Composting Biosolids
Re-evaluation of sludge management on Block Island

Report by: David L. Simmons
For: New Shoreham Sewer Commission
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Town Hall
Acknowledgements

- Ray Boucher, Superintendent of New Shoreham WPCF (Data, Archives, and Logistics)
- James J Geremia, P.E. Principle of J.J. Geremia and Associates (History, Data, and References)
- 2001 *Feasibility Study For Composting Solid Waste For Block Island* prepared by the Clean Land Fund in cooperation with Entech Engineering Inc.
- Other specific references follow the presentation or sited within this document.
- Cover Image: www.durham.ca/images/works/biosolids/biosolid.jpg
What are Biosolids?

- Biosolids are a by-product of the domestic sewage treatment process.
- Microorganisms are grown within aeration tanks/basins by supplying them with enough dissolved oxygen and wastewater (food) to proliferate.
- The microbial population within the tanks is referred to as activated sludge.
- Activated sludge is a stabilized microbial medium from aeration.

Aeration basins where the working populations of microorganisms grow and digest the waste stream.
Where do biosolids come from?

- The volume of activated sludge increases with increased wastewater flow.
- As the microbial population grows, a portion must be removed by “wasting” to maintain a specific density within the treatment system for optimum performance.
- The wasted stream is known in the industry as waste activated sludge (WAS). The WAS is a liquefied and stabilized form of biosolids. This stabilized form has no foul odors.

Clarifier where the activated sludge settles to the bottom and clean water flows over the top. The densely settled sludge is where the WAS is drawn.
Current Biosolids Management

- The WAS or liquefied biosolids are sent to an aerated holding tank from the bottom of the clarifier.
- The WAS is amended with liquid polymer to coagulate the sludge and sent through a belt filter press.
- The liquid is pressed out of the sludge forming a dried cake with the consistency of Play-Dough.
- The dewatered sludge is distributed to a 30 yd roll off dumpster.
- Once full, the dumpster is transported off island to RI Resource Recovery Corp (RIRRC) in Johnston and deposited to the landfill. (Necessary permissions are in place and being used for sludge deposition at RIRRC)
Dewatering Operation

Polymer Mixing

Adding the polymer, coagulating, and pressing

Belt Filter Press

Biosolids (in 30 yd dumpster ready for transport.)
Solids Handling History

- In 1989, the EPA and the State of RI provided a grant that funded the construction of the solids handling facility (building, belt filter press, sludge hold tanks, and odor control scrubbers) at the treatment plant.
- This facility was constructed as a result of RIDEM halting the past practices of dumping liquid sludge into the Town owned landfill from the mid 70s until 1980.
- The Town rented a belt filter press to handle the decade of solids handling before the permanent facility was built.
- The EPA and State funding for the facility triggered a mandatory evaluation of alternative methods for sludge disposal for two main reasons:
  1. Town landfill was closed for sludge disposal and the State central landfill (RISWMC) deemed Block Island sludge as new unapproved source not allowed under an existing Consent Decision between RIDEM and RISWMC.
  2. The seasonal nature of the resort community and ferry scheduling difficulties on the Island offered as challenging obstacles in determined solids handling alternatives.
1991 Engineering Study

- Due to aforementioned constraints, the Town was forced to focus on reuse and disposal options for the sludge on-island.
- Disposal was limited to incineration which was quickly ruled out due to air quality concerns, permitting, and capital costs.
- Reuse/recycling of the beneficial characteristics of the sludge via composting became the primary focus.
Class A Biosolids Composting Essentials

- Moisture Content (50-60%)
- Optimum Carbon to Nitrogen (C:N) Ratio 30:1
- Uniform Oxygen Delivery (Aeration)
- Bulking Agent (wood chips) used to balance out moisture content and C:N ratio
- Internal Compost Temp Must Exceed 55°C – 3 days to effectively kill pathogens and weed seeds.
- Available Real Estate/Site Location
- Proper Equipment and Trained Personnel
- Demand for Product in Marketplace
Composting Profile View Versus Time

Block Island Biosolids Characteristics

- Dewatered biosolids has a 16-18% solids content
- Industrial waste streams not present on Block Island enhances the quality of biosolids
- Heavy metal content negligible to zero
- Good recipe for exceptional quality EQ Class A compost.
## RIDEM Class A Biosolids Limits

