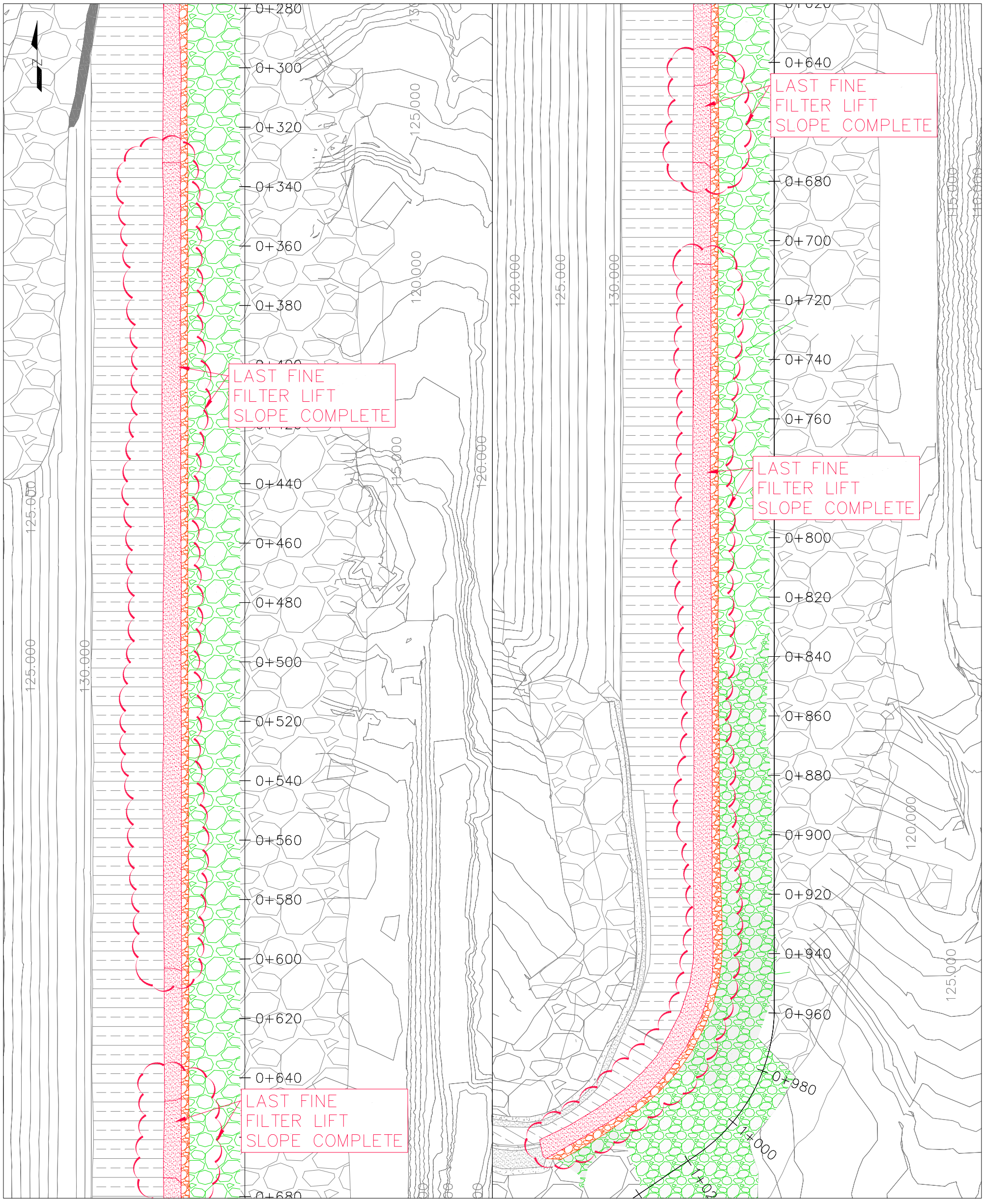
DAILY PROGRESS
CENTRAL DIKE AND SD5
CONTRACT # 11-505



