
Draft Report

Calgary Regional Organics Management Program Implementation Strategy

Prepared for
Calgary Regional Partnership

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Contents

1.	Introduction	1-1
1.1	Study Area.....	1-1
2.	Organic Waste Quantities	2-1
3.	Current Status of Programs and Facilities	3-1
3.1	Southern Waste Shed.....	3-1
3.1.1	Collection Programs.....	3-1
3.1.2	Public-sector Processing Facilities.....	3-1
3.1.3	Private-sector Processing Facilities.....	3-1
3.1.4	Biosolids Management.....	3-2
3.2	Western Waste Shed.....	3-2
3.2.1	Collection Programs.....	3-2
3.2.2	Public-sector Processing Facilities.....	3-2
3.2.3	Private-sector Processing Facilities.....	3-3
3.2.4	Biosolids Management.....	3-3
3.3	Central Waste Shed.....	3-4
3.3.1	Collection Programs.....	3-4
3.3.2	Public-sector Processing Facilities.....	3-4
3.3.3	Private-sector Processing Facilities.....	3-5
3.3.4	Biosolids Management.....	3-5
3.4	Eastern Waste Shed.....	3-6
3.5	Northern Waste Shed.....	3-6
4.	Design and Operating Requirements	4-1
4.1	Facility Classification.....	4-1
4.2	Permitting Requirements.....	4-1
4.3	Siting, Design, and Operating Requirements.....	4-3
4.4	Operator Certification.....	4-3
4.5	Proposed Regulatory Changes.....	4-3
5.	Product Quality Requirements	5-1
5.1	Alberta Environment.....	5-1
5.2	Council of Ministers of the Environment.....	5-2
5.3	Canadian Food Inspection Agency.....	5-3
5.4	Voluntary Product Standards and Programs.....	5-4
5.4.1	Compost Quality Alliance.....	5-4
5.4.2	Bureau de Normalisation du Quebec.....	5-5
6.	Implementation Strategy – Waste Diversion Programs	6-1
6.1	Southern Waste Shed.....	6-1

6.1.1	Residential Yard Waste	6-1
6.1.2	Residential Food Waste.....	6-2
6.1.3	Commercial Organic Waste.....	6-2
6.2	Western Waste Shed	6-3
6.2.1	Residential Yard Waste	6-3
6.2.2	Residential Food Waste and Commercial Organic Waste.....	6-3
6.3	Central Waste Shed.....	6-3
6.3.1	Residential Yard Waste	6-3
6.3.2	Residential Food Waste.....	6-4
6.3.3	Commercial Organic Waste.....	6-4
7.	Implementation Strategy - Biosolids Management.....	7-1
7.1	Southern Waste Shed.....	7-1
7.2	Western Waste Shed	7-1
7.3	Central Waste Shed.....	7-2
8.	Implementation Strategy - Processing Facilities.....	8-1
8.1	Southern Waste Shed.....	8-1
8.2	Western Waste Shed	8-2
8.3	Central Waste Shed.....	8-2
8.4	Eastern Waste Shed.....	8-3
8.5	Northern Waste Shed	8-3
8.6	Processing Facility Funding and Cost Recovery	8-3
9.	Implementation Strategy - Product Quality Assurance	9-1
9.1	Standards and Specifications.....	9-1
9.2	Process Control Systems	9-1
9.3	Finished Product Testing	9-2
9.3.1	Sample Frequency and Methods.....	9-2
9.3.2	Analytical Methods.....	9-3
9.3.3	Onsite vs. Offsite Testing	9-4
10.	Implementation Strategy - Product Marketing.....	10-1
11.	Implementation Schedules	11-1
12.	Grant Funding Sources	12-1
13.	References.....	13-1

Exhibits

Exhibit 1	Waste Sheds within the Calgary Region.....	1-2
Exhibit 2	Organic Waste Quantity Estimates.....	2-3
Exhibit 3	Summary of Current Regulatory Scheme for Composting Facilities in Alberta.....	4-2
Exhibit 4	Proposed Regulatory Scheme for Composting Facilities in Alberta.....	4-4
Exhibit 5	Southern Waste Shed Implementation Schedule.....	11-3
Exhibit 6	Western Waste Shed Implementation Schedule.....	11-5
Exhibit 7	Central Waste Shed Implementation Schedule.....	11-7

Appendices

A	Code of Practice for Compost Facilities
B	Standards for Compost Facilities in Alberta (DRAFT)
C	CCME Guidelines for Compost Quality
D	CFIA Standards for Metals in Fertilizers and Supplements
E	Example Compost Product Specifications
F	Operations Manual Example Table of Contents
G	Selected Certified CAP Laboratories
H	Funding Program Summary

1. Introduction

Previous studies completed for the Calgary Regional Partnership (CRP) have identified that organic wastes comprise a significant component of the solid waste stream in the region. These studies have further indicated that collection and composting of these organics wastes represents a significant waste diversion opportunity.

Most recently, a study completed for the CRP recommended that a series of multi-regional composting facilities be established within the region in accordance with a phased design and implementation schedule (CH2M HILL, 2006). These facilities would be located in the MD of Foothills, City of Airdrie, City of Calgary, and the Bow Valley Corridor. This multi-regional approach was unanimously endorsed by the CRP's general assembly in the Fall of 2006.

This technical memorandum provides further details and outlines specific steps for implementing the recommended multi-regional processing facility approach. It is based on consultation with each of the host facilities/regions and incorporates their existing plans and strategies. Recent developments within the industry, both locally and provincially, have also been taken into account.

In addition to the development of processing capacity, details and timelines for implementation of associated collection programs is also provided in this document.

1.1 Study Area

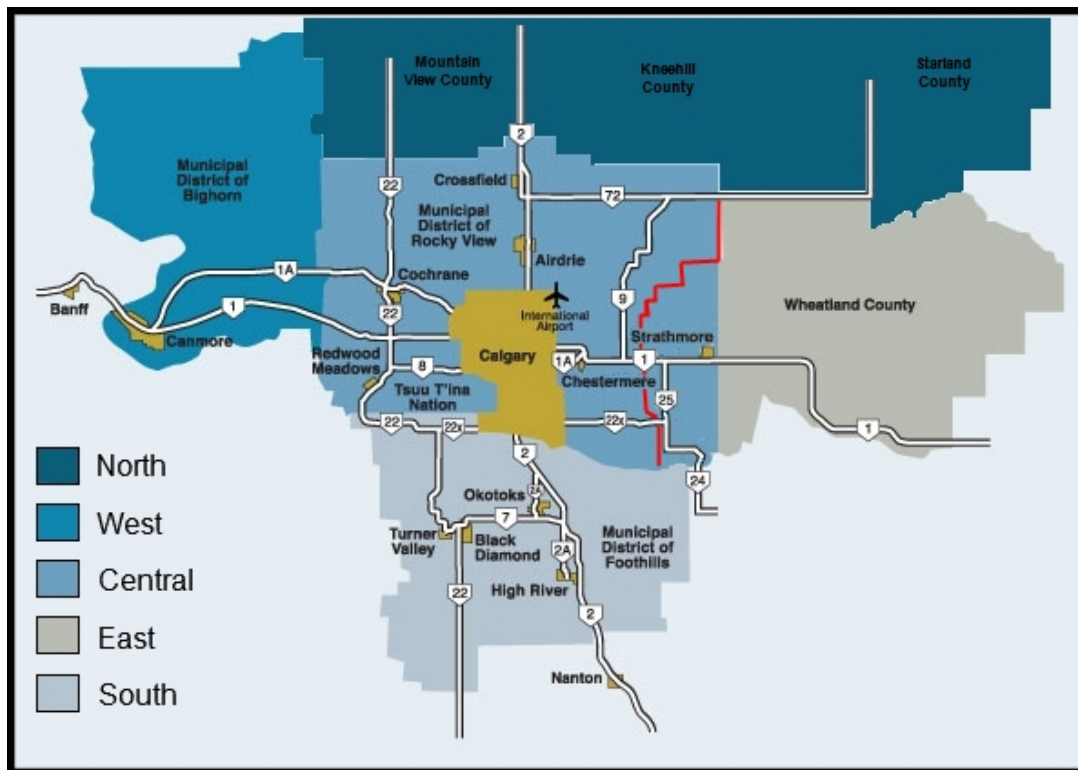
Borrowing the concept of "waste sheds" from the previous work, the study area has been broken down into five areas as described below and shown in Exhibit 1.

- **South Region Waste Shed:** MSW collected from within the MD of Foothills, Towns of Black Diamond, Turner Valley, High River, Okotoks, and Nanton follows a waste flow path to the Foothills Regional Services Commission (FRSC) Class II Landfill site located south of Okotoks.
- **West Region Waste Shed:** MSW from the Town of Canmore, Banff and MD of Big Horn is transported to landfill sites in Calgary. Within the local waste shed, C&D waste and organics (leaf and yard waste; scrub and brush) from Banff, Canmore and the MD of Big Horn are composted locally at the nearby Francis Cooke Class III Landfill Site in Exshaw.
- **Central Waste Shed:** Within the Central waste shed, municipal solid waste is collected from the City of Calgary, MD of Rocky View, Langdon, Chestermere, Irricana, Crossfield, Madden, Cochrane, Bragg Creek, Strathmore, and the City of Airdrie. Waste collected for disposal is landfilled within the City of Calgary's three MSW landfills, or in some cases BFI's Class II landfill site and ECCO Waste's Class III landfill (C&D waste only) in Calgary.

- **East Region Waste Shed:** MSW waste flow path leads to the Drumheller Regional Landfill site, which services the Town of Drumheller and the Counties of Wheatland, Kneehill, and Starland, including most towns and villages within. Waste from the Town of Beiseker is also shipped to the Drumheller landfill site, however the Town of Strathmore, currently sends its MSW to a landfill in Calgary.
- **North Region Waste Shed:** MSW collected as garbage within Mountain View County, and the towns of Sundre, Olds, Didsbury, Carstairs, Cremona, flows to a regional landfill site near Didsbury. However, green waste and organics are recovered through curbside, source-separated green waste collection programs in Olds, Sundre, Didsbury, and Carstairs. The recovered organics all flow toward the Town of Olds for composting.

EXHIBIT 1

Waste Sheds within the Calgary Region



Of the five waste sheds indicated above, three (i.e. Central, West, and South) are located completely within the CRP member boundaries and are the focus of this implementation strategy. Organic waste management options for the East and North region waste sheds are not considered in the strategy as the waste flow from these areas terminate at facilities outside of the Calgary Regional Partnership boundaries.

2. Organic Waste Quantities

As part of the Regional Organics and Paper Waste Recovery Study (CH2M HILL, 2006), organic waste volumes within the CRP were characterized and quantified. The estimates of residential waste and biosolids quantities were made based on the 2004 population in each of the municipalities within the region, and waste generation/composition data from similar jurisdictions. Commercial waste quantities were estimated based on Standard Industry Classification data, the number of reported employees in each jurisdiction, and commercial waste composition information from the City of Calgary.

