

CITY OF KELOWNA
BIOSOLIDS RECYCLING FACILITY:
OPERATIONS, QUALITY CONTROLS AND MARKETING

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ABSTRACT

Associated Engineering in combination with E&A Environmental Consultants combined to design a cost effective biosolids recycling facility for the City of Kelowna utilizing the Aerated Static Pile composting method.

The biosolids recycling facility produces a Retail High Grade Compost as designated by the Ministry of Environment, Lands and Parks under the Guidelines for the Disposal of Domestic Sludge, "Waste Management Act".

This presentation will show the process and equipment used to convert dewatered biosolids into a high quality soil amendment.

In addition, there will be an outline of our marketing success to date for the sale of our compost products under the trade name "OGOGROW".

INTRODUCTION

The City of Kelowna's Wastewater Management Plan states that stabilization of biosolids will be via composting. The composting technology selected was the extended aerated static pile (ASP) method. In the spring of 1994 E&A Environmental Consultants, Inc. in association with Associated Engineers B.C.) Ltd. provided design of the Biosolids Recycling Facility. The main goal of the project was to produce a "Retail High Grade" compost product as defined in Schedule E of the Guidelines for the Disposal of Domestic Sludge under the "Waste Management Act".

PROCESSING

A serviced population of 65,000 people creates 28 ML/day of wastewater. At the Kelowna Pollution Control Center wastewater is treated and dewatered. 12,000 wet tonnes of biosolids are produced each year. The biosolids contain pathogens and require further treatment to destroy pathogens. Composting uses the natural process of aerobic decomposition to create a condition

where hot pile temperatures kill pathogens and active decomposition stabilizes the biosolids, transforming it into a valuable resource that is safe to handle, environmentally beneficial and economically beneficial.

The Biosolids Recycling facility is located on private land in a remote location near Winfield, B.C.. Each day about 33 tonnes of biosolids (two or three truckloads) are transported to the site in trailers designed to contain odours and prevent spillage. The Material is 20% solid and resembles mud. It is turning anaerobic and starting to produce an objectionable odour. The moisture content is so high that it is displacing the air required for aerobic bacteria, which do not produce odours. Biosolids are placed on an asphalt pad where they can be picked up with a front-end loader.

Biosolids are rich in nitrogen and require carbon to help control the rate of decomposition. By mixing the biosolids with woodwaste, you create an environment where aerobic bacteria can flourish. Oxygen is trapped in the voids surrounding the particles of wood. Carbon is provided by the woodwaste. A Reel Augie 3550 Mixer manufactured by Knight Industrial Division is used to mix the biosolids and woodwaste. A mix ratio of one part biosolids to one four parts woodwaste creates a carbon to nitrogen ratio of about 35:1 which is ideal for bacterial action.

The initial mix is then placed in rows on a plenum of woodchips (figure 3-1). Inside the plenum of woodchips, running the length of the row is perforated pipe. The initial mix is piled to a height of three meters. A 0.35-meter final insulating layer, consisting of finished compost free of pathogens, is placed over the initial mix. The insulating layer ensures that all parts of the initial mix reach minimum temperatures required for pathogen destruction as well as being an effective biofilter to remove odours.

Air is forced through the piles with blowers that are attached to the perforated pipe. Sixteen New York Blowers (model 126) provide 1200 CFM of air to each row. The blowers are powered by single phase, three horsepower electric motors.

To control the rate of air supplied to the biosolids mix, the City of Kelowna uses a Compost Captain Aerator. This off the shelf item, manufactured by Marcom Industries Inc., controls the rate of air by timed intervals or by pile temperature. Temperature probes are inserted into the rows at random locations and feed pile temperatures back to the Aerator. Initially a small amount of air is provided to stimulate aerobic bacterial action. The bacteria begin to multiply causing the

