

Succession Planning Initiatives at the South Essex Sewerage District Salem, Massachusetts

New England Water Environmental Association
Boston, MA – January 2017

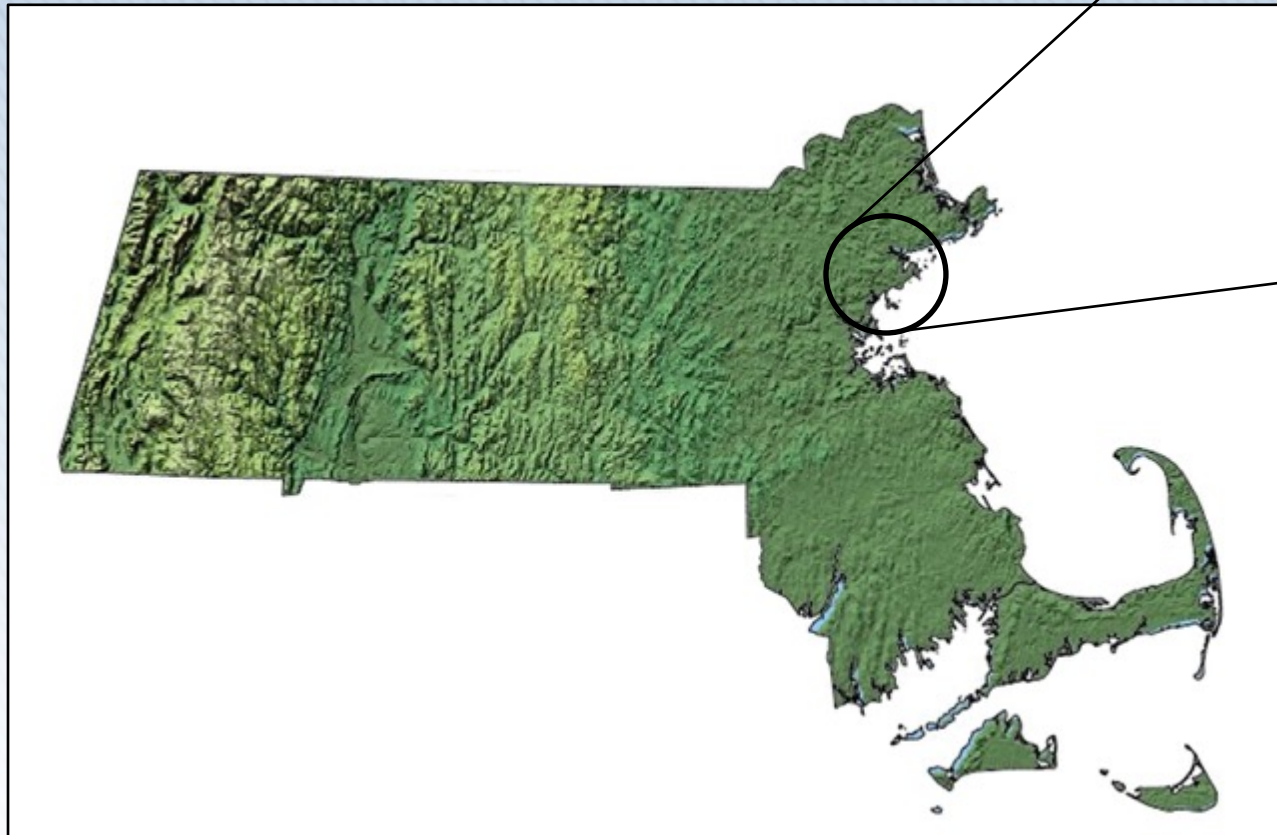
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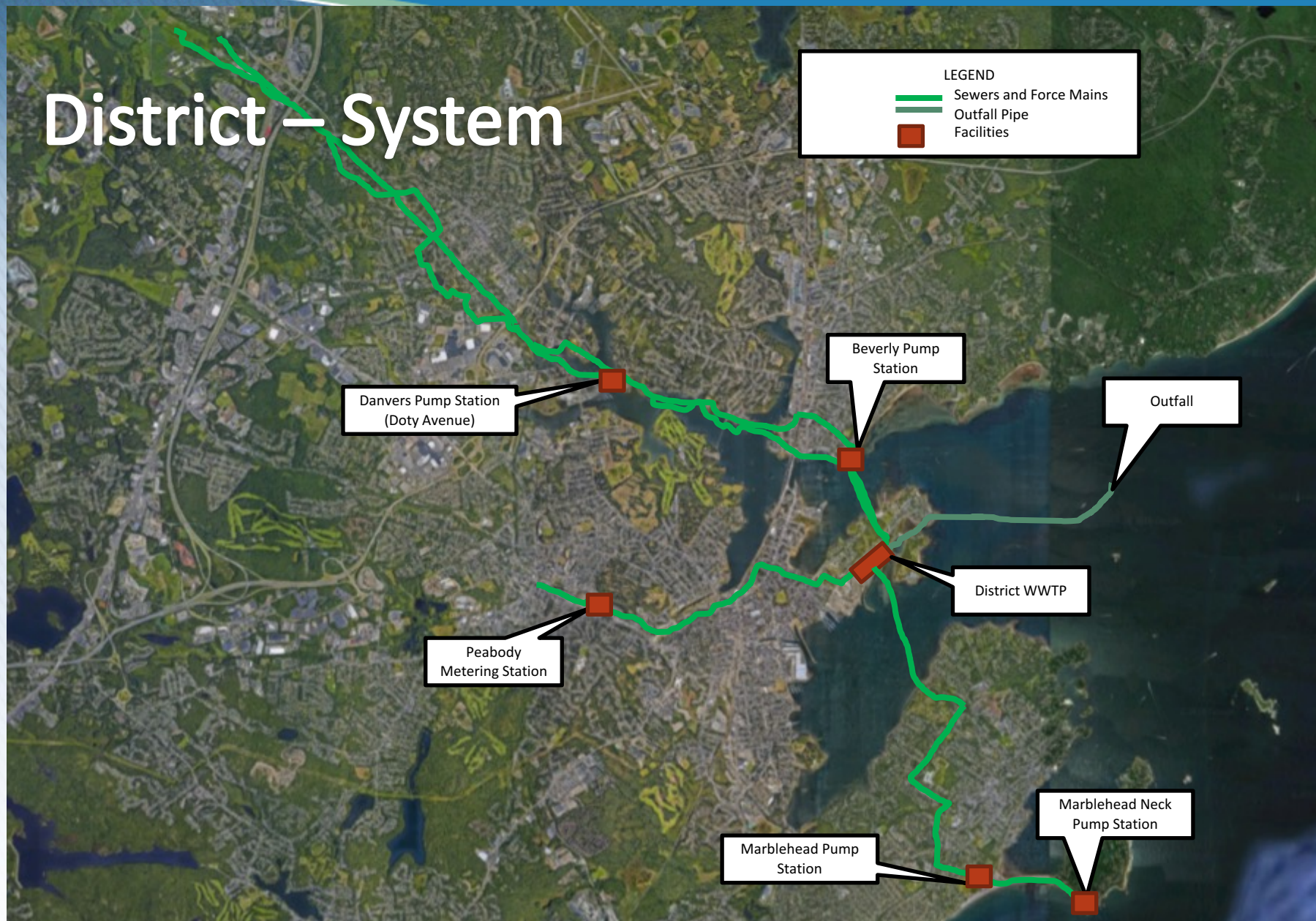
Outline

