Down the Drain: Trimming Energy Waste from a Wastewater Facility without Breaking the Bank

Simsbury, CT WPCF

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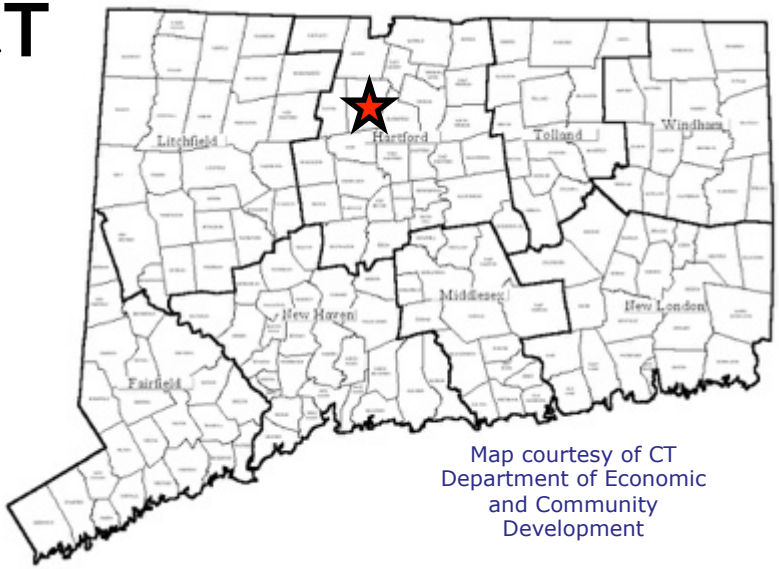
Tighe&Bond

Overview

- Plant Overview
- Plant Optimization Goals
- Energy Savings Opportunities
- Utility Rebate/Financing
- Design & Code Approach
- Discussion

Treatment Plant Overview

- **Located in North Central CT**
  - Farmington River
  - CT Nitrogen Trading Program
  - Future Phos Limit ~2.5 mg/l

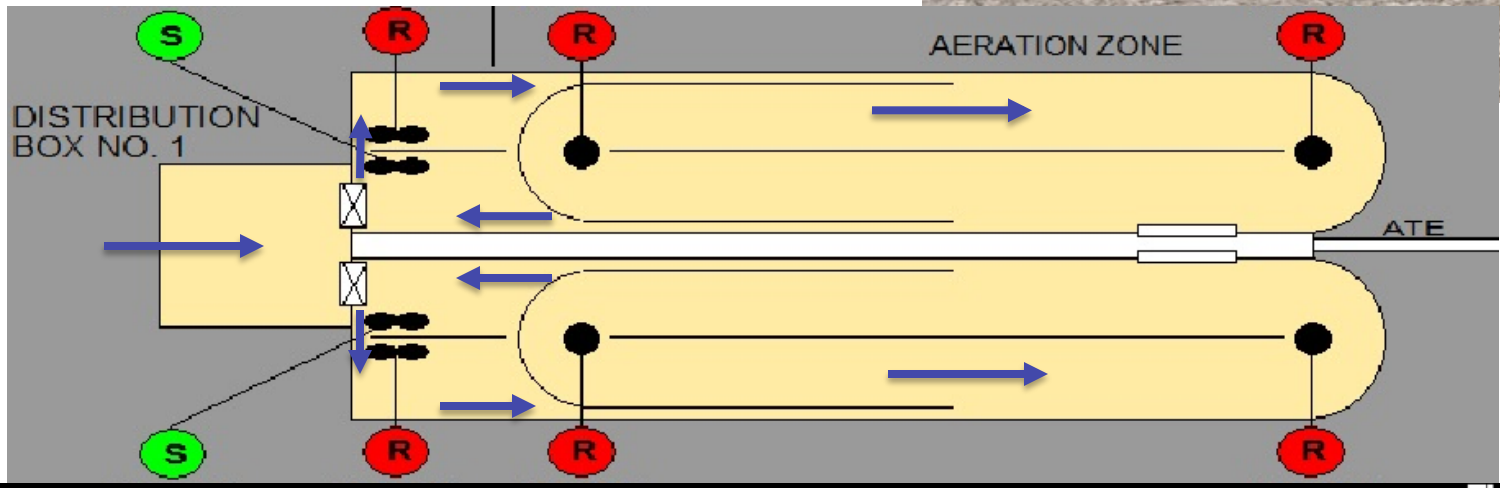


Map courtesy of CT Department of Economic and Community Development

- **Oxidation Ditch Plant**
  - 2006 Major Upgrade $22 Million
  - Average Flows
    - 3.8 MGD Design
    - 2.1 MGD Actual
  - $260,000/yr Gas & Elec

