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CASE STUDY:
Stoneybrook Sanitation, Inc.
Lowell, Michigan

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Land Application




Regulation vs. Space
Time & Temperature...Weather!

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Land Application WAS "FREE"!



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Regulations Got Tighter



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Hauling was:
4¢ & 5¢ per gallon = 10¢ with Hauling Fees



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Advantages to Building :

- ☛ **Get off the Land**
- ☛ **Increase Profits**
- ☛ **Improve Customer Service**
- ☛ **Facility is Available 24/7**
- ☛ **Trucking Costs Reduction / Man Power**
- ☛ **Possibly, Solve a Regional Problem**
- ☛ **The Need to Stay in Business**



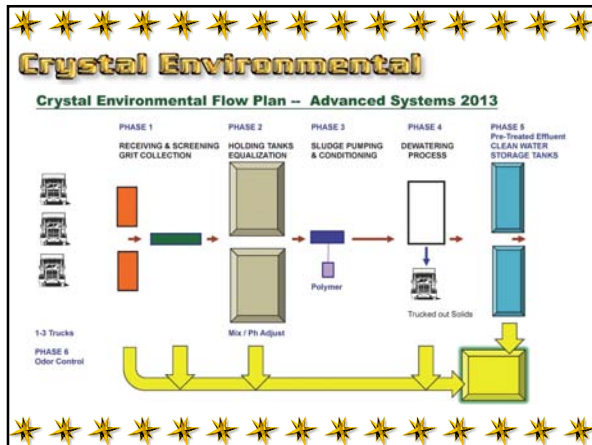
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Do Capital Costs Justify The Investment?

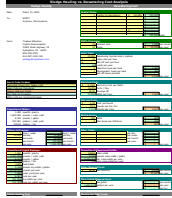
| Grease Trap | | | 5c | 10c | 15c | BioFuel Income: |
|----------------|----------------|---------------|---------------|---------------|---------------|-----------------|
| Gallons / Year | Gallons / Week | Gallons / Day | Expense | Expense | Expense | |
| 1,000,000 | 19,231 | 3,846 | \$ 50,000.00 | \$ 100,000.00 | \$ 150,000.00 | \$25,000.00 |
| 2,000,000 | 38,462 | 7,692 | \$ 100,000.00 | \$ 200,000.00 | \$ 300,000.00 | \$50,000.00 |
| 3,000,000 | 57,692 | 11,538 | \$ 150,000.00 | \$ 300,000.00 | \$ 450,000.00 | \$75,000.00 |
| 4,000,000 | 76,923 | 15,385 | \$ 200,000.00 | \$ 400,000.00 | \$ 600,000.00 | \$100,000.00 |
| 5,000,000 | 96,154 | 19,231 | \$ 250,000.00 | \$ 500,000.00 | \$ 750,000.00 | \$125,000.00 |

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Time for Change:

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**How Much Did It Cost to Dispose
What is the Potential Income to Process?**

4¢ 5¢ 10¢ per gallon

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**January, 2011
Visit to Lowell WWTP**



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Pre-Treatment Parameters Defined:

- ◆ pH
- ◆ TSS
- ◆ BOD / CBOD
- ◆ Phosphorus
- ◆ Ammonia
- ◆ Nitrite
- ◆ Nitrate
- ◆ Daily Limits
- ◆ POTW's Superintendent Welcomed Us!



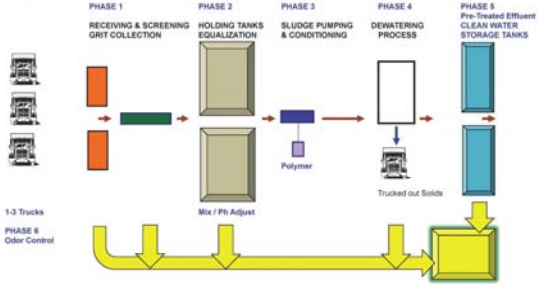

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The Engineering of the Plan...Water Quality...

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Crystal Environmental Flow Plan -- Advanced Systems 2013



PHASE 1 RECEIVING & SCREENING GRIT COLLECTION

PHASE 2 HOLDING TANKS EQUALIZATION

PHASE 3 SLUDGE PUMPING & CONDITIONING

PHASE 4 DEWATERING PROCESS

PHASE 5 Pre-Treated Effluent CLEAN WATER STORAGE TANKS

1-3 Trucks

PHASE 6 Odor Control

Polymer

Trucked out Solids

Mix / Ph Adjust

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The Process of the New Addition

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The Process of the New Addition

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The Process of the New Addition

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The Process of the New Addition



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PHASE 1

- Receiving Area for Trucks
- 500-1000 GPM Flow Capacity
- Degrit
- User Friendly
- Flow Meter



Learn from the Mistakes of Others

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Flow Meter



Manage Influent Flow

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Grit Removal



12,000 to 14,000 Gallons of Receiving Area

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July, 2013 We Collected 14-15 Yards of Grit in 1,000,000 Gallons