With the recent release of federal census data from 2006, the residential organic waste quantities and biosolids quantities¹ were updated for each municipality to provide a more current basis for planning. Commercial waste quantities were not updated. The organics waste quantities within each waste shed used for planning and strategy development are provided in Exhibit 2.

¹ Only biosolids generated at mechanical treatment plants are included within the scope of this implementation strategy. Biosolids from lagoon systems are not included as the quantities and rates of generation are infrequent and irregular.

Exhibit 2
Organic Waste Quantity Estimates

Population (2006)	Households	Residential Waste (tpy)	Yard Waste (tpy)	Food Waste (tpy)	Total Residential Organic Waste (tpy)	WWTP Type	Biosolids (dry tonnes/yr)	ICI Waste (tpy)	ICI Organic Waste (tpy)
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South	Black Diamond	Town	1,900	756	799	144	186	329	Lagoon		1,367	342
	High River	Town	10,716	4,363	5,476	986	1,273	2,258	Lagoon		6,491	1,623
	Longview	Village	307	N/A	154	28	36	63	Lagoon		N/A	N/A
	Nanton	Town	2,055	853	493	89	115	203	Lagoon		1,230	308
	Okotoks	Town	17,145	5,927	11,677	2,102	2,714	4,816	WWTP	288	8,529	2,132
	Turner Valley	Town	1,908	794	899	162	209	371	Lagoon		1,164	291
	M.D. Foothills	MD	19,736	7,460	12,424	2,236	2,887	5,124			12,989	3,247
West	Banff	Town	6,700	2,844	2,927	527	680	1,207	WWTP	113	6,797	1,699
	Canmore	Town	12,039	6,575	4,422	796	1,028	1,824	WWTP	202	9,380	2,345
	Ghost Lake	SV	69	N/A	35	6	8	14			N/A	N/A
	Waiparous	SV	55	N/A	28	5	6	11			N/A	N/A
	Kananaskis	ID	429	183	215	39	50	88			N/A	N/A
	Stoney First Nation (Chiniki)	IRI	1,400	N/A	700	126	163	289			N/A	N/A
	MD of Bighorn	MD	1,264	676	773	139	180	319			962	241
Central	Airdrie	City	28,927	10,768	7,104	1,279	1,651	2,930	Pump		15,062	3,766
	Crossfield	Town	2,648	960	41	7	9	17	Lagoon		1,701	425
	Irricana	Village	1,243	443	393	71	91	162	Lagoon		823	206
	MD of Rocky View	MD	34,171	11,604	3,417	615	794	1,409	Pump		23,260	5,815
	Calgary	City	988,193	401,389	344,089	58,426	83,717	142,143	WWTP	16,602	656,205	164,051
	Redwood Meadows	Townsite	1,150	N/A	575	104	134	237	Lagoon		N/A	N/A
	Tsuu T'ina Nation	IRI	1,321	N/A	661	119	154	272	Pump		N/A	N/A
	Cochrane	Town	13,760	4,969	3,674	661	854	1,515	Pump		8,416	2,104
	Chestermere	Town	9,564	3,165	4,782	861	1,111	1,972	Pump		2,766	692
	Strathmore	Town	10,225	3,943	850	153	197	350	WWTP	172	5,390	1,348

3. Current Status of Programs and Facilities

An inventory of organic processing facilities in the Calgary Region was previously prepared for the Calgary Regional Partnership (CH2M HILL, 2006). Detailed information about these facilities has been updated and is presented in the following sections along with information on the status of supporting diversion programs.

3.1 Southern Waste Shed

3.1.1 Collection Programs

Within the southern waste shed, existing residential organics collection programs are limited to drop-off depots for yard waste and brush. Depots are provided in Okotoks, Black Diamond, Turner Valley, and High River.

3.1.2 Public-sector Processing Facilities

A single publicly owned composting facility exists in this area. It is located at the Foothills Landfill and operated by the Foothills Regional Service Committee (FRSC). The compost facility was constructed in 2005 and permitted that same year. The site is designated as a Class 1 compost facility under EPEA, and currently accepts leaf and yard waste from drop-off depots in Okotoks, Black Diamond, Turner Valley, and High River. Until recently, stabilized biosolids compost from the Okotoks wastewater treatment plant (WWTP) was also accepted and further processed/cured. Food waste and other compostable materials (e.g. soiled paper) are not accepted at the facility.

In 2006, 2,120 tonnes of leaf and yard waste, and approximately 2,800 tonnes of stabilized biosolids compost were accepted. Currently, the product produced at the composting facility is being used on site for reclamation projects, and efforts are being made to market it offsite.

Associated with the composting facility is a wood waste diversion program. Wood waste that is brought to the site is segregated into three types: clean dimensional wood, painted or treated dimensional wood, and trees/brush. The stockpiled material is ground by contractor once or twice per year, and the resulting mulch products are used in the composting process as amendment, used for daily cover, or sold as mulch. Current mulch prices are \$40/tonne for mulch made from trees and brush, or clean dimensional wood, and \$20/tonne for mulch from painted or treated dimensional wood.

3.1.3 Private-sector Processing Facilities

The only private-sector facility in operation in the southern waste shed is owned by Roseburn Ranches. This site is located at Roseburn's feedlot operation near the Foothills Landfill. The site is registered with Alberta Environment as a Class 1 facility, and compost is produced using a windrow method. Primary feedstocks are feedlot manures, but the facility is also handles biosolids, paunch manure, and other animal byproducts. This facility is a

commercial venture, and waste generators are charged a fee for processing of their waste materials.

Finished compost products are marketed in bulk and in bags through a subsidiary company called “EcoAg Initiatives”. EcoAg also provides application services to its customers, and compost marketing services to the City of Edmonton.

3.1.4 Biosolids Management

Of the municipalities within the area, only the Town of Okotoks currently has a mechanical wastewater treatment plant. Dewatered biosolids from this WWTP are composted on-site for up to 14 days using a modular bin system. Following this initial period, the material is taken to an off-site facility for further composting and curing.

The Town of Okotoks’ biosolids composting program is currently being reviewed by the Town and its operating contractor (EPCOR). For many years, the secondary processing occurred at the Foothills Landfill’s compost facility, but arrangements were recently made to transfer the processing to the Roseburn Ranches facility. The existing composting system located at the WWTP is also reaching its capacity and will not be capable of processing the increased amounts of biosolids that will be produced in the coming years without expansion.

3.2 Western Waste Shed

3.2.1 Collection Programs

Within the western waste shed, residential organics collection programs are limited to drop-off depots for yard waste and brush. Depots are provided in Canmore and the MD of Bighorn.

3.2.2 Public-sector Processing Facilities

Two publicly owned composting facilities exist within the western waste shed; a biosolids composting facility in the Town of Banff, and a yard waste composting facility at the Bow Valley Waste Management Commission’s Francis Cooke Landfill near Exshaw. A third facility existed in the Town of Canmore in the 1990’s, but has since been closed due to odour complaints.

The Town of Banff facility is located at the Town’s WWTP, and operates under the WWTP’s environmental approval. This enclosed “tunnel” composting system was constructed in the early 2000’s as part of upgrades to the WWTP, and was intended to process the digested biosolids generated by WWTP operations. Stabilized compost from the site is transported as reclamation material to a closed landfill site at Castle Junction (within Banff National Park) where it is stockpiled and cured. Thus far, none of the product from this program has been marketed.

In 2006, the Town of Banff and the Bow Valley Waste Management Commission (BVWMC) initiated a pilot demonstration project at the Banff facility to test the feasibility of co-composting source-separated food waste collected from restaurants and hotels in Banff with biosolids from the WWTP. While no difficulties have been encountered and the results thus

far have been promising, the size of the pilot has not yet been large enough to extrapolate full-scale results. A stationary mixing unit was recently installed at the facility in preparation for ramping up of the demonstration project to include more commercial generators and organics from residential collection bins. Garburators are also being tested in selected commercial businesses as a means of delivering organics to the compost facility via the sanitary sewer and WWTP.

The compost facility at the Francis Cooke Landfill was initially constructed in 2003 and since then has operated using a low-tech windrow approach. Planning for the further expansion of the composting facility has been completed and funding has been allocated by the BVWMC. No technology changes will result from the facility expansion.

The Francis Cooke site is designated as a Class 2 compost facility and processes leaf and yard waste collected from drop-off depots in Canmore and the MD of Bighorn, as well as materials delivered directly to the site by area residents and businesses. Food waste and biosolids are not accepted at the facility. Compost produced at the composting facility has not yet been marketed.

The Francis Cooke site also operates a large wood waste diversion program. Wood waste that is brought to the site is segregated into two piles: clean and unpainted/untreated kiln dried wood and trees/brush. The stockpiled materials are ground by contractor once or twice per year, and the resulting chip are used as amendment in the onsite composting process, sold as paper pulp, or marketed as mulch.

3.2.3 Private-sector Processing Facilities

There are no known private-sector processing facilities located in the western waste shed that accept materials from off-site.

3.2.4 Biosolids Management

WWTP's exist in Banff and Canmore, and biosolids from both facilities are composted.

The current biosolids composting operations at the Banff WWTP have proven to be successful over the past five years. However, there have been challenges marketing the final product produced through the program, and this material continues to accumulate at the Castle Junction site. This is due in part to the location of Castle Junction relative to established markets (e.g. Exshaw, Cochrane, Calgary), but also due to characteristics of the finished products (e.g. particle size, presence of rocks), a limited product testing program, and a reluctance by Parks Canada and the MD of Bighorn to allow use of the material within their jurisdictions. The MD of Big Horn has expressed an interest in use of the final product if the compost could be consistently processed as a Category A product.

Currently, Canmore's biosolids are being transported to the City of Medicine Hat's windrow composting facility for processing. However, this practice is financially unattractive to the Town. Canmore is working on an evaluation of biosolids handling options in cooperation with their WWTP operator (EPCOR). This is being driven in part by the re-tendering of the existing contract for biosolids hauling in mid-2007, and the significant price increases that took place. Additional options have already been presented to Canmore for consideration, including the development of a regional composting facility

and the construction of lime-stabilization facility. With respect to the latter option, pilot testing of lime stabilization and use is underway in cooperation with a local industry partner.

3.3 Central Waste Shed

Due to the presence of the City of Calgary, the central waste shed contains the largest population base within the Calgary Region, even though the geographic area is similar to the other waste sheds. This high population density creates unique issues, and opportunities for organics diversion.

Several facilities and programs exist within the central waste shed of the Calgary Region. These include a mix of publicly and privately owned facilities.

3.3.1 Collection Programs

Residential organics collection programs in the central waste shed are limited to drop-off depots for yard waste and brush. Drop-off locations are provided in Bragg Creek, Langdon, Calgary, Airdrie, Cochrane, Irricana, Crossfield and Strathmore.

3.3.2 Public-sector Processing Facilities

Three of the four publicly owned facilities that currently exist within the central region are owned and operated by the City of Calgary. These sites are located at Spyhill Landfill, East Calgary Landfill, and the Shepard Landfill. Each is a Class 2 windrow operation, and consists of engineered composting pads and associated surface water controls.

