
**ASSESSMENT OF A TNRD AND SURROUNDING AREA
ENCLOSED COMPOSTING FACILITY FOR SLAUGHTER
WASTE**

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Table of contents

1. INTRODUCTION.....	4
2. IN VESSEL COMPOST SYSTEM SELECTION PROCESS.....	4
3. COMPOSTING FACILITY SITE SELECTION PROCESS.....	5
4. SLAUGHTER WASTE COMPOST PILOT PROJECT AT CINNAMON RIDGE	7
5. DEVELOPMENT OF NEW COMPOSTING FACILITY SCENARIOS AND ALTERNATIVE SITES	8
6. DETERMINATION OF VOLUME OF SLAUGHTER WASTE AND OTHER ORGANICS IN REGION..	9
7. REGULATORY REQUIREMENTS FOR COMPOSTING NON-SRM SLAUGHTER WASTE	10
8. SURVEY OF ORGANIC RESIDUAL COMPOSTING FACILITIES AND COMPOST WHOLESAL AND RETAIL VALUE	11
9. SURVEY OF AVAILABILITY OF WOOD WASTE IN REGION	12
10. SUMMARY	14

Appendices

APPENDIX 1. COMPOST SYSTEM AND SITE SELECTION COMMITTEE MEMBERS	16
APPENDIX 2. SUMMARY OF DESIGN, PROCESS AND COST ASPECTS OF FACILITIES	17
APPENDIX 3. NON-SRM SLAUGHTER WASTE COMPOST FACILITY SITING SUMMARY	21

1. INTRODUCTION

In May 2007, the Investment Agriculture Foundation of B.C. contracted Sylvis to continue its work in finding a local solution for the disposal of non-SRM slaughter plant waste in the Southern Interior of the province. This project was carried out with guidance from the North Okanagan/Thompson Waste Tissue Disposal Project Steering Committee. The rising cost of trucking slaughter plant waste for rendering in Calgary, mainly due to new BSE-related rendering restrictions, has imposed a financial strain on local slaughter plants; to remedy this, plant owners have been seeking a less costly, local disposal option. In fall 2006, a study completed for the committee comparing the various acceptable local disposal options for slaughter waste determined that composting of the non-SRM waste stream appeared to be the most cost effective means of managing the waste.

The committee decided to pursue composting on a regional scale, to include slaughter plants from the Thompson-Nicola Regional District (TNRD), the Regional District of North Okanagan (RDNO) and the Columbia-Shuswap Regional District (CSRD). The TNRD, recognizing the importance of the local slaughter industry to the beef industry in the area, indicated that it would support the industry in locating a site for the composting facility within the TNRD.

The project discussed in this report summarizes the work carried out to identify a suitable system and supplier of a facility to compost slaughter waste, and to identify a potential site for the facility. The project also gathered information on regulatory requirements for establishing the facility, sources of organics and wood waste within the region, and anticipated value of the finished compost.

2. IN VESSEL COMPOST SYSTEM SELECTION PROCESS

The project steering committee identified in-vessel or enclosed composting as the preferred technology for composting slaughter waste on a regional basis (Appendix 1 lists committee members and others who participated in the process). It was felt that odour control would be better with an enclosed system, the better process control would ensure that a saleable Class A compost could be produced, and public concerns about composting this type of waste would be minimized. Therefore only enclosed systems were considered in the search.

The committee identified five potential suppliers of in-vessel or enclosed technology that they wished to have proposals from. Because none of the potential suppliers had direct experience with composting slaughter waste, they were provided with a list of issues specific to the composting of this waste to be addressed in their proposal. All five potential suppliers submitted responses to the request for REOI.

The composting technology proposed by the five suppliers varied widely. Wright Engineering, X-Act compost systems and Hot Rot – Hatch all proposed in-vessel

continuous flow systems where material was continuously added to and removed from the system, and the compost was continuously mixed. The Wright system involved a moving, aerated floor where material was moved continuously along the bottom of the vessel, and remixed periodically. The X-Act system was a rotating drum on a slight incline where material moved gradually through the drum over a 2 week composting period. The Hot Rot – Hatch system was a drum shaped vessel with a rotating central shaft that mixed and aerated the compost, and moved it through the system. Both Transform and ECS proposed lower tech aerated static bin or vessel systems with remixing of the material once midway through composting. Transform proposed an aerated static bin system for the whole composting period followed by outdoor curing on a concrete pad. ECS proposed to undertake primary composting in an enclosed vessel, secondary composting outdoors on an aerated slab and curing on a concrete pad. Appendix 2 contains a summary of some of the facets of the five proposals. The committee decided to further investigate the proposals from Transform and ECS.

