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Drinking Water

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WATER SESSION INTRODUCTION

- Injury prevention
- Community assessment – water issues
- Water system assessment – environmental health surveys
- The components of drinking water wells
- Locating and providing safe water
- Making water safe
- Water sampling
- Disaster Community Preparation

117 Storm Related Fatalities
Florida 2004 compiled by FDOH

Type	Charly	Franc	Ivan	Jean
Injury during Repair	7		3	6
Debris/Trauma	7		9	1
Natural:stress/cardio	6		6	2
Vehicular	5		2	0
Carbon Monoxide	4		1	0
Electrocution	2		0	3
Drowning	1		6	1
Suicide	1		1	0
Misc.(3fire, 1OD, 1fall)			2	3
	33	38	30	16

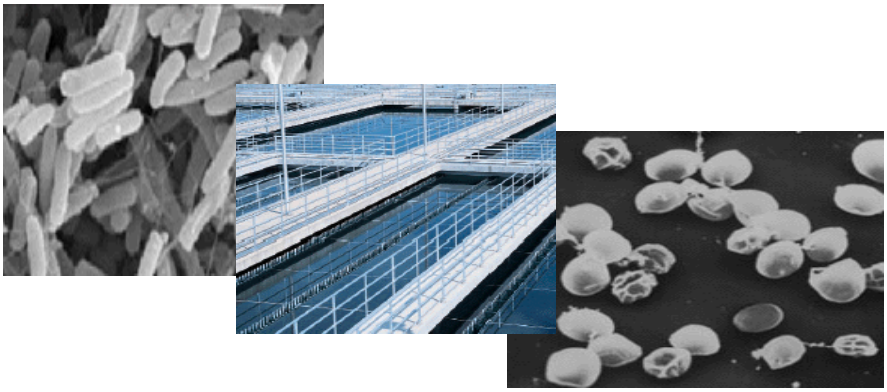
Safety is Job #1

- **Electrocution** – turn off the power
- **Carbon Monoxide** – pumps, generators, and pressure washers: outdoors only
- **Musculoskeletal Hazards** – know your limits
- **Thermal Stress** – heat stress and hypothermia
- **Structural Instability** – flooding creates unexpected hazards
- **HazMats** – skin contact and inhalation of volatiles.
  - Chemicals- Acids, caustics, oxidizers **Use PPE**

Safety (continued)

- **Fire** – Risks increase after floods
- **Drowning-** floods, moving water
- **Mechanical-** machinery, vehicles, falling objects
- **PPE-** Eyes, Feet, Hands, Hearing, Head
- **Driving**, **Animals, Insects, Slip/Fall**
- **Confrontations**
- **Stress, Fatigue,** - injury risk increased
- **Confined spaces- must be trained**

Why do disaster related waterborne outbreaks not occur in the United States?



Environmental Health Services Programs

1. Existing environmental health infrastructure
(Sanitation #1, engineered, monitored & operated)

2. An effective and efficient environmental health services delivery system
(PSAs, Rules, Education/Training)

Desirable Characteristics for Response Team Members

Fla WARN '06

- Positive attitude (not a complainer)
- Proven ability to work together in a team environment
- Willingness to "rough it" for many days
- Confidence in capabilities to handle any situation
- Ability to control temper and emotions
- A proven record of being able to work under stress
- Strong work ethic
- Willingness to take on tasks outside of specialty
- Be in reasonably good health
- Most importantly, an attitude of altruism