The Shepard and Spyhill sites are operated by the City and are used to process leaf and pumpkins from the City's fall drop-off collection programs. The Shepard site also processes manures and bedding from the Calgary Zoo that is delivered to the sites during the course of the year. Material from businesses, or from outside of City boundaries are not accepted at these two sites.

From 2003 through 2006, the East Calgary site was operated by a private entity on behalf of the City as part of a pilot program to divert commercial organic wastes. The facility also processed material from adjacent communities and from the City's annual Christmas Tree collection and grinding program. At the start of 2007, compost operations at this site were internalized by the City, and the commercial pilot program, while still being operated, is not being "publicized" while the City refines its organics strategy. Based on recent discussions with City personnel, this facility also no longer accepts feedstocks from outside of the City's boundaries.

Compost products from all three of the City sites have been marketed and sold cooperatively in the past. Products have been used by the both the City's Waste and Recycling Services and Parks Departments, and marketed to homeowners and landscapers through a broker.

The fourth publicly-owned composting facility in the area is owned/operated by the City of Airdrie. The Airdrie compost facility is located at the City's transfer station approximately

6km west of the City. The site was constructed in the early 2000's, and was funded in part with a grant from the Provincial and Federal governments.

The site is designated as a Class 2 facility under EPEA, and currently processes only leaf and yard waste that is either dropped off directly at the facility, or collected at a drop-off depot at the City's Recycling Yard in East Airdrie. Processing is done in large windrows using the "cold-start" method, and front-end loaders. Currently, the product produced at the composting facility is used by the City of Airdrie's Parks Department.

In 2006, approximately 500 tonnes of leaf and yard waste were processed, which is near the capacity of the site. Increased diversion of material to this facility will necessitate an expansion or a change in technology.

3.3.3 Private-sector Processing Facilities

Five private sector facilities are located within the central waste shed. Four of the five facilities are based on wastes from the agricultural sector.

The Thorlakson operation is located within the MD of Rocky View near Kathryn. Composting is used by the feedlot owners as a means of managing manures from their 20,000 head feedlot operation. Product is marketed almost entirely in bags under the "Nature's Call" label, although some private label bagging is also done.

Theissen is another feedlot operation that uses compost to manage manures. At this operation, a low-tech windrow approach is used to manage a portion of the feedlot manures. The program is operated in cooperation with Top Spray of Cochrane, who utilize the final product in their various soil blends and application projects.

International Compost Ltd. (ICL) is a producer of compost and organic fertilizer products for the retail and bulk markets. Their windrow composting operation is located near Strathmore, and uses paunch manure and animal bedding as the primary ingredients. Product manufactured by ICL is sold under the "Groundskeeper Pride" label. ICL owners recently sold the marketing arm of the company to other interests so that they could focus their resources on production.

Through its Top Spray subsidiary, Spray Lakes Sawmills does some conditioning and composting of its own wood residuals at their Cochrane location. Final products are marketed through Top Spray in the Calgary and Edmonton regions.

Earth Renew Organics Ltd. owns and operates a processing facility near Strathmore. This facility has only recently been completed, and at the time of writing is in the latter stages of commissioning. Earth Renew uses a proprietary anaerobic processing technology which allows them to capture gases and generate power. Of the five private facilities in the waste shed, this is the only one that accepts organic wastes from third-party sources.

3.3.4 Biosolids Management

WWTP's exist in the city of Calgary and the Town of Strathmore. Calgary's biosolids have been land applied to agricultural fields in the region since 1983 through the "Calgro" program, and the City does not anticipate changing this practice in the coming years.

Biosolids from the Strathmore WWTP are also being land applied, but with a coming plant expansion this practice will no longer be feasible. The Town and their contract operator (EPCOR) are evaluating alternative handling options, including composting.

3.4 Eastern Waste Shed

There are currently no publicly owned composting facilities located within the Eastern waste shed. There is however an extensive network of transfer stations which service Wheatland County residents. These transfer stations are part of the Drumheller regional waste system, and feed into a landfill site located outside of the Town of Drumheller.

3.5 Northern Waste Shed

Several publicly owned waste management facilities exist within the Northern Waste Shed. These include transfer stations and landfills at Sundre, Carstairs, Didsbury, Trochu, Three Hills, and Drumheller. There are also composting facilities in Drumheller and at Olds College. The latter facility handles both residential and commercial waste material generated in the region.

4. Design and Operating Requirements

The siting, design, operation and closure of non-agricultural composting facilities in Alberta are regulated by Alberta Environment. The quality of the products produced at these facilities is also governed by Alberta Environment as well as the Canadian Food Inspection Agency (CFIA).

Alberta Environment's regulatory authority stems from the *Environmental Protection and Enhancement Act* (EPEA). The specific EPEA regulations that relate to composting facilities are the *Activities Designation Regulation*, and the *Waste Control Regulation* (WCR).

4.1 Facility Classification

Through the *Activities Designation Regulation*, Alberta Environment has defined two categories of compost facilities: Class 1 and Class 2.

- Class 2 facilities are those which accept only manures and “vegetative matter”. The latter term is interpreted by Alberta Environment to include only leaf and yard waste, brush, and wood waste.
- Class 1 facilities are those which accept feedstocks not covered by Class 2 facilities. The most common feedstocks at existing Class 1 facilities includes residential food waste, biosolids, food processing waste, and unsorted municipal solid waste (i.e. City of Edmonton co-composting facility).

A graphical summary of the existing regulatory scheme is provided in Exhibit 3.

The majority of facilities that currently exist in Alberta, including those located in Airdrie, at the Francis Cooke Landfill, and the City of Calgary landfills, fall into the Class 2 category. There are fewer Class 1 facilities in Alberta, but those that exist tend to be larger in size. The Town of Banff's WWTP compost facility, and the compost facility at the Foothills Landfill are both Class 1 facilities.

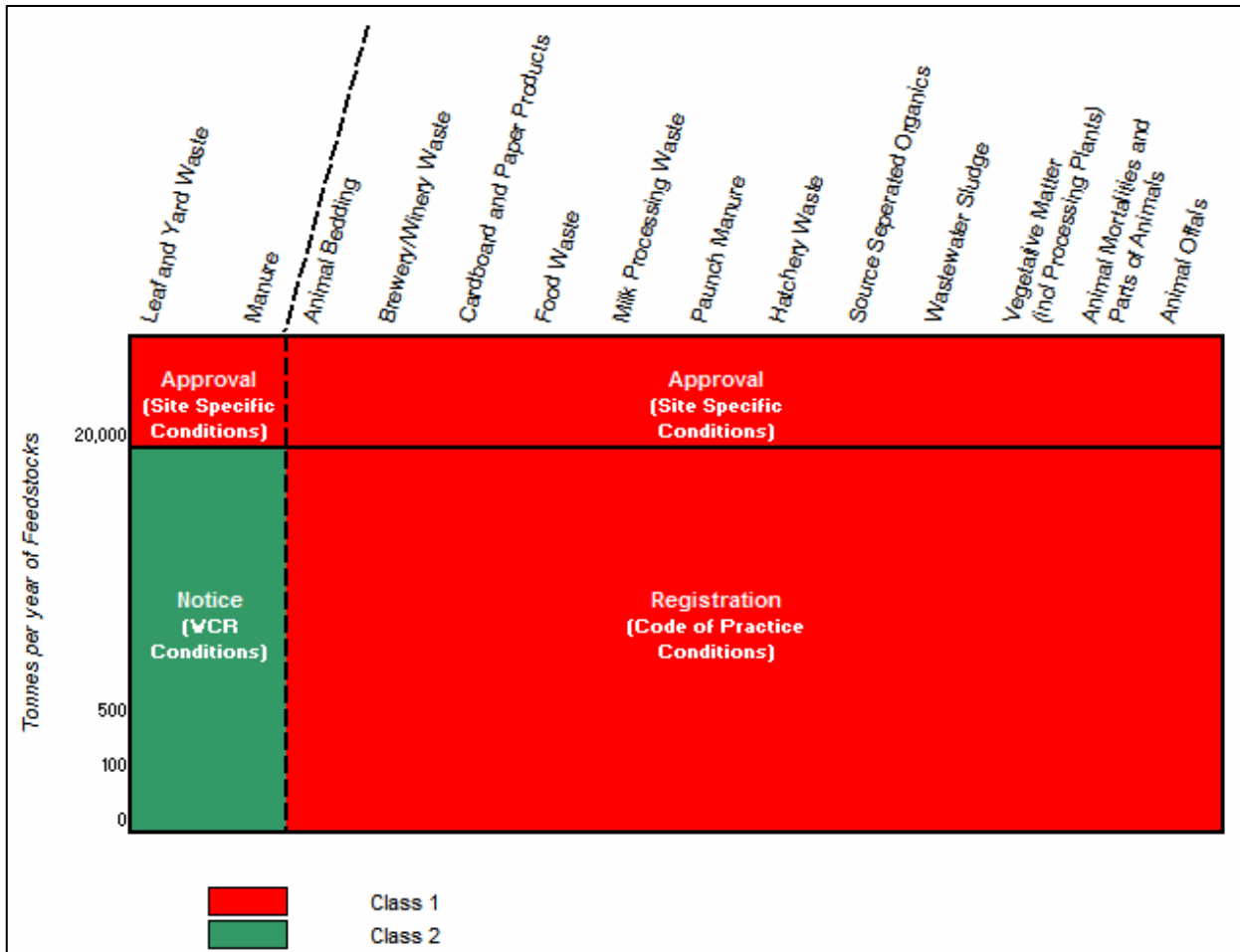
4.2 Permitting Requirements

There are three approaches to permitting composting facilities in Alberta: notification, registration, and approval. The choice of approach is dependant upon quantities and types of feedstocks that are accepted, and is outlined in the *Activities Designation Regulation*.

Notification is the simplest approach, and is used for Class 2 compost facilities that accept less than 20,000 tonnes per year of feedstock. The facility proponent is simply required to notify Alberta Environment about their intent to establish a composting facility. In the notification (which is typically a letter to Alberta Environment) the proponent must include, at a minimum, the name and address of the person responsible for the facility, the location and description of the facility, and the proposed dates for construction commencement,

construction completion and commencement of operation of the activity. Additional information may be requested by Alberta Environment at their discretion.

EXHIBIT 3
Summary of Current Regulatory Scheme for Composting Facilities in Alberta



Registration is used for Class 1 composting facilities that accept less than 20,000 tonnes per year of feedstock. In this case, the facility proponent is required to submit a registration form along with supporting documentation. The registration form and requirements are outlined in the Approvals and Registrations Procedures Regulation and the Code of Practice for Compost Facilities.

Approvals are required for all Class 1 and Class 2 facilities that accept more than 20,000 tonnes per year of feedstock. Approvals may also be required for smaller facilities (either Class 1 or Class 2) at the discretion of Alberta Environment (this is typically reserved for facilities that are sited in sensitive locations or handle unique feedstocks). Applying for an approval is typically the most involved of the three permitting processes. Approval requirements are outlined in the Approvals and Registrations Procedures Regulation.

