Appendix D – EOR Monthly Dam Inspections

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	21 January 2019	Date of Memo:	24 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	Sunny, few degrees below zero. Most of site in shade of Mt. Myra throughout the day. Discontinuous snow cover on site, particularly in the shade.		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Lower the water level in Lynx TDF, monitor pond levels with a staff gauge accurate to 1 cm.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- Tailings impoundment areas frozen without significant standing water except a shallow pond in the East Strip up to the elevation of the spillway culver inlets.
- East and west decants clear of obstructions. No significant flow at time of inspection.
- Groundwater boils in the East Strip are somewhat active. No flow from the DDSD.
- Seismic Upgrade Berm free of significant standing water. Snow covered, with just the access road area cleared.
- Surge Pond level is at the decant sill, per design. Pond mostly iced over.

Lynx TDF

- Significant pond present in Lynx TDF, iced over. Water level estimated at about 356.5 m based on inundation near pumping area. Collapsed ice on banks suggests water was up to about 1.5 m higher at some point.
- Seepage noted on the northeast side of the Lynx Springs Drain.
- Lynx Springs Drain flowing at moderate rate.
- Minor frozen seepage in a few locations along the toe of the existing dam, above the 2018 construction bench, particularly between Panel 5 and 10

Diversion Ditches

- Minor debris caught in bottom edge of the debris basin cable net.
- Moderate flow in LLDD. Moderate flow at Alder Reach waterfalls.
- Upper diversions not accessed due to snow cover on roads.

Waste Dumps

- Waste dumps were not reviewed due to snow cover on roads.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

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Photographs

Photo 1: Overview of Old TDF

Photo 2: Groundwater boils in the East Strip. Light to moderate activity.

Photo 3: APA East Decant. Clear of debris. Frozen surface, no significant flow.

Photo 4: Water ponded upstream of APA Spillway Culverts. Depth is controlled by pipe inverts.

Photo 5: Panorama of Lynx TDF. Water level is about 1.5 m higher than normal.

Photo 6: Panorama at pumping area. Note stranded ice on the upstream slope, indicating past higher water levels.

Photo 7: Seepage adjacent to the Lynx Spring Drain

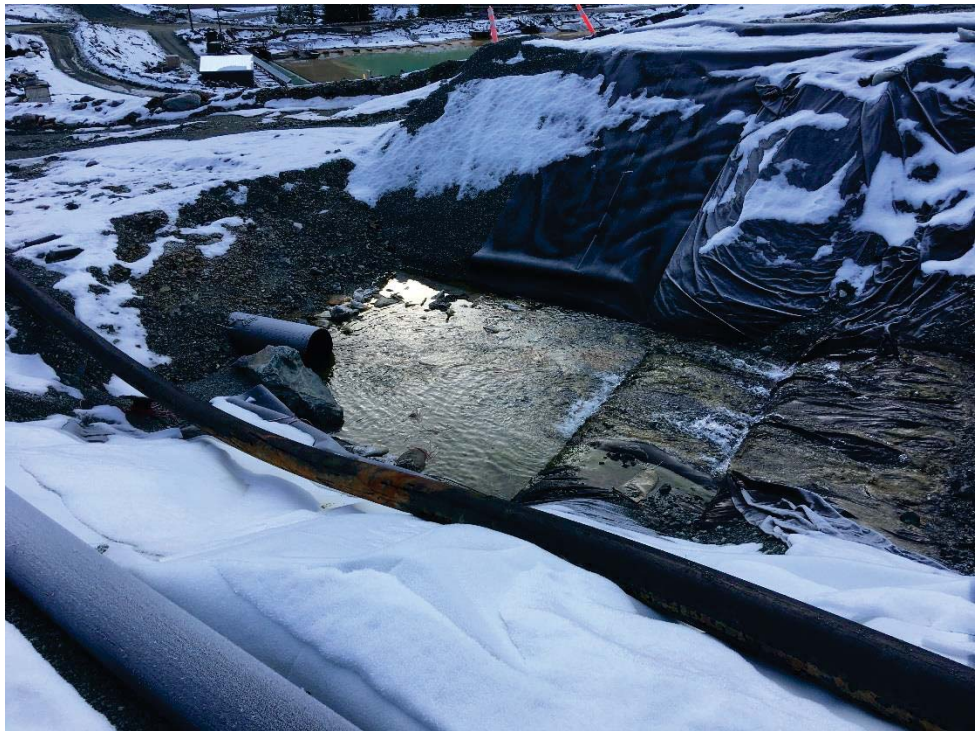

Photo 8: Moderate flow in the Lynx Spring Drain

Photo 9: Minor debris in the bottom edge of the debris net.

Photo 10: LLDD at Alder Reach

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	22 February 2019	Date of Memo:	25 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	Sunny, near zero. Relatively fresh snow cover over old snow in a lot of areas. South facing exposures are mostly snow free where not shaded by Mt. Myra.		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Install a robust staff gauge in Lynx TDF and record daily water levels.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- APA, Strip, Seismic Upgrade all snow covered.
- DDSD dry. Boils not observed due to snow cover. Seepage from the APA buttress drains.
- Surge pond frozen and snow covered. Water level is at the decant sill.

Lynx TDF

- Water levels close to target levels. Impoundment mostly ice-covered, with thawed areas around the treatment pond sludge outfall and pumping area at the east abutment.
- Dam crest and upstream slope snow-covered. Downstream slope mostly snow covered. Toe snow covered.
- Moderate flow in the Lynx Springs Drain.

Diversion Ditches

- Low flow in the LLDD. Minor debris in the debris net, debris basin clear. Some snow/ice in the concrete cloth channel.

Waste Dumps

- Waste dumps were not reviewed.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

Photographs

Photo 1: Overview of the APA

Photo 2: Old TDF looking west from the crest of the Seismic Upgrade Berm near the corner at about 0+650.

