Management of Specified Risk Material (SRM) in the Creston Valley

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1 Introduction

The Regional District of Central Kootenay (RDCK) seeks to assess options to help resolve barriers experienced by local agricultural producers for disposal of Specified Risk Material (SRM) from bovine deadstock. SRM handling and disposal is regulated by the Canadian Food Inspection Agency (CFIA). The Creston landfill does not meet the CFIA standards for permanent containment of SRM and there is currently no CFIA compliant disposal option for SRM in the Creston area or anywhere in the RDCK.

This report updates and builds on the April 2008 report titled "Creston and Slocan Valley SRM Community Solution Analysis", prepared by SYLVIS (Sylvis, 2008). The 2008 report looked at SRM volumes and disposal options in the Creston and Slocan Valleys, while the scope for this report has been narrowed to just the Creston Valley, including the Town of Creston and Electoral Areas A, B and C of the RDCK. This report presents updated information on volumes of SRM and non-SRM waste produced in the Creston area and current disposal practices, the findings of an evaluation of SRM disposal trends in Western Canada and the results of an analysis of potential local disposal options.

Waste volumes and costs included in this report should be considered estimates only and should be used for cost comparisons purposes only. The information is based on information that was believed to be current and accurate at the time this report was prepared. The information contained in this report is relevant to the scenarios discussed only. A more detailed cost analysis and environmental assessment of any selected disposal option would be required prior to implementation.

1.1 Background on BSE and SRM

Since the discovery of bovine spongiform encephalopathy (BSE) in the Canadian cattle herd in 2003, the Canadian Food Inspection Agency (CFIA) has taken measures to eradicate the disease and to re-establish global market confidence in the Canadian beef and dairy industries. While the exact cause of BSE is unknown, it is associated with the presence of an abnormal protein called a prion. SRM or 'specified risk material' is defined as the tissues in cattle that would contain the BSE prion if the animal were infected with BSE. These tissues include the skull, brain, trigeminal ganglia (nerves attached to the brain), eyes, tonsils, spinal cord and dorsal root ganglia (nerves attached to spinal cord) of animals over thirty months of age and the distal ileum (the end of the small intestine) from all cattle.

The CFIA has developed strict livestock handling and disposal protocols to ensure SRM is destroyed or contained permanently such that there is no potential for prions to enter

the food chain. CFIA regulation of SRM sets out the following general handling requirements (CFIA, 2018):

- Cattle deadstock and SRM remaining on the farm of origin are not subject to any specific CFIA requirements. On-farm disposal methods must comply with municipal and provincial/territorial regulations. All material, including any composted cattle remains, must stay on the premises.
- A CFIA permit is required to transport SRM in any form, including whole carcasses, from a farm's premises. A visible stripe must be applied down the backs of carcasses containing SRM, and raw SRM must be dyed.
- Records of all SRM and deadstock movement must be kept for 10 years.

Permanent disposal options for SRM are incineration or landfilling in a CFIA-approved landfill. Composting and rendering are considered intermediate processing techniques used to stabilize the material; permits for transporting or disposing of this stabilized material are still required.

2 Study Methodology

The study was conducted between May and July 2018. Information was gathered primarily through phone interviews and internet research but also included some in-person meetings with local industry associates in the Creston Valley. Background information on SRM and BSE was obtained from the Canadian Food Inspection Agency website, Guidance Document Repository. Background information on deadstock and SRM waste volumes and management in the Creston Valley area was obtained from interviews with local industry associates and various literature references cited throughout Section 3.0 and 4.0 of this report. Trends and economics of SRM management in Western Canada were investigated through phone interviews with relevant agricultural and waste management contacts as well as internet research. Design and costing information for each of the disposal options was obtained from sources cited within the costing tables (Tables 2a. through 2d.) included in Appendix 1 and as described in Section 5.2 of this report.

The study was generally conducted by reviewing background information provided by the RDCK upon contract award and gathering information through phone and in-person interviews and internet research. Initial interviews with local interested stakeholders were useful for understanding the current scenario and for referrals to other, useful sources of information. As the analysis phase proceeded, some follow-up conversations were conducted to obtain feedback on potential disposal scenarios, which has been included in the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis included as Appendix 2.

3 SRM and Bovine Deadstock in the Creston Valley

There are two primary sources of SRM in the Creston Valley, material produced by the local slaughter facility and non-butchered animal mortalities, which generally occur as a result of sudden animal death on farm. There is an established process for handling separated SRM and non-SRM waste from animals slaughtered at the local abattoir. The abattoir collects SRM waste and stores material until enough volume has accumulated for trucking to out-of-region disposal. Non-SRM waste is composted and used on farm.

SRM typically cannot be removed from on-farm mortalities due to the delay between animal death and carcass pickup. Local deadstock handlers suggest that animals dead for more than 24 hours cannot be processed to remove SRM, in which case the entire animal must be treated as SRM. For this reason, on-farm deadstock in the Creston Valley are assumed to be left intact and therefore the entire carcass must be treated as SRM waste.

Table 1a. in Appendix 1 presents the estimated volumes of SRM and deadstock in the Creston Valley; sources of deadstock and SRM are discussed below.