4.3 Siting, Design, and Operating Requirements

Siting, design, and operating requirements for composting facilities differ depending upon the classification of facility and how it has been permitted.

- Requirements for Class 2 facilities operating under notification are contained within the *Waste Control Regulation*, specifically Clause 38.
- Requirements for Class 1 facilities operating under registration area contained within the *Code of Practice for Compost Facilities*, a copy of which is provided in the appendices.
- Requirements for Class 1 and Class 2 facilities operating under an approval are generally spelled out in detail in the approval itself. In some cases, the facility's approval might adopt all or parts of the *Code of Practice for Compost Facilities*.

4.4 Operator Certification

It is required by the *Waste Control Regulation* that all compost and landfill facilities under Alberta Environment jurisdiction be supervised by a "Certified Operator". A certification program was established approximately ten years ago by Alberta Environment for municipal facilities. The program outlines minimum requirements for education and experience of Certified Operators, and lays out an exam process to verify Operator knowledge.

The composting aspects of the certification program are currently being reviewed by Alberta Environment's Waste Certification Advisory Committee to take into account changes in the industry over the past five to ten years, as well as proposed changes in Provincial regulations. Aspects of the program relating to temporary absences of Certified Operators and remote supervision are also being clarified.

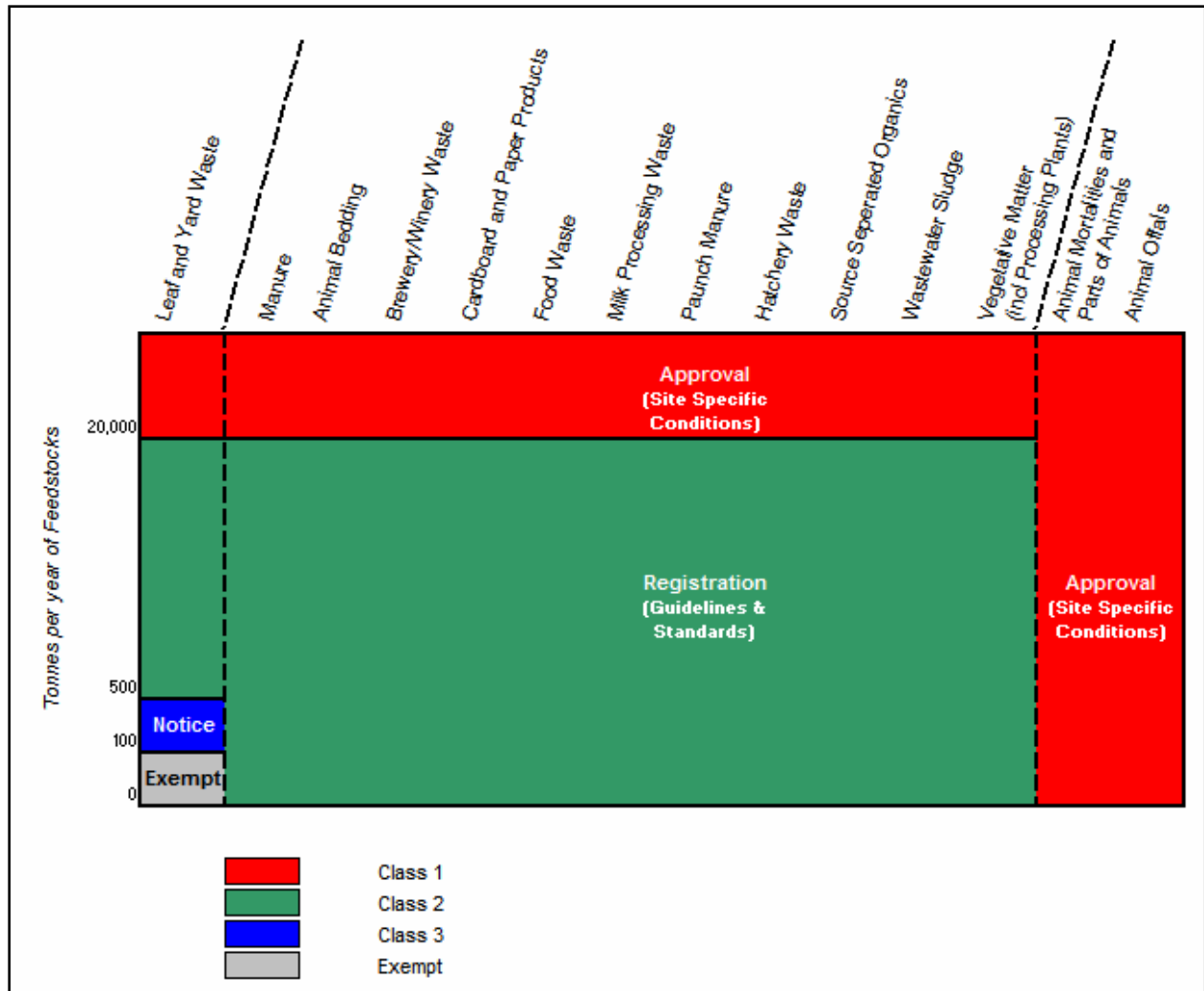
4.5 Proposed Regulatory Changes

For the past three years, Alberta Environment has been reviewing the regulatory framework around composting facilities as part of larger review of the *Waste Control Regulation*. This review has been done with the involvement of public and private sector stakeholders from the Province's composting industry.

The review has resulted in a new classification and permitting scheme for composting facilities, and the development of new standards for these facilities. The new classifications recognize the direction the industry has taken over the past ten years, and primarily involves expanding the type of feedstocks that can be handled at Class 2 composting facilities. A graphical summary of the proposed new scheme is provided in Exhibit 4.

Siting, design, and operating standards for facilities have been significantly updated as part of the review. The proposed new standards are contained in a document entitled *Standards for Composting Facilities in Alberta* that was released for public review in May of 2007. A copy of the most recent draft standards (July, 2007) are provided in the appendices.

EXHIBIT 4
Proposed Regulatory Scheme for Composting Facilities in Alberta



5. Product Quality Requirements

Quantitative quality criteria for finished compost products are necessary to protect human health and prevent environmental degradation. Criteria are also beneficial in that they help ensure product satisfaction and maintain consumer confidence. For these reasons, development of science-based standards, and documented adherence to these standards by producers, is fundamental to the continued expansion and strengthening of the composting industry in Canada.

Criteria generally fall into the categories of public health/environmental protection, fertility, and aesthetics. Regulatory standards are generally limited to the protection of public health and the environment and fertility criteria. Aesthetic criteria, which address the texture, color, composition, and aroma of the product, are more often industry-developed and voluntary in nature.

In Alberta, compost product quality criteria for health and safety and environmental factors are mandated by Alberta Environment and the Canadian Food Inspection Agency. The Canadian Food Inspection Agency also ensures consumer protection through its enforcement of the product labeling requirements of the Fertilizer Act and associated regulations.

5.1 Alberta Environment

As previously outlined, the siting, design, operation and closure of non-agricultural composting facilities in Alberta is governed by Alberta Environment. The quality of the products produced at these facilities is also governed by Alberta Environment.

In the case of Class 1 facilities, Alberta Environment mandates (either through the Code of Practice for Compost Facilities or through a site-specific approval) that the compost products produced at these facilities meet the criteria outlined in the Guidelines for Compost Quality published by the Canadian Council of Ministers of the Environment (CCME). If the products do not meet the CCME criteria, they are classified as a waste and must be managed accordingly.

Product sampling and testing requirements that Class 1 facilities must follow are either spelled out through the Code of Practice (which adopts the CCME Guideline's methods) or are written specifically in the approval documents. In the case of the latter, Alberta Environment specifies several analytical standards including USEPA, ASTM, and the Test Methods for Examination of Composting and Compost (TMECC) developed through the US Department of Agriculture.

Product quality standards for Class 2 facilities were not set or adopted when the Waste Control Regulation was first written, and technically Alberta Environment can not enforce the CCME standards on these facilities. However, this lack of quality standards is acknowledged by the Department as one of several oversights that were made in the drafting of the Waste Control Regulation in 1996, and will be addressed by revisions that are

currently being drafted by Alberta Environment. In the interim, it is generally accepted within the industry that the standard of care needed to establish due diligence at Class 2 facilities is adherence to the CCME guidelines.

The regulatory process and standards for non-agricultural composting facilities in Alberta has been under review for the past two years, and new standards were published in May of 2007 for public review and comment. With respect to compost quality, the proposed new regulatory scheme requires that compost that is produced at facilities regulated by Alberta Environment and that is “sold or given away” meet the quality requirements of the CCME guidelines. If the compost does not meet the CCME standards, it must be disposed of as a waste (in accordance with the Waste Control Regulation) or used/disposed of in a manner specifically authorized by the Department. The proposed standards do not distinguish between compost based on whether the product is classified as a Category A or B according to the CCME guidelines. However, Alberta Environment has indicated they intend to release a guideline document that will address application rates that are based on environmental protection.

5.2 Council of Ministers of the Environment

The Canadian Council of Ministers of the Environment is an “intergovernmental forum” of federal and provincial/territorial government representatives that work together to discuss and take joint action on environmental issues that have national implications. The CCME’s goal is to encourage consistent standards, practices and legislation across Canada.

The *Guidelines for Compost Quality* were first published in 1996 following discussion and collaboration by the Provinces, Environment Canada, and Agriculture Canada (a CFIA predecessor). An updated version of the guidelines was published in 2005 following consultations amongst these groups and industry representatives. A copy of the guideline is provided in the appendices.

The CCME guidelines include specific criteria for trace elements, pathogen levels, maturity, foreign matter (including “sharps”), and organic compounds. Two sets of criteria exist within the guidelines, which allow compost to be classified as either “Category A” or “Category B”². The distinction between the two lies in differing criteria for trace elements and sharp foreign matter. Criteria for pathogens levels, maturity and organic compounds are the same for both categories.

The trace element and sharps criteria for Category A are more stringent than Category B, the intent of which is to allow for more flexibility in using Category A products. The trace element criteria for Category B are derived from (and are thus harmonized with) the federally mandated criteria contained in the *Fertilizer Regulation* administered by the Canadian Food Inspection Agency.

² The terms “Category A” and “Category B” are specifically used in the CCME documentation. They should not be confused with, or used interchangeably with the terms “Class A” or “Class B” which are used to reference pathogen treatment levels for biosolids.

Sampling and analytical requirements are not specifically referenced in the CCME Guideline. Rather, the document refers to and adopts methods outlined in voluntary national standard published by the Bureau de Normalisation du Quebec.

5.3 Canadian Food Inspection Agency

The Canadian Food Inspection Agency (CFIA) was created in 1997 through the amalgamation of inspection and related services provided by the departments of Agriculture and Agri-Food Canada, Fisheries and Oceans Canada, Health Canada and Industry Canada. This restructuring consolidated the delivery of all federal food, animal and plant health inspection programs into one organization.

The CFIA's role is to enforce food safety and nutritional quality standards established by Health Canada. It is also responsible for setting standards and carrying out enforcement and inspections related to animal health and plant protection. The CFIA delivers over a dozen specific inspection programs related to foods, plants and animals across Canada.