Treatment Plant Overview

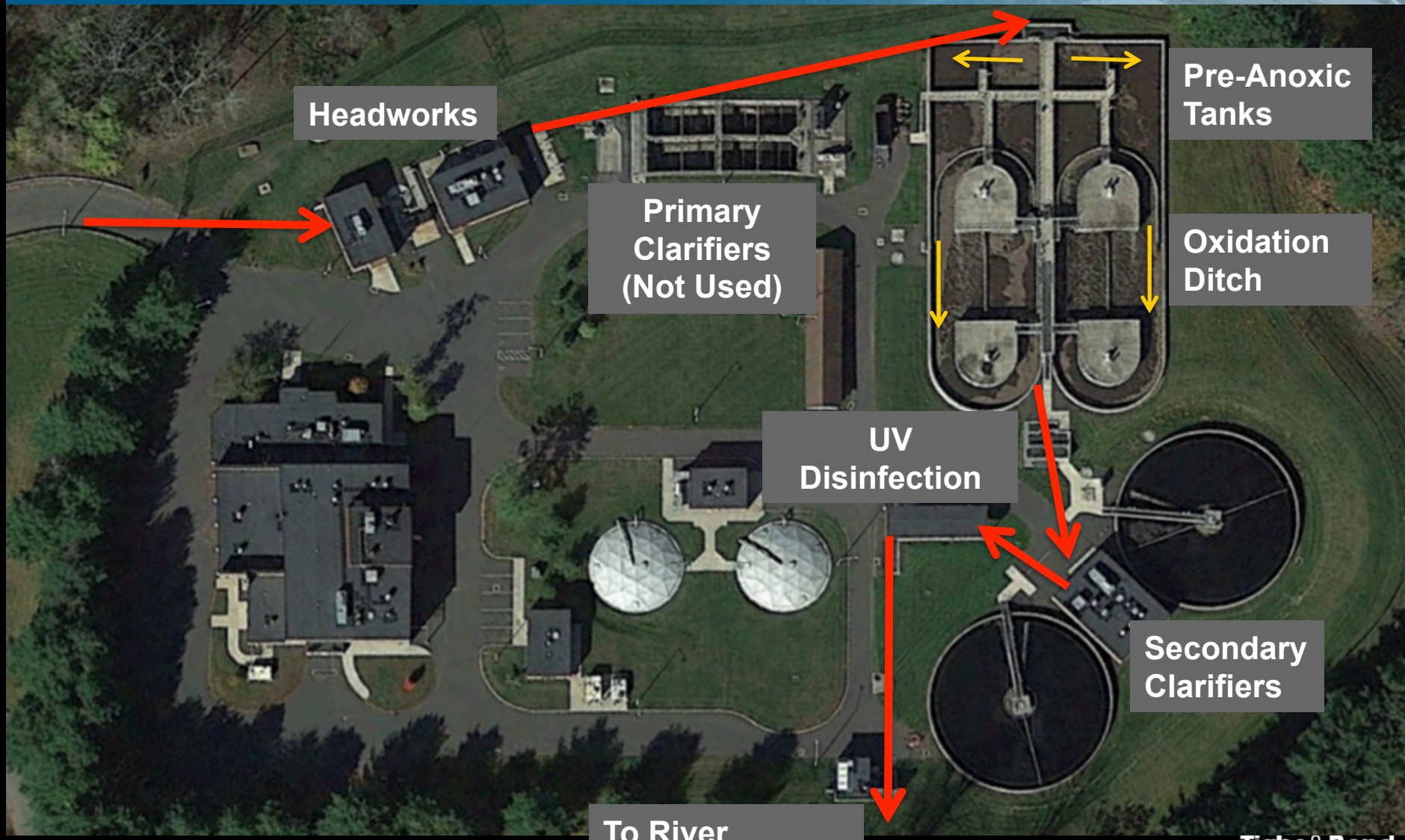
- **Oxidation Ditch**
  - Run 2 Winter
  - Run 1 Summer
- **Designed for Nitrogen Removal**
  - 2 Stage Anoxic Zone (Fixed Speed Submersible Mixers)



Treatment Plant Overview

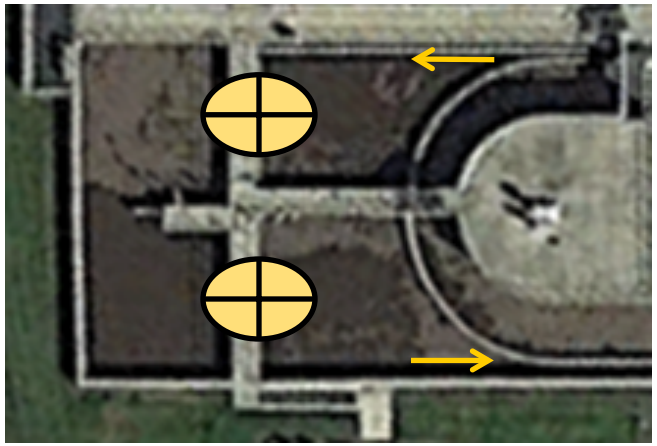
- **Upgraded solids handling system**
  - Sludge Storage Tanks (2)
  - Belt Filter Presses (2)
- **Odor Control System**
  - Chemical Scrubber
- **Modern SCADA Based Control System**