VOLUMETRY DETAIL

FINE FILTER : 557.74m³

KIVALLIQ CONTRACTORS GROUP LTD

PREPARED BY : MIKAËL LÉVESQUE
DATE : 12-05-2018
CON-QT-020-CD_DP_120518

QA WEEKLY REPORT

DATE May 21st 2018 1897439-1577-TM-Rev0

TO Patrice Gagnon, Pier-Éric McDonald
Agnico Eagle Mines Ltd, Meadowbank Division

CC Frédérick Bolduc, Alexandre Lavallée

FROM Marion Habersetzer **EMAIL mhabersetzer@golder.com**

QA WEEKLY REPORT FROM MAY 14TH TO MAY 20TH – TSF SOUTH CELL CONSTRUCTION MEADOWBANK (1897439)

This document summarizes QA activities performed by Golder from May 14th to 20th, 2018 inclusively, related to the construction activities of Saddle Dams 3 (SD3) and Central Dike (CD) at the Meadowbank mine site.

Unless otherwise specified, the construction activities use the centreline of the structures for a dike crest elevation of 150 m for reference (refer to the Drawings). The description of activities refers to the stations and offsets from the centreline (e.g., Sta. 0+500/-50 m). The "+" and "-" symbols indicate the location of the work downstream and upstream of the centreline, respectively.

1.0 GOLDER PERSONNEL ON SITE

Golder personnel on site during this reporting period is summarized in Table 1.

Table 1: Golder Personnel on Site

Name	Comments
Marion Habersetzer	QA Manager (arrival on May 14th)

2.0 HEALTH AND SAFETY

H&S meetings were held with AEM and FGL/SANA during the daily construction meetings. Minutes from these meetings are recorded and stored in Golder's on-site office. The key H&S elements for the reporting period were as follows:

- Cold weather and ice: apply caution when driving or walking on icy surfaces, wear appropriate clothing.

Golder Associés Ltée
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- Dust is still an issue on the construction field; be vigilant by staying out of the dust cloud near construction activities and road circulation. The personnel working on foot has to wear a mask due to the toxicity of the dust (fine tailings dust).
- Coactivity on the dikes: be aware of blind spots and safe spots, keep good communication and visual contact with the operators. It is recommended to call on the radio when entering Central Dike on either side when heavy equipment is working in the area.
- A fresh snow layer makes surfaces slippery: apply caution when driving or walking on snowy surfaces.
- A spill (about 10L of hydraulic oil) was noticed on Central Dike and cleaned up on May 15th. An environmental report was issued.
- A caribou was spotted on Saddle Road on May 16th. It was reiterated that in case of an encounter with wildlife, the lights on the vehicle and the engine must be switched off.
- The fog causes a visibility issue on the roads and on the dikes. Reduce driving speed and keep safety distances between vehicles. Make sure to be visible by the equipment operators.
- PPE and procedures for working in dusty conditions have been prepared for the arrival of the Liner Installers.
- The JHA for geosynthetics installation was reviewed before the arrival of the Liner Installers. The team is scheduled for SOP training and fit tests on May 21st when they arrive on site.

3.0 SUMMARY OF MAIN DISCUSSIONS IN CONSTRUCTION MEETINGS

Construction meetings were held daily during the reporting period and were attended by the QA Manager. The following items were discussed:

General

- From May 15th to May 17th, there was no AEM representative on site. The Dike Supervisor (Olivier Jacques) was in charge of the works.
- The QA Manager inspected visually the LLDPE rolls stored between Central Dike and the Rock Storage Facility. The new rolls are stored outside on 2 trailers, while old rolls are stored on the ground and are covered in snow. Those seem to be leftovers from last year's construction season and should not be used on the dikes this year. Most new rolls are in good condition, with some rolls on the blue trailer showing tears on their outer layers. It will be important before the LLDPE liner placement to discard the first few meters of the rolls to ensure that only intact, good quality material is used.
- The QA Manager reiterated that the liner must be dry and free of dust on at least 1 m from the top to allow for welding of the new LLDPE liner.

