comes from the Los Angeles aqueduct system. It is predicted that if the aqueduct system is damaged by an earthquake it could take 3 years or longer to repair. Also, in northern California, a major earthquake could disrupt 85 percent of the Bay Area's water supply which comes from the Hetch Hetchy Reservoir. California's source water, water transmission lines, treatment plants and water distribution systems are vulnerable to damage and contamination which can curtail water usage from hours to days. The American Water Works Association (AWWA) reports that nationally there are on average 15 water main breaks per 100 miles of water main each year. These are considered minor if there is less than 8 hours of down time, or major if greater than 8 hours of down time. California has 8,000 public water systems. Of these, 400 have greater than 3,400 service connections, and 2,000 have less than 200 service connections.

CHA endorses the "Emergency Water Supply Planning Guide for Hospitals and Health Care Facilities" (national guidelines) (<http://www.cdc.gov/healthywater/pdf/emergency/emergency-water-supply-planning-guide.pdf>) prepared by the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and the AWWA and recommends their use in planning for a water disruption. The same organizations, along with the federal Environmental Protection Agency, produced, "Drinking Water Advisory Communication Toolbox" (<http://www.cdc.gov/healthywater/pdf/emergency/drinking-water-advisory-communication-toolbox.pdf>) which can be used to assist hospitals in working with state agencies to communicate on potable water advisories. The CHA guidelines provide California hospitals with references to the key components of the national guidelines and adds components that are specific to California.

The roles of California regulatory agencies, in the event of a water disruption that affects a hospital, are also identified to assist hospitals as they develop an Emergency Water Supply Plan.

Overview

Continuous access to water is a necessity if a hospital is to maintain operations following an event which disrupts water.

Events that can result in a disruption of water fall into three categories:

1. Physical/Mechanical Water Disruption
2. Water Contamination
3. Combination of Both

Specific reasons for a water disruption can include:

- Fire;
- Flood;
- Hurricane and/or Tornado;
- Severe Weather (snow, ice, temperature, lightning, drought);
- Earthquake;
- Electrical Power Outage;
- Mechanical Failure, especially in aging systems;
- Water Supply Interruption;
- Contaminated Water Treatment Chemicals;
- Accidental Hazardous Chemical Spill/Release;
- Construction Accident;
- Personnel Problems (Loss of operator, medical emergencies);
- Vandalism;
- Unintentional Contamination of the Water Supply (e.g., waterborne disease outbreak, accidental cross connections, etc.); and,
- Terrorism

See Attachment A for a matrix to use in determining the probability of different types of water disruption at your health care facility.

The national guidelines identify the affect a water disruption may have on a hospital, including:

- Patient hygiene;
- Hand washing and hygiene;
- Drinking at faucets and fountains;
- Food preparation;
- Flushing toilets and bathing patients;

-
- Laundry and other services provided by central services (e.g., cleaning and sterilization of surgical instruments)
 - Reprocessing of medical equipment, including that typically performed by special services (e.g., bronchoscopy, gastroenterology);
 - Patient care (e.g., hemodialysis, hemofiltration, extracorporeal membrane oxygenation, hydrotherapy);
 - Radiology;
 - Fire suppression sprinkler systems;
 - Water-cooled medical gas and suction compressors (a safety issue for patients on ventilation);
 - Heating, ventilation, and air conditioning (HVAC);
 - Steam boilers;
 - Decontamination/HAZMAT response;
 - Ice machines (should have appropriate filters on hand); and,
 - Bathing/showering of on-site staff.

The national guidelines emphasize the need for an Emergency Water Supply Plan (EWSP). The steps of the EWSP are:

1. Assemble the appropriate EWSP Team. The necessary background documents for your facility (Sections 4 and 5 of the national guidelines) and, in this document, the role of California's regulatory agencies and appropriate checklists are included;
2. Understand your water usage by performing a water use audit (Section 6);
3. Analyze your emergency water supply alternatives (Section 7); and,
4. Develop and exercise your EWSP.

In addressing an emergency water supply, consideration must be given to potential hazardous waste sites and leach fields.

