Appendix D

Sequence of Events and Actions Taken by Spill Report and Other Concerns (With Photos)

Appendix D.1 - Spill Report 16-158 - Sheardown Lake Tributaries and Sheardown Lake

Table D.1 - Spill Report 16-158 - Sequence of Events and Actions Taken	
May 7	Sheardown Lake tributaries, LDFG and SDLT, discovered discharging turbid water into Sheardown Lake . Source of the discoloured, turbid water is thought to be snowmelt downwind of the Mine Site Crusher Pad.
May 8	Siltation control measures (silt fences, flocculent, treated jute) installed in both affected Sheardown Lake tributaries, LDFG and SDLT, to settle out sediments prior to discharge. Monitoring locations established in both affected Sheardown Lake tributaries.
May 9	Initial report submitted to Envirotnment Canada, DFO, and INAC via e-mail.
May 8 - June 8	Daily sampling program initiated and continued until June 8 at established monitoring locations along both affected tributaries. Water samples were primarily analyzed for TSS, TDS, pH and turbidity. Additional sampling was conducted on May 10, May 19 and May 23 for additional parameters, including acute toxicity, metals, nutrients, hydrocarbons and major ions.
May 9	Berms built up along road near culverts, CV-186 and CV-187, to prevent road runoff from directly discharging into Sheardown Lake tributary SDLT.
May 10	Sediment release from Sheardown Lake tributaries (LDFG and SDLT) reported to the NT-NU Spill Line and regulators (**NT-NU Spill Report - 16-158**).
	Check Dams #1 and #2 (see Figure 1) installed along Sheardown Lake tributary SDLT downstream of Crusher Pad.
May 12	Feasibility of removing sediments from ice surface on Sheardown Lake investigated. Sediment removal was determined to be not feasible due to weakening ice conditions along the shoreline of Sheardown Lake.
May 13 - 17	Additional flocculent, silt fences and treated jute installed along affected Sheardown Lake tributaries SDLT and LDFG.
May 18	Environment Canada and INDC inspectors arrive onsite and inspect Milne Port and Tote Road.
May 19	Environment Canada and INDC inspectors inspect Mine Site.
	Road built up at CV-186 to prevent road runoff from pooling and directly discharging into Sheardown Lake tributary SDLT.
	Environment Canada, INDC and Baffinland collect water samples at the outfalls of Sheardown Lake tributaries SDLT and LDFG.
May 19 - 20	Flow upstream of Check Dam # 1 is diverted to the Crusher Sedimentation Pond.
May 20	Environment Canada and INDC inspectors notify Baffinland that directions under the Fisheries Act will be issued to the Company as a result of surface water runoff conditions observed during their inspection.
	Additional sources of sedimentation entering the upper reaches of tributary SDLT, including sediment deposit discovered upstream of the Crusher Pad along the Mine Haul Road.
May 21	Mine Haul Road regraded and "berm punchouts" filled in to direct runoff away from Mary River and the upper reaches of tributary SDLT.
May 22	Silt fences and silt curtain installed along SDLT immediately downstream of Mine Haul Road discovered sedimentation sources.
	Flocculent stations installed in upper reaches of SDLT to settle out sediment from Mine Haul Road runoff.
May 23	Constructed check dam directly downstream of the Mine Haul Road "berm punchout" at km 104.5 to collect Mine Haul Road runoff and capture sediment from the Mine Haul Road runoff. (Runoff through this Mine Haul Road berm punchout had resulted in the development of a sediment delta near the upper reaches of tributary SDLT)
May 24	Kemira Chemicals and AMEC-Foster Wheeler contracted to assist Baffinland in developing and optimizing mobile water treatment systems using flocculants.
	Turbid water samples sent to Kemira Chemicals and AMEC-Fost Wheeler for initial flocculant bucket testing.
	Constructed check dam downstream of landfill access road along Sheardown Lake tributary LDFG using sandbags.
May 27 - June 23	Removed lose sediment from sediment delta located downstream of the Mine Haul Road berm punchout at km 104.5. (Sediment delta situated near the bank of tributary SDLT.)
May 29	Pumped Exploration Phase Ore Stockpile test pits to isolated natural sump to prevent test pits from overflowing into tributary SDLT.
June 1 - 15	AMEC-Foster Wheeler Engineer arrives onsite to develop flocculant treatment systems and pilot test additional siltation controls including geotubes..
June 8	Sampling program discontinued as a result of compliant, baseline TSS levels observed consistently over the past several days in both affected Sheardown Lake tributaries SDLT and LDFG.
June 12	Construction of three (3) check dams upstream of SDLT along Mine Haul Road (Sheardown Valley) to allow for water treatment (flocculants) of the Mine Haul Road runoff.
June 17 - 21	Kemira Chemicals Chemist arrives onsite to assist Baffinland in developing and optimizing mobile water treatment systems using flocculants.
June 20 - June 21	Coagulant/flocculant dosing system setup and pilot tested at Check Dam #4 (assissted by Kemira Chemicals).