Photo 3: Old TDF Surge Pond decant with ice-covered pond. Water level is at design normal operating level for low flows.

Photo 4: Seepage from the APA buttress drain outlet.

Photo 5: Ice covered Lynx TDF as viewed from the highwall.

Photo 6: Lynx TDF pumping area at the east abutment. Water level is nominally around target levels for pumping.

Photo 7: Downstream south face of Lynx TDF

Photo 8: Instrumentation maintenance work in the Lynx Hut.

Photo 9: LLDD debris basin clear of accumulation.

Photo 10: Minor ice and snow in the LLDD channel.

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	04 April 2019	Date of Memo:	25 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	High scattered overcast.		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Lynx TDF is at Maximum Normal Operating Water Level. Maintain water levels at or below the current level (355.0 m) in accordance with operating guidance and in response to the apparent expansion of the sinkhole diameter.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions. Note – this inspection is the "March" inspection, deferred due to availability in light of year-end reporting deadlines.

Old TDF

- APA has no significant standing water. Decants clear and functioning.
- Surge pond level is at the decant rim, per design.
- Minor ponded water in the East Strip (normal).
- East Strip boils are dry. Sedimentary patterns around the springs suggest flow may have reversed with the springs acting as sinks (groundwater levels lower than surface water levels).
- DDSD is dry.

Lynx TDF

- About 1/3 of the facility around the treatment pond sludge output location is slimes on surface. The rest of the facility is covered in shallow water, estimated less than about 1 m deep.
- Staff gauge has been installed. Pond level is 355.0 m, which is maximum Normal Operating Water Level.
- Minor surface water inflows from WRD 2.
- Lynx sinkhole is clearly visible and has expanded in diameter. Depth appears similar to previous observations. Expanded diameter is likely due to weak strength of treatment pond slimes.
- Minor intermittent cracking noted about 1.5-3.0 m from the upstream crest in the vicinity of Plane F. Cracks are open up to about 5 mm, no apparent vertical offset. No other significant cracking noted on upstream or downstream crests.
- Low flow from the Lynx Springs Drain
- No seepage noted on the downstream slope or toe.

Diversion Ditches

- Minor debris in the base of the LLDD debris net. Debris basin is clear.
- LLDD clear and functioning. Low to moderate flow.
- Concrete cloth liner has blistered up at the existing tear in the LLDD concrete cloth near the top of DD Hill. Bottom of the panel with the tear is delaminated and flow appears to be passing below the liner.
- Delamination damage noted on the terminal steep section near the Old TDF east abutment. Repairs will be needed.

Waste Dumps

- Waste dumps were not reviewed.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

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Photographs

Photo 1: Old TDF – East Strip looking west from the corner.

Photo 2: East Strip boils are dry. Some indication that flow may have reversed, with these springs acting as sinks.

Photo 3: East Strip viewed from the DDSD outlet at the east abutment.

Photo 4: Old TDF Surge Pond, with water level at the design intent.

Photo 5: Lynx TDF sinkhole. The diameter is much larger than prior observations.

Photo 6: Pumping area in Lynx TDF, with new staff gauge.

Photo 7: New staff gauge in Lynx TDF. Water level is 356.31 – (2.00 – 0.69) = 355.00 m, which is the maximum Normal Operating Water Level.

Photo 8: Low flow in the Lynx Springs Drain

Photo 9: LLDD clear and functioning.

Photo 10: Example delamination near the terminal section of the LLDD.

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	25 April 2019	Date of Memo:	25 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	High, thin overcast. Temperatures 4° in the morning, highs of 15°		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Clear the trash rack on the inlet of the culverted section of the ULDD.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- APA surface is free of significant ponding. Decants functioning as intended.
- Significant recent erosion in the large gully below WRD 6 (from beneath large boulder in the head of the ditch)
- Light flow from various LLDD subdrains. Moderate flow from one of the two drains at the APA East Abutment.
- Light seepage at the DDSD, likely from water entering the top of the drain near the exit.
- Several L/s flowing from each of the APA Buttress subdrains in the East Strip.
- Water infiltrating from surface through the seepage boil area in the East Strip (groundwater level below surface water level)
- Minor ponding in the East Strip, retained by sediment from the backfill plant overflow lines.
- Light seepage from the Pump House Spring (upslope of the pump house on the abutment contact).
- Moderate seepage from the Wet Well Spring (immediately adjacent to the northwest side of the pump house wet well).
- Trees growing around outer drain risers near Pumphouse 4. Consider clearing them as a maintenance activity.
- Minor ponding on the flat bench of the Seismic Upgrade Berm.
- 6H:1V slope of the Seismic Upgrade Berm has a significant number of alder, fir, and hemlock seedlings starting.
- Piping and other materials have been removed from the west end of the Seismic Upgrade Berm.
- Old TDF Surge Pond water level is at the decant sill, as designed. Plate covering the damaged low level outlet valve appears to be holding back water with only minimal leakage.
- Pond liner is free of apparent damage.
- Impounded water is very red but appears relatively clear near the surface.

Lynx TDF

- Water level is at 355.0 m (0.69 m on the staff gauge). Dredgate is exposed at surface near the sludge deposition point and inundated by shallow water elsewhere.
- Sinkhole has been filled by dredging slimes and is not visible.
- Minor surface water inflows from WRD 2 near the east abutment and above the Lynx Springs Drain catchment.
- Sediment observed in the outlet of the Panel 15 Spring Drain.

- Small amount of ponding occurring in the foundation area in Panels 7 and 13.

Diversion Ditches

- Moderate flow in LLDD. Moderate flow from the Alder Reach waterfalls.
- ULDD has moderate flow. Minor woody debris, nothing beyond normal maintenance requirements.
- Trash rack at the inlet of the culverted section of the ULDD is mostly blocked by gravel and needs cleaning.
- Erosion/deposition at transition between Upper Arnica and Lower Arnica ditches has damaged the geomembrane liner beyond functionality. The ditch still functions to divert peak flows, but low flows likely escape via groundwater to Lynx Upper Pit.