Emergency Water Supply Planning Team

The size of a health care facility and its service mix will determine who should serve on the EWSP team. The following should be considered:

- Facilities management
 - Plumbing Engineer Supervisor
- Pharmacy
- Radiology
- Biomedical Engineering
- Laboratory
- Dialysis
- Dietary
 - Food services director
- Surgical Services
- Administration or management

-
- Deputy administrator or deputy manager
 - Environmental compliance, health and safety
 - Occupational Safety Director
 - Quality and Safety Officer or Manager
 - Infection Control and Prevention
 - Infection Control Director or Specialist
 - Risk Management
 - Risk Manager
 - Nursing
 - Clinical Patient Care Director
 - Medical Services
 - Chief of Surgery
 - Chief of Medicine
 - Emergency Preparedness
 - Emergency Preparedness Coordinator
 - Security
 - Security Director
 - External partner responsibilities in California
 - Local Community Water System
 - District –California Department of Public Health – Division of Drinking Water and Environmental Management
 - Local/County Health Department
 - Local fire department
 - Local law enforcement
 - Insurance Agents
 - Licensing and Certification District Office
 - The Joint Commission, or appropriate accreditation partner

The EWSP should develop maps of the hospital layout:

- Map detailing the water pipe system within the hospital identifying shut-off valves
- Map detailing where water containers should be dropped off and stored throughout the hospital.

The EWSP also needs to plan for the use of a fire watch team if there is an interruption of water to fight fires.

During a water disruption, plans should be made for the use of hand pumps to be used if decontamination needs to be postponed.

Water Use Audit

In developing an EWSP, it is essential to conduct a water use audit. The EWSP addresses the following questions for both potable and non-potable water:

- What are the hospital's water supply sources?
- What is the hospital's typical potable and non-potable water use?

- What principal water uses does the hospital consider critical during a water disruption?
- What specific plans has the hospital made for meeting emergency water supply needs, including the hospitals emergency response plan and Memoranda of Understanding and Agreements?

A key component of a water audit is determining water usage under normal operating conditions and to identify essential functions and minimum water needs. To assist with this effort the national guidelines produced Table 6.4-1 which the CHA Hospital Preparedness Program (HPP) expanded. (Attachment B)

CHA HPP also identified current equipment in hospitals that could be upgraded to save water. (Attachment C) Hospitals can use substitute products to reduce water use, such as body wipes and waterless shampoos.

In Section 6.7, the national guidelines list alternative supplies and materials not requiring water. In Section 7, the national guidelines address Emergency Water Alternatives, including the use of storage tanks, tanker transported water, commercially bottled water and other water sources. The CDC's *Healthcare Water System Repair Following Disruption of Water Supply* is found under Attachment F. The American Water Works Association standard for Disinfecting Water Mains is at http://www.dot.ca.gov/hq/esc/sdsee/www/documents/Disinfecting_Water_Mains.pdf. Section 7 also addresses the use of potable treatment units and treatment technologies.

The Role of California Regulatory Agencies in a Water Disruption

CalEMA's "Multi-Agency Response Guidance for Emergency Drinking Water Procurement and Distribution" (CalEMA Multi-Agency Guidance)

<http://www.calema.ca.gov/PlanningandPreparedness/Documents/DrinkWaterGd.pdf> defines the roles of state agencies and departments during a water disruption. In implementing the Guidance, all preparedness organizations at all SEMS/NIMS levels are encouraged by CalEMA to:

- Integrate and coordinate the activities of the involved water utilities and jurisdictions served;
- Establish the standards, guidelines, and protocols necessary to promote interoperability between the utility and other response agencies;
- Document how priorities for resources and other requirements would be determined;
- Establish and coordinate a Multi-Agency Coordination System (MACS) Group specific to the issue of emergency drinking water with participation to include local water utilities and other response organizations;
- Facilitate MACS Group workshops or meetings to discuss plans and protocols when managing an emergency that disrupts the local water utility's distribution system during a significant or regional event;
- Develop procedures and protocols that translate into specific action-oriented checklists (this may include resource listings; maps, charts, and other pertinent data; mechanisms for notifying staff; processor for obtaining and using equipment, supplies, and vehicles; methods of obtaining mutual aid/assistance; mechanisms for reporting information to

organizational work centers and EOCs; and communications operating instructions, including connectivity with private-sector and non-governmental organizations).

