



Photograph A4-3 Vault Dike

Date: July 29, 2022

Photo Number: 147

Description: From downstream, looking northwest at the downstream toe.



Photograph A4-4 Vault Dike

Date: July 29, 2022

Photo Number: 141

Description: From the west abutment, looking southeast at the crest.



Photograph A4-5 Vault Dike

Date: July 29, 2022

Photo Number: 142

Description: From the upstream side, looking southeast at the upstream slope.



Photograph A4-6 Vault Dike

Date: July 29, 2022

Photo Number: 143

Description: From the upstream side, looking northwest at the upstream slope.



Photograph A4-7 Vault Dike

Date: July 29, 2022

Photo Number: 145

Description: From the downstream side, looking southwest towards Vault Lake.

Appendix A-5

Wail-Tail Dike

| | | | |
|------------------|--------------------|------------------|--------------------|
| Client: | AEM | By: | Marion Habersetzer |
| Project: | Whale Tail Project | Date: | July 27, 2022 |
| Location: | Whale Tail Dike | Reviewed: | Yves Boulianne |

GENERAL INFORMATION

| | | | |
|----------------------------|---|---------------------|------|
| Dam Type: | Rockfill shell with cement-bentonite secant pile cut-off wall enclosed in fine and coarse filter layers. 10 m deep grout curtain in the bedrock in the western section of the dike. Downstream grout blanket at bedrock interface all along the dike. | | |
| Weather Conditions: | Sunny | Temperature: | 20°C |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|---|--|--|--|
| 1. DAM CREST | | 91, 92, 93, 95, 96, 98, 97, 99, 100, 101, 103, 107, 105, 102, 110, 111, 94 | |
| 1.1 Crest elevation | El. 159 m (rockfill) El. 157 m (cut-off wall) | | A 2 m rockfill thermal cap covers the cut-off wall (cement-bentonite secant piles) |
| 1.2 Reservoir level | U/S El. 155.2 m (Whale Tail South) | | Operational water level: 155.5 m |
| Current freeboard | 3.8 m (rockfill crest) 1.8 m (cut-off wall) | | |
| 1.3 Distance to tailings pond (if applicable) | Not applicable | | |
| 1.4 Surface cracking | Some at the East abutment | 94, 108, 109 | Associated to foundation thawing. Cracks parallel to center line (20 mm wide) depressions (500-700 mm) with some perpendicular to center line. |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|--|-------------------------------------|--|----------------------------------|
| 1.5 Unexpected settlement | Some at the East abutment | | Associated to foundation thawing |
| 1.6 Lateral movement | Not apparent | | |
| 1.7 Other unusual conditions | None | | |
| 2. UPSTREAM SLOPE | | 91, 95, 96, 99, 103 | |
| 2.1 Slope angle | 1.5H:1V(dike) 1.3H:1V (U/S berm) | | Adequate |
| 2.2 Signs of erosion | None observed | | |
| 2.3 Signs of movement (deformation) | None observed | | |
| 2.4 Cracks | None observed | | |
| 2.5 Face liner condition (if applicable) | Not applicable | | |
| 2.6 Other unusual conditions | None | | |
| 3. DOWNSTREAM SLOPE | | 93, 101, 105, 110, 111, 113, 114, 115, 117, 118, 119 | |
| 3.1 Slope angle | 1.5H:1V(dike) 1.3H:1V (D/S berm) | | Adequate |
| 3.2 Signs of erosion | None observed | | |
| 3.3 Signs of movement (deformation) | None observed | | |
| 3.4 Cracks | None observed | | |
| 3.5 Seepage or wet areas | None observed. | | |