A tour of two composting facilities was organized as part of the compost system selection process. ECS aeration and computer technology was installed at the new regional biosolids composting facility in the Commonage south of Vernon, B.C. This facility receives biosolids from Kelowna, Vernon and other smaller municipalities in the area. Committee members also toured the municipal biosolids composting facility in Agassiz, a facility that Transform Compost Systems designed.

The committee selected Transform as the supplier to move forward with. The committee felt that Transform was the preferred supplier for several reasons including:

- The proposed Transform system was a lower tech, simpler system than the ECS system and therefore likely to require less maintenance and have a longer lifespan.
- The committee felt that the Transform system may offer better odour control because the entire composting process was proposed to occur in an enclosed space or under cover.
- Transform is a Canadian company based in B.C. which would allow for quick and efficient trouble shooting when problems arise.
- Transform has had extensive experience composting mortalities, a waste similar to slaughter waste; ECS has not had experience composting either slaughter waste or mortalities.
- The capital and operating costs of the Transform system appeared to be slightly less than those of the ECS system.

3. COMPOSTING FACILITY SITE SELECTION PROCESS

At the outset, the committee indicated that they wished to have two potential sites for the proposed compost facility assessed, the TNRD-owned Heffley landfill and the City of

Kamloops Cinnamon Ridge composting facility. Early in the site selection process, the committee identified several other potential sites to evaluate including: the Highland Valley Copper mine site, the Craigmont mine site, the proposed private composting facility east of Cache Creek and the Wastetech landfill at Cache Creek. The sites are discussed individually below; as well, Appendix 3 contains a summary of some aspects of the various sites investigated. After review of all potential available sites, it was decided that the Cinnamon Ridge composting facility was the most promising site.

Cinnamon Ridge: The City of Kamloops owns the approximately 15 acre Cinnamon Ridge facility along with several hundred acres of farm land used for municipal effluent irrigation. The composting facility receives green waste (yard waste, landscaping waste, trees) from throughout the City of Kamloops, and material is chipped, mixed and made into windrows. A compost turner is used to turn the windrows. Finished compost is sold in bulk from the site.

After touring the site, the committee felt that the site was ideal for a slaughter waste composting facility for several reasons including:

- There was sufficient flat land available to site the facility.
- The site was already permitted for a composting facility, and services were on site.
- The site was relatively remote from neighbours.
- Although located next to the Thompson River, the site was dyked and flooding had not been an issue with the existing composting facility.

City environmental staff members who were involved in the siting discussions felt that there may be opportunities for the City to use the facility for food waste and other organics generated by the City.

Heffley Creek landfill: This site is owned and operated by the TNRD as a regional landfill. The landfill site appeared to be ideal to site a compost facility: the site was remote from neighbours and was flat or gently sloping, services were available at the site, it was serviced by a good road, and ground and surface water did not appear to be of concern on the site. However, the available land base at the existing landfill was insufficient to meet the needs of the proposed facility, even without the expected expansion of the facility. There was additional land around the landfill that is undeveloped but this land is held by the crown as a buffer. The land could be accessed by the TNRD to expand the landfill's footprint but this could be a lengthy process. In comparison with Cinnamon Ridge, this site was further from sources of slaughter and butcher waste and further from potential markets. After the initial review of potential sites, this site was not considered the best option but could still be a viable option at some future time.

Craigmont mine site: this site was suggested by the TNRD as a possible option. The mine site is currently in the preliminary stages of development as an industrial area. The

site has a number of positive aspects including remoteness from neighbours, abundant land, and services in place. As well, other industrial facilities may be sited there eventually. However, this site is relatively remote from the slaughter plants that would be bringing waste to the facility and from potential markets. As well, the site is just beginning to be developed as an industrial area; this process could take considerable time which would delay start up of the composting facility. Although not deemed the best site of those assessed, this site could be a viable option for the composting facility.

Proposed Cache Creek-area private composting facility: at the time that this project was initiated, a private company was proposing a relatively large-scale composting facility just east of Cache Creek to compost food industry organics from Metro Vancouver (formerly Greater Vancouver Regional District). The developers of this project were not prepared to consider slaughter waste as a feedstock for their facility, largely because of concerns expressed by Cache Creek and Ashcroft city councils that the facility not be used to dispose of dead animals from the Fraser Valley but also because at that time slaughter waste was not included under the OMRR as were other wastes that the facility was planning to accept. This would have required that the facility have a Ministry of Environment permit for the operation. The OMRR was amended in June 2007 to include red meat waste. However, the project developers remained uncertain about accepting slaughter waste at this proposed facility.