3.1 Slaughter and Cut and Wrap waste

At slaughter, all SRM must be removed, stained and segregated in clearly marked containers. A CFIA inspector monitors these activities in slaughterhouses to ensure rules are followed and confirms the successful separation of SRM and non-SRM waste in each facility. For some BC slaughterhouses and on-farm animal processing, SRM is not separated from non-SRM due to the logistics of handling small volumes of separated material and the risks of cross-contamination. All slaughter waste must be handled as SRM in this scenario.

There are only two licensed abattoirs in the RDCK, both located in the Creston Valley, Chuckureese Abattoir and Tarzwell Farms. Chuckureese Abattoir slaughters primarily poultry and some rabbits, and Tarzwell Farms slaughters cattle, lamb, goats and other farm livestock. There is also a cut and wrap shop that produces non-SRM waste which is currently disposed of in the Creston Landfill. This study focused only on the volumes of bovine-related waste generated in the Creston area, and so only considered volumes of cattle by-products generated from Tarzwell Farm. Where economies of scale can influence the feasibility of implementing a slaughter waste solution, volumes from Chuckureese and non-bovine waste from Tarzwell may be considered, as well as volumes of SRM and non-SRM generated from outside the study area but within feasible trucking distance.

Tarzwell Farms only slaughters their own beef cattle or animals from within 5 kilometres of their farm. Animals for slaughter are primarily aged 18 to 24 months, meaning only the distal ileum tissues must be removed as SRM. Tarzwell separates the SRM from slaughtered cattle on site and freezes it until there is sufficient volume to make a truck load at which point it is transported to an Alberta disposal site. Tarzwell also uses a specialized in-vessel composting unit called a BioVator to compost non-SRM waste which is used as a soil conditioner on the farm (Tarzwell Farms, 2015; LIA, 2018).

3.2 On-farm mortalities

Information about the bovine livestock population in the Creston Valley was updated for this study through interviews with key individuals in the local industry. The bovine population includes beef and dairy cattle herds of varying sizes, with a total estimated population of 3,500 to 4,000 head of cattle in the study area. On-farm mortalities within this area are estimated at 35 head per year total for all beef and dairy producers (LIA, 2018).

4 Current Disposal Scenario in the Creston Valley

Interviews with local producers and industry partners in the Creston Valley indicate that the following practices are currently being used to deal with cattle mortalities:

- Storage and trucking out-of-region for disposal (compliant)
- On-farm burial and/or composting (compliant/non-compliant)
- Forest burial/dumping (non-compliant)

4.1 Storage and trucking out-of-region for disposal

The only compliant, off-farm disposal option for SRM in the Creston area is to truck the material to Alberta. The closest disposal facilities that are permitted to receive SRM waste are located in Lethbridge:

1. West Coast Reduction transfer station
   Contact Geoff Smolkin, Director of Prairie Operations (403) 203-1801
   28th Street N, Lethbridge, AB
2. Lethbridge Biogas
   Contact Ed Mulder, Plant Manager (403) 328-1429
   4456 8th Ave N, Lethbridge, AB T1H 6W5

The West Coast Reduction transfer station in Lethbridge receives material for transfer to their Calgary, AB rendering plant. At the rendering plant, SRM is processed separately

from other animal by-products and the residual material is sent to a CFIA permitted landfill in Coronation, AB for final disposal. Only the fat can be recovered from rendering SRM; bone and other residual material must be disposed at a CFIA permitted disposal site.

The Lethbridge biogas facility treats SRM using a thermal hydrolysis process that is approved for SRM destruction by the CFIA. Once treated, the residual from the thermal hydrolysis process is added to the main anaerobic digesters along with various other organic waste streams (manure, animal byproducts, food processing residues, pulp sludges etc). The digested residual from the anaerobic digesters is then used as a fertilizer and soil amendment on local agricultural land.

Transportation of SRM to Alberta for disposal is only viable once enough volume of material has been stockpiled to warrant trucking. This can be several months storage of SRM or more, depending on local production of SRM and the time of year. Presently, only Tarzwell Farms is using this option as they produce SRM on an on-going basis from their slaughtering operation.

Storage and trucking to Alberta for disposal is a cost prohibitive option for small abattoirs and is unlikely to be used by farmers unless there is an organized system in-place to handle material from the local area and beyond.

4.2 On-farm burial and/or composting

On-farm burial and/or composting of deadstock containing SRM is allowed under the BC Agricultural Waste Control Regulation and is not regulated by the CFIA. This disposal method is the most common method for managing on-farm mortalities throughout BC and Alberta. Some farmers in the Creston Valley are using this option to deal with their dead animals. However, farmers in the Creston Valley are faced with a unique combination of pressures from wildlife, urban encroachment, water quality concerns and other barriers to disposing of their animals properly on-farm when compared to farmers in other regions of BC and in Alberta. Given these pressures, it is likely that on-farm disposal practices are resulting in risks to ground water, migration of deadstock into waterways and other environmental or nuisance risks. In addition, on-farm burial is not an option during the winter months when the ground is frozen.

4.3 Forest burial/dumping

Due to the unique pressures in the Creston Valley and associated challenges to managing deadstock on-farm, local farmers and industry associates estimate that 50 to 70% of mortalities in the Creston Valley may be transported and dumped on Crown land off

Forest Service Roads (LIA, 2018). This practice is whole carcass disposal with SRM intact and is in contravention of the CFIA meat regulations, as well as other provincial regulations. In addition to issues with legality, major concerns with this practice include dispersal of SRM through carcass scavenging, contamination of surface and groundwater and creating general nuisance and safety concerns for local residents.

