APPENDIX A

Construction Photographs

1.0 NORTHERN PORTION – 2009 CONSTRUCTION

1.1 Turbidity Barrier

Photograph 1: Turbidity barriers functioning during rockfill placement - August 1, 2009

Photograph 2: Double line of turbidity barriers evident within Third Portage Lake, beyond the northern portion of the dike - August 6, 2010

1.2 Rockfill Placement

Photograph 3: Rockfill placement at approximately Sta. 30+366. Rockfill placement from the downstream (pit side) to the upstream to push lakebed sediments away from the dike centerline. Turbidity barrier installation in foreground - August 3, 2009

Photograph 4: Oversize rockfill is being placed on the sides of the dike platform – August 4, 2009

Photograph 5: Advancement of the rockfill platform at approximately Sta. 30+700, looking from the north abutment - August 24, 2009

1.3 Initial Trench Excavation

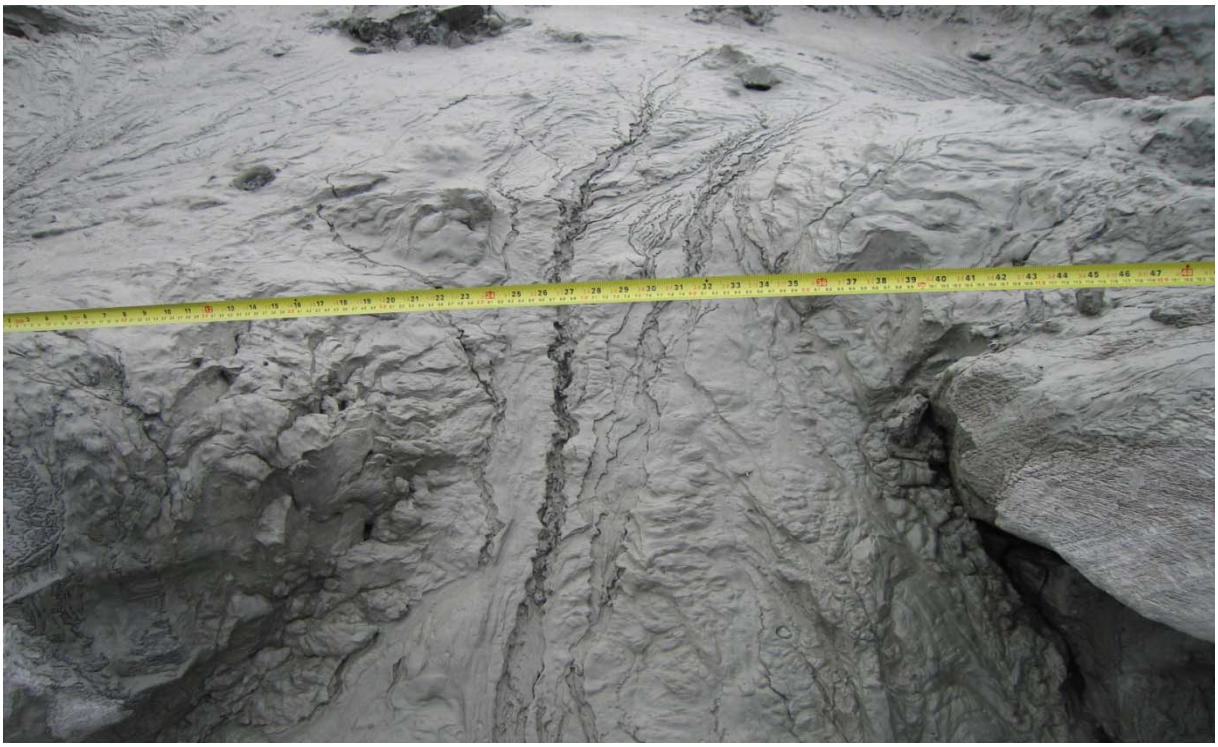
Photograph 6: Excavation of rockfill as part of the initial trench excavation, Sta. 30+200 - August 13, 2009

