NPC-5 Water Conservation/Rationing Plan

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MARCH 29 – 31, 2023
HILTON UNIVERSAL CITY HOTEL
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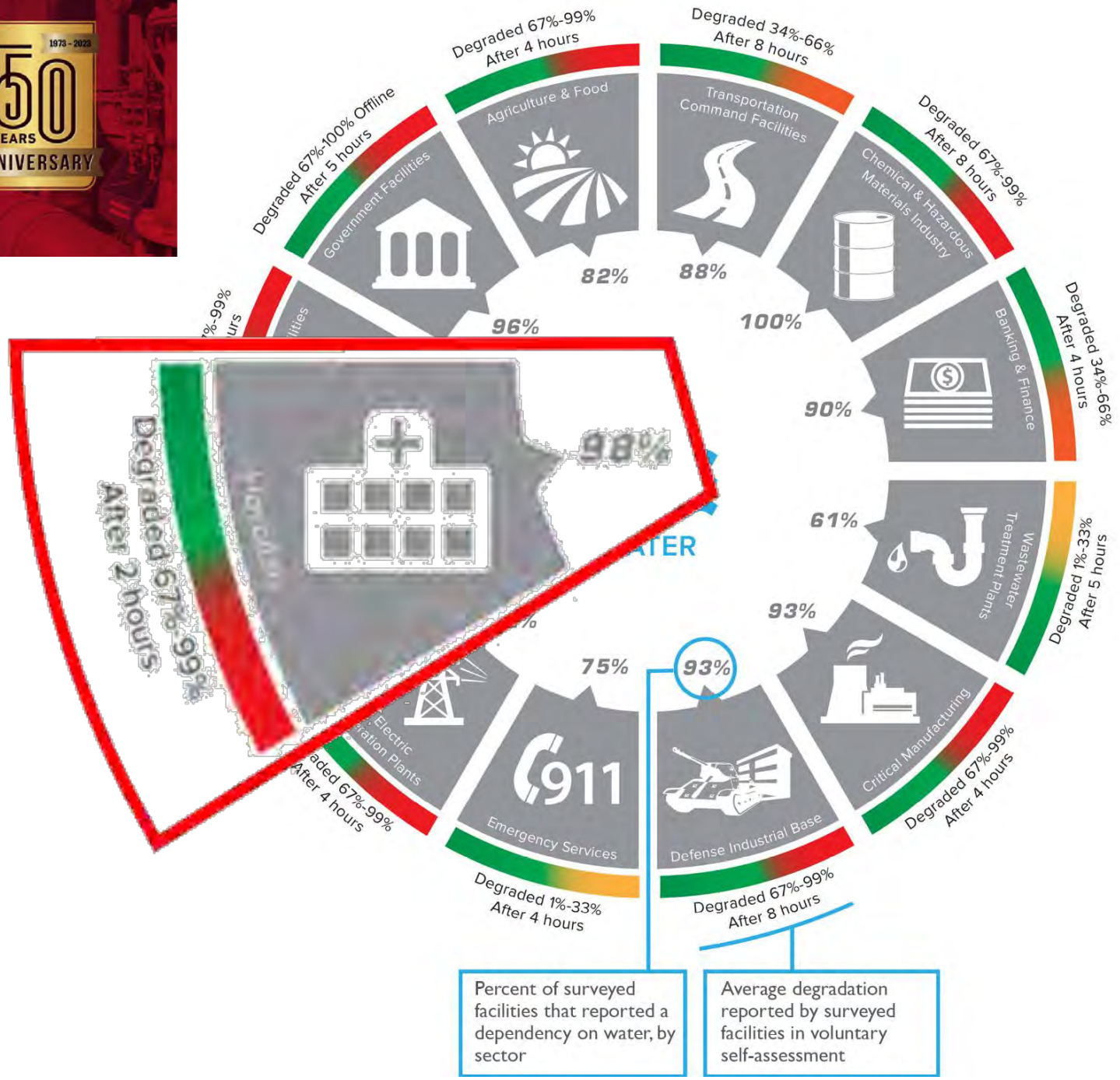
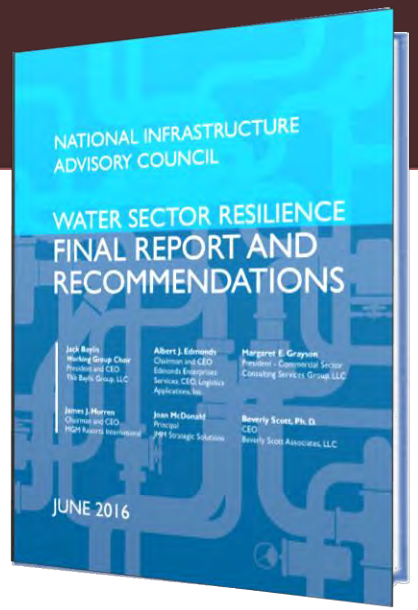
1973 – 2023 50 YEARS ANNIVERSARY





Northridge EQ 1994

Fire & Water: A ruptured supply line burned in the water on Balboa Boulevard in Granada Hills

AP

2014 South Napa Earthquake

WTP
TRANCAS ST
TROWER AVE
SALVADOR AVE
HARDMAN AVE
LINCOLN AVE
1ST ST
MAIN ST
SOSCOL AVE
SILVERADO TRL
COOMBSVILLE RD
WIMOLA AVE
JEFFERSON ST
COOMBS ST
Congress Valley
OLD SONOMA RD

- Water Main Breaks
- Asphalt Cracks or Fissures
- Potable Water Tank
- Water Mains 16" and Larger
- Active Fault Zone Boundary
- USGS Observed Fault 2014

120 water main breaks in the aftermath of 2014 S. Napa EQ.

Earthquakes Cause Extensive Damage to Critical Infrastructure

- Widespread damage to water and wastewater systems, resulting in loss of service for extended periods
- Extensive damage to other critical infrastructure, including transportation networks
- Hospitals are required to have enough emergency water to remain functional during lengthy outages caused by natural disasters

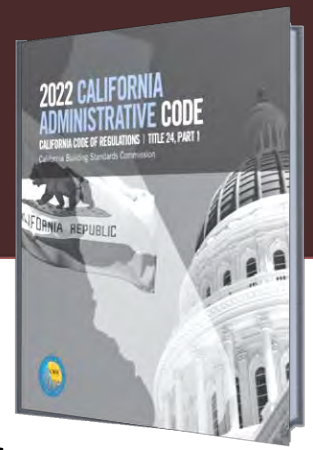
Curtesy of Portland Water Bureau

Consequences of Loss of Water in Hospitals After an EQ

- Patient care (e.g., hemodialysis, hemofiltration, extracorporeal membrane oxygenation, hydrotherapy);
- Loss of access to water for use in disinfection, sterilization, and water-based patient treatments
- Loss of HVAC systems that rely on water for heating, cooling, and ventilation
- Laundry and other services provided by central services (e.g., cleaning and sterilization of surgical instruments)
- Loss of fire suppression capabilities
- Loss of drinking water and sanitation services
- Potential loss of access to other hospitals and healthcare facilities on the same affected water system
- Inability to provide an effective hazmat-decontamination response
- Potential lack of water for field medical triage centers during an emergency response
- Etc.

Curtesy of Yumei Wang

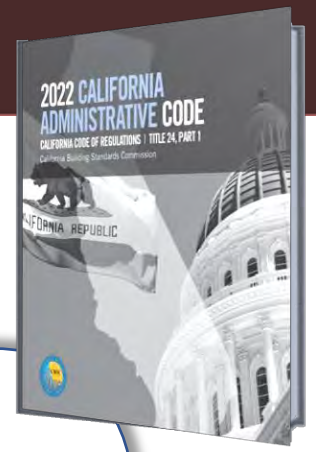
NPC-5 Emergency Water Requirements



CAC Part 1, Chapter 11, Table 11.1

- The building meets the criteria for NPC "4" or NPC "4D" and **onsite supplies of water and holding tanks for sewage and liquid waste, sufficient to support 72 hours emergency operations, are integrated into the building plumbing systems in accordance with the California Plumbing Code.** An onsite emergency system as defined in the California Electrical Code is incorporated into the building electrical system for critical care areas. Additionally, the system shall provide for radiological service and an onsite fuel supply for 72 hours of acute care operation.