- Acknowledgments
- District overview
- Challenges
- Review and Findings
- Implementation
- What is Next

The District Service Area



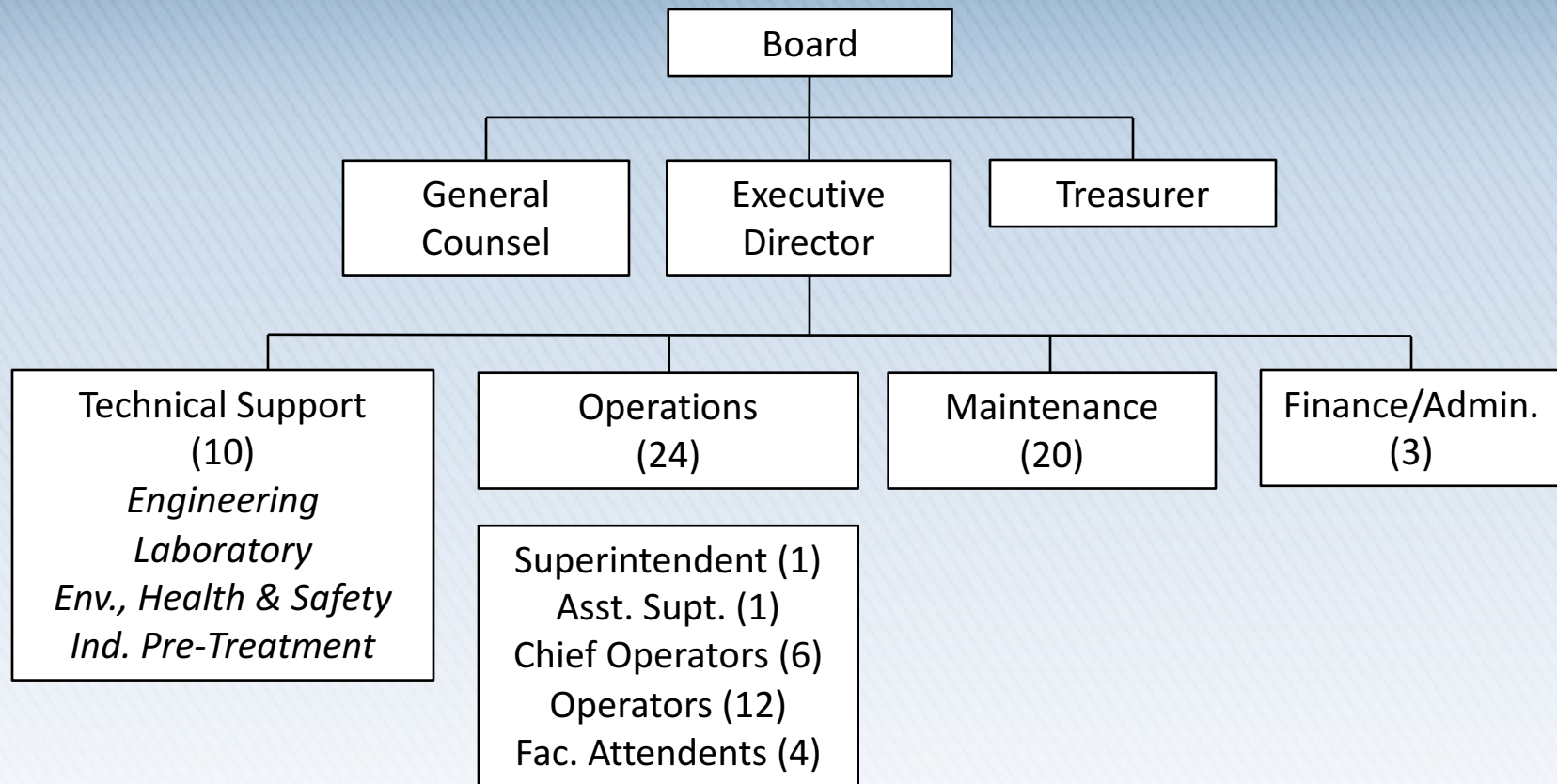
District – System



District – WWTP



District – Organizational Chart

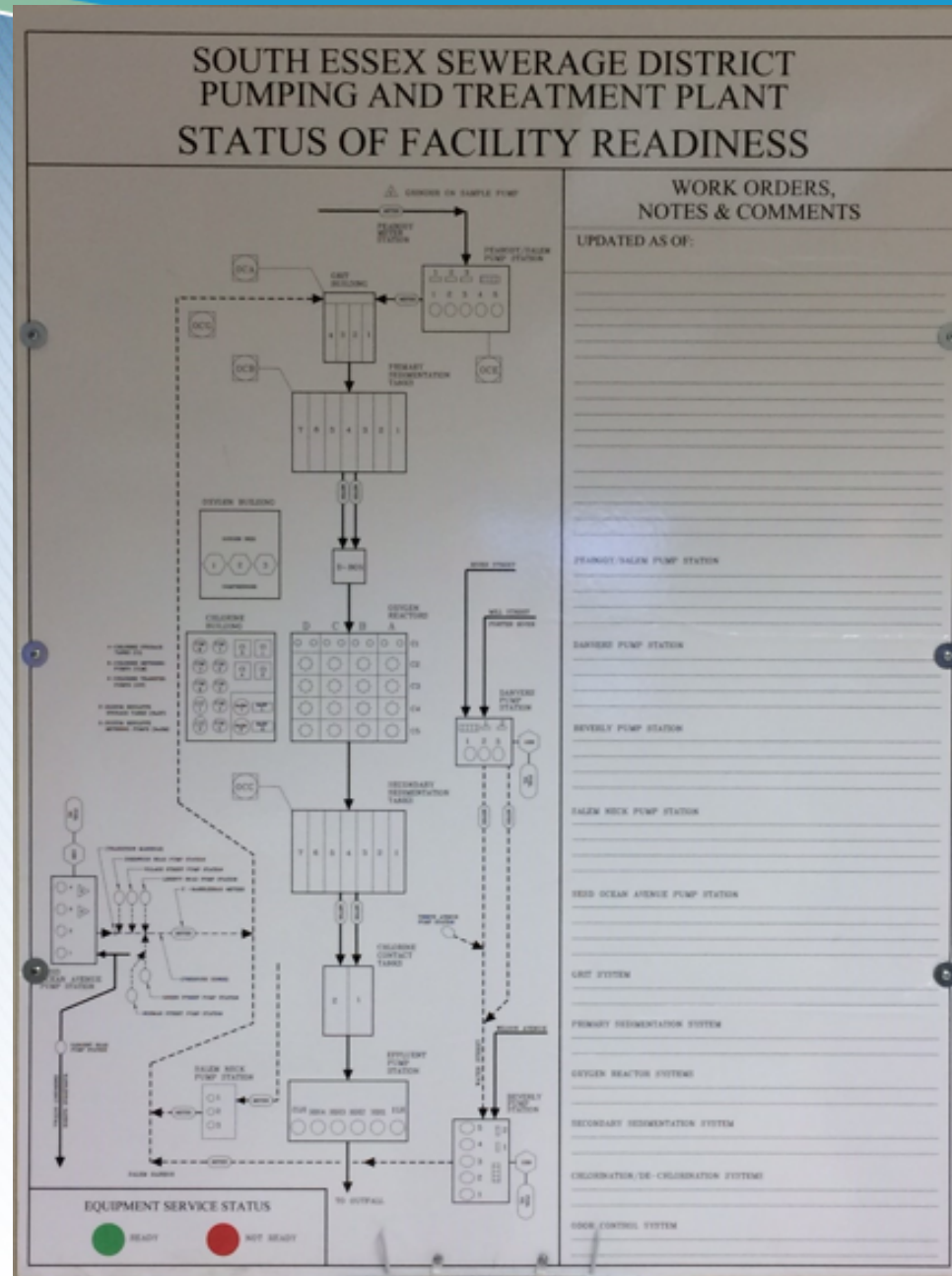


Challenges to SESD Operations

| Similar | Specific |
|--|---|
| <ul style="list-style-type: none">• Aging infrastructure• Aging work force• Imminent retirements• Limited qualified applicants for jobs• Rising energy and fuel costs• Rising labor costs• Competing demands for limited funds | <ul style="list-style-type: none">• Complicated and unique facility• Many daily paper forms• Limited data integration• Underutilized work order process• Communications between Operations/Maintenance/Engin.• Relationships between Management and Union• Peak wet weather flow mgmt |

Challenge: Internal Communication.

- Ops & Maint. Divs
 - Separate Building
 - Different shifts & lunch periods
 - Comm. challenges
- Management staff transitions
- Union employee transitions



