

WE WANT OUT!!

**Maybe We Can Do This!! Beneficial Re-Use
of a Nutrient-rich Wastewater**

(and Sludge)

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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

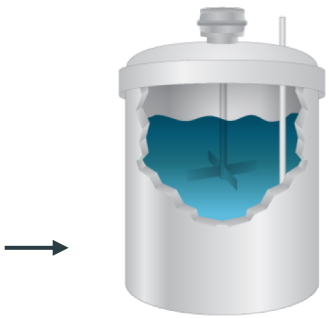
Our Facility in Photos



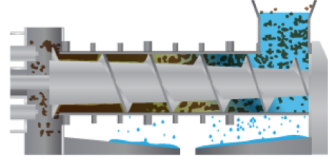
CURRENT

- **15 - 20000 GPD WW**
 - Regulated under a general permit
 - administered by the CT DEEP
- **1,500 - 2,000 mg/l Total N (99%NH₃)**
- **50 - 100 mg/l Total P (dissolved - P₂O₅)**

WW PROCESS



Digestate Holding Tank



Centrifuge



Compost



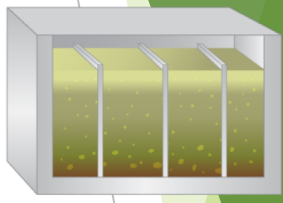
Struvite Recovery



Anoxic Zone



Aeration Zone



Membrane Filtration



30 KGPD
to
POTW
↑
To
Clean
Water
Holding
Tank



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