<table>
<thead>
<tr>
<th>METAL</th>
<th>DEM LIMIT, mg/kg (dry weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>41</td>
</tr>
<tr>
<td>Cadmium</td>
<td>39</td>
</tr>
<tr>
<td>Chromium</td>
<td>1,200</td>
</tr>
<tr>
<td>Copper</td>
<td>1,500</td>
</tr>
<tr>
<td>Lead</td>
<td>300</td>
</tr>
<tr>
<td>Mercury</td>
<td>17</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>75</td>
</tr>
<tr>
<td>Nickel</td>
<td>420</td>
</tr>
<tr>
<td>Selenium</td>
<td>36</td>
</tr>
<tr>
<td>Zinc</td>
<td>2,800</td>
</tr>
</tbody>
</table>

### PATHOGEN

<table>
<thead>
<tr>
<th>DEM LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fecal Coliform: Less than 1,000 Most Probable Number per 1 Gram of total solids (dry weight)</td>
</tr>
<tr>
<td>Bacterial</td>
</tr>
</tbody>
</table>


Class A Compost Benefits and Recommended Uses

**Benefits**
- economic source of organic matter
- provides slow-release nutrients for plant growth
- increases moisture holding capacity
- reduces soil erosion and nutrient leaching
- increases mineral fertilizer plant uptake efficiency
- improves soil structure
- reduces soil compaction
- increases water infiltration
- increases soil aeration
- weed free

**Recommended Uses**
- Turfgrass
  - establishment
  - renovation
  - sod production
- Agricultural Utilization
- Land Reclamation
- Manufactured Soils
- Ornamental Horticulture
  - greenhouse and nursery potting mixes
  - field nursery production
  - nursery stock transplanting
  - flower gardens and mass plantings
  - landscape planter mixes

Source: West Warwick RI Biosolids Users Guide
See: [www.westwarwickri.org](http://www.westwarwickri.org) for more specific info on using biosolids in Rhode Island
Composting Technology reviewed in 1991

- The three composting schematics reviewed were aerated pile, modified in-vessel, and in vessel, respectively.
- The location of the compost facility was sited on transfer station property.
- All designs reviewed implement different versions of mixing a bulking agent with the biosolids, aerating the mixture, and physically managing/monitoring the process.
- Leachates management and odor controls were factored into all of the designs.
- Variations in complexity simply translates to the bottom line capital cost.
In-Vessel Method

- Total Capital Cost in 1991 dollars for site related improvements and process equipment: $1,700,000

- Included 10% contingencies, 15% engineering and legal fees

Source: Geremia, 1991
Modified In-Vessel Method

- Total Capital Cost in 1991 dollars for site related improvements and process equipment: $1,200,000
- included 10% contingencies, 15% engineering and legal fees

Source: Geremia, 1991
Aerated Pile Method

- Total Capital Cost in 1991 dollars for site related improvements and process equipment: $225,000
- included 10% contingencies, 15% engineering and legal fees

Source: Shammas and Wang 2009
Recommendation and Outcome of 1991 Study

- The aerated pile was the chosen technology because of the low capital costs, the ease of operation, and the equipment being less complicated and proprietary than the alternatives.

- The compost project was abandoned when the Town ultimately obtained permission to dump dewatered sludge at central landfill before the island facility was constructed.

- With the new permit it became cheaper to dump and manage the sludge rather than reuse.
Composting Take Two - Mid 90s

- Composting was reviewed again in the mid 90s with the Town Engineer and the Director of Public Works.
- The outcome of that study showed that wood ash had to be shipped to the Island to drive the composting process.
- Wood ash is by-product from pulp and paper industry from the bark boiler operation.
- RIDEM approved of the wood ash over wood chips because it was a proven technique that reduces the odor and off volatilization problems.
- State will not allow stockpiling of materials for a long enough period to necessary to have the woodchips on hand for the operation.
- Town would have to get their existing transfer station permit amended.
- Capital, transportation, labor, site modification and regulatory parameters demonstrated the process was cost prohibitive.
Biosolids composting gets a third look as part of the 2001 study

- The Clean Land Fund in cooperation with EnTech Engineering Inc. performed a comprehensive compost study of all municipal solid waste (MSW) on Block Island.
- The 2001 report was a technical feasibility study primarily driven by economics and the public's (Business and Homeowners) willingness to participate whereas the 1991 study was born out of need for sludge disposal.
- Biosolids were a large part of that study and useful to this discussion.