Appendix D.1 - Photos

Photo 1 – Silt fence installation along road to prevent road runoff from directly discharging into Sheardown Lake Tributary (SDLT) near CV186.

Photo 2 – May 9th 2016. Flocculant stations installed along Sheardown Lake Tributary SDLT and LDFG.

Photo 3 – Treated Jute installed at Check Dam #1 to capture sediments within runoff.

Photo 4 – Sand bag check dams installed along Sheardown Lake Tributary LDFG near landfill access road.

Photo 5 - Improved water clarity and total suspended solid levels at outfall of Sheardown Lake Tributary SDLT following implementation of siltation control measures.

Appendix D.2 - Spill Report 16-176 - Camp Lake Tributaries and Camp Lake

Table D.2 - Spill Report 16-176 - Sequence of Events and Action Taken	
May 17	Runoff containing sediments observed flowing from the Mine Site airstrip into Camp Lake Tributary # 1 (CLT1) and Camp Lake.
	Siltation control measures (silt fences, flocculent, jute) installed along CLT1 and airstrip drainages to settle out sediments prior to discharge.
	Airstrip swale draining into Camp Lake Tributary #1 lined with 6" aggregate. Culvert installed at North end of airstrip to prevent airstrip runoff from crossing the road into Camp Lake Tributary #1.
	Sediment release to Camp Lake Tributary #1 and Camp Lake reported to the NT-NU Spill Line and regulators (**NT-NU Spill Report- 16-176**).
May 18	Camp Lake Sedimentation Ponds near the Camp Lake water intake jetty repaired to settle out and capture sediment entrained in runoff from the Exploration Camp pad at the Mine Site.
	Monitoring locations established along Camp Lake Tributary #1 and downstream of the Camp Lake Sedimentation Ponds (refer to Figure 1).
	Environment Canada and AANDC inspectors arrive onsite and inspect Milne Port and Tote Road.
May 18 - June 8	Conducted daily sampling until June 8 at established monitoring locations. Daily water samples were primarily analyzed for TSS, TDS, pH and turbidity. Additional sampling was conducted on May 23 for additional parameters, including acute toxicity, metals, nutrients, hydrocarbons and major ions.
May 18	Environment Canada and INAC inspectors arrive onsite and inspect Milne Port and Tote Road.
May 19	Environment Canada and INAC inspectors inspect Mine Site.
	Environment Canada,INAC and Baffinland collect water samples downstream of the Camp Lake Sedimentation Ponds
May 20	Environment Canada and INAC inspectors notify Baffinland that directions under the Fisheries Act will be issued to the Company as a result of surface water runoff conditions observed during their inspection.
May 24	Kemira Chemicals and AMEC-Foster Wheeler contracted to assist Baffinland in developing and optimizing mobile flocculant treatment systems.
	Turbid water samples sent to Kemira Chemicals and AMEC-Fost Wheeler for initial flocculant bucket testing.
June 1 - 15	AMEC-Foster Wheeler Engineer arrives onsite to develop flocculant treatment systems and pilot test additional siltation controls including geotubes..
June 8	Sampling program discontinued as a result of compliant, baseline TSS levels observed consistently over the past several days at the outfalls of CLT1 and the Camp Lake Sedimentation Ponds.
June 17 - 21	Kemira Chemicals Chemist arrives onsite to assist Baffinland in developing and optimizing mobile water treatment systems using flocculants.