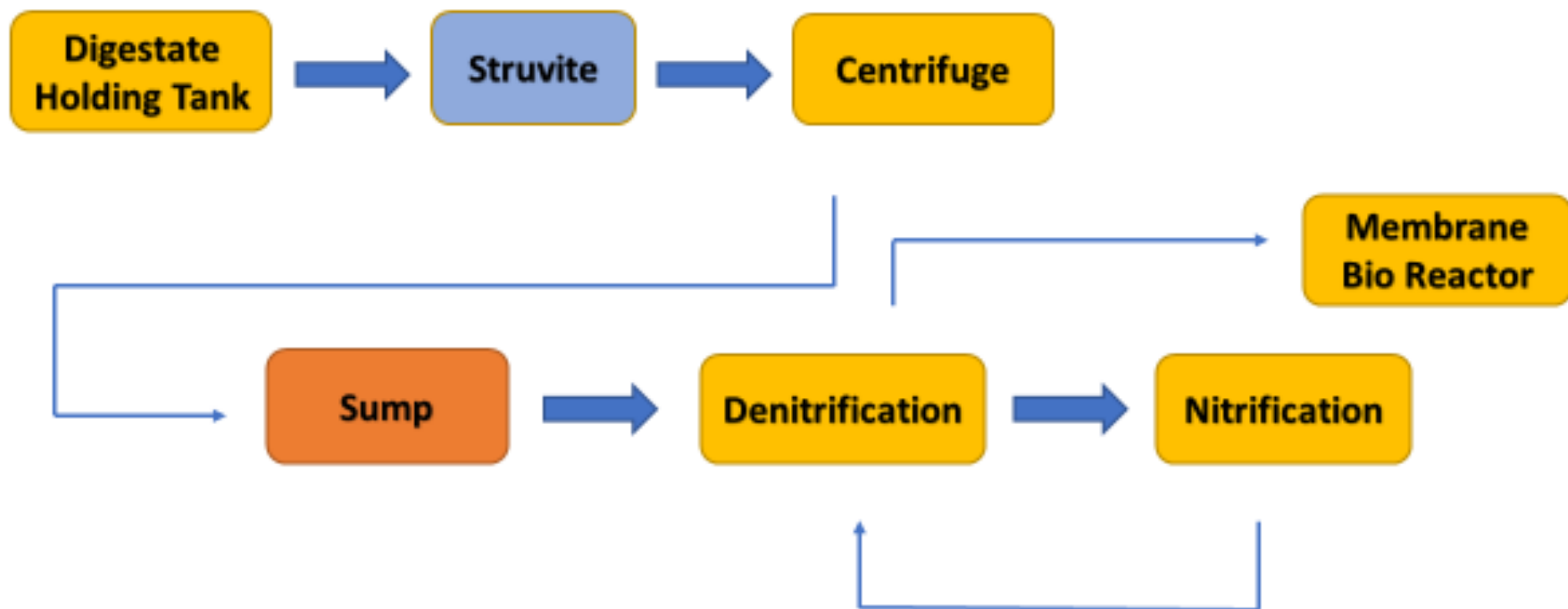
5 - 10 mg/l T Phosphorus

Very low metals

No organic priority pollutants

Micronutrients consistent with SSO's

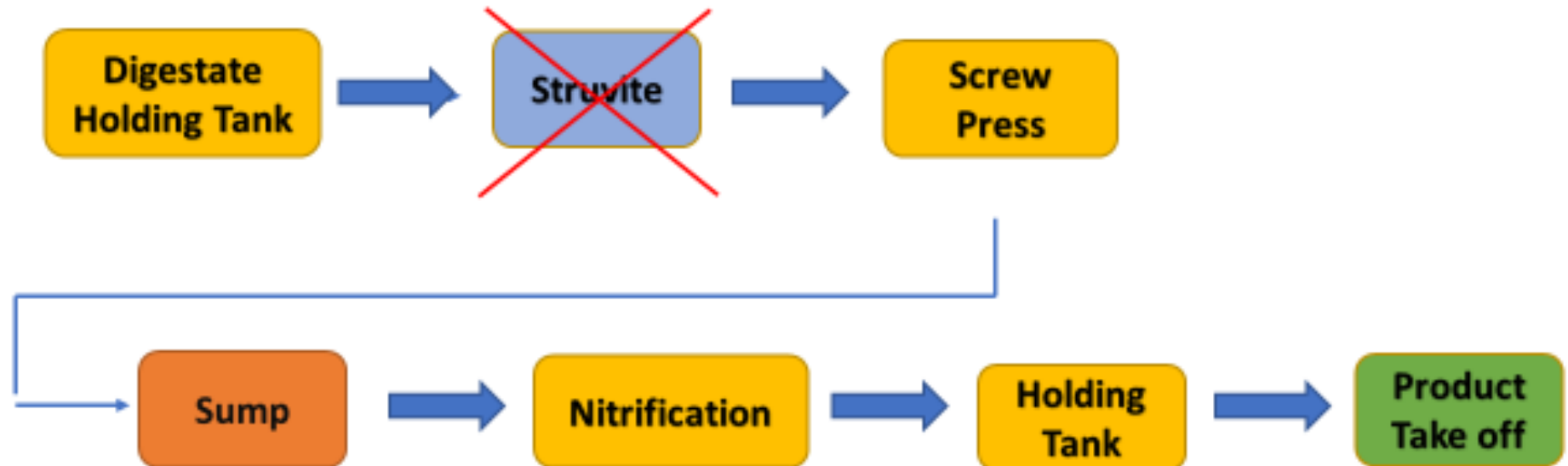
CURRENT FLOW REGIME



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)**

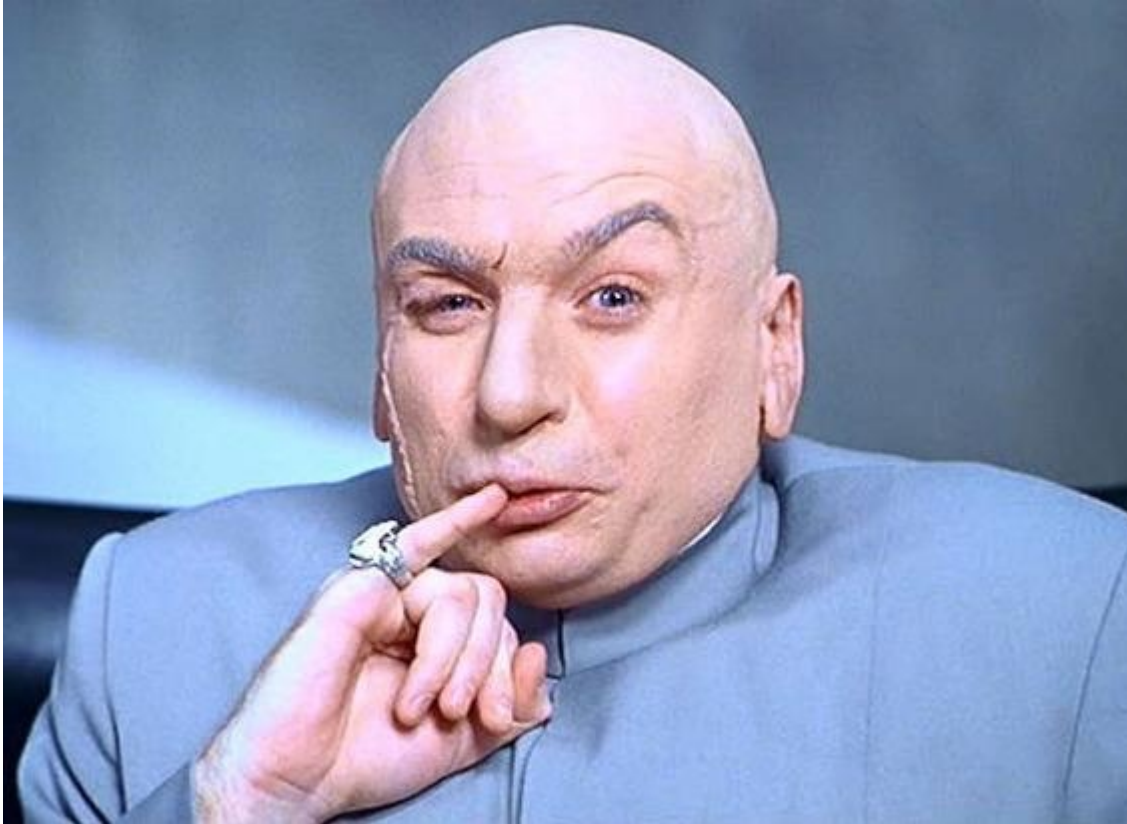
VALUE OF CURRENT OPERATION

- **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 !!! ...