Waste Dumps

- Waste Rock Dump 2 was reviewed for signs of instability. Review focussed on steeper slopes around the proposed 2019 work areas. No indications of active instability were noted. Conditions were consistent with previous reviews.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

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Photographs

Photo 1: Subdrain flow at the APA East Abutment

Photo 2: Active gully erosion on the APA below WRD 6

Photo 3: Surface water flowing into the East APA seepage boils area.

Photo 4: Shallow pond in the East Strip area.

Photo 5: Lynx TDF overview from above WRD 3. Sinkhole is absent.

Photo 6: Panorama of Lynx TDF from the East Arm near the pumping station. Water level is approximately 355.0 m (NOWL).

Photo 7: Damaged geomembrane liner at the Upper Arnica/Lower Arnica Diversion transition.

Photo 8: ULDD between Stream 1 and Stream 2, roughly above 5L East portal, looking downstream (east).

Photo 9: Terminal reach of the LLDD, just downstream of Alder Reach, looking upstream (west).

Photo 10: Trees growing around outer drain risers.

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	20 May 2019	Date of Memo:	25 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	High overcast, 12-16°		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Remove dumped waste piles situated within 30 m of the APA Berm Crest as noted near Plane C.
2. Remove Scotch broom infestation on the Old TDF Surge Pond spillway fuse plug.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- APA surface free of significant accumulation of surface water. Minimal flow in decants. Decants clear and functioning as intended. Some corrosion of trash rack bars noted.
- Water level in the old decant is estimated 6 m below ground surface.
- Water in sump hole immediately upstream of APA Spillway Culverts. Shallow water in East Strip in the vicinity of Plane C.
- Estimated 0.5 L/s discharge from LLDD subdrain at the APA East Abutment. APA Buttress drains have minor flows, likely totalling similar flow rate.
- Pump house springs are dry (on the dam abutment approximately 50 m upslope of the pump house). Wet well springs are flowing estimated 0.5 L/s (immediately northwest of the pump house).
- No significant puddling or ponding on the Seismic Upgrade Berm.
- Waste dumped near APA Berm crest in the vicinity of Plane C. Must be removed per stability requirements.
- APA spillway inlet inspected for indications of piping erosion. None found.
- Cake piles dumped near the apex of the APA. Must be spread when necessary to comply with the stockpiling plan.
- Scotch broom infestation noted on the Surge Pond spillway fuse plug.

Lynx TDF

- Water level is at 0.71 on the staff gauge (355.02 m), 2 cm above maximum Normal Operating Water Level.
- Sinkhole is visible in similar location and size as the inspection of 04 April 2019.
- Reviewed the dam crest for cracking. Cracking near Plane F consistent with prior observations. No additional cracking noted.
- Minor areas of puddling at the dam toe, mainly Panel 7 and 13. No significant seepage or runoff at the toe.
- Downstream slope appears as constructed. No sags/cracks/bulges.
- Twin tails line was freshly broken at the time of the inspection, discharging clear water on the dam crest at the west abutment. Repairs were underway.

- Recent slurry tailings deposition near Plane E from the south arm. A small, partially subaerial beach has developed. Mud wave formation in the dredgate is apparent up to about 150 m from the spigot.
- Estimated 20 L/s surface water inflow from WRD2 to Lynx TDF from above the Lynx Springs Drain capture zone.
- Lynx Springs drain has low flows.
- Operations spillway armour removal (for 2019 dam raise construction) is nearly complete.

Diversion Ditches

- Arnica Diversion dry.
- Low flow in ULDD upstream of the culverted section. Trash rack on culvert has been cleared per prior month's inspection items.
- Moderate flow in the ULDD below Stream 1. Minor rockfall debris in ULDD between Stream 2 and Stream 3 (upslope of WRD 2). Normal maintenance item.
- Leaning tree and a minor slough from the cut slope of the ULDD downstream of WRD 2 area. Normal maintenance item.
- Low to moderate flow in LLDD. LLDD is clear and functioning normally. Debris net and debris basin are free of debris.

Waste Dumps

- Work areas in WRD 2 were reviewed (WRD 2 Phase 2 Area 1). Removal is progressing from top-down by dozing. Areas below the pushing front are at the angle of repose, ~37°. Minor tension cracking within about 1.5 m of the loose face. No other indications of instability. Recommended pushing obliquely across the hill to the southeast instead of directly south/downslope in order to move the waste to the proposed load-out area.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

Photographs

Photo 1: Waste piles to be removed from within 30 m of the APA Berm near Plane C. Prohibit further dumping in this area.

Photo 2: Volunteer seedlings on the APA 6H:1V slope.

Photo 3: Corrosion damage to the trash rack at the APA West Decant

Photo 4: Looking down the old APA Decant. Water level in the tower is related to local groundwater phreatic level.

