



**American Water Works  
Association**

*Dedicated to the World's Most Important Resource™*

# Water Sector Approach to Manage Risk & Resilience

**Intelligent Water Networks Summit**

# Risk & Resilience $\Leftrightarrow$ All-Hazards Approach



# Role for Standards & Guidance



## **ANSI/AWWA G430-14: Security Practices for Operation & Management**

- Information protection and continuity is requirement



## **ANSI/AWWA J100-10: RAMCAP® Standard for Risk & Resilience Management of Water & Wastewater Systems**

- Cyber is required threat domain

## **ANSI/AWWA G440-11: Emergency Preparedness Practices**

- Consideration of key business & operating system recovery

## **Business Continuity Plans for Water Utilities**

- Cyber recovery plan is required action item

## **Process Control System Security Guidance for the Water Sector**

- Supports voluntary adoption of NIST Cybersecurity Framework



# ANSI/AWWA G430-14:

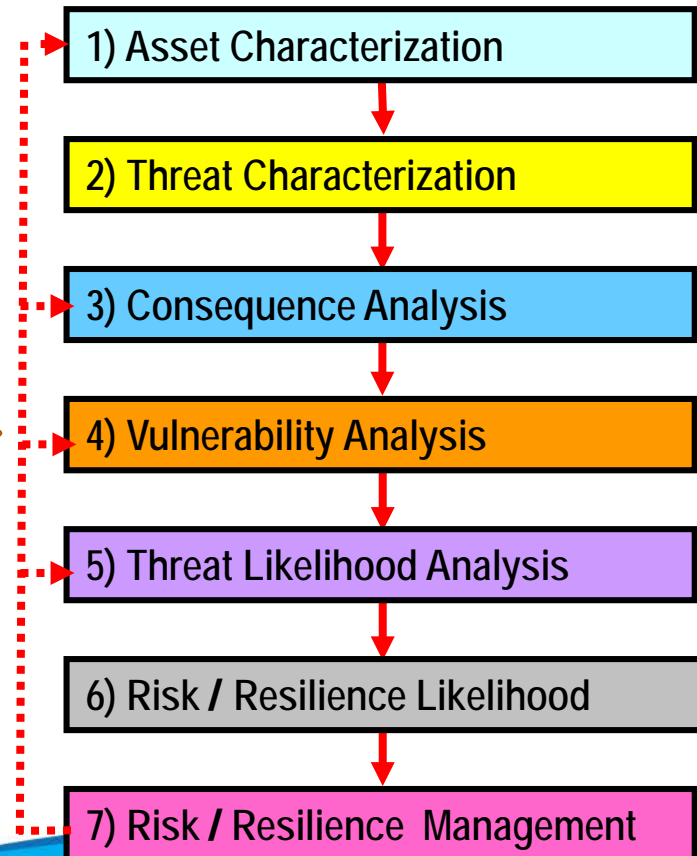
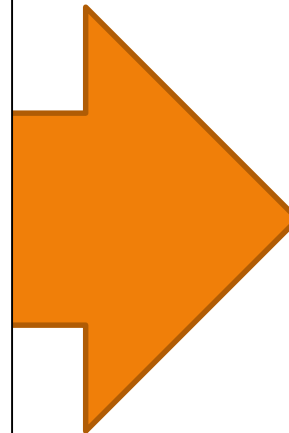
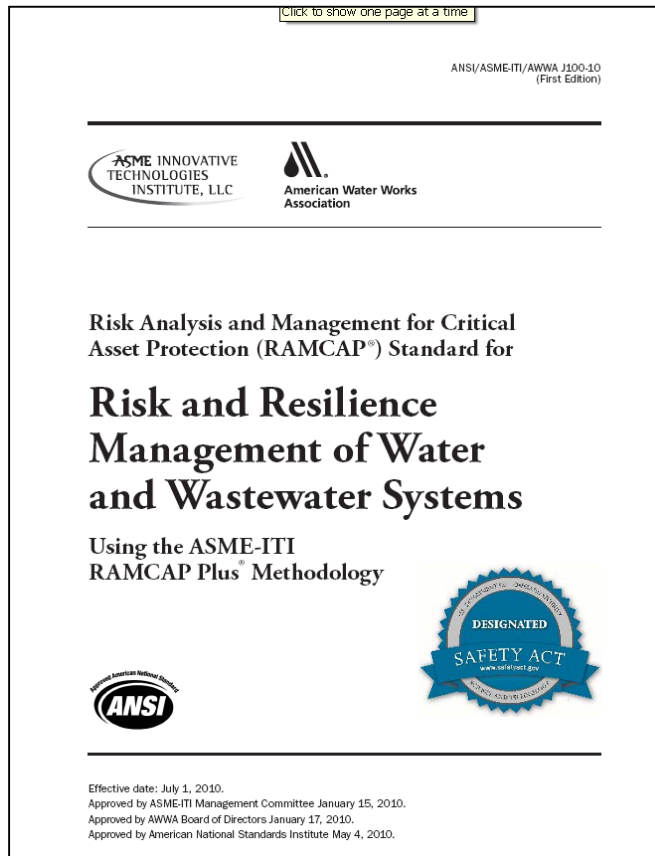
## Security Practices for Operations & Management