| 3.6 Vegetation growth | No | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|---|-------------------|---|---|
| 3.7 Other unusual conditions | None | | |
| 4. DOWNSTREAM TOE AREA | | 93, 101, 105, 110, 111, 113, 114, 115, 117, 118, 119, 112 | |
| 4.1 Seepage from dam | Yes | 117, 118, 112 | Collected in a trench from Sta. 0+430 to 0+720. Seepage interception system pumping water compose of 4 pumping stations (inactive). Sta. 0+150, seepage in the road fill from the dyke toe (flow). |
| 4.2 Signs of erosion | None observed | | |
| 4.3 Signs of turbidity in seepage water | None | | All seepage water is clear |
| 4.4 Discoloration/staining | No | | |
| 4.5 Outlet operating problem (if applicable) | Not applicable | | |
| 4.6 Other unusual conditions | None | | |
| 5. ABUTMENTS | | | |
| 5.1 Seepage at contact zone (abutment/embankment) | None observed | | |
| 5.2 Signs of erosion | None observed | | |
| 5.3 Excessive vegetation | No | | |
| 5.4 Presence of rodent burrows | None observed | | |
| 5.5 Other unusual conditions | None | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|--|--|---------------------|-----------------------|
| 6. RESERVOIR | | 91, 95, 96, 99, 103 | |
| 6.1 Stability of slopes | Stable | | |
| 6.2 Distance to nearest slide (if applicable) | Not applicable | | |
| 6.3 Estimate of slide volume (if applicable) | None observed | | |
| 6.4 Floating debris | None | | |
| 6.5 Other unusual conditions | None | | |
| 7. EMERGENCY SPILLWAY/ OUTLET STRUCTURE | No spillway or outlet structure exists | | |
| 7.1 Surface condition | | | |
| 7.2 Signs of erosion | | | |
| 7.3 Signs of movement (deformation) | | | |
| 7.4 Cracks | | | |
| 7.5 Settlement | | | |
| 7.6 Presence of debris or blockage | | | |
| 7.7 Closure mechanism operational | | | |
| 7.8 Slope protection | | | |
| 7.9 Instability of side slopes | | | |
| 7.10 Other unusual conditions | | | |
| 8. INSTRUMENTATION | | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|--|-------------------|-------|---|
| 8.1 Piezometers | Yes | | 9 piezometer holes with each 3 instruments. See Section 4.1.2 of the report |
| 8.2 Settlement cells | No | | |
| 8.3 Thermistors | Yes | | 16 piezometers in the dike. See Section 4.1.2 of the report. |
| 8.4 Settlement monuments | No | | |
| 8.5 Seismograph | No | | |
| 8.6 Inclinator | Yes | | 4 shape array accelerometers. See Section 4.1.2 of the report. |
| 8.7 Weirs and flow monitors | Yes | | 1 V-notch weirs (0+430). The V-notch at Sta. 0+560 is not present anymore. |
| 8.8 Data logger(s) | Yes | | |
| 8.9 Other | No | | |
| 9. DOCUMENTATION | | | |
| 9.1 Operation, Maintenance and Surveillance (OMS) Plan | | | |
| 9.1.1 OMS Plan exists | Yes | | |
| 9.1.2 OMS Plan reflects current dam conditions | Yes | | |
| 9.1.3 Date of last revision | November 2021 | | |
| 9.2 Emergency Preparedness Plan (EPP) | | | |
| 9.2.1 EPP exists | Yes | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|---------------------------------------|--------------------|--------------|-----------------------|
| 9.2.2 EPP reflects current conditions | Yes | | |
| 9.2.3 Date of last revision | September 2021 | | |
| 10. NOTES | | | |
| Inspector's Signature | Marion Habersetzer | Date: | July 27, 2022 |