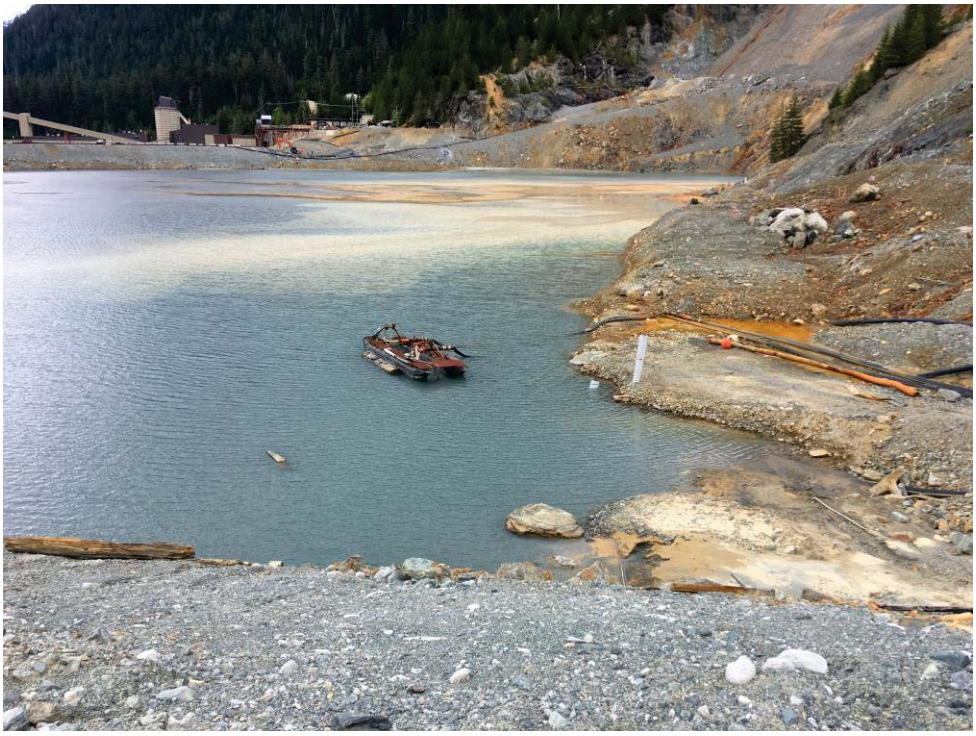

Photo 5: Lynx TDF pumping area. Water level at 0.71 m on the gauge, 355.02 m elevation.

Photo 6: View from above the Lynx Springs Drain capture area showing slurry tailings deposition point on the south arm of the dam near Plane E and mud wave formed in dredgate following slurry deposition.

Photo 7: Lynx Sinkhole viewed from 10L East portal

Photo 8: Low flow in the Lynx Springs Drain.

Photo 9: LLDD debris basin is clear of sediment/debris.

Photo 10: Myra Creek at the toe of the Old TDF. Scotch broom on the fuse plug in the Old TDF Surge Pond Spillway (at left).

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	11 June 2019	Date of Memo:	25 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	Sunny. Temperature 16° on arrival, afternoon highs of 28°.		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Reduce the water level in Lynx TDF to the maximum Normal Operating Water Level (355.0 m elevation).

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- APA surface is free of standing water and has commenced desiccation cracking due to the prevailing drier weather.
- LLDD subdrain at the APA Berm east abutment continues to flow at ~0.5 L/s.
- Minor ponding is present in the East Strip near the east abutment. The seepage boils area is not active. Water is likely from recent rainfall combined with flow from the LLDD subdrain noted above, and appears to be infiltrating into the tailings surface.
- Materials stockpiled adjacent to the APA Berm near Plane C have been removed and/or satisfactorily regraded.

Lynx TDF

- Lynx TDF water level is at 1.88 m on the staff gauge, 356.19 m elevation, 1.19 m above maximum Normal Operating Water Level. Reduce and maintain the water level as close as practical to 355.0 m elevation.
- Sinkhole is faintly visible, partly obscured by water depth.
- Spillway armouring has been removed for construction. Foundation preparation and continuation of the raise to 365.1 m (started in 2018) are underway.

Diversion Ditches

- LLDD debris basin and net are clear of debris. Moderate flow in LLDD.
- Upper diversions not inspected.

Waste Dumps

- The active construction area of WRD 2 Phase 2, Area 1 was inspected. Work to remove the dump from the top down was proceeding without indications of instability. The slope below the ULDD was being trimmed at 1.5H:1V and had not yet encountered natural ground.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

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Photographs

Photo 1: Overview of the APA and LLDD from the crest of WRD 6.

Photo 2: Shallow ponded water in the East Strip near the east abutment.

Photo 3: Dessicated surface of the APA, near the East Decant.

Photo 4: Stockpiles along the APA Berm crest removed. Some material was used to regrade the area and fill the closed depressions near the crest.

Photo 5: Water level in Lynx TDF is 1.88 on the staff gauge, 356.19 m elevation. Maximum Normal Operating Water Level is 355.0 m.

Photo 6: Panorama of Lynx TDF from 10L East portal. The sinkhole is faintly visible. Slurry tailings are depositing near Plane E on the South Arm, with the apex of the beach marginally above water level.

Photo 7: Spillway armouring fully removed. Excavation for raise foundation preparation is underway in Panel 4 area.

Photo 8: Removal of Waste Rock Dump 2 Phase 2, Area 1 is underway. The slope below the diversion is being trimmed at 1.5H:1V. Natural ground has not been encountered.

Photo 9: LLDD at the crest of the concrete cloth section. Debris net is clear (inset).

Photo 10: LLDD subdrain at the APA east abutment continues to flow at an estimated 0.5 L/s, similar to spring levels.

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	July 2019 (see below)	Date of Memo:	27 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	Sunny, seasonably warm, daytime highs in the upper 20s – all three dates in question.		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Reduce the water level in Lynx TDF to the maximum Normal Operating Water Level of 355.0 m and maintain this condition.
2. Remove windrows on the Old TDF Seismic Upgrade Berm and considering permanently closing the route to traffic (windrow was removed prior to 29 July).
3. Specific actions relative to the Superpond and Polishing Ponds are not given here; however, as noted below some deficiencies were noted. These deficiencies should be considered in work being carried out to address the regulatory compliance plan.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

This inspection was carried out on 22, 23, and 29 July 2019. The scope of inspection included Superpond and the Polishing Ponds. These structures should be inspected again in the wet season, preferably during passage of a significant rainfall event, in order to review their function under more demanding conditions.