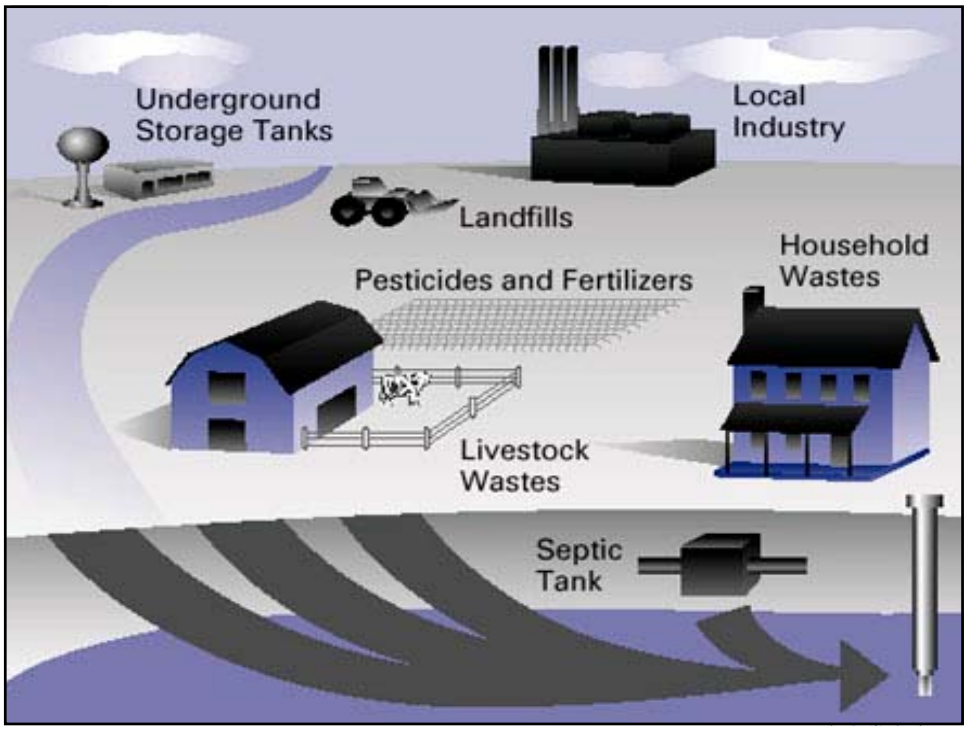
Water Systems


P JRAS


Charley 'vandalism'
Photo: Sarasota CHD EH staff

Essentials: power

Photo: Pensacola News Journal

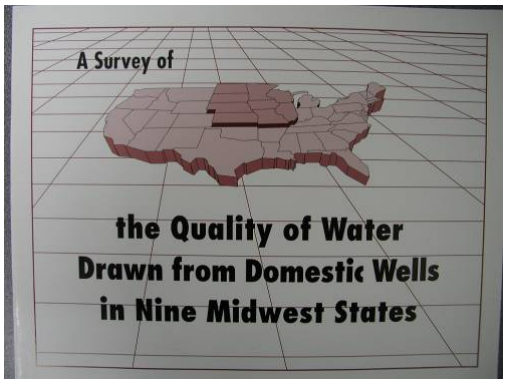


Well/ System Contamination?

Reasons for Concern

1994 multi-state survey of 5,520 wells:

- **41.3% contaminated with coliform bacteria**
- **11.1% contaminated with E-coli.**
- **Nitrate detected in 65.4%.**



Environmental Health Assessment – Water Supply

– ***Identify*** water supply issues
– Establish water supply ***priorities***
– Develop ***plan*** for action
– ***Monitor*** progress

Environmental Health Assessment – Water Supply

- Rapid Field Assessment
  - Water sources and supplies
  - Sewage management practices and other sources of contamination
  - Recent and historical water quality data
  - Water samples

EH Water System Surveys

- Primacy Agency or EOC have PWS list to visit
- Priority: Large Community, community, non-transient non-comms., transient NCs
- Get maps & data from primacy agency
- Agencies, other Utilities, RWAs in field
- Contract operators visit systems slowly

EH Water Surveys

- Need rapid info 1rst and then detailed info
- Send inspectors into damaged areas
- Remember SAFETY FIRST
- Contact the lead operator, or owner
- Rapid impact assessment reports

EH Water Surveys

- General-access, power, staffing, SCADA
- Wells-electrical, flood, damage, flow
- Pumps- power, damage, flow/pressure
- Treatment-chems available, injectors, process damage, debris, flood
- Storage-flood, vents, damage, leaks
- Distribution-pressure, leaks, zones
- Lab- working, materials, communication

FLA WARN Suggested Priorities for Restoring Service in Disaster Areas

- Water-Wells, Supply & High Service Pumps
- Lift Stations- Get Wastewater out of streets/homes
- Water Quality- Disinfection if deficient
- Wastewater Treatment- Operational
- Water Pressure and Leaks- Locate /Isolate Leaks, Storage
- See www.flawarn.org

Emergency Response & Preparedness

FlaWARN
Best Management Practices
for
Florida's Water & Wastewater Systems

DRAFT – 2: July 7, 2006

RIAT Drinking Water / Wastewater Facility Report

ESF 10 (DEP) & ESF 3 (Public Works & Engineering)

(Revision 0704A)

~ Verify Revision Prior to Transmitting Data ~

A: RIAT Data

1. Team #	2. Name:	3. Date/Time:

B: Facility Type

1. Public Water System (PWS)	2. Waste Water Treatment Plant (WWTP)

C: Facility Data

1. FDEP I.D. #	
2. Pop Served or Capacity:	
3. Municipality:	
4: Street Address:	
5: Facility Phone Number:	
6: Facility Contact Person:	
7: Latitude / Longitude:	
8: Critical Facility Map I.D. #	

D: Facility Status

1. Accessibility:	a. Good	b. Poor	c. Inaccessible
2. Plant Integrity:	a. Minor Damage	b. Major Damage	c. Destroyed
3. Distribution/Collection System:	a. Minor Damage	b. Major Damage	c. Destroyed
4. WWTP	a. Overflow	b. Bypass	c. Estimate
5. Hazmat Potential:	a. High	b. Low	c. None
6. Man Power:	a. Adequate	b. Marginal	c. None
7. Commercial Power:	a. Yes	b. No	c. Intermittent
8. Auxiliary Power:	a. Available	b. None	c. Fuel Needed
9. Potable Reserve:	a. Yes	b. No	c. Estimate
10. Estimated Recovery Time:	a. Hours	b. Days	c. Weeks

Steps in Conducting a Detailed Damage Assessment & Facility Recovery Program

FLAWARN

- Compile rapid assessment info
- Categorize into power outage & facility damage
- Determine extent of power outage and prognosis for power recovery
- Dispatch any unused portable generators to critical areas
- Dispatch skilled personnel to facility damage locations
- Complete detailed assessment form
- Develop status monitoring system (status board)
- Prioritize response plan according to critical needs
- Dispatch available in-house resources
  - Request outside assistance