Building Seismic Performance



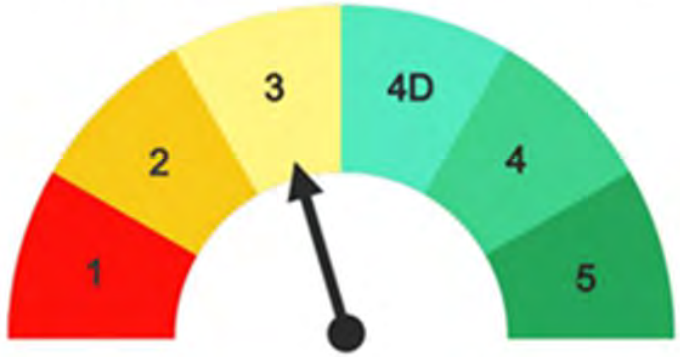
SPC/NPC

SPC=
Structural Performance Category

Structural Integrity

NPC=
Non-Structural Performance Category

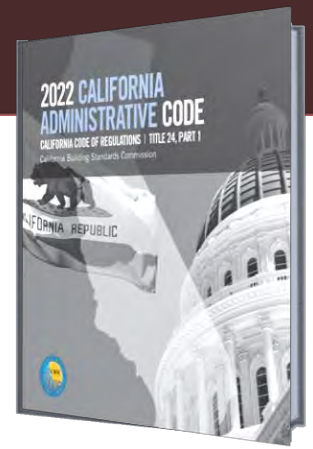
Equipment and Systems Critical to Patient Care



NPC 5 Compliance by 2030

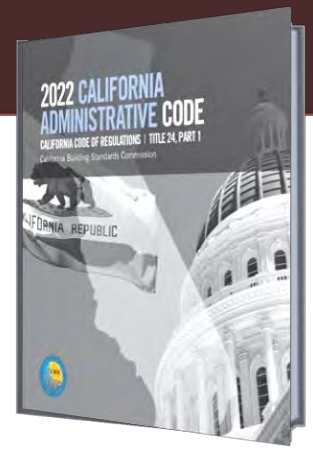
- **An NPC-5-compliant Hospital Facility is capable to support 72 hours of emergency operations during widespread damage caused by a Major EQ.**
- What does being reasonably capable of providing services to the public after a disaster mean?
  - Water storage/water conservation plan
  - Waste water storage
  - Fuel storage for emergency generator(s)
  - Utilities and systems anchored and braced

NPC Compliance Timeframe



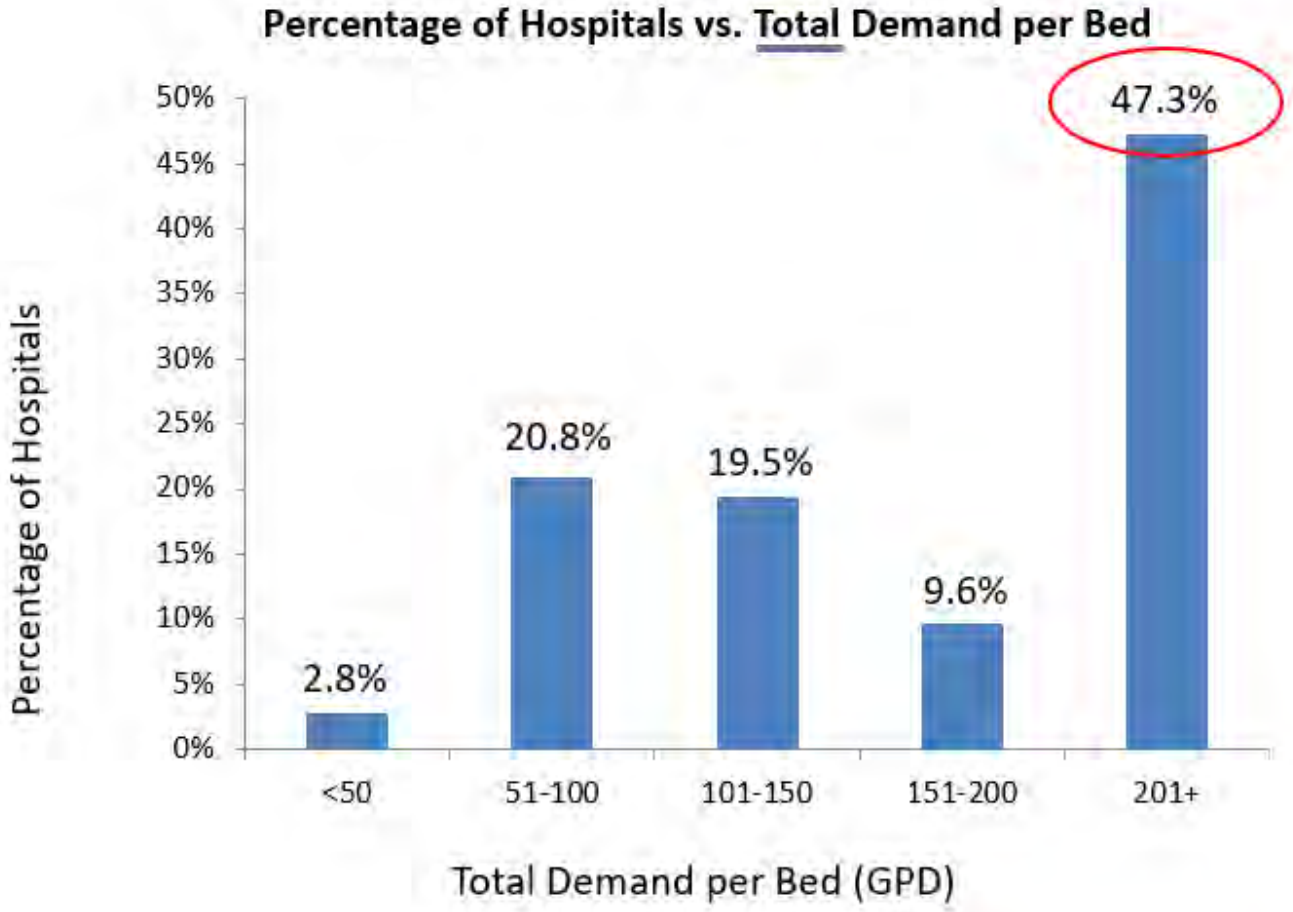
- For any general acute care hospital be use as a GAC hospital building after January 1, 2030:
  - **By January 1, 2024**, submit to the Office a complete nonstructural evaluation for each building.
  - **By January 1, 2026**, submit to the Office construction documents ready for review by the Office.
  - **By January 1, 2028**, obtain a building permit to begin construction.
  - **By January 1, 2030**, the GAC building shall achieve NPC-5 rating