Photograph 7: Initial trench excavation at Sta. 30+400, excavation was at a depth of 10 m, excavator was sitting on a lower bench - August 20, 2009

Photograph 8: A boulder of approximately 3 m diameter excavated from the centreline at Sta.30+440 - August 24, 2009

Photograph 9: A bedrock boulder of approximately 3 m diameter excavated from base of trench at Sta. 30+490 - August 28, 2009

Photograph 10: Sediments excavated from base of initial trench at Sta. 30+362 - August 24, 2009



Photograph 11: Lakebed sediments excavated during initial trench excavation at Sta. 30+615 - September 5, 2009

Photograph 12: Excavator bucket being used to investigate trench bottom at Sta. 30+570 - September 5, 2009

Photograph 13: CAT 345 excavator with long boom and breaker attachment used to smooth bedrock surface where irregularities were noted - September 6, 2009

Photograph 14: Bathymetry survey by FGL between Sta. 30+800 and 30+860. Core Backfill placement on the downstream side and dynamic compaction of the core backfill - September 12, 2009

1.4 Core Backfill and Coarse Filter Placement

Photograph 15: Core Backfill and Coarse Filter placement at Sta. 30+310 - August 22, 2009

Photograph 16: In-situ sampling of the Core Backfill taken from Sta.30+284 - August 22, 2009

Photograph 17: Sediment at the bottom of the trench excavated prior to Core Backfill and Coarse Filter placement at Sta. 30+450 - September 3, 2009

Photograph 18: Placement of the Core Backfill material by pushing the Core Backfill forward and down to minimize segregation, Sta. 30+500 - September 5, 2010

Photograph 19: Placement of the Coarse Filter upstream of Core Backfill by pushing forward with a dozer onto already placed material to minimize segregation, Sta. 30+500 - September 5, 2009

Photograph 20: Placement of Core Backfill on the downstream side of the initial trench excavation up to the level of the lakebed sediments, Sta. 30+550 - September 6, 2009

1.5 Densification Platform and Dynamic Compaction of Core Backfill

Photograph 21: Dynamic Compaction at Sta. 30+375 - September 2, 2009

Photograph 22: Craters formed within the Core Backfill Zone following dynamic compaction, Sta. 30+230 looking north - September 2, 2009

Photograph 23: Placement of the Densification Platform using Core Backfill in the center and Coarse Filter adjacent to the Core Backfill, Sta. 30+380 - September 4, 2009

Photograph 24: Dynamic compaction and construction of the densification platform in the background and placement of Core Backfill and Coarse Filter within the initial trench excavation in the foreground, looking north from Sta. 30+450 - September 4, 2009

1.6 Cutoff Trench Construction

Photograph 25: Bentonite slurry pond constructed on Goose Island - September 10, 2009

Photograph 26: Till screening to remove oversized particles and mixing of the till with dry bentonite powder - September 10, 2009

Photograph 27: Bentonite slurry is pumped into the cutoff trench excavation to provide trench support through the pipe visible in the foreground, Sta. 30+075. The excavator takes slurry from the trench to mix with the till and bentonite stockpile adjacent to the trench. The dozer is then used to mix the till to create the soil bentonite (SB) for placement in the trench - September 12, 2009

Photograph 28: The dry till and bentonite mixed with the bentonite slurry by a dozer to form the soil bentonite mix, Sta. 30+075 - September 12, 2009

Photograph 29: Excavation of the cutoff trench and widening at the bends, Sta. 30+140 - September 13, 2009

Photograph 30: Placement of the soil bentonite mix within the cutoff trench by a dozer, Sta. 30+106 - September 14, 2009

Photograph 31: Placement of cement soil bentonite mix within the cutoff trench. The cement soil bentonite (CSB) mixed on site within the box visible in front of the excavator - September 18, 2009