- The LLDPE liner installing equipment will only arrive on site on May 23rd. As a result, the Liner Installers will begin with the geotextile installation only. The QA Manager reminded that some minor correction works still need to be done on SD3 before the upstream slope can be approved for the installation of geosynthetics.
- It was noticed that the sandbags for securing geosynthetics in place are damaged and cannot be used. New sandbags are being prepared.
- The construction of the North Cell Internal Structure has begun (day shift, night shift to start soon) and will be followed up by the QA and QC personnel during the day shift. A separate report will be issued to document the works. Construction plans and the design report were communicated to all parties involved and the SANA surveyors will check the alignment and elevation of the existing capping.
- Given that no material was placed on the dikes this week, no daily as-built drawing was issued.

Central Dike

- The upstream slope of Central Dike has been approved for LLDPE liner installation. Damages in the existing liner below El. 143 m are marked with paint.

Saddle Dam 3

- Since the ultramafic volcanic (UM) rockfill on the crest of SD3 is frozen, a dozer was be used to rip the anchoring trench in preparation for the excavator.
- The available bentonite quantities are limited on site. As a result, it was decided with AEM and the Designer to replace the compacted sieved till (Type 1) in the LLDPE liner protection cover on SD3 with low quality till that will be sieved with an excavator, with a layer of geotextile on the LLDPE liner. The low quality till and the fine rockfill layers will remain as designed. In order to leave some time for the stockpiles to thaw, the installation of this protection cover has been postponed until August. For the same reasons, the upstream toe liner tie-in will only be done in August when the compacted sieved till (Type 1) stockpile has thawed.
- The QA Manager pointed out that since the LLDPE liner will be left in place for 2 to 3 months without anchoring at the toe of SD3, it will be important to have enough sand bags to secure the LLDPE liner in place.
- Snow and ice are beginning to melt. As a result, some water is ponding on the upstream toe line tie-in on the east extremity of SD3 and will need to be pumped out before installation of the LLDPE liner next week. The QA Manager noticed that a horizontal portion of existing LLDPE liner in the upstream toe liner tie-in had been exposed and damaged during snow removal operations at approx. Sta. 20+595 m.
- After inspection of the upstream slopes of SD3 and Central Dike, the following points have been identified on SD3 and will be addressed before liner installation:
  - The crest between the anchoring trench and the upstream slope should be compacted again with 2 passes of the compactor, as the anchoring trench excavation has brought to the surface large and sharp rocks on this area, which are unsuitable as liner bedding;

- The last panel of existing liner on the upstream slope at approx. Sta. 20+595 m is covered in finer filter. This fine filter will need to be removed to expose the liner for seaming of the next panel and prevent any contamination of the tie-in compacted sieved till;
- The portion of damaged liner needs to be exposed on at least 0.5 m on each side of the tear to allow for repairs and to ensure no further damage is encountered;
- The upstream slope of fine filter will need additional compaction with the roller attachment around the new upstream toe liner tie-ins at the extremities of the dike to ensure a smooth slope.

Follow up

- The damages to the LLDPE on the upstream slope of Central Dike have been marked with paint.
- The LLDPE rolls storage has been inspected.
- A design change in the SD3 erosion protection cover has been agreed on (see above).
- Preparation works for liner installation at SD3 must be completed.

4.0 SUMMARY OF CONSTRUCTION ACTIVITIES AND TEST RESULTS

Periodic QA inspections to monitor the construction activities and progress were performed by the QA Manager; these are summarized in the tables below.

Table 2: QA Observations for Saddle Dam 3

Activity or Area	Comments
Snow removal (upstream side)	■ Removal of snow on the upstream slope of SD3 above El. 142 m, from Sta. 20+595 m to 20+780 m. The snow was first removed with the excavator with a smooth lip bucket, and a hand shovel was used to remove the remaining snow on the LLDPE liner between El. 142 m and 143 m.
Upstream	■ Scarification of the frozen ultramafic volcanic (UM) rockfill on the crest with a dozer for the anchoring trench excavation between Sta. 20+959 m and 20+780 m. ■ Excavation of the LLDPE geomembrane crest anchoring trench with an excavator from Sta. 20+595 m to 20+780 m.
Water management	■ Water is ponding on the first compacted sieved till layer of the upstream toe liner tie-in at approx. Sta. 20+595 m and has frozen.

