

## **Appendix C**

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

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

Table C.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 Environment 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 ( <b>NT-NU Spill Report - 16-158</b> ).
	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 deposits 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 loose 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 (assisted by Kemira Chemicals).
June 24 - July 8	Sheardown Lake Tributaries are running clear for the period.

## Appendix C.1 - Photos



Photo 1 – Outlet at Sheardown Lake Tributary on July 4, 2016



Photo 2 – Sheardown Lake Tributary upstream of CV186 on July 4, 2016



Photo 3 – No flow conditions at Landfill Gate Tributary on July 7, 2016



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

Table C.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 ( <b>NT-NU Spill Report- 16-176</b> ).
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.
June 25 - July 8	Camp Lake Tribs are running clear. No sedimentation issues.

## Appendix C.2 – Photos



Photo 1 –Outfall to Camp Lake Tributary #1 on July 4, 2016



Photo 2 – Camp Lake Tributary #1 on July 4, 2016



**Table C.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 observed 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 ( <b>NT-NU Spill Report- 16-181</b> ).
	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 loose 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 (assisted by Kemira Chemicals).
June 21	Installed additional siltation controls, including geotextile, silt fences and flocculant, at km 108.5 of the Mine Haul Road.
June 25	Check dam completed at km 108.5, silt fences erected downstream.
June 26-27	Mine Haul Road ditch riprapped between km 108.5 and km 109
June 27-29	Maintenance of ditches and culvert inlets completed - excavation of deposited sediments.
June 25 - July 8	Tributaries running from Mine Haul Road running relatively clear.

### Appendix C.3 – Photos



Photo 1– Checkdam #5 constructed at Km 108.5. Picture taken on July 5, 2016.



Photo 2 – Silt Fences and Checkdam #5 at Km 108.5. Picture taken on July 5, 2016.





Photo 4 - New ditch with geotextile and rip rap up from Km 108.5. Picture taken on July 5, 2016



Photo 4 - New ditch with geotextile and rip rap at downhill from Km 108.5. Picture taken on July 5, 2016



#### **Appendix C.4 - Spill Report 16-198 - Camp Lake Tributary 1**

<b>Table C.4 - Spill Report 16-198 - Sequence of Events and Actions Taken</b>	
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 ( <b>NT-NU Spill Report 16-198</b> ).
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.
June 25 - July 8	Area of slumping remains stable over the reporting period.

## Appendix C.4 – Photos



Photo 1 – Update on stable slope face by Camp Lake Tributary #1. Picture taken on July 7, 2016

**Table C.5.1 Spill Report 16-202 and Update No. 1, Tote Road.**

<b>Sequence of Events and Actions Taken</b>	
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. This included conditions at various locations on the Tote Road.
May 20 - present	Siltation control measures (silt fences, silt curtains, flocculent, treated jute) installed at various locations along the Tote Road to address potential sedimentation and turbidity issues
May 20 - present	Operational resources are allocated to deal with sediment issues on Tote Road including removal of sediments using excavator, installation of geotextile and riprap in critical locations.
May 31	Several active of areas of sedimentation and turbidity observed and reported to the NT-NU Spill Line and EC and INAC Inspectors. These include stream crossings CV-223 (km 97), BG-17 (Km 90), and BG-29 (km 85). NT-NU Spill Report - 16-202
May 31 to present	Additional resources are dedicated to fixing potential sedimentation problems on the Tote Road between km 75 and km 100. These include trucks, excavators, labourers, etc., and a dedicated construction manager.
June 19	Sediment release observed at two additional locations along the Tote Road at stream crossing BG-31 at km 82 and at crossing BG-28 at km 86.3. ( <b>NT-NU Spill Report - 16-202, Update No. 1</b> ).
June 19 to present	Sediment controls put in place to curtail sediment release to Muriel and David Lakes.
	<b>REFER TO TABLE C.5.2 FOR DETAILS OF SPECIFIC ACTIONS TAKEN ON THE TOTE ROAD TO MINIMIZE SEDIMENTATION ISSUES.</b>