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Pump & Grinder



Reduce Liquid to 1/4" to 3/8" Particle Size

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PHASE 2

- Holding Tanks
- Sized for 50-100% of daily or weekly flow
- Collection for Wash Down Area
- Equalization & Mixing
- pH Adjustment




Learn from the Mistakes of Others

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Equalization & Storage

- Homogenized Loads in Tanks
- Each Batch is Similar
- Homogenized Our Discharge Results
- Minimized Chemical Use...\$\$\$\$



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Equalization & Storage

- IN: Offload Truck at 500-1000 GPM
- OUT: Process Waste 60-100 GPM



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Tanks, Storage & Equalization



pH Adjusting Zone

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Mixers



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PHASE 3

- Sludge Pumping
 - Positive Displacement Pumps with VFD
 - Additional Grinder
- Chemical Conditioning
 - Polymer



Learn from the Mistakes of Others

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Chemical Addition & Optimization



Mineral Masters: John MacDonald

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Chemical Addition & Optimization



On Demand: POLYMASTER

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Chemical Addition & Optimization



Mineral Master's Polymer Mixing

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Pumping to Dewatering



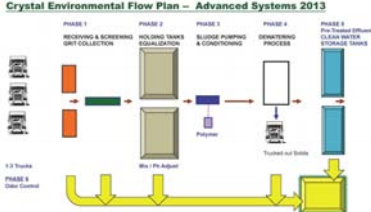
Bornemann Pump 50-200 GPM

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PHASE 4

Dewatering Containers

Crystal Environmental Flow Plan – Advanced Systems 2013



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PHASE 4

Dewatering Containers...Drains to Pipe to...



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PHASE 5



Direct Discharge to POTW

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PHASE 6
Odor Control



A photograph showing construction workers on a site. They are working on a concrete foundation for a structure. The ground is covered with dark mulch or soil. A large, light-colored building is visible in the background.

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PHASE 6
Odor Control for Grit Containers



An interior view of a facility with several large, black, rectangular tanks or containers. The tanks are arranged in a row. There are pipes and other equipment visible in the background.

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PHASE 6
Odor Control for Equalization Tanks



An interior view of a facility with several large, blue, rectangular tanks. The tanks are arranged in a row. There are pipes and other equipment visible in the background.

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PHASE 6
Odor Control



An interior view of a facility with various pieces of equipment, including tanks, pipes, and a ladder. The equipment is arranged in a room with a concrete floor.

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PHASE 6
Odor Control for Dewatering Containers



An interior view of a facility with several large, black, rectangular tanks. The tanks are arranged in a row. There are pipes and other equipment visible in the background.

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PHASE 6
Odor Control: Bio-Filter



An exterior view of a facility showing a long, low wooden structure. The structure is made of light-colored wood and is filled with a material, possibly wood chips or mulch. A large, light-colored building is visible in the background.

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**PHASE 6
Odor Control**




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Summer, 2013 Effluent Test Results:

| Date: | BOD/5 day | Phosphorus | TSS |
|--------------------|-----------|------------|-------|
| June 6, 2013 | 541 | 21.60 | 50.0 |
| June 13, 2013 | 495 | 20.40 | 51.0 |
| June 20, 2013 | 398 | 15.50 | 89.0 |
| June 27, 2013 | 1220 | 34.90 | 180.0 |
| July 12, 2013 | 247 | 13.10 | 34.0 |
| July 19, 2013 | 319 | 25.30 | 48.7 |
| July 26, 2013 | 233 | 9.60 | 26.4 |
| August 5, 2013 | 240 | 18.00 | 57.0 |
| August 12, 2013 | 435 | 15.30 | 47.3 |
| August 19, 2013 | 275 | 23.40 | 54.0 |
| August 26, 2013 | 230 | 14.00 | 34.0 |
| September 3, 2013 | 343 | 0.11 | 24.5 |
| September 10, 2013 | 149 | 12.10 | 55.0 |
| AVERAGE | 394 | 17.18 | 57.8 |

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You're Invited to Visit




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**Deluxe Accommodations
Main Street Inn**




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Main Street Inn 2nd Floor; Common Area



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Main Street Inn 2nd Floor; Common Area



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Private Rooms & Bath



The image shows a bedroom with a bed, pillows, and windows. The room is dimly lit, suggesting evening or night. The bed has a white coverlet and blue pillows. There are windows with blinds on the left and right sides of the room.

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QUESTIONS?



The image shows a business card for Crystal Environmental and a large blue question mark. The business card contains the following text: **Crystal Environmental**, Therese Wheaton, 21422 State Highway 18, Springtown, PA, 18459, www.crystalline.com | 1-800-328-9720, 610-905-8325 | 610-328-7259 FAX | 610-414-0540 Cell, **1-800-328-9720**, and Building is a Division of P. Wheaton & Co. Capital Separations since 1982.

Therese Wheaton

"Specializing in Industrial and Municipal Solids-Liquid Separation"