Table 3: QA Observations for Central Dike

Activity or Area	Comments
Upstream	■ Excavation of the LLDPE geomembrane crest anchoring trench from Sta. 40+780 m to 0+170 m. ■ Clean-up of the existing LLDPE with pressurized air stream in preparation for liner installation between Sta. 0+170 m and 40+780 m ■ Clean-up of the fine filter placed against the slope at the deposition finger at approx. Sta. 0+670 m with pressurized air stream to expose 1 m of LLDPE liner, in preparation for the new liner installation.
Downstream	■ Profiling of the downstream slope (1.5H:1V) from El. 143 m to 145 m with an excavator between Sta. 0+835 m and 0+990 m.

5.0 FOUNDATION APPROVALS

One foundation approval was carried out during the reporting period.

Table 4: Details of the Foundation Approvals

Name	Structure	Sta. and Offset	Date of Approval	Comment
FND-CD-140	Central Dike	Sta. 0+161.13 m to 1+059.48 m (o.s. -33.93 m to -23.30 m)	2018-05-18	Upstream slope approved for geosynthetics installation

6.0 SAMPLING, LABORATORY AND FIELD TESTING

Table 5 and

Table 6 present the samples collected or tested by the QA and QC as well as PNG field results.

Table 5: Samples Taken by the QC

Sample ID	Date Sampled	Date Tested	Fill Material Type	Location (Station/Offset Elevation)	Test	Testing Result

Table 6: Samples Taken by the QA

Sample ID	Date Sampled	Date Tested	Fill Material Type	Location (Station/Offset Elevation)	Test	Testing Result

7.0 PHOTOGRAPHS

Photograph SD3-297: From Sta. 20+730/-10 m, looking SE. Removal of snow on the upstream slope of SD3 with an excavator, from Sta. 20+640 to 20+760 m.

Photograph SD3-298: From Sta. 20+680/-88 m, looking S. Removal of snow on the upstream slope of SD3 above El. 142 m, from Sta. 20+620 m to 20+780 m.

Photograph SD3-299: From Sta. 20+620/-26 m, looking NW. Scarification of the frozen ultramafic volcanic (UM) rockfill on the crest with a dozer for the anchoring trench excavation between Sta. 20+605 m and 20+780 m.

Photograph SD3-300: From Sta. 20+790/-33 m, looking NW. Excavation of the LLDPE geomembrane crest anchoring trench with an excavator from Sta. 20+675 m to 20+780 m.

Photograph SD3-301: From Sta. 20+660/-22 m, looking SE. Excavation of the LLDPE geomembrane crest anchoring trench with an excavator from Sta. 20+655 m to 20+675 m.

Photograph SD3-302: From Sta. 20+595/42 m, looking NE. View of water ponding on the first compacted sieved till layer of upstream toe liner tie-in. A portion of exposed damaged LLDPE liner is visible.

Photograph CD-1852: From Sta. 0+500/-25 m, looking N. Excavation of the LLDPE geomembrane crest anchoring trench from Sta. 0+830 m to 0+170 m.

Photograph CD-1853: From Sta. 0+850/+3 m, looking S. Profiling of the downstream slope (1.5H:1V) from El. 143 to 145 m with an excavator between Sta. 0+835 m and 0+940 m.

Photograph CD-1854: From Sta. 0+960/-13 m, looking N. Profiling of the downstream slope (1.5H:1V) from El. 143 to 145 m with an excavator between Sta. 0+940 m and 0+990 m.

Photograph CD-1855: From Sta. 0+230/-22 m, looking S. Clean-up of the existing LLDPE with pressurized air stream in preparation for liner installation between Sta. 0+170 m and 40+780 m

Photograph CD-1586: From Sta. 0+670/-24 m, looking N. Clean-up of the fine filter placed against the slope at the deposition finger at approx. Sta. 0+670 m with pressurized air stream to expose 1 m of LLDPE liner, in preparation for the new liner installation.

Photograph from the LLDPE storage site: View of new rolls stored on a trailer, showing tears.

Photograph from the LLDPE storage site: View of old rolls stored on the ground.