Table C.5.2 Spill Report 16-202 and Update No. 1, Tote Road Work Completed			
Tote Road Chainage	Reason Work was/is Required	Proposed Control	Comments
km 77	Surface water flow through natural and excavated ditch contributing turbidy to drainage in to outflow of Muriel Lake	Lay geotextile liner in ditch and line with rip rap rock	To be completed.
82-83	Surface water flow through excavated trench/on grade along Tote Roadcausing sediment to deposit on ice of Muriel lake	Install two check dams at km 82.1. Requires strategy for long term stabilization/sediment control	Completed
83-83.2	Surface water flow through excavated ditch of fine sand contributig to turbidity in to head waters of BG30 HADD	Lay geotextile liner in ditch and line with rip rap rock	Completed
83.2-83.4	Surface water flow through excavated ditch of fine sand contributig to turbidity in to head waters of BG30 HADD	Lay geotextile liner in ditch and line with rip rap rock	Completed
83.4-83.6	Surface water flow through excavated ditch of fine sand contributig to turbidity in to head waters of BG30 HADD	Lay geotextile liner in ditch and line with rip rap rock	Completed
83.7-83.9	Surface water flow through excavated ditch of fine sand contributig to turbidity in to head waters of BG30 HADD	Lay geotextile liner in ditch and line with rip rap rock & Check dams	Completed
83.9-84.0	Surface water flow through excavated ditch of fine sand contributig to turbidity in to head waters of BG30 HADD	Lay geotextile liner in ditch and line with rip rap rock & Check dam	Completed
84.0-84.2	Surface water flow through excavated ditch of fine sand contributig to turbidity in to BG29 and feeds the creek in to Muriel Lake	Lay geotextile liner in ditch and line with rip rap rock	Completed
84.2-84.3	Surface water flow through excavated ditch of fine sand contributig to turbidity in to BG29	Lay geotextile liner in ditch and line with rip rap rock	Completed
85.25-85.35	Surface water flow through excavated ditch of fine sand contributig to turbidity in downstream drainages.	Ditch fully lined with geotextile and riprap for the entire length.	Completed
85.6-85.8	Ditch feeding Lake to BG29 CV contains some sedimentdue to ditch excavation	Lay geotextile liner in ditch and line with rip rap rock, silt curtain drainage in to lake	Completed. Silt Curtain installed.
85.65-85.9	Surface water flow through excavated ditch of fine sand contributig to turbidity in downstream drainages.	Ditch fully lined with geotextile and riprap for the entire length.	Completed.
85.8-86.1	Ditch stabilization required as trench feeds CV in to David Lake	Lay geotextile liner in ditch and line with rip rap rock	Completed
86.1- 86.25	Surface water flow through excavated ditch of fine sand contributig to turbidity in downstream drainages.	Riprap extentended for 40 , ditch line reestablished and check dam installed at outlent of culvert	Completed.
86.2-86.3	Ditch stabilization required as trench feeds CV in to David Lake	Lay geotextile liner in ditch and line with rip rap rock	Completed
86.3-86.5(cv)	Low flow condition only and trench requires significant earthworks in this area.	No mitigation in ditch. Install check dam on north side of culvert inlet	Completed
86.5-86.8	Low flow condition only and trench requires significant earthworks in this area.	No mitigation in ditch. Install check dam across creek drainage at km 86.8	Completed
86.8-87.3	Flooded ditch acting as settling pond with very low flow from pool. Ditch requires significant earthworks in this area	Install check dam at km 86.8	Completed
87.3-87.5(cv)	Large pool in ditch area acting as a settling pond and irregular trench requires significant earthworks.	No immediate action	Not completed yet, requires long term strategy
87.5-87.6(cv)	Ditch stabilization required as trench feeds culver in to David Lake	Lay geotextile liner in ditch and line with rip rap rock and install small check dams	Completed
87.6-88.0	Ditch stabilization required as trench feeds CV in to David Lake	No action at this time. Very small catchment area and ditch is dry.	Not completed yet, requires long term strategy
88.0-88.2(cv)	Ditch stabilization required as trench feeds CV in to David Lake	No action at this time in ditch. Very flat areas with no flow. Install rip rap at NW drainage in to culvert inlet and place a small CD upstream	Check Dam installed.
88.2-88.4	Ditching in culvert feeding David Lake	Lay geotextile liner in ditch and line with rip rap rock, laid geotextile and armoured eroded creek bed that ties in to drainage , and the culvert inlet basin	Completed. Silt Curtain installed.