Plant - Liquid Process Train

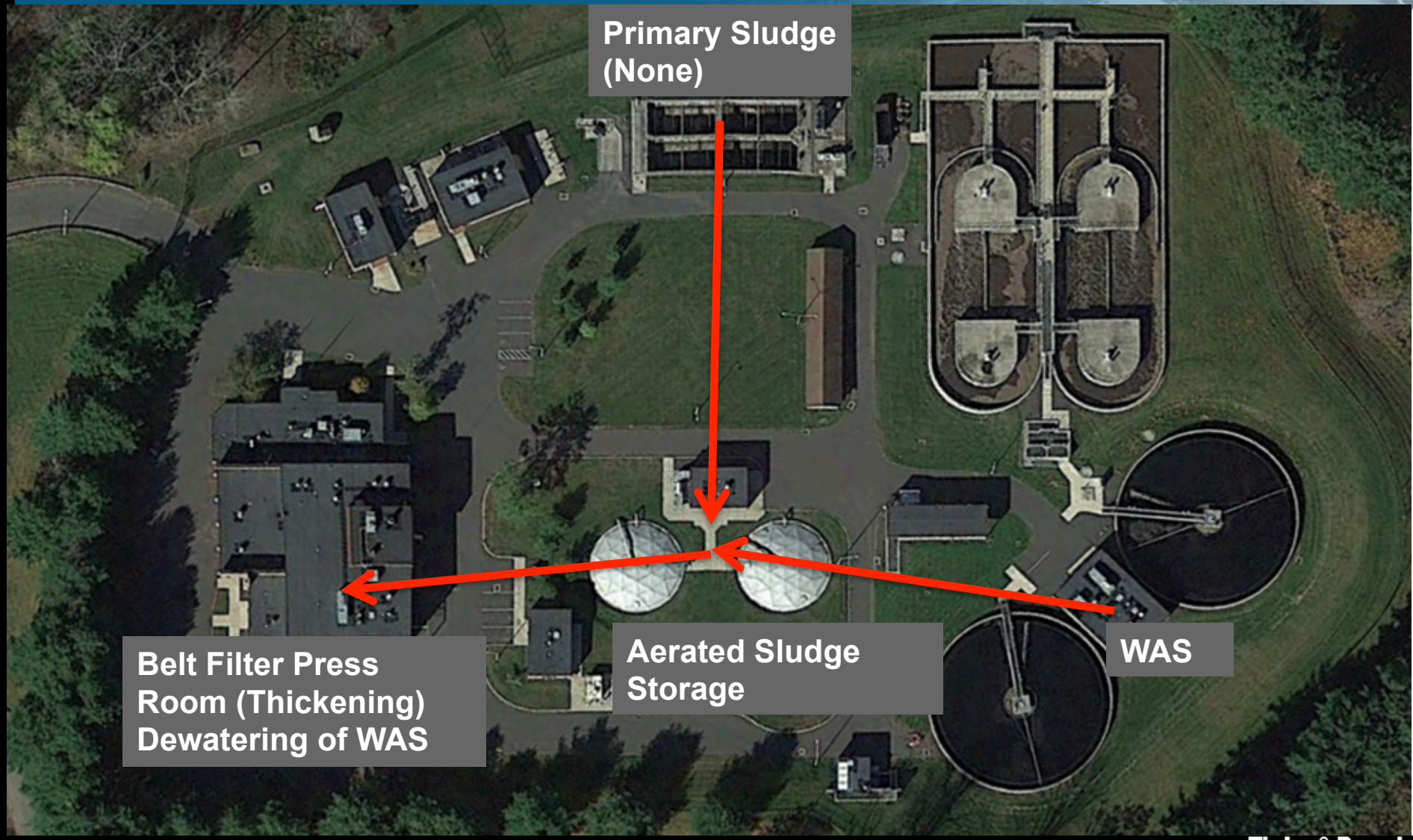


Optimization Goals - Aeration

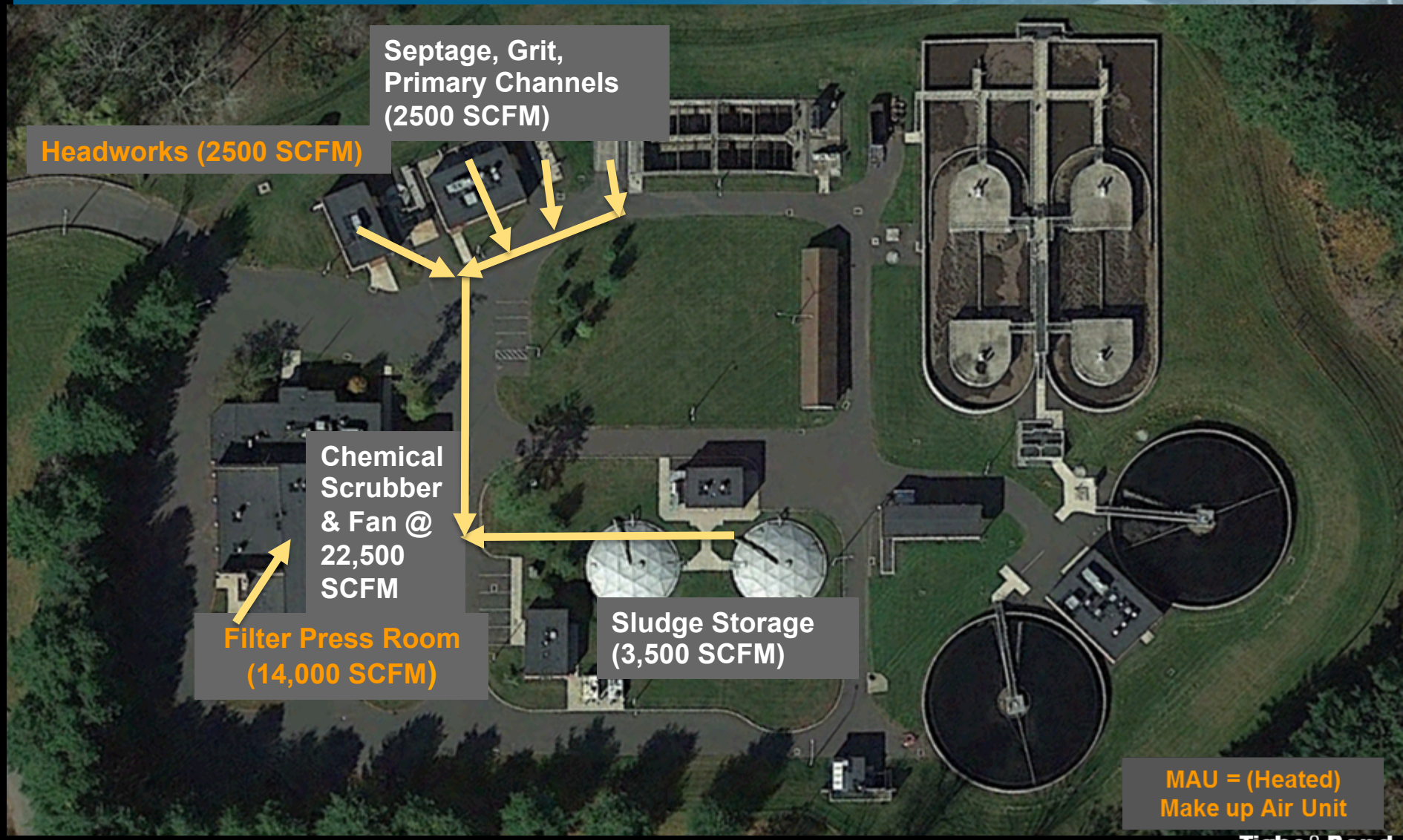
- **Reduce Energy Usage, Improve Nutrient Removal**
  - Low Cost Control Changes
    - ✓Optimize Aerators Speed Controls
    - ✓Minimum Dissolved Oxygen
    - ✓Sequencing Anoxic Mixers On/Off
    - ✓Bio Phos Removal < 1 mg/l TP
  - Next Step - Invest in Mixer VFDs ?
    - Off – Hi – Low - Off
    - Save $