Highland Valley copper mine site: The Highland Valley Copper Manager of Environmental Services indicated that the mine was not interested in this sort of venture at this time. Due to high copper prices, they are reopening areas of the mine and are keeping the overall site open for longer than previously anticipated. This site was not an option at the time of writing.

Other sites: the committee requested that we investigate the Cache Creek Wastetech landfill; this was felt to be too distant from the sources of slaughter waste relative to other sites. TNRD Environmental staff indicated that all other landfills owned and operated by the TNRD either had insufficient land base to site the proposed compost facility or were not suitable for other reasons. This includes the Lower Nicola landfill and the City of Kamloops landfill off Mission Flats Road.

4. SLAUGHTER WASTE COMPOST PILOT PROJECT AT CINNAMON RIDGE

When the City of Kamloops' Cinnamon Ridge composting facility was identified as the preferred site for the proposed composting facility, City environmental staff and senior management indicated that the critical next step in developing the project was to undertake a pilot project at the site to demonstrate the proposed technology. City staff and management felt that the pilot project was important to address concerns about odours during composting of slaughter waste, and to assess the effectiveness of the proposed compost system design. The committee approached Transform Compost Systems who agreed to undertake a pilot on site.

Unfortunately the pilot project was cancelled in late August 2007 by City of Kamloops elected officials who had received concerns from various parties about the proposal to compost slaughter waste at the Cinnamon Ridge facility.

5. DEVELOPMENT OF NEW COMPOSTING FACILITY SCENARIOS AND ALTERNATIVE SITES

Following cancellation of the Cinnamon Ridge pilot project and removal of that site as an option for the full scale composting facility, the committee reconvened to discuss other siting options. In view of the concerns being expressed by the public about building a large regional slaughter waste composting facility, several of the slaughter plant owners indicated that they would prefer to compost their own waste on their property. Others indicated that they did not have sufficient land base or separation from neighbours to site a composting facility at their plant. At the same time, an entrepreneur from Westwold indicated that he would be interested in having a facility sited at his property where he already has a large scale composting facility, primarily composting feedlot manure. With these options on the table the committee developed two possible scenarios for composting the non-SRM slaughter waste in the region. In general the two scenarios were:

1. Several small scale composting facilities taking waste from one or two plants.
2. One large and two small scale facilities.

In order to assess how acceptable each of the suggested sites would be to site a composting facility, a tour was conducted. The group visited Inland Meat Packers in Salmon Arm, Riverside Meats in Silver Creek, Medallion Meats in Westwold and the Heemskerk composting operation in Westwold. A very preliminary technical and environmental review of each site was conducted during the site visit in order to eliminate any sites that were obviously unacceptable.

Based on the preliminary site assessment conducted, it appeared that composting facilities could be safely built at Riverside Meats and at the Heemskerk site.

Following the tour, Dr. John Paul of Transform Compost Systems was contracted to develop new compost facility designs and costing for the various facilities proposed in the two scenarios. Various possible levels of government funding were applied to the costs, and disposal cost per unit of waste was calculated for the facilities to aid the committee in decision making.

The composting facility cost estimates were then combined with incineration cost estimates for the SRM waste to come up with a number of SRM and non-SRM waste disposal options for the slaughter plant owners to consider.

At a meeting of slaughter plant owners plus staff persons from the two funding agencies, 14 different disposal options for both SRM and non-SRM waste were presented to the plant owners for discussion. The slaughter plant owners ranked the various options

presented to them, and all but 3 options were eliminated. The three options selected by the group for further discussion were as follows:

1. 1 large scale gasifier (incinerator) for all SRM and non-SRM waste generated in the region
2. 1 incinerator for all SRM in the region and 4 smaller composting facilities as described above for the non-SRM waste.
3. 1 incinerator for all SRM in the region and 3 composting facilities – 1 large and 2 smaller for the non-SRM waste.

A further meeting of slaughter plant owners was convened to select one disposal option of the three short-listed options. At this meeting Darrell Ford of Westwood presented information on his gasification proposal. Dr. John Paul and Joe Heemskerk were present to answer questions about the two composting facility scenarios that were on the table. After considerable discussion, the committee of slaughter plant owners selected the option of one regional incinerator for all SRM waste and one large composting facility for most of the non-SRM waste (waste from Medallion Meats, Riverside Meats and Kam Lake View Meats and possibly from other smaller plants). Rainer Custom Cutting had previously obtained funding for a small facility to compost their own non-SRM waste, and Nicola Valley Meats indicated that they would prefer to install their own compost facility on site.