Appendix D.2 – Photos

Photo 1 –Airstrip runoff entering Camp Lake Tributary #1.

Photo 2 – Swale draining airstrip runoff lined with 6” aggregate and treated jute to capture sediments.

Photo 3 – May 30th 2016. Daily sampling and monitoring of Camp Lake Tributary #1 discharge at Camp Lake outfall.

Photo 4 – Improved water clarity and total suspended solid levels at Camp Lake Tributary #1 following implementation of siltation control measures.

Table D.3 Spill Report 16-181 - Mine Haul Road to Mary River and Sheardown Lake Tributary

Sequence of Events and Actions Taken	
May 20	Runoff containing sediments was obsevered flowing from the surface of the Mine Haul Road through "berm punch outs" on the outer edge of the road and into the Mary River and Sheardown Lake tributary SDLT.
	Sediment deposit discovered near upper reaches of tributary SDLT directly downstream of km 104.5 Mine Haul Road "berm punch out".
May 21	Sediment release to Mary River and Sheardown Lake reported to the NT-NU Spill Line and regulators (**NT-NU Spill Report- 16-181**).
	Mine Haul Road "berm punch outs" are sealed to redirect runoff to check dams and natural sumps to settle out and capture sediment entrained in runoff from the Mine Haul Road.
May 22	Constructed Check Dam #3 near entrance of magazine access road to collect Mine Haul Road runoff and capture sediment.
	Flocculant installed upstream of Check Dam # 3 on Mine Haul Road.
May 23	Constructed Check Dam #4 at the end of magazine access road to collect Mine Haul Road runoff.
	Constructed check dam directly downstream of the Mine Haul Road "berm punchout" at km 104.5 to collect Mine Haul Road runoff and capture any additional sediment releases from the Mine Haul Road. (Runoff through this Mine Haul Road berm punchout had resulted in the development of a sediment delta near the upper reaches of tributary SDLT)
May 24	Flocculant installed upstream of Check Dam #4 on Mine Haul Road.
May 26	Installed geotextile over the upstream face of Check Dam #4.
	Water samples taken upstream and downstream of Check Dam #4
May 27 - 31	Golder Associates geotechnical engineer arrives at site to provide guidance, assess risk, and develop a list of priority drainage works along the Mine Haul Road
May 27 - June 23	Removed lose sediment from sediment deposit located downstream of the Mine Haul Road "berm punch out" at km 104.5. (Sediment deposit situated near the bank of tributary SDLT.)
June 1 - June 15	AMEC-Foster Wheeler Engineer arrives onsite to develop flocculant treatment systems and pilot test additional siltation controls including geotubes.
June 12	Constructed three (3) check dams upstream of SDLT along Mine Haul Road (Sheardown Valley) to allow for water treatment (flocculants) of Mine Haul Road runoff before entering SDLT.
	Installed silt fences and flocculant stations upstream and throughout Sheardown Valley.
	Water samples taken upstream and downstream of Check Dam #4.

June 16	Installed silt fences downstream of the Mine Haul Road culverts discharging to Mary River.
June 17 - 21	Kemira Chemicals Chemist arrives onsite to assist Baffinland in developing and optimizing mobile water treatment systems using flocculants.
June 20 - June 21	Pilot testing of coagulant/flocculant dosing system at Check Dam #4 (assissted by Kemira Chemicals).
June 21	Installed additional siltation controls, including geotextile, silt fences and flocculant, at km 108.5 of the Mine Haul Road.

Appendix D.3 – Photos

Photo 1– April 28th 2016. Construction of Check Dam # 4 near the end of Magazine Access Road.

Photo 2 – Mine Haul Road runoff pooling upstream of Check Dam # 4

Photo 3 – Flocculant dosing system treating water upstream of Check Dam #4.


Photo 4 – Discharge of flocculant dosing system at Check Dam #4.