The CFIA is responsible for the administration and enforcement of the *Fertilizer Act*, *Fertilizer Regulation* and associated Trade Memoranda. As part of this, CFIA staff routinely sample fertilizers, fertilizer-pesticides and soil supplements to verify that products meet standards for safety. This is done through random inspections and product sampling at blending plants, manufacturing plants, processing plants, retail outlets and warehouses. The samples are tested for contaminants including heavy metals, pesticides and pathogens such as salmonella.

In accordance with the *Fertilizer Regulation*, the CFIA classifies compost as a "soil supplement" and all compost product sold are subject to certain minimum quality requirements. The quality requirements are outlined in Trade Memoranda that have been issued by the CFIA, most notably *T-4-93* which establishes cumulative loading rates of trace element in soils (a copy of the memorandum is provided in the appendices). The CFIA has also set criteria for organic matter, moisture content, pathogens and compost maturity, however these criteria have not been published in the form of trade memoranda and are not well known. Similarly, the sampling and analytical methods used by CFIA in enforcing these criteria are not published and this has led to regulatory enforcement problems at facilities in the past. Both these issues have been acknowledged by the CFIA, and they are working with the CCME to harmonize the two standards.

The *Fertilizer Regulation* also specifies labeling requirements for compost products that are sold. The labeling requirements include "guaranteed analysis" for organic matter and moisture content, instructions for use, and producer information. There are protocols for label sizes and fonts, as well as an extensive set of rules surrounding what claims can and can not be made on the label. While the CFIA's labeling requirements are extensive, they are not well documented or known, and as a result, not fully adhered to. Also, the requirements are not fully enforced by CFIA across all soil supplement industries, which leads to further confusion amongst producers and consumers.

It is well known by producers within the industry that the CFIA's regulations and requirements only apply to products that are sold. Thus, if a producer gives their product away, they do not have to meet any of the *Fertilizer Regulation* requirements for testing and

labeling. In recent years the CFIA has broadened the application of the concept of “sold” to include any transaction where money changes hands. This eliminates the potential for a producer to circumvent the requirements by giving the compost away to a user, but charging them a monetary amount for “loading” the product or an inflated amount for transportation. Again this policy is not well documented in the public domain by the CFIA.

Through the Composting Council of Canada, the composting industry has approached the CFIA with the need for clarification of regulation and policy surrounding compost products under the *Fertilizers Act*. In response, the Fertilizer Section and Fertilizer Safety Office of the Canadian Food Inspection Agency (CFIA) has begun to develop a specific Trade Memorandum for compost products. An initial draft of this document has been released for comment to the public.

The CFIA has also released new information in early 2007 on requirements for fertilizers and supplements in the context of the new program for animal health protection from BSE. Some of these requirements, which came into force on July 12, 2007, will affect all compost products, but most are targeted to compost that contains so-called “prohibited materials”³. The new requirements include lot numbering, labeling, recall procedures, and record keeping. The implications and full impact of these requirements on the composting industry is still not known.

5.4 Voluntary Product Standards and Programs

In several jurisdictions, voluntary standards have evolved to complement the regulatory standards. In most cases, this is because regulatory standards do not address agronomic issues that are important to compost users. In Canada, the Composting Council of Canada has developed a voluntary initiative called the Compost Quality Alliance. Through this program, compost producers participate in standardized testing and reporting of their product characteristics, and can provide comparisons with generally accepted agronomic criteria (e.g. EC, pH, soluble salt levels, etc.) for specific compost uses. A voluntary national standard has also been published by the Bureau de Normalisation du Quebec.

5.4.1 Compost Quality Alliance

The Compost Quality Alliance (CQA) is a voluntary program developed and managed by the Composting Council of Canada. The program’s goal is to improve consumer confidence in compost products through the use of standardized testing and reporting of product characteristics. The program has the benefit of helping consumers select the “right compost” for the intended use and will support regulatory compliance within the industry.

The CQA program is open to all compost producers, and focuses on final product quality instead of the process used to make the product. CQA participants follow prescribed sampling frequencies (based on annual production levels) and reporting methods, and through an annual licensing arrangement, use the CQA logo on packaging and product promotion.

³ Prohibited material includes animal protein, including meat and bone meal, derived from animals that are mammals except horses and swine, poultry and fish. Blood meal, milk and gelatine from any mammal, ruminant tallow with less than 0.15% impurities, and manures and solids from municipal wastewater plants that do not receive SRM are specifically exempted.

Products marketed under the CQA banner are tested to ensure they meet the appropriate provincial quality guidelines (i.e. CCME criteria in Alberta) as well as certain key agronomic characteristics. The agronomic criteria include pH, carbon to nitrogen ratio, moisture, particle size, soluble salts (i.e. electrical conductivity), and sodium.

Product testing is completed by CQA recognized labs in Canada or the United States who are involved in the Compost Analysis Proficiency (CAP) program. CAP is a laboratory quality assurance program to calibrate procedures and evaluate inter-lab method performance, and is administered by Dr. Robert Miller of Colorado State University. The *Test Methods for Examination of Composting and Compost* forms the basis of the analytical test methods used in the CQA and CAP programs.

The Composting Council of Canada is also working with CFIA on a process for streamlining regulatory inspections and reporting for CQA members. Conceptually, as a result of the testing and reporting aspects built-in to the CQA program, the CFIA would place less emphasis on field inspections of CQA members, and focus more on non-CQA members. This may require regular voluntary reporting of final product quality to CFIA.

5.4.2 Bureau de Normalisation du Quebec

The Bureau de Normalisation du Quebec (BNQ) is an affiliated “daughter” organization of the Standards Council of Canada (SCC) that was established in 1961. As part of its mandate within the SCC framework, the BNQ is the organization responsible for establishing national standards for organic soil supplements.

The first national standard (CAN/BNQ -413-200 Organic Soil Conditioners – Composts) was published by the BNQ in 1997. This was developed through a consensus-based approach that involved product manufacturers, users, government agencies and interested parties. Minor amendments were made to the standard in 1997 and 1999. A major review and amendment was commenced in 2003 and an updated standard was published in 2005.

The national standard establishes three categories of compost (AA, A and B), and includes criteria for physical characteristics (moisture, organic matter, foreign matter, sharps), chemical characteristics (trace elements, maturity) and biological characteristics (fecal coliform, salmonella). Detailed sampling methods, and references to analytical method standards published by other standard setting agencies (e.g. USEPA, ASTM) are also included in the standard.

In addition to publishing the national standard, the BNQ also runs a voluntary certification program for producers. However, this program is quite expensive to participate in and is not well known or marketed by BNQ. As a result, it is not used by producers outside of Quebec, and only by a few producers within that province.

6. Implementation Strategy – Waste Diversion Programs

Diversion of organic wastes is generally achieved in one of three ways: drop-off depots, curbside collection, or through the use of garburators.

Drop-off depots are common throughout Alberta and other parts of Canada for yard waste collection and also for recyclables. (e.g. paper, plastics, tin cans). Many of the jurisdictions within the study area utilize this approach due to its relatively low capital and operating costs. Depots are particularly well suited to areas with small population bases or low population densities. Depot-based programs can easily be adapted to provide service to both residential and commercial sectors. Diversion rates for programs that use depot systems are generally much lower than for systems using curbside collection.

While it is much less commonplace, depot collection of food waste has been implemented in some jurisdictions. In these programs, residents take their separated organics to a depot which serves an entire neighborhood or Town. This type of program has been implemented in the Town of Olds (for yard waste only) and field evaluations have been undertaken in Jasper and are currently underway in Banff.

Residential curbside organics collection is normally accomplished through modifications to curbside waste collection practices. In their most common form, programs involve segregation of yard and/or food wastes from other waste in discrete containers or bags, and separate collection of the two streams (in a split compartment truck or using two separate trucks). Automated or semi-automated collection methods are often employed when curbside organic waste collection programs are implemented, and are accompanied with the use of wheeled carts.

Garburator use in restaurants, cafeterias, and other commercial food preparation locations is commonplace. Use in residences appears to be less common in Alberta than in other jurisdictions. Garburator use is only feasible where the sanitary sewer network and wastewater treatment plant can accommodate the higher solids loading, nutrient loading, and other changes to effluent characteristics. Several jurisdictions in North America have banned the use of garburators through local bylaws.

6.1 Southern Waste Shed

6.1.1 Residential Yard Waste

The existing drop-off depots used to collect yard waste in Okotoks, High River, Black Diamond, and Turner Valley have been shown to be effective and appropriate for the amounts of materials handled. Accordingly, these systems should continue to be used. Through educational activities and promotion, it is estimated that the recovery rates could be increased, resulting in an overall estimated diversion of 300 to 400 tonnes per year.

Establishment of leaf and yard collection depots at Blackie, Cayley and Longview would further increase diversion by an estimated 25 tonnes per year.

A common set of “rules” for each depot program (e.g. separation of grass/leaves from brush, consistent acceptance criteria) should be adopted by all programs. This would provide operational advantages at the composting site, and equalize service amongst residents in the area.

6.1.2 Residential Food Waste

Within the southern waste shed, the Towns of Okotoks is large enough to support a food waste diversion program. Implementation of food waste diversion program in the remainder of the southern waste shed is unlikely to be cost-effective given the current population and geographical considerations.

The Town of Okotoks has informally discussed adopting a “zero waste” policy by 2015. Although it is very early in the planning process, it is likely that as part of adopting and meeting zero waste goals, the Town will need to expand its existing yard waste collection program to include residential food waste collection and processing. It is anticipated that the planning, evaluations, budgeting and approvals required to adopt a zero waste policy will take one to two years. Thus, the existing yard waste depot collection program (modified to be consistent with the regional depot program) should continue to operate, albeit with enhanced promotion to increase participation and diversion.

6.1.3 Commercial Organic Waste

High River and Okotoks are significant hubs of economic activity for the Foothills area, and as a result there is a significant amount of organic waste generated by the commercial sector. Most notably there are a considerable number of grocery stores and restaurants within these two towns that could support an organic waste collection program.

The most effective starting point for a commercial organic waste diversion program would be to target large volume commercial generators whose waste handling infrastructure would easily allow diversion of clean organic materials. Typically, these types of generators subscribe to collection services that utilize roll-off containers, and would include large hotels/conference facilities, grocery stores, and institutions containing dining halls/cafeterias. The materials collected could be diverted to the FRSC composting facility provided operating practices at the facility are altered.

As the commercial program matures and waste collection and disposal fees increase, there exists the potential for the program to be expanded to include smaller businesses (e.g. restaurants, cafes) within Okotoks and High River. Expansion of the service area to include businesses in Turner Valley, Black Diamond, and the southern extremities of Calgary could also be considered at this time. Prior to commencing with the launch of such a program, a market survey should be completed to gauge the acceptance of the program by generators, price points, and waste quantities. This program would also create an opportunity for private sector business development, as a collection programs would require the services of private waste haulers.

