Grease Trap Waste Acceptance and Codigestion at the Derry Township Municipal Authority Clearwater Road WWTP, Hershey, PA

PRESENTED TO THE NATONAL ASSOCIATION OF WASTEWATER TRANSPORTERS, Inc.

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Derry Township Municipal Authority
September 16, 2010

DTMA
Derry Township Municipal Authority

DTMA Organizational Overview

- **Operating Authority – Staff of 32**
- **Two Wastewater Treatment Facilities**
  - **Clearwater Road WWTP**
    - **5.02 MGD**
  - **Southwest WWTP**
    - **0.6 MGD**
    - **Unmanned Satellite WWTP**
- **Thirteen Pumping Stations**
- **150+ Miles of Sanitary Sewer**
  - **6” to 48” ☠**

DTMA Clearwater Road WWTP

Clearwater Road WWTP
Process Flow Diagram

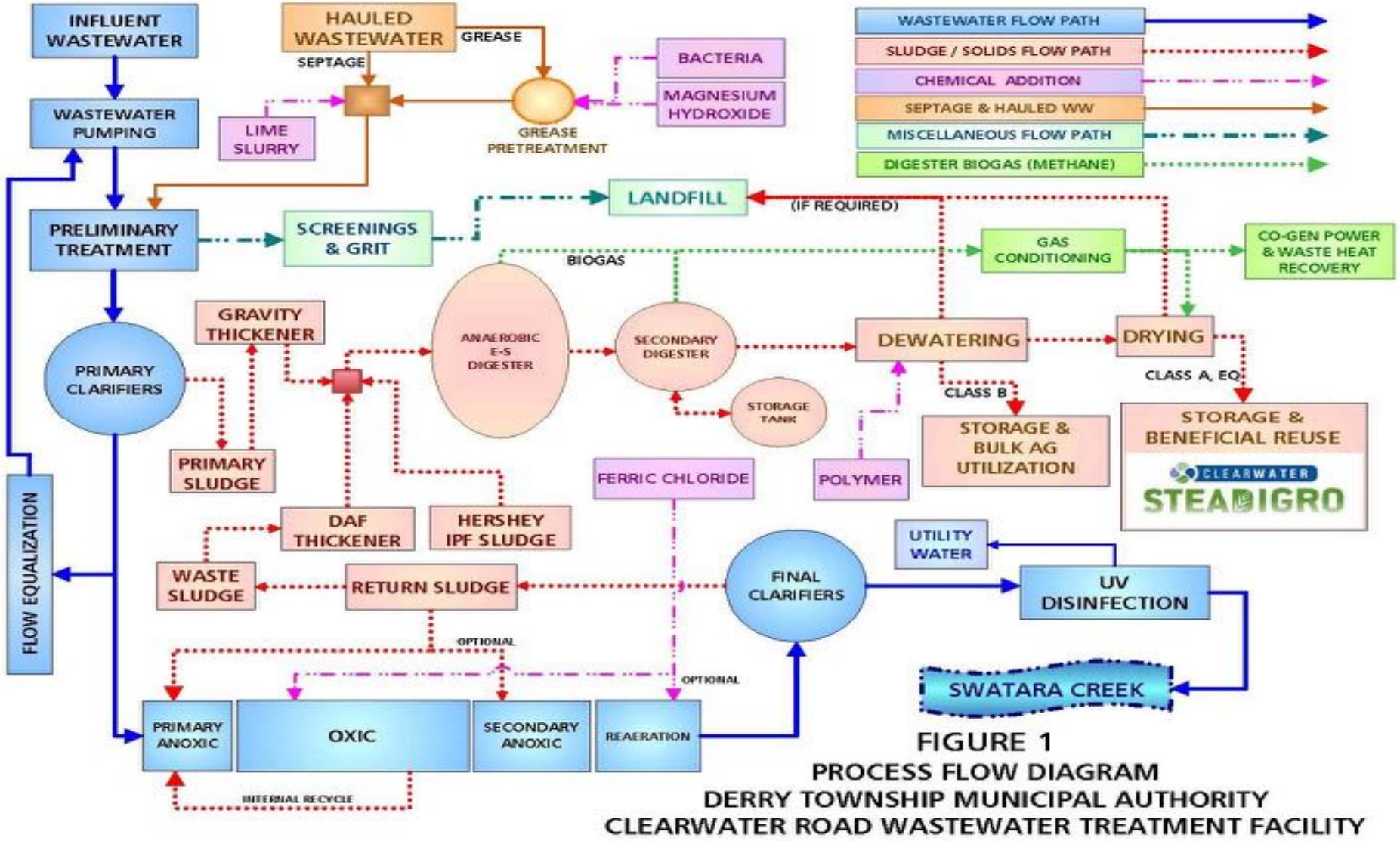


FIGURE 1
PROCESS FLOW DIAGRAM
DERRY TOWNSHIP MUNICIPAL AUTHORITY
CLEARWATER ROAD WASTEWATER TREATMENT FACILITY

Major Components
Wastewater Treatment

- **5.02 MGD Activated Sludge**
  - **Wastewater Pumping**
  - **Preliminary Treatment**
    - **Screening & Grit Removal**
  - **Septage Receiving Station**
  - **Primary Clarification**
  - **Activated Sludge Mechanical Aeration**
  - **Biological Nitrogen Removal (Chesapeake Bay compliant)**
    - **(anoxic ~ oxic ~ anoxic ~ re-aeration)**
  - **Ferric Chloride ($FeCl_3$) Addition for "P" Removal**
  - **Enhanced Final Clarification**
  - **UV Disinfection**

