The PVSC Resiliency & Mitigation Efforts/Lessons Learned

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Program Outline

1. An introduction to PVSC
2. Super-storm Sandy: The need / reason for Resiliency
3. Lessons Learned: Super-storm Sandy
4. The PVSC Resiliency Program: Key Projects
5. Questions
01

An Introduction to PVSC
• The Passaic Valley Sewerage Commission (PVSC) was established in 1902 by The New Jersey State Legislature.

• Statute created a remedy to alleviate pollution in the Passaic Valley sewerage district.

• Run by Board of Nine (9) Commissioners.

• Through expansions and upgrades through the twentieth century, PVSC has become the Largest NJ and 5th largest treatment facility in the US.
PVSC - Permits

• PVSC operates under permit issued from The New Jersey Dept. of Environmental Protection (NJDEP)

• Operates an average – 330 MGD

• NJDEP and State OEM have identified PVSC as a critical component of NJ Infrastructure and requires the facility to be protected and meet 500 year / 0.2% annual storm event consistent with Presidential Executive Orders.
PVSC - Who We Serve - Locally

- **PVSC Service District**
  - 1.5 million residents
  - 48 municipalities within 5 counties: Bergen, Essex, Hudson, Passaic & Union

- **PVSC main interceptor Begins in Paterson, NJ**
  - Ends 22 miles later at PVSC in Newark
  - Collection System sizes range from 3’ feet to 12’ feet in diameter
Also serve 2.0 million residents through our Trucked in Liquid Waste (TILW) program. Includes: 11 different states from Maine to Virginia

- Accepts 100-200 trucks daily.
  (approximately 11.5 mg per month)

- 4 - 5 NYCDEP ships weekly.
  (approximately 6.5 mg per month)

- 1 - 2 BCUA barges weekly.
  (approximately 5.2 mg per month)
PVSC - Who We Are - Physical Facility

• Designed to treat over 300MGD of Wastewater
• Contains 48 buildings.
• 1 mile long underground Utility Tunnel, which include: Complex Industrial Processing Equipment, Electrical Equipment, and miles of Electrical HV/LV Conduits.
PVSC - Who We Are - Physical Facility
PVSC - Who We Are - Physical Facility
02

Super-storm Sandy – the need / reason for Resiliency
Tracking Super-storm Sandy

N.O.A.A. - Satellite Image
“Super-storm Sandy” Timeline

Week of October 22 – October 28, 2012 (Preparations)

• Began tracking the storm
• Setup Emergency Communications/Notification Systems
• Mobilized standby crews (50)
• Mobilized line operations
• Anticipated local flooding
• Offered local assistance
“Super-storm Sandy” Surge Timeline

6:30 – 7:00 p.m.
- Surge breeches bulkhead reaching the secondary process facilities.
- Maintained control of treatment process
  - Facility powered down to preserve equipment.

8:00 p.m.
- Tidal surge continues moving west on plant towards Ave. P
  - Power strategically de-energized to preserve facility equipment

8:30- 8:39 p.m.
- 12’ Tidal Surge engulfs plant
  - Loss of full power by PSE&G
  - PVSC loses control of processes.
FLOODING OF TUNNELS AND BELOW GROUND PROCESS AREAS

BASEMENT OF STORAGE TANKS

BASEMENT OF ZIMPRO BUILDING

SWITCH GEAR BUILDING NO.1

OXYGEN PRODUCTION

SUPERNATANT BUILDING

OXYGEN TANK GALLERY

INFLUENT PUMPS

PST GALLERY

THICKENER GALLERY

DECANT TANK GALLERY

NPW PUMPS

OEM BASEMENT

FST GALLERY

NOTE:
TUNNELS AND BELOW GROUND PROCESS AREAS FILLED WITH APPROXIMATELY 37,000,000 GALLONS OF SALT WATER
Super-storm Sandy – Areas Impacted

All in blue flooded to 4ft+ with Saltwater.
“Super-storm Sandy” – Returning To PVSC
Basement and Offices
“Super-storm Sandy” – Returning To PVSC Final Clarifier Tanks
“Super-storm Sandy” – Returning To PVSC
Dock Area Equipment and Trailer
“Super-storm Sandy” – Returning To PVSC
Final Clarifier Tanks
“Super-storm Sandy” – Recovery

• **Immediate Needs:**
  - Set-up command center (8 & 4)
  - Damage assessment
  - Temporary power
  - Communications (Telephone & Internet)
  - OEM (Through Essex County Unified Command)
  - Notifications (EPA, NJDEP, LWA customers)
  - Restore power to Influent (IPS) and Effluent (EPS) pumps
  - Dewatering of facility
  - Sludge removal
“Super-storm Sandy” - Recovery

-Process Equipment Restored:

- Hypochlorite Treatment @ outfall (4 days)
- Primary Treatment restored within 7 days
- Wastewater Influent accepted from all Municipalities on November 3, 2012
- Secondary treatment began on November 16, 2012 using a newly (purchased) seeded biomass
“Super-storm Sandy” – Recovery

- Equipment Restored:
  
  - Rebuilt 560 motors ranging from (25 to 900 hp)
  - Cleaned and rebuilt 40 Motor Control Centers
  - Rebuilt 19 Computerized Control Panels
  - Rebuilt 12 air compressors (900 hp)
  - Re-tested and started 21 substations from 138,000 - 480 volts
  - Rebuilt 171 pumps over 25 hp to 1200 hp
  - Rebuilt 6 submerged boilers
  - Replaced to date over 200 miles of wire and fiber cable
“Super-storm Sandy” – Recovery