6.2 Western Waste Shed

6.2.1 Residential Yard Waste

Existing yard waste collection depots in Canmore and the MD of Bighorn should continue to operate, and through increased education and promotion among residents, it is estimated that the recovery rates could be increased, resulting in an overall diversion in the order of 200 to 300 tonnes per year. Establishment of a leaf and yard waste collection depot at Banff with a similar level of education and promotion, would divert an additional 100 to 200 tonnes of material per year. It is anticipated that these municipalities (through the BVWMC) would take part in the development and adoption of common yard waste program guidelines and acceptance criteria that would be used throughout the Calgary Region.

6.2.2 Residential Food Waste and Commercial Organic Waste

A decision by the Town of Banff to implement full-scale diversion of roughly 2,300 tonnes per year of residential and commercial food waste from landfill disposal is tied to the success of the ongoing pilot. The early indications from the ongoing demonstration program suggest that organics diversion through a combination of bear-proof collection depots and garburator use is possible. However, larger-scale implementation of the pilot program must be completed and the results fully analyzed. It is expected that recommendations from the demonstration program will be available in late 2007, and a go-forward decision will be made by the Town in early 2008.

With a permanent population base of approximately 12,000 residents combined with seasonal tourist influxes, there is the potential to divert over 3,000 tonnes per year of food waste from Canmore's residential and commercial sectors. At this point, there are no plans by the Town of Canmore to expand existing programs to include food wastes. However, the results from Banff's demonstration program and their applicability to Canmore's situation should be evaluated in 2008. A key consideration in this evaluation will be the availability of processing capacity.

Implementation of a formalized food waste or commercial organics collection program for MD of Bighorn residents is not feasible in the short term due to the relatively small number and large geographic distribution of residences. However, as the pace of development within the MD increases and population "hubs" develop, this should be re-evaluated in the five to ten year planning horizon.

6.3 Central Waste Shed

6.3.1 Residential Yard Waste

The City of Calgary offers both seasonal and year round options for diverting residential yard waste from landfill. In the spring and fall, dozens of drop-off locations are set up throughout the City to which residents can deliver their leaves and pumpkins. As well, grass, leaves, brush and pumpkins are accepted free of charge from City residents at the East Calgary Landfill throughout the year. All of the material collected through these two programs is composted, and the resulting material is used in green spaces around the City.

A recent update to the MD of Rocky View's Solid Waste Master Plan included the establishment of new yard waste drop-off depots in Bragg Creek and Langdon (the establishment of new drop-off depots at other locations was not considered in light of the MD's ongoing involvement with the CRP organics planning process). Additional MD residents could be served through inter-municipal agreements allowing them access to existing facilities in Airdrie, Cochrane, and Strathmore.

A drop-off site for recyclables has been set up for Town of Crossfield residents, and MD residents in the area are able to access this site through an inter-municipal agreement. Similarly, a recyclables drop-off site exists at the MD's Irricana transfer station for Town of Irricana and MD residents. As part of a regional system, allowances should be made at the Crossfield and Irricana recycling facilities for yard waste collection. This would involve slight modifications to the existing inter-municipal agreements for these facilities.

As with the southern and western waste shed, a common set of acceptance criteria should be adopted for all of the existing and new yard waste drop-off facilities in the area. In addition to operational advantages at the processing site(s), this would allow for harmonization of educational efforts throughout the waste shed. This would be particularly important for the MD of Rocky View and City of Calgary whose residents could be accessing several different drop-off locations.

6.3.2 Residential Food Waste

The City of Airdrie is currently in the process of evaluating curbside organics collection for residents. A six month long yard waste pilot collection program was recently initiated, and the results from this program will be used to evaluate costs, resident satisfaction and operational issues. A decision on whether to proceed with the program, and staging of the program implementation, is expected in early 2008.

A curbside organics collection program was proposed by the City of Calgary in 2006. This program was one component of a larger suite of programs that including automated curbside collection of waste, organics and recyclables, and centralized processing of recyclables and organics. However, decisions early in 2007 at the political level have resulted in setbacks in the timing of an organics diversion program. There appears to be general support within the current City Council to move ahead with organics diversion, but a city-wide program will not be considered until the commencement of the next three-year business plan cycle in 2009. Of course, it is possible that despite the current support, the business case for implementing a city-wide program may not be supported by the City Council of the day when it is submitted for decision in 2008.

6.3.3 Commercial Organic Waste

There is currently limited processing capacity within the central waste shed to support a commercial organics diversion program. Implementation of commercial organic diversion is thus dependent upon the development of additional centralized facilities, in particular a facility that would service the City of Calgary.

7. Implementation Strategy - Biosolids Management

Several municipalities in the Calgary Regional Partnership rely on mechanical/biological wastewater treatment plants (WWTP) to manage their community's sanitary sewer waste. A by-product of these treatment processes is a nutrient rich, but unstable sludge material called biosolids.

7.1 Southern Waste Shed

The Town of Okotoks' biosolids composting program is currently being reviewed by the Town and EPCOR. The existing composting system located at the WWTP is reaching its capacity and will not be capable of processing the increased amounts of biosolids that will be produced in the coming years without expansion.

At a planning meeting held during the development of this implementation strategy, the concept of consolidating the Town's entire biosolids composting operation in one location was discussed and was met with favourable reaction. Further discussion and assessment of the consolidation option is necessary, and should include an evaluation of replacing the existing composting system (e.g. modular ECS "bins") with an alternative technology that is more suited to the quantities of biosolids generated.

With the consolidation of biosolids composting at one location, there also exists the potential to resolve biosolids management issues being faced elsewhere within the Calgary Regional Partnership. Specifically, the Towns of Canmore and Strathmore are faced with increasing biosolids generation and a limited ability to manage these wastes in a viable manner. Combined, Canmore and Strathmore produce an estimated 375 dry tonnes per year (dtpy) of biosolids.

7.2 Western Waste Shed

Canmore is working on an evaluation of biosolids handling options in cooperation with their WWTP operator (EPCOR). This is being driven in part by the re-tendering of the existing contract for biosolids hauling in mid-2007, and a significant increase in costs that took place. Additional options have already been presented to Canmore for consideration, including the development of a regional composting facility and the construction of lime-stabilization facility. Given past experiences and the encroachment of development around Canmore's WWTP over the past five years, it is unlikely that situating a biosolids handling facility at the WWTP will be a feasible option for Canmore. Thus, continued reliance on a remote site for both primary and secondary processing is expected in the foreseeable future.

The MD of Bighorn is facing rapid growth and, as a result of several new developments being proposed, could see its population reach 10,000 during the next five to fifteen years. Planning is currently underway to determine the waste water and biosolids treatment

infrastructure required to support this growth. Currently the MD is investigating lime stabilization technology as a treatment method of biosolids and has a growing interest in accessing some form of regional site for limited processing or preparing materials for market.

The current biosolids composting operations at the Banff WWTP have proven to be successful over the past five years. However, there have been challenges marketing the final product produced through the program, and this material continues to accumulate at the Castle Junction site. This is due in part to the location of Castle Junction relative to established markets (e.g. Exshaw, Cochrane, Calgary), but also due to characteristics of the finished products (e.g. particle size, presence of rocks), a limited product testing program, and a reluctance by Parks Canada and the MD of Bighorn to allow use of the material within their jurisdictions. The MD of Big Horn has expressed an interest in use of the final product if the compost could be consistently processed as a Category A product.

Work is planned by Banff and Parks Canada to address the latter issue through field demonstrations during 2008. It is hoped that this work will lead to an opening of uses within the Bow Valley corridor related to highway development and borrow pit reclamation. To support entrance into these emerging markets, and allow increased penetration into existing markets, the level of management of curing operations should be increased by Banff, including the implementation of a more formal record keeping, quality assurance and quality control procedures.

Banff's program would also benefit from relocating curing operations from Castle Junction to a location further east within the Bow Valley corridor that is closer to the established markets in the Calgary and Cochrane areas. An eastern location would further position compost from Banff's program to be utilized in reclamation projects in the Exshaw area. However this will only occur once reclamation standards have been finalized by the MD of Bighorn.

7.3 Central Waste Shed

There are currently no plans by the City of Calgary to change biosolids landspreading practices. This is emphasized by the design and construction of the City's new Pine Creek WWTP which has no dewatering or alternative handling systems. There have been some informal discussions between City departments regarding co-composting of biosolids and residential organic waste, but this has not been factored into the planning of residential or commercial organic waste diversion programs.

Biosolids from Strathmore's WWTP are currently being land applied, but once a pending plant upgrade is completed, this will no longer be viable. Biosolids quantities at the WWTP are sufficient to justify a small composting program. However, discussions with the plant operator (EPCOR) indicated that onsite treatment (whether through composting, lime treatment or some other technology) is not the preferred option due to the proximity of existing and future commercial development around the site. Thus, Strathmore would prefer to develop a remote site for primary and secondary processing of its biosolids, or tie into an existing or proposed regional development.

8. Implementation Strategy - Processing Facilities

8.1 Southern Waste Shed

Within the context of a multi-regional organics processing system, it is envisioned that the existing composting facility at the Foothills Landfill would continue to serve as the hub of organics processing for the Southern Waste Shed into the future. There also exists the potential for expansion of the facility to handle additional organic waste types and wastes from additional sources.

Short term development plans (e.g. 2007) at the Foothills compost facility should focus primarily on enhancing the existing windrow composting program through implementation of a re-developed operations plan, odour management procedures, and site-specific record keeping and monitoring/testing procedures. Site staff should also undergo more in depth training as part of preparations for obtaining provincial certification. Ongoing problems with the suitability of the compost pad's working surface, and surface water drainage capacity should also be addressed.

The existing capacity of the FRSC site and the type of technology used is sufficient to handle the additional quantities generated from enhanced diversion of yard waste in High River, Okotoks, Black Diamond and Turner Valley, and from the establishment of new drop-off depots in Blackie, Cayley and Longview. The existing facility also has the capability to process a limited quantity of commercial organic wastes without creating nuisance conditions provided best management practices are implemented and followed. However, a large influx of commercial organics would require further upgrades to operating practices and a shift in technology.

Technology upgrades and changes in operating practices would also be required if the existing biosolids composting program at the Town of Okotok's WWTP were to be relocated to the FRSC site. This would include evaluating the continued use of the ECS composting system, versus the installation of an alternate composting technology. It is anticipated that the ECS or a new system could be situated within the existing footprint of the composting pad provided upgrades to the working surface are completed.

If a food waste diversion program were to be implemented in the Town of Okotoks, processing the collected materials at the Foothills Landfill would be a logical choice from a geographic perspective. However, this would trigger an upgrade and expansion of the FRSC's existing composting facility to handle the changing nature of the feedstocks and the quantities. A number of existing technologies have been proven and would be suitable, and some form of selection process would be required. At this point, a key decision will also be whether to maintain the composting operation under the FRSC, or outsource it through a "P3" (i.e. public-private partnership) arrangement. This decision will dictate the type of facility development approach (e.g. traditional design-tender, or some combination of design-build-operate- finance).

8.2 Western Waste Shed

Communities within the western waste shed have been moving towards implementing a regional composting solution for many years. Despite some setbacks, the communities have seen a measured success. The CRP strategy seeks to support the strategy of the Bow Valley Waste Management Commission (BVWMC) in building upon those successes and the direction already set out.

