Water and Wastewater Resilience Programs

**Moderator:** Col. Eric Potts, P.E., F.SAME, USA (Ret.), Freese and Nichols, Inc

**Speakers:**

- Greg Olinger, Coastal Water Authority
- Jason Iken, P.E., Senior Assistant Director of Wastewater Operations, City of Houston
Coastal Water Authority
Resiliency

[Image of Coastal Water Authority logo]
Agenda

- CWA Overview
- Power Reliability
- Luce Bayou Interbasin Water Transfer Project
- Corps of Engineers Flood Wall
Coastal Water Authority

- A Conservation and Reclamation District of the State of Texas.
- Created by Special Act of the Texas Legislature in 1967.
- Located in Harris, Chambers, and Liberty Counties.
Coastal Water Authority

- Convey and Distribute Raw Water to the City of Houston and Industrial Customers.

- Overall system is rated at over 1 billion gallons per day.

- Located in Harris, Chambers, and Liberty Counties.
Coastal Water Authority

- Trinity River Pump Station – existing capacity 1 BGD (16 pumps)
- Lynchburg Pump Station – existing 970 MGD (16 pumps)
- Lake Houston Pump Station – existing 250 MGD (5 pumps)
- Conveyance System - consisting of 50 miles of open canals
Coastal Water Authority

- Distribution system - consisting of 53 miles of large diameter pipeline
- Bayport Industrial Complex – 65 MGD; 52 miles small diameter pipe providing service to 38 industrial customers
- Red Bluff Water Treatment Plant – 6.5 MGD treated water to two industrial customers
Power Reliability
Redundant Power Feeds

- TRPS – Dual 138 KV power feeds to CPE substation

- LPS - Dual 138 KV Power feeds to CWA owned and operated Electrical Substation.
NRG Reliability Contract

- TRPS – 16 Emergency Generators (8 MW).
- LPS – 30 Emergency Generators (15 MW).
- Supplies 480 V three phase 400-600 KW power.
- Diesel Fuel – 24-48 hour supply with ability to continuously refuel.
Luce Bayou Interbasin Water Transfer Project
Luce Bayou Interbasin Transfer Project Design

Canal Segment 1
Sta 5+50 to 2494+82
Features: 7 pipeline adjustments, 7 siphon/culvert crossings, 1 water control gate, 1 outfall structure, 1 electrical easement crossing, 1 bridge

Canal Segment 2
Sta 2494+82 to 491+26
Features: 1 pipeline crossing, 3 siphon/culvert crossings, 1 water control gate, 3 bridges

Canal Segment 3
Sta 491+26 to 736+00
Features: 1 pipeline adjustment, 1 siphon/culvert crossing, 2 water control gates, 1 bridge

Canal Segment 4
Sta 736+00 to 984+44
Features: 5 pipeline crossings, 4 siphon/culvert crossings, 1 Water control gate

Canal Segment 5
Sta 984+44 to 1247+00
Features: 9 siphon/culvert crossings, 1 bridge, 2 water control gates, sedimentation basin

Settling Basin Site

Access Road

Capers Ridge Pump Station

Pipelines (Dual 108" Pipes)
Sta 2001+00 to 2153+50
Features: Isolation Valves, Cathodic Protection, 12 Access manholes, 12 Air Vac assemblies, pigging facilities

Maintenance Station
Sta 5397+00
Features: Maintenance Building (offices, vehicle bays, parts storage) parking, water well, generator, stormwater retention pond, fuel storage and pumps

Figure 1

Luce Bayou Interbasin Transfer Project
Coastal Water Authority

PROJECT OVERVIEW

Engineering Contracts
CRPS, Pipeline, 5 Canal Segments, Maintenance Station, Access Road
Corps of Engineer Flood Wall
LPS
Lynchburg Pump Station

- Control Center for the CWA System.
- Protected by a U.S. Army Corps of Engineers Hurricane Flood Protection Project (LPS Floodwall).
- Floodwall elevations range from 25 ft. to 29 ft. (msl)
- One Flood Gate and discharge works on the West Side.
LPS Floodwall

- Consist of north, east, and west concrete floodwalls which tie into the earthen levee around Lynchburg Reservoir.