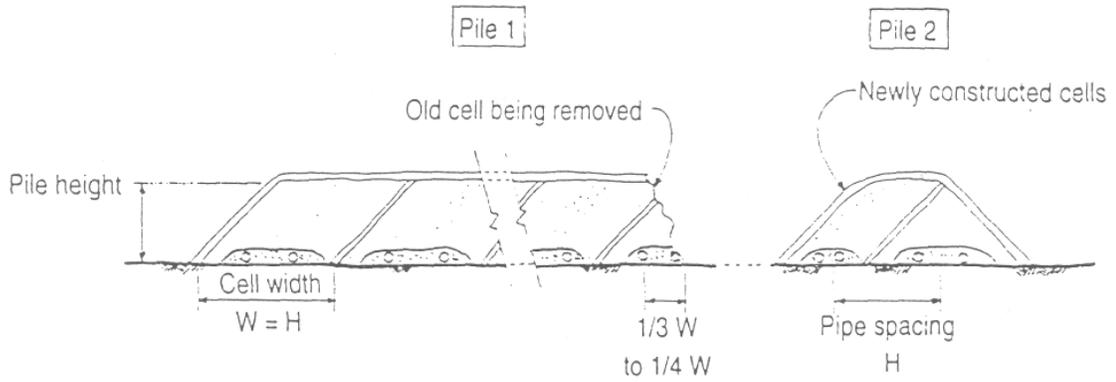
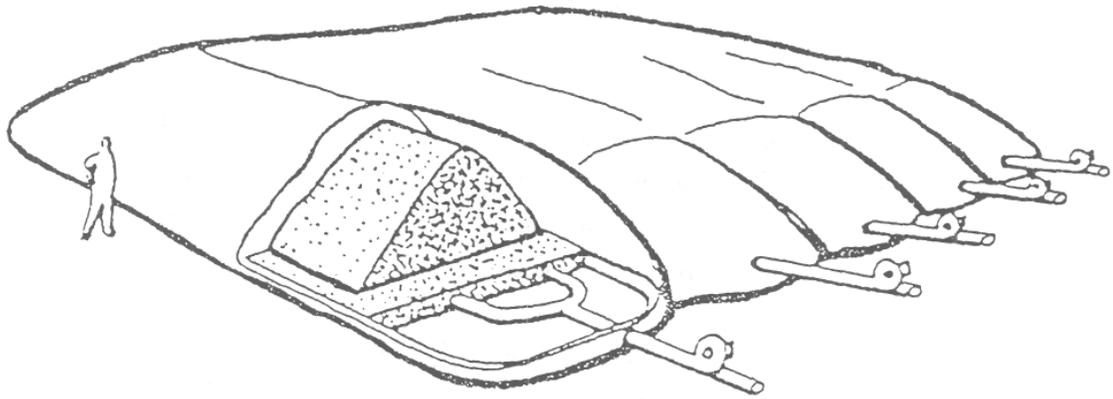


FIGURE 3-1

E & A ENVIRONMENTAL CONSULTANTS, INC.

EXTENDED AERATED STATIC
PILE COMPOSTING

pile to heat up. Within one or two days, thermophilic bacteria cause the rows to exceed 55 degrees Celsius. Rows are maintained at the high temperature for three days to ensure pathogen destruction. Rows are then cooled down to 45 to 55 degrees Celsius by purging them with more air. Cooling the rows creates an environment where mesophilic bacteria can flourish. These bacteria are more effective than thermophiles and can stabilize the biosolids in 21 days.

After rapid decomposition the initial mix, plenum and insulating layer along with some broken pipe are removed and repled to form windrows where curing takes place over the next three to four months. During this stage, other microorganisms begin to feed on the bacteria. Mites wade through the thin layer of water on each particle of wood, like herds of cattle, consuming the bacteria. As their numbers increase springtails appear and feed on the mites. The material takes on an earthy smell and texture during this phase and is important in producing a stable product that meets the customer's expectations.

The composted biosolids are then screened to remove the woody oversize fraction from the finished product. The City of Kelowna purchased a MCB 621-RE portable trommel screen from Tyalta Industries Inc. at a cost of \$200,000. The screen features double brush assemblies, scraper bars and non-bridging hoppers specifically designed to handle compost.