The committee selected composting over the gasification option but did not reject gasification outright. The committee felt that composting was an option that would be very similar in cost to gasification but that a composting facility could probably be sited more quickly than a gasification unit. There was no site proposed for a gasification project and there were many unanswered questions about whether a site could be found that could utilize the energy generated by the facility and thus reduce operating costs. The committee felt that there were too many unanswered questions about gasification at the time but that if the questions were answered adequately the option may become viable.

6. DETERMINATION OF VOLUME OF SLAUGHTER WASTE AND OTHER ORGANICS IN REGION

In order to size the proposed compost facility the committee wished to have updated numbers on anticipated volumes of slaughter waste that might be expected, and on other types and volumes of waste that might be available in the area. A phone survey was conducted of the five largest slaughter plants in the area (Medallion Meats, Kam Lake View Meats, Riverside Meats, Inland Meat Packers and Cliffview Meats) and found that these plants currently generate approximately 3000 tonnes per year of non-SRM slaughter waste, and are expecting with expansion in the next few years to produce 3500 tonnes of non-SRM waste annually. This estimate does not include any other

meat wastes such as butcher wastes or poultry processing wastes from the area; this could increase the compostable volume considerably.

At the time of writing, none of the three regional districts has a significant surplus supply of organics that could be composted in a regional composting facility. However, the TNRD is actively promoting recycling in the region. The CSRD is several years from having a significant supply of source separated organics to contribute to such a facility. The CSRD currently accepts yard waste at one of its landfills; the material is chipped on site and used as landfill temporary cover. This material would be an excellent bulking agent for a slaughter waste composting facility however trucking costs would likely make its use uneconomical if the facility were sited any distance from the landfill.

7. REGULATORY REQUIREMENTS FOR COMPOSTING NON-SRM SLAUGHTER WASTE

Part of the project was to acquire some background information on provincial government regulatory requirements in the development of the compost facility. Composting in B.C. (aside from on-farm composting of manure and other farm-generated wastes) is regulated by the Organic Matter Recycling Regulation (OMRR) under the Provincial Ministry of Environment. This regulation contains requirements for siting composting facilities and quality standards for finished compost. The regulation contains a list of organic materials that are acceptable to be composted in B.C. under this regulation. 'Red meat' is an acceptable compost ingredient; slaughter waste can be composted under OMRR.

There are several requirements when siting a compost facility under OMRR. A qualified professional (registered engineer, agrologist or similarly qualified professional with experience in siting compost facilities) must prepare a plan for the facility, outlining the works to be constructed, the design capacity, a leachate management plan that states how leachate from the facility will be managed, and an odour management plan that details how odours from the facility will be controlled so as not to cause pollution. The Ministry of Environment (appropriate Regional Manager) and the Agriculture Land Commission must be given notice in writing of the composting facility at least 90 days before startup.

Under OMRR, ongoing monitoring of compost quality is required. There are process, time, temperature and quality requirements to meet Class A compost standards. The acceptable processes to create Class A compost all require active aeration of the compost pile; the process proposed by Transform Systems meets these process requirements. The compost must achieve specified temperatures for specified periods of time to meet Class A standards. Transform staff has indicated that they are confident that their process will meet these requirements; slaughter waste composting projects have demonstrated that these requirements are easily met provided that the feedstock blend is correct. The finished compost must meet pathogen and trace element standards as outlined in OMRR and must fall within the stated carbon:nitrogen range.

The Transform system can meet pathogen standards, and it is not expected that trace elements will be an issue as the feedstock is very low in trace elements of concern.

ALC: If the composting facility is sited on land in the agricultural land reserve, it must produce Class A compost; the production of Class B compost is considered a non-permitted use on agricultural land. The proposed facility will produce Class A compost. It does not appear that the ALC will require a permit for the application of the compost to agricultural land however it is recommended that the ALC be consulted to ensure that their regulatory requirements are met.

8. SURVEY OF ORGANIC RESIDUAL COMPOSTING FACILITIES AND COMPOST WHOLESALE AND RETAIL VALUE

A peripheral part of the project was to conduct a brief survey of several facilities that currently compost a variety of other organic residuals to determine the approximate market value for these composts. There are currently no commercial scale slaughter-waste composting facilities in North America although there are many small scale, low tech static pile systems in use where the end product is not sold but is applied to farm land as a fertilizer.