NPC-5 Post-Earthquake Emergency Water



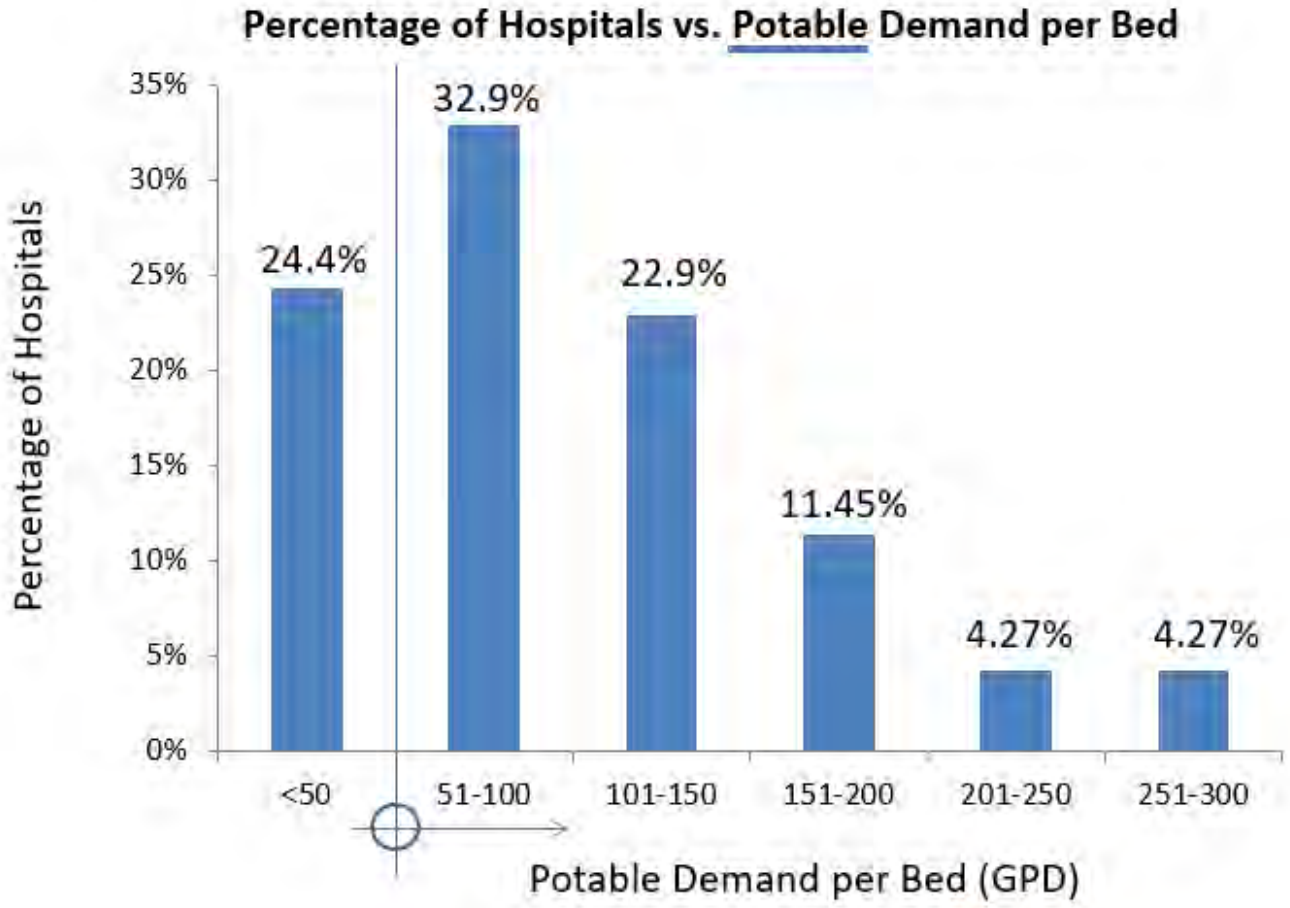
- NPC-5 requirements include potable water as well as industrial/process water to operate hospital utilities and equipment **to support 72 hours of emergency operations**
- CPC, Section 615.4
  - ". . . For acute care hospital facilities or buildings required to meet NPC-5, on-site water supply of not less than 150 gallons [based on 50 gallons/day/bed for 72 hours] of potable water per licensed bed shall be provided."