4.4 Impacts of current disposal practices

Bear Scavenging and Vector Attraction

Although many species of wildlife will scavenge a dead carcass, grizzly bear scavenging presents an especially high risk to both the bear and human population in the Creston Valley. Creston Valley farmers report a notable increase in the local grizzly population over the last 15 years and that some bears are strongly habituated to feed associated with agricultural production, including cattle farms (LIA, 2018). Grizzly bear specialist, Dr. Michael Proctor, confirms that local grizzly populations in the Creston area are healthy and some individuals are being drawn to populated areas by various attractants, including deadstock on farms (Proctor, 2018).

Dead carcasses also attract other nuisance "vectors" (i.e. flies, mosquitoes, rodents, birds, etc.) that feed or otherwise use carcasses and can spread the material significant distances from the carcass disposal site. This presents a risk through the potential for dispersal of SRM, as well as the potential for contamination of water through the introduction of putrescible material.

Water Contamination

Decaying carcasses pose a risk to water quality in several ways. Carcasses buried on the Creston flats or over coarse gravel deposits on the benched land above the flats pose a risk to groundwater quality. Introduction of dead animal carcasses in surface water poses a similar risk as many areas around Creston are community watersheds or used for recreation.

Nuisance

In addition to some human safety risk and environmental impacts, improper disposal of deadstock can also pose a nuisance factor to both producers and their neighbours. Decaying or composting deadstock can produce strong odours as well as create or intensify pest problems.

For producers who bury their deadstock, the resident grizzly bear population requires that farmers excavate holes in excess of 8' deep to bury carcasses because bears are known to dig at least that deep to scavenge (Proctor, 2018; Sanders, 2018). This is costly and presents a significant hassle, as well as a risk of groundwater contamination.

4.5 Compliance barriers

For on-farm mortalities, many farmers in the Creston area cannot bury or compost deadstock due to high water tables, frozen ground and/or risk of attracting pests and scavengers. While the local slaughter facility appears to have found a way to remain economically viable while managing SRM in compliance with CFIA rules, the cost of SRM disposal is a primary barrier for small-scale slaughterhouses across BC.

Farm biosecurity issues are also a concern for farmers that may want to have a contractor come to slaughter animals on-farm and remove SRM for compliant disposal. Strict rules, for the dairy industry especially, require significant decontamination of all persons, vehicles and equipment entering a farm. This creates a barrier for dairies and beef producers wanting to hire contractors to slaughter animals, process carcasses to remove SRM and/or have materials picked-up by a licensed transporter.

The process of removing SRM from a carcass and transporting to disposal sites requires specific expertise and CFIA permitting. At present, there is only one known contractor in the Creston Valley who is licensed by the CFIA and will visit farms to remove SRM and/or pick-up deadstock (LIA, 2018). The logistics and handling required to remove SRM from animals butchered or found dead on-farm presents a hassle and risk of contamination, which means SRM is often not separated from on-farm mortalities. For this reason, SRM is not normally removed from on-farm deadstock in the valley and, as a result, carcasses are disposed of whole.

5 Analysis of SRM Disposal Options

5.1 SRM management in Western Canada – trends and economics

The discovery of BSE in the Canadian cattle herd in 2003 dramatically changed the way slaughter waste was handled. Prior to the discovery of BSE in Canada, slaughter waste generated revenue for abattoirs. West Coast Reduction in Calgary and McLeod's rendering plant in Spallumcheen paid a small amount for the waste and picked it up free of charge from slaughter plants all over BC. Since the discovery of BSE, the value of slaughter waste to abattoirs has disappeared and disposal is now a significant net cost to these facilities. Unrelated to the discovery of BSE, McLeod's closed their rendering facility in the early 2000's and as a result, until 2017, West Coast Reduction in Calgary was the only rendering plant accepting beef slaughter waste and more specifically SRM from BC.

In the fall of 2017, Lethbridge Biogas, an anaerobic digestion facility in Lethbridge, AB, obtained a CFIA permit for SRM destruction and began accepting SRM. Because their thermal digestion process is approved for SRM destruction, residuals from the Lethbridge biogas facility are considered fully treated and are used as a fertilizer and soil amendment. Representatives from the Alberta SRM processing and disposal facilities indicate that capacity for disposal is more than adequate for the volumes produced in the Creston area now and in the future, and that the capacity is expected to remain stable over the long term (Mulder, 2018; Smolken, 2018).

In the Fraser Valley of BC, most of the SRM generated in slaughter plants is collected and transported to a West Coast Reduction transfer station in Abbotsford, BC. Deadstock in the lower mainland is collected by various operators (Dargartz, Canal and Carsons) processed to remove usable portions and the remainder (including SRM) is also taken to the West Coast Reduction transfer station. West Coast Reduction then transfers the material to their rendering plant in Calgary, AB via the Trans-Canada Highway 1 on a non-stop haul (Wise, 2018). Estimated tonnage of SRM (mixed with some non-SRM) collected in the Fraser Valley and trucked to Alberta ranges from 5,000 to 7,000 tonnes (Ference Weicker and Co., 2008). Farmers and abattoirs in the Fraser Valley are likely more able and willing to pay disposal costs for trucking SRM to Alberta due to larger volumes produced, pressure from urban encroachment and a lack of viable on-farm disposal options. Costs paid by Lower Mainland abattoirs for SRM disposal were not available at the time of writing this report.