Yard waste from existing collection programs in Canmore and the MD of Bighorn should continue to be handled at the windrow composting operation located at the Francis Cooke landfill in the foreseeable future. The Francis Cooke facility also has the capacity to handle additional yard waste diverted from Town of Banff through a drop-off program, and proposed residential development in the MD of Bighorn. A change in technology is not necessary in order to handle these increased tonnages. However, the operation would benefit from guidance and region-wide standards on product characteristics, curing operations, quality assurance and control procedures and marketing strategies developed through the CRP. The operation of Banff's Castle Junction site would also benefit from this guidance.

Pending the outcomes of the food waste composting demonstration program in Banff, strong consideration should be given to the establishment of a regional composting site that is shared amongst the three member municipalities of the BVWMC. There is a clear need for a local biosolids management solution for Canmore, and in future years for the MD of Bighorn. Banff would also benefit from relocating its existing curing operations from Castle Junction to a regional site.

Elected officials and senior administration from the Towns of Canmore and Banff and the MD of Bighorn have been working together through an inter-municipal strategic planning process over the past several months. While the strategic planning process is very broad in scope, it is hoped the process will tackle solid waste and biosolids management issues. As an outcome to this process, clear direction and consensus on the development of organics handling programs and processing facilities within the Bow Valley is needed.

Based on the outcomes of the inter-municipal strategic planning process, there may be a need for implementation of new infrastructure and technology in the three to five year horizon to support a regional program. The nature of the required technologies is unknown at this time.

8.3 Central Waste Shed

Yard waste from the City of Calgary programs should continue to be processed at the City's Shepard, Spyhill and East Calgary facilities. However, the current political situation in the City does not allow these facilities to accept materials from outside of the City's boundaries. Therefore, it is envisioned that yard waste diverted through the expanded network of drop-off sites in the central waste shed would be processed at the City of Airdrie's composting site.

An expansion of the Airdrie site would be required to handle the additional quantities of material, but this could be done in coordination with the expansion needed to process the

materials from Airdrie’s planned curbside yard waste collection program. Some changes to the windrow composting methods currently used should also be considered to provide for a higher level of management, and more efficient use of the available space.

A change in technology at the Airdrie facility is envisioned in three to four years, triggered by the decision to incorporate food waste in the curbside collection program. As previously outlined, a number of existing technologies have been proven and would be suitable for use at the Airdrie site, including the ECS composting bin system currently used at the Okotoks WWTP. At the time when the technology change is considered, Airdrie should also consider whether to maintain the composting operation themselves, outsource it under contract, or pursue a “P3” arrangement.

With uncertainties in the direction and format that a collection program in the City of Calgary will take, it is not expected that there will be any capacity increases or technology upgrades at the three City-owned composting sites in the near future.

8.4 Eastern Waste Shed

The Eastern Waste Shed is not within the scope of the Calgary Regional Partnership’s organics strategy since the waste terminates at locations outside of the Region. Having acknowledged that, there may be some benefit for Wheatland County and the Drumheller and District Solid Waste Management Association to review and consider adopting components of this strategy.

8.5 Northern Waste Shed

The Northern Waste Shed is not within the scope of the Calgary Regional Partnership’s organics strategy since the waste terminates at locations outside of the Region. However, there may be some benefit for the municipalities within this area, to review and consider adopting components of this strategy through the Drumheller and District Solid Waste Management Association and the Mountain View Regional Waste Commission.

8.6 Processing Facility Funding and Cost Recovery

Whenever wastes are imported into a municipally owned facility from outside of that municipality’s boundaries, it is important to ensure that the costs to handle the imported wastes are not being subsidized by local taxpayers. The same can be said about facilities that are operated under contract to a specific municipality. For this reason, funding of municipal disposal facilities in many jurisdictions has been extracted from the tax base and set up on a “user-pay” basis. Cross-subsidization of residential and commercial waste is another reason for the implementation of user-pay system.

Another consideration when setting cost recovery options is the concept of “full-cost accounting”. Developed and promoted by the US Environmental Protection Agency specifically for the waste industry, this concept ensures that indirect costs of facility operation (e.g., employee benefits, financing costs, cost of services from supporting departments such as finance and human resources) are considered along with direct costs

(fuel, utilities, equipment capital). Full cost accounting approach also incorporates the development and closure/post-closure costs into cost accounting, taking into account how these costs change over the lifetime of the facility.

User-pay and full-cost accounting are fundamental principles that should be adopted by CRP members with respect to the regional organic processing facilities. By setting up appropriate inter-municipal agreements that are based on these principles, the reality and perception of cross-subsidies can be avoided.

9. Implementation Strategy – Product Quality Assurance

One of the keys to satisfying customers and ensuring market presence is to consistently produce a product to defined specifications. Variable products that do not produce consistent results can damage market perceptions of products and/or brand(s).

Development of an appropriate quality assurance and quality control (QA/QC) program is one of the primary tools used in manufacturing industries to maintain the desired level of quality in their products. A QA/QC program is simply the combination of various tools, measures and proactive management methods that allow control of inputs, processes, and outputs to meet customer requirements. A typical QA/QC program at a compost facility consists of adoption/development of product standards and specifications, implementation of process controls, and finished product testing.

9.1 Standards and Specifications

Consistency in product standards is a key component to ensuring a harmonized approach to composting in the study area. Therefore, even through it may not be a requirement by Alberta Environment at this time (i.e. for Class 2 facilities), all processing facilities involved with the multi-regional system should adopt the requirements of the CCME Guidelines for Compost Quality as minimum product quality standards.

Testing of final products should be expanded beyond the requirements of CCME to also include agronomic criteria. At a minimum, the agronomic criteria outlined in the CQA program should be used. A set of standardized specifications for products should also be developed and shared among the processing facilities. This will allow for consistency of marketing efforts and reduce consumer confusion. Example specifications are included in the appendices.

As the program develops and is marketed to consumers, participation in the CQA program would have benefits for CRP members. Consideration should be given by the BVWMC and Airdrie to joining the program during the next 1 to 2 years. CQA membership will also assist with compliance with CFIA inspections and reporting, which is of particular importance given the introduction of new trade memorandums and BSE controls.

9.2 Process Control Systems

A Process Control System consists of the tools and procedures used for stringent and documented monitoring of all critical control points in a composting operation. Its purpose is to control the composting process so as to ensure consistent manufacturing process, to minimize defects, to make products which can be guaranteed to customers.

Control methods will vary with the size of operation, level of technology and end product goals. For small compost facilities that do not market final products offsite, control points might be limited to one or two process variables (e.g., temperature, EC) and monitoring might be done every two to three weeks. Larger composting facilities, particularly those utilizing in-vessel technologies, generally have a greater number of control points for the biological processes (temperature, oxygen levels), mass flow (truck scales, conveyor scales) and water balance (flow meters).

The key considerations or steps in establishing a process control system include:

- Identifying critical variables and upper/lower limits of each.
- Selecting suitable instruments to measure variables.
- Developing and follow documented procedures.
- Providing training to operators.
- Maintaining records.
- Building in checks in the system where possible.
- Maintaining and calibrate instruments.
- Understanding the data the system generates.

All processing facilities that are part of the multi-regional system should ensure that the appropriate process controls are incorporated into their operating plan and procedures. An example outline of an operating plan incorporating process controls is provided in the appendices.

9.3 Finished Product Testing

Finished product testing is a cornerstone of compost product QA/QC programs. Though testing, a Producer can show that process control steps are working and that products conform to regulatory criteria (e.g. Alberta Environment, CFIA). Results from a testing program can also be used for product labeling, to assurance customers that the products meet their needs, and used to determine application rates.

The components of the product testing program include sampling frequency, sampling methods, and testing methods.

9.3.1 Sample Frequency and Methods

In the composting industry, sampling frequency is generally determined by the amount of product produced. There are no current regulatory requirements, and guidance from Alberta Environment and CFIA is minimal. Annual sampling is generally accepted as the minimum standard for smaller facilities producing less than 1,000 tonnes of product per year. Sampling frequencies for larger facilities is influenced by processing and finishing technologies, but testing of individual product “batches” or “lots” ranging in size from 1,000 to 5,000 tonnes is not uncommon. Participants in the CQA program are required to obtain at least four samples during the production season at smaller sites (<5,000 tonnes), and as many as twelve samples at larger sites (>15,000 tonnes).

Consistency in the use sampling and analytical methods is critical to a good product testing program. Consistency in testing programs between facilities is also beneficial in that it

allows for “apples-to-apples” comparison of products, and facilities working together may leverage their combined purchasing power to obtain preferential pricing.

Methods for sampling compost products are specified by Alberta Environment for Class 1 facilities through their adoption of the *CCME Guidelines for Compost Quality*, which in turn adopts the sampling methods outlined in the BNQ standard. In some approvals for Class 1 facilities, Alberta Environment has allowed the use of TMECC methods, which also include sampling procedures. In both cases, the underlying premise of the procedures is to obtain a representative sample of the product, handle it in a manner which preserves the integrity of the sample, and provide documentation of the sampling event for future reference.

Within the CRP, final product sampling and handling procedures should be harmonized among processing facilities, and done in a manner that it consistent with the procedures contained in the BNQ’s voluntary standards.

All CRP member facilities should also amend their process and product tracking procedures to incorporate batch or lot numbers. This will improve compliance with recently released and expected CFIA regulatory changes.

9.3.2 Analytical Methods

There are many different analytical methods and standards in use within the composting industry, which makes comparison of results with product standards/specifications, or results from other products, difficult and confusing. For example, when measuring electrical conductivity, it is not uncommon for a “saturated paste” method to yield a result that is significantly different than that obtained from a “dilution” method. The choice of method in this case will drastically affect consumer confidence. Similarly, the choice of the digestion method used in the analysis of trace element content can mean the difference between meeting Alberta Environment or CFIA quality requirements or failing.

This lack of standardization has been recognized as a problem by the industry. In response, the composting industry worked with the assistance of the US Department of Agriculture and various academic institutions to develop the *Test Methods for Examination of Composting and Compost*.

TMECC provides detailed protocols to measure a range of physical, chemical, and biological parameters of composting feedstocks, material in process, and finished products. The format of the TMECC method manual was based on American Society for Testing and Materials (ASTM) standards; methods to measure each parameter are presented in their own section. Generally, more than one test method is presented for each parameter, and a discussion of the biases of each method are included.

The specific test methods contained in TMECC were adapted from existing method manuals (e.g. US EPA Report SW-846, AOAC Official Methods of Analysis, ASTM, Standard Methods for the Examination of Water and Wastewater) or have been developed and provided by labs that specialize in compost and soil analysis (e.g. Woods End Research Lab, Soil Control Lab). All of the methods in TMECC have gone through a peer-review process.

Within Alberta, TMECC is generally well accepted by producers and laboratories who are familiar with it. Alberta Environment has also adopted TMECC. However, some other

Canadian regulatory agencies, including the CFIA have shown some initial reluctance in allowing the use of TMECC methods.