Nearly 50% of hospitals need more than 200 GPD per bed for an emergency

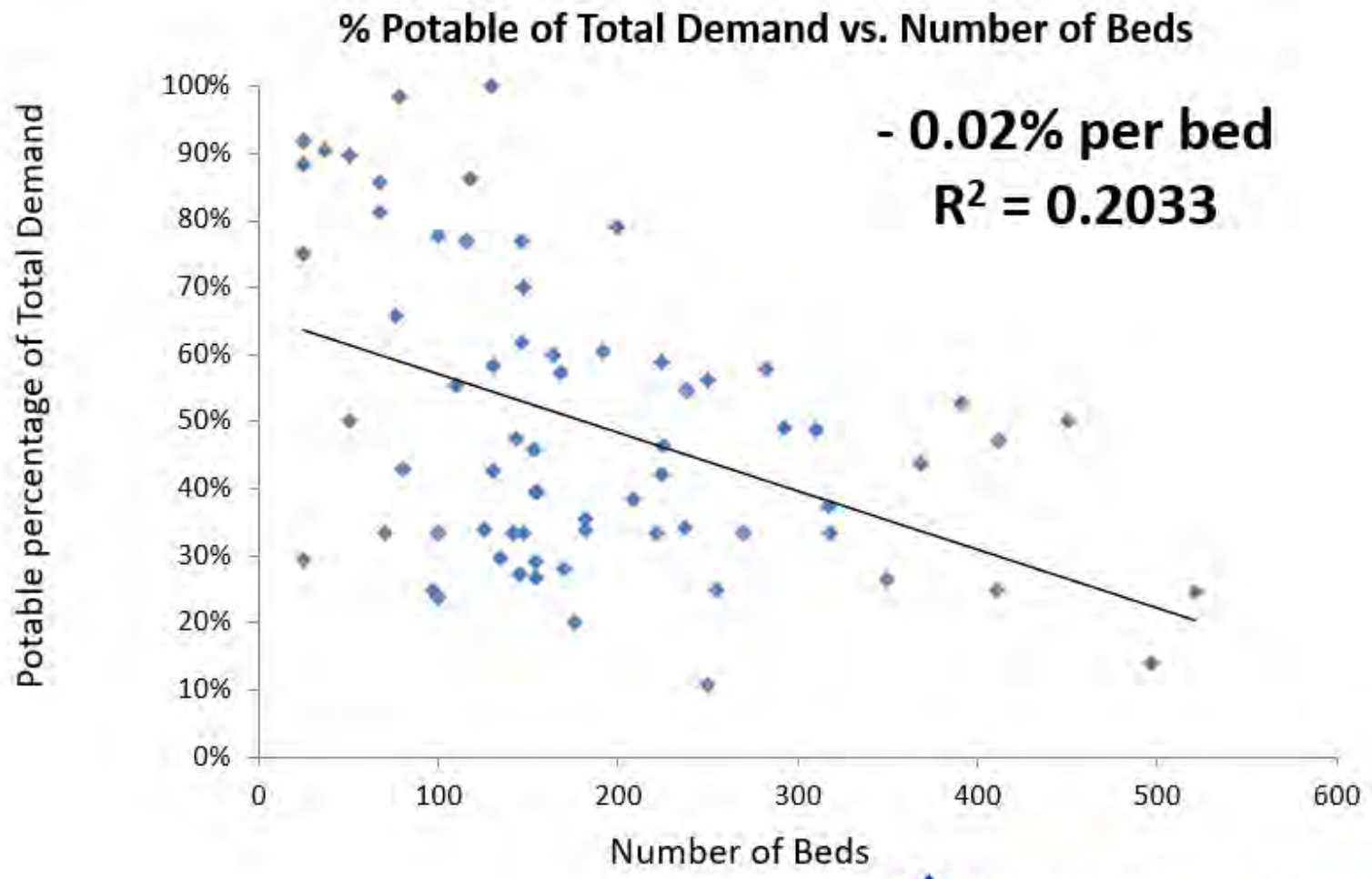


TEMPEST ENVIRONMENTAL

Most hospitals need more than 50 GPD to serve potable needs in an emergency

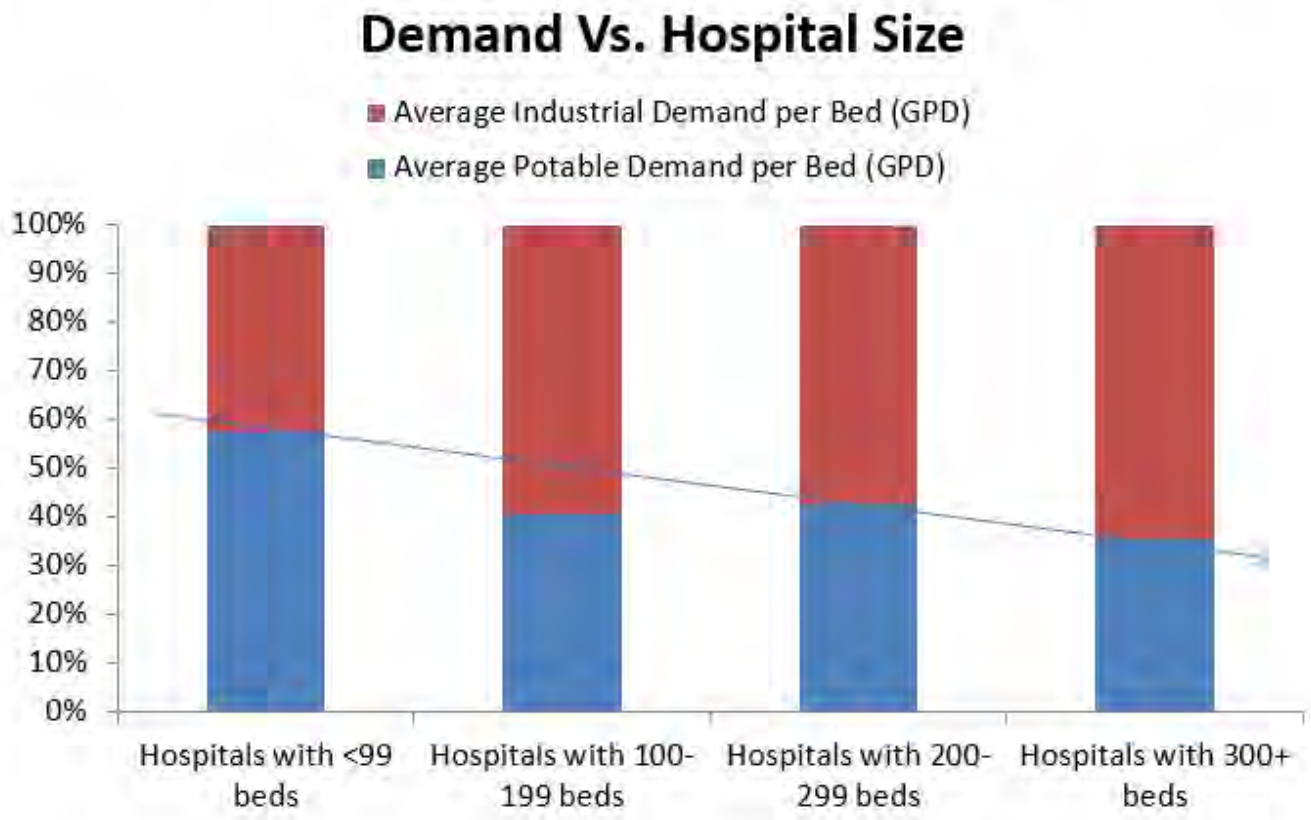


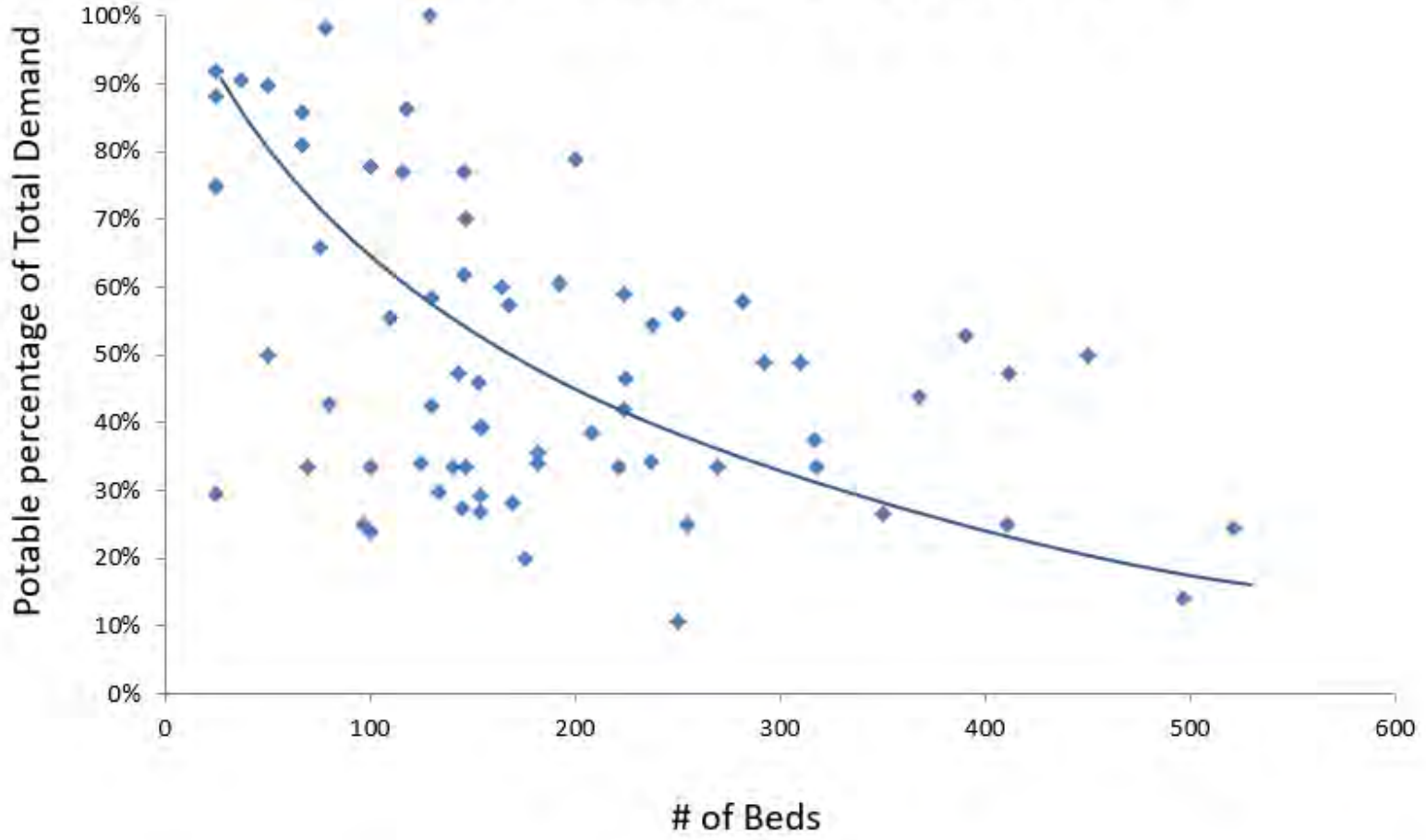
Percentage of water demand from potable sources decreases for larger hospitals