### Requirements:

- a) Explicit Commitment to Security
- b) Security Culture
- c) Defined Security Roles and Employee Expectations
- d) Up-To-Date Assessment of Risk
- e) Resources Dedicated to Security and Security Implementation Priorities
- f) Access Control and Intrusion Detection
- g) Contamination, Detection, Monitoring and Surveillance
- h) Information Protection and Continuity
- i) Design and Construction
- j) Threat Level-Based Protocols
- k) Emergency Response and Recovery Plans and Business Continuity Plan
- l) Internal and External Communications
- m) Partnerships
- n) Verification



# ANSI/AWWA J100-10: Risk Analysis and Management for Critical Asset Protection (RAMCAP®) Standard for Risk and Resilience Management of Water and Wastewater Systems



# Early J100 Adopters

- DC Water
- Washington Suburban Sanitary Commission
- City of Richmond (VA)
- Gwinnett County (GA)
- City of Chicago, Dept of Water Management
- Long Beach Water Department
- American Water - Delran System (NJ)
- Minneapolis
- Sacramento, CA
- Chattanooga, TN

## HOW?

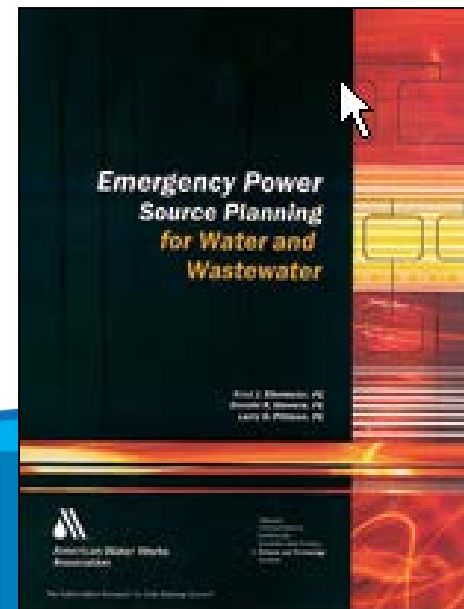
The logo for PARRE, featuring the word "PARRE" in a bold, blue, sans-serif font with a trademark symbol (TM) to the upper right, set against a white rectangular background.The logo for VSAT, featuring a blue water drop icon to the left of the word "VSAT" in a blue, sans-serif font, all contained within a blue rectangular background.

