SOLID WASTE MANAGEMENT
Annual Operations and Monitoring Report
Golden Refuse Disposal Site MR-17006
2016

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1.0 INTRODUCTION

The Golden refuse disposal site (hereinafter referred to as "the site") is located at 350 Golden-Donald Upper Road, Golden, BC approximately 2 km northeast from the core of Golden. The legal description of the property is Subdivision 12 of Section 18, Township 27, Range 21, West of the 5th Meridian, Kootenay District. The landfill site is approximately 1.2 km north of the Kicking Horse River, the nearest major surface water body.

The site has been in operation since the early 1970's as a natural attenuation landfill. In the late 1970's the permit was transferred to the Columbia Shuswap Regional District (CSRD). The property is leased to the CSRD by the Crown and covers an area of approximately 17 ha. The waste footprint currently covers an area approximately 4.4 ha. The landfill site was operated by Frank Strain in 2016 under contract with the CSRD.

The landfill site provides solid waste disposal and residual processing services to residents, businesses, and institutions located within the municipality of Golden and to the CSRD Electoral Area A. CSRD manned transfer stations in Parson and a transfer station located in Field (owned and operated by Parks Canada) deliver solid wastes to the site in 50 yrd^3 containers on a regular frequency. The site is operated under an approved Design and Operations Plan (D&O Plan), in accordance with Operational Certificate 17006, issued by the Ministry of Environment on May 5, 2003 and amended on August 29, 2012.

Environmental monitoring in 2016 included groundwater sampling, analysis and reporting at the site. Data collected from the groundwater monitoring program has been compared to the historical record to determine whether the site has affected groundwater quality and, if so, to what extent. The qualified professionals report is currently in draft and will be posted to the CSRD's webpage in April 2017.

In accordance with the user-pay principles of the Solid Waste Management Plan, fees are charged for the disposal of all waste materials. The disposal fee for co-mingled municipal solid waste across scaled sites is set at $70 per tonne, as per changes in 2009 in accordance with the new Solid Waste Management Plan. Furthermore, in 2010 a differential tipping fee was introduced to encourage recycling by creating disincentive fees for loads which are not separated to the appropriate marshaling areas.

2.0 BACKGROUND

With the exception of statutory holidays, the site was open to the public in 2016 on the following schedule:

Year Round Monday to Saturday from 10:00 am to 4:00 pm

The site contains a lockable gate, a single truck scale with electronic weighing and reporting software, a scale house, and an internal transfer station. The site operates on a user pay system where payment is collected on a load weight bases.

3.0 OBJECTIVES

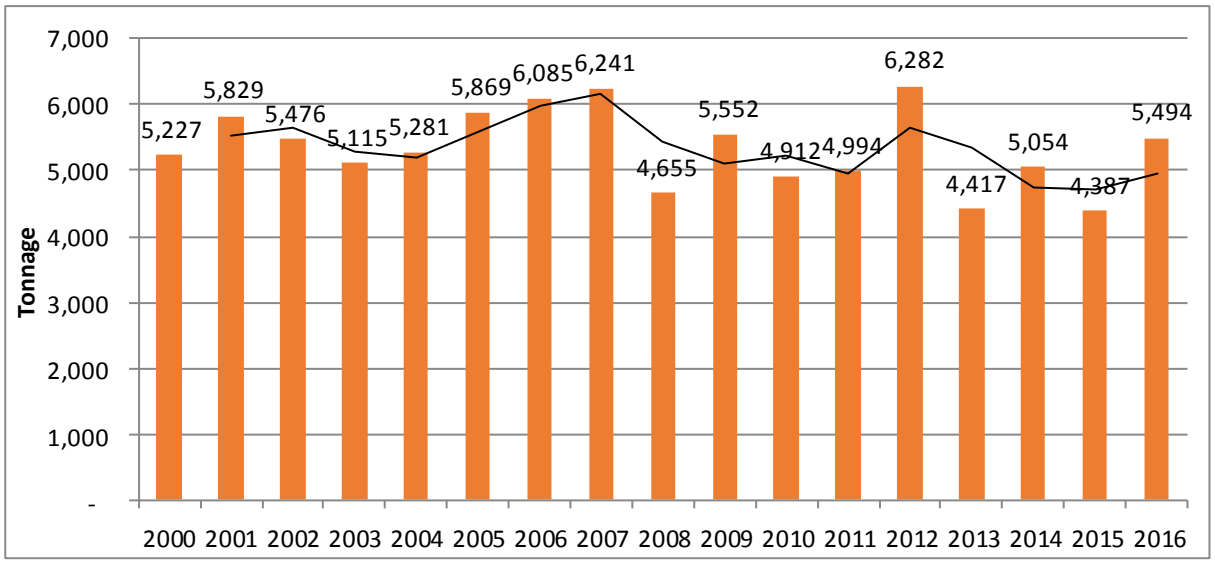
The objective of this report is to provide information required to meet the annual reporting requirements in Section 5.1 of Operational Certificate MR- 17006 issued by the BC Ministry of Environment on August 29, 2012.

