REGIONAL WASTEWATER UTILITY RESPONSE AND RECOVERY FROM HURRICANE SANDY

Presented By:
Keith B. Marcoon, P.E.
Manager, Engineering & Construction
Ocean County Utilities Authority

The 2013 NJWEA Winter Technology Transfer Seminar
March 4 - March 7, 2013
Eatontown, NJ
Acknowledgements

- Fred Auermuller, Director, OCUA Central Division
- Countless other operations, maintenance, electricians, mechanics, engineers, managers, and administrative staff
- Contractors, consultants, service providers
- Emergency response, various agencies
Regional Wastewater Utility Response and Recovery From Hurricane Sandy

Ocean County Utilities Authority (OCUA) Service Territory

- Ocean County and Southern Monmouth County
- 37 municipal and private/governmental participants
- Approximately 600,000 people served
Ocean County = Tourism
= Water Quality
3 Secondary Wastewater Treatment Plants

- 40 Pump Stations
- 160 Miles of Interceptor
- 11 Miles of Barnegat Bay Crossings
- 4 Miles of Atlantic Ocean Outfalls
Northern Water Pollution Control Facility

- Brick Twp.
  - Design Capacity
    - 32 mgd
  - Annual Average Daily Flow (AADF)
  - 2012 AADF
    - = 21.4 mgd
Central Water Pollution Control Facility

- Bayville, Berkeley Twp.
  - Design Capacity = 32 mgd AADF
  - 2012 AADF = 20.8 mgd
Southern Water Pollution Control Facility

- Stafford Twp.
  - Design Capacity = 20 mgd AADF
  - 2012 AADF = 7.2 mgd
NWPCF, Effluent Outfall: Bay Crossing, Ocean Diffusers

Mantoloking Bridge

OCUA 48-inch Outfall/ Diffuser
Pre-Storm Preparations

• Previous storm flooding in NJ:
  – Annual Nor’easters
  – Hurricane Irene
  – October 1991 “Frankenstorm” (the perfect storm)
  – December 1992 Nor’easter – widespread flooding

• Personnel and shift planning, food, water

• Trucks and drivers on-call or on-site (sludge)

• Review and Distribute Emergency Contacts

• FUEL ... PUMPS ... GENERATORS
Pre-Storm Preparations

- Secure loose items from high winds
- Top off fuel and Hypo tanks
- Shutdown island-area stations odor control and chemical feed systems

CPS-18 Wrangle Brook Lift Station Transformer (Toms River)
Pre-Storm Preparations

- Meetings begin about October 24
- Thursday, October 25th: NHC projects “Left-Turn”
What Happened?

- **October 29, 2012:**
- Two additional Nor'easters
- 2nd Costliest Hurricane in US History
- 32 foot high waves off Sandy Hook
- 89 mph wind gusts – Surf City
- Immense Storm Surge
Before / After (Ortley Beach, Toms River Township)
Ortley Beach, Toms River Township
Before / After

(Seaside Heights Amusement Pier)
Before / After (Mantoloking Bridge)
Mantoloking Bridge / North Barrier Island Breach
NWPCF Ocean Outfall Manhole, Mantoloking

Before Sandy

After Sandy
NWPCF Ocean Outfall Manhole, Mantoloking

December 13, 1992 Nor'easter
What Happened To OCUA?

- Minimal damage/impact to all three WWTPs
- Flooding close to NWPCF property
- 27 of 40 pump/lift stations damaged
  - Average $108,000 per station
  - Almost $3.0 Million in damages
  - Bayhead to Beach Haven
- Several stations out of operation
- 22 Metering and 16 Cathodic Protection Stations impacted
What Happened To OCUA?

- Typical Pump/Lift Station damages:
  - Pump Rebuilds/Rehab – bearings, mech. seals
  - Electric Motors: Dimminutors, screw pump
  - Light fixtures, receptacles
  - Circuit Breakers, Contactors, Starters
  - Control Panels
  - Valve and gate actuators
  - Metering equipment
  - Conduit/Wire
OCUA Central Service Area

CPS-19 Ortley Beach Pump Station
What Happened to OCUA?
SCADA system analysis: 10/28 through 11/1

- CWPCF Influent Flow
- Ortley Beach P.S. Flow
- Ortley Beach P.S. Standby Generator
- CPS-14 (mainland) P.S. Flow
- Ortley Beach P.S. Wet well level
- CWPCF Effluent EQ Basin Level
SCADA system analysis: 10/28 through 11/1

• 10/29/12, 8:00 pm: CPS-19 lost pumping capacity  last recorded flow = 12 + mgd

• 10/30/12, 2:00 am:
  – CWPCF influent flows maxed at ~50 mgd
  – CWPCF Effluent EQ Basin gates opened to buffer peak influent flow

• What IF?
CPS-2 Lift Station, Seaside Heights

Screw Pump Motors in wet well, one removed pre-storm
CPS-2 Lift Station, Seaside Heights

First Floor Elev. = 9.15 ft.