**Proprietary  
consultant  
applications**



# Emergency Power

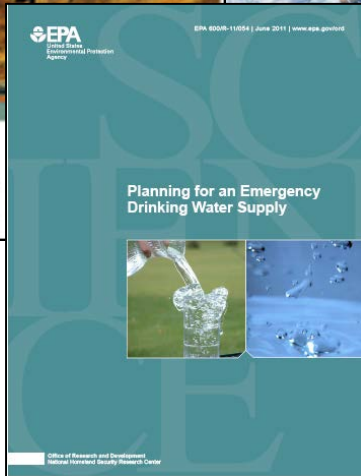
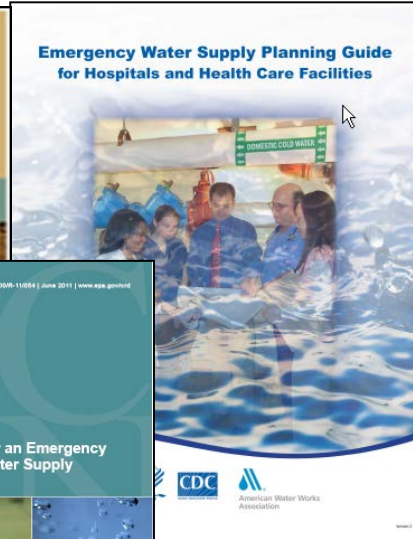
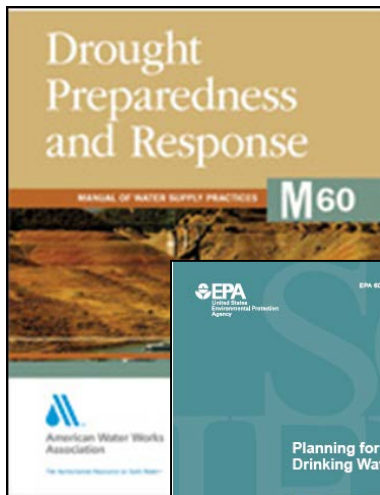
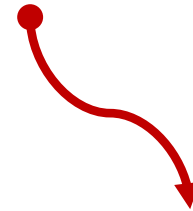
- Key limiting factor in water sector recovery
- What is current capability to support full load operations with generators?
- Partnership with local power on critical customer and priority for recovery
- Key Info?
  - Voltage
  - Single or Three Phase
  - Connection requirements





# Emergency Water Supply

- Nation is unprepared to scale
- Where and how to distribute



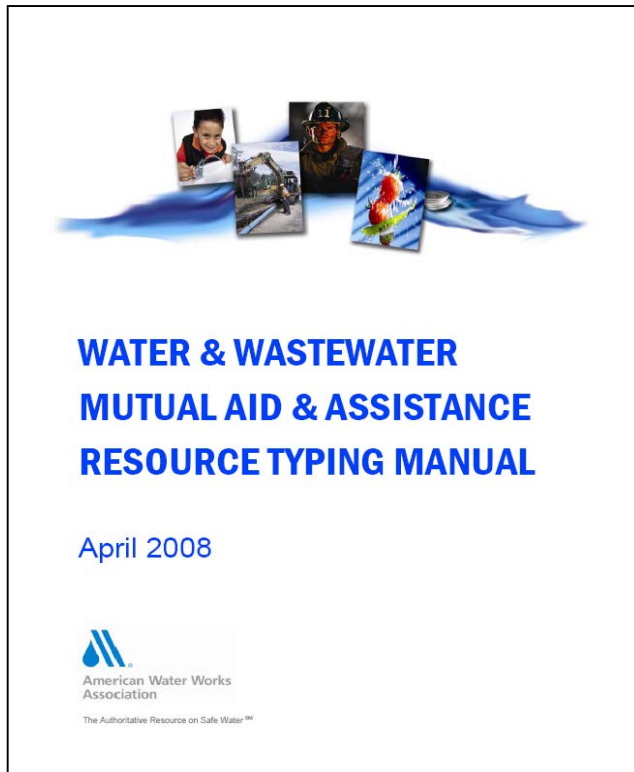
		Gal/Person/Day		
Population	25 Million	1	3	
<b>Bottles</b>	8 oz	400,000,000	1,200,000,000	
	12 oz	266,666,667	800,000,000	
	16.9 oz	189,349,112	568,047,337	
<b>Trucks</b>	8 oz	5,342	16,026	
	<b>53' Trailer</b>	12 oz	5,088	15,263
	16.9 oz	4,215	12,644	





