

A Case Study In Strategizing Alternatives For Biosolids Management



A CASE STUDY IN STRATEGIZING ALTERNATIVES FOR BIOSOLIDS MANAGEMENT

FINAL REPORT

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ACKNOWLEDGMENTS

CWC is a nonprofit organization providing recycling market development services to both businesses and governments, including tools and technologies to help manufacturers use recycled materials. CWC is an affiliate of the national Manufacturing Extension Partnership (MEP) – a program of the US Commerce Department’s National Institute of Standards and Technology. The MEP is a growing nationwide network of extension services to help smaller US manufacturers improve their performance and become more competitive. CWC also acknowledges support from the US Environmental Protection Agency and other organizations.

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SUMMARY OF GRANT PROPOSAL

1.0 INTRODUCTION

TerraCycle Technologies (TCT) currently intercepts and composts source separated organic waste from the winter produce industry (in addition to operating an organic farm). TerraCycle received technical assistance through the Environmental Protection Agency (EPA) and the Clean Washington Center (CWC) to evaluate its business potential for managing biosolids generated in southwest Arizona and Mexico. The biosolids are currently treated by the Nogales International Wastewater Treatment Plant (NIWTP) and stockpiled in lagoons on the NIWTP site.

A technical expert (R. Alexander Associates, Inc.) assisted with the project to aid TerraCycle Technologies in developing a working relationship with the NIWTP and was instrumental in initiating dialogue with the co-permittees to consider composting as a viable management tool for the biosolids.

Through meetings with various interested parties, including NIWTP, mining companies as potential end users, and governmental entities, a definite interest was established to have TCT manage the biosolids.

2.0 PROJECT DESCRIPTION

The Nogales International Wastewater Treatment Plant serves communities on both sides of the US-Mexico border. The plant on average treats 13 million gallons of wastewater per day. Of the wastewater treated, 70% originates in Nogales (Sonora, Mexico) and the other 30% is generated in Nogales, Arizona. The Santa Cruz Valley aquifer relies heavily on watershed recharge from Nogales (Sonora) water via the NIWTP. The wastewater is treated using a short detention time aerated lagoon system. Once treated, water from the plant is used to recharge the Santa Cruz River.

Currently, the plant has 40,000 cubic yards of dewatered Class A Biosolids that must be moved. The International Boundary and Water Commission (IBWC) was granted a 24-month timeframe from the Arizona Department of Environmental Quality (ADEQ) to distribute the biosolids that were excavated from its ponds. The ADEQ is also drafting a new biosolids disposal plan and planning for a wastewater treatment plant expansion within the next four to five years. The plant must identify how biosolids generated will be “recycled”.

Before the CWC project funding was received, TCT had met with City of Nogales and International Boundary and Water Commission (IBWC) officials to explore ways to address beneficial uses of biosolids generated at the plant, potentially using TCT as the biosolids manager. It is anticipated that TCT will establish a co-composting facility on the NIWTC site.

A technical consultant reviewed TCT’s current operations and capabilities, then participated in discussions with the TCT, NIWTP, and with two mining company representatives to establish TCT’s credibility and interest in assisting the treatment plant with management of the biosolids.

- TCT travel to Albuquerque, New Mexico to attend the Biocycle Conference (May 1999); fostered contacts and self-education for TCT in the area of composting biosolids. A tour of a local biosolids composting facility was beneficial.
- Extensive literature review provided essential background on:
 - Biosolids management
 - EPA guidelines,
 - Biosolids used in mining land reclamation efforts
 - Market development for composted and uncomposted biosolids.

- Strategy meetings with NIWTP and City of Nogales:
 - meeting and tour facility;
 - discussion of mine reclamation with dredged biosolids and composted biosolids; and
 - discussion of a proposal for TCT management of the biosolids.
- NIWTP staff and City of Nogales representatives toured TerraCycle composting facility.
- Meeting with mining companies - toured reclamation sites and discussed reclamation possibilities using biosolids.
- Meeting with other composted biosolids producers.
- Biosolids sample testing for analysis and agronomic information of the biosolids.
- Collection of approximate annual dewatered biosolids volumes, estimated solids content and federal compliance information. This data will be used to develop cost information for land application and composting the biosolids.
- Development and submittal of a proposal to the Arizona Department of Environmental Quality to conduct sustainability study and pilot composting project to determine the costs and benefits of establishing a co-composting facility at the NIWTP.
- Discussion of a proposal with one mining company and the NRCS to establish application trials/research plots for revegetation and reclamation on mining sites using composted biosolids.

3.0 DISCUSSION OF SALIENT BIOSOLIDS ISSUES

Local and regional mine sites are interested in utilizing the stockpiled biosolids, but will not pay for shipping of biosolids to their sites. There is no indication that the International Boundary and Water Commission (IBWC) will cover the costs to distribute the biosolids. Therefore, an in-depth economic study for composting of the biosolids is required before TerraCycle Technologies could assure that a biosolids management operation could cover the shipping costs and still be a profit enterprise for TerraCycle Technologies.

The IBWC is interested in the possibility of composting the biosolids, but any contracted relationship would have to be between the City of Nogales and TerraCycle. The City of Nogales considers the management of these biosolids to be the responsibility of NIWTP and it simply pays a percentage of the cost to manage that material. They were not concerned with the biosolids that are stockpiled and stated that a local farmer had received the stockpiled biosolids in the past. They were interested, however, in TerraCycle working with the IBWC to find the lowest cost option to remove and distribute the dried biosolids.

As a long-term biosolids management option, the City on Nogales would be interested in composting biosolids with yard waste, possibly wood waste, and with outdated/damaged produce (which TerraCycle is currently composting at its site). However, additional research is needed.