Old TDF

- The Old TDF is free of significant ponded water. The surface of the APA is desiccating in the summer weather.
- Tailings are being removed from the apex of the APA for use in Lynx TDF construction. Nyrstar indicated the intent is to replace the excavated materials with filter cake.
- The APA Decants and spillway culverts are clear. There is no flow due to the dry summer conditions.
- The Surge Pond water level is at the decant sill elevation, as per design intent. The water is relatively clear with the submerged buttress in the east end of the pond clearly visible.
- Grading activities on the Old TDF Seismic Upgrade Berm have created a windrow along the haul route (22 July). The windrow is up to about 0.4 m high and would pond significant water. The road surface has been carved down several centimetres below the adjacent surface. Given the sensitivity of the area to drainage and ponding of water, and the design intent that it shed runoff, Wood recommends regrading to remove these windrows (competed prior to 29 July) and then permanently closing the Upgrade Berm as a haul route/road. Vehicle access should be for maintenance of the area only, with the exception of access to the helicopter area near 0+700. Consideration could be given to accessing the helicopter area from the OEB via the side of the Operations Spillway or by a new designated route constructed down the 6H:1V slope.

- The wet well springs at Pump House 4 are flowing at an estimated 0.5 L/s. The pump house springs (located about 50 m up slope on the abutment contact) are not flowing.
- Scotch broom infestation has been removed from the Surge Pond fuse plug. Monitor the area for further sprouting and/or regrowth.

Lynx TDF

- Pumping has been moved from the east abutment to the west abutment, in order to move it away from the future tailings beach. The pumps discharge in the mill ditching system.
- A new staff gauge has been established at the new pumping area. The gauge is a freeboard gauge and is numbered from top-down. 2.00 m on the gauge is surveyed as 355.77 m, therefore the maximum normal operating water level is 2.77 m on the gauge.
- Water level in the evening of 22 July was about 1.85 m on the gauge = 355.77 + (2.00 – 1.85) = 355.92 m.
- Water level in the afternoon of 23 July was about 2.01 m on the gauge, 355.78 m.
- Water level in the afternoon of 29 July was about 2.40 m on the gauge, 355.37 m. Water clarity at the pumping area was very turbid below 4 cm depth. At this water elevation, most of the impoundment has dredgate exposed at the surface. Pumping to 355.00 m elevation may require improvements to the pump area to limit sediment ingress. Lower portions of the gauge are difficult to read due to sediment deposited on the face.
- The sinkhole is visible in a location and size consistent with recent observations (all dates noted above).
- Work is underway to place a platform for the upstream beach. Fill placement is resulting in significant displacement of dredgate, and a mud wave approximately 50-100 m wide. There are indications of upwelling groundwater in response to consolidation at the toe of the fill.
- Cracking is present roughly parallel to the dam crest in the vicinity of Plane E to Plane F, 1.5-3.0 m from the upstream crest, adjacent to the work area below. The cracks are discontinuous and open up to about 1 cm, without significant apparent vertical offset. The cracking is interpreted as primarily horizontal strain resulting from consolidation settlement of the toe of the embankment due to the placement of fill at the toe. Construction staff are reviewing the cracks multiple times daily to check for signs of changing conditions.
- Construction on the downstream side continues. The working bench is about half way up the dam across the south arm and part of the west arm.
- Seepage or surface runoff were not observed on the downstream side of the embankment.
- Low flows at the Lynx Springs Drain.

Diversion Ditches

- Low flow in the LLDD.
- The LLDD debris basin and net are clear of alluvium or debris.
- Significant and wide-spread delamination are present between shingles of the LLDD concrete cloth liner in many areas. The LLDD should be subjected to a thorough condition assessment and repair program before the wet season flows commence. The LLDD is a critical structure and these repairs must not be deferred.
- Alder reach waterfalls are dry.

Waste Dumps

- Waste dumps were not reviewed.

Superpond

- The downstream side of the embankment is near angle of repose in several areas. There are no indications of active instability in those areas. Future upgrades should include reconstruction of the downstream slope at stable slope angles.
- The downstream side of the embankment has coniferous trees growing in some areas. These trees are currently unlikely to adversely affect dam performance; however, if they were to become fully mature there could be some potential concern about root penetration.

- The corrugated steel pipe culverts between the secondary sump weir box on the upstream side and the secondary outlet sump on the downstream side are in poor condition. The inlets are badly corroded and partially blocked by rockfill. Two of the three culverts have HDPE pipes routed through them, a practice which should be abolished when the culverts are intended for water conveyance. Corrugated steel piping should not be used for conveyance of waters which are potentially corrosive to steel.
- The secondary outlet sump on the downstream side has been undermined during overtopping events. The slope below the sump is eroded and rests near the angle of repose. This configuration is not robust relative to the intended function. Future upgrades should consider a more robust sump.
- A variety of unknown and partially abandoned piping is present in both the upstream and downstream sides of the embankment. Some lines appear to penetrate the embankment. Disused lines should be removed or filled with grout.
- The HDPE liner is generally in good condition, but has several significant tears above the normal water level on the south side, and a number of minor tears or punctures elsewhere. Liner repairs should be undertaken.
- This inspection did not include condition review or testing of control structures/valves/etc. This equipment must be tested at least once per year as part of the annual dam safety inspection. Schedule this testing for the wet-season inspection.

Polishing Ponds

- The polishing pond embankments were reviewed for indications of instability. No obvious cracks, sags, or seepage were noted.
- All pond levels are below their indicated minimum freeboard markings.
- Pond 2A is partially dredged, with cut lines from the dredge clearly visible. The other ponds appeared to be more thoroughly dredged.
- Decant structures are in generally poor condition. They are timber structures and most show at least some signs of rot or damage. Internal bracing or loose boards may interfere with conveyance of peak flows. Control of water levels via stop logs (as intended) is not currently possible at several of the decants.
- The condition of the conveyance culverts could not be assessed. Some of the conveyance pipes appear to be HDPE while others appear to be corrugated steel pipe. The use of metal pipes should be reviewed relative to potential corrosion. Future upgrades should consider potential corrosion as a key design constraint.
- The diversion ditch on the slope above the ponds was reviewed. The ditch appears to be cut in large, open-graded talus. The sides of the ditch are oversteepened relative to the natural angle of repose. Rocks in the ditch were moss-covered, and there were shrubs and trees growing on the ditch and retaining embankment. Apart from ravelling there were no indications of major instability. The ditch does not appear to have conducted significant flows of water and given the substrate material it is unlikely that it ever would. The ditch should not be relied upon for water conveyance; however, any study considering inflows from the hillside should consider high infiltration rates and the influence of infiltrated runoff on valley-bottom aquifer levels.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

Photographs

Photo 1: Family of deer on the toe of the Seismic Upgrade Berm

Photo 2: Tailings excavation at the apex of the APA for use in Lynx TDF construction.

