WE WANT OUT!!

TURNING AN INDUSTRIAL WASTEWATER DISCHARGE INTO A COMMERCIAL PRODUCT

Michael D. Curtis, Ph.D., P.E.
Director – Project Development
Quantum Biopower
Southington, CT

CURRENT

- 40,000 TPY SSO anaerobic digester
- Two stage Thermophilic System
- 1.2 MW power generation
  - 800 – 900 homes
- Virtual Net Metering – host town
- 10,000 TPY solids
  - A story unto itself!!

Primary Operations of the Digester Project

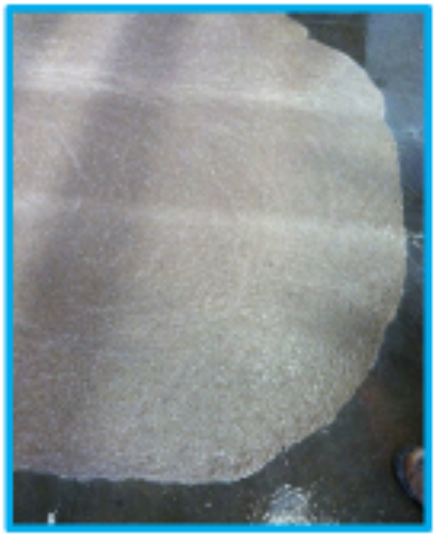
Decontamination/Depackaging
Pulp & emulsify food waste/contamination removal
(8-12% solid)

Digestion/Biogas Creation
2-stage digester, biogas collection sphere

Biogas Conditioning & Combined Heat and Power
Drying & H2S removal & energy creation

Nutrient Recovery & Removal
2-stage digester, biogas collection sphere

Our Facility in Photos

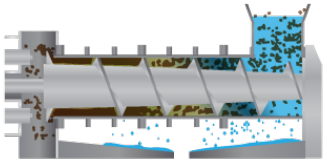


CURRENT

- 15 – 20000 GPD WW
  - Regulated under a general permit
  - administered by the CT DEEP
- 1,500 – 2,000 mg/l Total N (99%NH_3)
- 50 – 100 mg/l Total P (dissolved – P_2O_5