# Critical Parts and Equipment

- Resource Typing ↔ Asset Management



- 24 standardized resource teams developed per FEMA Guidance
- Mission Ready Package – Cost development worksheet
- Mutual Aid Accommodations Checklist
- EMAC recognized

**AWWA WITAF Project #508**



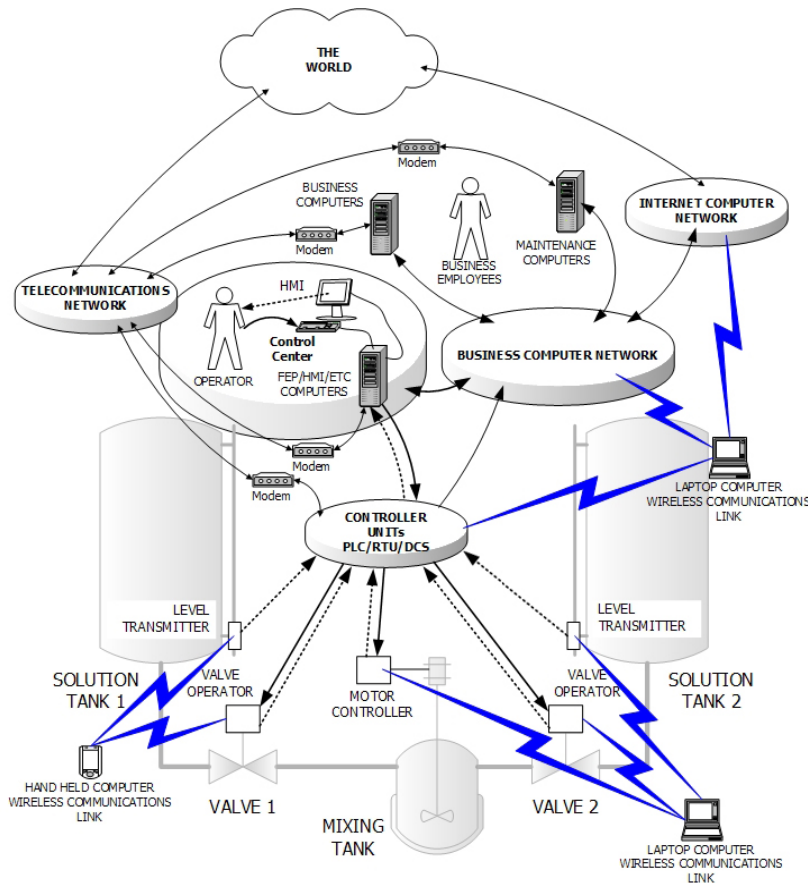
# ANSI/AWWA G430-14: Security Practices for Operations and Management