Photograph A5-1 Whale Tail Dike

Date: July 27, 2022

Photo Number: 115

Description: From approx. Sta. 0+250 downstream (P4 pumping station), looking east. A large amount of water is ponding.



Photograph A5-2 Whale Tail Dike

Date: July 27, 2022

Photo Number: 114

Description: From approx. Sta. 0+250 downstream (P4 pumping station), looking southwest. A large amount of water is ponding.



Photograph A5-3 Whale Tail Dike

Date: July 27, 2022

Photo Number: 116

Description: From approx. Sta. 0+600 downstream (P1 pumping station), looking southwest.



Photograph A5-4 Whale Tail Dike

Date: July 27, 2022

Photo Number: 103

Description: From approx. Sta. 0+725 (east abutment), looking southwest at the upstream slope.



Photograph A5-5 Whale Tail Dike

Date: July 27, 2022

Photo Number: 104

Description: From approx. Sta. 0+725 (east abutment), looking west at the crest.



Photograph A5-6 Whale Tail Dike

Date: July 27, 2022

Photo Number: 105

Description: From approx. Sta. 0+725 (east abutment), looking west at the downstream slope.



Photograph A5-7 Whale Tail Dike

Date: July 27, 2022

Photo Number: 102

Description: From approx. Sta. 0+700 (east abutment), looking west at the crest.



Photograph A5-8 Whale Tail Dike

Date: July 27, 2022

Photo Number: 99

Description: From approx. Sta. 0+575, looking west at the upstream slope.



Photograph A5-9 Whale Tail Dike

Date: July 27, 2022

Photo Number: 100

Description: From approx. Sta. 0+575, looking west at the crest.



Photograph A5-10 Whale Tail Dike

Date: July 27, 2022

Photo Number: 101

Description: From approx. Sta. 0+575, looking west at the downstream slope and downstream platform.



Photograph A5-11 Whale Tail Dike

Date: July 27, 2022

Photo Number: 111

Description: From approx. Sta. 0+400, looking west at the downstream slope and downstream platform.



Photograph A5-12 Whale Tail Dike

Date: July 27, 2022

Photo Number: 110

Description: From approx. Sta. 0+400, looking east at the downstream slope and downstream platform.



Photograph A5-13 Whale Tail Dike

Date: July 27, 2022

Photo Number: 98

Description: From approx. Sta. 0+400, looking west at the crest.



Photograph A5-14 Whale Tail Dike

Date: July 27, 2022

Photo Number: 97

Description: From approx. Sta. 0+400, looking east at the crest.



Photograph A5-15 Whale Tail Dike

Date: July 27, 2022

Photo Number: 95

Description: From approx. Sta. 0+400, looking west at the upstream slope.



Photograph A5-16 Whale Tail Dike

Date: July 27, 2022

Photo Number: 96

Description: From approx. Sta. 0+400, looking east at the upstream slope.



Photograph A5-17 Whale Tail Dike

Date: July 27, 2022

Photo Number: 91

Description: From approx. Sta. 0+200 (west abutment), looking northeast at the upstream slope.



Photograph A5-18 Whale Tail Dike

Date: July 27, 2022

Photo Number: 92

Description: From approx. Sta. 0+200 (west abutment), looking northeast at the crest.



Photograph A5-19 Whale Tail Dike

Date: July 27, 2022

Photo Number: 93

Description: From approx. Sta. 0+200 (west abutment), looking northeast at the downstream slope and downstream platform.



Photograph A5-20 Whale Tail Dike

Date: July 27, 2022

Photo Number: 113

Description: From approx. Sta. 0+200 on the downstream platform, looking northeast at the downstream slope and platform.



Photograph A5-21 Whale Tail Dike

Date: July 27, 2022

Photo Number: 118

Description: From approx. Sta. 0+430 downstream, looking west at the seepage collection trench. V-notch is not present anymore.



Photograph A5-22 Whale Tail Dike

Date: July 27, 2022

Photo Number: 117

Description: From approx. Sta. 0+450 downstream, looking east at the seepage collection trench and downstream toe.



Photograph A5-23 Whale Tail Dike

Date: July 27, 2022

Photo Number: 119

Description: From approx. Sta. 0+675 downstream, looking west at the downstream slope and platform.



Photograph A5-24 Whale Tail Dike

Date: July 27, 2022

Photo Number: 94

Description: From approx. Sta. 0+225 on the crest, looking northeast at the crest platform. Presence of a healing longitudinal tension crack.



Photograph A5-25 Whale Tail Dike

Date: July 27, 2022

Photo Number: 106

Description: From approx. Sta. 0+725 downstream, looking northwest at the downstream slope and platform.



Photograph A5-26 Whale Tail Dike

Date: July 27, 2022

Photo Number: 108

Description: From approx. Sta. 0+775 upstream, looking west at the crest platform. Presence of tension crack along upstream crest berm.



Photograph A5-27 Whale Tail Dike

Date: July 27, 2022

Photo Number: 109

Description: From approx. Sta. 0+775 downstream, looking west at the downstream crest and slope. Presence of a tension crack perpendicular to the dike.



Photograph A5-28 Whale Tail Dike

Date: July 27, 2022

Photo Number: 112

Description: From approx. Sta. 0+150 downstream, looking east at the downstream slope and platform. Water resurgence within the rockill (flow).