Major Components
Solids Processing

- **Sludge / Biosolids Processing Facilities**
  - **Gravity Thickening - Primary Sludge**
  - **DAF – WAS**
  - **Hershey IPF Sludge**
  - **Anaerobic Sludge Digestion (two stage)**
  - **Centrifuge**
  - **Indirect Paddle Dryer**
  - **Biosolids Storage Pad**
  - **SteadiGro™, Class A – “EQ” Product Beneficial Reuse**

Solids Handling
2009 Sludge Production

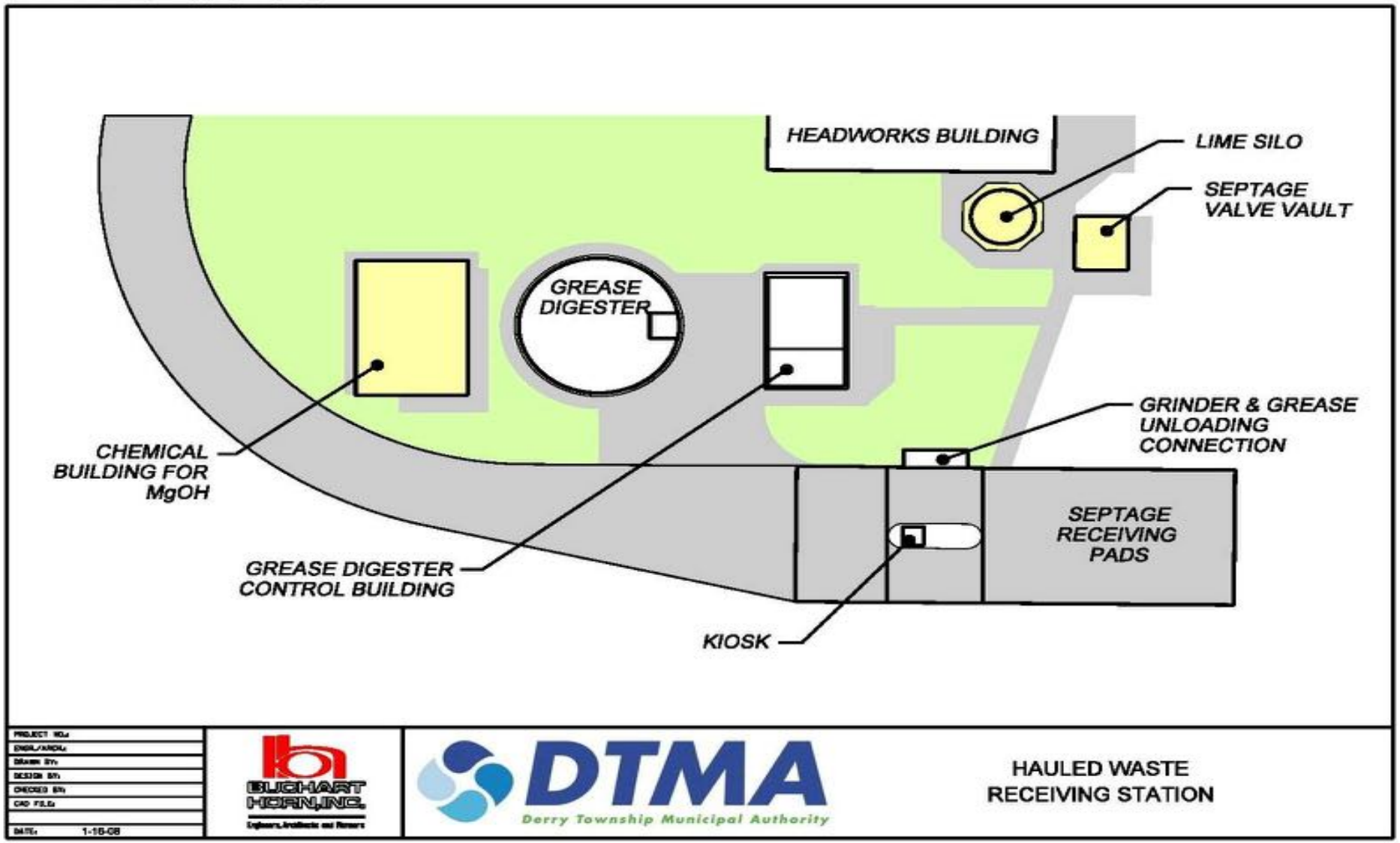
- **9.1 DT/D Raw**
  - **5.7 DT/D (63 %) Primary Sludge**
    - **1 DT/D (12%) Septage/Grease Pretreatment Solids**
  - **2.2 DT/D (24%) WAS**
  - **1 DT/D (11%) IPF Sludge (anaerobic raw)**
  - **0.2 DT/D (2.2%) DTMA SW WWTP WAS**