3.1 Total Tonnage of Waste Landfilled (Figure 1)

In 2016 approximately 10,028 tonnes of refuse and recoverable wastes were managed at the Golden landfill. The quantity of municipal solid waste landfilled at the site in 2016 was 5,494 tonnes, which represents a 25% increase over 2015. The increase in tonnage can be attributed in part to large clean-up projects carried out by CN Rail in 2016. Using the most recent census date (2016) the per capita disposal rate for 2016 was 0.80 tonnes/person/year, based on a population of 6,856 for the service area.

Nearly half of all incoming materials, 4,534 tonnes, were diverted to marshaling areas for recovery and recycling. Existing diversion programs include; mattresses, drywall, asphalt shingles, concrete, contaminated soil, wood waste, metal and reusable items.

Figure 1



3.2 Design Volume/Life Expectancy

The Golden D&O Plan was prepared by EBA Engineering Consultants Ltd. in November 2007 and updated in 2013 by Golder & Associates in accordance with the requirements of the Operational Certificate. According to the updated plan, the site will be constructed and progressively closed in four phases which will consume approximately 1,230,000 m3 of air space.

Before the D&O Plan was created waste had been placed across much of the landfill site. The CSRD is currently completing the construction of the pre-phase of the landfill which will then accommodate the phased development according to the D&O Plan which will progress on top of the pre-phase. According to projections in the D&O Plan, Phase 1 will reach capacity by 2028 with overall capacity being exhausted by 2098.

It was determined by survey that 9,815 m3 of air space was consumed at the site in 2016, representing a 20% increase over 2015.

3.3 Accomplishments and Inspections in 2016

In 2016, CSRD staff inspected the Golden landfill four times. The Cover and Compaction contractor and Scale House Operations contractor were found to be in compliance with their contracts and the D&O Plan with every inspection.

The CSRD hired a contractor in 2016 to re-grade the south side slope of the current active landfill phase. The slope was not at the 3H:1V grade required for outside final slopes. The entire south facing slope was re-graded and re-covered with 30 cm of inorganic intermediate cover material and is now in compliance with the D&O Plan.

CSRD staff received significantly fewer complaints from neighbours regarding odours at the site. Efforts were made by the site contractor to ensure odorous materials were managed quickly and effectively.

3.4 Occurrences or Observations of Wildlife

The perimeter of the Golden landfill has an electric fence. Voltage is checked during inspections and is in the 6 -7 kV range. One inspection found no voltage due to damage to the fence from a tree which had fallen across it. The fence was repaired and voltage was restored. Occurrences of wildlife in 2016 included ravens and deer accessing the site. There were no incidents of bears.

3.5 Closure Planning

Each spring the CSRD's Finance Department assesses closure reserves, future closure projects and landfill capacity to ensure adequate reserve funds are available for planned closure work. A copy of this assessment work has been included as Appendix 'A'.