SRM generated by abattoirs on Vancouver Island is collected in bins and transported to the West Coast Reduction transfer station in the Lower Mainland. Available information for SRM management on Vancouver Island is dated but the last study (FtGU, 2009) cited costs for this service at approximately $0.275/kg of waste and that approximately 2,000 tonnes of mixed SRM and non-SRM waste is picked-up by WCR annually.

West Coast Reduction will also pick up from abattoirs that are on or close to their route from the lower mainland to Alberta. They provide bins which are picked up when full.

Other than the bin pickup service provided by West Coast Reduction along the Highway 1 corridor, there are currently no SRM disposal options for producers and abattoirs in the South Okanagan, North Okanagan or Thompson-Nicola regions. One abattoir, Rainer Custom Cutting in Darfield, BC has a CFIA-permitted landfill on-farm that they exclusively use to dispose of their SRM waste. Beef and dairy producers manage their deadstock on-farm but generally have more land-base for burial and fewer issues with high groundwater tables, bear-human conflicts and other social issues associated with

deadstock management than in the Creston Valley. [RDOS, 2018; SHA, 2017; McDougall, R. 2012]

The Columbia-Shuswap Regional District (CSRD) Salmon Arm landfill is an engineered landfill that fully complies with CFIA requirements for SRM disposal and is permitted to do so (as of 2012). It only accepts SRM from the CSRD and currently receives a small volume of material from local producers at a cost of $240/tonne (Van Nostrand, 2018).

In the Cariboo Regional District (CRD), both the 100 Mile House and Big Lake landfills are permitted for SRM disposal; area abattoirs use these for disposal at a cost of $70/tonne and $66/tonne, respectively. The Gibraltar landfill is permitted for SRM disposal but to the best of our knowledge at the time of preparing this report has not yet been used. This region generally has good SRM disposal options, in addition to a large land base for natural disposal of deadstock on-farm (McDougall, R. 2012).

The Regional District of Bulkley-Nechako (RDBN) has a permitted landfill for SRM disposal and accepts material from abattoirs in this region at a cost of $110/tonne. It is not known if there is an SRM disposal option in the Peace River region, however the area is geographically closer to Alberta so SRM would likely be preferentially hauled there for disposal.

Presently, abattoirs in the Regional District of East Kootenay (RDEK) use cold storage and trucking to Alberta for disposal of their SRM at an approximate cost of $40 per animal. Producers in this region generally have large land-bases and can dispose of deadstock on-farm without experiencing the same pressures as producers in the Creston Valley. Slaughter facilities in the south part of the RDEK transport their material to the WCR transfer station in Lethbridge, and facilities in the north part of the RD truck SRM directly to the Calgary WCR rendering plant.

The five landfills permitted to accept SRM in the BC Interior charge tipping fees as follows:

Landfill	**Region**	**Tipping fee**	**Min. charge**
Big Lake	CRD	$66/tonne	n/a
100 Mile House	CRD	$70/tonne	$50/load
Gibraltar	CRD	n/a	n/a
Houston	RDBN	$110/tonne	n/a
Salmon Arm	CSRD	$240/tonne	$240/load

5.2 Evaluation of local SRM management options

The RDCK identified the following options for investigation in this study:

a) Compost stabilization with trucking to Alberta for disposal
b) Cold storage with trucking to Alberta for disposal
c) Upgrading of the Creston Landfill for SRM disposal
d) Incineration at the Creston Landfill

For ease of analysis, it was assumed that all options would be sited at the Creston Landfill and that all options except construction of an engineered cell would require purchase of a small loader. The following sections contain a discussion of each option as well as factors included in the analysis. Costing information is presented in Appendix 1, Tables 2a through 2d.

5.2.1 Compost stabilization with trucking to Alberta for disposal

Compost stabilization was identified as an option of interest by the RDCK for SRM waste in the Creston area; it was considered a possible means of stabilizing the SRM waste so that it could be stockpiled until it is transported to out-of-region disposal in Alberta. Transportation and disposal of SRM in Alberta is generally summarized in Section 4.1 of this report.

Composting SRM prior to transport and/or disposal serves to both stabilize the material for storage and reduce the overall volume which will require trucking to Alberta. The final product is still considered SRM and must be handled in accordance with CFIA requirements; it would be trucked to Alberta for disposal in the scenario considered for this study.

The composting system includes a Biomulcher grinder and enclosed, aerated bins for composting. The system was designed by Transform Compost Systems of Abbotsford, BC who are experienced in the composting of deadstock. The Biomulcher system was designed specifically for handling deadstock and can process up to 2,500 lb (1,134 kgs) of SRM or deadstock plus bulking agent. The Biomulcher grinder can handle a whole dead cow and will grind it into a particle size of less than 6 inches in 3-5 days. Bulking agent is added to the grinder with the SRM or deadstock; this absorbs moisture from the tissues and blood, and minimizes odours during grinding. After grinding, the material is moved to an aerated bin where it composts for a further period of time until all putrescible material has been degraded by microbial activity. During the composting process, the material dries to 20 to 30% moisture from an initial moisture content of >60%. At this point it is stable and can be stockpiled with no leachate and minimal odour until there is sufficient volume to fill a truck.