A total of 8 composting facilities in western Canada and the northwest U.S states were contacted in a phone survey. All of these facilities composted organics other than slaughter waste, such as municipal biosolids and chipped yard and garden waste and all produced Class A compost for retail or bulk sale.

Table 1 below contains a summary of feedstock and price information for the facilities surveyed. All values have been converted to cost per cubic yard (prices from American facilities are in US dollars). The price charged by the compost facility for their product ranged widely. For purchase of small volumes (1-5 cubic yards) the price ranged from \$8.00 to \$30.00 per yard. For larger volumes, prices ranged from \$2.25 to \$19.50 per yard. Prices for the same products when sold through garden centres are much higher but customers have the option of purchasing the compost either bagged or in small quantities.

Table 1. Wholesale value of composted organic residuals (all meet Class A standards)

Composting facility	Primary feedstock	Small volumes (1-5 cubic yards)	Large volumes (larger than 5 cubic yards)
		(\$/cubic yard)	(\$/ cubic yard)
Kelowna-Vernon regional composting facility	Biosolids	\$30.00	\$2.25-\$19.50
City of Kamloops Cinnamon Ridge composting facility	Yard and garden waste	\$15.29 (\$20.00/m ³)	\$15.29 (\$20.00/m ³)
City of Edmonton composting facility	Biosolids	Not sold in small volumes	\$11.30 - \$16.00
Comox-Strathcona Regional District composting facility	Biosolids	\$14.00	\$8.00 - \$10.00
Cedar Grove organic waste recycling facility, Maple Valley WA	Yard and garden waste, household organic waste	\$17.45 US\$	\$17.45 US\$
City of Lynden, WA. composting facility	Biosolids	Free	Less than \$5.00 US\$
City of Tacoma, WA. composting facility	Biosolids	\$8.00 US\$	\$10.00 US\$

9. SURVEY OF AVAILABILITY OF WOOD WASTE IN REGION

The composting facility will require an inexpensive source of wood waste for bulking agent to blend with the slaughter waste. An internet and phone survey was conducted to determine what private sources of wood waste were available within the Kamloops region, primarily from lumber mills. Mills from Vavenby in the north to Merritt in the south, and east to the Shuswap and Revelstoke areas were contacted to determine availability and cost of various wood waste products. Table 2 contains a summary of the information obtained.

The amount of wood waste that would be required as bulking agent to compost all of the slaughter and butcher waste within the TNRD, CSRD and RDNO is small relative to the volumes of wood waste generated by most mills. Most mills have pre-existing arrangements with trucking companies or other end users for the waste but would supply the relatively small amounts that would be required by this facility for the cost of trucking (i.e. the wood waste is free; the cost of the material would be the cost to truck it to the compost facility).

Tolko Industries at Heffley Creek has no wood waste available as all is burned in their cogeneration plant. The three mills in Merritt, Tolko Industries, Aspen Planers and Ardeu Wood Products all could supply sufficient wood waste for the facility for the cost of trucking. Wood waste from the Tolko Industries mill in Armstrong is committed to their

cogeneration plant. Gilbert Smith Forest Products in Barriere, North Enderby Timber in Enderby and Downie Timber in Revelstoke mill all or mainly cedar which does not produce a wood waste that is suitable for composting due to inhibited microbial breakdown of the waste. Wood waste is also available from the Canfor mill in Vavenby for the cost of trucking.

Table 2. Sources and cost of wood waste in TNRD and surrounding area

Wood waste supplier	Types of wood waste available	Cost	Notes
Tolko Industries, Heffley Creek	none	NA	All wood waste used in co-gen plant; none available
Tolko Industries, Merritt	Hog fuel, shavings and sawdust – mixed species	NA	All products are available but no commitment on price. Waste currently committed to other buyers but could be available.
Aspen Planers, Merritt	Shavings, chips	NA	Most of chips and other wastes committed to pulp mill but supply could be available
Ardeu Wood Products, Merritt	Hog fuel, sawdust, chips	NA	All waste committed to pulp mill but would consider supplying small amount required by facility
Canfor, Vavenby	Hog fuel - mixed	Free; trucking \$80./hr.	Wood waste available free, trucking cost estimated.
Oyama Forest Products, Oyama	Hog fuel, mostly fir	\$320.00/load, trucking extra	

10. SUMMARY

In May 2007, the Investment Agriculture Foundation of B.C. contracted Sylvis to continue its work in finding a local solution for the disposal of non-SRM slaughter plant waste in the Southern Interior of the province. This project was carried out with guidance from the North Okanagan/Thompson Waste Tissue Disposal Project Steering Committee.

