QUALITY WATER TO THE PEOPLE AT ALL TIMES
THE ONE REHABILITATION PRIORITY THAT TRUMPS ALL OTHERS
Presentation Topics

• Project Background

• Project Team

• Unique Challenges and Opportunities

• Risk Assessment and Mitigation

• Factors That Cannot be Controlled—Quality and Quantity

• Quantity

• Quality

• Current Project Status/Lessons Learned
PROJECT BACKGROUND
Columbus, OH Service Area

- 2015 Annual Volume:
  - 7.2 Billion Gal
  - 15.9 Billion Gal
  - 25.6 Billion Gal

- 48.7 billion gallons in 2015
- 83% surface water
- Service population 1.16 million
Treatment Plant Site
Existing Treatment Process

- Scioto River
- Conventional Lime Softening Plant
- 65 MGD Capacity
Plant Treatment Goals

• Total Hardness: 120 mg/L to 125 mg/L as CaCO3
• Alkalinity: >35 mg/L as CaCO3
• Total Organic Carbon (TOC): <2.0 mg/L
• Nitrate: < 10 mg/L as N
• Atrazine: <2.5 ppb (MCL= 3.0 ppb)
• Stage 2 DBP Compliance:
  • Target 80% of Location Running Annual Average (LRAA) and Operational Evaluation Level
• Comply with all primary drinking water regulations
• Taste and Odor
New Treatment Processes & Upgrades to 80 MGD

• Biologically Active Carbon Filters
• New Recarbonation System
• Ozone
• Ion Exchange
• Residuals Handling, Electrical, Pump Station, and Miscellaneous Plant Upgrades
PROJECT TEAM
Project Team

Plant Operations & Maintenance

Tools to the Operations Staff

Pre-Construction Use
UNIQUE CHALLENGES & OPPORTUNITIES
UNIQUE CHALLENGES & OPPORTUNITIES

• Three Plants in System
  • All Three Scheduled for Renovation
    Same Period

• Dual Power Feed to Plant
  • Both Thru Same Substation
  • Significant New Users Added to One Circuit
  • City Owns Power System

• Plant Maintains System Pressures
  • Short Response Time
RISK ASSESSMENT AND MITIGATION
Risk Assessment & Mitigation

• Ongoing Process in All Phases of Work

• Condition Assessment
  • Criticality of Each Piece of Equipment
  • Consequences of Failure

• Phasing
  • Regulatory and Schedule Impacts

• Pilot Testing
  • Capability of Processes/Potential Modifications

• Design Details–Construction Restrictions & Sequencing
Risk Assessment & Mitigation

Construction Contract Phasing

TEMPORARY PUBLIC/EMPLOYEE ENTRANCE
FACTORS THAT CANNOT BE CONTROLLED
FACTORS THAT CANNOT BE CONTROLLED

• KEY FACTORS
  • System Demand
  • Weather
  • Raw Water Quality

• MITIGATION FACTORS
  • Share Demand Between Plants
  • Upstream Monitoring
  • Provide Tools for Treatment
  • Plant Personnel Prepared
MAINTAINING QUANTITY & QUALITY
Phasing Criteria—Quality & Quantity

• Regulatory Compliance
• Personnel & Public Safety
• Risk Assessment
• Contractor Work Areas/Interference/Use of Site
• Coordination with Construction at Other WTP
• Schedule and Approvals
QUANTITY
QUANTITY

• Three Plants
QUANTITY

• Replacement of:
  • Residuals Pump Station
  • High Service Pumps
  • Raw Water Pumps
  • Electrical System
QUALITY
QUALITY

• Approved Capacity for Each Process (OEPA)
• Upstream Monitoring
• Pilot Testing
  • Existing
  • New
• Historical Plant Data
CONSTRUCTION HOUSEKEEPING

• Filters
  • Enclosure Requirements
  • Performance
  • Enforcement

• Exterior Improvements
  • Open Basins
  • Inflow

• Equipment in Basins

• High Service Pumps

• Control Room & Lab
FILTERS

• Pilot tested existing and proposed media
  • Rate (2.0 gpm/ft$^2$ to 3.4 gpm/ft$^2$)
  • Performance
• Filters Out of Service
• Housekeeping
• Testing and Backwash
FILTERS
CHEMICAL FEED SYSTEMS

• Virtually every system rehabilitated or replaced
  • Condition Assessment
  • Risk Assessment
• Min. Tanks in Service
• Coordinate w/ Suppliers
• Removal w/o damaging Adjacent Tanks
RECARBONATION SYSTEM

- Installed a new Secondary System
- Operations prior to Shutdown of Existing
- Rental Tank during Switchover
POLYMER

• Coagulant Aid & Filter Aid Polymers
  • Bench scale screening
  • Plant scale testing
  • Regulatory Approval
• Pre-Construction
• System Left in Place
PROJECT STATUS & LESSONS LEARNED
LESSONS LEARNED

• Expect the Unexpected
  • PAC Quality
  • Nitrate Event

• Need to Sweat the Small Stuff
  • Chemical Deliveries (24/7)
  • Good Housekeeping

• Emphasize Criticality Early
• Communication
• Sequencing & Restrictions
• Continuous Improvement
• Know Your Plant
## PROJECT STATUS

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<th>Year</th>
<th>Av. TOC (ug/L)</th>
<th>% Removal</th>
<th>MIB Geosmin</th>
<th>TAP (ug/L)</th>
<th>DRWP THM (ug/L)</th>
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### DRWP THM (µg/L)

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### DRWP HAA (µg/L)

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Thank you!
Questions?
Existing Treatment Plant Site

• Original Plant -- 1907
• Existing Plant Constructed -- mid 1970’s
• No option to obtain additional property
  • Railroad
  • Post Office
  • Major Road plus Scioto River
  • County Engineers Office and Abandoned Landfill
• Department of Public Utilities Office Complex—1980’s
Existing Treatment Plant Site

• Multi Purpose Site
  • Treatment Plant
  • DPU Administrative Offices
  • Fleet Maintenance Facilities
  • Support Facilities and Personnel

• Access Required at All Times

• Public Access and Parking

• Space for Future Treatment Requirements