WW PROCESS

Digestate Holding Tank

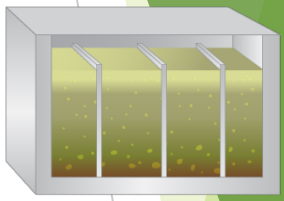


Centrifuge

Struvite Recovery

Anoxic Zone

Aeration Zone



Membrane Filtration

30 KGPD to POTW

To Clean Water Holding Tank

Compost

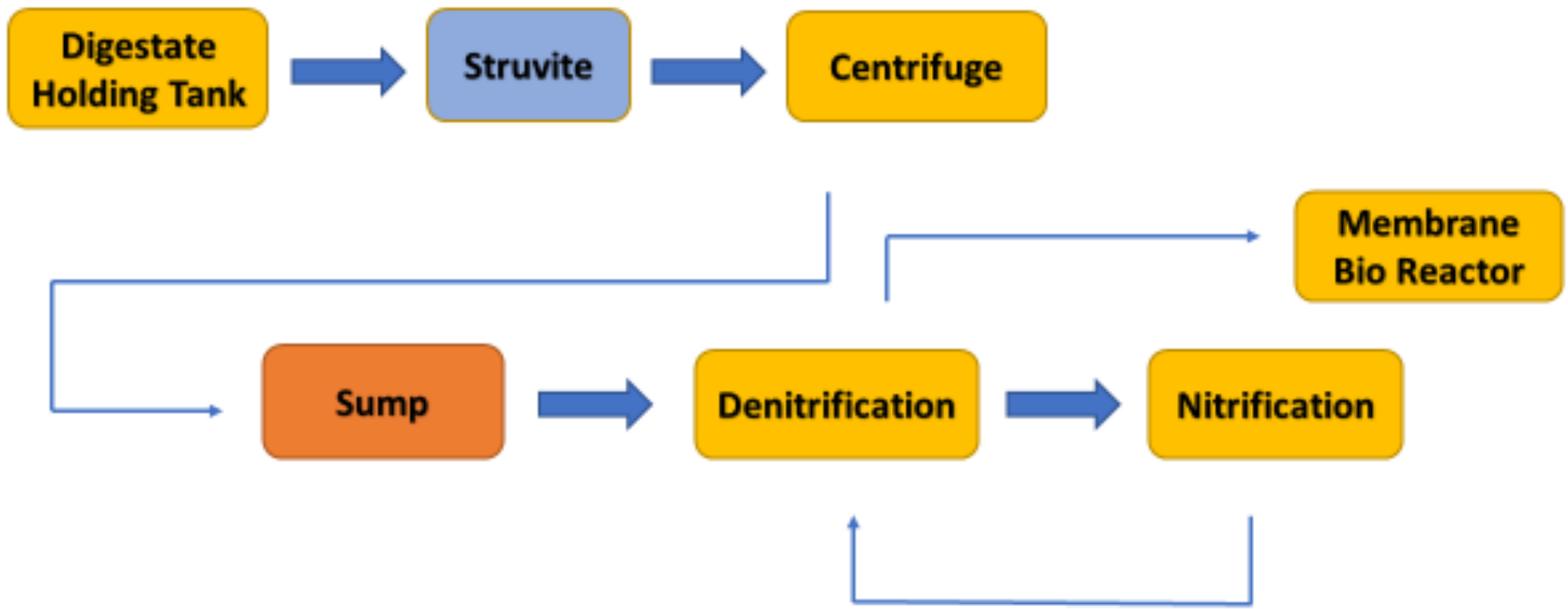
Digester

Parameter	Average Daily Limit	Maximum
BOD	185 mg/l	370 mg/l
TSS	185 mg/l	370 mg/l
Nitrogen	50 mg/l	50 mg/l
Phosphorus	5 mg/l	10 mg/l

TREATED WW CHARACTERISTICS

- 50 mg/l – T Nitrogen
- 5 – 10 mg/l T Phosphorus
- Very low metals
- No organic priority pollutants
- Micronutrients consistent with SSO's