There is odour potential with this system especially if putrescent deadstock are accepted, at least during the initial stages of grinding. The capacity of this system as designed may only be able to handle the projected volume of SRM and deadstock from the study area

(Town of Creston and RDCK Areas A, B and C). However, it can be expanded to include more composting boxes and a larger impermeable surface if required.

Composted material must be covered while awaiting transport to Alberta for disposal. This can be achieved through tarping or by transferring the material from the compost bins to a pole barn or similar covered area. It is assumed that tarping would be the preferred storage method for cost efficiency.

Cost estimates for compost stabilization and trucking to Alberta for disposal

Composting facility capital and operating costs were obtained from Transform Compost Systems Ltd, Abbotsford BC. The capital and operating costs are based on an enclosed, static bin system that can be sized to suit varying volumes of waste by purchasing additional bins, and the purchase of a small loader. Cost estimates for trucking were obtained from Boot Trucking Ltd. All capital and operating costs for this option are presented in Table 2a. presented in Appendix 1.

Should this option be selected for further development, obtaining updated and specific waste hauling rates is recommended. There are currently no commercial hauling companies transporting SRM waste from the Creston area to Alberta. As was the case in the 2008 study, the main issue with this option is that no trucking company was currently serving the area nor readily willing to commit to hauling the waste. Waste Management, the main municipal waste hauler in the area, indicated that it probably would not haul the waste such a long distance. If trucking were selected as the preferred disposal option for SRM, the RDCK would have to ensure that there was a hauler available that would be willing to provide rental bins and truck the material to Calgary. Alternatively, the RDCK could purchase a large (e.g. 20 yard) dumpster trailer, which would require a larger capital investment but would allow more flexibility and opportunity for hauling to Alberta.

Tipping fees for both potential disposal facilities in Lethbridge, AB are presented for consideration because, although both facilities have indicated they are currently accepting SRM waste, the viability of the more cost-effective option (Lethbridge Biogas) is uncertain as it has only recently begun receiving and processing SRM waste. Currently, the two facilities in Lethbridge that accept SRM have quoted the following rates:

- West Coast Reduction - $0.140 per pound ($0.064 per kilogram)
- Lethbridge Biogas - $0.045 per pound (0.020 per kilogram)

5.2.2 Cold storage with disposal by trucking to Alberta

Cold storage was identified as an option of interest by the RDCK for storage of SRM waste at the Creston landfill until enough material has accumulated to warrant transport to out-of-region disposal in Alberta. Transportation and disposal of SRM in Alberta is

summarized in section 4.1 of this report. Further information about cold storage is provided below.

The cold storage scenario would require construction of a freezer storage room to house bins where SRM could be stored frozen until enough material had accumulated to fill the bin and warrant transport to Alberta for disposal. Disposal sites for material is as described for the compost stabilization and trucking to Alberta for disposal in Section 5.2.1 above.

Cost estimates for cold storage and trucking to Alberta for disposal

For this scenario, the costs considered include the cost to build and operate a freezer storage area for waste, purchase of a small loader, bin rental, trucking costs and tipping fee at the disposal facility. Cold storage capital and operating costs were obtained from a variety of sources. Costs for trucking were obtained from Boot Trucking Ltd. All costs and referenced sources are summarized in Table 2b. presented in Appendix 1.

As described above, the main issue with this option is that no trucking company is currently serving the area nor readily willing to commit to hauling the waste. Waste Management, the main municipal waste hauler in the area, indicated that it probably would not haul the waste such a long distance. If trucking were selected as the preferred disposal option for SRM, the RDCK would have to ensure that there was a hauler available that would be able to provide rental bins and truck the material to Calgary. Alternatively, the RDCK could purchase a large (20 yard) dumpster trailer, which would require a larger capital investment but would allow more flexibility and opportunity for hauling to Alberta.

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- West Coast Reduction - $0.140 per pound ($0.064 per kilogram)
- Lethbridge Biogas - $0.045 per pound (0.020 per kilogram)

5.2.3 Upgrade Creston landfill for SRM disposal

The Creston Landfill does not have an impermeable liner and leachate collection system and therefore does not meet CFIA requirements for SRM disposal. The RDCK is interested in determining the costs, operational feasibility and other considerations for upgrading the existing landfill to CFIA requirements to receive SRM and deadstock waste.

Cost estimate for upgrading the Creston Landfill (engineered cell)

Upgrading the existing Creston Landfill to accept SRM waste would involve constructing a small cell built within the existing landfill that meets CFIA requirements, as well as completing associated permit applications and landfill operating requirements. Costs for construction and operation of an engineered cell in the existing landfill was obtained from Sperling Hansen Associates, North Vancouver BC. The cost estimates used in this report include the cost to build the engineered cell based on landfilling the estimated volume of SRM generated in the study area (approximately 50 tonnes/year), the cost to operate the cell for its 20-year lifespan and the cost for closure and long-term monitoring and maintenance of the site. Detailed costing information for this option is presented in Table 2c. in Appendix 1.

5.2.4 Incineration

The CFIA only approves fixed-facility incineration for SRM destruction. The incinerator must operate at a temperature of 850°C or above for at least 15 minutes, or above 900°C for at least four seconds, and until all organic matter has been reduced to ash containing no detectable proteins. Large, fixed-facility incineration units (including one large enough to incinerate SRM and deadstock from the Creston Valley) require a permit administered by the BC Ministry of Environment under the Environmental Management Act.