REGISTERED PROFESSIONAL ENGINEER
Y. BOULIANNE
LICENSEE
2018-05-21
NT/NU

Marion Habersetzer, M.Sc.
Mine Waste Group

Yves Boulianne, P.Eng.
Associate, Senior Geotechnical Engineer

MH/YB/

https://golderassociates.sharepoint.com/sites/1897439/preparation of deliverables/weekly reports/2018-05-14 to 2018-05-20/south cell/1897439-1577-tm-rev0 qa weekly report south cell 2018-05-14 to 2018-05-20.docx

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 2018-05-21
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

QA WEEKLY REPORT

DATE May 28th 2018 1897439-1577-TM-Rev0

TO Patrice Gagnon, Pier-Éric McDonald
Agnico Eagle Mines Ltd, Meadowbank Division

CC Frédérick Bolduc, Alexandre Lavallée

FROM Marion Habersetzer **EMAIL mhabersetzer@golder.com**

QA WEEKLY REPORT FROM MAY 21ST TO MAY 27TH – TSF SOUTH CELL CONSTRUCTION MEADOWBANK (1897439)

This document summarizes QA activities performed by Golder from May 21st to 27th, 2018 inclusively, related to the construction activities of Saddle Dam 3 (SD3) and Central Dike (CD) at the Meadowbank mine site.

Unless otherwise specified, the construction activities use the centreline of the structures for a dike crest elevation of 150 m for reference (refer to the Drawings). The description of activities refers to the stations and offsets from the centreline (e.g., Sta. 0+500/-50 m). The "+" and "-" symbols indicate the location of the work downstream and upstream of the centreline, respectively.

1.0 GOLDER PERSONNEL ON SITE

Golder personnel on site during this reporting period is summarized in Table 1.

Table 1: Golder Personnel on Site

Name	Comments
Marion Habersetzer	QA Manager (arrival on May 14th)

2.0 HEALTH AND SAFETY

H&S meetings were held with AEM and FGL/SANA during the daily construction meetings. Minutes from these meetings are recorded and stored in Golder's on-site office. The key H&S elements for the reporting period were as follows:

- Cold weather and ice: apply caution when driving or walking on icy surfaces, wear appropriate clothing.

- Dust is still an issue on the construction field; be vigilant by staying out of the dust cloud near construction activities and road circulation.
- Material handling risks and procedures were added into the JHA for geosynthetics installation. The JHA was communicated to the Liner Installers.
- It was reiterated that it is unsafe to go in the downstream slope of Central Dike (1.5H:1V) and that surveying in this area can be done with a GPS-equipped excavator.
- There is important heavy equipment coactivity on Central Dike because of geosynthetics installation operations: personnel on foot must make sure to be visible at all time.
- Frozen LLDPE liner is slippery in the morning: be careful when walking on the liner in the upstream slope.

3.0 SUMMARY OF MAIN DISCUSSIONS IN CONSTRUCTION MEETINGS

Construction meetings were held daily during the reporting period and were attended by the QA Manager. The following items were discussed:

General

- The materials for geosynthetics placement (geotextile rolls, LLDPE liner rolls) were moved on Central Dike and SD3 on May 20th in preparation for the works. The LLDPE liner rolls are stored on a smooth surface (compacted fine filter in place) covered by a layer of geotextile (see photograph below).
- Stéphane Côté, supervisor for ZTG, will also be the QC for liner installation, as was done last year. One of the Liner Installers is unable to work and is replaced by a worker from SANA.
- The LLDPE liner installation equipment only arrived on site on May 23rd. Until then, the geotextile panels were spot-welded together and secured with sandbags at the bottom of the slope to protect them against the wind until they can be covered with LLDPE liner.
- The QA Manager reiterated that the geotextile panels spot-welded with a heat gun must have a minimum overlap of 450 mm.
- It was pointed out by AEM that the tensiometer used for calibrations of the welding equipment does not have a calibration certificate on site. AEM has requested this certificate from ZTG.
- The QA Manager reiterated that the LLDPE liner anchoring trench on the crest of the dike must be compacted after being backfilled with 4 passes of the compactor.
- Due to the adverse weather (sleet and strong winds), no geosynthetics could be installed on May 26th. In general, wind conditions caused delays in the geosynthetics installation on many days; as a result, this operation will require more time than expected in the construction schedule (likely 3 weeks in total).