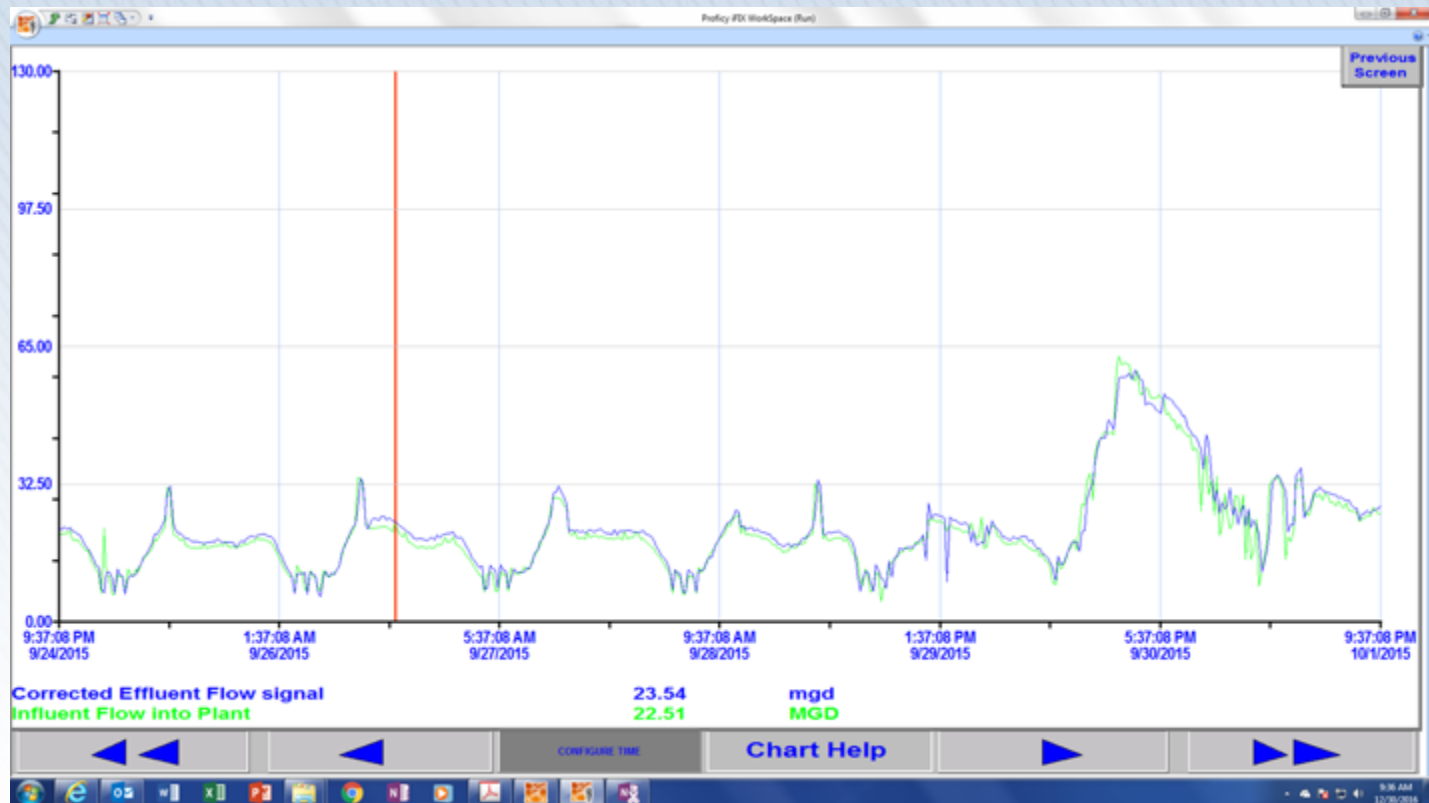
Challenge: Inefficient Use of Ops Staff

- Extensive paper insp. forms
- Labor intensive processes:
 - Solids processing
 - Odor control
 - Cleaning covered tanks
- Some work not getting done:
 - Valve exercising
 - Space cleaning
 - Equipment insp.



Challenge: Peak Flow Mgmt.

- Regular daily duties
- No secondary by-pass



Operations and Process Efficiency Review

- Wanted to get a “report card”



Operations and Process Efficiency Review

- Phase 1 – Review/Discovery
- Phase 2 – Initial Implementation

Phase 1 Activities

- Site Review
 - Process Data and Compliance History
 - Liquids Treatment/Hydraulics
 - Solids Treatment & Odor Control
- Staff Interviews
 - Operations
 - Management & Engineering
- Documentation review



Phase 1

Key Findings

- Very good compliance record
- Lack of secondary by-pass is challenging
- Significant portion of labor is dedicated to solids handling
- Facility layout makes communication challenging
- Weak communication links between Operations, Maintenance and Engineering

Phase 1

Key Findings

- SCADA & process control infrastructure is limiting
- Significant generation of under-used data
- Limited data sharing between Operations, Maintenance and Engineering
- Work order system is inconsistently utilized
- Significant staff transition coming quickly

Phase 1

Operations Staffing

| Position | No. Current | No. Target | No. Retiring by FY2019 |
|--------------------------|----------------|---------------|------------------------------|
| Superintendent | 1 | 1 | 0 |
| Assistant Superintendent | 1 | 1 | 1 |
| Chief Operators | 6 | 6 | 4 |
| Operators | 12 | 14 | 6 |
| Facilities Attendants | 4 | 4 | 0 |
| Totals | 24 | 26 | 11 |

Phase 2

Focus

- Update data collection/sharing approach
- Develop Operational Guide
- Develop training modules
- Improve communication on-site

