PA Section AWWA – 2015
67th Annual Conference
Technical Session - Distribution

Clearfield Municipal Authority
Water Storage and Transmission Project

Presented By:
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Gwin, Dobson & Foreman, Inc.
April 23, 2015  11:00-11:30 AM
System Description

- Clearfield Municipal Authority
  - Created: 1882
  - Customers: 6,000
  - Population Served: 12,000

- Service Area
  - Clearfield Borough; Lawrence & Goshen Twps

- Water Sources
  - Montgomery Run Reservoir: 210 mg
  - Moose Creek Reservoir: 18 mg
  - Moose Creek Well Field: 475 gpm

- Water Transmission & Distribution System
  - 85 miles
System Description (cont.)

- Water Treatment Plants
  - Montgomery Run WTP: 2.5 mgd
  - Moose Creek WTP: 1.0 mgd

- Water Storage
  - 3.65 mg (2013); 6.95 mg (2015)

- Water Pumping
  - 3 Booster Stations

- Water Transmission & Distribution System
  - 85 miles (4-20 inch; cast, ductile, PVC)

- Water Production
  - 1.64 mgd (avg)
  - 2.20 mgd (peak)
Storage-Transmission Problems

- No Distribution Storage at Montgomery WTP
- 100-year old Transmission Line in Poor Condition
- System Supply Vulnerable to Extended Outages
- Lack of Fire Protection Storage at Industrial Park
- Industrial Park Booster Station in Poor Condition
- Deteriorated In-town Distribution Storage Tank
- Update Water Meters System & SCADA System
Hydraulic Analysis and Evaluation

- Hydraulic parameters of the design of the Montgomery transmission main and storage tank

- Effect of replacing old 16” main in relation to siting new finish water storage tank

- Distribution storage tanks in Clearfield (Hillsdale) and Industrial Park (Wolf Run) based on storage capacity for ISO standards
Hydraulic Analysis and Evaluation

GOALS:

- Increase system hydraulic capacity
- Stabilize Montgomery Run WTP operation
- Enhance system reliability; reduce system vulnerabilities
- Stabilize system operating pressures; create gravity service
- Increase fire protection
- Provide additional finish water & distribution storage
Hydraulic Analysis and Evaluation

Montgomery Run System Problems:

- No Storage at WTP causes pumps to run continuously
- WTP is paced to system demand; makes it difficult to operate
- 16” main results in excessive discharge pressures and costs
- When demand rises customers see higher pressures with the potential for pipe breaks and leakage
- Only 30 – 50 feet of total head available between WTP & town
Flow Testing

16” Cast Iron Tran. Main “C” Factor: 45
2012 HYDRAULIC GRADIENT
MONTGOMERY 16" TRANSMISSION MAIN
FLOW = 900 GPM (1.3 MGD)
TOTAL ENERGY LINE = 1405.54 (TO STA. 101+50, BEFORE 12" MAIN) Q = 1.612 MGD (1120 GPM)

HYDRAULIC GRADE LINE (H.G.L.)

EL. 1364.89
h_f = 40.69
(LOSS 16" MAIN)

STA. 127+00 TO STA. 274.70
h_f SYSTEM LOSS = 7.04'

HILLSDALE TANK
EL. 1375.26
(W.S. EL.
1357.81
(25 ft.)
EL. 1332.81
(GRADE EL.)

2012 HYDRAULIC GRADIENT
MONTGOMERY 16" TRANSMISSION MAIN
FLOW = 1,120 GPM (1.61 MGD)

HYDE CITY
LAWRENCE TOWNSHIP
CLEARFIELD BOROUGH

PLOT CREATED: 9/17/2012 11:40 AM FILE: G:\2009\ENGINEERS REPORTS\EXHIBITS\EXHIBIT P.png
Design Considerations

- After further simulation, set Montgomery Tank Overflow at Elevation 1405
- Provide separate fill line to tank from WTP pumps
- After further simulation, set Hillsdale Distribution Storage Tank Overflow at Elevation 1373
- Replace 16” main with 20” main; by eliminating line head loss, in effect moves tank 2 miles closer to town
- Provide for control valve to regulate flow on tank outlet line to town
Proposed System Hydraulic Profile

- Montgomery 1.5 MG Tank & 20 Tran. Main
- Hillsdale 1.5 MG Tank
- Wolf Run 1.5 MG Tank Pump Sta. & Waterline
Project Components