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# Connectivity = Exposure

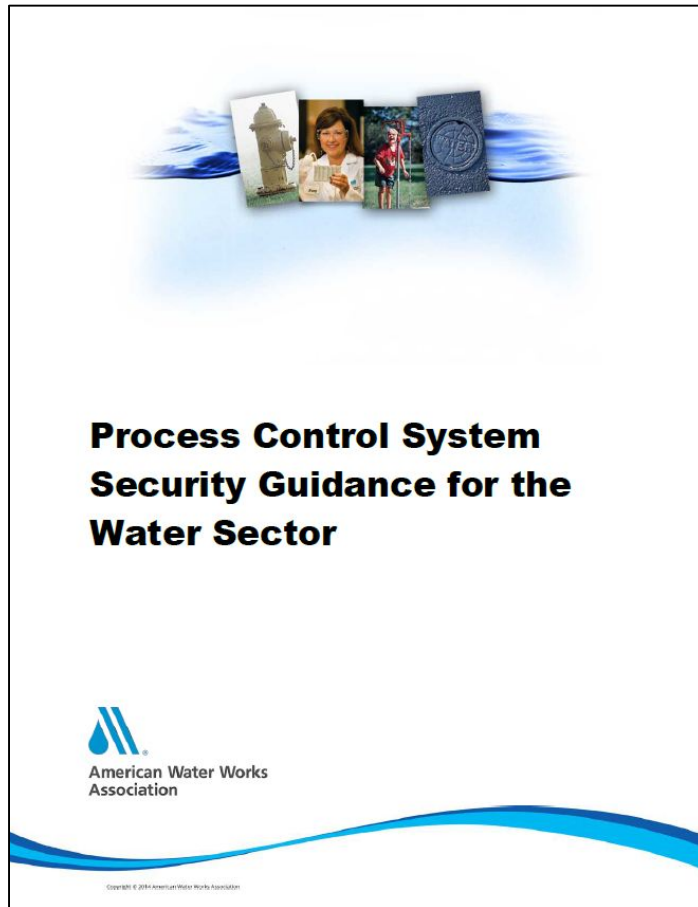


Source: ICS-CERT

- Process Control Systems
  - SCADA
  - AMR/AMI
  - Telecommunications
  - HVAC
- Enterprise Systems
  - Employee Payroll
  - Service Contracts
  - Customer Billing
  - LIMS etc



# Utility Driven



AWWA WITAF Project #503

- Organized based on **HOW** the utility uses or operates their process control system
- It does **NOT** evaluate current security profile
- Generates prioritized list of controls that empowers utility to consider appropriate actions to reduce potential vulnerabilities



# One Step at a Time



**AWWA Guidance & Use-Case Tool**

Aligns w/NIST Cyber Framework

**Cyber Security Evaluation Tool (CSET®)**

Assessment of policy & procedures relative to NIST 800-52 & NIST 800-53

**Design Architectural Review (DAR)**

Evaluates network access/egress, design, configuration, applications and rules.

**Network Architecture Verification and Validation (NAVV)**

Baseline network architecture, communication protocols, discover rogue connections, & identify configuration errors.

Supported by ICS-CERT







# ANSI/AWWA G440-11: Emergency Preparedness Practices

## Requirements:

- 4.1 Explicit Commitment to Emergency Preparedness
- 4.2 Preparedness Culture
- 4.3 Defined Preparedness Roles and Employee Expectations
- 4.3 Risk Assessment
- 4.4 Preparedness Plans
- 4.5 Internal and External Communications
- 4.6 Training
- 4.7 **Partnerships**
- 5.0 Verification

Prepare for the *effect*, do not attempt to manage the cause



# WARN in Action

## CalWARN

Northridge Earthquake, 1994  
El Nino Storms, 1998  
Sonora Fires, 2001  
Southern California Fires, 2007  
Baja Earthquake, 2010  
Napa Earthquake, 2014  
Wildfires, 2015

## UTWARN

Diesel Fuel Contamination 2015

## FlaWARN

Hurricanes Katrina, Wilma & Rita, 2005  
Tornadoes, 2007  
Hurricane Irma, 2017

## NYWARN, NJWARN, PAWARN, MAWARN

Hurricane Sandy, 2012

## NCWaterWARN, PAWARN

Hurricane Irene, 2011

## IDWARN

Power Outage, 2015

## SCWARN

Hurricane Joaquin Flooding, 2015

## TxWARN

Hurricane Humberto, 2007  
Hurricane Dolly & Ike, 2008  
Drought, 2012  
Hurricane Harvey, 2017