For this project to continue, additional grant funds are necessary to complete an economic analysis, develop a preliminary compost facility design, and to potentially operate a pilot-composting project. After discussions relating to job creation and other economic benefits, the City of Nogales was interested in teaming with TerraCycle to seek such grants.

A meeting with mining representatives was held to determine what biosolids distribution opportunities exist with various local copper mines and the Arizona Mining Association. There were discussions regarding the utilization of biosolids for land reclamation and opportunities for research in mine land

reclamation. Many of the mine sites have rail spurs, as does the wastewater treatment plant, which could be a viable distribution mechanism.

Various mining companies who are members of the Arizona Mining Association have been working with the ADEQ to upgrade the current biosolids management rules, with the intent to allow greater application rates of biosolids on mine land reclamation sites. Current rules only allow up to 20 dry tons per acre on mine sites. Research conducted by the University of Arizona has proved that a 70 to 100 dry ton per acre rate is needed for maximum results in reclamation. Passing the updated ruling, however, could take six months to a year.

The two major mining companies in the area could potentially utilize a portion of the uncomposted biosolids currently stockpiled at the plant at closed mines and 'over-burdened' sites. As a contingency, additional end markets must be developed to consume the existing and future stockpiles of biosolids. Both mines want to charge tip fees for receiving biosolids and hold contracts with local cities to be the managers of their biosolids products (similar to what land application companies are doing). This arrangement would be a financial benefit for the mines, since they would be paid to receive the biosolids and offset much of the cost of reclaiming their mine sites.

The Solid Waste Department of the ADEQ is interested in seeing a large-scale demonstration completed at one of the mine sites. Although both mining companies were interested in being paid to take the biosolids as a future business opportunity, they were also interested in discussing receipt of the IBWC biosolids for FREE (e.g., someone else pays shipping) so large-scale demonstration sites could be tested for the ADEQ.

4.0 FUTURE PLANS

TerraCycle Technologies and the initial technical consultant have now partnered on a grant request for funds to demonstrate a pilot-scale composting operation on the treatment plant site and to evaluate the cost-effectiveness of a biosolids management operation. The intent is to prove the sustainability (defined as environmentally responsible, economically sound and socially beneficial) of composting of various feedstocks generated at the NIWTP. In order to leverage resources, the possibility of combining TCT's current composting efforts with a future effort at the plant will be explored.

The co-permittees of the Nogales International Wastewater Treatment Plant (specifically, the International Boundary and Water Commission (IBWC) and the City of Nogales) have requested TerraCycle to submit this proposal to generate conclusive information on using composting as a sustainable management tool for recycling Class A Biosolids and yard/wood waste. The study will provide co-permittees with the information necessary to implement a sustainable diversion program and to develop a revenue generating beneficial-use option of the composted organics.

APPENDIX A

SUMMARY OF GRANT PROPOSAL

The following is a summary of the project proposal that was developed and submitted to the Department of Arizona Environmental Quality (DEQ).

Summary of Grant Proposal

Project Goal - TerraCycle Technologies (TCT) will conduct a sustainability study and pilot composting project to determine the costs and benefits associated with establishing, operating and maintaining a co-composting facility at the Nogales International Wastewater Treatment Plant (NIWTP) for the purpose of producing a marketable compost while diverting significant amounts of organics from the solid waste stream.

Multiple Organic Diversion - This study and pilot project may lead to establishing a sustainable co-composting facility at the wastewater treatment plant. The potential also exists to divert other organic wastes. Produce waste could be added, as appropriate, to increase the nitrogen content and soil amendment value of finished compost (Disney World currently does this at their co-composting facility in Orlando, Florida). Paper and cardboard products are potential feedstocks easily diverted from the waste stream. The Albuquerque Municipal composting facility has piloted composting paper products and biosolids with positive results.

Compost Marketing Plan - Relevant market, product, and customer related data will be obtained by surveying potential end users. Data to be collected includes: quantity of similar products used; quality requirements; product value; seasonality of usage; and specific end use applications. All data collection will be completed using a standardized survey, allowing for uniform data collection, and will be completed by experienced marketing staff. Initial contact and surveying will be made via the telephone, and face-to-face visits will be scheduled where appropriate to obtain more detailed information. Other

relevant data will be obtained from area experts and the agricultural extension service. This data will be used in the economic analysis, since revenues generated through product sales can be used to offset facility operations and maintenance costs.

Pilot Project: Concept designs will be used for preliminary evaluation of the area needed and acceptability of the proposed site. Phase I will consist of project design for windrow and static pile pilot. Phase II will entail developing the design for desired composting facility, based on pilot results. Tasks will include: identifying physical and operational requirements; description of physical layout of proposed facility design and selected site; description of general facility operations; and determining capital and annual operating costs.

The pilot program will operate for a minimum of four months, and will use the same biosolids and yard waste that would be managed in the full-scale facility. At the onset of the pilot, a mass balance will be completed to determine the proper mix ratio of feedstocks. Again, both the aerated static pile and windrow composting processes will be operated and evaluated. It is estimated that composting and curing will be completed in approximately 90 days. During the composting process, temperatures will be taken daily to assure meeting PFRP, and moisture content will be taken as necessary to assure process control. Once the compost is cured, it will also be tested for various parameters, such as pathogen destruction, heavy metal content, pH, soluble salts, moisture content, bulk density, maturity, stability, nutrient content, etc. The compost will be screened and used for market research purposes.

Economic analysis for windrow and static aerated pile co-composting operations: The economic feasibility of combining wastewater residuals with yard waste or other high carbon amendments will be developed using data provided by the wastewater facility, pilot project results, market study results and preliminary designs. The analysis will compare capital and annual operating and maintenance costs and advantages/ disadvantages of each alternative.