- Montgomery WTP 1.5 MG Water Storage Tank
- New 20-in. Water Transmission Mains (Montgomery)
- Hillsdale 1.5 MG Water Storage Tank (In-Town Reservoir)
- Wolf Run 0.5 MG Water Storage Tank (Industrial Park)
- Wolf Run Pump Station Replacement (Industrial Park)
- System Wide Meter Replacement and SCADA System
Montgomery WTP Finish Water Storage Tank

- Montgomery WTP 1.5 MG Finish Water Storage Tank
  - 92 ft. diameter x 30 ft. high
  - AWWA D110, Type III Prestressed Concrete Tanks
  - Hydrodynamic Mixing Systems (Red Valve)
  - 1-day of storage for Montgomery WTP finish water
  - At Maximum Draft Condition of 4,000 gpm: 6.25 Hours
  - Contractor: DN Tanks, Inc., Wakefield, MA
  - Cost: $1,500,000
1.5 MG Montgomery Finish Water Storage Tank
Montgomery Tank Control Valves
Montgomery Transmission Main

- Montgomery 20” Water Transmission Main
  - 12,800 LF of 20” PVC water transmission main
  - Flow control station ate Montgomery Run WTP regulates flow from the tank and downstream "turnover" at Hillsdale tank
- Increased Hydraulic Capacity
- Reduced Leakage/Breakage Incidents
- Increases System Reliability
- Cost: $2,060,000
16” x 16” Montgomery Transmission Main Tapping Sleeve & Valve
Montgomery Transmission Main System Interconnection
Hillsdale Distribution Water Storage Tank

- Hillsdale 1.5 MG Distribution Water Storage Tank
  - 92 ft. diameter x 30 ft. high
  - AWWA D110, Type III Prestressed Concrete Tanks
  - Hydrodynamic Mixing Systems (Red Valve)
  - Sufficient Capacity for 5,000 gpm, 5 hour fire (downtown)
  - Contractor: DN Tanks, Inc., Wakefield, MA
  - Cost: $1,685,000
Hillsdale 1.5 MG Distribution Storage Tank
Industrial Park Storage Tank

- Wolf Run 500,000 Gallon Water Storage Tank
  - 66 ft. diameter by 19.5 High
  - Bolted Stainless Steel with Aluminum Dome
  - Contractor: American Structures, Menomonie WI
  - Supports a 2,750 GPM Fire Flow for 3 Hour Duration
  - Hydrodynamic Mixing System
  - Cost: $580,000
1.5 MG Wolf Run Tank Mixing System
Industrial Park Pump Station

- Wolf Run Pump Station Replacement
  - Factory-built pump station with two (2) 700 gpm centrifugal pumps with VFD’s
Wolf Run (Industrial Park) Pump Station
Wolf Run Water Booster Pumping Pumps
Industrial Park Waterline

- Wolf Run Waterline Replacement
  - 600 LF of 12” waterline (pump station)
  - 3,500 LF of 6” distribution system waterline installed by Horizontal Directional Drilling (HDD) method
- Final Contract Amount: $430,000
Wolf Run 12”/8” Tapping Sleeve & Valve
AMI System - New Water Meters

- Advanced Metering Infrastructure (AMI) System
- Replacement of 5,520 5/8” and ¾” meters; 230 1” - 4” meters; 5700 meter interface units
- Mobile meter reading system
- Operations and mapping software
- 5-year installation period
- Procurement Cost: $1,611,600
SCADA Upgrade

- SCADA System Upgrade
  - SCADA Control & Monitoring
    - 2 Plants, 1 Well
    - 6 Tanks
    - 3 Pump Stations
  - Hardware: Allen Bradley PLC's, Allen Bradley Touch Screens and Calamp Viper Data Radios
  - Remote monitored via master unit, laptops or Smartphone
  - Radio addressing allows for scenario if a site stops communicating with master unit it can default to local communication, i.e., from specific tank to a pump station or from a specific tank to a treatment plant
- Programming, Hardware & Telemetry Cost - $250,000
Hydraulic Performance
NEW MONTGOMERY TANK AND 20" TRANSMISSION MAIN (WITH CONTROL VALVE VAULT IN OPERATION) HYDRAULIC GRADIENT SIMULATION
Project Funding

Pennvest Loan

- Date: April 4, 2013
- Interest Rate: 1.56% (average)
- Term of Loan: 20 years
- Principal: $10,320,000
- Annual Debt Service: $605,000
Questions