Source: http://yfrog.com/26wheelsel6g
2001 Study Solid Waste Data Related to Biosolids Composting

Ingredients are in hand

- Study assumed 50% of C&DD is clean wood capable of being chipped. (497 tons)
- Biosolids/Sludge is a component stream that is already isolated, diverted, and ready to use.

<table>
<thead>
<tr>
<th>SOLID WASTE AVAILABLE FOR COMPOST (2000)</th>
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<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Solid Waste (After Recovery)*</td>
</tr>
<tr>
<td>Construction and Demolition Debris (C&amp;DD)</td>
</tr>
<tr>
<td>Sludge</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*diversion of recyclables occurs at transfer station for recovery
2001 Technology Chosen

- Study reviewed several composting technologies with the criterion focused on minimizing potential odor and vermin problems, adaptation to the seasonality of the island, and be technically simple to operate.

- An in-vessel system “EcoPOD®” marketed by Ag-Bag was chosen that met these criteria and also had additional maintenance benefits.

- The Ag-Bag system is an totally enclosed updated version of what the aerated pile method approved in 1991.
What is Ag-bag Eco-POD®

- The Ag-Bag Environmental CT-5 compost system is designed for the small volume operator, without sacrificing speed or efficiency. The Ct-5 works in conjunction with the 5’x 200’ EcoPOD and had a storage capacity of approximately 76 tons or 190 yards. However, 150 yards is a realistic load based on pilot studies (ACOE, 2010).

Image source: http://www.pacbag.com/Composting/Machines.php
“The unique design incorporates a hydraulic ram, which pushes the material through the tunnel and into the EcoPOD. It is equipped with a 13 hp Honda engine (with an option for a 10 hp Yanmar diesel engine) to power the hydraulics and features a remote control unit to operate the ram, making this system efficient and easy to use. The feed hopper will hold approximately 3.5 yards of material at one fill. By pushing the hydraulics ram forward and leaving it extended against the material, the product remains confined. Retracting the ram prepares the hopper for another load of material.”

“A large air receiver tank installed on the machine holds the perforated pipe for feeding into the EcoPOD. This allows the EcoPOD to be aerated and odor to be controlled at any stage of filling. If an excess of two weeks time is required to fill the EcoPOD, the composting stages become varied throughout the bag, prolonging composting time overall. This is the only system available to do small batches on a continual basis. To start a new EcoPOD: place the POD plastic on the tunnel, open the air receiver, put in a new roll of pipe, and start filling.”

Source: http://www.ag-bagfs.com/CT-5specs.html
In-Vessel Composting Steps

1) Raw materials (Feedstock) mixing
   - Optimize mixture for porosity, particle size, moisture, carbon to nitrogen ratio, substrate complexity and quality
   - Often done before placing in vessel

2) Active composting in the vessel
   - High temperatures (mostly thermophilic), rapid decomposition and high odor potential.
   - Where pathogens and weed seeds are killed
   - Generally 2-3 weeks, but could be shorter or longer

3) Curing
   - Ending stage after microbial activity begins to stabilize and pile cools (mesophilic)
   - Can be inside the composting vessel, in a separate vessel, or outside in windrows or aerated static piles
   - Odorous compounds are not usually produced
   - Generally cured for at least 30 days

Ag-Bag Technology Schematic

Systems Photos

Ag-Bags Benefits

- Totally enclosed system that controls odors, leachates, and vector/vermin.
- System controls maintain moisture, oxygen supply and temperature automatically.
- As long as mixture is feed at the right C:N/bulking ratios, density, and moisture content, the system self regulates with no mechanical adjustments.
- 8-12 weeks composting residence time.
- Open the bags and let stabilized compost cure 30-60 additional days.
- Screening residual bulking material ensures a uniform marketable end product.
Capital Costs of Ag-Bag Technology

- Capital cost estimates were performed by Clean Land Fund and are in 2001 dollars.
- The projections were given in the 2001 study in low and high estimates.
- The total capital cost on the low estimate was $224,493 with the primary savings on the screen and the shredder.
- High estimates were provided to give the most realistic cost in 2010 dollars.

