New Jersey American Water Springfield Water Treatment Plant Planning and Design



1994 Water Quality Analysis

Weighted composite water quality based upon water quality analysis and various flow scenarios:

Iron (mg/L) 0.16 0.16 Manganese (mg/L) 0.11 0.11	
Manganese (mg/L) 0.11 0.11	
Hardness (mg/L) 235 235	
Alkalinity (mg/L) 123 123	
TDS (mg/L) 344 344	
TCA (ppb) 5.6 12	
TCE (ppb) 5.6 12	
PCE (ppb) 56.1 115	

Flow of 3.0 MGD used in the above simulation



Hardness reduction treatment
Sodium cycle ion-exchange
Weak Acid Cation Exchange
Sulfuric Acid
Hydrochloric Acid
Lime-Soda Ash Process
Reverse Osmosis



Manganese and Iron Removal

- Sequestering
- Oxidation and conventional pressure filters
- Sodium cycle ion exchange
- Manganese greensand



VOC Removal
Packed Tower Aeration
Granular Activated Carbon



• 1993 and 1994 Studies recommended:

- Split train of manganese greensand (CR) for iron & manganese removal and weak acid cation (WAC) exchange for hardness reduction
- Packed tower aeration for VOC, radon and CO₂ removal
- Chemical treatment systems including potassium permanganate, caustic soda, hydrochloric acid and sodium hypochlorite



Process Schematic



1994 Study

 Estimated Construction and Operating Costs

 Construction costs including treatment facility, backwash neutralization, residuals pump station and force main, site work and demolition – \$5.3 million
 Annual operating cost – \$267,000



What Next?

The Drought of 2002!

 NJDEP Commissioner Campbell issues Administrative Order 2002–25 directing NJ American to determine the feasibility of reactivating the Springfield Well Field and providing treatment

 NJ American retained HMM to re-evaluate feasibility of reactivation and treatment requirements



2002-03 Re-evaluation Process

 Review of previous reports and analysis Conduct additional hydrogeological analysis to establish maximum flow to the plant Evaluate incremental construction costs of 3.0, 3.5 and 4.0 MGD plants Review treatment options previously evaluated



2002–03 Design Process

 Design flow of 4.0 MGD • 3 WAC units, 11' diam. operating at 5.29 gpm/sf 3 manganese greensand units in CO mode operating at 7.0 gpm/sf Packed tower 11.5' diam. w/30' packed bed for VOC, radon and CO_2 removal



Changes from 1994 to 2003

 Hydrogeologic analysis showed 4.0 MGD capacity is viable from 11 wells "Great Eastern" wells were all abandoned due to their distance from the Treatment Plant, need for rehabilitation of the transmission main that crosses Rt. 78 and the low capacity of the wells



Changes from 1994 to 2003

 Additional security for all wells needed to be implemented due to concerns from 9/11 Need to construct a new High Lift PS Change from CR to CO mode of operation for the manganese greensand units. This was possible due to low iron levels and the need primarily for manganese treatment



Treatment Facility



Raw Water Pumps



Treatment Units



Hatch Mott MacDonald

Project Summary

Total Construction Cost (including Treatment Plant, Well Rehabilitation and High Lift Pump Station) – \$7.1 million
Design and Permit acquisition – Sept 2002 to June 2003
Construction period – July 2003 to July 2004
Facility placed into operation July 2004



Acknowledgements

Scott Conner, George Morris, Manoj Patel and Tom Laucik – NJ American
Mike Polito, Syam Babu and Joe Stanley – HMM