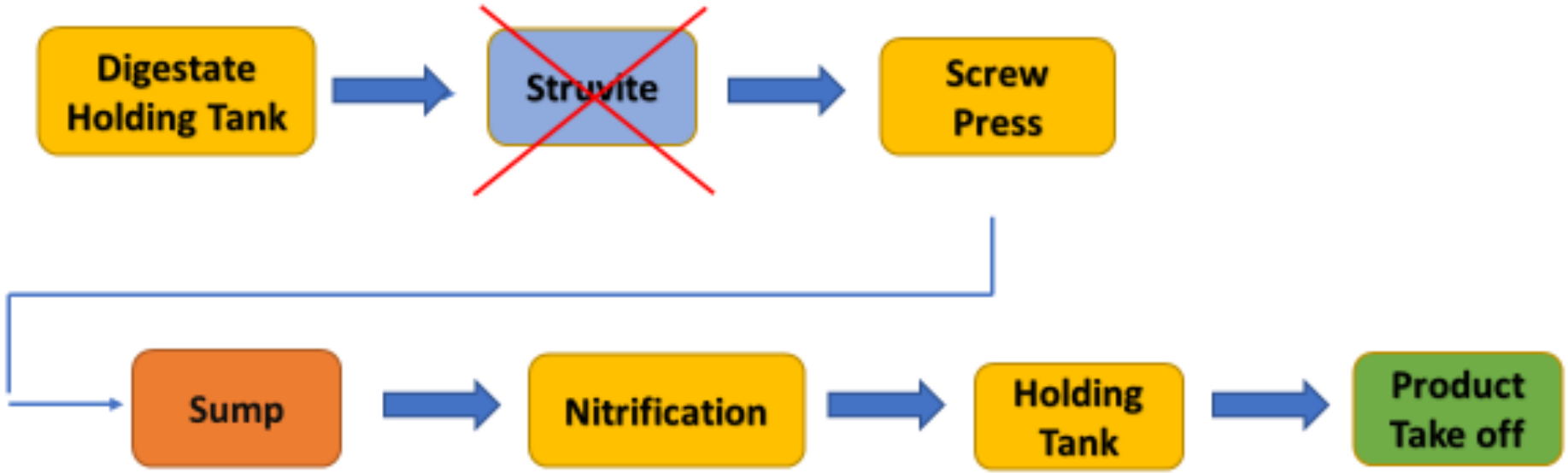
CURRENT FLOW REGIME



VALUE OF CURRENT OPERATION

- 20 Years - 20,000 gpd · 1,500 mg/l
- $400 per ton - N
- $350 - 400 K - N value
- Using $400 per ton - anhydrous ammonia

POSSIBLE PRODUCT TAKEOFF



VALUE OF CURRENT OPERATION

20 years – Eliminate Permitting

- **Sampling - Chem analysis**
- **Reporting**

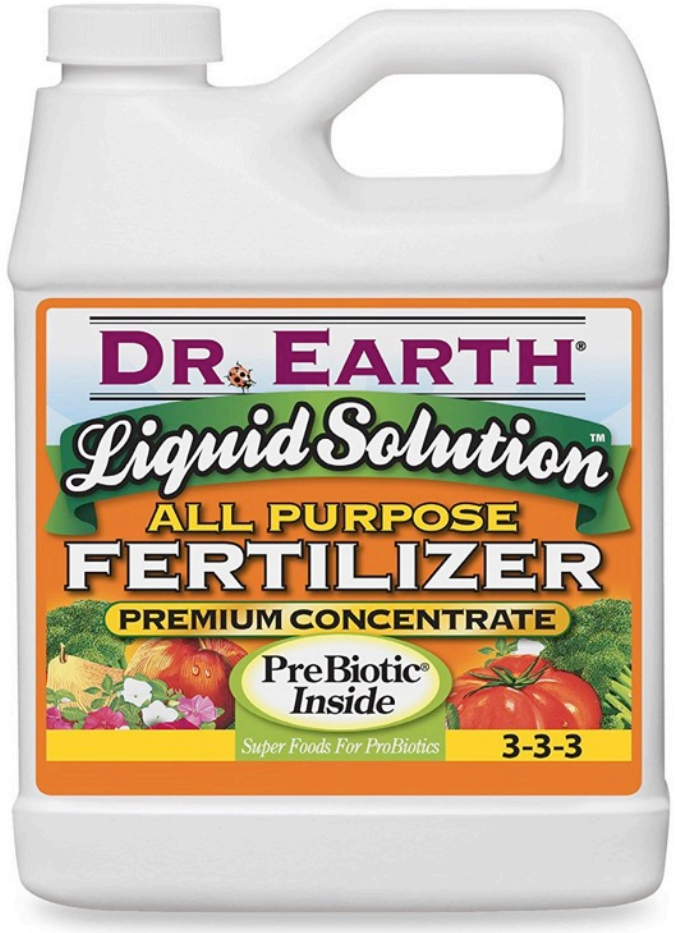
Treatment Process Savings

- **Eliminate MBR ?**
- **Struvite Precipitation**
- **$750 - 1,000k (app present worth)**