Water Supply Assessment

- Quality
  - Waterborne infections
    - Ingestion of contaminated water
      - **Hepatitis A, Norwalk virus, Escherichia coli, Salmonella**
      - **Vibrio cholera, Cryptosporidium, Giardia**
  - Water-washed infection
    - Skin and eye infections, Louse-borne typhus, Louse-borne relapsing fever, Shigellosis

Water Supply Assessment

- Quantity
  - Drinking water
  - Personal hygiene
  - Food preparation
  - Home sanitation
  - Laundry

Storing emergency water supplies

- Commercially bottled water can be stored for two years or longer without affect to quality and taste
- Home bottled water should be replaced every 6 months
- Fill sanitized bath tub(s), laundry

Hidden water sources in your home

- Sources: hot water tank, water supply lines, ice cubes, reservoir tank of toilet (not bowl), water beds.
- It is recommended that water from water beds be used for bathing
- Water from all sources should be disinfected.

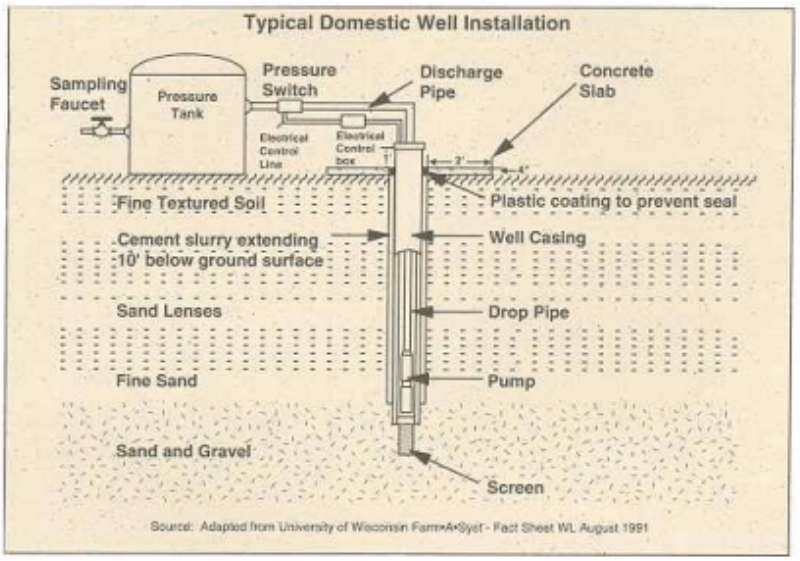
Emergency- Outdoor Water Sources

- Rainwater, streams, rivers, and other moving bodies of water
- Ponds and lakes, Natural springs
- Swimming pools

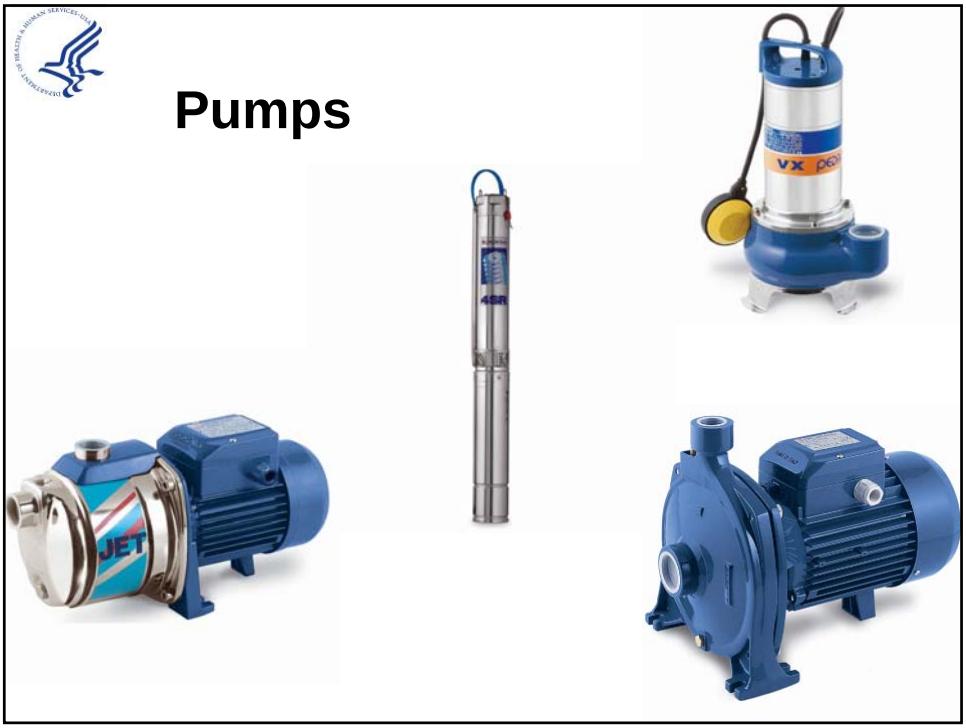
Water from these sources should be boiled or disinfected prior to drinking.