Photo 3: Windrow on the Seismic Upgrade Berm (22 July). This was regraded prior to 29 July.

Photo 4: Overview of the APA looking east, from the WRD 6 Toe Haul Road.

Photo 5: Staff gauge in Lynx TDF. Clear water level is 2.40 on the gauge. Sediment laden water level is 2.44 on the gauge. (29 July)

Photo 6: Panorama of Lynx TDF (29 July)

Photo 7: Construction on the upstream toe of the Lynx TDF dam raise (22 July).

Photo 8: Indications of upwelling groundwater at the upstream toe of Lynx TDF construction, in response to consolidation (22 July)

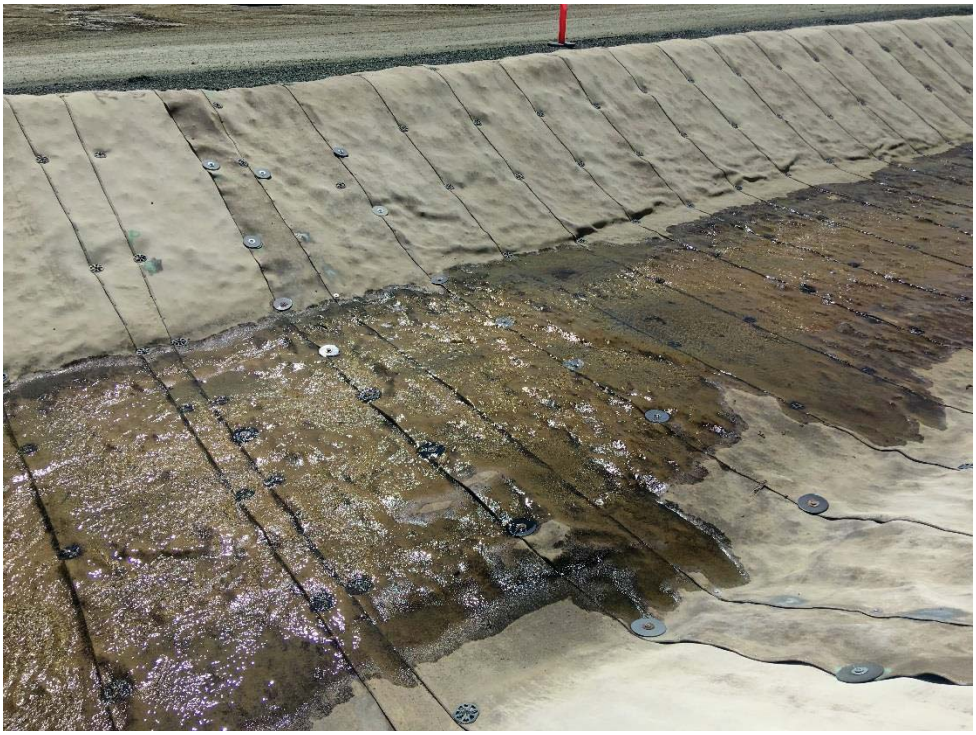

Photo 9: Example delaminated area in the LLDD.

Photo 10: Closeup view of a delamination.

Photo 11: Poor condition of the upstream sump box for the secondary Superpond outlet.

Photo 12: Undermined condition of the secondary outlet sump on the downstream side of the Superpond embankment.

Photo 13: Example of a tear in the Superpond liner, this one just east of the primary outlet.

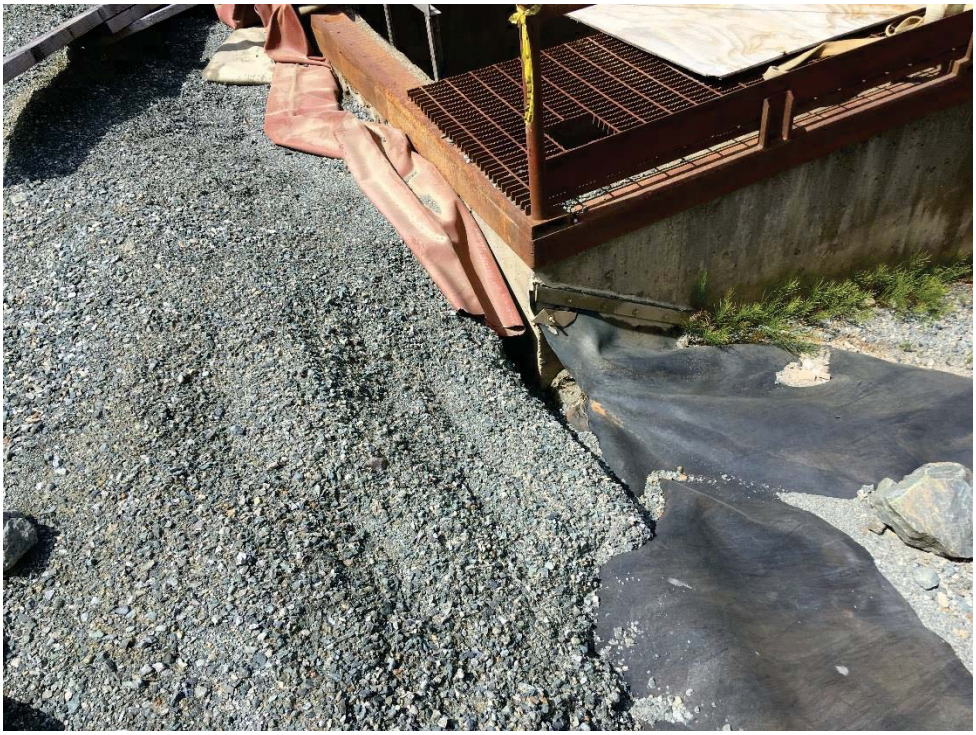

Photo 14: Tears in the Superpond liner where joined to the primary sump box.