Tote Road Chainage	Reason Work was/is Required	Proposed Control	Comments
88.4-88.5 (CV)		No action at this time	
88.5-88.6	Open Ditch.	Install Check dam at km 88.6 at north end of pool	Completed
88.7-88.9	Open Ditch.	Southern pool to CV is flat with no drainage. No action at this time.	Not completed.
88.9-89.2	Open Ditch.	Lay geotextile liner in ditch and line with rip rap rock	Not completed.
km 89.9	Permafrost degradation pond culvert plugged and risk of pond overtopping in to David Lake Tributary	Steam clean culvert open and drain pond	Complete June 11.
km 90.2	Erosion from snow melt/creek off of Hill	Stabilize drainage from vegetation down to ditch with rip rap	Complete June 11.
km 90.2-90.4	Base of steep embankment excavated and causing slope instability along the 300 meter stretch.	Geo and armour areas not yet failing to prevent future (0-2 year) failure of slope as in other adjacent areas. Reassessment of areas requires input from permafrost engineer.	Not yet completed.
km 90.3	Steep slopes in two areas along embankment in process of failing due to disturbance at base of slope, and surface run off/permafrost degradation	Sluffed embankment reinforced with rip rap berm and silt fence applied. Permanent engineered solution required for long term stabilization	Immediate actions completed.
~91.4-91.7	Ditching of fine sand on drainage on either side of culvert producing very turbid water feeding creek to David Lake	Construct ditches at crest of km 92 hill. Lay geotextile liner in ditch and line with rip rap rock. Excavate and backhaul excess fine sand to temporary storage location at km 97 laydown	Completed.
km 97	Water draining off rip ripped shoulder and embankment through low lying sediment rich delta to Tom's creek	Install new silt fence at discharge	Completed June.
km97-CV223	Sediment laden snow in draianage. Potential for erosion from slope around culvert inlet	Remove sediment laden snow and armour slopes.	Snow removed from West and East drainages, East culvert slope lined with geo and armoured with rip rap.
Km 96 - CV224	Sediment laden snow in draianage. Potential for erosion from ditches in to culvert drainage	Remove sediment laden snow and armour approach ditches and slopes.	Sediment removed from inlet drainage. Rip rap removed and geotextile lined and rip rapped South East ditch 30 m. SW drainage lined.
km 95 - CV001	Sediment laden snow in drainage.	Remove sediment laden snow	Snow Removed.
km 94 - BG004	Potential for erosion from ditches in to culvert drainage	Line NW and SW drainages (~30 m each) with geotextile and armoured with rip rap.	NW and SW drainages (~30 m each) lined with geotextile and armoured with rip rap.
km 90 - BG17	Sediment laden snow in draianage. Potential for erosion from SE ditches in to culvert drainage	Remove sediment laden snow and armour SE approach ditches and slopes.	Sediment laden snow removed from inlet basin. SE drainage ditch lined with geo and armoured with rip rap for ~70 m down to creek.
km 96 CV224	Post completion of controls, ice melted under geo allowing embankment to erode into creek bed	Remove sediment from creek bed and sediment covered snow from drainage & edge of embankment. Extend geotextile liner along SE enbankment and line with rip rap rockt.	Completed.
km 91 BG14	Ditching on in ditch and along embankment creating turbid water feeding creek to David Lake	Repair and reinforce check dam at upstream of CV. Excavate and backhaul excess fine sand to a location to be designated?	Check dam completed. Excess sand removed.

Note: Shaded cell indicate work was completed during the reporting period June 25 to July 8, 2016.

## Appendix C.5 – Photos at various locations along the Tote Road



Photo 1 – BG-31. New culvert installation at Km 82 reduces siltation downstream



Photo 2 – BG -31 flowing clear downstream of culvert



Photo 3 – BG-28 flowing clear at Km 86.5.



Photo 4- Rip rap in ditch at Km 85





Photo 5: Rip rap in ditch at Km 85



**Table C.6 Construction of Ditches and Drainage System Around Milne Port Ore Stockpile and Mine Site Crusher Stockpile**  
**Sequence of Events and Actions Taken**

Prior to May 20	Milne and Mine Site - Ongoing monitoring of surface water adjacent to the ore stockpile to ensure that there was no adverse impacts due to surface water runoff or seepage.
May 20	Environment Canada and INAC inspectors notify Baffinland that directions under the Fisheries Act will be issued to the Company due partially to the incomplete drainage works around the Milne Ore Stockpile Facility and the Mine Crusher Stockpile Area and Crusher Ore Pad. Written Direction provided June 7. INAC letter of non-compliance received on June 16.
May 23	Document provided to Environment Canada and INAC Inspectors: Milne Stockpile Pad Water Drainage System – Excecution Plan and Schedule. Completion date of July 17.
May 24 to present	Milne - The drainage system ditches are functionally operational by June 7.
June 22	Milne - Ditching system presently fully operational, minor items to be included including survey for as-built report and clean-up of the area.
June 25 - July 8	Mine Site - Installation of final ditching system is underway for Crusher Stockpile Pad.

**Table C.7 Impacted Snow Removal from Milne Beach and Tote Road Bridges**  
**Sequence of Events and Actions Taken**

May 20	Environment Canada and INAC inspectors notify Baffinland that directions under the Fisheries Act will be issued to the Company. One of the items of concern was dirty snow west of the Ore Loader at Milne and on/under bridges on the Tote Road.
May 21-23	Dirty snow removed from Milne Beach using Loader.
May 21 - 25	Crews mobilized to clean under bridges on Tote Road. Effort is partially successful by hampered by warmer temperatures and soft slushy conditions which posed safety hazard.
June 24 - July 8	Snow has melted, monitoring of areas along beach ongoing, rivers at bridge crossings flowing well, no further problems in this regard.