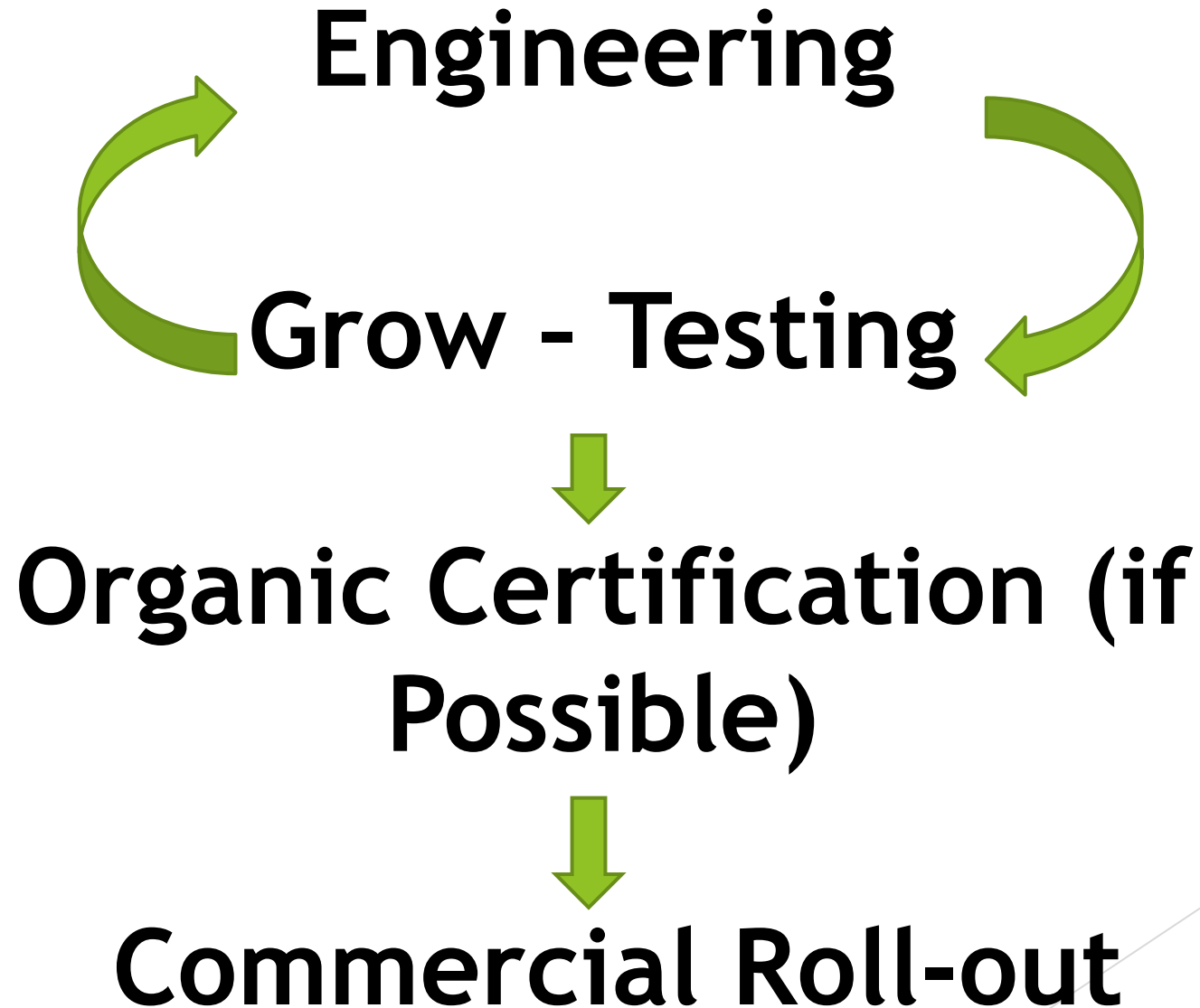
It's Worth



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

Certain Materials are >\$50 per Gallon

We Want In (or Out)