3.6 Plans for 2017

Plans for 2017 include re-grading the west side slope on the current active phase of the landfill and applying intermediate cover. Drainage ditches will be constructed at the base of the re-graded south and west side slopes to control surface water and to improve overall drainage in the site. A perimeter road will be added at the base of the south and west side slopes to improve access around the site. Excavation of cover material will continue along the east bank in the site in 2017.

The CSRD acquired new GPS survey equipment in 2016 which will be used to check the current landfill design to ensure it is compliant with the D&O Plan. New alternative daily cover plates will be purchased to replace damaged ones. This will help reduce vectors from accessing refuse.

3.7 Training Programs

No formal training was completed by the contractor in 2016.

4.0 ENVIRONMENTAL MONITORING

Western Water Associates Ltd. conducted all environmental (groundwater) monitoring and reporting for the Golden Landfill, as per the requirements of the Operational Certificate. Western Water has provided conclusions and recommendations based on the 2016 data collected, which will be posted on the CSRD website for public review after April 1, 2017.

4.1 Perimeter Gas Monitoring

The Golden landfill has two soil gas monitoring probes situated around the landfill property. Gas probe 6 is located on the west side of the property and gas probe 7 is located in the south west corner of the property.

Each monitoring probe has two nested gas sampling probes for shallow and deep sampling indicated by an S or D in the tag. Each probe has 3 metres of screened pipe and nested probes are isolated by a 1 metre bentonite plug. Shallow probes are screened from approximately 1 to 4 metres depth and deep probes are screened approximately 5 to 8 metres depth. The CSRD began monitoring these gas probes in 2013.

Sampling was done annually using a Landtec GEM2000 portable gas analyzer. Each gas probe is purged for 10 minutes before the sample is taken. No evidence of landfill gas was present in either gas probe in 2016. Methane and hydrogen sulphide concentrations were 0.

The CSRD plans to continue annual gas readings to monitor landfill perimeter soil gas concentrations in 2017.

5.0 WASTE HIERARCY

The CSRD emphasizes and encourages the 6R Hierarchy of Rethink, Reuse, Reduce, Recycle, Recovery and Residual management and continually strives towards a higher ‘R’ in waste management practice. At the Golden landfill there are a number of programs established to facilitate the separation and salvaging of various recyclable materials.

The CSRD also manages a network of Multi Material BC (MMBC) recycling depots throughout the regional district, including one in at the Parson transfer station, one in downtown Golden and one at the Golden landfill. MMBC is the provincial stewardship group responsible for collecting packaging and printed paper, including but limited to; paper, cardboard, newsprint, containers, plastics, glass and styrofoam. Furthermore, the CSRD tracks and reports the amount of recycling collected via the Town of Golden’s curbside recycling program.

5.1 Resource Recovery - Landfill Salvaged Materials

In 2016 over 4,000 tonnes of material was marshaled and recycled or reused on site. Wood waste and yard and garden waste are separated on site and are chipped by the CSRD wood grinding contractor. Wood chips are used on site for access roads, unloading pads, and blended with cover material for use on interior landfill cells. Metal, gypsum/drywall, asphalt shingles, mattresses, auto batteries, and propane tanks are separated from waste on site and are salvaged by CSRD contractors for recycling off site.

Concrete, asphalt, brick, and porcelain are separated on site and stockpiled to be crushed into an aggregate product for use on site. No concrete crushing was done in 2016. Appliances containing refrigerants and Ozone Depleting Substances are separated on site and these substances are removed by a CSRD contractor before items are added to the metal area for salvage. Clean soil, contaminated soil, and chipped wood are separated for internal use at the site.