- **4.1 DT/D Digested**
  - **55% Reduction**

Septage Receiving

- **Septage Receiving**
  - **Illegal Dumping in late ’80’s**
  - **First Receiving Station Started in August 1991**
- **Current Receiving Station**
  - **Two Lane**
  - **Hauler Kiosk & DTMA Operator Station**
  - **Lime addition to settle solids (& organic load) in primary clarifier**
  - **Screening & Grit Removal via WWTP Headworks**
- **2009 Totals – 20.6 MG**
  - **Septage - 13.85 MG [~48,400 GPD]**
  - **Grease Trap Wastes - 5.89 MG [~20,600 GPD]**
  - **Misc. Sludges - 0.81 MG [~2,800 GPD]**

Septage Receiving
Facility Layout



Septage Receiving
Overview

Greasetrap Wastes Pretreatment
Genesis

- Originally Refused Grease Trap Wastes (GTW)
  - Grease was loosely define as 750 mg/l FOG
- "Evolution" of GTW Acceptance
  - Started Grease Trap inspections to prevent sewer clogs & issues at pump stations & required proof of pump-out
  - Restaurant documentation of pump out was "weak"
- Accepted GTW from Derry Twp Restaurants
  - Requested GTW be diluted

Greasetrap Wastes Pretreatment
Genesis

- Problems, Problems, & PROBLEMS
  - Build up of Grease on Primary Clarifier baffles, weirs, beaches, in the PC center wells & scum pits
  - 30 – 40 CY removed from each PC every 3 months
  - Plugging Primary Sludge Line
  - Tear down & flush line every month
  - Visible grease “specks” in digested BFP cake

GTW Pretreatment
Genesis

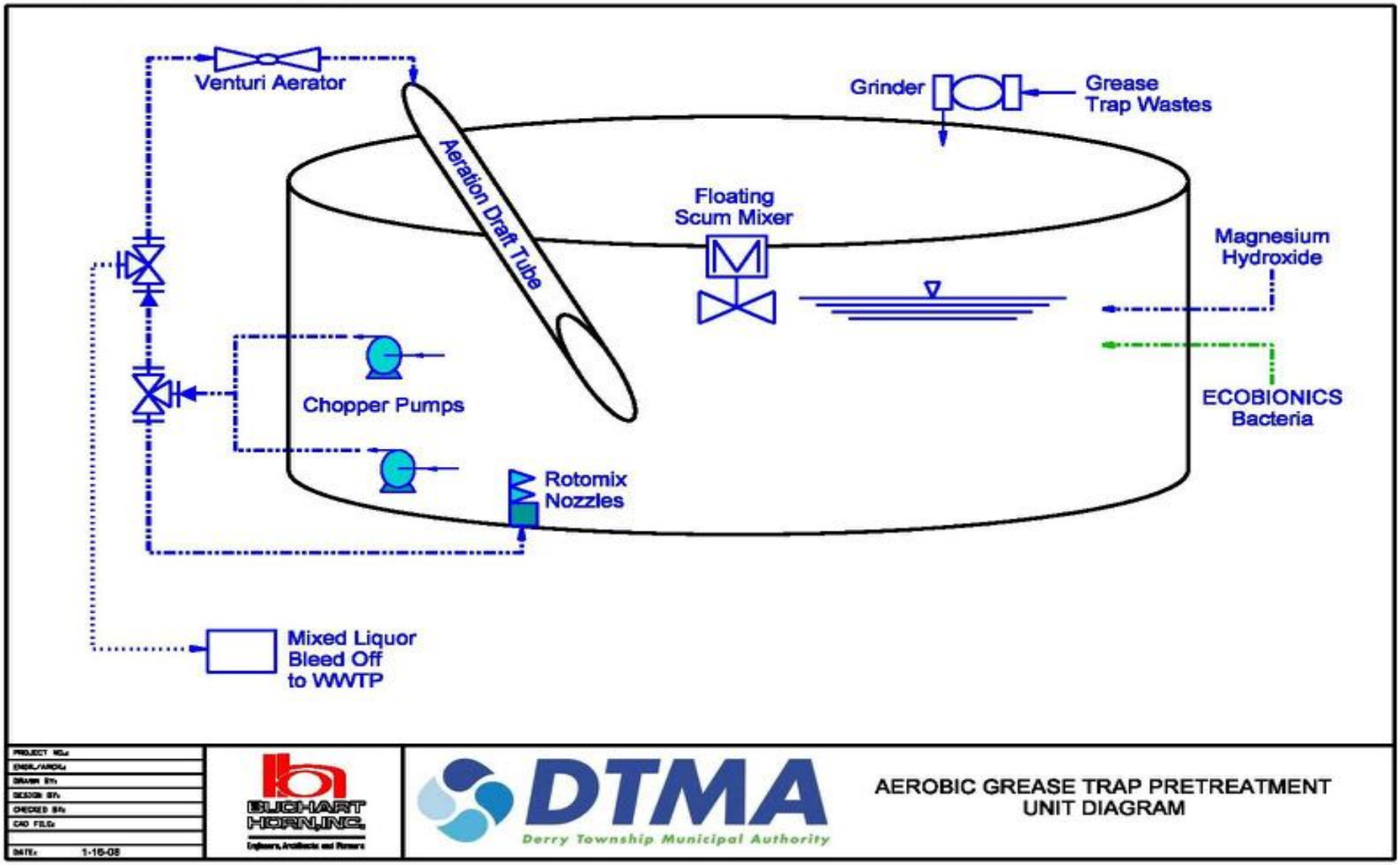
- Accumulation in Primary Clarifier Scum Pits
  - Genesis of pretreatment idea
  - Pilot “Digestion” in Scum Pits
  - Bugs, soda ash, & mixing/aeration