Ground Elev. = 5.75 ft. (+/-)

Screw Pump Motors

ROUTE 3/8" GREASE LINE TO NEAREST WALL ALONG GROUT LIP. THEN UP WALL OUT OF FLOW AREA TO GREASE PUMP. PANTHER AT 6 FT. INTERVALS.

3/8" TYPE "K" COPPER FOR GREASE LINE IN 3/4" SCH. 80 PVC. SEAL SPACE BETWEEN GREASE LINE & CARRIER PIPE WITH RUBBER PLUG AS DIRECTED BY ENGINEER.

ODOR CONTACT CHAMBER

3" PVC, W/EP HOLE
CPS-17 Lift Station, Brick Bayway - Island Region

Screw Pump wet well
CPS-19 Pump Station, Ortley Beach

Dry Well (Pump Room) fully submerged
CPS-19 Ortley Beach P.S. Flooded Areas

Ground Surface/FF Elevation = 8.50 ft.

Control Panels

Wet Well

Dry Well
CPS-19 Pump Station, Ortley Beach

- Subgrade Motor Room, at sea level (+/−)
- 4 centrifugal pump motors: 100 hp - 125 hp
- Motor Control Centers
- Distribution Panels
- Switchgear
- Control Panels
- Flomatcher controls
CPS-19 Pump Station, Ortley Beach

Damaged Electrical Control Panels, Breakers, etc.
CPS-19 Pump Station, Ortley Beach

Unsealed conduits from station exterior and from upstairs generator room

= sources of dry well flooding
Damaged Equipment
Vapor Phase GAC unit shifted
Collection System Conditions
WHY did this happen?

• Most wet wells flooded due to extreme flows, compromised collection systems

• Wet wells impacted Dry wells
  – Unsealed wall penetrations, conduits
  – Sump pump check valves

• Limited overland flow above first floor into stations
  – CPS-19 Ortley: FF elevation = 8.50 (1929 N.G.V.D.)
  – CPS-19 Dry well water level = -4.5 ft. (1929 N.G.V.D.)
WHY did this happen?

• Commercial power failures

• Standby Generator failures
  – Fuel supplies
  – High temperature alarms
  – Radiator Cooling water supply failed
    • First time local water supply failed in 30+ years
    • No power to run private wells
WHAT did we do?

• Form small initial assessment teams
  – Operations
  – Maintenance
  – Electricians
  – Engineers
• Prioritize Locations
• Evaluate Needs
• Evaluate Available Resources

• Operational status updates
  – Restore at least one pump at each station
  – Coordination
  – Communication
• Update to NJDEP and other agencies, NJOEM, NJSP
• Agency resource coordination:
  – Generators
  – Fuel
CPS-1 Lavallette Pump Station Clean-up efforts
CPS-1 Lavallette Pump Station Clean-up efforts

Date: 11/4/12
WHAT do we need to do?

• REPAIR and RESTORE to pre-Sandy condition

  – Procure and Install
  – Major repairs contracts to be advertised
  – Simple steps:
    • seal penetrations
    • closed loop radiators on roof
    • Secure loose items...
    • Check valve operation

• Insurance Claim
• FEMA Claim
WHAT do we need to do?

• Future Mitigation Steps ???
• Standby generator reliability
  – Water sources
  – Closed-loop radiators
  – Fuel Deliveries, staging
• Portable generator purchase - Trailers
• Bypass pumping equipment
• Submersible pumps
WHAT do we need to do?

• Stock spare motors, equipment
• Vulnerable pump stations:
  – Raise electrical equipment to above grade
    (Losses vs. Mitigation Cost vs. Public Impacts)
  – Flood proofing?
• Remove threatened equipment pre-storm
  – Metering panels
• Flow Isolation and Operational Status ???
WHAT do we need to do?

• FEMA Advisory Base Flood Elevations
  – First Floor Elevations vs. ABFE

• Approximately $\frac{1}{2}$ of damaged stations first floor are below ABFE “1%” elevation

• Evaluate Capital Plan, Budgets, FEMA and Financing Options

• Another SANDY ???
Questions?

Contact Information:

Keith Marcoon
Ocean County Utilities Authority
Email: kmarcooon@ocua.com
Phone: (732) 269-4500