Avoid water with floating material, bad odors, sheens

Private Water Systems



Pumps



Return Systems to Pre-event Condition

- Water system focus is on water quality
  - Mainly microbial
  - Less so for:
    - **chemical**
    - **radiological**

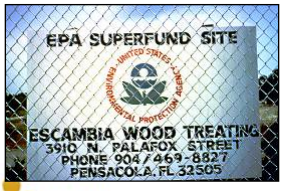
Other Drinking Water Contamination Sources

Pesticides/Fertilizers

Cattle Dipping Vats

CAFOs

Hazardous Waste Sites



Landfills

Spills/Leaks/Derailments

Hazardous Waste

Water Disinfection

- Municipal Systems
- Hauled or bulk water
- Groundwater Well

Drinking Water - Chlorine residual of not more than 4.0 mg/L or less that 0.2 mg/L (0.6 for combined minimum)

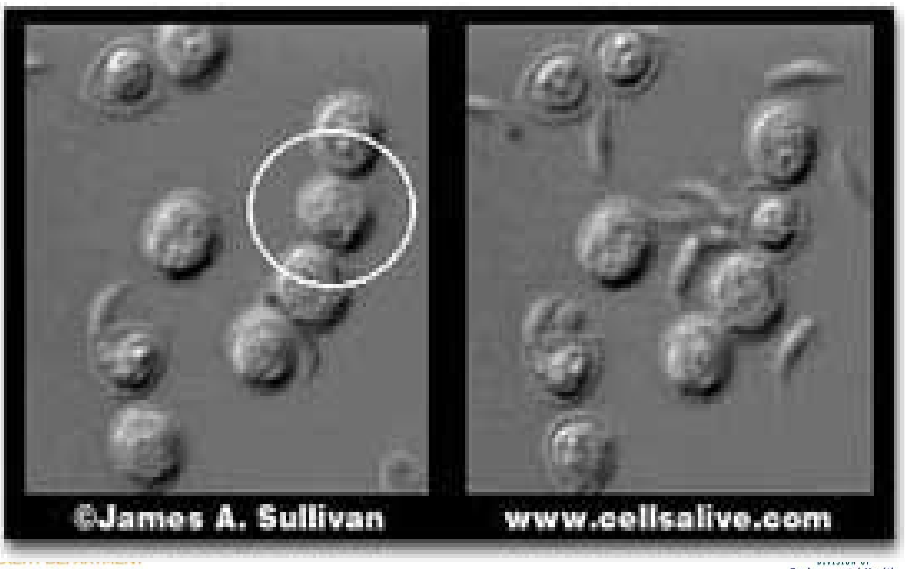
Three easy ways to make water safe

- Boiling 1 minute is the best way to make water safe
- Chlorination, disinfection (Chlorine or Iodine)
- Distillation, reverse osmosis, hiking/camping filters
- Or use commercial bottled water

Chlorine

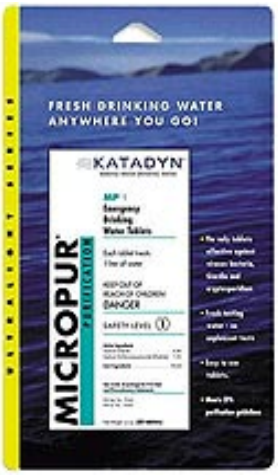
- Chlorine gas – 100%
- Calcium Hypochlorite – 65 to 75 %
- Sodium Hypochlorite – 5.25 to 12.5 %

Cryptosporidium oocysts



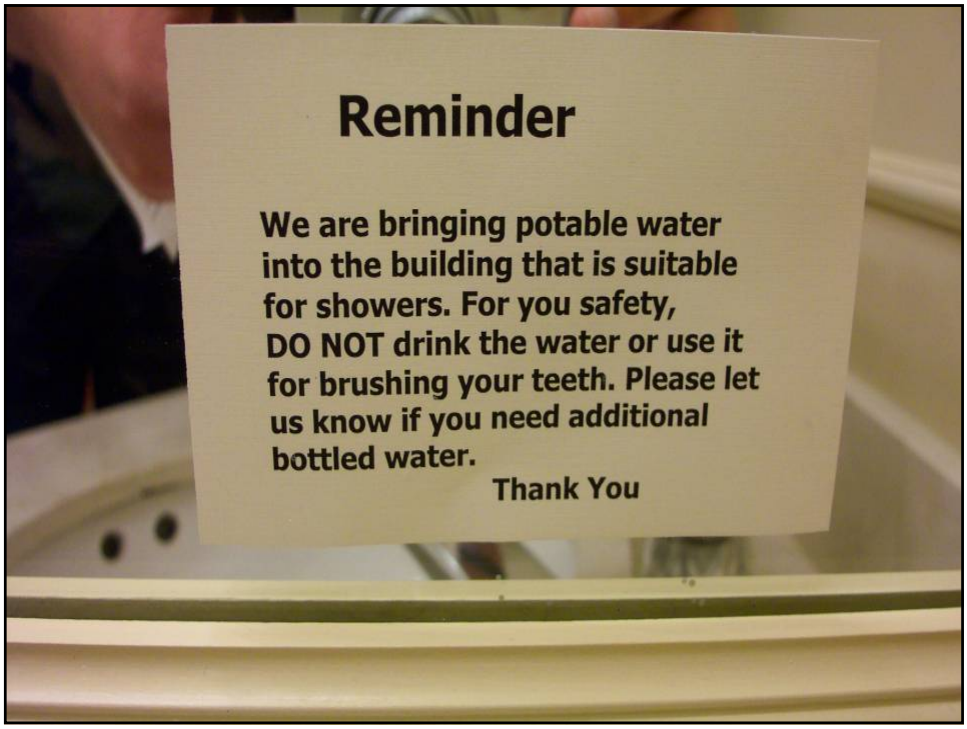
- 45,000 bottles purchased 8/25-9/18/04
- Filled 9,000 with 6% bleach
- Distributed 40,000 into 25 Fla. counties
- @Comfort Stations, Red Cross, Health D.

