St. Bernard Parish, Louisiana Wastewater System - From Hurricane Katrina to Isaac

Case Study in the Implementation and Performance of Mitigation Measures

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Presentation Outline

• Overview of St. Bernard Parish Wastewater Infrastructure
• Overview of Storm Impacts
• Overview of Comprehensive Consolidation
• Pump Stations
• Plant Processes
• Chemical Systems/Storage Tanks
• Performance During Hurricane Isaac
• Closing
Overview of St. Bernard Parish

- Pre-Katrina Population – 67,000
- Current Population – Approximately 40,000
- Location – Southeast of New Orleans, Louisiana
Map of St. Bernard Parish
Overview of St. Bernard Parish Wastewater System

- Dravo WWTP – 3.5 MGD (20 to 40 years old)
- Violet WWTP – 2.0 MGD (>30 years old)
- Fazendville WWTP – 1.0 MGD (>30 years old)
- Munster WWTP – 7.5 MGD (expanded in 2000)
- Riverbend Pond – 0.5 MGD
- Two Package WWTPs – 0.05 MGD each
Overview of St. Bernard Parish Wastewater System
Overview of St. Bernard Parish Wastewater System – 2005 Planned Consolidation

- Dravo WWTP – Peak Flow Improvements
- Fazendville WWTP – Decommission
- Violet WWTP – Decommission
- Riverbend Pond – Decommission
- Munster WWTP – Peak Flow Improvements
- Two Package WWTPs – Decommission
- Partial Funding through $50M Bond Issue
Surge Inundation Map of St. Bernard Parish

St. Bernard Parish, Louisiana – Implementation and Performance of Mitigation Measures
Overview of Hurricane Katrina Impacts on Wastewater Infrastructure

- All 90 sewer lift stations rendered inoperable
- All power eliminated
- All seven wastewater treatment facilities flooded and off-line
- Extensive emergency measures required until treatment facilities returned to service
- High risk impacts to chemical feed/chlorine systems
Katrina Impact Photos

St. Bernard Parish, Louisiana – Implementation and Performance of Mitigation Measures
Katrina Impact Photos

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Drivers for Comprehensive Consolidation Approach

- Consolidation Plan already in place pre-Katrina
- Avoid repairs to two WWTPs slated for decommissioning
- Ability to provide a comprehensively hardened system
- Ability to reduce future emergency measures
- Staffing and operating budget impacts
Components of Consolidation Approach

- Fazendville WWTP Decommissioning – Hardening of F1-01 Pump Station and New Force Main
- Dravo WWTP Decommissioning – Hardening and Reuse of Effluent Pump Station and Force Main
- Violet WWTP Decommissioning – Hardening and Reuse of Influent Pump Station and New Force Main
- Munster WWTP – Hardening and Expansion
- Riverbend Oxidation Pond – Conversion to Wetlands Assimilation Discharge
Post-Katrina Consolidation Approach

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Fazendville Decommissioning (F1-01 Pump Station)

- Raised Control Panels
- Reused Existing Dry Pit
- Conversion to Dry Pit Submersible Pumps
- Force Main to Dravo Effluent Pump Station
- Future Ability to Monitor from Munster WWTP (SCADA)
Dravo Decommissioning

- Elevated Electrical/Control Building
- Elevated Emergency Generator
- Reuse of Existing Effluent Pump Station
- Conversion to Submersible Pumps
- Reuse of Existing Force Main from Dravo to Munster WWTP
- Future Ability to Monitor from Munster WWTP (SCADA)
Dravo Photo

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Violet Decommissioning

• Elevated Electrical/Controls on Existing Structure
• Elevated Emergency Generator on Existing Wet Well
• Reuse of Existing Influent Pump Station
• Conversion to Dry Pit Submersible Pumps
• New Force Main from Violet to Munster WWTP
• Future Ability to Monitor from Munster WWTP (SCADA)
Violet Photo

St. Bernard Parish, Louisiana – Implementation and Performance of Mitigation Measures
Munster WWTP Expansion – Highlights

• Comprehensive Mitigation of Entire Facility

• Capacity Expansion to Accommodate Decommissioned Facilities

• Extensive Emergency Generation Capabilities

• Innovative Treatment Process to Increase Resiliency and Minimize Capital Costs

• Elimination of Future Chlorine/Chemical Hazards
Munster WWTP Process Flow Diagram
Influent Pump Station and Headworks

- **Influent Pump Station**
  - Elevated Electrical/Control Building
  - Reuse of Existing Influent Pump Station
  - Conversion from VTSH Pumps to Submersible Pumps

- **Headworks**
  - Elevated Electrical/Control Building
Influent Pump Station and Headworks Photos
Influent Pump Station and Headworks Photos
Aeration Basins and Digesters

- Elevated Electrical/Control Building
- Top of Structure Above Katrina Flood Elevation
- Aeration Basin Blowers Located on Top of Structure
Aeration Basins and Digesters Photos
Aeration Basins and Digesters Photos
Effluent Pump Station

- Elevated Electrical/Control Building
- Reuse of Existing Effluent Pump Station
- Conversion to Dry-Pit Submersible Pumps
Electrical Feed and Emergency Generators

- Elevated Main Electrical Building
- Elevated Transformers
- Elevated Generators and Fuel Storage
  - Two 2000 kW Generators
  - 7 Days of Fuel Storage
Electrical Feed and Emergency Generators

St. Bernard Parish, Louisiana – Implementation and Performance of Mitigation Measures
Administration Building

St. Bernard Parish, Louisiana – Implementation and Performance of Mitigation Measures
Munster WWTP – Biologically Enhanced HRC

- Replaces 3.5 MGD of Dry Weather Capacity at Low Capital Cost (12 MGD Peak Capacity)
- Provides High Level of Treatment at Low Horsepower
- Limits Emergency Generator Needs and Fuel Consumption under Emergency Conditions
- Limits Other Emergency Operation Needs
Biologically Enhanced HRC Photos
Munster WWTP – Chlorination

- Converted from Gaseous Chlorine to Sodium Hypochlorite Disinfection
  - Eliminates chlorine gas hazards during normal operations
  - Eliminated dangerous gaseous releases during flood conditions
  - Simplifies hazard mitigation approach
Hurricane Isaac

- Slow Moving Category 1 Hurricane
- Limited Evacuations
- Landfall near mouth of Mississippi River and then Port Fourchon, Louisiana on August 28, 2012
- Storm Surge Flooding Outside of Levees
- Widespread Power Outages Throughout Southeast Louisiana
Hurricane Isaac – St. Bernard Parish

• Storm Surge Flooding in Coastal Areas
• Power Outage Lasting 3+ days Throughout the Parish
Post-Katrina Consolidation Approach

St. Bernard Parish,
Louisiana – Implementa8on and Performance of Mitigation Measures
Hurricane Isaac – St. Bernard Parish

- Continued to Pump/Treat up to 3 time ADWF (21 MGD)
  - During Peak of Storm
  - Throughout Power Outage
- Limited System Overflows and Home Backups
- Storm Surge Flooding Outside of Levees
- Widespread Power Outages Throughout Southeast Louisiana
Benefits of Comprehensive Hazard Mitigation

• Provides a System-Wide Approach to Avoid Damages
• Greatly Reduces the Need for Future Extensive Emergency Measures
• Facilitates Quick Community Return After Storm Event
• Reduces Operational Costs and Staff Needs for Severely Impacted Communities
• Maintain System Operation During Extended Power Loss
Questions?