Plant - Solids Process Train



Plant -Odor Control



Role of ESC Environmental Systems Corporation

- **Design Build Contractor**
  - HVAC
  - Building Automaton
- **Specialty: Deliver Energy Saving Projects**
  - Create Financial Package
  - Facilitate Utility Involvement
  - Act as GC to Install Measures
  - HVAC Controls Programming

HVAC Controls Measure

- **2 Office HVAC RTUs**
  - Original Controls provided scheduled heating and cooling
- **Proposed:**
  - Dual Enthalpy Economizer
  - Demand Based Ventilation
  - Improved scheduling

Saves $2,800 per year

Anoxic Mixer VFD Measure

- **Four 15 HP Mixers**
  - Cycle On and Off at full speed
  - On 50% of Time
- **Proposed:**
  - Better process control
  - Reduced motor speeds
    - Hi 10 min
    - Low 110 min

Saves $8,100 per year

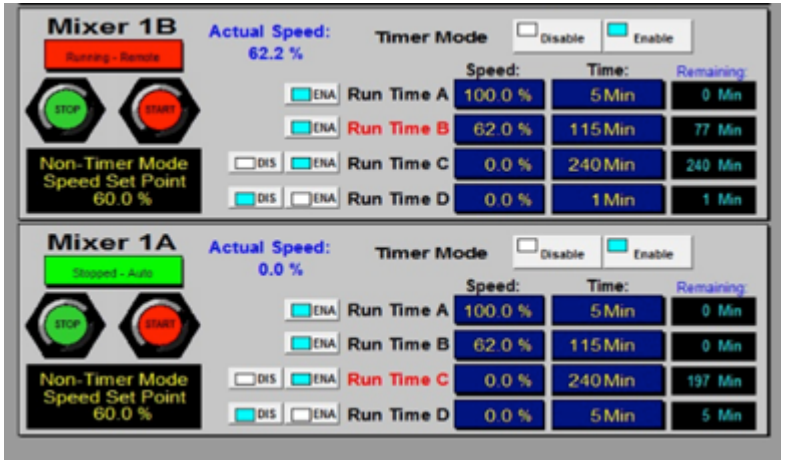
Odor Control Measure

- **Odor Control Fan**
  - Exhaust Fan: Two Speed 40/18 HP
  - Runs Hi Most time (Can't shut off)
  - Manual Dampers
- **Belt Press Room MAU**
  - 15 HP / 12,000 CFM Gas Fired
  - One Speed – Full Time
- **Proposed:**
  - Reduced Ventilation when Presses are Off
  - VFDs /Better Controls

Saves $15,600 per year

Role of Tighe&Bond

- Wastewater Process
- Process Controls Redesign
- Code (NFPA 820) Review
- Submittal Review on Control Panel Modifications
- SCADA Programming