• 14 FEMA and Contractor Specialists on site daily

• Identified 48 FEMA Project Worksheets (PW’s) that were considered as damaged and in need for repair

• Daily meetings with EPA, NJDEP & US Army Corps.
Lessons Learned: Super-Storm Sandy
Lessons Learned

1. Necessity for independent power source
   - At 8.39pm on the night of the storm Utility cut power to the plant
   - PVSC lost full control of processes
   - Long term mitigation strategy: **34 MW Standby Power Plant**
Lessons Learned

- Short Term - Standby Generator Power
  - 600KW: Administration, MIS and Security Buildings, Head End – IPS. Used to power Computer and Communications Systems.
Lessons Learned

2. Necessity for Storm Surge protection
   - Long Term – Perimeter Flood Wall with Flood Gates for access and egress.
Lessons Learned

- Short Term – Muscle Wall / Watertight doors
  - Used to protect plant temporarily until we complete Resiliency Projects
Lessons Learned

3. Drainage improvements for Flood Wall
   - Storm Water Drainage System being designed to prevent damage to facilities from the 24 hour 100 year rainfall event.

4. Storm Water Pumping Stations for Flood Wall
   - To control runoff
   - Ponding limited to 6 inches below finished floors of buildings.
5. MCC and Cabling Mitigation

- Temporary cabling
- Raise MCC’s
- Raise Switchgear
- Replace cabling
Lessons Learned

6. Other:

- Liquid Waste Acceptance Program – Identify alternate sites for disposal
- Set up Emergency Communication System – Radio Communication
- Establish Data Storage System – Cloud base
- Implement Procurement Strategies
  - On call contracts for professional services and contracts to assist in recovery (Fuel/Generator/Construction/Consultants)
- Early Warning System.
  - NOAA Notifications
  - Surge Warning System – Monitor Bay Elevations with Model
- Implement Risk Management Strategies.
  - Flood Insurance (Contractors-OCIP).
- Retaining Professional’s that understand and are experienced in Navigating through FEMA requirements.
- Funding – Long-term/ Short-term (SRF/NJEIT SAIL Program – low interest loans/ FEMA (90/10))
Lessons Learned

6. Other: cont’d...

- Regulatory Assistance (EPA & NJDEP)
- Navigating FEMA Requirements:
  - Event Guidelines – Define Damaged Electrical Equipment / Lines
  - Project Worksheet Development – Actual Cost vs. RS Mean
    - Defining Scope of Work
  - FEMA Employee Turnover
  - Electronic Documentation
  - Amendment Processing Time
  - Funding de-obligation
  - Project Closeout documents
- Do not hesitate to utilize other Governmental resources available to assist. (US Army Corps./Local-State OEM, etc.)
The PVSC Resiliency Program: Key Projects
Resiliency Program – Key Projects (Overview)
Resiliency Program – Key Projects

- **34MW Power Plant ($118 million)**
  - (3) 17MW Gas Turbines

- **Flood Wall ($75 million)**
  - West: 7,450 lf / East: 5,140 lf

- **Storm Water Pumping Stations ($39.5 million)**
  - West: (5) 375hp pumps, 158MGD.
  - Northeast: (4) 150hp pumps, 59.5MGD
  - Southeast: (3) 100hp pumps, 27.2MGD

- **Storm Water Collection System ($19.4 million)**
  - West: Approx. 9,000 lf of 12” to 72” pipe
  - East: Approx. 1,600 lf of 12” to 54” pipe

- **Plant-wide Replacement of Electrical Cables and Utility Tunnel Bulkheads ($71 million)**

- **Plant-wide Replacement & Relocation of Switchgear and MCC’s ($25 million)**

- **Construction of East/West Substations ($12 million)**

- **Project Worksheet Contracts – Qty 4 ($14 million)**
Resiliency Program – Key Projects

PROPOSED FLOOD WALL ($75 million)

EXISTING BERM TO BE RECONSTRUCTED

TOP OF WALL ELEVATION 19.0

TOP OF WALL ELEVATION 17.0

(12) FLOOD GATES

5,200 lf

7,500 lf

* Typical Road Elevation = 10-0’ ASL
TYPICAL FLOOD GATE
Resiliency Program – Key Projects

($58.9 million)
Resiliency Program – Key Projects

• Replacement & Relocation of Switchgear and MCC’s ($25 million)

• Plant-wide Cable Replacement/Tunnel Bulkhead Work ($71.0 million)
Resiliency Program – Key Projects

Stand By Power Plant
($118 million)
Resiliency Program – Key Schedules

- Program Manager – AECOM/ HDR/ JV

- Power Plant
  - Design Services Awarded: B&V

- Plant-wide Replacement & Relocation of Switchgear and MCC’s
  - Design Services Awarded: URS/Current Solutions
  - Construction Start: January 2018

- Flood Wall
  - Design Services Awarded: STV & MM
  - Construction Start: January 2019

- East / West Substations
  - Design Services RFP Issued December 2017
  - Construction Start: 2019

- Storm Pumping Stations
  - Design Services: CH2M
  - Construction Start: January 2019

- Plant-wide Replacement of Electrical Cables & Utility Tunnel Bulkheads
  - Design Services: H&S
  - Construction Start: June 2018

- Collection System
  - Design Services: PS&S
  - Construction Start: June 2019

- Project Worksheet Contracts
  - Construction Start: Dec 2017
Resiliency Program – Key Challenges

1. Schedule
2. Managing Site Logistics
3. Safety
4. Maintenance of Plant Operations
5. Managing FEMA Reimbursement
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Questions:

Thank You