One aspect of finished product testing that should be considered is respirometry. This is a measure of the relative maturity of the compost and its suitability to support plant growth. In the TMECC methods there are at least six different methods to measure oxygen consumption, carbon dioxide production, or both. They include oxygen uptake, carbon dioxide evolution, in-situ oxygen refresh rate, self heating measurement, Solvita measurement, and biologically available carbon.

Like sampling practices, analytical methods should also be harmonized among the various processing facilities within the study area, and should be based on the methodologies accepted by Alberta Environment. In particular, CRP members should specify the use of TMECC methods where possible as these have been developed specifically for compost products.

9.3.3 Onsite vs. Offsite Testing

It is common for larger manufacturing facilities to conduct product testing at accredited labs located within the production facility. This approach is also common within the wastewater industry where many treatment plants have small labs to measure key criteria contained within their operating permits.

Within the composting industry, having accredited on-site labs is less common. Many compost facilities will have small lab facilities for completing basic process monitoring (e.g. bulk density, particle size, moisture content, pH), but few have set up to do more than these basic parameters. Final product testing is usually outsourced to a commercial laboratory.

In large part this has to do with the costs involved with purchasing, operating and maintaining the testing equipment; when compared to the services offered by commercial laboratories, it is rarely cost effective for a compost facility to internalize this service. Another reason for outsourcing final product testing is the cost of setting up and running the laboratory QA/QC programs that are mandated by regulatory agencies.

Self declaration of compost product quality based on on-site testing may also not be sufficient to provide consumer confidence. Not many compost producers have the reputation of a large corporation (e.g. Proctor and Gamble, Kraft Foods) that would allow this.

CRP member processing facilities should rely on on-site labs and testing for process control purposes only. All product testing should be outsourced to ensure that it meets regulatory requirements and to help consumer confidence.

The laboratory used for final product testing should be harmonized among the CRP facilities. This will improve consistency of results and report formats, and may allow for preferred pricing on analytical services. It is recommended that the CRP facilities use lab(s) that are participants in the CAP program, or are working towards CAP accreditation. A list of CAP accredited labs is provided in the appendices.

10. Implementation Strategy – Product Marketing

There are a number of value-added compost products that can be produced from clean source separated organic feedstocks. Traditional products include compost for general horticultural and agricultural use, top dressing (finer texture), mulch, and use in manufactured topsoils.

Increased attention to product quality control and the adoption of a manufacturing approach by many compost producers in the industry (as opposed to a waste diversion mentality) has helped with the emergence of several new uses in the past few years. These include the incorporation of compost into packaged potting soils and other specialty growing media, use in erosion control applications (where is it pneumatically applied or “blown” on its own or as a mixture with seed or fertilizer), use in stormwater filtration products, and in retaining wall applications (e.g. Filtrex’s Living Wall™ and Greenloxx™).

While there are a number of demonstrated uses for compost products, one of the keys to a sustainable composting program is the ability to transform these uses into paying markets. Most composting facilities have what they refer to as a “marketing plan” that outlines how this transformation is to be achieved. However, marketing plans are often confused with “sales plans” which are simply the specific strategies used to sell a product to the consumer (i.e. lead generation, cold calls, literature, samples). A true marketing plan covers a much broader scope and range of activities that are undertaken, from the initial concept development to the point at which there are consistent return sales. It includes product research and development, market research and needs analysis, planning and positioning, distribution, promotion, and sales.

Within the composting industry, the time required to implement and realize consistent results from a marketing plan normally takes from two and five years. Fortunately, purchasers of organic products tend to be loyal and stick to a particular brand. This means that once established, market shares are generally easier to maintain than for “commodity” products (e.g. paper clips, garbage bags) that compete solely on price.

It is rare that the financial returns (i.e. sales revenue) from a successful marketing program are sufficient to offset all of the costs associated with compost production. Wholesale pricing for screened bulk compost in the Calgary region can be expected to range from \$5 to \$15 per yd³. Most often, these revenues are only sufficient to offset marketing and sales costs, lab testing costs, and perhaps some portion of product refining.

Historically, many compost programs have been set up with little thought given to the end users that will buy the product and their needs, or on the assumption that all of the compost products will be sold straight to homeowners. While the homeowner market is important, it is certainly not the only market. Nor is it one that producers generally sell large volumes into directly. More often homeowners purchase bulk compost from landscape centres, or in

bagged form through retail outlets (e.g. Home Depot, Canadian Tire). Both these markets can be difficult to penetrate. In the case of retail “bag” markets, the investment required in equipment and QA/QC is also very significant, and the return on investment is low unless millions of bags can be packaged and sold.

Two established markets that are often pursued by new compost producers are topsoil manufacturers and municipal parks or public works departments. These markets have previously been researched and taken advantage of by individual members of the CRP. They present an excellent starting point for a CRP marketing program since finishing and packaging requirements are simple, and the size of the two markets allow for large volume sales.

Topsoil manufacturers or “soil blenders” sell significant volumes of topsoil-based products to customers such as property developers, landscaping contractors, golf courses, and municipal parks departments. As a result, they have the ability to absorb large amounts of compost. Often these manufacturers use peat or other organics products (e.g. manure, mushroom substrate) in their blends, but are willing to look at alternatives. This is particularly true if the alternatives are competitive in cost, or if it can be demonstrated that they will provide the final soil blend product with an advantage over competitor’s products (e.g. organic matter content, nutrients). Highlighting third party research by universities and colleges as well as successful local projects where compost has been used are two means that the CRP can use to promote product benefits to soil blenders.

Municipal parks and public works departments are traditionally another large user of soil products. Compost can be marketed to these users in the form of top dress for sports fields, cemeteries, boulevards and parks, horticultural grade compost for establishing or amending planting beds, or mulches for use around trees and shrubs. The improved moisture holding capacity of compost amended soils, and the slow-release nutrient value of compost can be a key sales features when dealing with municipal managers who often have a large amount of green space to maintain with limited resources. An advantage that CRP members have over private-sector compost producers is the presence of these internal customers. Participating members are therefore encouraged to amend their municipal policies to promote the purchase and use of compost products for public works construction and maintenance projects.

In order to pursue these and other markets efficiently, it is suggested that the municipal producers within the CRP network work together under a cooperative marketing arrangement, and develop a common marketing plan. Conceptually, this arrangement would allow for pooling of product lines and resources as well as the development of common product branding, consistent marketing and sales information (e.g. labels, brochures and web site content, point-of-sale literature), and a consistent pricing strategy.

It has previously been identified (CH2M HILL, 2006) that the elements of a product marketing plan for the Calgary Region Partners should include:

- A benefit statement for the program and products.
- A set of standard specifications for the various products being manufactured (e.g. top dress mix, mulch, general horticultural mix).
- A common brand for all participating jurisdictions.

Those involved with the cooperative program, particularly those in sales positions, should take specific training on compost utilization, basic soil science, and basic sales techniques. These personnel would then become the points of contact for the marketing program, taking referrals from each municipal office as well as generating and following up on sales leads. These personnel would also be responsible for providing after-sales support within their respective geographic areas.

As an alternative to having municipal staff take on marketing and sales roles, it might be feasible for the cooperative network to outsource this role to a “broker”. This approach has been undertaken by several other municipal producers in Canada and the United States.

11. Implementation Schedules

A summary of the required action steps in each waste shed and a tentative implementation schedule is provided in Exhibits 5 through 7.

EXHIBIT 5

Southern Waste Shed Implementation Schedule

			2007	2008	2009	2010	2011
Southern Waste Shed	Waste Diversion	Increase yard waste diversion in Okotoks, High River, Turner Valley, Black Diamond through education and promotion					
		Establish yard waste drop-offs at Blackie, Cayley and Longview					
		Evaluation curbside organics collection program for Okotoks as part of "zero waste" program evaluation					
		Commence Okotoks curbside collection program pending positive decision on processing facility siting					
		Divert organics from large-volume commercial generators in Okotoks and High River					
		Conduct "market survey" and expand commercial diversion program based on survey results					
	Biosolids Management	Implement short term upgrades to Okotoks biosolids composting program					
		Complete technical review of biosolids management options for Okotoks WWTP.					
		Capacity upgrade for Okotoks biosolids composting facility					
	Facilities	Enhance existing compost operations at FRSC facility					
		FRSC finalizes decisions regarding future direction of existing composting operations.					
		Undertake evaluation of regional facility options (siting, feedstocks, technology)					
		FRSC composting facility upgrade/expansion, or development of new regional facility					

EXHIBIT 6

Western Waste Shed Implementation Schedule

			2007	2008	2009	2010	2011
Western Waste Shed	Waste Diversion	Increase yard waste diversion in Canmore and Bighorn through education and promotion		■			
		Establish yard waste drop-off at Banff		■			
		Complete co-composting pilot at Town of Banff	■				
		Implement residential/ICI composting program in Banff using WWTP site			■		
		Evaluate co-composting/garburator use in Town of Canmore		■			
	Biosolids Management	Increase management of biosolid compost curing operations at Castle Junction	■				
		Evaluate biosolids handling options for Canmore WWTP		■			
		Transfer Canmore biosolids to regional site				■	
		Relocate Banff curing operations to regional curing site				■	
	Facilities	Canmore/Banff/Bighorn complete Inter-municipal Strategic Planning Process	■				
		Complete approval amendments and expansion of existing Francis Cooke site	■				
		Evaluate use of Francis Cooke for regional curing/refining site, or siting/development of a new regional site		■			
		Develop regional curing/refining site			■		

EXHIBIT 7

Central Waste Shed Implementation Schedule

		2007	2008	2009	2010	2011	
Central Waste Shed	Waste Diversion	Establish new yard waste depots at Bragg Creek and Langdon	■				
		Negotiate inter-municipal agreements for MD access to Airdrie, Cochrane and Strathmore		■			
		Increase yard waste diversion in Cochrane, Calgary and Strathmore through education and promotion		■			
		Expand Irricana and Crossfield recycling depots to include yard waste drop-off		■			
		Complete Airdrie Curbside Organics Collection Pilot Study and survey. Evaluate results	■				
		Finalize planning and business plan submissions for curbside organics collection program in Calgary		■			
		Implement City-wide Curbside yard waste collection in Airdrie			■		
		Evaluate addition of kitchen waste to Airdrie curbside collection program			■		
		Expand Airdrie curbside collection program to include kitchen organics				■	
		Implement City-wide Curbside yard waste collection in Calgary					■
	Facilities	Enhance Airdrie site and operations to increase capacity (no technology change)	■				
		Expand Airdrie site to handle additional waste volumes		■			
		EOI/RFP/Contract Negotiation for Calgary processing facility			■		
		Calgary facility design, permitting, construction & commissioning				■	

12. Grant Funding Sources

In addition to traditional funding sources available to municipalities, (e.g. tax role, utility fees), there are a number of grant funds that could be accessed to support the development and implementation of organics management strategy. A summary of several federal, provincial and NGO grant programs is provided in the appendices.

13. References

CH2M HILL, *Regional Organics and Paper Waste Recovery System and Processing Facility Study*,
December, 2006