Photograph 32: Cement soil bentonite backfill within the cutoff trench - September 19, 2009

Photograph 33: Slump test carried out on a sample of soil bentonite taken from Sta. 30+455 - September 22, 2009

Photograph 34: Soil bentonite placed within the cutoff trench by a dozer, Sta. 30+628 to 670 - September 24, 2009

Photograph 35: Cutoff trench excavation widened at the bends, Sta. 30+725 - September 24, 2009

Photograph 36: Completed surface of cutoff trench - September 27, 2009

1.7 North Abutment

Photograph 37: Cleaning of the bedrock surface on the north abutment between Sta.30+000 and 30+050 - August 12, 2009

Photograph 38: Abutment excavation and initial trench excavation up to Sta. 30+190 - August 13, 2009

Photograph 39: Placement of till to form the north abutment cutoff between Sta. 30+000 and 30+050 - August 14, 2009

Photograph 40: Placement of 19 mm minus Core Backfill over the till placed on the north Abutment, Sta. 30+045 looking North - August 15, 2009

2.0 SOUTHERN PORTION – 2010 CONSTRUCTION

2.1 Rockfill Causeway

Photograph 41: Rockfill causeway construction from Goose Island to South Camp Island during winter 2010, to provide structure for anchoring turbidity barriers to for the remainder of the summer construction program - June, 2010

Photograph 42: Rockfill placement as part of the causeway construction at Sta. 31+950 - June 2010

Photograph 43: Depression observed on causeway surface at Sta. 31+680, due to thawing of ice trapped in rockfill during winter causeway construction – July 23, 2010

2.2 Turbidity Barrier

Photograph 44: Turbidity barriers on upstream side of causeway at Sta. 31+350, barriers placed as small cells and anchored to the causeway - July 23, 2010

Photograph 45: Upstream turbidity barriers functioning during rockfill placement, Sta. 31+780 - August 4, 2010

Photograph 46: Turbidity barriers on downstream side of dike, looking east from South Camp Island - August 13, 2010

Photograph 47: Turbidity barriers and rockfill placement to widen causeway - August 2010

2.3 Rockfill Placement

Photograph 48: Rockfill placement to widen causeway at Sta. 31+200 - July 22, 2010

Photograph 49: Rockfill placement at Sta. 31+460 - July 24, 2010

Photograph 50: Rockfill placement at Sta. 31+580 to connect to rockfill placement front 2 - August 1, 2010

2.4 Initial Trench Excavation

Photograph 51: Pump to be installed in excavation trench to pump water from trench to water management pond. Purpose was to try and reduce outward pressure on turbidity barriers through equalizing volumes of water being removed with those being displaced during material placement within trench - July 27, 2010

Photograph 52: Initial trench excavation with CAT 385 excavator at Sta.31+330. Pump installed on downstream side of trench – July 31, 2010

Photograph 53: Komatsu 1250 excavator removing loose material after CAT 385 excavator with breaker attachment shaped bedrock surface at Sta. 31+348 - August 1, 2010

Photograph 54: Initial trench excavation at Sta. 31+700 - August 1, 2010

Photograph 55: Manual sounding and centreline marking in preparation for core backfill placement, Sta. 31+680 – August 3, 2010

Photograph 56: Komatsu 1250 excavator removing sediments prior to core backfilling of initial trench - August 7, 2010

Photograph 57: Excavation of rockfill and frozen core backfill at tie-in of the north portion of the cutoff wall to the south portion, Sta. 30+850 - August 12, 2010

Photograph 58: Core backfill and CSB excavation at north portion tie-in, approximately Sta. 30+860 - August 12, 2010

Photograph 59: Sample showing one of the rods used to survey base of initial trench excavation – August 16, 2010

Photograph 60: Initial trench excavation, Sta. 32+007 - August 25, 2010

Photograph 61: Manual sounding of trench excavation, Sta. 32+050 - September 11, 2010