- Starting May 27th, the geotextile panels are welded together with the dual hot wedge instrument. The overlap is about 150 mm. This type of welding yields a more regular and stronger bond than the heat gun.

Central Dike

- The as-built width of Central Dike next to the south access ramp (between Sta. 0+950 m and 0+975 m) is 0.6 m less than specified in the design. The 1.5H:1V slope is however correct. Given that this minor difference causes neither a stability issue nor a circulation issue on the crest, it was decided with AEM to leave it as is, and to document this non-conformity in the as-built report. This geometrical anomaly would be difficult to correct in the current configuration; however, it would be easily corrected should a raise of Central Dike above El. 145 m be built.
- Minor corrections to do at the bottom of the fine filter on the upstream slope of Central Dike were identified by the QA Manager (see photograph below) and completed. Some fine filter was missing to achieve a smooth slope and transition with the existing liner. It is likely that the combination of the thawing of the fine filter today and the recent cleaning operations using pressurized air accounts for the observed loss of material at the junction with the existing LLDPE liner.
- Efforts were made to remove the accumulated dust encrusted on the existing LLDPE liner at the junction between Central Dike and SD5, and to keep the liner clean for welding.
- Because of humidity (thawing slope underneath the geosynthetics), the extrusion weld at the bottom of the LLDPE liner panels needed additional repairs on some sections between Sta. 40+680 m and 0+950 m. Welding is difficult because of water flowing down the slope, which creates bubbles in the resin. The underlying liner has been cut at some places to drain the water and patches have been welded (see photograph CD-1864).
- The Liner Installers took the initiative to sample and test a small destructive sample at approx. 40+740 m on the extrusion weld (panel 804) on May 25th as part of their QC program to ensure the quality of welding after thawing of the underlying fine filter, on a section where no need for repairs had been identified. The QA Manager was not present for this sampling and testing. The Liner Installers' QC representative reported that the tested sample was compliant (this test is not reported in the Liner Installers' QC report
- The uncovered geotextile in place is wet and frozen in the morning. In order to avoid welding issues due to humidity, uncovered geotextile panels are inspected and if deemed too wet, they are removed and replaced with new geotextile before LLDPE liner installation.

Follow up

- Preparation works for liner installation at SD3 to be completed.
- Calibration certificate of the tensiometer to be provided by ZTG.

4.0 SUMMARY OF CONSTRUCTION ACTIVITIES AND TEST RESULTS

Periodic QA inspections to monitor the construction activities and progress were performed by the QA Manager; these are summarized in the tables below.

Table 2: QA Observations for Saddle Dam 3

Activity or Area	Comments
Upstream	■ Smoothing of the surface of the fine filter with an excavator on top of the upstream slope from Sta. 20+600 m to 20+780 m.
Water management	■ Water is ponding on the first compacted sieved till layer of the upstream toe liner tie-in at approx. Sta. 20+595 m and is partially frozen.

Table 3: QA Observations for Central Dike

Activity or Area	Comments
Upstream	■ Snow removal in the anchoring trench with an excavator between Sta. 0+170 m and 40+780 m. ■ Final clean-up of the existing LLDPE liner with pressurized air for geosynthetics installation.
Geotextile and LLDPE liner installation	■ Installation of the geotextile on the upstream slope 3H:1V (SD5 side) to 2H:1V (Central Dike side) between El. 143 m and 145 m from Sta. 40+640 m to 0+900 m. The geotextile surface was inspected before being covered with LLDPE liner. ■ Removal of the wet uncovered geotextile in place from Sta. 0+935 m to 0+900 m, replaced with new geotextile. ■ Pre-calibration of the welding instruments after arrival of the equipment on site on May 24th. Calibration results met Technical Specifications. Loads at failure in peel and shear were greater than minimum values presented in Table 6-2 from Technical Specifications. ■ AM and PM calibration results met Technical Specifications each day. Loads at failure in peel and shear were greater than minimum values presented in Table 6-2 from Technical Specifications.