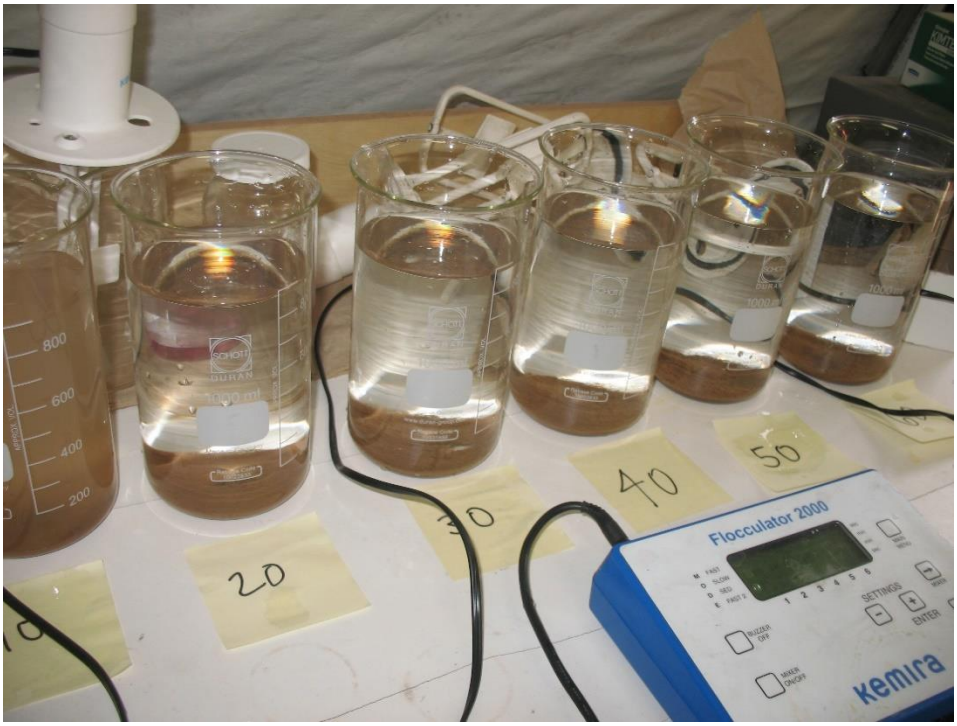

Photo 5 – Laboratory testing for flocculant dosing optimization.


Photo 6 – Check dam constructed at outlet of Sheardown Valley along Mine Haul Road.

Photo 7 – Sediment deposit removal along upper reaches of Sheardown Lake Tributary SDLT (downstream of km 104.5 of the Mine Haul Road).

Appendix D.4 - Spill Report 16-198 - Camp Lake Tributary 1

Table D.4 - Spill Report 16-198 - Sequence of Events and Actions Taken	
May 31	Sediment deposit along the bank of Camp Lake Tributary #1 (CLT1) discovered near the North end of the Mine Site airstrip. The source of the sediment deposit is determined to be from a slumping section of stream bank along Camp Lake Tributary #1.
	Sediment release to Camp Lake Tributary #1 reported to the NT-NU Spill Line and regulators (**NT-NU Spill Report 16-198**).
June 1	Installed silt fences around perimeter of sediment deposit to prevent migration of sediment into tributary.
	Removed sediment deposit from stream bank. Lined face of slumping stream bank with geotextile and reinforced with 6" aggregate to prevent similar incidents.
June 1 - 15	AMEC-Foster Wheeler Engineer arrives onsite to develop flocculant treatment systems and pilot test additional siltation controls including geotubes..
June 17 - 21	Kemira Chemicals Chemist arrives onsite to assist Baffinland in developing and optimizing mobile water treatment systems using flocculants.

Appendix D.4 – Photos

Photo 1 – May 29th 2016. Silt fence installation around sediment deposit from slumping stream bank along Camp Lake Tributary #1.

Photo 2 – June 3rd 2016. Snow along slumping slope face and sediment deposit removed.

Photo 3 – June 3rd 2016. Slumping stream bank lined with geotextile to protect underlying soil from erosion.

Photo 4 – June 4th 2016.Slumping stream bank reinforced with 6” aggregate.