<table>
<thead>
<tr>
<th>Capital Cost Equipment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>Permitting</td>
<td>$6,000.00</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Ag Bag CT5 Compost System</td>
<td></td>
</tr>
<tr>
<td>Encapsulator</td>
<td>$49,500.00</td>
</tr>
<tr>
<td>Aeration System, Set up, and Training</td>
<td>$3,868.00</td>
</tr>
<tr>
<td>Support Equipment</td>
<td></td>
</tr>
<tr>
<td>Grinder Shredder</td>
<td>$100,000.00</td>
</tr>
<tr>
<td>Mixer/Blender System</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>Screen</td>
<td>$80,000.00</td>
</tr>
<tr>
<td>Backhoe</td>
<td>$35,000.00</td>
</tr>
<tr>
<td>Contingencies at 5%</td>
<td>$14,625.00</td>
</tr>
<tr>
<td><strong>Total Capital Cost</strong></td>
<td><strong>$340,993.00</strong></td>
</tr>
</tbody>
</table>
Biosolid Composting Goals

- Increase the island's overall recycling rate of a large portion of its solid waste going to landfill using a sustainable biosolids composting program.
- Generate a marketable end product that meets EPA Class A standards.
- Class A compost is humus-like product, free of pathogens, toxic heavy metals, and other undesirable characteristics that is safe to use.
- Reduce tipping fees and transportation costs to the landfill and appropriate them to stay on the island.
- Calculate savings used offset capital expenditures and operating costs.
- Application as a soil conditioner, top soil for lawns, fertilizer for ornamental gardens.
The sewer plant produced 338.44 tons of biosolids fiscal year 2010 (FY2010)

The volume of biosolids is approximately 600 yd$^3$ of material.

85% of the biosolid production occurred between June 1$^{st}$ and Oct 31$^{st}$. (5 months)

Density of the biosolids averaged 0.56 tons/ yd$^3$ or 1120 lbs/ yd$^3$

RIRRC Tipping Fees are $65/ton or $22000 FY2010

19 trips to RIRRC at $1800/trip or $34200 FY2010

Total Solids Handling Cost FY2010 $56200
How much wood chips would be needed for compost

- Assuming 18% solids content, a ratio of approximately 2.5:1 by volume can be estimated.
- 1500 yd$^3$ of wood chips needed for entire year or 1275 yd$^3$ for the five months of major production.

Source: Shammas and Wang 2009

*Note: This curve is site-specific for one compost operation. This curve will shift depending on the relative volatility and solids content of the wood chips and sludge.*
Wood chip data

- The bulk density of new wood chips is about 550 lbs/yd³.
- The bulk density of recycled wood chips after recovered from compost is about 750 lbs/yd³.
- A cone shaped pile (1500 yd³), the pile would be approximately 30 feet tall with a base diameter of 72 ft and a circumference of 226 ft.
- Weight of wood chips needed for start of compost operation would be 825,000 lbs or 412.5 tons.
How many EcoPODs- how much compost?

- According to a recent Feb 2010 pilot study of the EcoPOD system by the Army Corp of Engineers, each 5’x 200’ pod can hold 150 yd$^3$ of mixed material.
- 600 yd$^3$ of biosolids + 1500 yd$^3$ wood chips = 2100 yd$^3$ mixture or 14 Pods
- 268 tons of finished compost assuming 65% weight loss during the composting process.
- The density of the finished compost is assumed at 800 lbs/ yd$^3$. 670.9 yd$^3$ of finished compost for market yd$^3$
- Assuming 10’ by 200’ are needed for each pod, 28000 sq ft (roughly 2/3 of an acre) of space would be needed for the pods alone. This does not include stockpiling space.
- The max space should be considered in the design because most of the solids generated occur over a few months.
EcoPOD Layout and Curing

Cost Benefit Economic Model

- Assumptions and data reused are listed within the model.
- Data used were based on current costs within FY2010 time frame and assumptions from original study.
- Municipal Solid Waste was removed from the model.
- The Original 2001 model incorporates analysis as it relates to the full economic view of costs and benefits to the Sewer Commission and the Town.
## Projected Annual Compost Production

<table>
<thead>
<tr>
<th>Compostable Material Tipping Fee</th>
<th>Federal Class A Compost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Weight Loss (%)</td>
</tr>
<tr>
<td>Compostable Material Tipping Fee</td>
<td>85%</td>
</tr>
<tr>
<td>Sewer Commission Cost Savings</td>
<td>65%</td>
</tr>
<tr>
<td>Total</td>
<td>132.82</td>
</tr>
</tbody>
</table>

