LESSONS LEARNED FROM RESPONSE TO HURRICANE IKE IN HOUSTON

THE TEXAS WATER/WASTEWATER AGENCY RESPONSE NETWORK

Pflugerville, Texas
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Jason Iken, P.E., Senior Assistant Director
Wastewater Operations Branch

Hurricane Ike

- Ike Information
- City of Houston Impacts
- Emergency Preparedness
- Wastewater System Impacts
- Response
- Lessons Learned

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
Impacts on City of Houston

- Extensive power outage
- Damage to homes & buildings
- Lack of water/wastewater
- Food shortage
- Debris
- Pre & post-hurricane stress on citizens/employees
  - Fuel
  - Evacuation
  - Uncertainty

Hurricane Ike Preparedness

- SOPs during emergencies
- Public Works represented at COH EO Center
- Strategically located critical Employees and equipment
- GIS & SCADA system in place
- Chemical storage

Hurricane Ike Preparedness

- Prioritized facilities for generator deployment based on:
  - Collection system storage capacity
  - Potential for SSOs
  - TPDES permit limits
  - Each facility assigned a number
  - Power requirements
    - Voltage / kW / no. phases
  - Strategic placement of portable generators before Ike
Impacts on Wastewater System

- POWER OUTAGE AT ALL LIFT STATIONS & WASTEWATER TREATMENT PLANTS!!
- NEVER BEFORE RECORDED IN OPERATIONS HISTORY!!
- Dramatic increase in SSOs
- Sims Bayou WWTP flood wall
- Debris everywhere
- Numerous other impacts

Power Supply

- Major transmission/distribution/individual lines damaged
- Multiple levels of system components affected
  - Transformers
  - MCCs/Panels
- Outage lasted an average of 1 week (Range: 3 to 24 days)
- Facilities returned to commercial power supply by 10/7/08
Debris
- Collection system
- Debris in process units at plants
- Numerous trees down
- Facilities inaccessible

Other Impacts
- System communications limited (SCADA, phone, & e-mail)
- Equipment damaged due to flooding and/or power surges
- Security fences damaged
- Increased odor issues
- Damaged buildings
- Safety
- Resource availability (adjoining cities)

Wastewater Operations’ Response
- Communications
- Damage assessment
- Temporary power supply
- SSOs containment & cleanup
- Facility restoration
Communications

- Managing chaos during initial days
- Internal meetings each day
- Main Communication
  - CenterPoint Energy
  - FEMA
  - Director's Office
  - Response Team
- Prepared facilities status report 4 times/day

Damage Assessment

- Ten damage assessment teams
- Inspected facilities to note extent of damage
- Assessment drives scope and extent of response

Generator Deployment

- Prioritized facilities database utilized
- Modified based on:
  - Commercial power restoration
  - SSOs
  - Wastewater system needs
  - D/5 to U/S
- Deployment, connection, operations and fueling by:
  - COH
  - FEMA
  - Contractors - FEMA/COH
SSO Containment & Cleanup

- Isolated areas around SSOs (e.g., intersections)
- Dead fish removed from waterways
- Pumped water bodies & refilled with potable water
- Coordinated increased fresh water release from upstream dams w/ USACE to flush waterways

Other Response Actions

- Numerous RFI responses
  - Director's Office/Mayor/Council
  - Regulatory Agencies
  - Media/Customers
- Emergency purchase orders
- Re-started facilities including treatment
- Meals, employee vehicle fueling

Lessons Learned - Damage Assessment

- Damage assessment is key first step of response
- Need uniform, high quality assessments in a timely manner
- Assessment to include:
  - Power supply status
  - Site accessibility
  - Structural damage
  - Equipment damage
  - Water levels
  - Site security, safety, etc.
  - Service life compromised

EMPLOYEE RESPONSE WAS GREAT!!!
Lessons Learned - Power

- System-wide backup power plan
- Power from two separate substations
- Power restoration schedule
- Overcoming site access challenges
- Generator with manual transfer switches needed
- GPS tracking of each generator & secure installations
- Trouble-shooting complicated
- Fueling program coordination

Lessons Learned - Power

- Trailer-mounted generators preferred
- Preparation time for new generators
- Stock of connection supplies and repair parts
- Improve generator preventive maintenance
- Annual emergency contracts
  - Electricians/Mechanics/Technicians
  - Generator hauling & fueling
- COH employees at FEMA/USACE emergency power logistic center

Lessons Learned - SSOs

- Collection system storage capacity reduced the number of SSOs
- Spill clean up procedures
- Restore facilities from downstream to upstream
- Plan for surface water cleanup
- Methods to properly communicate with public
Lessons Learned - Other

- Updated facilities information packages
  - Lat./long.
  - Photos/map/access code
- Re-examine employee deployment schedule
- On-call consultant
  - Damage assessment
  - Emergency design tasks
- Update response plan documents annually and rehearse

Lessons Learned - Other

- FEMA paperwork
- Flexible response organization structure
- Balance security needs with facility access needs
- Delayed hurricane impacts (e.g., debris in collection system, employee morale, O&M and capital budgets, etc.)

On-Going Efforts

- Purchase of generators
  - 56 total (36 during Ike)
  - 32 Portable (19); 24 Stationary (17)
- Optimized PM of generators
- Established protocol with USACEO
- Reprioritized critical facilities
- Negotiating contract to:
  - Deploy, fuel, and monitor generators during emergencies