There are numerous private water utilities that are investor-owned and operated. Private water utilities are not mandated to follow SEMS. Therefore, it is important in your communities' water disruption planning to work with and encourage private water districts to become part of the SEMS process.

The California Department of Public Health-Division of Drinking Water and Environmental Management (CDPH-DDWEM) is the lead state department in addressing water contamination issues. It has north and south branch offices. The branches have a total of 5 regions. The five regions are divided into 23 districts. If a hospital experiences contaminated water, the hospital deals with its District office. The District office brings in the Regional office if necessary. Within some districts, there are local primacy agencies (CDPH/LPA). CDPH/LPAs are county environmental health jurisdictions that are granted regulatory authority over a public water system serving fewer than 200 service connections. However, most CDPH/LPAs do not have the resources to deal with contamination and would rely on the CDPH-DDWEM District office to take the lead.

The SEMS process may be activated if there is a water disruption due to contamination and CDPH Licensing and Certification will be a player if it affects a health care facility or patients. CDPH Licensing and Certification will rely heavily on the local water system and perhaps local public health, an entity that is also involved, as far as remedying the contaminant. However, CDPH Licensing and Certification, through its district offices, will monitor the activities of the hospital operations if the hospital has no or little water, physical/mechanical or chemical disruption of water and can't operate at its licensed capacity. The air quality management district will be involved if the contamination affects the air. If the contaminate is radioactive, the CDPH Radiologic Health Branch would also be involved. CDPH-DDWEM has a working relationship with Federal EPA Region 9 and will involve them as necessary. The only other federal entity that may be brought in through the SEMs process is the Federal Bureau of Investigation (FBI) if the contamination is suspicious. Hospitals do not have any direct contact with federal agencies in a water disruption.

If the contamination is only on the hospital site, it is possible the local public health officer would be in the lead with consultation from CDPH-DDWEM, if there is an existing contamination remedy procedure established by CDPH-DDWEM. Whenever there is not a contamination remedy established (e.g., exotic pesticide), CDPH-DDWEM is always the lead.

CDPH-DDWEM is responsible for Crisis and Emergency Risk Communication (CERC) in a water disruption and will share risk communications with appropriate parties through CAHAN.

CDPH-DDWEM is responsible for laboratory testing of contaminated water. CDPH-DDWEM belongs to the California Mutual Aid Laboratory Network (CAMAL). This is a consortium of state, federal and local public water utility laboratories and includes:

-
- Public Water System Drinking Water Laboratories
 - USEPA Region 9 Laboratory
 - California Department of Water Resources Laboratory
 - CDPH Sanitation and Radiation Laboratory

CDPH-DDWEM provides technical assistance on the disinfecting/flushing of water pipes but it has no responsibility for performing these tasks. It is the responsibility of the local community water system to disinfect/flush pipes up to private property. It is the responsibility of the owner of private property (hospital) to disinfect/flush pipes on their property based on the directions of the local community water system. CDPH Licensing and Certification may want to ensure the pipes associated with health care facilities are free from contamination prior to use.

Cal/OSHA would not get involved unless a worker alleged that the water pipes were not disinfected or he/she got ill due to pipes being contaminated. The Office of Statewide Health Planning and Development (OSHPD) does not have a role with contaminated water. The role of all state agencies involved in a water disruption are summarized in the previously mentioned CalEMA Multi-Agency Guidance Report.

If there is a water disruption due to a broken water main or water pipe it is the responsibility of the local community water system to fix it, unless it is on private property. On private property, it is the responsibility of the owner. In the case of a hospital, this needs to be reported as an emergency repair to OSHPD and OSHPD will make every effort to expedite its approval as an emergency. CDPH Licensing and Certification would monitor how the disruption affects patient care. CDPH-DDWEM has no role in damaged water mains/pipes unless the break results in contamination of water.