Photo 15: Example of stray disused pipes just above the Superpond liner.

Photo 16: View of the north end of Pond 2A. Marks from dredging are clearly visible.

Photo 17: Example of a timber decant in poor condition.

Photo 18: Wood debris partially blocking the decant shown above. This debris would be difficult ot remove safely.

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	20 August 2019	Date of Memo:	27 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	n/a	Cc:	
Weather:	High overcast/sunny, temperatures in the mid 20s.		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Maintain Lynx TDF at or below maximum Normal Operating Water Level of 355.0 m
2. Monitor the condition of the trash racks in the APA east and west decants and at the Surge Pond decant. Consider replacement with non-corrodible materials.

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- The APA and Strip area were free of standing water. There was no flow from the DDSD or east strip seepage areas.
- There was minimal seepage at the wet well springs (at Pumphouse 4).
- The APA decant trash racks have corroded (see Photo 3). The condition of the trash racks in these decants and in the Surge Pond decant should be monitored, and they should be replaced if necessary using non-corrodible alternatives.
- The Surge Pond decant low level outlet appears to be adequately plugged by the plate over the outside of the tower. Only minimal seepage from the outlet was observed.
- Water level in the old APA Decant is estimated at about 6 m below the adjacent tailing surface.

Lynx TDF

- Water level is at 2.22 m on the gauge = 355.55 m elevation. Maximum Normal Operating Water Level is 355.0 m. The pond should be lowered and maintained below that level.
- Paste deposition from the east arm of the dam has commenced. The paste appears to be of a suitable consistency/water content as compared to past observations prior to mine shut-down. The paste is displacing the dredgate, forming a significant mud wave.
- Construction of the base lift/working bench of the upstream raise is complete. Further raising has been deferred pending additional stability analysis of the upstream slope configuration. Some minor cracking was noted at the outside edge of the lift on the west arm near Plane D and on the south arm near Plane F, likely due to consolidation settlement. The cracks are open up to about 2 mm and there is no apparent height difference across them.
- Construction on the downstream face continues. The bench on the south arm is approximately 2/3 of the dam height. The former operational spillway has been filled to 362.5 m elevation.
- Dredge pump lines are being rerouted up over the rock bluff at 10L East portal in preparation for construction at the west abutment.

- The sinkhole is somewhat visible, partly obscured by the water depth. The size and position appear consistent with prior observations.
- Cracks observed on the dam crest between Planes E and F have been obscured by fill handling necessary to construct the upstream slope. Cracking has re-formed near the instrument hut near Plane E. The new cracking is of similar size and extent as previously observed – crack openings up to about 4 mm and no apparent vertical displacement across the cracks.

Diversion Ditches

- LLDD is clear and functioning. Flows are low, although higher than normal for August.
- The LLDD debris net and basin were clear.
- The upper diversions were not reviewed due to access limitations. They should be inspected in early fall.

Waste Dumps

- Waste dumps were not reviewed.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

Photographs

Photo 1: Old TDF viewed from near the East Decant. Surface has dessicated in the summer weather.

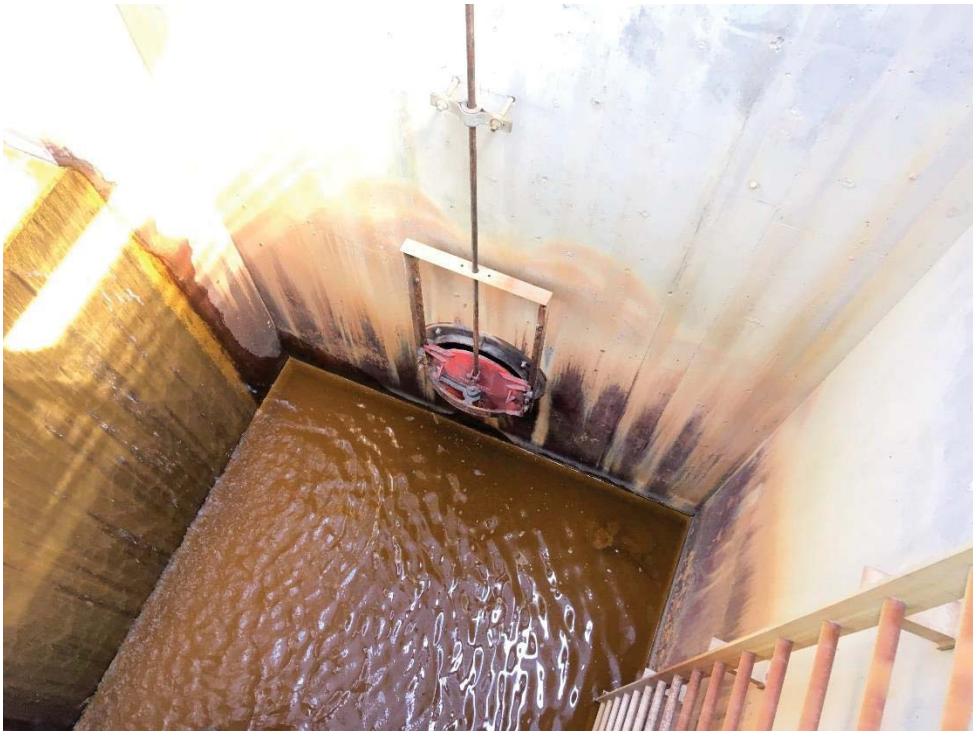

Photo 2: Patch over the Surge Pond low level outlet appears to be holding water with minimal leakage. The plate is likely blinded off by sediment.