Water disinfection tablets



Drinking Water

- **Bulk tankers from water systems**
  - Source of water (treatment plant vs. hydrants)
  - Need Manifests showing source, disinfection test results
  - Storage tanks & hauling trucks: food grade!
  - Re-chlorinating inside lodging facilities



Chlorine Dosage Calculator

6-24. Emergency Disinfection of Water for Drinking and Cooking Purposes. If an approved potable water source is not available it may be necessary to treat an unapproved water source for drinking and cooking purposes in an emergency situation. The water to be treated should be as clear as possible. Before human consumption, this water shall be chlorinated initially to at least 5.0 ppm FAC with a minimum 30 minute contact time. Water at the point of consumption shall have a final residual of at least 2.0 ppm FAC. Water can also be made safe by holding at a rolling boil for 2 minutes. Water taste complaints may be anticipated with chlorine residuals above 1.0 ppm FAC but higher levels of FAC needed to ensure water is safe to drink. If the water is excessively contaminated or turbid, consideration should be given to the use of canned, bottled, or other emergency drinking water sources.

Army Preventative Medicine Field Manual

Chlorine Dosage Calculator

Table 6-3. Chlorine Dosage Calculator for 5% Liquid Sodium Hypochlorite (Unscented)

Tsp = teaspoon Tbsp = tablespoon 3 Tsp = 1 Tbsp 2 Tbsp = 1 Oz Qt = quart Gal = Gallon

QUANTITY (GAL.)	PPM 1	PPM 5	PPM 25	PPM 50	PPM 100	PPM 200
50,000	1 Gal.	5 Gal.	25 Gal.	50 Gal.	100 Gal.	200 Gal.
25,000	2 Qt.	10 Qt.	50 Qt.	25 Gal.	50 Gal.	100 Gal.
10,000	26 Oz.	1 Gal.	5 Gal.	10 Gal.	20 Gal.	40 Gal.
5,000	13 Oz.	2 Qt.	10 Qt.	5 Gal.	10 Gal.	20 Gal.
2,000	6 Oz.	26 Oz.	1 Gal.	2 Gal.	4 Gal.	8 Gal.
1,000	3 Oz.	13 Oz.	2 Qt.	1 Gal.	2 Gal.	4 Gal.
500	2 Oz.	7 Oz.	1 Qt.	2 Qt.	1 Gal.	2 Gal.
200	1 Tbsp.	3 Oz.	13 Oz.	26 Oz.	52 Oz.	103 Oz.
100	2 Tsp.	2 Oz.	7 Oz.	13 Oz.	26 Oz.	52 Oz.
50	1 Tsp.	1 Oz.	4 Oz.	7 Oz.	13 Oz.	26 Oz.
25		1 Tbsp.	2 Oz.	4 Oz.	7 Oz.	13 Oz.
10			1 Oz.	3 Tsp.	3 Oz.	6 Oz.
5			1 Tsp.	5 Tsp.	2 Oz.	3 Oz.

Well Disinfection Dosage Chart

Quantities* of calcium hypochlorite 65% (rows A) & liquid sodium hypochlorite, 5.25% (rows B) required for water well disinfection at 100 ppm

Depth of water in well (ft)		Well Diameter (inches)								
		2	3	4	5	6	8	10	12	16
5	A	1 T	1 T	1 T	1 T	1 T	1 T	2 T	3 T	5 T
	B	1 C	1 C	1 C	1 C	1 C	1 C	1 C	1 C	1 C
10	A	1 T	1 T	1 T	1 T	1 T	2 T	3 T	5 T	8 T
	B	1 C	1 C	1 C	1 C	1 C	1 C	2 C	2 C	1 Q
15	A	1 T	1 T	1 T	1 T	2 T	3 T	5 T	8 T	4 oz
	B	1 C	1 C	1 C	1 C	1 C	2 C	3 C	4 C	2 Q
20	A	1 T	1 T	1 T	2 T	3 T	4 T	6 T	3 oz	5 oz
	B	1 C	1 C	1 C	1 C	1 C	2 C	4 C	1 Q	2.5 Q
30	A	1 T	2 T	2 T	3 T	4 T	6 T	3 oz	4 oz	8 oz
	B	1 C	1 C	1 C	1 C	2 C	4 C	1.5 Q	2 Q	4 Q
40	A	1 T	1 T	2 T	4 T	6 T	8 T	4 oz	6 oz	10 oz
	B	1 C	1 C	1 C	2 C	2 C	1 Q	2 Q	2.5 Q	4.5 Q
60	A	1 T	2 T	3 T	5 T	8 T	4 oz	6 oz	9 oz	
	B	1 C	1 C	2 C	3 C	4 C	2 Q	3 Q	4 Q	
80	A	1 T	3 T	4 T	7 T	9 T	5 oz	8 oz	12 oz	
	B	1 C	1 C	2 C	4 C	1 Q	2 Q	3.5 Q	5 Q	
100	A	2 T	3 T	T 5	8 T	4 oz	7 oz	10 oz	1 lb	
	B	1 C	2 C	3 C	1 Q	1.5 Q	2.5 Q	4 Q	6 Q	