Appendix A-6

IVR Dike D-1

Client: AEM **By:** Marion Habersetzer
Project: Whale Tail Project **Date:** July 26, 2022
Location: IVR Dike **Reviewed:** Yves Boulianne

| GENERAL INFORMATION | | | |
|----------------------------|---|---------------------|------|
| Dam Type: | Rockfill shell with a LLDPE geomembrane liner tied in a fine filter amended with bentonite key trench and an upstream thermal berm. | | |
| Weather Conditions: | Cloudy | Temperature: | 10°C |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|---|-----------------------------------|--|---|
| 1. DAM CREST | | 8, 9, 10, 11, 13, 12, 14, 16, 18, 20, 21, 22, 24, 23 | |
| 1.1 Crest elevation | El. 165.5 m (rockfill and liner) | | |
| 1.2 Reservoir level | U/S El. 161.92 m | | IVR Attenuation Pond |
| Current freeboard | 3.58 m (rockfill crest and liner) | | Max. operational water level: 163.2 m |
| 1.3 Distance to tailings pond (if applicable) | Not applicable | | |
| 1.4 Surface cracking | Yes | | Likely related to rockfill and shallow foundation thawing after winter construction. Cracks 1-2 m long. |
| 1.5 Unexpected settlement | Yes | | Likely related to rockfill, esker and shallow foundation thawing after winter construction. Settlement of about 200 to 300 mm |
| 1.6 Lateral movement | Not apparent | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|--|-------------------|---------------------------|--|
| 1.7 Other unusual conditions | None | | |
| 2. UPSTREAM SLOPE | | 9, 10, 11, 13, 12, 15, 14 | |
| 2.1 Slope angle | 2H: 1V | | Adequate |
| 2.2 Signs of erosion | None observed | | |
| 2.3 Signs of movement (deformation) | None observed | | |
| 2.4 Cracks | None observed | | |
| 2.5 Face liner condition (if applicable) | Not observed | | Liner covered in a fine filter protection layer. |
| 2.6 Other unusual conditions | None | | |
| 3. DOWNSTREAM SLOPE | | 9, 18, 20, 21, 22, 24 | |
| 3.1 Slope angle | 2H:1V | | Adequate |
| 3.2 Signs of erosion | None observed | | |
| 3.3 Signs of movement (deformation) | None observed | | |
| 3.4 Cracks | None observed | | |
| 3.5 Seepage or wet areas | None observed. | | |
| 3.6 Vegetation growth | None | | |
| 3.7 Other unusual conditions | None | | |
| 4. DOWNSTREAM TOE AREA | | 8, 18, 20, 21, 22, 24 | |
| 4.1 Seepage from dam | None observed | | Little water ponding at the toe. No flow observed. |
| 4.2 Signs of erosion | None observed | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|---|-------------------|----------------|-----------------------|
| 4.3 Signs of turbidity in seepage water | None | | |
| 4.4 Discoloration/staining | No | | |
| 4.5 Outlet operating problem (if applicable) | Not applicable | | |
| 4.6 Other unusual conditions | None | | |
| 5. ABUTMENTS | | | |
| 5.1 Seepage at contact zone (abutment/embankment) | None observed | | |
| 5.2 Signs of erosion | None observed | | |
| 5.3 Excessive vegetation | None | | |
| 5.4 Presence of rodent burrows | None observed | | |
| 5.5 Other unusual conditions | None | | |
| 6. RESERVOIR | | 15 | |
| 6.1 Stability of slopes | Stable | | |
| 6.2 Distance to nearest slide (if applicable) | Not applicable | | |
| 6.3 Estimate of slide volume (if applicable) | None observed | | |
| 6.4 Floating debris | None | | |
| 6.5 Other unusual conditions | None | | |
| 7. EMERGENCY SPILLWAY/ OUTLET STRUCTURE | | 19, 16, 17, 18 | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|-------------------------------------|-----------------------------------|-------|----------------------------------|
| 7.1 Surface condition | Good | | |
| 7.2 Signs of erosion | None | | |
| 7.3 Signs of movement (deformation) | None | | |
| 7.4 Cracks | None | | |
| 7.5 Settlement | None | | |
| 7.6 Presence of debris or blockage | Yes, piping in the lower spillway | | |
| 7.7 Closure mechanism operational | None | | |
| 7.8 Slope protection | None | | |
| 7.9 Instability of side slopes | None | | |
| 7.10 Other unusual conditions | None | | |
| 8. INSTRUMENTATION | | | |
| 8.1 Piezometers | No | | |
| 8.2 Settlement cells | No | | |
| 8.3 Thermistors | Yes | | See Section 4.3.2 of the report. |
| 8.4 Settlement monuments | No | | |
| 8.5 Seismograph | No | | |
| 8.6 Inclinator | No | | |
| 8.7 Weirs and flow monitors | No | | |
| 8.8 Data logger(s) | Yes | | |
| 8.9 Other | No | | |
| 9. DOCUMENTATION | | | |