Photograph 62: Sample of competent till excavated at Sta. 32+062 - September 11, 2010

Photograph 63: Sample of ice-rich till excavated at Sta. 32+127 - September 14, 2010

2.5 Core Backfill and Coarse Filter Placement

Photograph 64: Core backfill placement at Sta. 31+390 - August 7, 2010

Photograph 65: Core backfill, coarse filter and fine rockfill placement at Sta. 31+835 - August 10, 2010

Photograph 66: Core backfill placement at Sta. 31+565 and 31+605 to connect work fronts 1 and 2 - August 12, 2010

Photograph 67: Placement of core backfill material by pushing the core backfill forward and down. Coarse filter wing advanced with dozer on downstream side, Sta. 31+975 – August 25, 2010

Photograph 68: Placement of core backfill material on downstream side slope of trench – September 14, 2010

2.6 Vibro-Densification of Core Backfill

Photograph 69: Excavation of coarse filter and fine rockfill to widen core backfill for vibro-densification, Sta. 31+820 - August 23, 2010

Photograph 70: Vibro-densification of core backfill - September 1, 2010

2.7 Densification Platform and Dynamic Compaction of Core Backfill

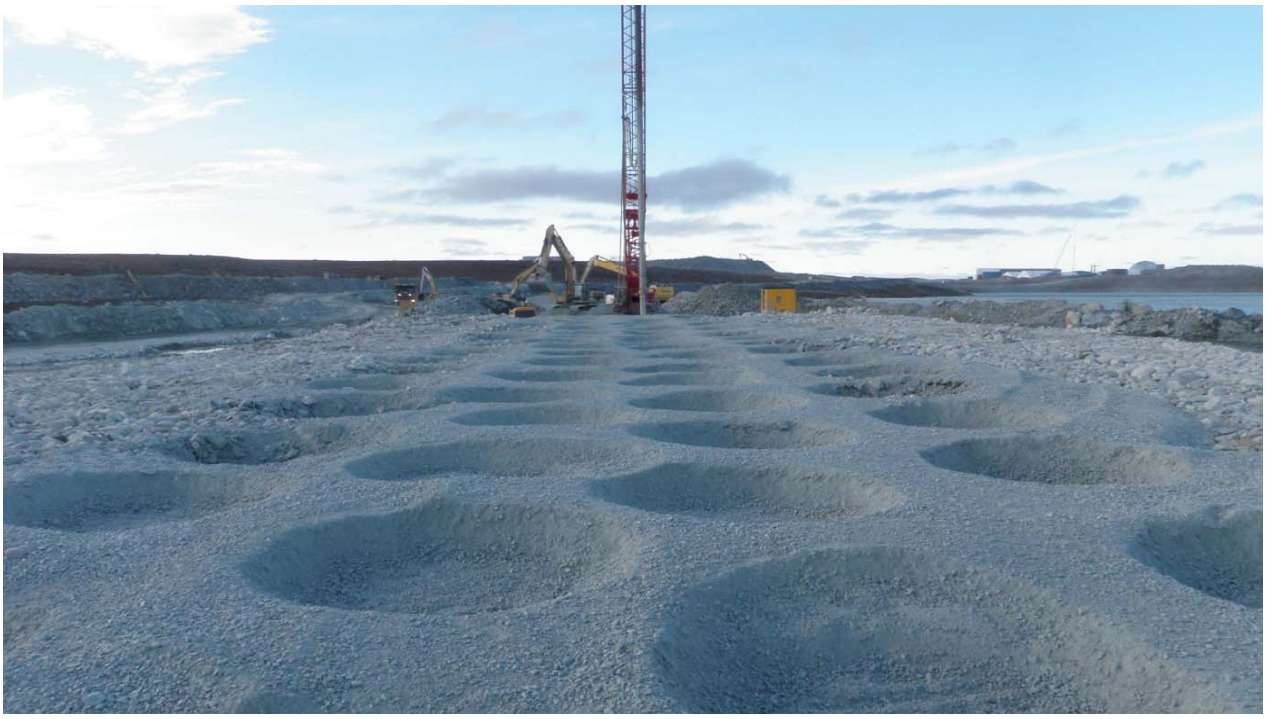
Photograph 71: Downstream side of densification platform at Sta. 31+100. Core backfill and coarse filter downstream wing - August 2, 2010