Emissions standards for incineration of SRM have been challenging to meet in pilot studies. The Livestock Waste Tissue Initiative funded a pilot project to test a European-made incinerator against the requirements of the CFIA (time and temperature) and the BC Ministry of Environment (emissions). Another pilot studied was conducted in the Thompson-Okanagan, spearheaded by local slaughter plant owners looking for a solution to disposal of their SRM. Both pilots found that the tested incinerator models did not perform as expected, were quite costly to run (fuel costs) and did not meet the Ministry of Environment's emission requirements. [McDougall, 2009]

The scenario considered for this study was purchase of a B&L Cremations Systems Inc. model BLI 2500. This unit can process up to 2,500 lb per batch and 250 lb per hour.

<u>Cost estimates for incineration at the Creston Landfill</u>

Incineration capital and operating costs were obtained from a variety of sources. The incinerator cost is for a 2018 model of the same incinerator costed in the 2008 report (B&L model BLI 2500). The costing also includes purchase of a small loader to load the incinerator and a cold storage building to store waste until it is incinerated. The incinerator is sized to hold a whole dead cow and would only be used approximately 1 day per week but the larger size unit is required to allow incineration of a whole animal.

The annual operating cost for disposing of the volume of waste is based on the purchase of an incinerator and a small loader, and the cost of building a cold storage building to

store the waste until it is incinerated; these are 2018 estimates. The cost estimate also includes the cost of fuel, labour and other operating costs for running the incinerator; these are 2008 values increased by 10% to allow for inflation and cost increases.

Costs for Ministry of Environment (MoE) emissions monitoring and CFIA time and temperature monitoring are not included, nor is the cost of utility hookups. Detailed costing information for this option is presented in Table 2d. in Appendix 1.

5.3 Other considerations

5.3.1 Economies of scale

Only incineration offers any tangible opportunity to achieve economies of scale through receipt of additional volumes. If incineration is a preferred option, then it would be worthwhile considering recouping or offsetting capital and operating costs by attracting material from outside the defined study boundaries (the Town of Creston and RDCK Areas A, B and C). Areas within the RDCK but not within the study boundaries include the Slocan Valley, Nakusp, north end of Kootenay Lake and Balfour and Harrop/Proctor. The previous 2008 report looked at SRM disposal options for the Slocan Valley, but this area was not included in the current study nor has the proposed beef slaughter facility that was discussed at the time for the Slocan Valley been commissioned. Estimated volumes that may be available from these areas are summarized in Table 1b. in Appendix 1.

Opportunities for achieving economies of scale by receiving SRM from outside the study area appear to be limited by a combination of factors, including:

- Small volumes of material spread over large distances
- Costs of storage, transportation and any potential tipping fee
- Hassle-factor associated with storage and transportation
- Costs and hassle factor compared with other workable options currently used

It is possible that development of an economical SRM disposal option in the RDCK will enable development of new slaughter capacity in the area, and further support local food production. The previous 2008 SRM study conducted for the RDCK by SYLVIS looked at SRM production in the Slocan Valley; this area is estimated to have the 2nd largest population of cattle in the RDCK, with the north end of Kootenay Lake having the largest at approximately 2,100 head of cattle. A new abattoir in the Slocan Valley or Meadow Creek area would provide valuable slaughter capacity for the surrounding areas.

Presently, there are 3 or 4 licensed cattle abattoirs in the Regional District of East Kootenay (RDEK). These abattoirs separate and freeze their SRM and truck to Alberta once enough material has accumulated. The abattoirs truck the material themselves and

are interested in exploring more practical options for disposal of SRM. Due to the proximity of the RDEK abattoirs to disposal options in Alberta, it is unlikely that they would transport SRM west for disposal in Creston unless tipping fees were low enough and the process was convenient enough to compete with the Alberta disposal option. However, there may be opportunity to coordinate a pick-up route through the RDCK and RDEK, thereby diverting more SRM to proper disposal, achieving cost-efficiencies and convenience for area abattoirs and potentially enabling development of new slaughter capacity in the two regions.

5.3.2 Compliance and enforcement

Voluntary compliance will be strongly influenced by the cost and convenience of accessing local SRM and deadstock disposal services. Local industry associates suggest that tipping fees applied to SRM and deadstock should be comparable to on-farm disposal costs, and access to the Creston Landfill for waste drop-off should be convenient without extended wait times or the need to make appointments. On-farm disposal costs would be based on using a tractor or small loader to move the carcass and/or excavator time if the carcass is buried; costs are estimated to be in the range of $40 to $120 depending on the distance the carcass needs to be moved, whether the carcass is composted or buried and the equipment/labour used to complete the associated disposal tasks. (Edwards, 2018; LIA, 2018)

6 Recommendations

The most cost-effective option for disposal of local SRM waste is to construct an engineered cell at the Creston Landfill. The second most cost-effective option is cold storage with trucking to Alberta for disposal. Based on information gathered and analysis completed during this study, both these options appear to be practical and sustainable solutions for SRM management in the Creston area. Analysis of the strengths, weaknesses, opportunities and threats was also conducted for each option and is summarized in Appendix 2 – SWOT Analysis. These considerations also suggest that construction of an engineered cell or cold storage with trucking to Alberta are the most desirable options.