- Design Concept for Aerobic Grease Pretreatment (AGP)
  - KISS
  - Incorporate into existing septage receiving station
  - Provide 48-72 Hours of detention (40,000 gal tank)
  - Computer controlled fill & draw
    - Draw off mixed, tank liquor to WWTP Headworks

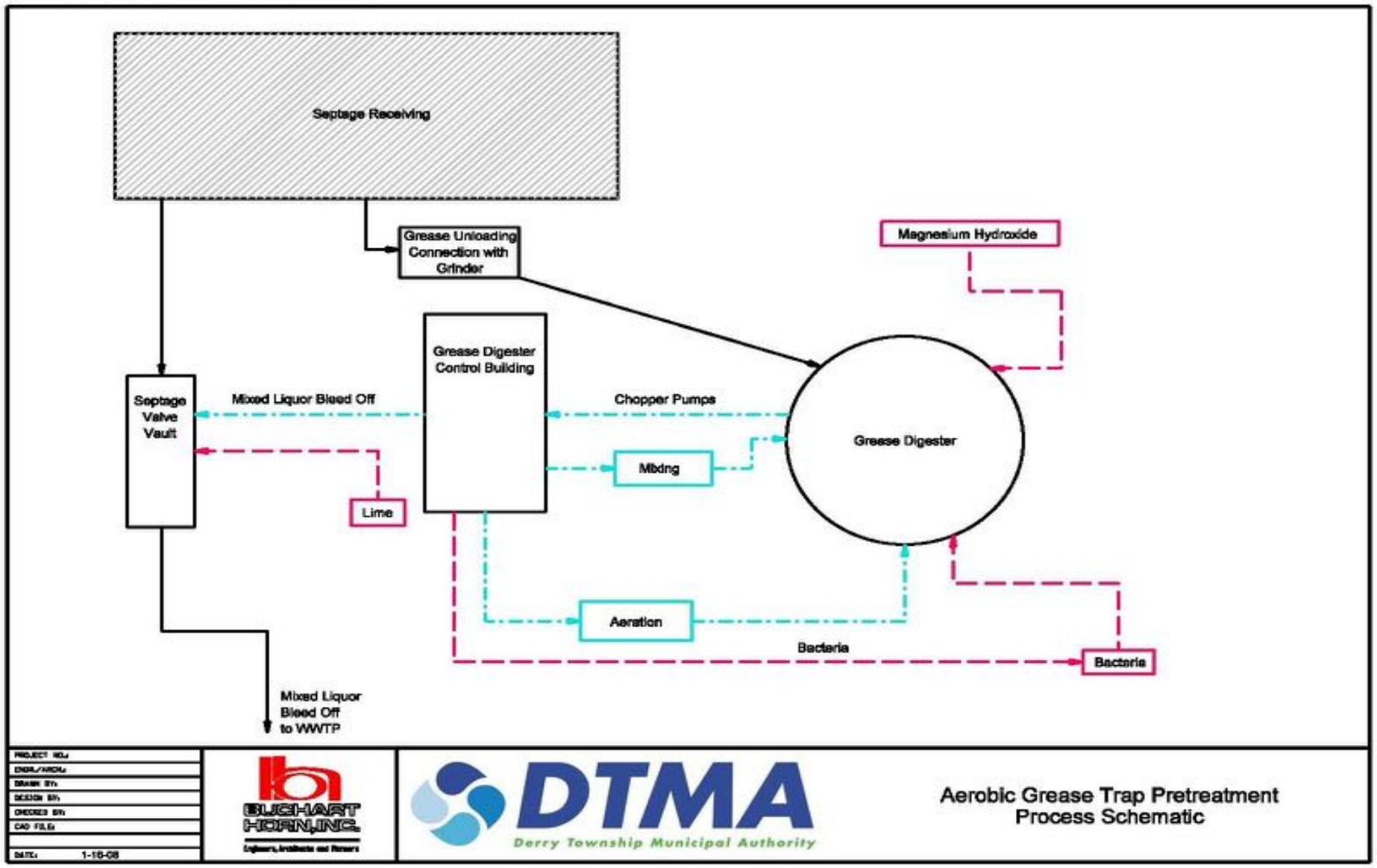
GTW Pretreatment
Genesis

- Design Concept (continued)
  - Chopper Pumps
    - Venturi Aeration
    - Rotomix Mixing Nozzles
  - pH Adjustment (original)
    - Manual control
    - Lime Addition
  - pH Adjusment (current)
    - Automatic control via pH probe
    - Magnesium Hydroxide
  - Addition of Bacteria
    - ECOBIONICS™ Biogenerator bacteria delivery system

GTW Pretreatment
Process Schematic



GTW Pretreatment
Process Flow Diagram



GTW Pretreatment
Performance

- Immediate & Dramatic Results throughout WWTP
  - Within a few weeks grease buildup through out the WWTP was gone.
  - Within a few months grease “specks” in BFP cake disappeared.
- Change in delivery philosophy
  - Requested concentrated and if possible dedicated grease trap loads.
  - “Adjusted” rates to enhance cooperation