	■ Installation of the LLDPE liner on the upstream slope 3H:1V (SD5 side) to 2H:1V (Central Dike side) between El. 143 m and 145 m from Sta. 40+680 m to 0+900 m (panel numbers 802 to 823). The LLDPE was free of folds and holes. Seam tests (air channel tests) were carried out under the supervision of the QA Engineer and results met Technical Specifications. ■ Vacuum box tests were performed from Sta. 40+680 m to 0+900 m on panels 802 to 823. All leaks identified have been marked and repaired. All repairs were tested with the vacuum box again. ■ Repairs on the extrusion fillet seam at the bottom of the LLDPE liner panels between Sta. 40+680 m and 0+950 m, on panels 802 to 807, and 811 to 813. The patches are 0.7 m to 3 m long approximately, and spaced by 0.1 m to 10 m. ■ The total fusion seam length is about 233 m. The total extrusion fillet seam length is about 140 m. ■ Destructive testing was carried out on the sample collected on the LLDPE geomembrane at Sta. 0+960 m (see Table 4). Loads at failure in peel and shear were greater than minimum values presented in Table 6-2 from Technical Specifications. The sample was kept for the Owner's Representative. ■ Backfilling of the geosynthetics tie-in from Sta. 40+680 m to 0+900 m. The material has not been compacted yet.

Table 4: Details of the Destructive Testing and Repairs

Name	Date sampled and tested	Structure	Station	Seam	Comment
D-1	Sampled and tested on May 25th	Central Dike	0+960 m	Between panels 814 and 815	Compliant

5.0 FOUNDATION APPROVALS

No foundation approval was carried out during the reporting period.

Table 5: Details of the Foundation Approvals

Name	Structure	Sta. and Offset	Date of Approval	Comment

6.0 SAMPLING, LABORATORY AND FIELD TESTING

Table 6 and Table 7 present the samples collected or tested by the QA and QC as well as PNG field results.

Table 6: Samples Taken by the QC

Sample ID	Date Sampled	Date Tested	Fill Material Type	Location (Station/Offset Elevation)	Test	Testing Result

Table 7: Samples Taken by the QA

Sample ID	Date Sampled	Date Tested	Fill Material Type	Location (Station/Offset Elevation)	Test	Testing Result

7.0 PHOTOGRAPHS

Photograph CD-1857: From Sta. 0+700/-20 m, looking N. Snow removal in the anchoring trench with an excavator between Sta. 0+170 m and 40+780 m.

Photograph CD-1858: From Sta. 0+970/-45 m, looking S. View of the bottom of the fine filter upstream slope. Some material is missing to achieve a smooth slope.

Photograph CD-1859: From Sta. 40+780/-38 m, looking SW. Installation of the geotextile on the upstream slope 3H:1V (SD5 side) to 2H:1V (Central Dike side) between El. 143 m and 145 m from Sta. 40+640 m to 0+830 m.

Photograph CD-1860: From Sta. 0+790/-26 m, looking N. Installation of the geotextile on the upstream slope 2H:1V between El. 143 m and 145 m from Sta. 0+830 m to 0+750 m.

Photograph CD-1861: From Sta. 40+680/-28 m, looking NE. Installation of the LLDPE liner on the upstream slope 3H:1V (SD5 side) to 2H:1V (Central Dike side) between El. 143 m and 145 m from Sta. 40+680 m to 0+950 m (panel numbers 802 to 817).

Photograph CD-1862: From Sta. 40+960/-24 m. View of an air channel test.

Photograph CD-1863: From Sta. 40+750/-18 m, looking SW. Backfilling of the geosynthetics tie-in from Sta. 40+680 m to 0+950 m.

Photograph CD-1864: From Sta. 40+700/-38 m. View of bubbles formed in the extrusion weld because of humidity.

Photograph CD-1865: From Sta. 40+740/-35 m, looking NW. Repairs on the extrusion fillet seam at the bottom of the LLDPE liner panels between Sta. 40+680 m and 0+950 m, on panels 802 to 807, and 811 to 813.

Photograph CD-1866: From Sta. 0+940/-25 m, looking NW. Installation of the LLDPE liner on the upstream slope 2H:1V between El. 143 m and 145 m from Sta. 0+950 m to 0+935 m (panel numbers 818 and 819).