Photograph 72: Densification platform surface at Sta. 31+310. Coarse filter material placed on downstream side of platform - August 4, 2010

Photograph 73: Dynamic compaction of core backfill at Sta. 31+650 - August 15, 2009

Photograph 74: Crater formed following dynamic compaction, Sta. 31+670 – August 15, 2010

Photograph 75: Excavation of oversize fine rockfill on upstream side of densification platform in preparation for dynamic compaction - August 15, 2010



Photograph 76: Craters formed within the central core backfill zone following dynamic compaction, Sta. 31+841 to 31+930 - September 7, 2010

Photograph 77: Excavation of core backfill previously compacted with dynamic compaction at channel 3 in preparation for vibro-compaction – September 21, 2010

2.8 Cutoff Trench Construction

Photograph 78: Cutoff trench excavation and bentonite slurry placement – August 23, 2010

Photograph 79: CSB plug between Sta. 31+552 and 31+570. Dozer spreading till mixed with dry bentonite for SB preparation - August 25, 2010

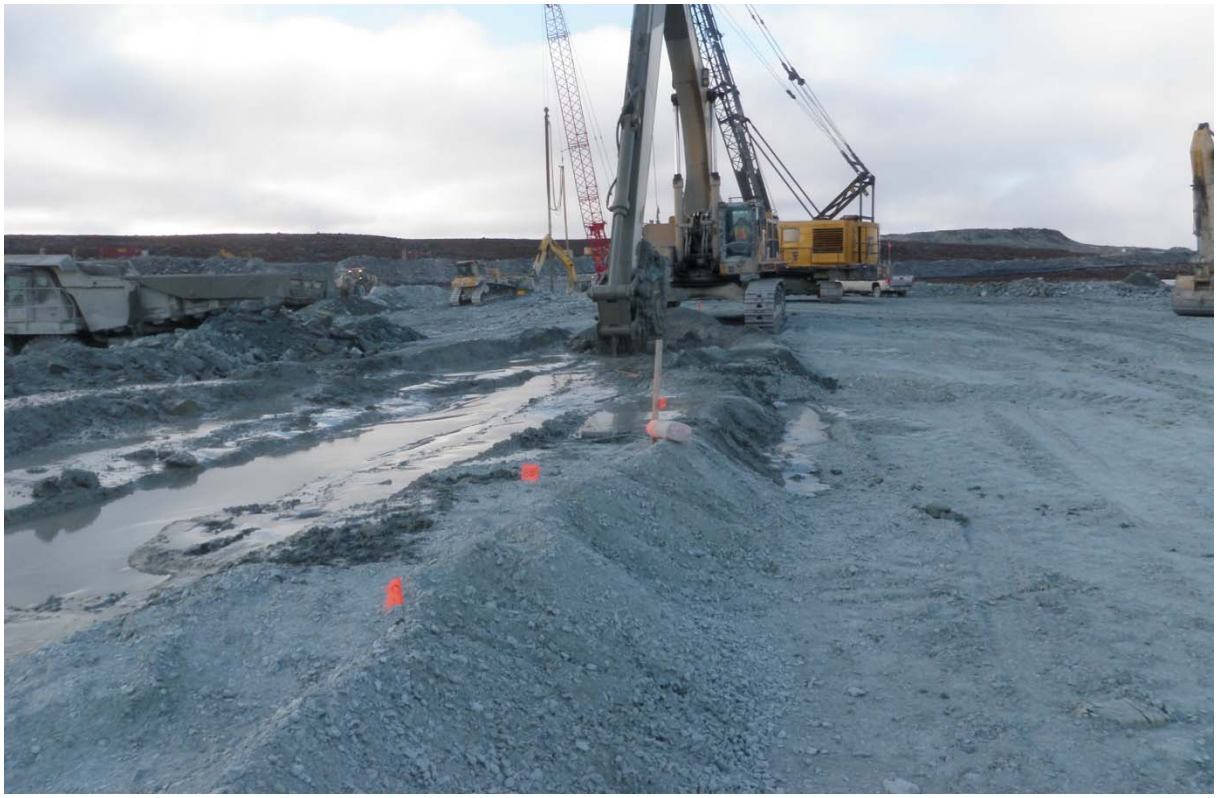
Photograph 80: SB placement into cutoff wall with dozer - August 26, 2010