### 2010 Compostable Data by Category*

<table>
<thead>
<tr>
<th>Input</th>
<th>Annual Volume (tons)</th>
<th>% Compostable</th>
<th>Compostable Volume (tons)</th>
<th>Moisture Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Waste (Not factored)</td>
<td>0</td>
<td>20%</td>
<td>0</td>
<td>50%</td>
</tr>
<tr>
<td>Construction &amp; Demolition Debris</td>
<td>994</td>
<td>42%</td>
<td>412.51</td>
<td>13%</td>
</tr>
<tr>
<td>Sewer Sludge</td>
<td>338.44</td>
<td>100%</td>
<td>338.44</td>
<td>82%</td>
</tr>
<tr>
<td>Total</td>
<td>1332.44</td>
<td>39%</td>
<td>750.95</td>
<td>44%</td>
</tr>
</tbody>
</table>

*2010 Sewer solids numbers and C&DD 2001 numbers at Wood/Biosolids ratio 2.5:1

### Cost Benefit Analysis: Ag-Bag System 2010

<table>
<thead>
<tr>
<th>Sources of Funds (annual)</th>
<th>2001</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compostable Material Tipping Fee</td>
<td>$ 92,130</td>
<td>$ 85,641</td>
</tr>
<tr>
<td>Sewer Commission Cost Savings</td>
<td>$ 22,846</td>
<td>$ 34,199</td>
</tr>
<tr>
<td>Transportation ($101.05/ton)</td>
<td>$ 15,585</td>
<td>$ 21,999</td>
</tr>
<tr>
<td>Tipping Fee ($65/ton)</td>
<td>$ 38,431</td>
<td>$ 56,198</td>
</tr>
<tr>
<td>Total Sewer Commission Gross Savings</td>
<td>$ 15,585</td>
<td>$ 21,999</td>
</tr>
<tr>
<td>Net Cost Savings</td>
<td>$ 22,846</td>
<td>$ 34,199</td>
</tr>
<tr>
<td>Compost Sale Revenues</td>
<td>$ 21,082</td>
<td>$ 13,142</td>
</tr>
<tr>
<td>Assume 50% annual production @ $40/cy</td>
<td>$ 38,431</td>
<td>$ 56,198</td>
</tr>
<tr>
<td>Total Sources of Funds</td>
<td>$ 136,058</td>
<td>$ 132,982</td>
</tr>
</tbody>
</table>

### Uses of Funds (annual)

<table>
<thead>
<tr>
<th>Operating And Maintenance Expenses (O&amp;M)</th>
<th>2001</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag-Bag CT-5 Compost System (plus 20% for 2010)</td>
<td>$ 6,812</td>
<td>$ 8,174</td>
</tr>
<tr>
<td>Support Equipment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel Expenses: 1 FTE @ $50000</td>
<td>$35,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>Operating Expenses plus 20% for 2010</td>
<td>$1,000</td>
<td>$1,200</td>
</tr>
<tr>
<td>Maintenance Expenses plus 20% 2010</td>
<td>$2,100</td>
<td>$2,520</td>
</tr>
<tr>
<td>Contingencies (0.25% Capital Costs)</td>
<td>$6,366</td>
<td>$6,366</td>
</tr>
<tr>
<td>Total Support</td>
<td>$44,466</td>
<td>$60,086</td>
</tr>
</tbody>
</table>

### Equipment

<table>
<thead>
<tr>
<th>Total O&amp;M Costs</th>
<th>2001</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Station Tipping Revenues Loss</td>
<td>$119,070</td>
<td>$99,002</td>
</tr>
<tr>
<td>Less Transportation Cost Savings ($101.05/ton)</td>
<td>$54,857</td>
<td>$41,870</td>
</tr>
<tr>
<td>Less Tipping Fee Cost Savings ($54.00/ton)</td>
<td>$39,974</td>
<td>$22,276</td>
</tr>
<tr>
<td>Total Transfer Station Cost Savings</td>
<td>$94,831</td>
<td>$64,145</td>
</tr>
<tr>
<td>Transfer Station Net Tipping Revenues Loss</td>
<td>$24,239</td>
<td>$34,857</td>
</tr>
<tr>
<td>Debt Service: $340,000 @ 4% for 10 years</td>
<td>$41,586</td>
<td>$41,586</td>
</tr>
<tr>
<td>Total Uses of Funds</td>
<td>$117,103</td>
<td>$144,703</td>
</tr>
</tbody>
</table>

