Appendix A

Landfill Monitoring Report - Main Landfill North

~~3.1~~A.1 Main Landfill North

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~~3.1.1~~A.1.1 Landfill Summary

The main landfill is located to the east of the main station and encompasses an area of approximately 10,000 m^2. The depth of the landfill is approximately 1.5 to 2.0 m. The landfill configuration and sample locations are shown on Figure A-1. Prior to the remedial work in 1999, DCC had previously classified this as a moderate potential environmental risk. The remedial work for this landfill included the installation of a synthetic liner anchored into the permafrost along the toe of the landfill and re-grading with the placement of additional granular fill material sufficient to promote the permafrost aggradation through the landfill contents. The cover of the landfill has no vegetation. The surface consists of a veneer of pebbles and cobbles overlying the granular and silt cover.

~~3.1.2~~A.1.2 Visual Inspection

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Based on the visual inspection, the Main Landfill North area appears to be in good condition with no visible signs of settlement or frost action. There are erosion rills and gullies on the slopes (particularly well developed on the north slope) along the margins of the landfill which appear unchanged from the previous year's inspection. A minor crack extending for some 30 m and several mm wide was observed on the NE side slope. The crack is located parallel to the slope crest at approximately the mid-slope height, as shown in photograph MLFN2. No evidence of differential displacement cross the crack was observed, and no obvious deformation of the crest or toe was detected. As shown in photograph MLFN11, an old almost imperceptible crack, approximately 15 m long, was observed on the southeast sideslope near monitoring well MW-5. The width of the crack, which has 'self-healed" in places, varies between 10 and 20 mm, and is located at about the lower quarter-point of the slope length. Again, no evidence of differential displacement across the crack, nor of overall slope deformation, was observed Vegetation cover is sparse and scattered with minimal ground cover. The site inspection record is provided at the end of this section. Overall, the top surface and sideslopes of the landfill appear in good condition, free of evidence of significant instability, and are judged to be acceptable.

A.1.3 Soil Sampling

Soil samples were collected at the designated locations of MW4, MW5, MW6, MW6-SWest, MW7 and MW8. The sampling locations are shown on Figure A-1. At each location wherever possible two samples were collected at approximately 0.10 m below ground and between 0.40-0.50 m below ground. A photograph of each test pit for each location sampled is shown in Appendix A3.

APPENDIX A Main Landfill North

Figure A-1 Main Landfill North

Hydrocarbon odours were identified at MW6 soil sampling location. A thin hydrocarbon sheen could be seen on the water that had seeped into the testpit. No free product was detected in MW6.

Low concentrations of Total Petroleum Hydrocarbons (TPH) (C10-32) were detected in the shallow samples from soil sample locations MW 4, MW 5, MW-6-SWest and MW 7. The concentrations noted are not considered to be of significance, however these should be evaluated in the context of the Landfill Monitoring Plan. Higher concentrations of TPH were detected in the shallow and deep samples from soil sample location MW 6. Samples TP17 and TP18 represent the shallow and deep samples at the MW 6 location. These samples were re-analysed to characterize CCME fractions F1-F3. The highest concentrations of hydrocarbons were found in fraction F3.

Analytical results and depths of samples are provided in Table A-1 and the Laboratory certificate is provided in Appendix G.

~~3.1.4~~A.1.4 Groundwater

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Groundwater depths and monitor well condition were documented for observation wells MW 4, MW 5, MW 6, MW 6-Swest, MW 7 and MW 8. The monitoring well development records are provided at the end of this section. Generally the observation wells were in good condition. As per the recommendation in the 2002 report and requested by DCC, j-plug caps were installed on the monitoring wells in 2003 with the exception of MW 4. A j-plug could not be installed on MW 4 due to the insufficient amount of clearance between the top of the pipe and the casing lid. In each of the wells, the bentonite seal had heaved up inside of the protective casing to an elevation parallel or above the top of the monitor pipe. Excess bentonite around the top of the pipe was removed to permit access to the well without contaminating the well. Ponded water was observed in the casings in a few of the observation wells as noted in the Monitoring Well Development records.

