Large-Scale Vermicomposting

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Who

RT Solutions, LLC
DBA Worm Power

• Created solely to develop professional horticultural products based on vermicomposting technology
• Own & operate “state-of-the-art” vermicomposting facility
• Recognized technology leader in the field
Federal and state regulations are changing the way manure is managed – (human & animal)

- Nutrient Management Plans required with loading limits
  - Manure can only be applied at rates equal to crop’s nitrogen removal.

- Nuisance parameters / quality of life issues
  - Right to Farm vs. adjacent land owner conflicts (new tensions at the growing rural / suburban interface)

- Increased focus on agriculture’s impact on air, soil and water quality
Background – Waste Issues

Economics of manure management (the CRUCH)

• Large farm operations (compensate for revenue/animal)
• More animals = more manure
• Regulations limit manure application rates (tons manure/acre)
• Results in more land needed (acreage)
• Costs increase dramatically as distance from farm to field increases

Excess manure becomes a waste issue, as the value of manure cannot offset handling costs ($/ac spreading costs > $/ac fertilizer value)
One Potential Solution

Large-Scale Vermicomposting of Animal Manures

- A publicly and environmentally acceptable solution for manure management.

- A reliable technology capable of producing a marketable “premium” organic product at a competitive rate.

- Multiple animal operator’s benefits: reduced land application costs (labor and equipment), nutrient timing & compaction.

- Win–Win–Win Scenario for:
  - Animal operation
  - Vermicomposting company
  - Consumer of the worm castings

Vermicomposting
The Search

Conducted a six month search across the Eastern U.S. to find the **RIGHT Opportunity**:

- A progressive owner, willing to sign a long term Operation Agreement
- Suitable piece of ground for the project (developable)
- Operator with more manure than can be economically used
- Ability to secure an increasing supply of manure (future growth)
- Proximity to target marketing sectors (product support)
- Close proximity to major transportation routes
Why Vermicompost in New York

✦ New York State is a Major Agricultural State – A leading state in grape, apple production and dairy production - We all don’t live in Manhattan.

✦ 675,000 cows in active production, produced in excess of 10 billion lbs of milk (USDA 2003)

✦ Dairy manure produced: in excess of 16 billion lbs/year
Site Selection – Coyne Farms

- Location: Avon, NY - (3rd largest concentration of dairies USA)
- 1,000 milking cow operation (dairy of distinction)
  - Generate approximately 107,000 lbs/day of manure slurry (53+ tons/day)
- Less then 1-mile from major interstate
- Close proximity to target market sectors
- Great people to work with!
Coyne Farms

- 1,000 Registered Holstein milkers & 600 heifers.

- 4th Generation family “Dairy of Distinction”

- Average Cow weighs 1,800 lbs

- Average cow produces 80 lbs/day of milk

100 lbs/day of manure
Coyne Farm - Main Facility

Legend
- Main Facility
- Mobile Home Park
- Interstate 390
- Roads

Interstate 390
Proposed Vermicomposting Facility
Jenks Road
Route 5 & 20
Coyne Farm Main Facility
RTS Process Flow / Design

Manure Lagoon

Raw manure → Manure Separator

Liquid Manure → Vermicomposting Flow-Through Digesters
(Worms Worms and more Worms)

Water

Vermicompost Material

Worm Castings + Worm Compost

Storage

Distribution

TARGET MARKETS

Hay/corn Silage (carbon)

Manure Solids (nitrogen)

Mixing (C/N Ratio)

Mixed Material

Pre-Vermicomposting Conditioning (composting active aeration)
Pathogen Reduction
Weed Seed Destruction
Site Permitting

- Permitting – (local/state) in-house engineers prepared all permits and received approvals in 4 months

- Site Designed for efficient material handling (1.25 person)
Site Design – Manure Separator Facility

- Manure Separator (manure in – effluent & solids out)
- Solids delivered for vermicomposting
- Liquid diverted to existing lagoons
Separator Facility Construction

Construction of separator facility (June 2005)  Final separator facility (December 2005)
Separator Facility Construction

prototype manure separator (above).