Phase 2

Update Data Collection & Inspection Approach

- 22 paper logs
- Example: Daily Plant Walkthru Form

| PLANT WALKTHRU | | SHIFT | DATE | OPERATOR | COMMENTS |
|---|--------|-----------|------|----------|-------------------------------|
| INFLUENT PUMPING STATION - SAMPLER | | | | | All 5th Hrs 1st Shift only |
| CONTAINER LVL | WW LVL | LEAD PUMP | FLOW | MGD | |
| GRIT BUILDING; SAMPLER BLOWER # OIL TEMP *F | | | | | |
| TANK(S) ON LINE #1 #2 #3 #4 BLOWER # OIL TEMP *F | | | | | |
| WALKER PROCESS; SCUM PUMP STATUS #1 #2 #3 #4 | | | | | |
| THICKENED LEVEL #1 #2 #3 #4 | | | | | |
| BLENDED LEVEL #1 #2 #3 #4 | | | | | |
| PRIMARY TREATMENT; TKS; STATUS DRIVE SCUM | | | | | |
| #1 | | | | | |
| #2 | | | | | |
| #3 | | | | | |
| #4 | | | | | |
| #5 | | | | | |
| #6 | | | | | |
| #7 | | | | | |
| SWTP INSPECTION SECURE PROBLEM | | | | | |
| RV DUMP: CLEAN DIRTY | | | | | |
| CHEMICAL TREATMENT; H2O2 LEVEL #1 GALS. H2O2 LEVEL #2 GALS. | | | | | |
| OXYGEN GENERATION; BACKUP COMPRESSOR PSI AIR DRYER # | | | | | |
| COOLING WATER PUMP PSI | | | | | |
| COMP ON # # | | | | | |
| WATER TEMP *F *F | | | | | |
| AIR TEMP *F *F | | | | | |
| OIL TEMP *F *F | | | | | |
| OIL PRESS PSI PSI | | | | | |
| PSA PURITY % LOK LEVEL | | | | | |
| PSA DRAINED LIT Level | | | | | |
| HEAT EXCHANGER IN OUT DIFF | | | | | |
| PLANT WATER TEMP *F *F | | | | | |
| CITY WATER TEMP *F *F | | | | | |
| SECONDARY TREATMENT; Effluent Quality (circle) CLEAR CLOUDY DIRTY | | | | | |
| TKS; STATUS UPPER LOWER RAS PUMPS P-VAL CHECK VALVES | | | | | |
| #1 | | | | | |
| #2 | | | | | |
| #3 | | | | | |
| #4 | | | | | |
| #5 | | | | | |
| #6 | | | | | |
| #7 | | | | | |
| ALL IN-PLANT SAMPLER SPEARS ARE CLEAR OF RAGS | | | | | |
| PLANT WATER SKID OXYGEN REACTION BLDG; OR'SON LINE "A" "B" "C" "D" | | | | | |
| PSI @ SKID O2 VALVE SETTING AIR CO N VALVE SETTING AIR CO | | | | | |
| FLOW PRIMARY SAMPLER: NORTH / SOUTH O2 PRESSURE | | | | | |
| MANUAL STRAINER | | | | | |
| INLET PSI | | | | | |
| OUTLET PSI | | | | | |
| EFFLUENT PUMP STATION; LEAD LOW PUMP # LEAD HIGH PUMPS # & | | | | | |
| CHLORINE RESIDUAL | | | | | |
| DFO HEAD PPM END PPM DECHLOR PPM | | | | | |
| METER HEAD PPM END PPM DECHLOR PPM | | | | | |
| SECONDARY BOILERS PSI *TEMP | | | | | |
| CHLORINATION BLDG; DEF TK LVL #1 + #2 GALS. = TOTAL GALLONS MTHAD SAMPLER ? | | | | | |
| CR TK LVL #1 + #2 + #3 + #4 GALS. = TOTAL GALLONS | | | | | |
| HYPO PUMP # STROKE HYPO PUMP # STROKE DEF PUMP # SPEED TO POST | | | | | |