GTW Pretreatment
Work in Progress

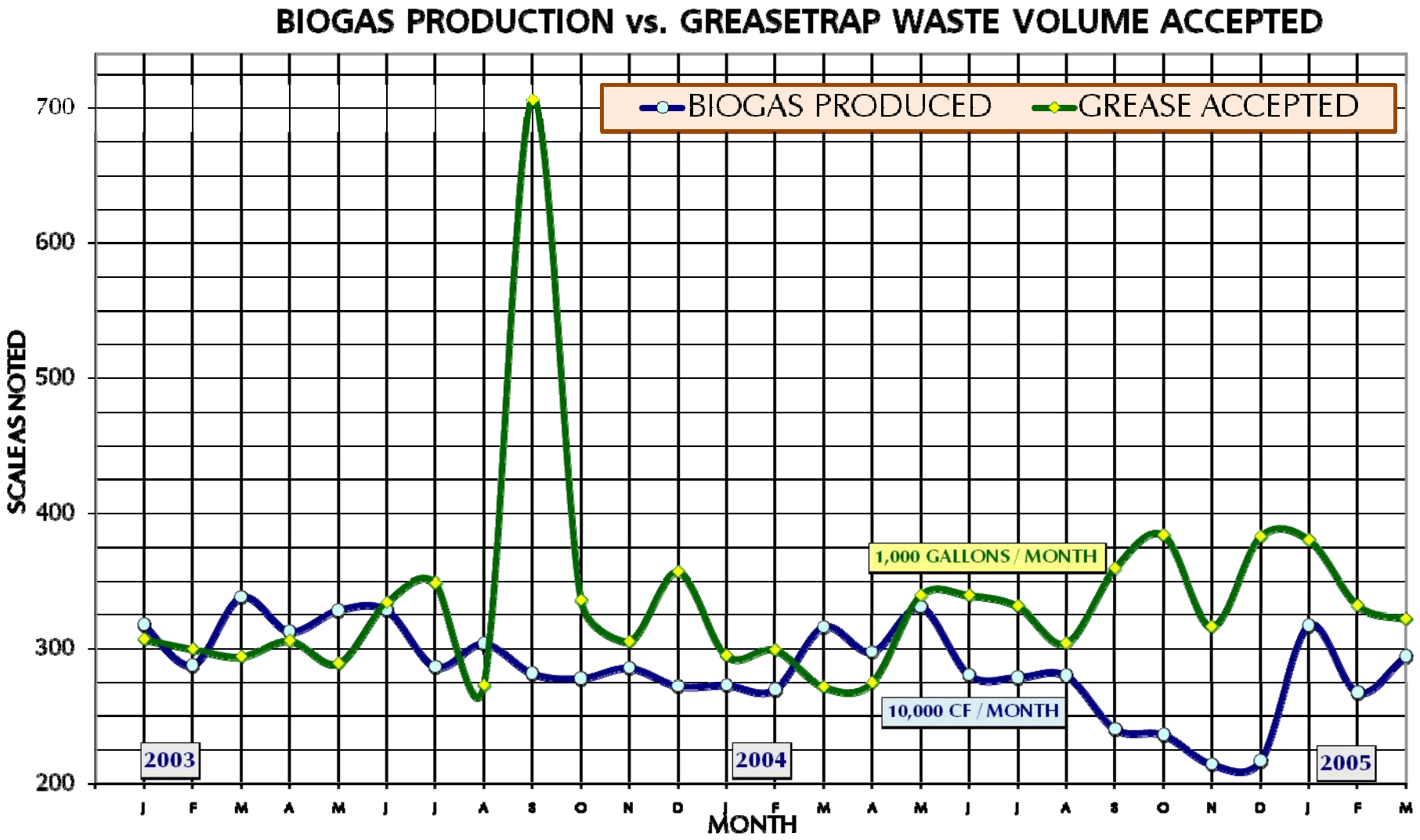
- Improvements
  - Grinder/macerator on truck discharge to AGP
  - Addition of rock trap in front of macerator
  - Addition of pH control for magnesium hydroxide feed
  - Scum / Foam Control
    - Cannot operate system at optimal conditions of pH 7 and D.O. 1 or the foam/scum problem becomes uncontrollable
    - Mission impossible