Quantities are indicated as: T = tablespoons; oz = ounces; C = cups; lb = pounds; Q = quarts; G = gallons. For shock chlorination of iron bacteria, the amounts of either compound should be multiplied by 10 to obtain the necessary chlorine concentration.
Note: For cases lying to the left of the double line, add 5 gallons of water to the chlorine before pouring it into the well. For those cases to the right of the double line, add 10 gallons of water.

Well and Pump Inspection

- **Flood Conditions at the Well** - flood water can carry large debris that could loosen well hardware, dislodge well construction materials or distort casing.
- **Electrical System** - do not turn on the equipment until the wiring system has been checked by a qualified electrician, well contractor, or pump contractor.
- **Pump Operation -** pump including the valves and gears may need to be cleaned of silt and sand

Steps to Disinfect Wells

Step 1

If water is cloudy, run the water from an outside spigot with a hose attached until becomes clear and free of sediments.

Step 2

Determine type of well you have and how to pour the bleach into the well.

- remove air vent or a plug
- bored or dug well, the entire cover can be lifted off to provide a space for pouring the bleach into the well.

Well depth

- Average of well depths in area
  - determined in advance?
- Measure depth?
  - A rule of

– "Put a gallon of bleach in the well"???

(Discussion)

Appendix I: How Do I Collect Samples Properly? Sample Collection Techniques and Procedures

Before you begin, have all of your supplies on hand.

- Cooler for shipping and storage of your sample
- Ice for your shipping cooler
- PVC or Neoprene gloves (optional to protect sample)
- 125mL sample bottle with sodium thiosulfate for chlorinated systems
- Lab slips, labels, and markers

Additional Recommended Items are:

- Paper towels for drying off the sample container
- Plastic storage baggies for ice and sample container

Sampling (continued)

B. Sampling Containers.
- 125mL sterilized, plastic bottles most common

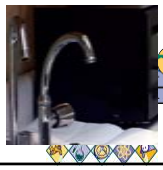
C. Collecting a Clean Sample.
- Wash hands
- Avoid smoking, eating
- Adhere to good sampling collection practices

Sampling (continued)

D. Avoid Use of Damaged Sample Containers.

E. Sampling Procedures- TCR coliform and *E. coli*

1. Sampling site selection:
   - Approved sampling location as designated by your approved sampling site plan.
   - Proper design of sampling Faucets and or specially-installed sampling taps
2. Remove any aerator, strainer, or hose
3. Optional Steps: Some sampling practices involve spraying the tap with a chlorine solution, or even flaming the tap.



Sampling (continued)

4. Turn on the cold water and flush the tap 2-3 minutes

- **Reduce the flow to no greater than ¼ inch in diameter**
- **While the water is running, fill out the labels, tags, and laboratory forms.**
- **Apply the labels to the container**
- **Test for both the chlorine and the pH of the water and place the results on your lab slip.**

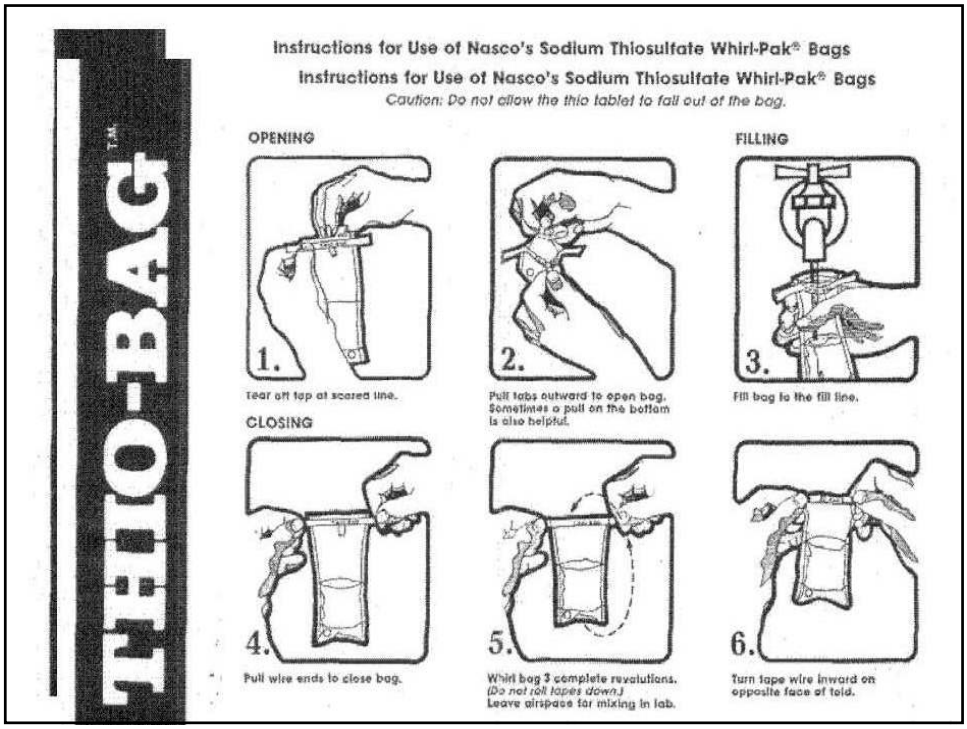
5. Carefully remove the bottle cap-touch only outside surfaces