| INSPECTION ITEM | OBSERVATIONS DATA | PHOTO | COMMENTS & OTHER DATA |
|--|---------------------|--------------|-----------------------|
| 9.1 Operation, Maintenance and Surveillance (OMS) Plan | | | |
| 9.1.1 OMS Plan exists | Yes | | |
| 9.1.2 OMS Plan reflects current dam conditions | Yes | | |
| 9.1.3 Date of last revision | November 2021 | | |
| 9.2 Emergency Preparedness Plan (EPP) | | | |
| 9.2.1 EPP exists | Yes | | |
| 9.2.2 EPP reflects current conditions | Yes | | |
| 9.2.3 Date of last revision | September 2021 | | |
| 10. NOTES | | | |
| Inspector's Signature | Marion Habersetzner | Date: | July 26, 2022 |



Photograph A6-1 IVR Dike D-1

Date: July 26, 2022

Photo Number: 9

Description: From approx. Sta. 0+540 (east abutment), looking west at the crest (thermal cap) and upstream slope.



Photograph A6-2 IVR Dike D-1

Date: July 26, 2022

Photo Number: 8

Description: From approx. Sta. 0+540 (east abutment), looking west at the crest (thermal cap) and downstream slope.



Photograph A6-3 IVR Dike D-1

Date: July 26, 2022

Photo Number: 10

Description: From approx. Sta. 0+480, looking west at the crest (thermal cap) and upstream slope.



Photograph A6-4 IVR Dike D-1

Date: July 26, 2022

Photo Number: 11

Description: From approx. Sta. 0+430, looking west at the crest and upstream slope. Presence of old tension cracks.



Photograph A6-5 IVR Dike D-1

Date: July 26, 2022

Photo Number: 24

Description: From approx. Sta. 0+430, looking west at the crest and downstream slope. Presence of tension cracks.



Photograph A6-6 IVR Dike D-1

Date: July 26, 2022

Photo Number: 12

Description: From approx. Sta. 0+300, looking northwest at the crest and upstream slope.



Photograph A6-7 IVR Dike D-1

Date: July 26, 2022

Photo Number: 13

Description: From approx. Sta. 0+300, looking east at the crest and upstream slope.



Photograph A6-8 IVR Dike D-1

Date: July 26, 2022

Photo Number: 21

Description: From approx. Sta. 0+300, looking northwest at the crest and downstream slope. Some water ponding at the toe.



Photograph A6-9 IVR Dike D-1

Date: July 26, 2022

Photo Number: 22

Description: From approx. Sta. 0+300, looking east at the crest and downstream slope. Some water ponding at the toe.



Photograph A6-10 IVR Dike D-1

Date: July 26, 2022

Photo Number: 20

Description: From approx. Sta. 0+220, looking southeast at the crest and downstream slope. Some water ponding at the toe.



Photograph A6-11 IVR Dike D-1

Date: July 26, 2022

Photo Number: 23

Description: From approx. Sta. 0+395, looking west at the crest. Presence of tension cracks (1-2 m long).



Photograph A6-12 IVR Dike D-1

Date: July 26, 2022

Photo Number: 15

Description: From approx. Sta. 0+070, looking northeast at the downstream toe and the attenuation pond.



Photograph A6-13 IVR Dike D-1

Date: July 26, 2022

Photo Number: 14

Description: From approx. Sta. 0+070, looking southeast at the crest and downstream slope.



Photograph A6-14 IVR Dike D-1

Date: July 26, 2022

Photo Number: 19

Description: From approx. Sta. 0+070, looking southwest at the emergency spillway.