The following would help with implementation of the selected option:

- If one of the options requiring trucking were selected as the preferred disposal option for SRM, the RDCK would have to ensure that there was a hauler available and willing to supply rental bins and truck the material to Alberta. Alternatively,

the RDCK could purchase a dumpster trailer and contract a CFIA-permitted truck and driver to haul the trailer to a disposal site in Alberta.

- The RDCK should continue to liaise with the BC Ministry of Agriculture and the Canadian Food Inspection Agency to ensure any option pursued is aligned with provincial and federal initiatives.

- Public consultation/engagement on the implementation of the preferred option should be considered. It should highlight the benefits of providing a solution for deadstock disposal which will alleviate nuisance and environmental impacts.

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APPENDIX 1 - TABLES

Table 1a. Estimated annual SRM and non-SRM waste production in the Creston Valley area (Town of Creston plus RDCK Area's A, B and C)

Type of waste	No. of animals	Weight calculations/ assumptions	SRM (T/yr)	Non-SRM (T/yr)	Total (T/yr)
Slaughter plant	n/a	Tarzwell Farms	16*	n/a	16*
Maximum cut and wrap waste from area	n/a	Study area pop'n = 12,400 Area pop'n[1] 12,400 * 24 kg beef/person/yr = 297,600 kg beef consumed (based on Stats Can per capita beef consumption) 297,600 kg / 286 kg yield per live animal * 94 kg cut and wrap waste per animal = 98 tonnes	0	98	98
Estimated annual on-farm deadstock	35	35*0.68 tonnes/yr (LIA, 2018)	23.8	0	23.8
Mortalities from liner transport	6	6*0.68 tonnes/yr, carcass disposed of whole (LIA, 2018)	4.1*	0	4.1*
		Totals	**44**	**98**	**149**

[1] RDCK Comprehensive Land Use Bylaws for Electoral Areas, 2013

* Estimates believed to be high. Tarzwell tonnage taken from 2008 report. Liner mortalities currently handled by cattle hauling companies, may not be available for inclusion in disposal volumes

Table 1b. Estimated cattle population in remaining areas of the RDCK (MoA, 2017; LIA, 2018)

Area	No. of animals	Assumptions	Total (T/yr)
North end of Kootenay Lk (Area D	2,100	Majority beef cattle at ~ 1% mortalities	14.3
Balfour, Harrop/Procter (Area E)	200	Majority beef cattle at ~ 1% mortalities	1.4
Slocan Valley	1,000	Majority beef cattle at ~ 1% mortalities	6.8
Nakusp	670	Majority beef cattle at ~ 1% mortalities	4.6
			27.1

Table 2a. to 2d.: Detailed cost estimates for SRM disposal options (calculations based on estimated local SRM waste production of 50,000 kg per year (110,231 lbs/yr)

2a. Compost stabilization with trucking to Alberta for disposal			
Cost Item	***Costs***	***Annual Costs***	***Cost/lb***
Composting capital costs			
Compost facility infrastructure[1] – biogrinder, 2 composting drying boxes, asphalt pad, small loader	$104,000	n/a	n/a
Composting operating costs (annual)			
Labour, electricity for grinder, bulking agent, loader fuel and maintenance	-	$21,080	$0.191
Cost of borrowing capital	6% for 20yrs	$8,941.08	$0.081
Composting subtotal		$30,021.08	$0.272
Trucking and disposal costs[2]			
Trucking to Lethbridge, AB[3]	$3.25/mile * 1,080 miles * 2 trips/ year	$7,020	$0.0.64
Tipping fee[4]	Lethbridge BioGas	$1,587	$0.045
Trucking and disposal subtotal		$8,607	$0.109
Total Estimated Costs		**$38,628.08**	**$0.38/lb $838/T**

[1] Costs obtained from Transform Compost Systems for SRM compost and dry stabilization system design, July 2018.
[2] Assumes SRM volume reduction to approx.. 40m3/16T or 35,274lbs annually (McDougall, 2018).
[3] Costs associated with trucking estimated from general mileage costs obtained from Boot Trucking Ltd., Fort McLeod, AB.
[4] Costs associated with tipping material at Lethbridge Biogas facility obtained from Ed Mulder, Lethbridge Biogas.
Note: does not include cost of utility hookup, if required.

2b. Cold storage with trucking to Alberta for disposal			
Cost Item	***Costs***	***Annual Costs***	***Cost/lb***
Cold storage capital costs			
Freezer storage room for SRM storage, small loader	$102,500	n/a	n/a
Cold storage operating costs (annual)			
Labour, electricity, bin rental, plastic for bin liners[1]	-	$9,162	$0.083
Cost of borrowing capital	6% for 20 years	$8,812.08	$0.080
Cold storage subtotal		$17,974.08	$0.163
Trucking and disposal costs			
Trucking to Lethbridge, AB[2]	$3.25/mile * 1,080 miles * 4 trips/year	$14,040	$0.127
Tipping fee[3]	Lethbridge BioGas	$4,960	$0.045
Trucking and disposal subtotal		$19,000	$0.172
Total Estimated Costs		**$36,974.08**	**$0.33/lb $738/T**

[1] Electricity usage estimated using: 1. energy consumption estimated at 67 KWh/m3/year (Evans et al, 2015) and Fortis BC commercial electricity rates (Fortis, 2018). Costs for bin rental and plastic lining estimated based on 2008 estimates +10%.
[2] Costs associated with trucking estimated from general mileage costs obtained from Boot Trucking Ltd., Fort McLeod, AB.
[3] Costs associated with tipping material at Lethbridge Biogas facility obtained from Ed Mulder, Lethbridge Biogas.
Note: does not include cost of utility hookup, if required.