- On the south, two earthen levees tie the west and east floodwalls into the relocated and elevated Lynchburg Road.
LPS East Floodwall
LPS West Floodwall
Questions
LESSONS LEARNED FROM RESPONSE TO HURRICANE IKE IN HOUSTON

SOCIETY OF AMERICAN MILITARY ENGINEERS
2015 JETC
Houston, Texas
May 20, 2015

Jason Iken, P.E., Senior Assistant Director
Wastewater Operations Branch
Hurricane Ike

- Wastewater Infrastructure
- Hurricane Ike
- Lessons
- Continuous Improvement
Wastewater infrastructure

- 40 Permitted WWTPs
  - 222 MGD Actual (5yr Avg)
  - 565 MGD Permitted
- 3 Wet Weather Facilities
- 25 Chemical Feed Facilities
- 7 Sludge Transfer Systems
- 386 Lift Stations
- 36.7 Mil LF Collection Line
- 1.54 Mil LF Force Mains
- 125,000 Manholes
Hurricane Ike

- Category 2 hurricane
- 500 miles wide
- Eye passed over Houston’s east side
- Effects began on 9/12/08 (Friday)
- Effects felt thru 9/13/08 (Saturday)
- Maximum sustained winds = 60 mph
- Wind gusts = 110 mph
- Storm surge = 8 to 21 ft
- Due to size, amount of destruction approximates Category 4 storm
Hurricane Ike

- Extensive power outage caused
- Loss of wastewater service
- Dramatic increase in SSOs
- Limited communications
As of 09/13/2008 11 a.m. CST, CenterPoint Energy reports 2.1 million customers without power (out of 2.3 million customers).

Click below to view a specific region in detail:
- Northwest
- West
- Southwest
- Northeast
- East
- Southeast

CenterPoint Energy
Lessons – Damage Assessment

- Need uniform, high quality assessments in a timely manner
- Utilize FEMA forms
Lessons – Power

- System-wide backup power plan
- Power from two separate substations
- Prioritize Power restoration schedule
- Trailer mounted generator with manual transfer switches needed
- GPS tracking of each generator & secure installations
- Fueling program coordination
Lessons – SSOs

- Communicate with public (properly)
- Restore facilities from downstream to upstream
- Understand collection system storage capacity
- Plan for surface water cleanup
- Know spill clean up procedures
Lessons – SSOs

- Isolate areas around SSOs
- Dead fish removed from waterways
- Coordinated increased water release from upstream dams w/USACE to flush waterways
- Pumped water bodies & refilled with potable water
Continuous Improvement

- Read your SOP
  - Practice
  - Revise
  - Repeat

- Include Pre-deployment
  - People
  - Equipment
  - Materials

- Post Event
  - Stabilize
  - Recover
  - Adapt

STANDARD OPERATING PROCEDURE (SOP)
PUBLIC WORKS AND ENGINEERING
PUBLIC UTILITIES DIVISION
WASTEWATER OPERATIONS BRANCH

EMERGENCY OPERATIONS
March 19, 2008
Continuous Improvement – Adapting

Revising Pre-deployment based on information

- SCADA real time
- Pre-negotiate support contracts
- What is critical?
- GIS
  - Longitude / Latitude
  - Photos / maps / codes
  - Power requirements
  - Permit limits
  - Storage capacity areas
  - Potential SSO’s
Collection System Monitoring / Alerting

Flow monitoring w/your AMR System

- Leverage existing infrastructure
- Real time data
- Ability to analyze data collected
- Quickly identify source of overflow based on monitoring data
- Improve responsiveness
Collection System Monitoring / Alerting