### Net Operating Return

<table>
<thead>
<tr>
<th>2010 Assumptions</th>
<th>2001</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Cost Estimates provide by compost equipment suppliers with a 5% contingency.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Life for Ag-Bag System of 10 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Inflation Rate of 3.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Value Discount Rate equal to the Town's borrowing rate i.e., 4% for ten years and 6% for 20 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewer Commission's Cost Savings based on Contractual Costs for FY2010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compost Sale price based on Survey Interviews with Island Landscapers: 2001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System O&amp;M Costs provided by compost equipment suppliers in 2001.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Expenses equal to one Full Time Equivalent (FTE) Employee with benefits.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt Service based on Level Payment Amortization with fixed interest rate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return On Investment calculated by dividing the projected Net Operating Return by the higher level of projected Total Capital Costs.</td>
<td></td>
<td></td>
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</tbody>
</table>
Model Results Summary

- Results showed a negative return on investment (ROI) of -$11,722 or -3.4% just composting biosolids.
- Model Assumes 100% of capital costs are funded by users of the facility. A grant could offset some of these costs to put the model out of the red and into the black.
- Model does not include the use of subcontracts for support equipment already available by on-island contractors. IE Backhoe, Screen, Chipper etc.
Latest Sludge Regs (RIDEM)

- RIDEM has drafted revisions to the sewage sludge regulations and is seeking informal comments before sending them out for formal public notice and comment. A marked-up version of the draft regulations along with a brief summary of the revisions can be found at the following link: [http://www.dem.ri.gov/programs/benviron/water/permits/wtf/pdfs/slujdrft.pdf](http://www.dem.ri.gov/programs/benviron/water/permits/wtf/pdfs/slujdrft.pdf).

- The overall intent of the revisions is to update and clarify the language in the regulations to reflect how RIDEM has been interpreting and implementing the regulations particularly as it relates to distribution, stockpiling and land application of Class A Biosolids. We also made significant structural changes to consolidate the regulations, with the intent of making them easier to work with.

- Comment period on the revised regulations ended July 1, 2010
Key Regulatory Parameters For Composting Biosolids on Block Island

- A minimum of two (2) feet of soil is required between the proposed sludge treatment surface and the highest water table level established during the seasonal high groundwater table period as determined by the Department a DEM-licensed Class IV soil evaluator.
- No sludge shall be treated or stockpiled within two hundred (200) feet of any body of surface water.
- No sludge shall be treated or stockpiled within the watershed of any surface water used as a public drinking water supply.
- No sludge shall be treated within one thousand (1,000) feet of any private drinking water supply well or within the Wellhead Protection Area for a public drinking water supply well.
- No sludge shall be composted within four hundred (400) feet of a property line. Stockpiles need to be 100 feet away. Variances can be granted if facility is enclosed.
- Groundwater monitoring may be required for treating or stockpiling biosolids.
- All sludge intended for composting and bulking agents treatment may be required to be tested using the Toxicity Characteristic Leaching Procedure for the parameters. For composting facilities, any bulking agents utilized in the operation may also be required to be tested. All sludge analyses shall be the responsibility of the owner or operator of the facility that produced generates the sludge; all bulking agent analyses shall be the responsibility of the owner or operator of the sludge composting facility.
- Odor control technology may be required if QA/QC measures are not adequate.
Layout of Transfer Station
Conclusion

- Composting the biosolids to generate a Class A product for market on Block Island is technically feasible using the Ag-bag technology.
- Spatial and regulatory constraints under the current sludge regulations adversely affect the transfer station as a potential composting site. The site would require multiple RIDEM variance requests to run the facility.
- The economic model showed a negative return on investment (ROI) when just using biosolids rather than combining with compostable MSW.
- The model should be recalibrated with adjustments to the assumptions, the potential for grant funding, and the use of sub-contractors.
- Incorporating the compostable MSW stream shifts the ROI into the black, but you would still be limited by the sludge regulatory setbacks.
- In cases where carbon sources are not available locally or clean CD&D is not allowed by the State, the system would have to transport wood ash back to the island with transportation and carbon feedstock costs.
- Due to the stigma attached to biosolids, the true market conditions on the sale of the end product might be potentially limited as was found in the West Warwick biosolids compost facility. Strict land application regulations of composted biosolids further aggravates the potential for market use.
- Contingencies for the location/use for excess compost must be considered.
References:


Ag-Bag Environmental. CT-5 Specifications http://www.ag-bagfs.com/CT-5specs.html


Clean Land Fund in Cooperation with Entech Engineering, 2001 Feasibility Study For Composting Solid Waste For Block Island Draft Final. Online: www.blockislandwater.org/compost


Town of West Warwick. West Warwick Biosolids Users Guide. www.westwarwickri.org


