Steelton Borough Authority’s Systematic Approach to DBP Removal

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Pennsylvania – American Water Works Association
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Steelton Water System - Overview

> Approximately 28 Miles of Water Main
  4 Inch thru 20 Inch Diameter
  Age – 1910 thru Present
  CIP & DIP

> One Water Booster Station
  1973 Construction

> Two Finished Water Storage Tanks
  1973 Construction
  2 Million Gallon Capacity Each

> Two Interconnections with SUEZ

> Water Treatment Facility
  1973 Construction
Water Treatment Facility - Overview

>Serves Approximately 6,300 Customers
  Largest Customer Accounts for ~ 60% of Flow

>Water Allocation Permit – 3.0 MGD River Withdrawal
  Typical Production Rate = 1,670 GPM
  Operates 13 to 16 Hours/Day – 7 Days/Week

>4 Dual Media INFILCO Vacuum Filters – 1973 Construction
  No Filter to Waste

>Pre-Chlorination (Chlorine Gas)
  CT - Necessary to Meet 1-Log Giardia Inactivation
  Existing Clearwell ~ 70,000 Gallons
Steelton Water Treatment Facility
Regulatory Issues – Stage 2 DBP Rule

- October 1, 2013 Compliance Date

- Initial Distribution System Evaluation – 2 Regulatory Sites
  - Site 700 – Rozman Brothers Furniture
  - Site 701 – Family Dollar

- Various DBP Violations
  - HAA5 & TTHM LRAA Violations
  - Violations at Both Sites

- 2015 – DBP Removal Study Commencement
DBP Removal Study & Water Distribution System Evaluation - Components

- Enhanced Coagulation Study
- PADEP Distribution System Hold Study
- Water Treatment Facility & Distribution System Sampling
- Finished Water Storage Tank Sampling
- Water Modeling
- Alternatives Evaluation
Water Treatment Facility Effluent

TTHM Results

THM Concentration (µg/L)

30 Day Minimum Water Age (hr.)

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- EP: Event Procedure
- MSD: Mixed Suspended Solid
- HSD: High Suspended Solid
- TTHM MCL Limit: Total Trihalomethanes Maximum Contaminant Level Limit

7/8/2015 TTHM:
- 128.3
- 143.9
- 138.0
- 157.8
- 143.6
- 152.4

7/27/2016 TTHM:
- 64.3
- 53.0
- 69.0
- 65.6
- 81.9
- 128.0
- 92.9
- 84.9
- 86.0
- 71.0
- 71.9
- 89.5
- 82.2

8/20/2016 TTHM:
- 94.9
- 118.0
- 106.0
- 110.0
- 122.0
- 114.0
- 111.0
- 102.0
- 101.0
- 123.0
- 123.0
- 118.0
- 119.0
Alternatives Evaluation – Water Treatment Facility

- Chlorine Dioxide Disinfection
- Ozone Disinfection
- UV Disinfection
- Contact Pipe

Clearwell Tank Addition – Selected Alternative

- Present Worth Cost
- Reliability
- Ease of Operation
Clearwell Tank Addition - Project Components

> **260,000 Gallon Above Ground Tank**
  Precast, Wire-wound, Prestressed Circular Tank
  DN Tanks - Basis of Design
  Diameter = 41 Feet/Height = 39 Feet

> **Tank Baffle System**
  Concrete Baffle Walls
  Concentric C Baffle Design
  Tracer Study – 0.65 Target Baffling Factor

> **Interface with Existing Clearwell**
  Fiberglass Baffle Installed – Existing Clearwell
  25 Horsepower Booster Pumps
  (Existing Clearwell to New Above Ground Tank)
Clearwell Tank Addition - Overall Site Layout
Clearwell Tank Addition - Baffle Wall Layout

ADDITIONAL LATERAL BRACING AS REQUIRED BY TANK MANUFACTURER

BAFFLE WALL LAYOUT DETAIL

TANK FOOTING
OUTLET
INLET
BAFFLE WALL (TYP.)

SCALE: NTS
Clearwell Tank Addition - Project Summary

**PENNVEST Funding**
$2.8M Project

**Schedule**
Design & Permitting Complete – May 2016
PENNVEST Funding Offer – July 2016
Construction Notice to Proceed – January 2017
PADEP Operations Permit – August 2017
Substantial Completion – October 2017
Final Completion – February 2018
PADEP Approval of Tracer Study – March 2018
Additional Work Completed

> **PSU Harrisburg – Treatment Facility Optimization Study**
  Sampling Plan Throughout Facility
  Raw Water, Clarification, Filtration & Effluent – Various Times
  Pilot Test – Biologically Activated Carbon (HAA5 Removal)

> **New Instrumentation**
  CL17 – KMNO₄ Monitoring
  DR6000 – Organics Monitoring
  Streaming Current Monitor – Coagulant Dosing
  SCADA Improvements

> **Operational Improvements**
  Optimized Chlorine Dosing – Pre & Post Clearwell Construction
  Sludge Blanket Management
  SRBC TOC Data Monitoring
Next Steps

> **Water Treatment Facility Improvements**
  - Improved KMNO₄ Mixing & Dosing
  - Improved SCADA
  - Improved Ventilation (TTHM Removal)
  - Filter Media Improvements – BAC, etc. (HAA5 Removal)

> **Distribution System Improvements**
  - Improved Flushing Program
  - Automatic Flushers
  - Finished Water Storage Tank Mixing/Aeration
Thanks To Our Partners

HRG
Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
AN EMPLOYEE-OWNED COMPANY

AECOM

STEELTON BOROUGH
SINCE 1880

PennState Harrisburg
QUESTIONS?