Fan centrifugal model shown to the right.
Separator Facility Construction

1,000,000 & 7,000,00 gallon manure effluent lagoons

Effluent is injected into crop fields behind chisel plow
Site Construction

Site clearing and pad construction for processing and conditioning buildings (Feb. 2005)
Site Construction

Continued building construction of processing and conditioning buildings
(March 2005)
Facility Construction

Construction of composting building & aeration bays
(May 2005)
Facility Construction

Construction of composting aeration system

(May 2005)
Facility Construction

Installation of flow-through digesters
(June 2005)
Facility Commissioning

Introduction of worm species to vermicomposting digesters
Facility Construction

Construction of raw storage building
(November 2005)
Finished Facility Construction

Overall facility
(December 2005)
RTS Process Flow / Design

Manure

Lagoon

Screening

Manure Screening

Raw manure

Liquid Manure

Manure Separator

VERMICOMPOSTING
Flow-Through Digesters
(Worms Worms and more Worms)

Water

Worm Castings + Worm Compost

VERMICOMPOSTING
Flow-Through Digesters
(Worms Worms and more Worms)

Composted Dairy Manure

Storage

Composting 
Active Aeration

Mixed Material

Target Markets

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TARGET MARKETS
Site Design – Vermicomposting Facility
Process Controls

Raw materials stored in covered facility
Materials are mixed with large agricultural equipment to specific parameters
  • Porosity, MC, C:N ratio, bulk density
  • Reproducible recipes (weighted within 10 lbs)
Process Controls

Mixed materials loaded into aeration bays

Thermophillic Composting
- 14 days with one turn
- Min of 3-days @ 55 degree C
- Weed seed destruction
- Pathogen reduction (PFRP)
- Acts to stabilize the material

Oxygen and temperature are measured, with feedback to air flow - rate & volume controls
Feeding

Material is spread in a uniform 1” layer across the surface of each digester.

Continuous-Process, Flow-Through Earthworm Vermicomposting Digester
**Process Controls**

- Worms are fed the uncured compost
  - Only when ready!!!

- Building was engineered with automatic ventilation, watering, heat and directed lighting systems - happy worms = a good night’s sleep.

- Harvested by multiple hydraulic systems -
Process Controls

- Good animal husbandry of worms is most critical
- Homogenous moisture content of material
- Monitor temperature continuously (tipping point)
- Look for cocoons and reproduction.
Harvest Worm worked material is removed from bottom of each digester.
Process Controls

- **Finished product screening**
  - Robust aggregate screener
  - 3 current product lines
  - Bulk packaging
  - Retail packaging

- **Finished product storage**
  - All product kept in fully enclosed buildings
Facility Operations

✓ Finished product distribution
  • Nationwide shipping contracts
  • Local shipping
The Worm Power Line of Products

- Solid vermicompost products and a liquid extract product are sold in bulk and small retail packaging
  - Worm Power (solids)
    - Bulk in 1 cu-yd crates (commercial growers)
    - Retail in a variety of small packages
  - Worm Power Shower – liquid vermicompost product (under development)
Research and Development

- Worm Power has been awarded eight grants from Federal and State Agriculture Agencies over the past 4 years to develop vermicomposting and vermicompost products.

- Funded Research includes*
  - Large Scale Vermicomposting
  - Vermicomposting and dairy manure management
  - Vermicompost use in vegetable production
  - Vermicompost use in potting mixtures
  - Vermicompost in diseases suppression
  - Development of liquid vermicompost extracts
  - Mechanisms for disease suppression from vermicompost

*Worm Power has a long-term research collaboration with multiple departments at Cornell University
Worm Power is designed to be the nation’s largest supplier of organic plant growth and protection products based on our patented earthworm composting technology.
Future Facility Development

-Roll movie-

Thanks for your attention