The committee decided to pursue composting on a regional scale, including slaughter plants from the Thompson-Nicola Regional District (TNRD), the Regional District of North Okanagan (RDNO) and the Columbia-Shuswap Regional District (CSRD). The goal of the project was to identify a suitable composting facility supplier and design to compost non-SRM slaughter waste from slaughter plants in the identified area and to locate a suitable site for the composting facility. Additional minor tasks were to quantify slaughter waste volumes in the region, identify available sources of wood waste for use as bulking agent in the facility, source information on sale value of similar composted materials and review the BC Ministry of Environment regulatory requirements for composting beef slaughter waste in B.C.

Through a 'Request for Expression of Interest' process, submissions were obtained from five compost system suppliers in North America. Two of the five suppliers were selected for further investigation, and ultimately Transform Compost Systems of Abbotsford B.C. was selected as the supplier of choice. Transform proposed an enclosed static pile composting process for the slaughter waste with comprehensive odour controls built into the system.

Several sites were investigated as potential sites for this composting facility. The City of Kamloops' Cinnamon Ridge yard waste composting facility was selected as the best fit to site a regional slaughter waste composting facility. A pilot project was proposed, a design was developed and funding obtained from the federal SRM program for the pilot. Unfortunately, the Cinnamon Ridge site was eliminated as a potential site by City elected officials and the pilot was cancelled.

After consultation with area slaughter plant owners, two new composting facility siting options were put forward by the committee. Scenario 1 involved building one large composting facility to take the waste from the three largest plants in the area, Medallion Meats, Riverside Meats and Kam Lake View Meats, and building smaller facilities for outlying plants, the Nicola Valley Meats proposed plant in Merritt, and Rainer Custom Cutting in Darfield (already funded for a small composting facility). Joe Heemskerk of Westwold indicated his interest in having a facility sited at his existing compost facility. Other smaller plants and startups would be required to make arrangements with one of the facilities to take their waste. The second scenario was a derivative of scenario 1 where Riverside Meats composted their own waste, and the large facility took waste from the remaining two plants. Transform Compost Systems developed designs for the various proposed facilities based on an aerated static pile design enclosed in a building.

A gasification plant to handle all SRM and non-SRM from the three regional districts was also considered. This option was set aside due to lack of information about a site for the plant and an end user for the energy generated by the plant.

Of the two remaining options, the committee selected Scenario 1, a large scale compost facility to be sited in Westwold taking waste from the three plants in the vicinity. This option appeared to be considerably less expensive than the other composting scenario.

Additional background information gathered for the project included volumes of slaughter waste and other organic waste available in the study region, sources of wood waste for bulking agent for the facility, wholesale and retail value of similar composted materials in western Canada and the Pacific Northwest and BCMoE regulatory requirements for the composting of non-SRM beef slaughter waste in B.C.

Appendix 1. In-vessel system and site selection committee members

Slaughter/livestock industry

Jennifer Cunningham, Jay Springs Ranch
Ron Keely, Kam Lake View Meats
Anam Kour, Medallion Meats
Bill Miekle, Riverside Meats
Karl Rainer, Rainer Custom Cutting
Mike Rose, Quilchena Ranch
Mino and Dan Kuiper, Nicola Valley Meats
Steve Brunner, Barriere

Local Government

David Laird, TNRD Director, Chair of Waste Management Committee
Ronaye Elliot, TNRD Director
Pat Wallace, TNRD Director
Don May, TNRD Environmental Staff
Peter Hughes, TNRD Environmental Staff
Darcy Mooney, CSRD Environmental Staff
Nicole Kohnert, NORD Environmental Staff
Jim McNeely, City of Kamloops Environmental Staff

Provincial Government

Graham Strachan, BC Ministry of Agriculture and Lands
Barb John, BC Ministry of Environment
Mark Raymond , BC Ministry of Agriculture and Lands (seconded to BC SRM Management Program)
John Luymes, BC Ministry of Agriculture and Lands (seconded to BC SRM Management Program)

Other

Rick Van Kleeck, Investment Agriculture Foundation
Ruth McDougall, Sylvis Environmental

Appendix 2. Summary of design, process and cost aspects of in-vessel compost facility proposals