GTW Pretreatment
Impact on Codigestion

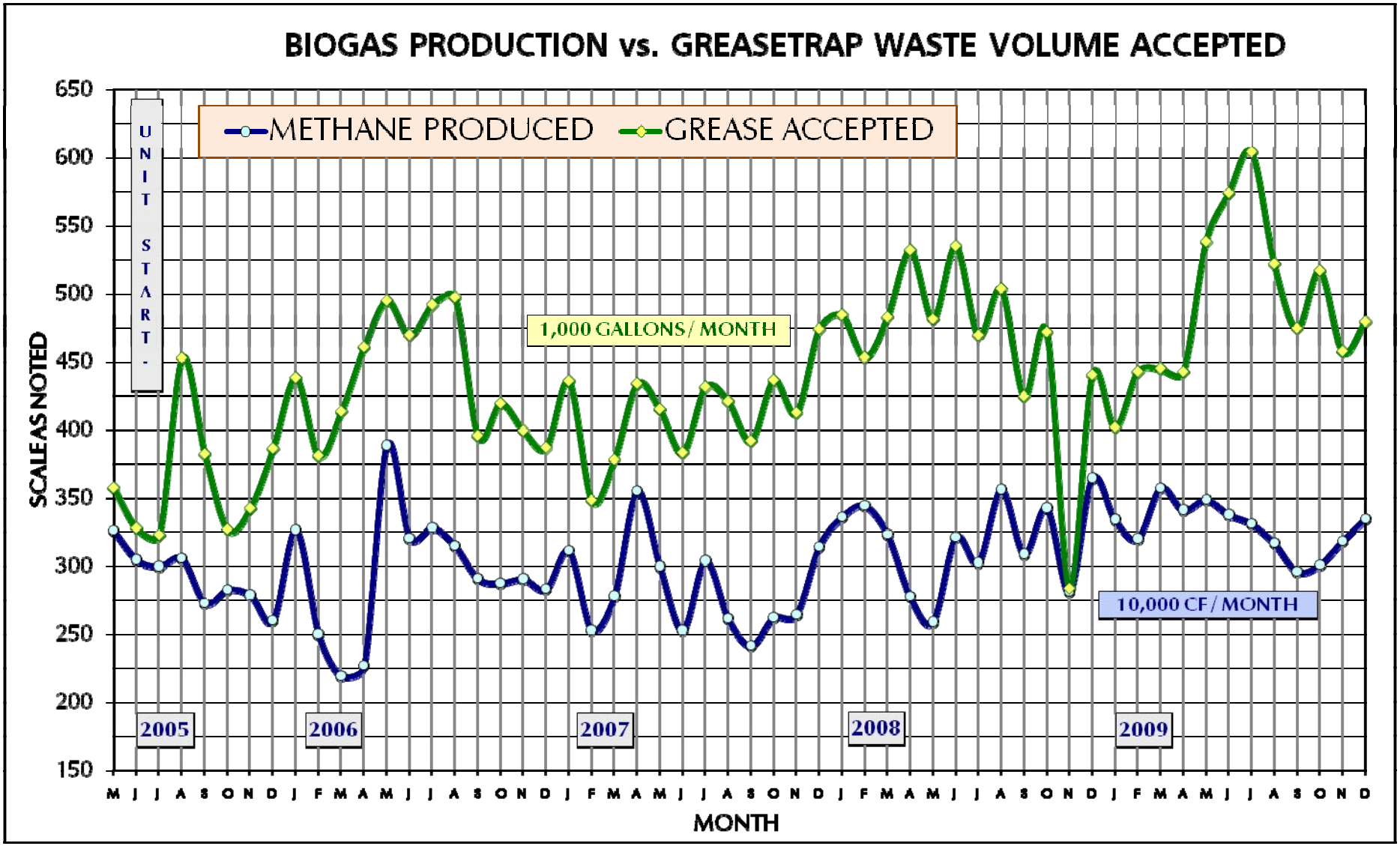
- GTW Mixed Liquor is discharged into headworks with Plant Influent
- Screening & Grit Removal
- Settles out as Primary Sludge
- Anaerobic digester feed stock
  - High Volatiles
  - Very good alkalinity

- Impact of Biogas Production
  - Because of all the variables involved in the digestion of sludge and the subsequent generation of methane, it is very difficult, to establish a quantitative relationship between the amount of grease wastes received and the volume of methane produce, but clearly a relationship exists.

Impact on Codigestion
Before GTW Pretreatment



Impact on Codigestion
After GTW Pretreatment



Biogas Utilization
History

- 2000 - ES Anaerobic Digester On-line
- 2001 - Biogas utilization study
  - No favorable PPL rate structure
  - Green Energy not yet in vogue
  - Phase aligned induction generator not yet common
- 2003 – Plan B
  - Use biogas to produce steam and dry biosolids into STEADIGRO™ Class A, EQ Product for sale
  - Some biogas wasted
- 2007 – Install Centrifuge
  - 50% reduction in dryer biogas use due to increased cake solids
  - Increased biogas production from grease acceptance