The following table provides an annual summary of 1) materials received and separated for processing and 2) categories and related tonnages processed for recycling or reused on the site for internal purposes:

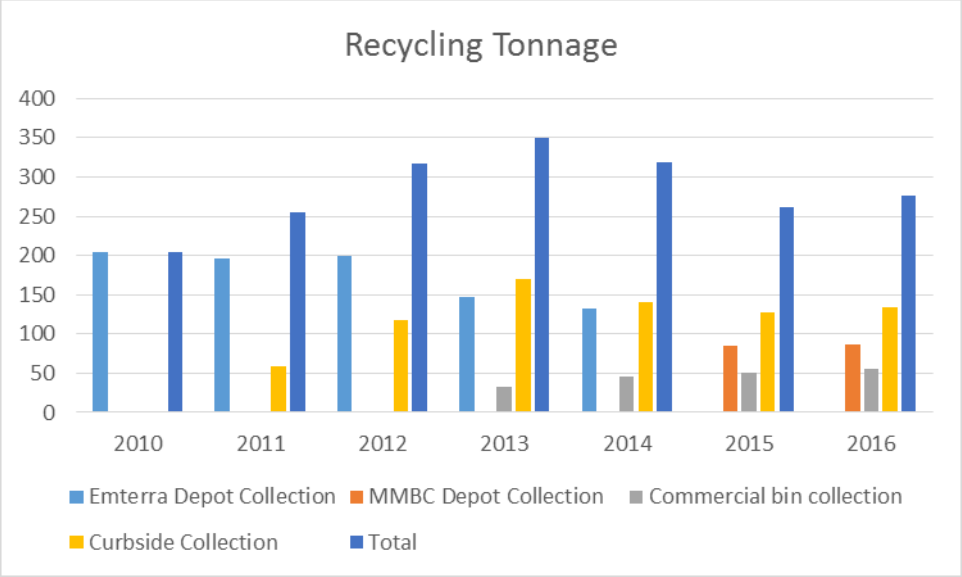
Golden Landfill - Resource Recovery							
Recoverable Resource	2010	2011	2012	2013	2014	2015	2016
Wood Waste - Received (MT)	448	485	310	632	711	479	292
Wood Waste - Processed (m^3)	1,450	3,777	1,968	3,944	1,956	1,193	2,949
Yard & Garden Waste - Received (MT)	176	208	250	284	423	313	349
Yard & Garden Waste - Processed (m^3)	incl. WW	incl. WW	incl. WW	incl. WW	840	1,072	1,155
Metal Waste - Received (MT)	168	166	190	175	190	212	127
Metal waste - Salvaged (MT)	396	409	141	187	157	196	171
Gypsum Drywall - Received (MT)	-	48	46	64	43	48	56
Gypsum Drywall - Salvaged (MT)	-	20	117	72	53	51	75
Asphalt Shingles - Received (MT)	-	97	202	138	106	112	146
Asphalt Shingles - Salvaged (MT)	-	25	104	99	102	24	105
Concrete/Brick/Porcelain - Received (MT	-	347	960	655	1,012	733	318
ODS Units - Received	-	82	118	133	221	190	172
ODS Units - Processed	187	161	153	221	253	260	165
Propane Tanks - Salvaged	-	-	206	289	132	141	281
Auto Batteries - Salvaged	151	168	119	121	112	112	159
Mattresses - Received	-	-	-	-	290	584	501
Mattresses - Salvaged	-	-	-	-	290	451	524
Contaminated Soil Received (MT)	-	8,285	2,900	3,900	2,544	1,118	1,914
Clean Soil Received (MT)	-	1,541	1,160	382	520	1,020	1,317
Wood Waste Chipped Received (MT)	-	-	-	-	3	29	3
MT - Metric Tonne							
m^3 - cubic metre							

5.2 Recycling - Commercial and Residential Programs

In January of 2015, the residential recycling collection changed to the MMBC Packaging and Printed Paper collection Extended Producer Responsibility (EPR) program. Prior to the MMBC program the depot recycling program was not monitored which contributed to illegal dumping and inflated tonnage results.

The CSRD maintains a recycling program for commercial users, which is tracked separately. In addition, the CSRD has been working to add other stewardship materials, such as power tools and electronics, where there is a lack of program accessibility and partnerships with stewardship groups can be achieved.