TEMPEST ENVIRONMENTAL

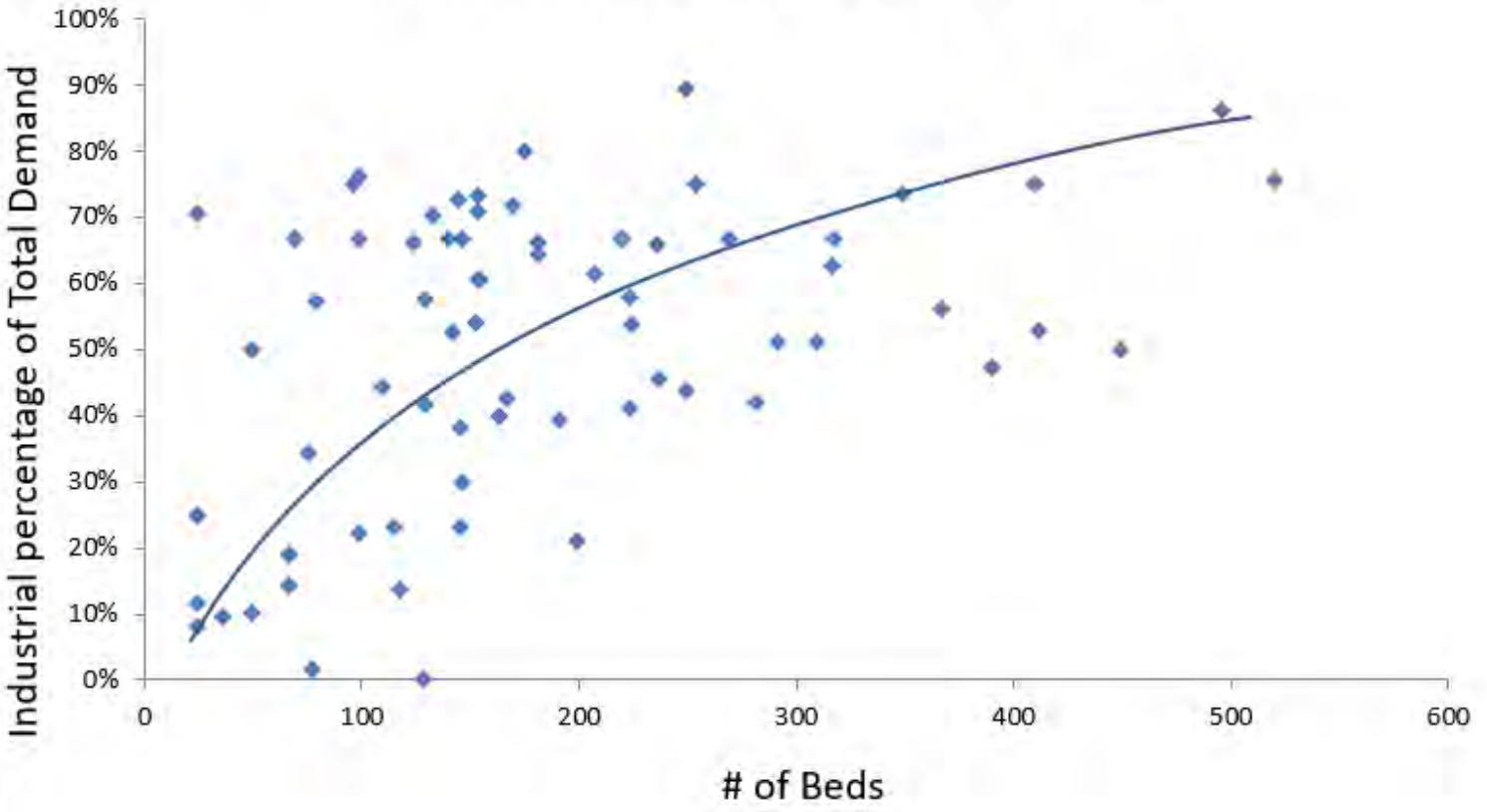
Industrial demand becomes more significant for larger hospitals





TEMPEST ENVIRONMENTAL

% Industrial Demand vs. # of Beds

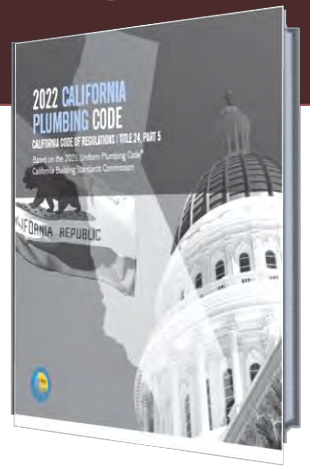


TEMPEST ENVIRONMENTAL

Existing Requirements Inadequate

- Tempest Environmental Findings:
  - Based on studies and analyses OSHPD's currer requirement of 50 gallons/licensed bed/three days appears to be inadequate for most hospitals.
- CHA's Endorsement
  - 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.

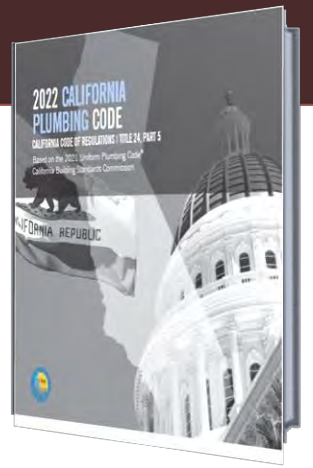
NPC 5 for (E) Hospital Buildings



CPC, Section 615.4

- All existing buildings remaining in the acute care inventory on January 1, 2030
  - Required to comply with the NPC-5 requirements by January 1, 2030

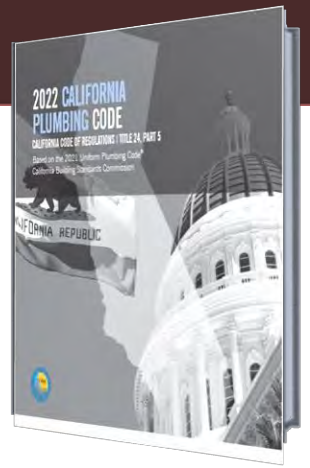
NPC 5 for New Hospital Buildings



CPC, Section 615.4

- New seismically separate hospital buildings w/ licensed patient beds:
  - 2022 California Plumbing Code, Section 615.4
  - A minimum of 150 gallons of potable water per licensed bed shall be provided with additional industrial/process water to support 72 hours of emergency operation of the subject building

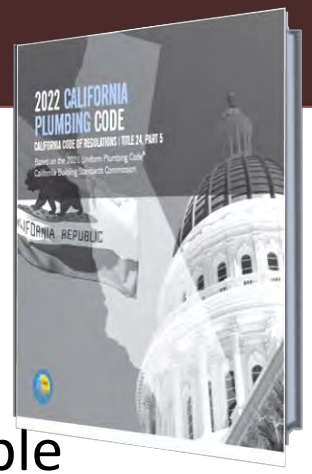
NPC 5 for New Central Plants



CPC, Section 615.4

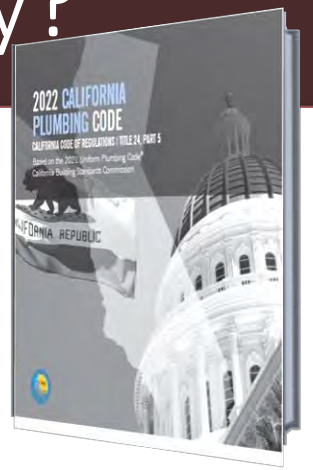
- New Central Utility Plant
  - 2019 California Plumbing Code, Section 615.4
  - Required to provide water for 72 hours min emergency operations for itself and any other new buildings
    - Not required to support the existing buildings on the facility campus,
    - Nothing prohibits installation of larger tanks at the time of construction.

NPC-5 Post-Earthquake Emergency Water



- The 2022 California Plumbing Code (CPC) exceptions:
  - Section 615.4 allows much smaller holding tanks where alternate arrangements have been made for delivery of water; and,
  - Section 727.0 allows alternate arrangements to be made for transportable means for sewage and liquid waste disposal.
- Where such exceptions are used, the arrangements require approval by HCAI and CDPH.

