Illinois EPA’s Best Operated Plant of 2010!

UCSD Southwest Plant
Champaign, IL
Accepting Applications – Project Engineer

Open House May 21, 2016
What is Forty Billion Gallons of Reused Sewage Plant Effluent Worth?

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ILLINOIS SUSTAINABLE TECHNOLOGY CENTER
FEBRUARY 11, 2016
Background

- **Buyer would be Cronus Fertilizers, LLC**
- **Potential $1.2+ billion urea fertilizer plant**
  - Largest private investment in central IL since Mitsubishi/Diamond Star
  - 170 permanent jobs, 1,500+ construction jobs
  - Natural gas pipelines converge at Tuscola
  - Tuscola region lacks major water supply or storage
  - Needs a steady, continuous supply of water
  - 4,400 gallons per minute = 6.3 million gallons per day = 2.3 billion gallons per year = 46 billion gallons over 20 yrs
Timeline

- First contact with UCSD on January 15, 2013
- Agreed to general contract terms in June 2013
- Agreed to specific contract in March 2014
- Cronus committed to Illinois in October 2014
- 3 year construction window
  - 1st sales expected in... 2019
Background

- Sale of fully treated sewage, or effluent, from UCSD
  - Avoids pumping *new* water from Mahomet Aquifer
    - Cronus prefers *reuse* – not common
    - Avoids pumping water from Kaskaskia River
    - Matches lower-grade water with lower-grade use
    - *Reduces* overall pollutant loading
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Sole Source for ~1 million people. Deepest cone of depression near Champaign.
Mahomet Aquifer
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[Map showing locations of UCSD sites and Cronus site within the Mahomet Aquifer region]
Mahomet Aquifer
Mahomet Aquifer

Cronus site
Location

- 20 miles between cities
- 200 square miles in picture
- No large water resources
Location

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Except Mahomet Aquifer

Or UCSD
Pipeline

- 23 miles long
- Cost about $20 million

UCSD site

Cronus site
Pipeline

- 23 miles long
- Cost about $20 million
- Cronus’ responsibility after UCSD fence line
Water Usage and Quality

- 80% of water would be evaporated for cooling
  - Natural gas and nitrogen from the air are urea’s primary ingredients

- Effluent quality is important – UCSD effluent very good fit
  - Particulates, phosphorous, and chlorides are key parameters
  - Filtered effluent, bio-P facility, drinking water is lime-softened
  - But contract DOES NOT include a quality or quantity guarantee
    - UCSD is a Sanitary District, that happens to sell effluent...
$0 vs. Income vs. Subsidy

- Currently we receive $0 from effluent discharge to creeks.
$0 vs. Income vs. Subsidy

Currently we receive $0 from effluent discharge to creeks.

What does “The Market” tell us?

- Almost nobody buys effluent around here.
  - $10,000 per year for unlimited volume
  - $0.10/1,000 gallons, $0.25/1,000 gallons

- In arid areas they “charge” more, but the net rate is a subsidy.

- Fracking water can be as high as $70/1,000 gallons
  - Very limited volume and duration. NOT a valid comparison
$0 vs ?
$0 vs ONE MILLION DOLLARS
$0 \text{ vs } \text{ONE MILLION DOLLARS}?$
Avoided Costs, Shared Benefit

- Mahomet Aquifer
- Drinking Water Rate

Pipeline Value
Avoided Costs, Shared Benefit

- Mahomet Aquifer
- Drinking Water Rate

- Pipeline Value

- UCSD Construction
- UCSD Op. Costs
- Financial Guarantees
- UCSD Benefit
- Cronus Benefit
- Cronus Constr.
- Pipeline Value
Avoided Costs, Shared Benefit

- Drinking water from aquifer about $3/1,000 gallons
- Raw groundwater option about $2/1,000 gallons
- UCSD base rate about $1/1,000 gallons
Primary Financial Terms

- **Bottom line** = \(~$1\) million / yr net benefit
  - \(~7\) to \(10\)\% of total UCSD income from Cronus
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Primary Financial Terms

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- **Ratepayer protection from “What if... ???”**
  - UCSD’s initial expenses have been reimbursed
  - Before start, UCSD receives $10 million Letter of Credit
  - After sales start, “Take or Pay” 5.5 MGD = $2 million/yr
Primary Flow Terms