Parameter	ECS	Hatch - HotRot	Transform	Wright	X-Act
Process	Batch	Continuous flow	Batch	Continuous flow	Continuous flow
Aeration	Aerated static pile process, in floor aeration system in both vessels and ASP's	Aerated and mixed constantly by rotating shaft thru middle of compost vessel.	Aerated static pile process, in floor aeration system	Aerated static pile process with mixing half way thru 2 week composting cycle; in floor aeration system	Aerated and mixed continuously as vessel rotates, constant air flow through vessel
Pretreatment	Primary composting in layered system, then aggressive mixing to break up bones	Ground in shredder to 1.6-3.5 cm size	Grinding of waste in enviroprocessor to less than 5 cm size	Grinding recommended, no further details provided	Grinding to 1.3 cm
Time to compost	14 days in primary composter vessels, 3-5 weeks in ASP to finish composting	14+ days in vessel	42 days in aerated bunker (28 days, remixed and composted for a further 14 days	14 days in tunnel, with mixing and repiling mid way thru period	7 days in vessel
Time to cure	3-5 weeks in curing piles	1-2 weeks	180 days	4-6 weeks	21 days in curing piles
Meet OMRR process, time and temp requirements for Class A compost ?	yes	yes	Yes	Does not specify but meets USEPA 503 requirements which are the same.	Yes

Parameter	ECS	Hatch - HotRot	Transform	Wright	X-Act
Odour control	Mixing area and vessel filling area enclosed, negative ventilation in building and in vessels, all air thru biofilter, additional air scrubbing technology to be installed later if required	All air from vessel exhausted thru biofilter or other odour control system. No odour control for receiving and mixing areas.	Mixing area is enclosed in building, all air from building exhausted thru biofilter	Negative air flow in tunnel with all air from tunnel exhausted thru biofilter	Negative ventilation in vessel, all air pumped thru biofilter
Labour requirement	2-3.5 FTE	0.5-1 FTE	1 FTE	Not specified	0.5 FTE
System lifespan	Fans etc. 15-20 yrs Small items 5 yrs	15 yrs +	Building 20 yrs, bins 20 yrs+, other not estimated	Not specified	10-15 yrs
Future expansion	Add additional vessels	Add additional vessel	System is modular, add more bunkers	System is modular; additional tunnel could be installed. System in proposal is sized for 8000 tonnes of waste so there would be excess capacity at start of project	Add additional tube

Parameter	ECS	Hatch - HotRot	Transform	Wright	X-Act
Bulking agent: slaughter waste mix	Est. 2-5 ratio of bulking agent to SW, some recycled, of wood waste and sawdust	Suggests 1:9 or 1:8 ratio of wood waste to slaughter waste (10-15% wood waste by mass)	0.75-1 part of wood waste or straw for each part of SW	Recommends 1 part of wood waste or yard waste for each 2 parts of slaughter waste	No information given – only that wood waste will be used
Footprint	46,500-81,400 ft sq. for vessel, ASP, curing areas, mixing building, biofilter and roads etc. Actual area required will depend on proportion of wood waste blended with slaughter waste.	1100m ² (11,840 sq. ft.) for vessel and associated buildings and equipment, additional area required for compost curing/storage and access.	12000m ² (130,000 sq. ft.)- 28000 sq.ft. building for composting, receiving and mixing, remainder for access, storage, curing etc. Area increases by 25% if volume composted doubles.	Not specified	No estimate
Leachate collection	In floor leachate collection, drained to sump for disposal or reuse	No leachate collection system. Leachate is recirculated into the vessel.	In floor leachate collection system, leachate not anticipated	In floor leachate collection system with leachate recirculated back into vessel on to composting material	Yes but details not specified
Electricity requirement	Not specified	Not specified	3 phase 600 V	6V 3 phase 400 amp service	3 phase required