Independent labs in accordance with B.C. Environment regulations test screened compost. The results are made available to B. C. Environment who approve the sale of Ogogrow based on metals analysis, proof of pathogen kill and vector reduction requirements. All Compost produced to date has been approved for unrestricted distribution and can be used in vegetable gardens.

MARKETING

Introduction

The City of Kelowna Biosolids Recycling program has experienced another successful year in 1997. Revenues have exceeded \$107,000 and total volume sold was just over 16,000 yds. There continues to be a strong demand for the product, especially from orchardists. The ability to consistently produce a high quality product has been greatly enhanced by the purchase of a trommel screen in the summer of 1997. With an annual budget of \$364,000 and revenues in 1998 on pace to reach \$150,000 a cost recovery of 41% will result.

Marketing Strategies

The success of marketing strategies depends on the ability to produce a high quality compost product. The product should be in continuous supply. The soil amendment is primarily marketed through a series of distributors who sell the product on a retail basis. The product is also sold on a retail level at the Glenmore Landfill and at a wholesale level at the Kelowna Biosolids Recycling Facility in Winfield.

Target Markets

Based on actual sales in 1997 the following markets will be targeted in 1998.

<u>Market</u>	<u>1996 % of market</u>	<u>1997 % of market</u>	<u>1998 % of</u>
Nurseries & Landscape Industry	51.6	40.1	30
Orchardists	22.1	24.6	25
City Parks	10.5	0.2	5
Residential	10.4	28.0	30
Glenmore Landfill retail outlet	4.6	6.6	7
Promotional	0.8	0.6	1
Turf Industry	0	0	2

In 1996 the success or failure of marketing the product relied heavily on the Nursery and Landscape industry. A sudden change of direction by these few consumers would have caused a critical shortage of product or worse, a surplus. By 1997 a trend was being established that shows a more even distribution of percent market share. Projecting this concept into 1998 one can see that a swing by any one industry would be easier to absorb by other industries that have growing market shares.

Nurseries and Landscapers have been grouped together because Nurseries resell the product to Landscapers and these figures are not available. While the percentage of total composted biosolids sold to Nurseries and Landscapers has continued to drop, the volume utilized by these has continued to rise because more product has been produced each year. Orchardists have continued to capture more of the market share but are more concerned about price than other industries. The Provincial Government often funds replant programs that consume large quantities of soil amendments. If funding for these programs were cut then it

would follow that the industry would use less composted biosolids and thus a smaller market share would result.

Product Strategy

One grade of product will be marketed. The product shall meet B.C. Environments 'Guidelines for the Disposal of Domestic Sludge under the Waste Management Act', Retail High Grade designation. Screening to 1/2 inch and 3/8 inch will produce two products. The products shall be in consistent supply, weed seed free, containing no pathogens and no objectionable odours.

Packaging Strategy

Composted biosolids will be sold in bulk by the yard, or by the bag when the customer fills the bag from a bulk bin. Selling by bulk eliminates the requirements of the Federal Fertilizer Act that requires labeling and guaranteed analysis.

Pricing Strategy

The 1/2 inch product is wholesaled for \$5.50/yd, while the 3/8 inch product is \$10.00/yd based on the fact that the material has a higher end use value and the material will be more costly to screen. The soil amendment is also retailed at the Glenmore Landfill for \$17.50/ yd or \$2.00 / bag for 1/2 inch material. The price for 3/8 inch material is \$22.00 /yd or \$3.00 / bag. With this pricing strategy in place we should be within the industry average for cost recovery, between 25 to 33% of operating costs.

Distribution Strategy

The product is primarily distributed from the Biosolids Recycling Facility in Winfield to Nurseries, Landscapers and Orchardists by the dump truck load. The product is then used directly on a jobsite or resold at bulk distribution centers. The soil conditioner is also distributed to residential customers who have hired a commercial vehicle to deliver the product and are purchasing more than three cubic yards.