- **Goal is first 6.0 million gallons per day (MGD) to creeks**
- **Flow to Cronus typically is next 6.3 +/- MGD**
  - Flow rate to Cronus can be reduced by UCSD
  - Lower charged rates when less than 5.5 MGD available for Cronus
    - UCSD to build storage basin for this and daily variation in drought
- **Remaining/balance of flow goes to creeks**
  - 5 to 15 MGD in normal weather, 0 MGD in deepest drought
    - Selling to others is now all but impossible
      - We’re “OK” with 2 “customers”
- **UCSD to fund habitat projects at $50,000/yr**
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Other Terms

- UCSD owns, operates within SW Plant
- Cronus builds anything downstream
  - Design, Builds & Operates 20 mile pipeline
    - Easements took 18 months and threat of Eminent Domain
    - WRRDA = State Revolving Loan Funds now an option for reuse
- 20 year initial term
  - Expect to renew repeatedly
  - Contract is binding on future owners
    - Only approved effluent buyer is a fertilizer plant
Reduce
Reuse
Recycle

That order is the preferred hierarchy
How People Recycle Effluent:
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They pay Sanitary Districts to do it !
How People Recycle Effluent:
They pay Sanitary Districts to do it!

Thanks!
Reduce
Reuse
Recycle

That order is the preferred hierarchy
Reasons People DON’T Reuse Effluent

1a. Effluent quality

1b. Economics

*Net is often higher cost, for less quality.*

*Such a deal!*

2. Regulations

3. Perceptions

4. Habit
Reasons People DON’T Reuse Effluent

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Net in ILLINOIS is usually higher cost, for less quality. 
Such a deal!

2. Regulations
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4. Habit
Reason *Most* People DON’T Reuse Effluent

Operational savings must offset $500,000+ in pipeline costs
Reason *Most* People DON’T Reuse Effluent

Operational savings must offset $20,000,000+ in pipeline costs
Lessons Learned

• Simplicity in truisms. 1st job = Sanitary District.
  • Government plays it safe

• No quality guarantee by UCSD
  We treat sewage to levels for creek / NPDES Permit compliance

• No quantity guarantee by UCSD

• No subsidy for re-use or out-of-town business interest
  No pressure to help “local” business
  Some amount of protect “our” effluent from others using it
  Few people really care about the “goodness” of re-use

• UCSD controls design, operation, and costs of UCSD assets
  No reimbursement of itemized costs; just keep it simple
Lessons Learned

• Drought sensitivity - avoiding zero discharge.

  • Most people (and all fish) like having water in creeks. Design is to continue to discharge 365 days – not at all normal

  • But an obligation to discharge would be an obligation to pollute
    National Pollution Discharge Elimination System Permit
    So discharge decisions necessarily stay with UCSD & IEPA
Lessons Learned

- Statutes demonstrate public preferences.
  - “Is reuse a laudable goal?”
    
    YES! Congress & President agreed on something in 2014!
    
    That included (better) SRF funding option for re-use projects
  
  - “What gives you the right to sell my sewage?”
    
    Sanitary District Act of 1917 (UCSD can also sell biosolids)
QUESTIONS?

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QUESTIONS?

What habitat project might happen?

Why not save effluent for farming and climate change?

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UCSD SW Plant
UCSD SW Plant & Copper Slough
Habitat Improvement
Projects in Crystal Lake, Copper Slough
Pool and Riffle Design
Reason *Most* People **DON’T** Reuse Effluent

Operational savings must offset $500,000+ in pipeline costs
Storage Lagoon Options
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Avoided Costs, Shared Benefit

- **Drinking water from aquifer about $3/1,000 gallons**
  - Pipeline built by drinking water company

- **Raw groundwater option about $2/1,000 gallons**
  - Pipeline built by drinking water company

- **UCSD base rate about $1/1,000 gallons**
  - Pipeline by Cronus (cost of ~$1.00/1,000 gallons)
  - Pumps and storage basin via Cronus contribution (~$0.30/1,000)
  - Financial guarantees to UCSD (very significant concern)
  - Potential need for treatment due to effluent quality
  - Risk of unknown