Standards and Regulations

There is no one set of standards which provide direction as to how much water should be stored on-site or be accessible to a health care facility in case of a water disruption. There are numerous variables that must be considered in each health care facility determining its water needs in time of a disruption. These variables are discussed in later sections of this document and in the appendices.

The following standards and regulations pertain to preparing for and responding to a water disruption:

- *The Joint Commission*

The current standard of The Joint Commission (TJC) requires that a hospital's emergency operation plan identify procedures in the event that the hospital cannot be supported by the local community for at least 96 hours relative to water, wastewater disposal, power and heating fuels.

- *California Plumbing Code Section 614.4*

614.4.1 For acute care hospital facilities required to meet NPC-5, an on site water supply of 150 gallons (567.9 L) (based on 50 gallons/day/bed for 72 hours) of potable water per licensed bed shall be provided.

The emergency supply shall have fittings to allow for replenishment of the water supply from transportable water sources and a means to collect water in portable containers in the event that normal water supply becomes unavailable.

Exceptions:

- (1) With the licensing agency approval of a water rationing plan, the emergency water storage capacity may be computed based on the approved water rationing plan to provide for 72 hours of operation.
- (2) With the approval of the Office and the licensing agency, hook-ups that allow for the use of transportable sources of potable water may be provided in lieu of on-site storage.

614.4.2 The emergency supply of water shall be provided at adequate pressure using gravity, pressure tanks or booster pumps. Pumps used for this purpose shall be provided with electrical power from the on site emergency system.

- *Title 22 Requirements*

71665. Water Supply and Plumbing

- (a) Water for human consumption from an independent source shall be subjected to bacteriological analysis by the local health department, State Department of Health or a licensed commercial laboratory at least every three (3) months. A copy of the most recent laboratory report shall be available for inspection.
- (b) Plumbing and drainage facilities shall be maintained in compliance with Part 5, Title 24, California Administrative Code, Basic Plumbing Requirements. Drinking water supplies shall comply with Group 4, Subchapter 1, Chapter 5, Division T17, Part 6, Title 24, California Administrative Code.
- (c) Backflow preventers (vacuum breakers) shall be maintained in operating condition where required by Section T17-210(c), Division T17, Part 6, Title 24, California Administrative Code.
- (d) For hot water used by patients, there shall be temperature controls to automatically regulate the temperature between 40.5°C (105°F) and 48.9°C (120°F).
- (e) Hot water at a minimum temperature of 82.2°C (180°F) shall be maintained at the final rinse section of dishwashing facilities unless alternate methods are approved by the Department.
- (f) Taps delivering water at 51.60°C (125°F) or higher shall be identified prominently by warning signs with letters 5 cm (2 inches) high.
- (g) Grab bars are not required for each toilet, bathtub and shower except where both are appropriate to patient care and supervised by personnel.

- (h) As a minimum, toilet, hand washing and bathing facilities shall be maintained in operating condition in the number and types specified in construction requirements in effect at the time the building or unit was constructed.
- (i) Overhead pipes and ducts shall not be exposed in such manner as to endanger the patient directly or indirectly.

70741 Disaster and Mass Casualty Program

- (b) The program shall cover disasters occurring in the community and widespread disasters. It shall provide for at least the following:
 - (1) Availability of adequate basic utilities and supplies, including gas, water, food and essential medical and supportive materials.

Coordinating Your Hospital Preparation and Response for a Water Disruption with Your Community's Response

On June 12, 2002, President Bush signed into law the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (PL 107-188, referred to as the Bioterrorism Act). In the Bioterrorism Act, Congress recognizes the need for drinking water systems to undertake a more comprehensive view of water safety and security. The Act amends the Safe Drinking Water Act and specifies actions Community Water Systems (CWSs) and the U.S. Environmental Protection Agency (USEPA) must take to improve the security of the Nation's drinking water infrastructure.