Biogas Utilization
History

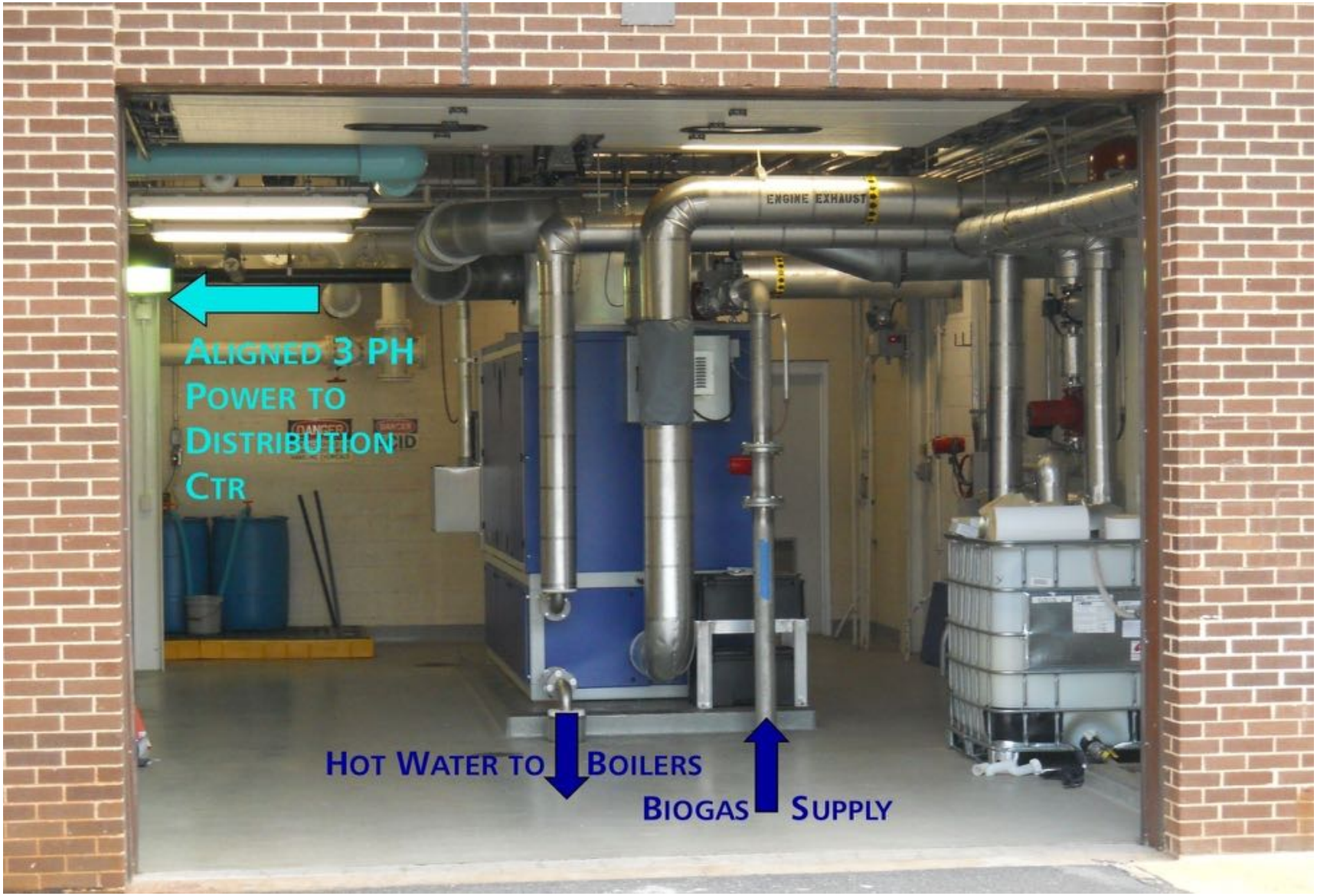
- 2008 - Biogas utilization for CHP
  - PPL rate caps off – 20-30% rate increase
  - Green Energy / REC's
  - Recovered waste heat for building heat
  - Payback ~ 8½ years
- 2009 – Cogen & Gas Conditioning Design & Bid
  - Award Contract ($2,200,000) & Notice to Proceed - July
  - $500,000 PA Green Energy Works (ARRA/DOE) Grant – December
- 2010
  - Unit start-up June 8th