## CoWARN

Salmonella outbreak, 2008  
Flooding, 2013

## TNWARN, INWARN, KYWARN

Ice Storm, 2009

## IAWARN, MNWARN

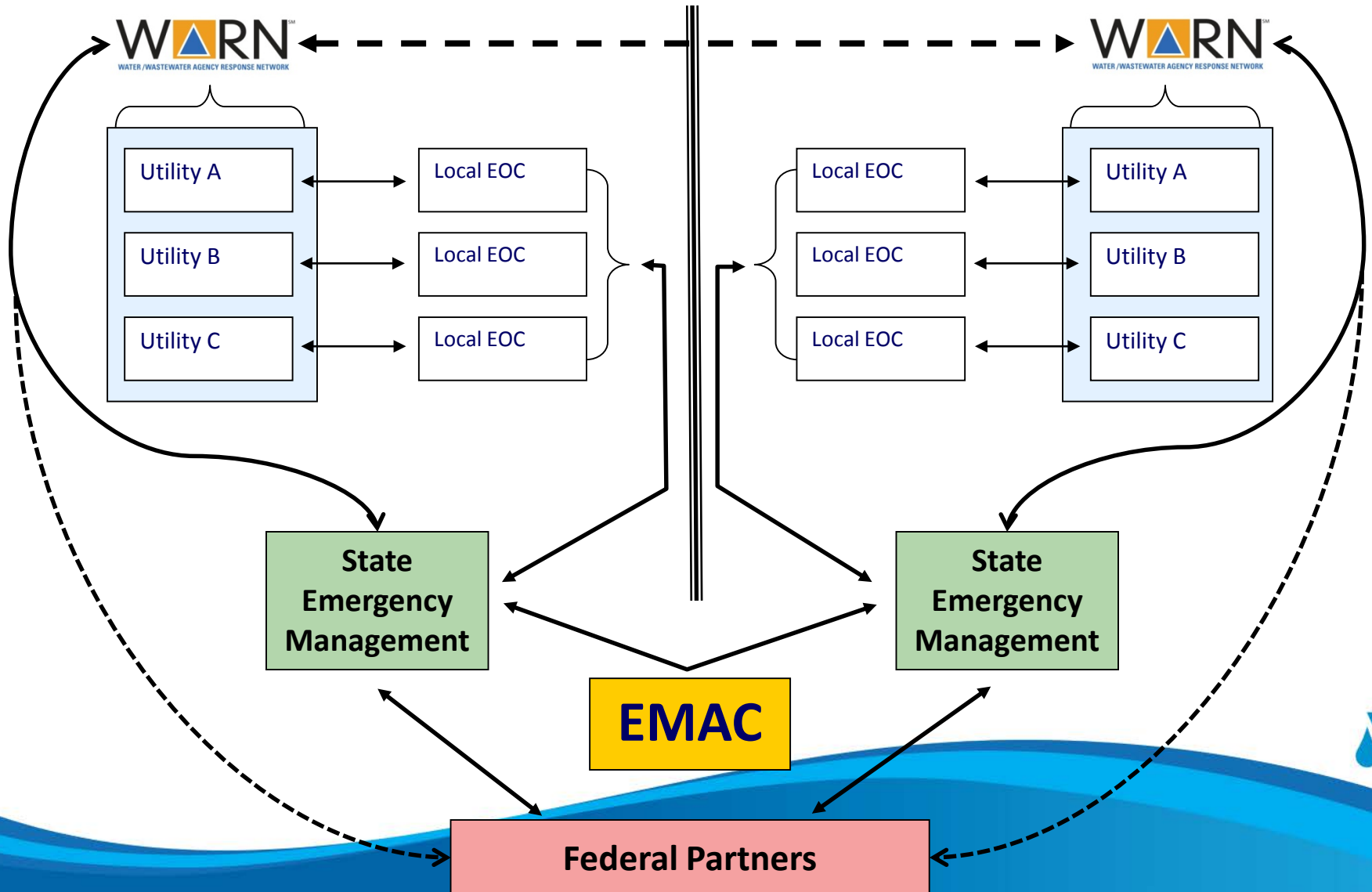
Flooding 2010, 2011, 2014

## SDWARN


Missouri River Flood, 2011  
City of Bison Water Outage, 2012



# Coordination & Communications... in ALL Directions as Partners



# Common Operating Picture

  
 Drinking Water and Wastewater Facility Assessments— Puerto Rico and US Virgin Islands  
 December 15, 2017  
 EOC Water Desk