Nitrogen

Nitrogen Goal

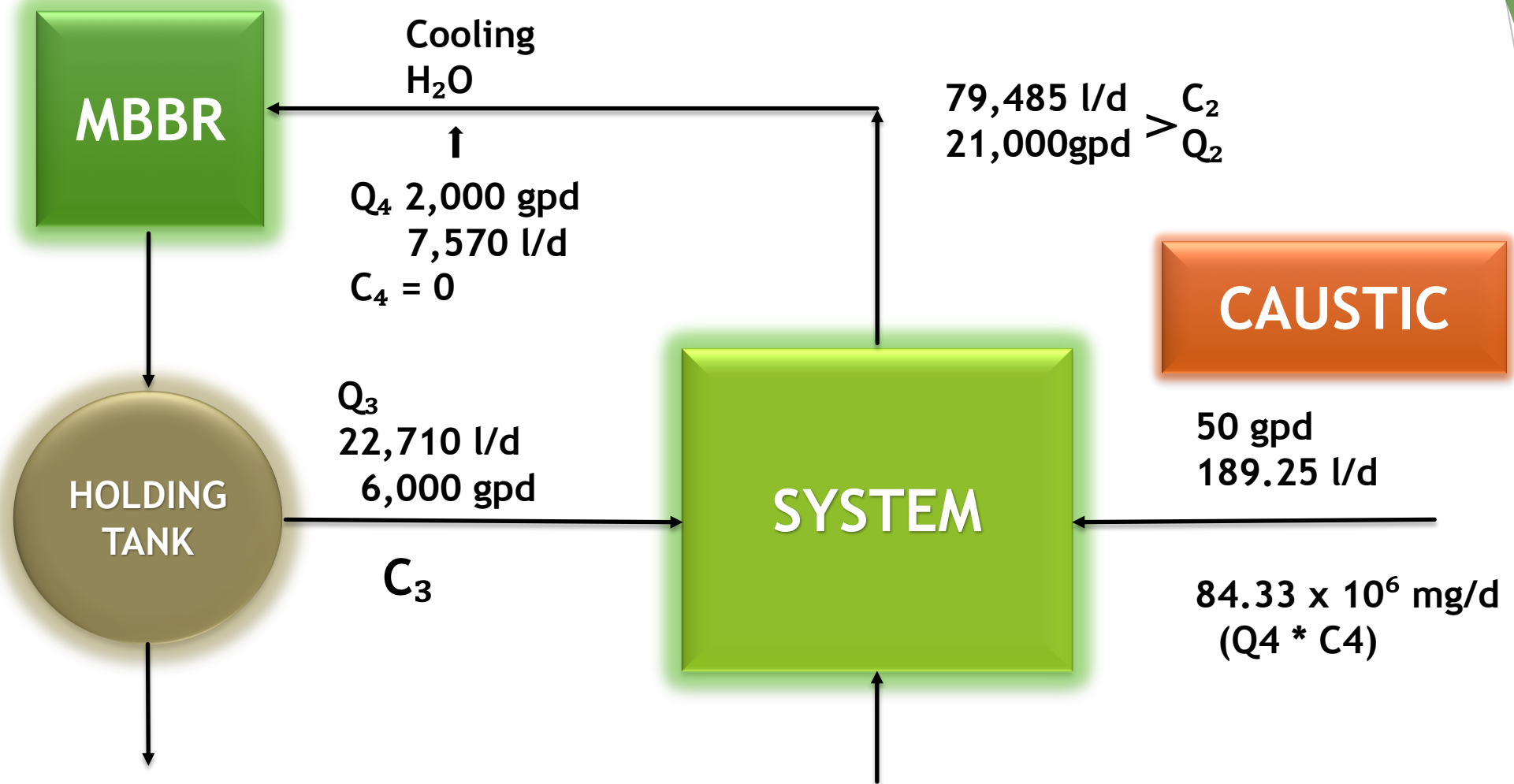
0.15% N → 4 (3-5)% N

30 X Concentration

Multi - Stage (i.e. UF/RO)

Might be pushing it too far

SALT - SALT - SALT - SALT - SALT



Knowns
 $C_3 = C_5 = 5,100 \text{ mg/d TDS}$
 $C_2 = \frac{17}{15} C_5 = 5,780 \text{ mg/d TDS}$

Salt

- **NaCl Will Kill Plants - Not the Desired Result - Duuhh!!**
- **2,500 mg/l TDS WW**
- **Mostly Sodium**
- **30 X Concentration - YIKES !!**
- **Caustic Use in Reactors**
- **Evaluate KOH - But Will Go Slowly**



Pivot to Soils

NPK - 7-4-2

Very Low Metals

Consistent with Food (i.e CU, ZN)

No Organic Priority Pollutants

Market Forces (Organic Soils)

Retail - \$0.30 - \$0.40 per POUND

Sodium Solubility - not as Solid Borne

Pivot to Soils

Seen as Easier Entre'

Bulk (Organic Compost)

Bagged (Strategic Partners)

Offtake from Digestate Holding

OMRI Review

Larger Input Issue



Assessment of 'Micro - Nutrients'

- **Solids a Unique Product**
- **Concentrated WW Will Differ Markedly from Synthetic Equivalent.**
- **Both Will Contain All the Dissolved Micronutrients Associated with Food Input**

Seen As a Very Good Thing - but Must Watch

Spring Solids Grow Testing

Greenhouse -
12 week

Leafy Greens
(i.e. spinach,
lettuce)

Legume - Peas

Other - TBD

Concurrent
Concept - Level
Engineering

Final Product

Water (a Ways Off)

600 gpd Product

Possible Wholesale Value - \$1M

Still have a discharge

Soils - \$100 / ton Wholesale

Possible Sale Value - \$1M

Conclusion



**Soils - Possible Market Intro
2020**

Have Customers

Developing Product



Final Thought



**These New Top Line \$\$
Add-Ons Allow More plants
to be Built - Increase
Organics Recycling
Opportunity**