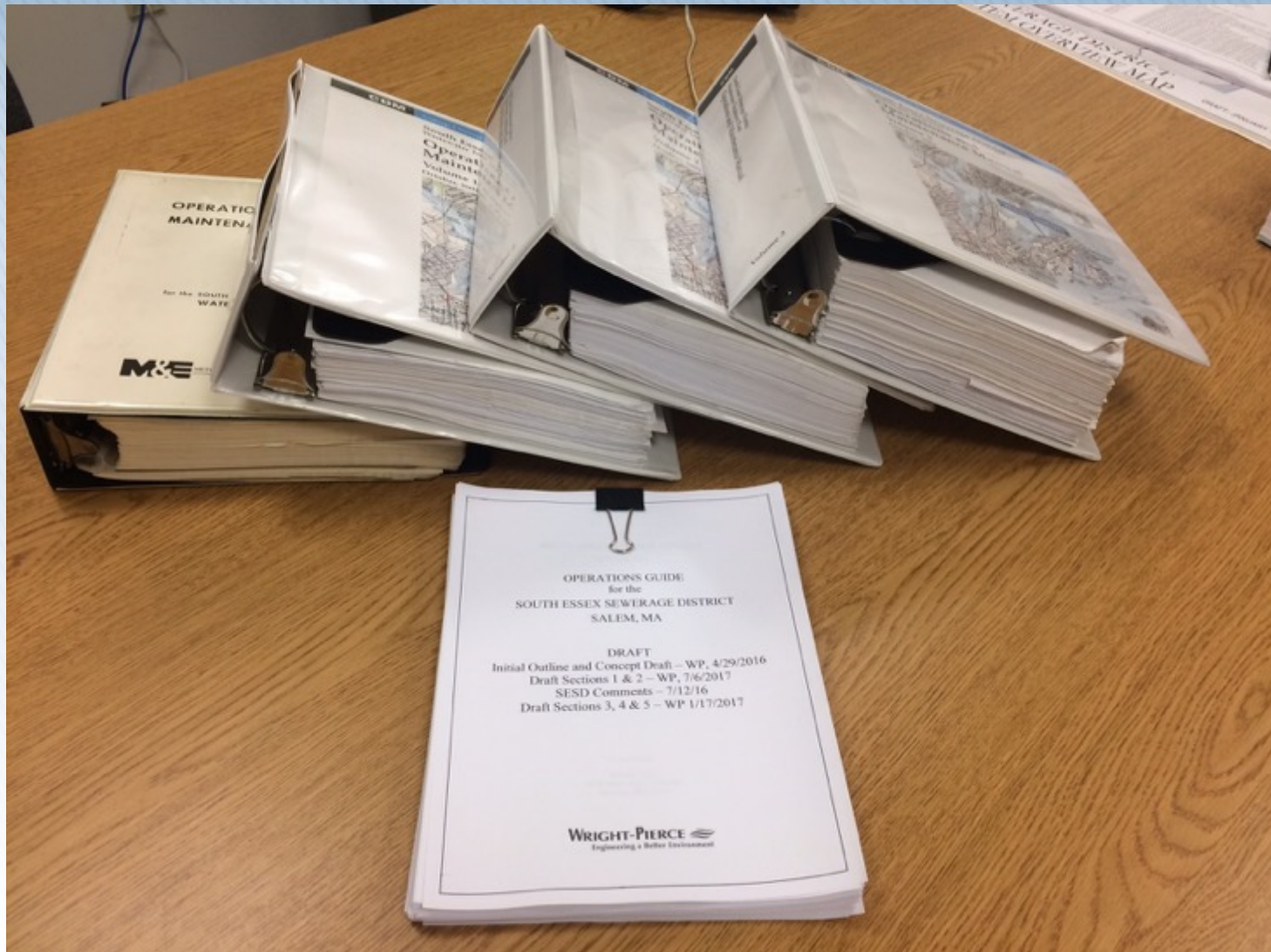
Update Data Collection & Inspection Approach