- **Position the bottle under the water flow. Hold the bottle in one hand and the cap in the other.**
- **Fill the bottle to about ¼ inch from the top or the 100ml fill line.**

Sampling (continued)

IMPORTANT:

- Analysis must begin within 30 hours of collection.
- Samples should be refrigerated or cooled to below 10 degrees Celsius (50 degrees Fahrenheit).
- Use ice packs, and deliver the samples if lab is close
- If using overnight courier.
  - Tape the chest prior to shipping
  - Bag samples and ice separately
  - Copy forms if possible



Coliform Occurrence

- Treatment Breakthru
- Source positive
- Disinfection failure
- Filter malfunction
- Open Storage
- Low Residual maintenance
- Regrowth

- Intrusion
- Cross connection
- Backflow
- Main Repairs
- Main Breaks
- Colonization

- Marie-Claude Besner, et al.
- AWWA Journal August 2002

Lab Test

- **The most common test (MMO-MUG) uses a reagent that changes color and glows, depending on the organisms present.**
  - **Clear for no growth.**
  - **Yellow for total coliforms only.**
  - **Fluorescence for *E. coli***

How to Interpret the Form

- In the example below:
  - Sample 1 tested Absent for both organisms.
  - Sample 2 had total coliforms Present.
  - Sample 3 had both total & fecal coliforms Present (fecal=acute MCL violation).

To be completed by collector of sample							*To be completed by lab*			
							Analysis Method: MF MTF MMO-MUG HPC			
Coll. No.	Sample Point (Location or Specific Address)	Date Coll.	Time Coll.	Raw/ Dist.	Cl Res'd	pH	Non Coliform	Total Coliform	E.coli/FC	Lab Number
1	Well	2/7/04	12:45	R	0.0	7.1		A	A	05-00101
2	Tap 1	2/7/04	13:00	D	0.7	7.2		P	A	05-00102
3	Tap 3	2/7/04	13:15	D	0.8	7.1		P	P	05-00103

Disaster Boil Water Notices

- Preparation before disaster is critical
- Water Systems and Public need advice
- Agencies need protocols to coordinate issue & rescind
- Expect power loss in impacted area; therefore communication gaps for days
- Expect bottled water to be primary source
- Expect deviations from the boil water notice protocols

Boil water notice, PREP

- Letters to all public water systems instructing them of rule duties and liabilities long before event
- Provide agency emergency contact lists
- Rule requirements take time; & are useful
- Public outreach info to public from PWS and agencies before event
- Media outreach materials, before & after

Example

June, 2006

To: PWS Name or To: ~~Community~~ Water Systems in ____District or ____County

Subject: **Issuance of Precautionary Boil Water Notices during Hurricanes, Community**

Dear Water System Owner/Manager:

Prior to ~~the~~ response to the hurricanes of 2004 and 2005, the Florida Departments of Environmental Protection (DEP) and Health (DOH) had ~~established a guidance document for precautionary~~ boil water notices in the event of specific emergencies. The widespread hurricane power outages over the last two summers revealed that protocols for implementing the guidance need to be clarified for public water systems (PWS) to enhance communication and coordination between the impacted water system, your customers, the county health department, and the DEP District Office. Effective communication between entities and consistency of application for these guidelines is critical for public health protection during emergencies.

When an emergency event occurs that warrants a precautionary boil water notice (PBWN), it is vital that the public water system first notifies its water regulatory agency (DEP District Office or Approved County Health Department) about the situation as is required under Rules 62-555.350(10)(b) and 62-560.410(1)(a)1 and (9), Florida Administrative Code (FAC). When the water system is regulated by DEP, then we request that you also notify the county health department (CHD) about an event requiring a PBWN. By rule, it is the water utility's responsibility to provide public notification to its affected consumers; however the Approved CHD and DEP must be consulted and they will initiate customer notification (a PBWN) if the PWS cannot or will not do so. Following the issuance of a PBWN, communication and coordination must continue.