Observation wells MW 4, MW 5, and MW 6 had insufficient volumes to sample. Observation wells MW 7 and MW 8 were purged and sampled. The groundwater samples were analyzed for total concentration of inorganics, total petroleum hydrocarbons and PCBs. The results are presented in Table A-2 and the laboratory certificate is provided in Appendix G.

~~3.1.6~~A.1.5 Thermal Monitoring

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The manual readings taken from each thermistor from the Main Landfill – North are provided in Tables A-3 through A-7. The tabulated thermistor data and the graphs for each thermistor are provided in Graphs 1 through 5 appended to this section. The graphs from this year and previous years have also been appended to this section.

All thermistors were downloaded, reset and had their batteries replaced. Data loggers with one string attached have an anticipated memory capacity to January 2011. Data loggers with two strings attached have an anticipated memory capacity to January 2008. A full download of the thermistor data loggers should be completed the summer of 2007.

APPENDIX A Main Landfill North

Table A-1 CAM-M Cambridge Bay, Summary of 2004 Soil Analysis – Main Landfill North

Table A-2 CAM-M Cambridge Bay, Summary of 2004 Groundwater Analysis – Main Landfill North

Table A-3 Thermistor String VTI CAM-M

Thermistor No.	Ohms	°C
1	13920	3.3
2	15130	1.6
3	17020	-0.8
4	18310	-2.2
5	19360	-3.3
6	20380	-4.4
7	21240	-5.2

Note: 0.03m stick-up.

Table A-4 Thermistor String VT2 CAM-M

Thermistor No.	Ohms	°C
1	12150	6.0
2	12960	4.7
3	13980	3.2
4	15100	1.6
5	16470	-0.1
6	17360	-1.2
7	18160	-2.1

Notes: 0.38 stick-up.

Table A-5 Thermistor String VT3 CAM-M

Thermistor No.	Ohms	°C
1	11890	6.5
2	12540	5.4
3	13570	3.8
4	14670	2.2
5	15910	0.6
6	17050	-0.8
7	17710	-1.6

Note: 0.50 m stick-up.

Table A-6 Thermistor String ITN1 CAM-M

Thermistor No.	Ohms		°C	
	A	B	A	B
1	17460	18960	-1.3	-2.9
2	18240	21850	-2.1	-5.8
3	18400	24500	-2.3	-8.1
4	18060	26450	-1.9	-9.6
5	17660	27610	-1.5	-10.5
6	17460		-1.3	
7	16890		-0.6	
8	17370		-1.2	
9	17580		-1.4	

Note: 0.09 m stick-up.

Table A-7 Thermistor String ITN2 CAM-M

Thermistor No.	Ohms		°C	
	A	B	A	B
1	16860	17180	-0.6	-0.9
2	16600	19170	-0.3	-3.1
3	16310	22350	0.1	-6.2
4	16310	24690	0.1	-8.2
5	16080	25990	0.4	-9.3
6	15810		0.7	
7	16060		0.4	
8	16180		0.3	
9	16230		0.2	

Note: 0.52 m stick-up.

Appendix A Attachments

A1 Site Condition/Visual Inspection Records

A2 Geotechnical Inspection Photographic Records

A3 Soil Testpit Photographic Records

A4 Monitoring Well Development Records

A5 Thermistor Data Tables 2005

A6 Thermistor Graphs 2005

A7 Thermistor Graphs 2004

A8 Thermistor Graphs 2003

A9 Thermistor Graphs 2002

A10 Thermistor Graphs 2001

A11 Field Notes

Appendix A1

Site Condition/Visual Inspection Records

Appendix A2

Geotechnical Inspection Photographic Records

Appendix A3

Soil Testpit Photographic Records

Appendix A4

Monitoring Well Development Records

Appendix A5

Thermistor Data Tables 2005

Appendix A6

Thermistor Graphs 2005

Appendix A7

Thermistor Graphs 2004

Appendix A8

Thermistor Graphs 2003

Appendix A9

Thermistor Graphs 2002

Appendix A10

Thermistor Graphs 2001

Appendix A11

Field Notes