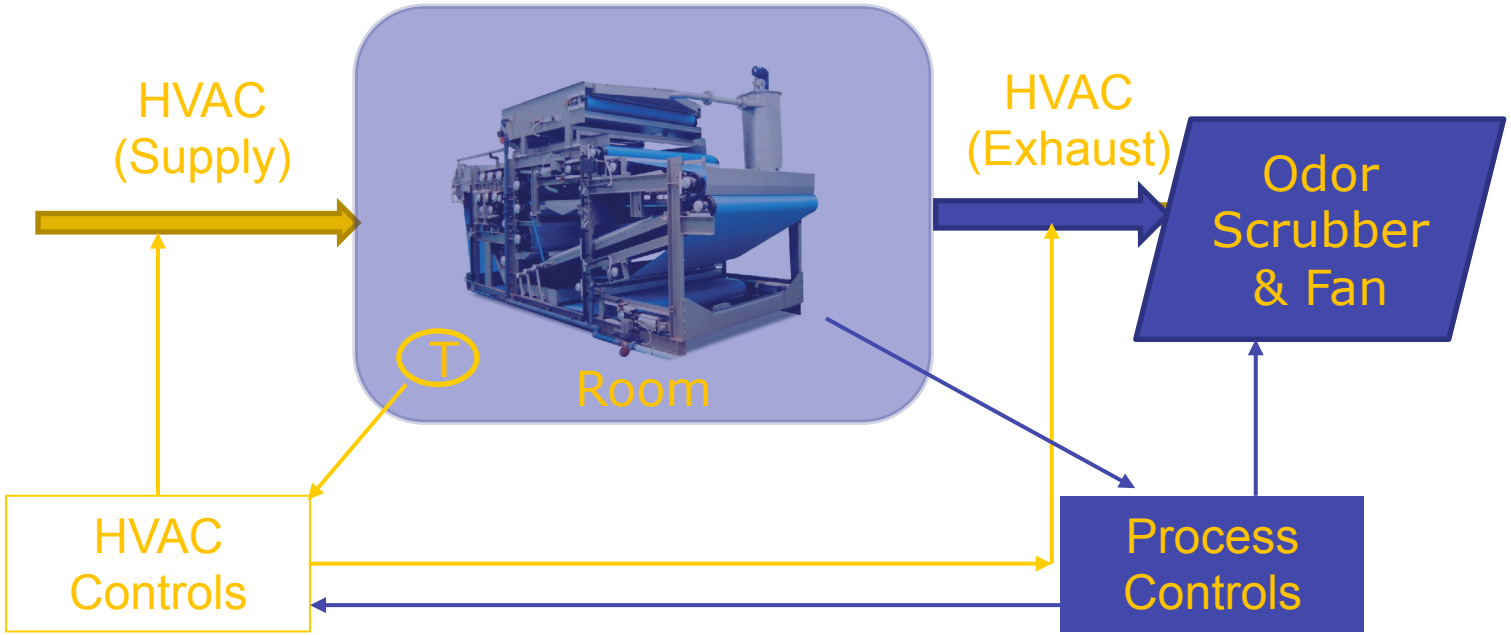
5 Min 100%

115 Min 62%

240 Min Off

HVAC vs Process Controls

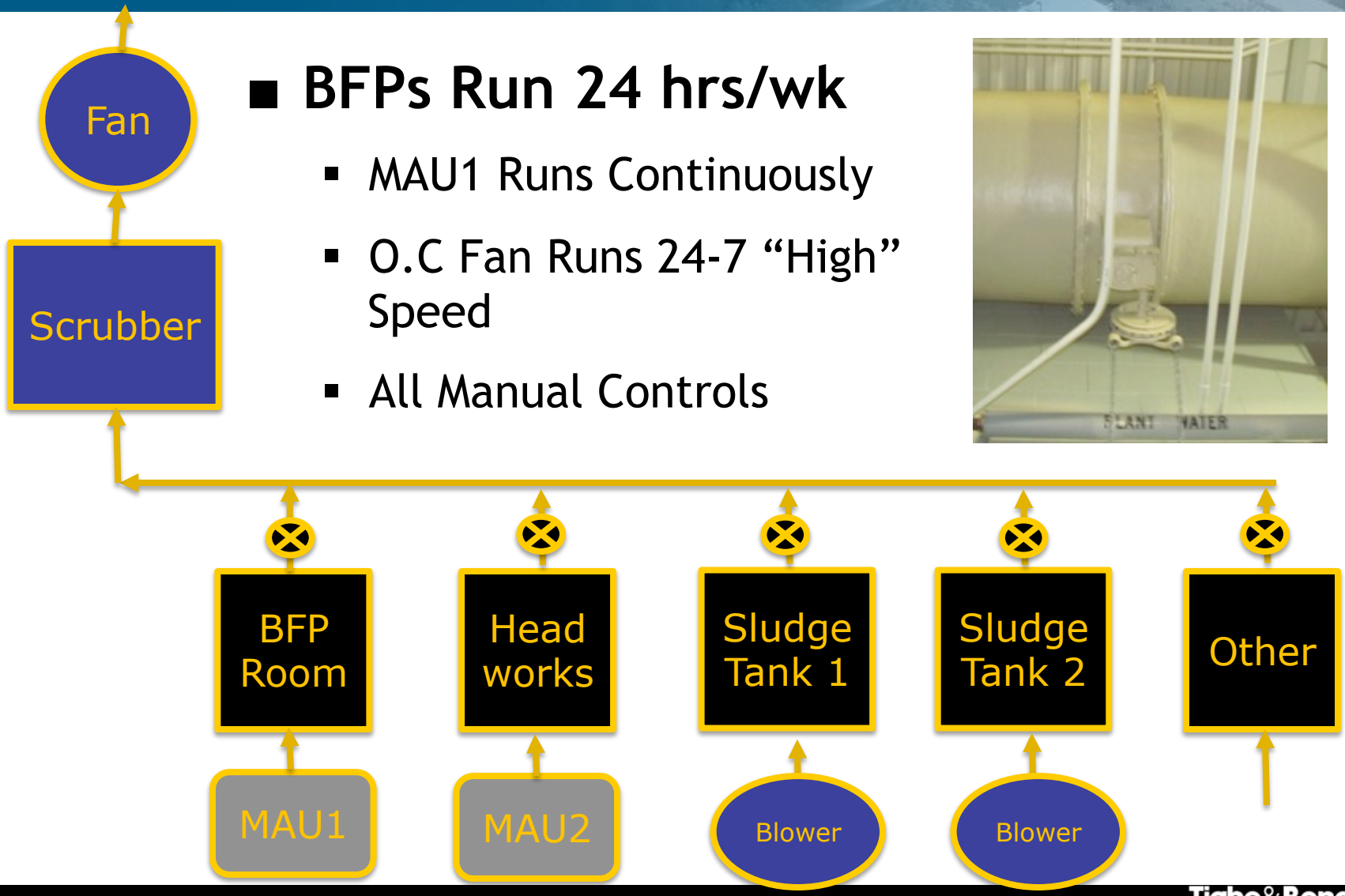
- **Each - their Own Language**



Simsbury Approach

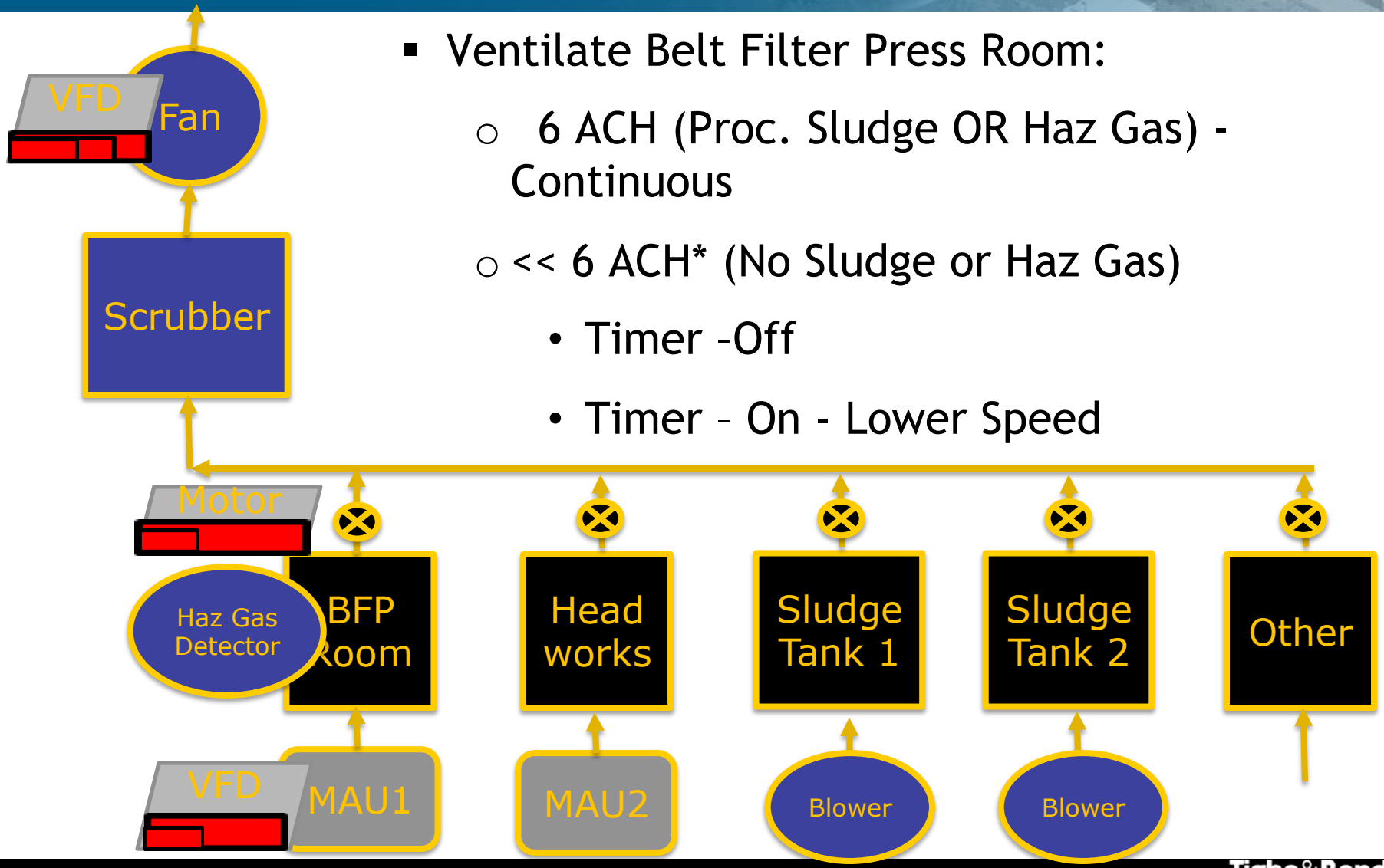
- **Is Press Running (Sludge in Room)?**
  - Yes – Ventilate at 6 Air Changes Per Hour
    - NFPA – 820 Para 6.2A Row 12
  - No - Treat Like a Normal Room
    - Minimize Ventilation for Energy Conservation
      - Cycle on-off (keep Room Fresh)
      - Vent for Summer Cooling
      - Rely on Fin Tube Radiation for Winter Heating

Odor Control Not Optimized



- **BFPs Run 24 hrs/wk**
  - MAU1 Runs Continuously
  - O.C Fan Runs 24-7 “High” Speed
  - All Manual Controls

