
District of Sechelt

2009 Biosolids Management Summary

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2009 BIOSOLIDS MANAGEMENT SUMMARY

Liquid biosolids from the lagoon at the District of Sechelt's (DoS) Dusty Road Wastewater Treatment Plant (WWTP) were applied to Lehigh Materials Sechelt Mine throughout 2009. Liquid tankers were used to transport and apply the biosolids to the mine as a fertilizer and soil amendment. Prior to application the biosolids were analyzed for physical parameters, nutrients and trace elements as presented in Table 1 and Table 2. Concurrently, seven discrete samples were collected from the lagoon and analyzed for fecal coliforms as provided in Table 3.

District of Sechelt biosolids meet Class B requirements for trace element and fecal coliform concentrations as specified in the Organic Matter Recycling Regulation (OMRR). The total number of loads of biosolids recycled from the DoS in 2009 is provided in Table 4. Photograph 1 displays the lagoon at the WWTP where biosolids are removed. Photograph 2 illustrates the application of the liquid biosolids to a row of poplars. Photograph 3 displays the post biosolids application response by poplars.

SYLVIS has partnered with the DoS to manage their biosolids. SYLVIS looks forward to continuing this amicable relationship and managing DoS biosolids in the nationally recognized reclamation program at the Lehigh Materials Sechelt Mine.

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Photograph 2: Sechelt biosolids are applied to the Northcote Upper Slope using a tanker truck,
(May 2009)

Photograph 3: Sechelt biosolids are also used to fertilize poplar trees at the mine, (May 2009)

Table 1: Biosolids quality monitoring – 2009 individual sampling events.

Parameters	Sechelt Biosolids			Class B Limits ^a	Units
	10-Jun-09	9-Jul-09	6-Aug-09		
Available Nutrients					
Ammonium - N	2,210	1,580	2,470	-	µg/g
Nitrate - N	< 10	< 10	< 10	-	µg/g
Phosphorus	2,000	4,000	4,000	-	µg/g
Potassium	3,800	3,700	2,800	-	µg/g
Sulfate - S	222	160	323	-	µg/g
Boron ^b	14	25.1	28.9	-	µg/g
Copper	8.2	5.2	11	-	µg/g
Iron	739	747	628	-	µg/g
Manganese	59.7	57.8	60.5	-	µg/g
Zinc	22.4	19	35.3	-	µg/g
Classification					
Organic Matter	67.7	57.4	58.6	-	%
Total Kjeldahl Nitrogen	5.30	5.32	5.43	-	%
Total Organic Carbon	33.8	28.7	29.3	-	%
C:N Ratio	6.4	5.4	5.4	-	-
Cation Exchange Capacity	95	110	85	-	meq/100g
pH	5.9	6.1	6.0	-	pH units
Electrical Conductivity ^c	5.33	4.65	4.36	-	dS/m at 25°C
Moisture	95.6	94.7	94.4	-	%
Apparent Bulk Density	0.06	0.05	0.06	-	dS/m at 25°C
Apparent Wet Bulk Density	1.36	0.99	1.01	-	dS/m at 25°C
Trace Elements					
Arsenic	5.1	5.3	5.5	75	µg/g
Cadmium	2.84	2.82	2.94	20	µg/g
Chromium	23.2	29.1	37.8	1,060	µg/g
Cobalt	2.4	2.5	2.8	150	µg/g
Copper	660	660	650	2,200	µg/g
Lead	43.5	41.8	42.0	500	µg/g
Mercury	1.32	1.24	1.49	15	µg/g
Molybdenum	5	6	6	20	µg/g
Nickel	15.8	18.7	22.1	180	µg/g
Selenium	7.1	7.1	7.5	14	µg/g
Zinc	1,060	1,040	1,100	1,850	µg/g
Antimony	1.8	2.0	2.1	-	µg/g
Barium	2,000	669	701	-	µg/g
Beryllium	< 0.1	0.1	0.2	-	µg/g
Silver	34.5	29.4	31.6	-	µg/g
Thallium	< 0.05	0.06	0.06	-	µg/g
Tin	30	39	40	-	µg/g
Vanadium	12.6	12.0	13.0	-	µg/g

^a These limits are the trace element concentrations limits for Class B biosolids under the Organic Matter Recycling Regulation (2002), Schedule 4.

^b Determined as hot water soluble.

^c Determined by the Saturated Paste Equivalent method.