Photo 3: Corroded trash rack bars on the APA West Decant. East Decant is in similar condition.

Photo 4: Paste deposition has commenced from the east arm of Lynx TDF Dam. The paste is displacing the dredgate, creating a significant mud wave.

Photo 5: Water level in Lynx TDF is at 2.22 m on the gauge = 355.55 m. NOWL is 355.0 m.

Photo 6: View of Lynx TDF from the 10L portal. The base lift/platform on the upstream side is complete. Construction on the upstream side has stopped pending additional stability modeling of the upstream slope configuration. Mud wave from paste deposition is visible.

Photo 7: Construction of the downstream shell continues.

Photo 8: The ultimate final downstream crest of Lynx TDF Dam has been marked on the cliff above 10L East portal. Dam centreline is several metres on the other side of the portal.

Photo 9: LLDD is clear. Flows are relatively low, albeit higher than usual for August.

Photo 10: LLDD debris net is clear and in good condition.

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Myra Falls Mine
Tailings Facility Field Review Report

Date of Field Review:	17 September 2019	Date of Memo:	27 September 2019
File No.:	NX14001B1	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Keith Watson, P.Eng.
With:	Dixie Ann Simon, P.Eng. Bryan Woods, P.Eng.	Cc:	
Weather:	Showers changing to rain, heavy at times. Temperatures between 10-20°		

Summary

- The Old TDF and Lynx TDF facilities were reviewed by Wood.
- Action Items:

1. Monitor cracking along the upstream slope of Lynx TDF.
2. Inspect LLDD repairs during/after high flows.
3. Spread the cake piles at the apex of the APA into the adjacent excavations if practical (if weather allows).

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a monthly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

Old TDF

- The APA has normal water levels, with flow along the APA Berm into the east and west decants.
- The water level in the Old TDF decant is near the elevation of the tailing surface.
- The APA west decant is flowing at moderate rates, with turbid, sediment-laden water.
- The Surge Pond water level is just above the decant sill, per design. The water is red in colour and the surface appeared relatively clear. Water discharging through the decant tower is relatively clear.
- Fill has been advanced from the laydown area in the west end of the APA across one of the significant gullies. Gullies should be filled with tailings materials to reduce the potential for formation of preferential seepage pathways during closure. Details to provide groundwater cut-off will need to be provided during the cover detailed design phase. Alternately, exhume the fill from the gully and fill it with tailings.
- Tailings cake remains piled at the apex of the APA, adjacent to the excavation that was created during the summer for a source of Lynx TDF construction materials. The cake piles should be spread into the excavations if practical.
- The APA Operations Spillway inlet area has been the subject of piping erosion in the past. The area is currently free of indications of continued piping erosion – prior interim repairs appear to be performing.
- The East Strip has a shallow depth of ponded water, controlled by the spillway culvert inlets and by a fan of material deposited from the backfill plant overflow lines.
- The DDSD and East Strip groundwater boils area are not flowing.
- The LLDD subdrain at the APA east abutment is flowing at about 0.5 L/s, consistent with past observations. It flowed at similar rates all summer, suggesting LLDD leakage is responsible for the source of the flow (as opposed to hillside groundwater sources).

Lynx TDF

- Water level is as low as practically attainable, with dredgate slimes exposed across most of the impoundment surface.
- Sinkhole is visible. The location and size are consistent with prior observations since April 2019.
- Paste tailings deposition near the southeast corner continues. The tailings are displacing dredging slimes; however, there are islands and strips of dredgate trapped between deposition lobes.
- Cracking is present along the upstream crest, between about 2-3 m from the edge, primarily from Plane E to the east. The cracks were intermittent and open up to about 5 cm, with similar displacement across the. The cracks are thought to be likely due to consolidation settlement but should be monitored.
- Some ponding of water is present at the toe of the south arm in Panel 13 area. The area should be drained by pumping, as in past years.
-

Diversion Ditches

- LLDD is flowing at moderate levels.
- LLDD debris basin and net are clear of debris.
- Repairs have been made to the LLDD punctures and delaminations. Moderate flows preclude thorough inspection to see if all issues have been addressed. Repaired areas should be monitored for performance relative to high flows.

Waste Dumps

- Waste dumps were not reviewed.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

Photographs

Photo 1: Overview of the Old TDF. Fill has been advanced from the laydown area to the east, covering a significant gully. Gullies should be filled with materials consistent with the tailings in order to reduce formation of preferential seepage pathways at closure.

Photo 2: Cake material dumped above the excavations created during the summer. This material should be spread into the excavation if practical.

Photo 3: Moderate flow through the APA west decant. Note the turbidity of the water.

Photo 4: Old TDF Surge Pond water level is at the decant outlet, as intended.

Photo 5: Flow through the Surge Pond decant inlet. Note the clarity of the water relative to Photo 3. The Surge Pond appears to be settling tailings solids as intended. The current level of sediment in the pond and the future need for dredging should be evaluated.

Photo 6: Panorama of Lynx TDF from the 10L East portal. Water level is at the achievable minimum, with dredgate exposed across most of the surface. The sinkhole is visible with size and location consistent with prior observations.

Photo 7: Crack on Lynx TDF Dam upstream crest near Plane E. The crack has apparent opening up to about 5 cm and has an apparent vertical offset of similar magnitude. This crack should be monitored for further development.

Photo 8: Voids found along the continuation of the alignment of the crack shown in Photo 7.

Photo 9: LLDD debris basin is clear of sediment. LLDD has moderate flows.

Photo 10: Repairs in the LLDD near the crest of the DD Hill, at the site of a puncture and delamination. The puncture has been patched and the delamination has been sealed with a caulking-type compound. This area should be monitored for performance in high-flows.