- All Shifts
- 1st Shift
- 2nd Shift
- 3rd Shift
- HACH Wims

| | | | | | |
|--|------------|-----------------|---|--|--|
| Plant Walk-thru Sheet: | | | Shift <u>All</u> | Date: _____ | Operator: _____ |
| Walker Process Status: #1: _____ #2: _____ | | | Scum Mixer Run Status: #1: _____ #2: _____ | | |
| Concentrated Scum Tanks: #1: _____ #2: _____ | | | Pumped Down?: _____ Flushed with hot water?: _____ | | |
| Blended Scum Pumps: #1: _____ #2: _____ #3: _____ #4: _____ #5: _____ | | | Peroxide Storage Level: _____ | | |
| Primary Clarifier Tanks | | | Peroxide Storage Leaks: _____ | | |
| Tank# | Status | Drives A B C | Scum Skimmers A B | Peroxide Pump Stroke: _____ | |
| #1 | _____ | _____ | _____ | Primary Scum Plugged?: _____ Flushed?: _____ | |
| #2 | _____ | _____ | _____ | Did you free a plug?: _____ Odor Level: _____ | |
| #3 | _____ | _____ | _____ | Primary Auto Sampler: Rags?: _____ Temp: _____ | |
| #4 | _____ | _____ | _____ | Influent Pump Station: Odor Level: _____ | |
| #5 | _____ | _____ | _____ | Screen Status: #1: _____ #2: _____ #3: _____ | |
| #6 | _____ | _____ | _____ | Auto Sampler Free of Rags?: _____ Temp: _____ | |
| #7 | _____ | _____ | _____ | Lead Pump: _____ Flow Total: _____ | |
| | | | Wetwell Level: _____ Screenings Container Level: _____ | | |
| Preliminary Treatment: | | | Pump Status: #1: _____ #2: _____ #3: _____ #4: _____ #5: _____ | | |
| Grit Blowers: | | | | | |
| # | Run Status | Temperature | Oil Level | Grit Tank Debris?: #1: _____ #2: _____ #3: _____ #4: _____ | |
| 1 | _____ | _____ | _____ | Sampler rags?: _____ Sampler Temp?: _____ | |
| 2 | _____ | _____ | _____ | Building Odor Level: _____ | |
| 3 | _____ | _____ | _____ | | |
| Oxygen Generation: | | | Chemical Storage Building: | | |
| Main Compressors: Run Status: _____ | | | Bisulfite Storage Tank Level: #1: _____ #2: _____ Leaks?: _____ | | |
| Back-up Compressor Pressure: _____ | | | Bisulfite pump stroke: _____ | | |
| Air Dryer: _____ | | | Chlorine Storage Tank Level: #1: _____ #2: _____ Leaks?: _____ | | |
| Cooling water pump pressure: _____ | | | Chlorine pump status: #1: _____ #2: _____ #3: _____ | | |
| Run Status: _____ | | | Chlorine pump stroke: #1: _____ #2: _____ #3: _____ | | |
| Heat exchanger water temperature: _____ | | | Marblehead sampler free of rags?: _____ Temp: _____ | | |
| PSA purity: _____ Drained?: _____ | | | | | |
| Oxygen Reactors: | | | | | |
| Train Status: A: _____ B: _____ C: _____ D: _____ | | | Mixers: Any offline? _____ | | |
| Secondary Clarifier Tanks: | | | | | |
| Tank# | Status | Upper | Lower | Scum Skimmers | |
| #1 | _____ | _____ | _____ | H/A | Secondary Channel Blowers: #1: _____ #2: _____ |
| #2 | _____ | _____ | _____ | H/A | Secondary Boiler Lead/Lag: _____ Temp: _____ |
| #3 | _____ | _____ | _____ | H/A | Scum Removal Pump Status: #1: _____ #2: _____ #3: _____ |
| #4 | _____ | _____ | _____ | H/A | #4: _____ #5: _____ #6: _____ #7: _____ |
| #5 | _____ | _____ | _____ | H/A | Effluent Sample Pump Status: #1: _____ #2: _____ #3: _____ |
| #6 | _____ | _____ | _____ | H/A | Secondary Pump Gallery: |
| #7 | _____ | _____ | _____ | H/A | RAS Pump Status: #1: _____ #2: _____ #3: _____ #4: _____ |
| Effluent Pump Station: | | | | | |
| RAS Pump Status: #1: _____ #2: _____ #3: _____ #4: _____ #5: _____ #6: _____ #7: _____ #8: _____ #9: _____ | | | | | |
| #10: _____ #11: _____ Plant Water Strainer: _____ psi | | | | | |
| Plant Water Pumps: #1: _____ psi #2: _____ psi #3: _____ psi | | | | | |
| #4: _____ psi #5: _____ psi Plant Water Flow Rate: _____ | | | | | |
| Secondary Effluent Sampler: Rags? _____ Temp: _____ | | | | | |
| Lead Pump: _____ | | | | | |
| Pump run status: #1: _____ #2: _____ | | | | | |
| #3: _____ #4: _____ #5: _____ #6: _____ | | | | | |
| Sample pump run status: _____ | | | | | |
| Auto sampler free of rags?: _____ Temp: _____ | | | | | |
| Wetwell Level: _____ Any work orders?: _____ | | | | | |
| Chlorine Residuals | | | | | |
| | DPD | Meter | Comments: _____ | | |
| Head: | _____ | _____ | _____ | | |
| End: | _____ | _____ | _____ | | |
| Dechlor: | _____ | _____ | _____ | | |
| | | | _____ | | |
| | | | _____ | | |
| | | | _____ | | |

Phase 2

Develop Operational Guide



Phase 2

Develop Operational Guide

- Typical summary table – grit removal

| Item | Standard | High Flow | Low Flow |
|----------------------------|----------------------------------|----------------------------------|----------------------------------|
| Sluice Gates | Fully Open to On-line Grit Tanks | Fully Open to On-line Grit Tanks | Fully Open to On-line Grit Tanks |
| Grit Tanks | 3 Units | 4 Units | 3 Units |
| Grit Blowers | 2 | 2 | 2 |
| Air Control Valves | Fully open | Fully open | Fully open |
| Septage Receiving Stations | 1 | 1 | 1 |
| Septage Pumping | Automatic | Off | Automatic |

Phase 2

Develop Training Modules

South Essex Sewerage District
Salem, Massachusetts

On-Boarding Training Module

WRIGHT-PIERCE 
Engineering a Better Environment



South Essex Sewerage District
Salem, Massachusetts

Operations Training Module

WRIGHT-PIERCE 
Engineering a Better Environment



Phase 2

Improved Communication

- Initiated weekly meetings to discuss equipment status:
 - Operations, Maintenance, Engineering
- Assessing enhanced Computerized Maintenance Management System (CMMS)
- Increasing use of Hach Wims to leverage data
- Striving to accelerate communications across all divisions

Closing Remarks

- SESD transition planning effort focused on opportunity to improve operational efficiency.
- Change existing mindset of doing things the same way.
- As new operators come on-board, working to have new systems in place.
 - Maximize use of staff time/ tackle incomplete work
 - Improved reference materials
 - Improved communication
 - Improved data management systems
- Training of new and existing staff on new systems and new mindset.

Questions

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