Biogas Utilization
Projected Performance

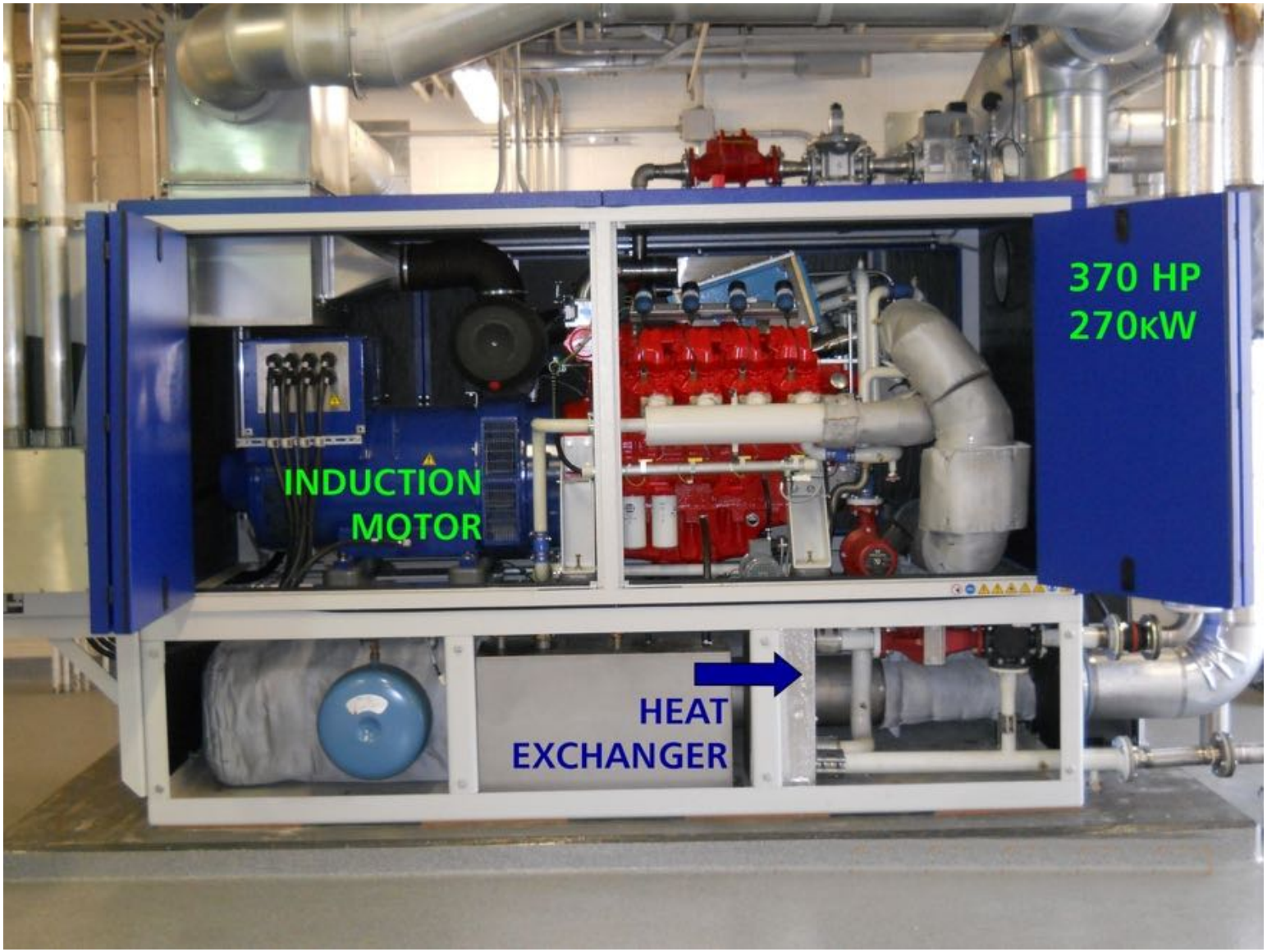
- Annual CHP Forecast
  - Electric Power
    - 1,500,000 kWh / Yr Power Production
    - Approximately 20% of WWTP consumption
    - $150,0000 savings @ $0.10 / kWh
  - Recovered Heat (winter)
    - 20,000 gallons of #2 fuel oil saved
    - $47,000 savings (@ $2.365/G)
  - System O & M
    - Two year bumper to bumper including PMs for Gas Skid & Engine
  - Payback with Grant
    - ~6.5 years

Biogas Conditioning

Cogeneration Engine



Cogeneration Engine
Inside the “Box”



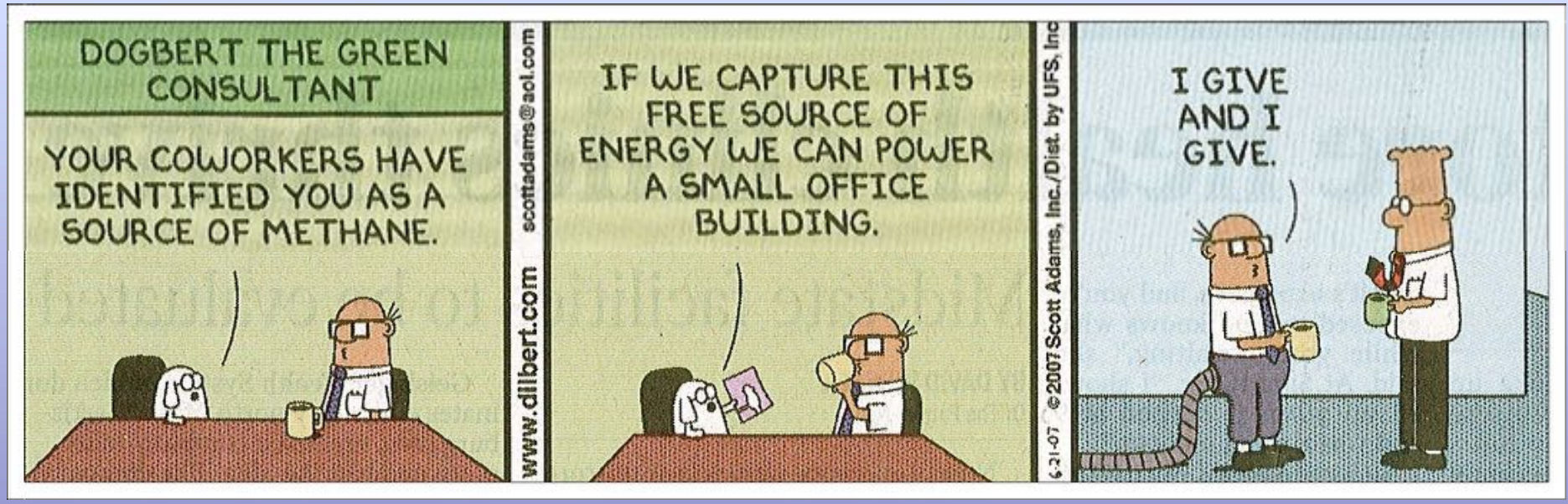
Cogeneration Engine
Connections

Heat Recovery Connections

Waste Heat Radiator

THE FINAL OBJECTIVE

QUESTIONS ?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