Naval Support Activity Annapolis (NSAA)
Water Reduction and Conservation

Andrew Hood, PE, Director of Engineering
Water Reduction & Conservation Opportunity

- Plant design capacity of 2.3 Million Gallons per Day (MGD)
- One MGD potable water being supplied
- Potable water to the US Naval Academy
- Iron-oxide sludge with continuous backwash sand filters
- Sand filters backwash 380,000 gallons per day at design flow (up to 38% of total flow)
- Potential $380,000 savings in discharge to sanitary sewer
- Potential $220,000 savings in sludge disposal costs (7-9% Solids)
Existing Plant Flow Diagram

Well No. 15

Well No. 16

Well No. 17

No. 1
Tray Aerators

Chlorine Lime Polymer Fluoride

No. 2
Solids Contact Clarifiers

Chlorine (optional)

No. 7

No. 6

No. 3

No. 4

Chlorine (optional)

No. 1
1 MG

No. 2
1 MG

No. 1
1 MG

Finished Water Elevated Storage Tank

Finished Water Pump Station

Continuously Backwashed Sand Filters

Distribution System
Site Overview
Project Timeline

• Plant study completed by AH Environmental in July 2008
• Original Request for Proposals late 2008
• JCC/Keystone submitted Proposal March 2009:
  • Sludge Holding Tank
  • Centrifuge
  • Conveyor and Sludge Dumpsters
• April 2009 JCC/Keystone presented to NSAA why we choose a centrifuge
• AECOM Completed Study in May 2011 with revisions:
  • Gravity Thickener Addition
  • Lamella Plate Settlers
  • Two (2) Centrifuges
  • Sludge Truck for Disposal
• New Request for Proposals Issued October 2011
• JCC/Keystone submitted new Proposal November 2011
• Contracted Awarded March 2013
• Project to be Completed June 2016
Request for Proposals - 2011

• Energy Conservation Measure type project
• Design-Build Project bid by Constellation Energy
• Project entailed sediment removal in the backwash and recycling the water as raw water
RFP Type

• Original (2009) proposal provided minimal information (performance based)
• RFP was the prescriptive type with design document references, 25% conceptual drawings, equipment performance information, previous project geotechnical report and general equipment specifications
• No contingency allowances were included in the proposal
• Deviation and value-engineering was not part of proposal process
Selection Process

Johnston Construction & Keystone Engineering

- Working together on previous DB projects is very beneficial.
  - Know each others roles and expectations
  - Trust has already been developed
  - Better opportunity to improve DB delivery based on past experience through completed projects
  - Demonstrating this experience is usually required in RFP and is typically assigned a relatively high scoring value
  - Working together on previous DBB projects is helpful experience also
Contractor/Engineer Team Development

- Due to our prior successful design build experience Johnston Construction Company and Keystone Engineering Group, were selected for the project
- Our past experience in design-build projects made team development a simple process
- JCC took the lead due to bonding requirements
- Communication procedures and assignments were identified at the project onset
Residuals Settling

Sedimentation and flotation / Settling Zone

Vertical Parallel Plate Clarifiers
Centrifuge
Installed Lamella Clarifiers
Gravity Thickeners
Additional Improvements

- SCADA system upgrades
- New second generator for new electrical loads
- New VFDs and premium rated motors for three remote well pumps
Initial Project Results

• Discharge to the sanitary sewer is 0 GPD now
• Percent solids has increased from 7-9% to 34-39% reducing disposal costs significantly
Projected Cost Savings

Estimated Annual Operating Costs

1 = Current Operation
2 = Centrifuge
Permitting Phase

U.S. Naval Academy Water Treatment Plant

- New Federal guidelines required for full NSF compliance
- New MDE guidelines required all outdoor open top tanks to be covered
- Erosion and Sedimentation Control permitting delayed project
- All communication to the regulatory agencies was required to go through NAVFAC
Jar Testing

• Jar testing was completed to identify the best product for dewatering
• Anticipated percent solids much higher than anticipated
Lessons Learned

• Sludge Pump needs screening/grinding or macerator
• Agency regulations changes between bidding and contract award created challenges
• Direct contact between Design-Builder and Regulatory would have been beneficial
• Design engineer learned valuable lessons by managing the construction process
• Long lead projects can happen, 8-years from initial conception to project completion
Questions?

• Andrew C. Hood, PE, Director of Engineering