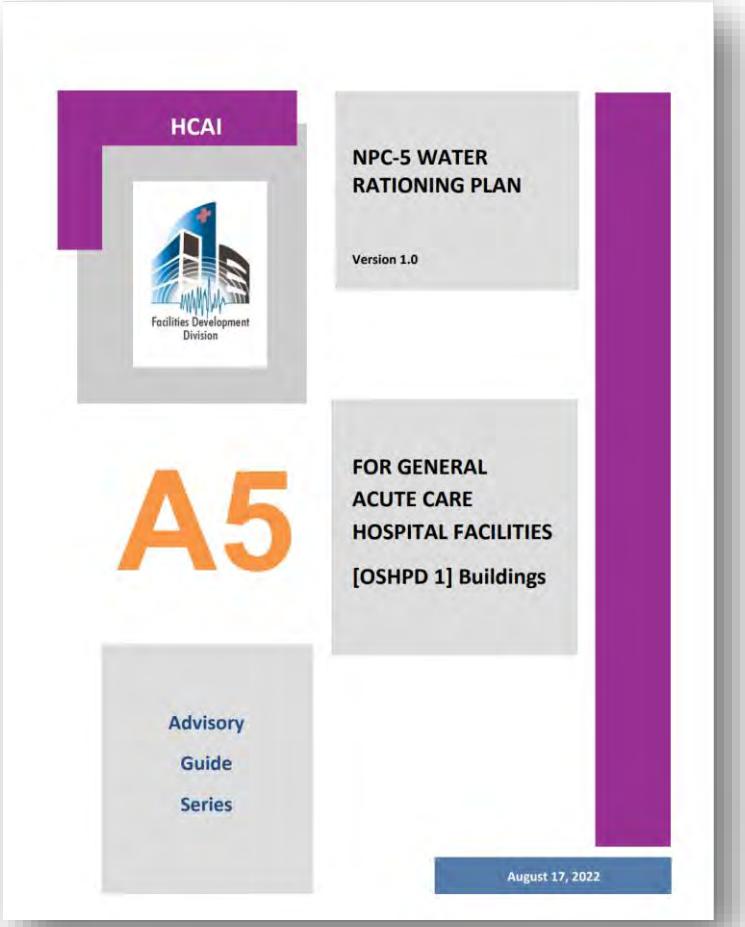
How Much Water Does Your Hospital Need in an Emergency?



- The amount of water required to provide for 72 hours of operation is determined from:
  - The Facility's emergency operations plan; and,
  - The associated **Water Conservation/Water Rationing plan**
- Approvals req'd by CDPH, Licensing Division
- **The min. volume of potable water required per licensed bed is defined**
- **The min. volume for industrial/process water is not defined in the California Plumbing Code**
  - Which utilities and systems the hospital facility intends to operate during an emergency? and,
  - Losses in the process water for closed loop heating and cooling systems?

NPC-5 Water Rationing Plan Guide

- Plan shall be based on the following:
  - Water Usage under Normal Operating Conditions
  - Source(s) of Emergency Water Supply
  - Identification of Water Uses in the Building(s)
  - Water Quality
  - Water Replenishment / Tanker Trucks
  - Temperature (Heating /Cooling)
  - Impacted Services in the Building(s)
- HCAI and CDPH approvals are required for all water rationing plans



Typical Water Rationing Plan – Recommended outline

The water rationing plan should include, but is not limited to, the following:

1. Identify hospital's water supply sources.
   - On-site water tank(s)
   - On-site wells
2. Water usage under **normal operating conditions** for the various functions, services, and departments within the facility.
3. Functions critical to the facility, and which services can be temporarily restricted or eliminated in the event of a water supply interruption.
   – Provide working estimates of the quantity of water required to continue operation.

Typical Water Rationing Plan – Recommended outline

6. Identify emergency water conservation measures.
7. Water piping line diagram plans showing the shutoff locations and area being affected.
8. If tanker trucks are utilized to transport water to the facility:
   - Coordinate its use from the drinking water authority: State, public water utility, and, possibly, the local emergency management agency.
   - Have an agreement with a company(s) to provide tanker trucks to replenish water
   - Identify the connection locations that will allow for placement of the truck
9. If fire suppression sprinkler system is planned to be down, fire watches for the building is required per CFC.

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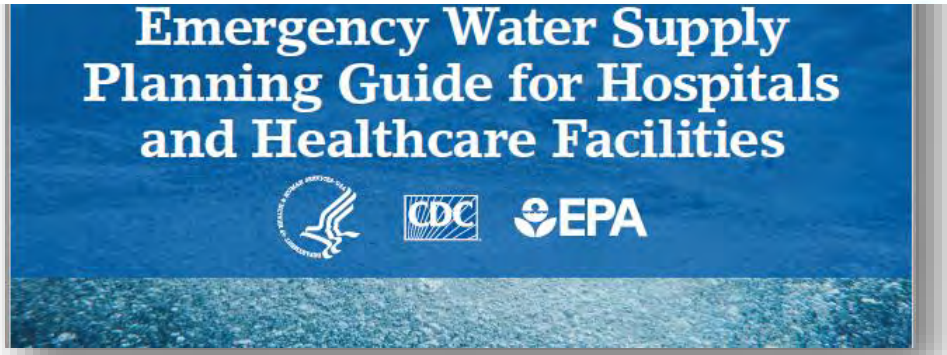
Helpful Tools & Resources

STEP 1
ASSEMBLE
the facility's EWSP team and the necessary background documents

STEP 2
UNDERSTAND
water usage through a water use audit

STEP 3
ANALYZE
your emergency water supply alternatives

STEP 4
DEVELOP
EWSP test/exercise



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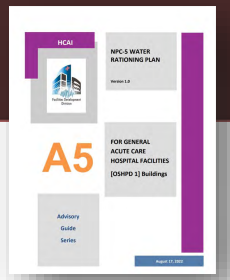
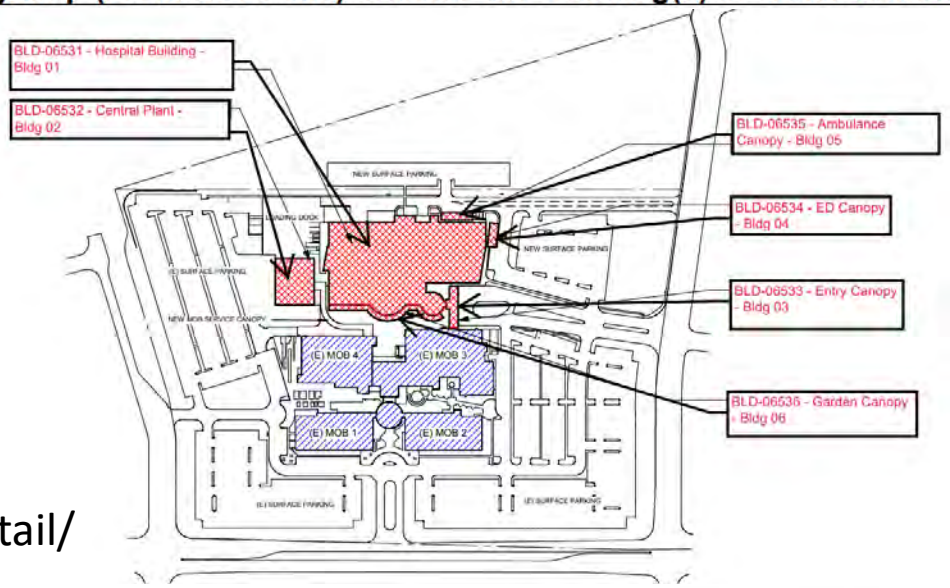
NPC-5 Water Rationing Plan



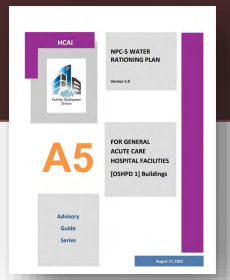
Date:	
Facility ID:	
Facility Name:	
Building Number(s):	BLD-xxxxx
Licensed Beds:	Per BLD-xxxxx
Building Area(s) (SF):	
HCAI Construction Project Number(s) (if any):	
HCAI SCU Project Number(s) (if any):	

Facility Key Map (From HCAI site) Indicate the Building(s) in Water Rationing Plan



Facility key maps are available:
https://hcai.ca.gov/construction-finance/facility-detail/

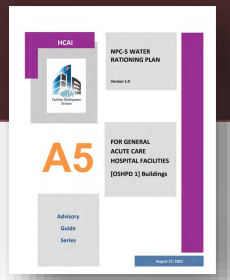
NPC-5 Water Rationing Plan



Documents Required:

- Executive Summary Indicating:
  - Provided capacity (gallons),
  - Anticipated emergency usage (gallons); and,
  - Services that are affected
- Diagram showing the shutoff / redirection valve locations
- Architectural Floor Plans showing services (optional)
- Supporting capacity calculations

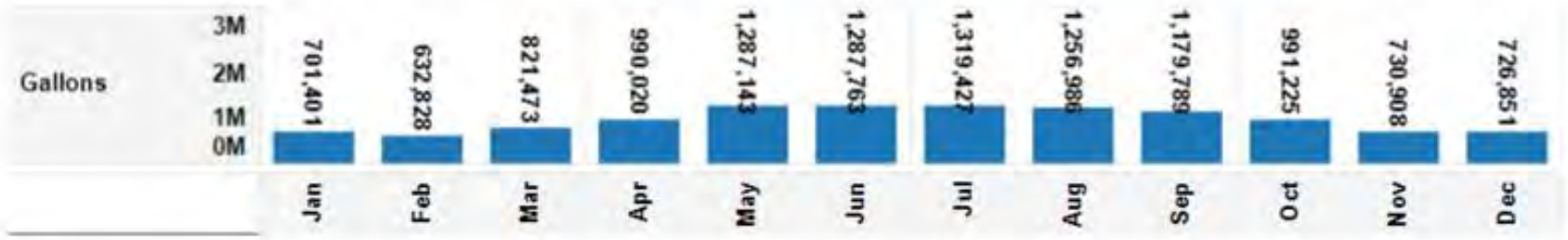
Water Usage under Normal Operating Conditions



For New Buildings in design		Gallons per day
	Anticipated normal water usage (extrapolating from other similar existing buildings is acceptable.)	
For Existing Buildings		
	Wintertime minimum normal water usage	
	Summertime maximum normal water usage	

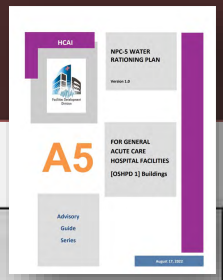
Example - Facility-wide XYZ year long water bill:

Feb: 632,472 gallons / 28 days = 22,588 gallons per day
July: 1,319,427 gallons / 31 days = 42,562 gallons per day



(Irrigation related usage can be excluded from the calculation if emergency water tank(s) are not connected to the irrigation network.)

Source(s) of Emergency Water Supply



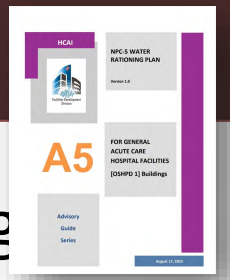
- Req'd:
  - Clear descriptions of facility's water source(s)/supplier(s) (including utility and other source/supplier contact information); and,
  - Supply main(s) and corresponding meter(s) for water entering the facility

Primary Emergency Water Supply [1,4]	*Capacity (Gallons)*	*Notes*
Existing Water Tank(s)		
New Water Tank(s)		
Well(s) if any (daily average) [2]		
Other		

Secondary Emergency Water Supply (if any) [3]	*Capacity (gallons)*	*Notes (indicate location)*
Bottled Water		
Other Stored Water		

Footnotes:
1 Primary water supply— Provide capacity, location(s) and building numbers served.
2 Well(s) including tanks, pumps, etc.: Provide well study showing anticipated average output on a daily basis. Provide a statement documenting that water quality (and/or treatment) satisfies public health standards.
3 Secondary water supply—This may include bottled water suppliers or bulk water tanker services.
4 The building that houses pump, tanks, filtering equipment must be in HCAI jurisdiction

Identify Water Uses in the Building(s)



- Consider all equipment, processes, and materials that use water. (e.g HVAC, water cooled compressors, etc.

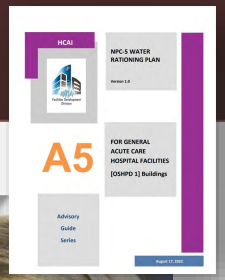
Water Uses	Minimum Gallons per day
Plumbing Fixtures[1]	
Physical Plant	
Humidification	
Laundry, if outsourced, are there adequate supplies on hand?	
Housekeeping / Infection Control	
Fire & Life Safety Systems	
Sterilization equipment	
Clinical Lab	
Hemodialysis	
Kitchen / Dietary	
Pharmacy	
Drinking Water	
Others (please list)	

[OSHPD 1]
General Acute Care Hospital (GACH)
PLUMBING FIXTURES TABLE

Plumbing Fixture Calculation							
Fixture Type	Quantity	Water use		Duration	Use per day[1]	Daily total	72 hr total
Water closet	(#)	1.28	flush	n/a	(#)	(#)	(#)
Urinal	(#)	(#)	flush	n/a	(#)	(#)	(#)
Handwash	(#)	(#)	minute	20 sec	(#)	(#)	(#)
Lavatory	(#)	(#)	minute	20 sec	(#)	(#)	(#)
Scrub Sink	(#)	(#)	minute	2 min	(#)	(#)	(#)
Process Sink	(#)	(#)	minute	tbd	(#)	(#)	(#)
Shower	(#)	1.5	minute	5 min	(#)	(#)	(#)
Clinical Sink	(#)	6.5	flush	n/a	(#)	(#)	(#)
Mop Sink	(#)	(#)	minute	tbd	(#)	(#)	(#)
Drinking Fountain	(#)	.25	minute	(30 sec)	(#)	(#)	(#)
Other							

1 – Use per day factored on occupant load in building

Water Quality

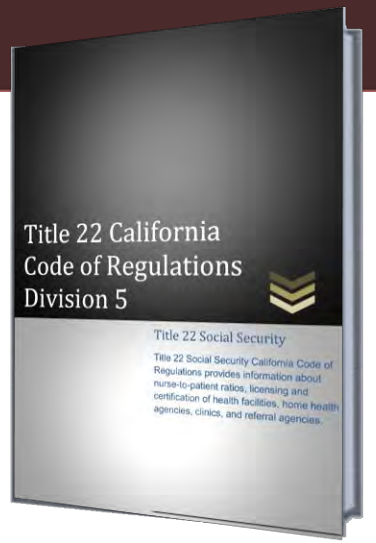


- For new and/or existing tanks, indicate how water quality will be maintained.
- Provide a plan that addresses treatment processes and water quality testing (if applicable)

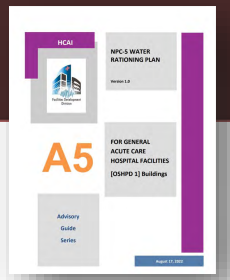
Water Quality

- **TITLE 22 § 70863. 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.