VALUE OF CURRENT OPERATION

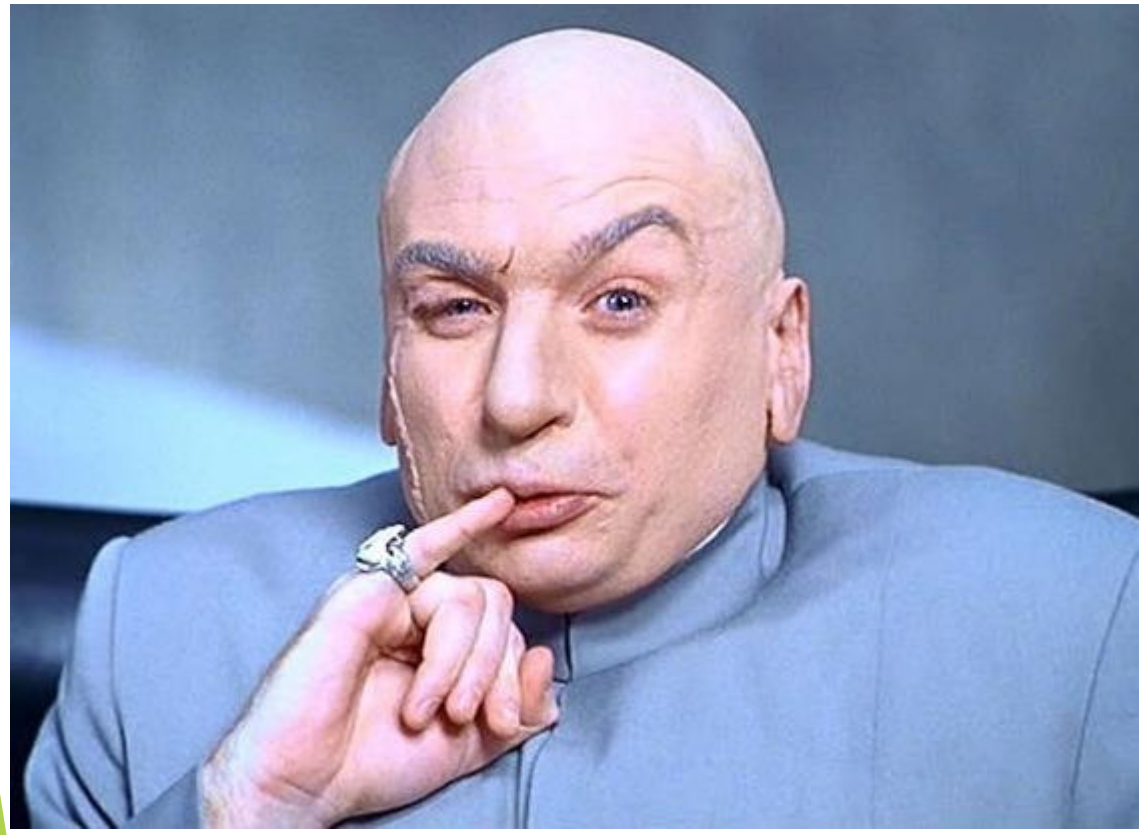
- App $2M
- But ..
- Will Have to Treat Still (Nitrification)
- And – Will Have to Treat More !!
  - Filtration – R/O
  - Will Be Expensive
- Not Compelling Enough To Pursue

Except That !!! …


DR. EARTH
Liquid Solution
ALL PURPOSE
FERTILIZER
PREMIUM CONCENTRATE
PreBiotic Inside
Super Foods For ProBiotics
3-3-3


Espoma
ORGANIC
Bloom!
Super Blossom Booster
FOR ORGANIC GARDENING
Promotes Flowers & Fruit
Mix with Water • Feeds Instantly
For Indoor & Outdoor Plants