Table 2: Biosolids quality monitoring – 2009 summary statistics.

Parameters	Min ^a	Max ^a	Mean ^a	Class B Limits ^b	Units
Available Nutrients					
Ammonium - N	1,580	2,470	2,900	-	µg/g
Nitrate - N	<10	<10	10	-	µg/g
Phosphorus	2,000	4,000	3,000	-	µg/g
Potassium	2,800	3,800	3,400	-	µg/g
Sulfate - S	160	323	240	-	µg/g
Boron ^c	14	28.9	23	-	µg/g
Copper	5.2	11	8.1	-	µg/g
Iron	628	747	705	-	µg/g
Manganese	57.8	60.5	59.3	-	µg/g
Zinc	19	35.3	26	-	µg/g
Classification					
Organic Matter (LOI)	57.4	67.7	61.2	-	%
Total Kjeldahl Nitrogen	5.30	5.43	5.35	-	%
Total Organic Carbon	28.7	33.8	30.6	-	%
C:N Ratio	5.4	6.4	5.7	-	-
Cation Exchange Capacity	85	110	97	-	meq/100g
pH	5.9	6.1	6.0	-	pH units
Electrical Conductivity ^d	4.36	5.33	4.78	-	dS/m at 25°C
Moisture	94.4	95.6	94.9	-	%
Apparent Bulk Density	0.05	0.06	0.06	-	kg/L
Apparent Wet Bulk Density	0.99	1.36	1.1	-	kg/L
Trace Elements					
Arsenic	5.1	5.5	5.3	75	µg/g
Cadmium	2.82	2.94	2.87	20	µg/g
Chromium	23.2	37.8	30.0	1,060	µg/g
Cobalt	2.4	2.8	2.6	150	µg/g
Copper	650	660	660	2,200	µg/g
Lead	41.8	43.5	42.4	500	µg/g
Mercury	1.24	1.49	1.35	15	µg/g
Molybdenum	5	6	6	20	µg/g
Nickel	15.8	22.1	18.9	180	µg/g
Selenium	7.1	7.5	7.2	14	µg/g
Zinc	1,040	1,100	1,100	1,850	µg/g
Antimony	1.8	2.1	2.0	-	µg/g
Barium	669	2,000	1,000	-	µg/g
Beryllium	<0.1	0.2	0.1	-	µg/g
Silver	29.4	34.5	31.8	-	µg/g
Thallium	<0.05	0.06	0.06	-	µg/g
Tin	30	40	40	-	µg/g
Vanadium	12.0	13.0	12.5	-	µg/g

^a Where the value was below detection limit, the detection limit was included in the determination of the minimum, maximum and mean.

^b These limits are the trace element concentration limits for Class B biosolids under the BC Organic Matter Recycling Regulation (2002), Schedule 4.

^c Determined as hot water soluble.

^d Determined by the Saturated Paste Equivalent method.

Table 3: Biosolids quality monitoring – 2009 fecal coliform analysis.

Sample Number	Sample Date	Fecal Coliform (MPN/g) dry weight	OMRR Class B Limit (MPN/g) dry weight
Sample 1	10-Jun-09	23,000	-
Sample 2	9-Jul-09	5,000	-
Sample 3	9-Jul-09	3,700	-
Sample 4	6-Aug-09	33,000	-
Sample 5	6-Aug-09	15,000	-
Sample 6	30-Sep-09	1,800	-
Sample 7	30-Sep-09	1,800	-
Geometric Mean		10,000	2,000,000^a

^a The maximum concentration for Class B biosolids under the BC Organic Matter Recycling Regulation (2002).

Table 4: Total number of loads of biosolids managed from the District of Sechelt in 2009.

Location	Number of Loads
Upper Retaining Berm	96
South Plateau	78
Northcote Upper Berm	159
Northcote Road	43
Crown Berm	113
Total	489 ^a

^a The contracted number of loads for 2009 was 500. Due to inclement weather conditions (frozen ground) in the fall, the remaining 11 loads for 2009 will be completed in 2010 in addition to the 500 loads scheduled to be applied in 2010.



Photograph 1: Sechelt biosolids at the Dusty Road WWTP lagoon, (May 2009)



Photograph 2: Sechelt biosolids are applied to the Northcote Upper Slope using a tanker truck, (May 2009)



Photograph 3: Sechelt biosolids are also used to fertilize poplar trees at the mine, (May 2009)