Parameter	ECS	Hatch - HotRot	Transform	Wright	X-Act
Capital cost	2.5-4 M	3 M	2.9 M	3 M	1.466 M
Operating cost	Insufficient information to specify	Not specified. Electricity usage est. at 25-35 kWh/tonne.	\$70/tonne at 4000 m ³ SW, \$60/tonne at 8000 m ³ SW	Not specified. Electricity requirements: 60,000 kw h per year for tunnel and other equipment	Not specified
Included in capital cost:	Construction, delivery, installation of vessels, ASP aerated floors for secondary composting, vertical mixer, biofilter, aeration system, leachate collection system, and all controls and software, training.	Grinder-shredder, composting unit, associated augers and storage containers, control systems, foundations and buildings, installation, commissioning, shipping	Grinder-mixer, conveyor, 18 concrete bunkers, building, aeration system, biofilter, leachate collection system, screening equipment, control and software, design, engineering, project management or commissioning, training	Tunnel, mixer, various conveyors for tunnel, tunnel loading platform, parts for biofilter, all required controls, delivery, installation, commissioning of equipment, staff training <u>Does not include:</u> Waste receiving and mixing building, construction of biofilter, concrete pad for tunnel,	Rotating drum vessel, ribbon mixer, grinder, fluid storage tank, augers, amendment hopper, distribution conveyor, all required controls, installation and mechanical and material training. <u>Does not include:</u> engineering, on site works, electrical requirements, buildings, leachate collection system, crane rental for installation

Appendix 3. Non-SRM Slaughter Waste Composting Facility Siting Summary

Site	Location	Positives	Negatives	Status
City of Kamloops Cinnamon Ridge yard waste composting facility	Approx. 5 km west of Kamloops city centre towards Tranquille	<ul style="list-style-type: none"> • Good accessibility • Services in place • No obvious environmental issues with the site • Composting facility currently on site • Large land base available • Short distance to truck waste relative to other sites • Portion or all of wood waste requirements available on site 	<ul style="list-style-type: none"> • Site not remote – odour and public perception may be an issue • Waste must be trucked through City of Kamloops to reach facility • Adjacent to a road that will get further traffic depending on the outcome of the Tranquille site. 	Apparently the best option at this time.
TNRD Heffley Creek landfill	Approx. 20 km north of Kamloops at Heffley Creek, within TNRD	<ul style="list-style-type: none"> • Relatively remote site – odour and public perception issues should be minimal • Good accessibility • Currently permitted for landfill • Services on site • No obvious environmental issues • Short distance to haul waste relative to other sites 	<ul style="list-style-type: none"> • Insufficient footprint for facility – expansion of site possible but would require 1-2 years and increase in landfill footprint • Citizens group in Heffley may raise concerns about facility • Access to City of Kamloops organic wastes is uncertain. 	A possible option with sufficient lead time for TNRD to access additional land and expand landfill footprint.

Site	Location	Positives	Negatives	Status
Craigmont Mine site	Approx. 100 km SW of Kamloops, near Lower Nicola	<ul style="list-style-type: none"> • Remote site – odour and public perception issues should be minimal • Abundant land for siting and expansion • Services in place • Large scale industrial facility may be developed on the site, proponents are interested in other ventures • Suitable location for SRM incinerator 	<ul style="list-style-type: none"> • Long distance to truck waste relative to other sites • Uncertainty about future development on site – time frame to site facility here may be 1-2 years • New use for the site will trigger extensive regulatory & permitting requirements 	A possible option with sufficient lead time for overall site plan to evolve.
Proposed Cache Creek private MSW composting facility	Approx. 80 km west of Kamloops, just east of Cache Creek	<ul style="list-style-type: none"> • Remote site – odour and public perception issues should be minimal • Would be located in vicinity of an existing mushroom compost plant 	<ul style="list-style-type: none"> • Private facility – owner does not want slaughter waste due to concerns from area towns about accepting putrescible wastes. • Adjacent to Trans Canada highway • Possible increase in odours in area with an additional composting facility. 	Not an option at this time

Site	Location	Positives	Negatives	Status
Highland Valley Copper Mine site	Approx. 60 km SW of Kamloops, near Logan Lake	<ul style="list-style-type: none"> • Remote site – odour and public perception issues should be minimal • Abundant land for siting • Services in place 	<ul style="list-style-type: none"> • HVC not very interested in the facility at this time due to active mining on most of mine site • Long distance to truck waste relative to other sites • May not be interested in co-location of an incinerator at this site for SRM's 	Not a viable option at this time
City of Kamloops landfill	Mission Flats road – approx. 3 km from downtown Kamloops	<ul style="list-style-type: none"> • Long term life to the landfill, 50 years. • Close proximity to various waste streams. 	<ul style="list-style-type: none"> • Not a stable building site for a long term facility. • No access to water 	Not being pursued, mainly due to lack of suitable building site on existing landfill
TNRD Lower Nicola landfill	Approx. 3 km west of Lower Nicola	<ul style="list-style-type: none"> • Remote site – odour and public perception issues should be minimal 	<ul style="list-style-type: none"> • Insufficient land area, area not suitable 	Not an option