2c. Build CFIA approved cell at Creston landfill for SRM and bovine deadstock[1]			
Cost Item	***Costs***	***Annual Costs***	***Cost/lb***
Capital costs			
Construct engineered cell	$166,667	n/a	n/a
Operating costs			
Total operating costs (yrs 1-20)	$85,000	-	-
Closure cost (year 20)	$56,667	-	-
Post-closure cost (yrs 21-50)	$255,000	-	-
Total Estimated Costs		**$28,166.70**	**$0.26/lb $443/T[2]**

[1] Costing obtained from Sperling Hansen Associates, July 2018.

[2] Break-even tipping fee based on capital repayment over 20 year life of engineered cell with consideration of operating costs split between management of engineered cell and routine landfill operation.

2d. Incineration at Creston Landfill[1]			
Cost Item	***Costs***	***Annual Costs***	***Costs/lb***
Capital costs			
Incinerator, loader, cold storage building	$303,947	n/a	n/a
Operating costs (annual)			
Fuel, labour, loader maintenance, electricity	2008 costs updated	$53,359	$0.484
Loan repayment cost	6% for 20 yrs	$26,131	$0.237
Ash tipping fee	$85/tonne	$212.50	$0.002
Incineration			
Total Estimated Costs		**$79,702**	**$0.72/lb $1,594T**

[1] Costing based on 2007 Golder Associates report on incinertors for BC slaughter plants (Golder, 2007.

Note: cost does not include pre-startup, ongoing BCMoE emissions monitoring, CFIA time-temperature monitoring or utility hookup costs.

APPENDIX 2 – SWOT ANALYSIS

Strengths, Weaknesses, Opportunities, Threats

Disposal Options SWOT Analysis

	Compost stabilization with trucking to Alberta for disposal Biomulcher enclosed composting system with trucking to Lethbridge, AB	**Cold storage with trucking to Alberta for disposal** Freezer building with roll-off bins with trucking to Lethbridge, AB	**Upgrade Creston Landfill** Construct CFIA permitted engineered cell to receive estimated annual volume of SRM for 20 years	**Incineration at Creston Landfill** Purchase and install incinerator at the Creston Landfill
Capacity range for design scenario (t/yr)	50 to 60 tonnes/yr, additional volume could be handled if facility upsized	50+ tonnes/yr, additional volume can be accepted but operating costs will increase due to more frequent disposal trips to Alberta	50 tonnes/yr, additional volumes can be accepted but will shorten the lifespan of the cell	50 to 200 tonnes/year, additional volume can be accepted but operating costs would increase correspondingly
Capital Cost **Operating Cost** **$/tonne** **$/year**	$104,000 $838/tonne $38,628/year	$102,500 $738/tonne $36,974/year	$166,667 $443/tonne $28,167/year	$303,947 $1,594/tonne $79,702/year
Strengths / Opportunities	1. removes SRM from region 2. reduces volume of SRM for disposal 3. opportunity to develop a pick-up network throughout RDCK and RDEK for trucking to Alberta, which would potentially enable development of new slaughter capacity	1. removes SRM from region 2. proven technology 3. one of 2 (landfilling) least complicated options for operators 4. least time-consuming option for operators 5. opportunity to develop a pick-up network throughout RDCK and RDEK for trucking to Alberta, which would potentially enable development of new slaughter capacity	1. lowest cost option 2. local management of SRM with local control 3. proven technology for containment of SRM 4. one of 2 (cold storage with trucking) least complicated options for operators 5. once contructed, least amount of potential for interruption in service	1. local management of SRM with local control 2. permanently destroys SRM 3. can process a variety of waste streams 4. volume is reduced significantly, to approximately 7% of input volumes 5. potential to achieve economies of scale by receiving additional volumes from outside study area or other feedstocks (i.e. waste from poultry abattoir)
Weaknesses / Challenges	1. generates odours that may cause nuisance/complaints 2. operation and maintainance of Biomulcher unit requires specialized operator training and potential downtime due to malfunction 3. requires sourcing and purchase of carbon feedstock (wood shavings) 4. requires significantly more operator time to manage composting process 5. requires contigency plan for equipment failure or shut-downs 6. limited opportunity for economies of scale by receiving volumes from outside study area	1. requires attention to scheduling to ensure SRM is trucked and capacity to receive more is maintained 2. requires contingency plan for potential equipment (freezer) failure	1. landfilling only contains SRM, does not destroy it 2. must pursue CFIA permit and associated inspections/monitoring 3. potential public resistance due to water quality concerns 4. receiving additional volumes will shorten the lifespan of the cell	1. highest cost option 2. technological uncertainty associated with meeting MoE emissions standards and criteria for CFIA permitting (destruction of SRM) 3. must pursue CFIA permit and associated inspections/monitoring 4. operators would require specialized traning 5. requires contigency plan for equipment failure or shut-downs 6. potential public resistance due to air quality and odour concerns. 7. pilot studies have shown challenges in meeting emissions standards