The Bioterrorism Act amends the Safe Drinking Water Act (SDWA) by adding, among other requirements, section 1433. Section 1433(b) requires community water systems serving populations greater than 3,300 to either prepare or revise an Emergency Response Plan that incorporates the results of its Vulnerability Assessment (VA). The Emergency Response Plan must include "plans, procedures, and identification of equipment that can be implemented or utilized in the event of a terrorist or other intentional attack" on the Community Water System. The Emergency Response Plan also must include "actions, procedures, and identification of equipment which can obviate or significantly lessen the impact of terrorist attacks or other intentional actions on the public health and the safety and supply of drinking water provided to communities and individuals". In developing an Emergency Response Plan, Community Water Systems are encouraged to work with local public health, local first responders, and local emergency planning. Community Water Systems are also encouraged to include hospitals. The Act recognizes that the water component can be used as an all hazards approach.

In June, 2011, the US Environmental Protection Agency produced, "Planning for an Emergency Drinking Water Supply"

(http://oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=502174) to assist communities plan for emergency drinking water. The Metropolitan Washington Council of Governments (MWWOG) in a 2006 study recognized that an extensive level of field operations by either the utility or fire department might not be available during an actual emergency. Therefore, it was recommended that hospitals contract with equipment rental companies with emergency deployment capability. The study recommended that technical operational aspects that needed to be addressed in operational plans include: (See Attachment E)

-
- Routing of above ground hoses or temporary piping, including provisions for traffic ramps where the distribution lines would have to cross traveled roadways;
 - Provision for disinfection of hoses, pipes, and pump apparatus not normally used for potable water purposes (depending on the intended water use); and,
 - Special valve control capability for pumping into closed-pipe systems, which the rental contractor or fire department typically would not be familiar with in its normal dewatering or firefighting operations (Typical construction operations involving sewage bypass or dewatering pumping and a fire department's normal firefighting operations both involve pumping to an open atmosphere. Pumping into a closed-pipe system would require special valving in order to match supply and demand rates. The water utility would be able to provide guidance on this issue. Another approach to the closed system supply problem would be the use of a hydro pneumatic tank; however, the tank size that would be needed for a large hospital may be impractical).

Following a water disruption, a hospital should have plans in place with the water utility on decontamination of water mains, if they are compromised. The CDC Guidelines for Environmental Infection Control in Healthcare Facilities (2003) should be used to decontaminate building plumbing: http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf.

The following are short term alternate water supply options Community Water Systems consider:

- Bottled water provided by outside sources;
- Bottled water provided by local retailers;
- Bulk water provided by certified water haulers;
- Bulk water transported or provided by military assets (i.e., National Guard or U.S. Army Corps of Engineers (USACE));
- Bulk water provided by neighboring water utilities by truck or via pipeline;
- Bulk water from hospitals, universities, and local industry that maintain backup water supplies for consumption;
- Interconnections with nearby public water systems;
- Water treated by plant and hauled to distribution centers (i.e., in the case of water distribution system contamination);
- Water pumped from surface water sources, treated at the plant or nearby plants, and hauled to distribution centers;
- Water for firefighting from Federal agencies such as the USACE and FEMA; and,
- Water from unaffected wells owned by local citizens and businesses.

See the worksheet available under Attachment D related to Alternate Source options. Additional equipment may be available from:

- Local businesses such as dairies, well drillers, irrigation supply firms, or distributors that may have tank trucks that can be made suitable for carrying water, chlorinators or generators that can be used for emergency distribution, and pipe that can be used to extend water supply lines.

-
- Other water utilities in the area that may have spare parts (such as valves, pumps, and pipe) available for use in an emergency.
 - FEMA, USACE, and the U.S. Forest Service that may be able to provide firefighting equipment.

It is essential that a hospital's Emergency Water Supply Plan is coordinated with the Community Water Systems plan and the local department of public health and the LEMSA.

In working with community resources thought has to be given to:

- Determine who is actually in charge of the water disruption response and to ensure those in charge understand the priority water needs of hospitals.
- Distribution of water to those who need it.
- Personal preparation education for the community.
- Security requirements to protect water as a scarce commodity.
- Shelf life of alternative water supplies as determined by the federal Food and Drug Administration (<http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/BottledWaterCarbonatedSoftDrinks/ucm077079.htm>).
- Just-in-time training for staff and patients