**Source: EPA Region 2 Management Report 12-15-2017**  
**DRINKING WATER / WASTEWATER**  
**Puerto Rico.**  
**Puerto Rico Drinking Water Status**

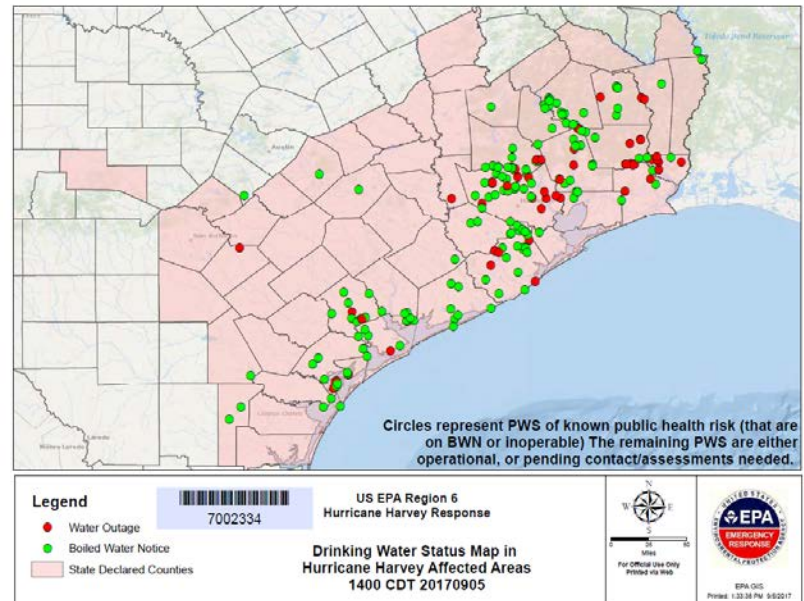
- PRASA – PRASA reports that 7.09% of clients are without drinking water service.
- 1 of the 115 drinking water treatment plants (WTPs) operated by PRASA are out of service.
- 75 WTPs are working on alternate power and 59 on primary power.
- Plant out of service: Indjera, Alta (0.5 MGD) - Raw water pump station flooded.

**Non-PRASA Water Treatment Systems.**

- EPA, CEFD, and USACE conducted assessments of privately-owned community drinking water systems (not operated by PRASA) in rural areas in the West and South Branch for infrastructure repair needs.
- Seven non-PRASA systems have been inspected and a report will be prepared for incident command review
- **Unasdo Municipality - William Lugo DW-PR-0212 (assessed 12/7).** The system is producing water for the community, but the current capacity is below original pre-hurricane capacity. The original 12,000 gallons cement tank was destroyed by the hurricane and was replaced with tanks that have a total capacity of 1,250 gallons. Team conducted a visual inspection of the chlorinating system that was donated by Samaritan Purse and the operator is using the system correctly. Recommendation: The system needs additional tank capacity.
- **Penuelas Municipality - Sec Balleza DW-PR-0092 (assessed 12/7).** The team spoke with system users and they stated that repairs to the water delivery system were performed. The community is presently being served by the system, but the operator has declared it for non-potable use. A non-potable sign was placed on tank and a letter was sent to the users. Samaritan Purse has distributed a filter bucket to system users. Recommendation: A chlorinating system should be added to system to ensure it is potable.

1

VS.



# Resilience & Data Analytics

- Situation Awareness/Common Operating Picture
- Access/Reentry Coordination
- Communications/Interoperability
- Etc...



# ?? Questions ??

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**AWWA – Government Affairs**

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[www.awwa.org/CYBERSECURITY](http://www.awwa.org/CYBERSECURITY)

[www.NationalWARN.org](http://www.NationalWARN.org)