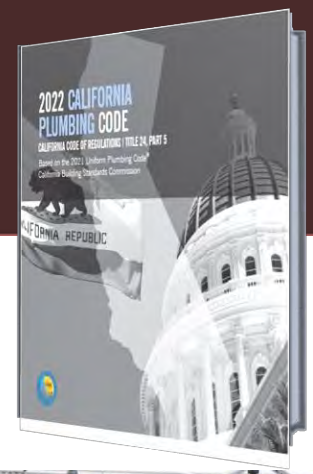


Water Replenishment / Tanker Trucks



1. Identify the connection locations that will allow for placement of the tanker truck.
   - Indicate which connections are for potable water and which are for nonpotable / industrial water, if broken out separately
   - Indicate water tank(s) refill time (24, 48, 72 hours).
2. Name the company(s) that have been contracted to provide tanker trucks to replenish water.
   - Specify the date range for which the contract/agreement is valid.
3. Indicate how the contract will be monitored.
4. Provide information on the water source, i.e.
   - The state drinking water authority,
   - The public water utility; and,
   - The local emergency management agency (if possible)

Water Pressure During Loss of Power

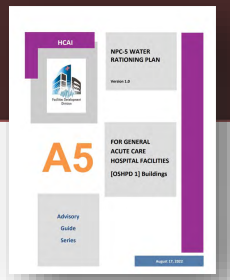


CPC Section 615.4.2

- The emergency supply of water shall be delivered to the end point of usage at sufficient pressure from the storage tank
- Sufficient pressure may be obtained by:
  - Use of gravity; or,
  - Pressure tanks; or,
  - Booster pumps
- Booster pumps are required to be connected to the emergency power supply system

Getty Images/iStockphoto

Identify Impacted Services in the Building(s)



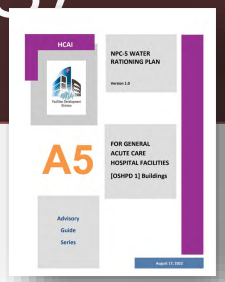
- What services may be impacted/restricted in the event of a water supply interruption and/or by the implementation of facility's water rationing plan?
- List of services and details on:
  1. Impacts by the implementation of the Water Rationing Plan (by service).
  2. Reduction in capacity or services
  3. Applicable modifications to staff procedures

List of Services	Building Number(s)	Fully Functional	Restricted or Impacted	N/A
Basic				
Medical & Nursing				
Surgical & Anesthesia				
Clinical Laboratory				

Further Considerations

- Pharmacy
  - Are there any impacts to compounding oral and IV clean rooms (cleaning, handwashing, and eyewash)?
  - . . . .
- Dietetic
  - Has normal dietetic service water usage been determined? If there is a plan to reduce water usage in dietetic service, describe what the plan is and how the reduction is calculated.
  - . . .
- Life Safety Code
  - Does the Water Rationing Plan reflect the same Emergency Preparedness requirements as their Emergency Preparedness Program?
  - . . .

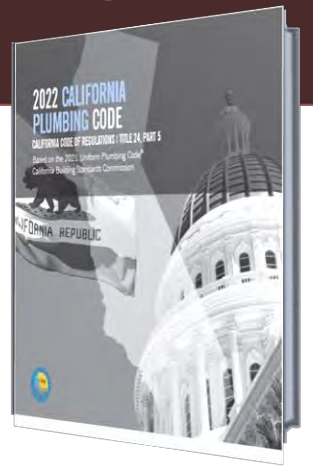
Temperature (Heating /Cooling)



- If the facility is planning on limiting (or temporarily shutting down) heating/cooling, what services will be affected?
- How will the facility monitor and maintain adequate humidity, temperature, and air pressure

List of services to be affected by heating/cooling modifications from normal day to day operations	Building Number(s)

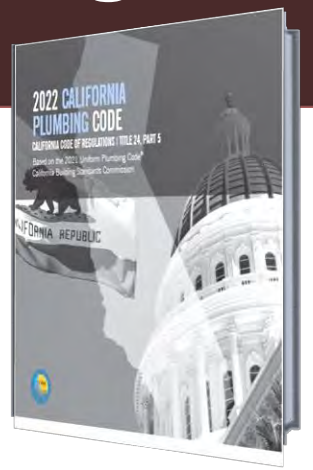
Emergency Wastewater Storage



- Hospitals discharge considerable amounts of chemicals and microbial agents in their wastewaters.
  - …. Pathogens & harmful bacteria, cytostatic agents, anesthetics , antibiotics, disinfectants iodinated contrasted media radioactive substances, toxic chemical, heavy metals. . .
- **CPC, Section 727.0 - Emergency Sanitary Drainage to support 72 hours of continuing operation in the event of an emergency**

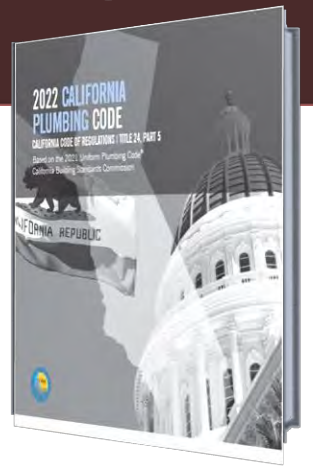
Emergency Wastewater Storage

CPC, Section 727.0



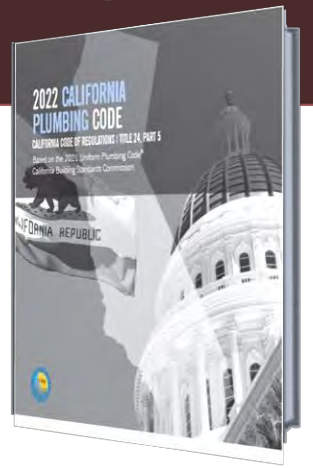
- New acute care hospital buildings shall have:
  - On-site holding tank[s] to store sewage and liquid waste sufficient to operate essential hospital utilities and equipment in the acute care hospital building
- Existing general acute care hospital in operation after January 1, 2030 shall have:
  - On-site holding tank[s] to store sewage and liquid waste sufficient to operate essential hospital utilities and equipment in the acute care hospital buildings on the campus
- The emergency waste holding capacity shall be **based on the Water Conservation/Water Rationing Plan** required in CPC, Section 615.4.1

Emergency Wastewater Storage



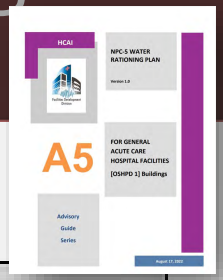
- CPC, Section 727.0, Exception:
  - Hospital has a plan for leak-proof bags for on-site storage for sewage and liquid waste if adequate storage facility(s) are provided
  - Hook-ups that allow for the use of transportable means of sewage and liquid waste disposal

Emergency Wastewater Storage



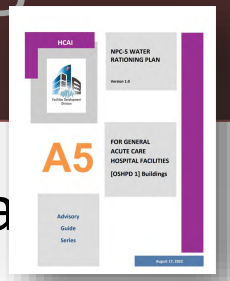
- CPC, Section 727.0, Exception:
  - Facilities for waste collection and storage :
    - Lockable room[s] or lockable screened enclosure[s] of adequate capacity to store the quantity of waste anticipated for the washing and cleaning of containers and for the storage of sewage and waste water.
      - Floor and curb. A sealed concrete floor or other approved impervious flooring with a curb and with a drain connected to the sewer.
      - Water. Steam or hot water and cold water supplies in accordance with the California Plumbing Code.
    - Comply with:
      - Local health and environmental authorities' requirements; and,
      - California Department of Public Health requirements for medical waste management

Emergency Wastewater Storage



Primary Emergency Wastewater Storage[1]	Capacity (Gallons)	Notes
Existing Wastewater Tank(s)		
New Wastewater Tank(s)		
Secondary Emergency Wastewater (if any)		
Leak-proof bags [2]		
Location of leak-proof bags [2]		

Emergency Wastewater Storage



- There is no minimum size for the holding tank(s) provided in the California Plumbing Code.
  - The capacity shall be based on the Water Conservation/Water Rationing Plan required in CPC, Section 615.4.1.
- The purpose of the holding tank is to permit 72 hours of continuing operation if the external sewer connection is severed.
  - No HCAI requirements for connection of the holding tank to the existing sewer line;
  - Connections should be made with sufficient valves to isolate the external sewer lines.
- Use of leak-proof bags requirements:
  - Adequate storage
  - CDPH and local health and environmental authorities' approvals
  - Location for storage complies with the requirements of a lockable screen enclosure, floor, curb, drain connected to a sewer and supply of water.

NPC-5 Water Rationing Plan – HCAI/CDPH Review & Approval

- Water Rationing Plan
  - Submit to HCAI
  - HCAI to triage, give comments/feedback to the DPOR
  - Once agreed, HCAI will route the document to CDPH for approval.
  - If CDPH has comments, HCAI will forward to the DPOR

- New Buildings→ HCAI region projects (H, I type projects..)
- Existing Buildings → HCAI SCU (SER, SRU type projects)

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Q&A