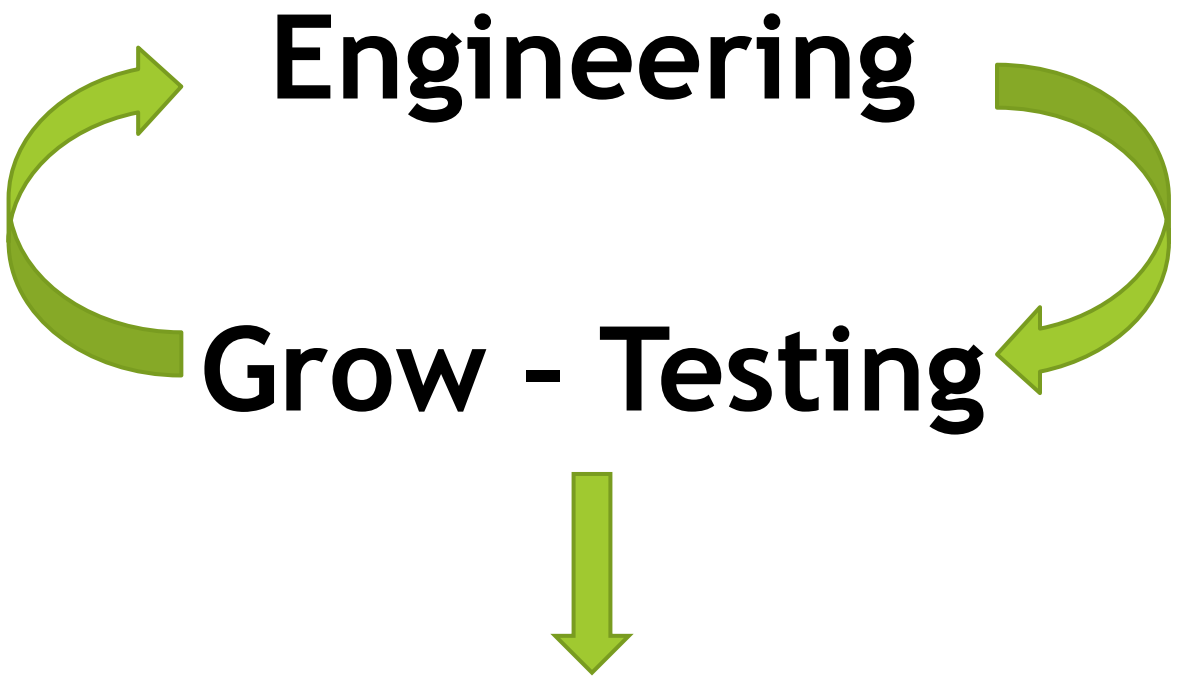
It’s Worth



$1 Billion Dollars ($25 to $50 gallon at a Time)

Certain Materials are >$100 per Gallon

We Want In (or Out)



Trinity College
Spring 2018

Liquid Organic Fertilizer
Business Planning
5 year Pro-Forma
Huge 2 Year Engineering Budget

UConn

SoEng’g – CAHNR

Fall – Env Eng’g – Chem Eng’g
Membrane Expertise – Sr. Design

DHT digestate → Solid Separation
Process Flow TBD

Rough Filtration → Microfiltration

Fall - 2018

Microfiltered → Reverse Osmosis

0.15% N → 4 (3-5)% N

30 X Concentration

Multi – Stage ??

Might be pushing it too far

SALT – SALT – SALT – SALT - SALT

Salt

NaCl Will Kill Plants – Not the Desired Result - Duuhh!!

Feed Back – Every Step with Agronomist – Soil Nutritionist

Assessment of ‘Micro – Nutrients’

Concentrated WW Will Differ Markedly from Synthetic Equivalent.

Will Contain All the Dissolved Micronutrients Associated with Food Input

Seen As a Very Good Thing – but Must Watch

Grow Testing

Greenhouse - 12 week

Leafy Greens (i.e. spinach, lettuce)

Legume - Peas

Other - TBD

Concurrent Concept – Level Engineering

Final Product

20,000 gpd WW Discharge
18,000 gpd after Filtration
30 x Concentration
600 gpd Product
Possible Retail Value >$5M
17,400 gpd Dilute WW - Opportunities for Dilute – WW That Do Not Exist Today

Conclusion

With luck -

Summer 2019 - Engineering in Earnest

Possible Market Intro 2020

Have Customers - Product

Final Thought

?

Is this a Possible Outcome for WRRF High Strength Water Streams ??

Organic – Nope

Otherwise ??