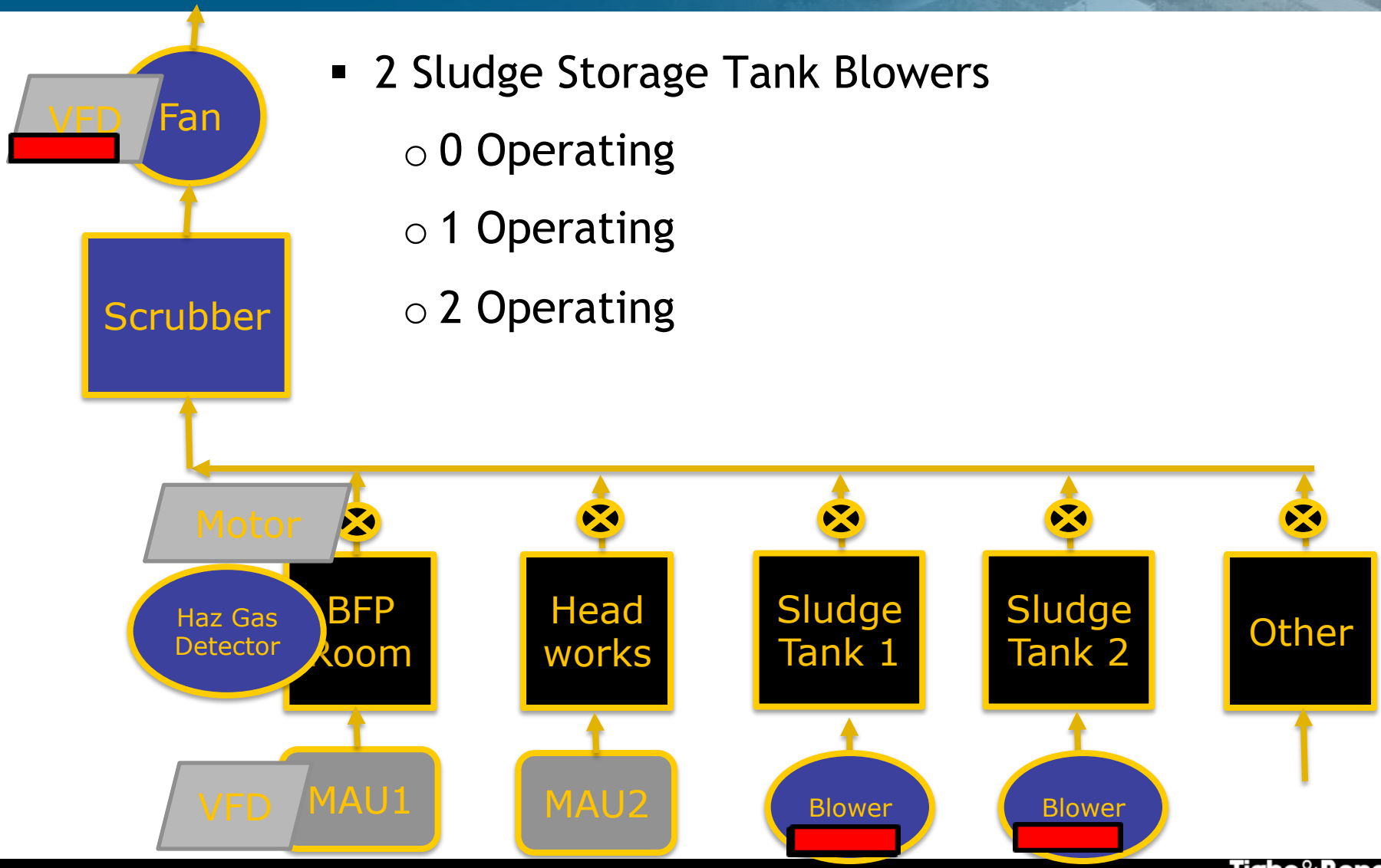
Odor Control Optimized - BFPs



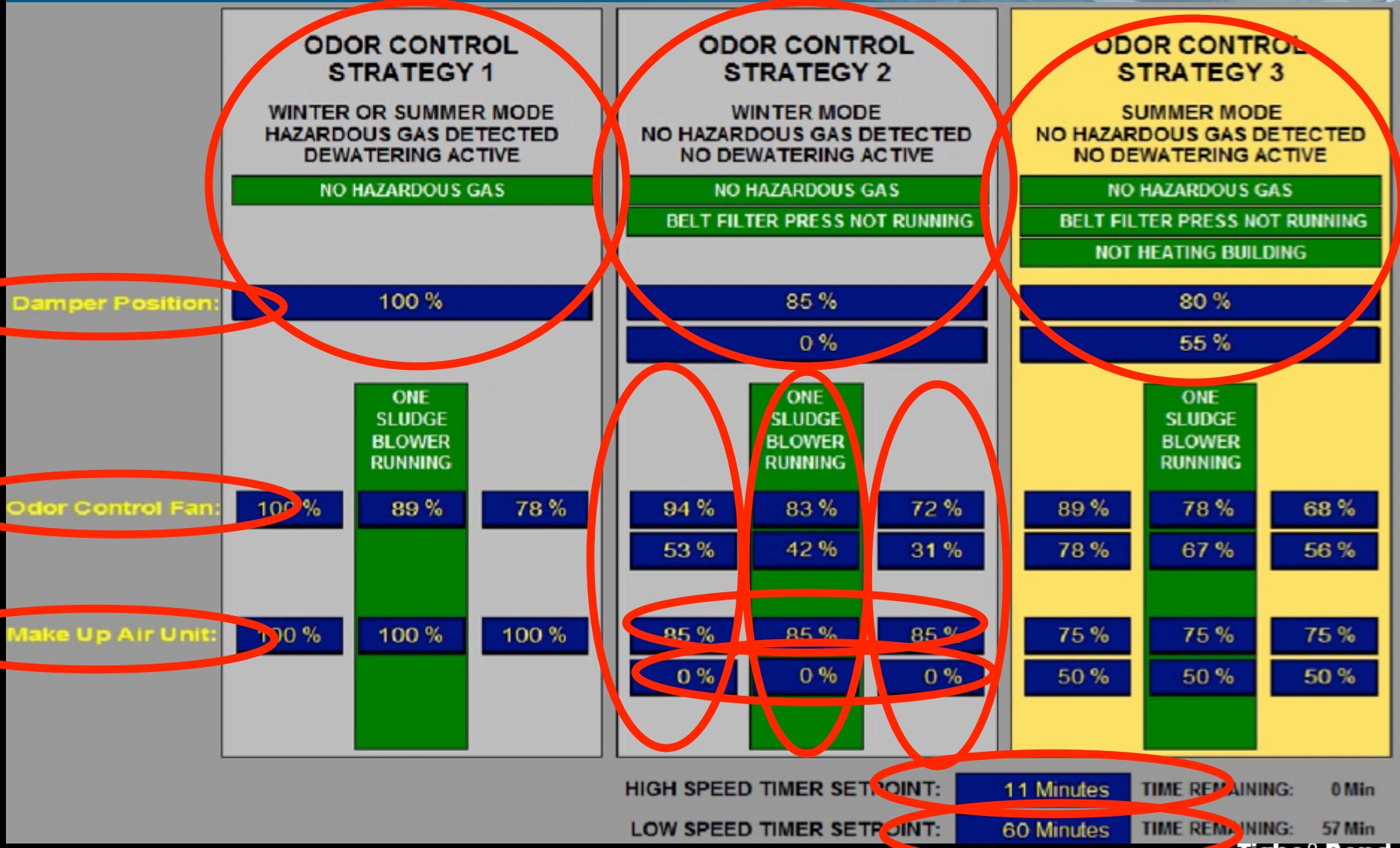
- Ventilate Belt Filter Press Room:
  - 6 ACH (Proc. Sludge OR Haz Gas) - Continuous
  - << 6 ACH* (No Sludge or Haz Gas)
    - Timer –Off
    - Timer – On - Lower Speed