The following table is an overview of tonnage collected since 2010:



5.3 Recycling – Household Hazardous Waste

The CSRD is committed to providing residents with recycling opportunities for household hazardous waste materials by way of conducting round up events. Materials are collected, safely packed and consolidated in either drums or pails. The following table provides a summary of the amounts of materials collected, including but not limited to; flammable substances, corrosives, mercury, etc., since 2012:

	Drums	Pails
2012	19	13
2014	19	42
2016	17	86

The CSRD intends on establishing a permanent household hazardous waste collection facility at the Golden landfill in 2018. As a result the CSRD will no longer have a need to host round up events in Golden.

Appendix 'A' - Solid Waste Landfill Closure and Post-Closure Liability

COLUMBIA SHUSWAP REGIONAL DISTRICT

Notes to Consolidated Financial Statements

December 31, 2016

5. Solid Waste Landfill Closure and Post-Closure Liability

The Environmental Management Act of B.C. and the Ministry of Environment of B.C. set out the landfill criteria to properly close and maintain all active and inactive landfill sites. Under the guidelines, there is a requirement for closure and post-closure care of solid waste landfill sites. Provisions are therefore made over the estimated remaining life of the Regional District landfill sites based on scalehouse records and through tipping fees.

The main components of the landfill closure plans are: final capping using an engineered cap design and the implementation of a drainage and gas management plan. The post-closure care requirements may involve: cap maintenance; groundwater monitoring; gas management system operation and maintenance; inspections; leachate treatment and monitoring; and annual reports. Post-closure care activities begin once the entire landfill site no longer accepts waste and continues on for a period of twenty-five years. As the date of the site closure is unknown, management estimates the liability to begin after the closure of the current active phase, assuming another phase will not be opened. In the event another phase is opened, the start date for the liability will be adjusted to begin upon closure of the newly opened phase.

The table below sets out the liability based on the estimated capacities used in cubic metres, multiplied by the estimated total expenditures, expressed as discounted present values, assuming 1.80% (2015 - 1.10%) inflation and 2.10% (2015 - 2.75%) long-term borrowing rate (fall issue MFA 25 year rate). The amount remaining to be recognized in future years is $1,869,700 (2015 - $1,619,300). The annual provision is reported as an Operating Fund expense and the accumulated provision is reported as a liability on the Consolidated Statement of Financial Position. Reserve funds totalling $1,347,230 (2015 - $1,004,009) have been established to provide for this liability in the Landfill Closure Special Reserve Fund.

The table also indicates the remaining landfill life in years and remaining capacity (100 minus % used) on the open phases and the anticipated post-closure costs recognized on total site capacity used.

	Estimated Remaining Life (Years)	Estimated Total Expenditure for Closure	Cumulative Capacity Used (m^3)	Total Estimated Capacity (m^3)	Used (%)	Liability for Closure December 31, 2016
Salmon Arm (phase 2 of 5)	10	$ 2,202,700	165,799	383,778	43	$ 951,600
Golden (pre-phase)	12	356,400	613,416	613,416	100	356,400
Golden (phase 1 of 4)	12	407,400	75,147	157,000	48	195,000
Revelstoke (pre-phase)	4	324,800	70,000	70,000	100	324,800
Revelstoke (phase 1 of 4)	4	728,800	57,476	98,535	58	425,100
Revelstoke (phase 2 of 4)	10	749,500	65,000	156,212	42	311,900
Revelstoke (phase 3 of 4)	21	911,000	10,000	160,688	6	56,700
Sicamous (phase 2 of 4)	9	293,300	87,315	166,000	53	154,300
Sicamous (phase 4 of 4)	27	463,600	110,000	125,000	88	408,000
Closure liability subtotal		$ 6,437,500	1,254,153	1,930,629	65	3,183,800
Post closure liability subtotal						1,384,000
2016 total liability						4,567,800
Less: expenses previously recognized						(3,430,700)
2016 increase in the liability for landfill closure						$ 1,137,100