Photograph 81: Excavation of the cutoff trench and corner construction, Sta. 31+468 - August 27, 2010

Photograph 82: Excavation of the cutoff trench at Sta. 31+091 and erosion of cutoff wall crest due to slurry placement – September 1, 2010

Photograph 83: From top to bottom: Cutoff trench with bentonite slurry, CSB plug at Sta. 31+806 and cutoff wall excavation – September 7, 2010

Photograph 84: Placement of cement soil bentonite mix within the cutoff trench, Sta. 31+900 - September 20, 2010



Photograph 85: Excavation of the cutoff trench at Sta. 31+984 – September 20, 2010

2.9 South Abutment

Photograph 86: South abutment foundation preparation. Ice rich material was left in place between Sta. 32+125 and 32+166 due to schedule constraints - September 14, 2010

Photograph 87: Core backfill placement on top of ice-rich material at the south abutment, Sta. 32+140 to 32+166 - September 15, 2010

Photograph 88: Cutoff trench at south abutment, Sta. 30+140 - September 23, 2009

3.0 BEDROCK GROUTING

Photograph 89: All-weather, mobile grouting plant - April 2010

Photograph 90: Grouting plant mobilization with CAT 980 loader - October 14, 2010

Photograph 91: Rockmaster 100 DTH drill rig for casing installation and triconing - April 1, 2011

Photograph 92: Rockmaster 80 DTH drill rig for casing installation and triconing - October 13, 2010

Photograph 93: Tamrock 996 top hammer drill rig for bedrock drilling - April 21, 2010

Photograph 94: Chemgrout CG-680 3L8_EH High Shear Colloidal Mixer/Agitator with Moyno Pump - October 11, 2008

Photograph 95: RST Permeation Grout Monitoring System with field laptop for real-time monitoring - April 15, 2011

Photograph 96: Geopro (Bimbar) Double Packer - October 17, 2008

Photograph 97: Holte steel casing perforator tool - June 4, 2010

Photograph 98: Atlas Copco DM45 drill rig for perforating steel casings - June 2010

Photograph 99: Casing installation - April 2010

Photograph 100: QA measurement of installed casing lengths - May 2010

Photograph 101: 152 mm (6") LDPE pipe while triconing - April 1, 2011

Photograph 102: Mobile grouting plant, mixing side - September 21, 2011

Photograph 103: Mobile grouting plant, injection side with removable floor - November 27, 2010

4.0 JET GROUTING

Photograph 104: Jet grouting coverall tents for drill rig and mixing station - April 18, 2011

Photograph 105: Jet grouting cement supply by zoom boom and water truck - November 20, 2010

Photograph 106: Jet grouting mixing station - November 20, 2010

Photograph 107: Keller KBO-1 Drill Rig - November 20, 2010

Photograph 108: Jet drilling / grouting monitoring screen - November 5, 2010

Photograph 109: Davey Drill DK525 drill rig - October 26, 2010

Photograph 110: Jet grouting early stages with two rig operation / pre-drilling - November 5, 2010

Photograph 111: Jet grouting single rig operation within coverall tent - November 20, 2010