Odor Control Optimized- Storage Tanks

- 2 Sludge Storage Tank Blowers
  - 0 Operating
  - 1 Operating
  - 2 Operating



SCADA System Control Screen



Tighe&Bond

Utility Incentives and Financing

- Gas & Electric Incentives
- Comprehensive Bonus (Process & HVAC)
- Design Build
- Utility Financed

ANNUAL SAVINGS:
$26,600

TOTAL INVESTMENT REQUIRED:
$203,200

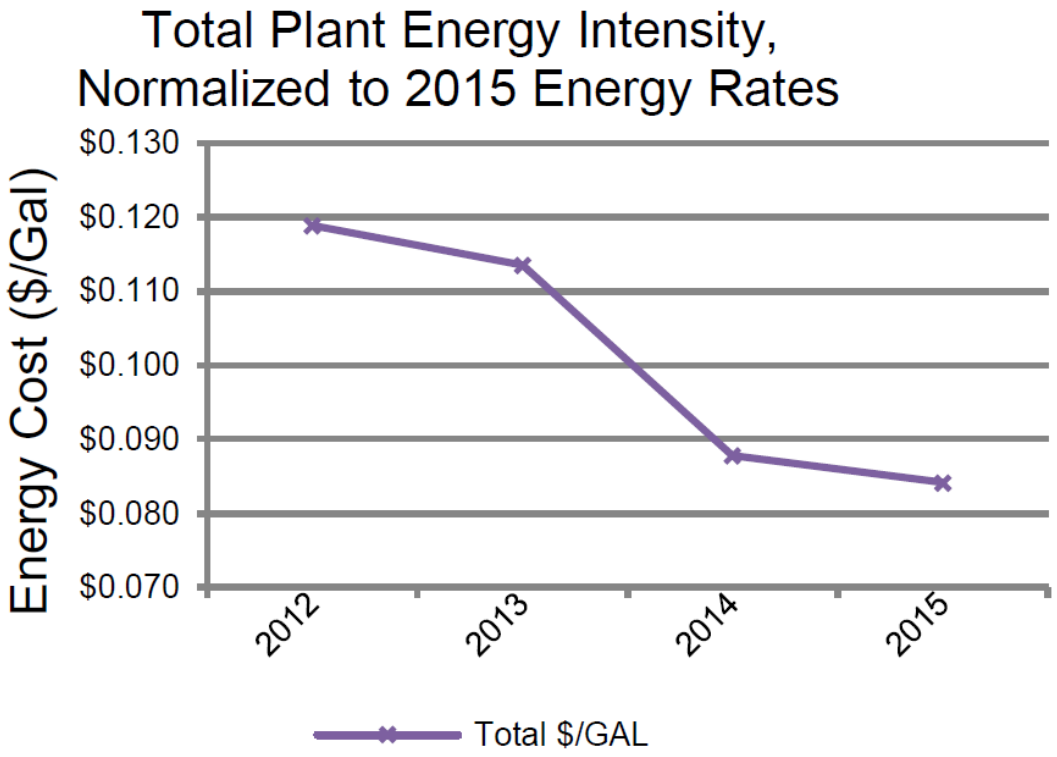
AMOUNT FINANCED:
$100,000 (0% interest)

UTILITY INCENTIVES OBTAINED:
$86,100

OUT OF POCKET REQUIRED:
$17,100

Project Status

- **Work Completed Aug 2015**
- **Mild Weather Since**



Closing

- **Discussion & Questions for the Team?**
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