In the event that you have a power outage or system malfunction that results in zero pressure in portions or your whole distribution network, you need to:

Call, and e-mail or FAX the PBWN to your DEP District Office, or Approved County Health Department

Call, and e-mail or FAX the PBWN to the county health department and your county emergency operations center (if phones are down, hand deliver a message to the EOC)

E-mail or FAX the PBWN to the media serving the affected area

The PBWN must state the name of the PWS, the area affected, the time and date of issuance, what happened, corrective measures you are taking, what the public should do, your contact number, and other information required in Rule 62-560.410(5), FAC

Undertake those corrective actions to the water system, restore pressure and maintain disinfectant residual, perform flushing as needed, and test for coliform bacteria as prescribed by the agency overseeing your system

Boil water notice, PREP

- Coordination with food regulators, food service & processors before event
- Planning for critical medical **(hospitals, dialysis)**
- EOC/ESF8 briefings, at state and county
- Web post media/public info year round
- Discuss with & train all EH staff
- Ready for overlapping jurisdictions

INDUSTRY BULLETIN
for Florida's Food Industry

SUBJECT: BOIL WATER NOTICE GUIDELINES May 23, 2005

BOIL WATER NOTICE

These procedures **must** be observed while a **"BOIL WATER NOTICE"** is in effect:

TAP WATER

- Do not serve water from faucets until local authorities advise the water is safe for consumption. Use only bottled water from an approved source and/or boiled tap water. Boil water at a rolling boil for one minute to kill infectious organisms.
- An alternative method for areas without power is to mix 8 drops (1/8 teaspoon) of unscented household bleach per gallon of water and allow to stand for 30 minutes. If the water is cloudy in appearance, add 16 drops (1/4 teaspoon) and let stand for 30 minutes. (Water will not be toxic, but may have a chlorine odor and taste.) Note: Using bleach will not kill parasites that may be present, however boiling will kill parasites.

ICE, ICE-MAKING, BEVERAGE & WATER VENDING

- Ice bagged or made prior to the issuance of the boil water notice may be used.
- Ice produced in ice machines after the issuance of a boil water notice must be discarded and machines not restarted until the water supply is deemed safe. Sanitize the interior of the ice machine, ice trays and built-in ice-makers with two teaspoons (100+ ppm) of household bleach in one gallon of water prior to restarting the ice machine or ice-maker.
- Disconnect or turn off water vending machines, drinking fountains, misters, ice-making units and post-mix beverage machines so they can not be used.
- Filters in your water lines should be replaced if your water supplier detected bacteria in the clearance samples or if you detect debris accumulation in the filter(s). The water supplier or the media will provide you bacteria sampling information.

HANDWASHING

- Do not use tap water for handwashing. Use only bottled water from an approved source and/or boiled (and safely cooled) tap water. After proper handwashing, use a sanitizing solution on the hands. This may be accomplished by using a commercial hand sanitizing lotion that requires no rinse or a chlorine bleach solution of two teaspoons of household bleach in one gallon of water. Single-use gloves may be used to provide additional protection after proper handwashing.
- No bare hand contact with ready-to-eat food is allowed.

COOKING & CLEANING

- Food equipment and utensils and food-contact surfaces that must be cleaned in place (does not fit into a three-compartment sink), may be cleaned with steam with no additives, a sanitizing mix of bottled or boiled water and bleach (50 ppm chlorine) or other approved sanitizing solution.
- Do not use tap water for food processing or food preparation until the BOIL WATER NOTICE is lifted by local authorities. Use only bottled water from an approved source and/or boiled tap water for these purposes.

Boil water notice, EXPECT

- **Communication losses for days +**
- **Limited media info to the public after event**
- **Comfort stations and other official aide sites to be best info outreach locations**
- **Most people will use bottled water**
- **Public water systems may not abide by BWN protocol; mayors, commissioners, administrators, water plant supervisors, owners will take charge to short-cut bureaucracy**

Boil water notice, EXPECT

- **Not all needed staff will work due to damage or other good reasons (especially on weekends)**
- **Larger utilities are fairly self sufficient, and have mutual aide compacts with others**
- **Small PWSs are not, and their contract operators are overwhelmed or gone**

Boil water notice, Issue/Rescind

- BWN can be issued by PWS, Health Authority, Primacy Agency, EOC
- Should be lifted by same agency only after:
  - Repairs are done
  - Good pressure throughout system
  - Good residual chlorine throughout system
  - Low turbidity (mainly for surface water)
  - Satisfactory bactis, number based upon needs
- Can be lifted in hydraulically discernable areas

Fuel/Chemical Contamination

Fuel/Chems Sampling

After floods, if fuel or chemical contamination is probable, lab tests are warranted for:

- Total petroleum hydrocarbons w/EPA 503.1
- Benzene, toluene, ethyl benzene, xylene
- Volatile organic compounds (VOC) EPA502.1, 524.1

- Pesticide scans EPA 504, 505
- Metals- Lead
- Inorganics- Arsenic

Helpful References

- www.bt.cdc.gov/disasters
- www.epa.gov/safewater/faq/emerg.html

• www.doh.state.fl.us	FL DOH
• www.bt.usf.edu	Univ. of South FL
• www.inspect-ny.com	private inspectapedia