Page 001 of 427

Withheld pursuant to/removed as

s.13; s.14

From: Neale, Tina FLNR:EX
To: Baldwin, John FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?
Date: March 12, 2018 10:02:57 AM
Attachments: DRAFT 2017 MOU Update20170504.docx

Hi John,
Yes, we need to pick up the MOU again. I have attached the working draft where Lowell Constable, Pierre Johnstone and I left off last May. It's still a work in progress. The notes and edits are from the last time Pierre, Lowell and I had a conference call.

s.13

Tina

From: Baldwin, John FLNR:EX
Sent: Monday, March 12, 2018 9:19 AM
To: Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX
Subject: FW: Valentine Dam - FLNRORD or Mines dam?

Tina/Scott – I have a dam on private land licenced under WSA to the owner of the land (TimberWest). This licence is for fire fighting purpose. TimberWest want to transfer the water licence thus ownership of the dam to a mining company. The mining company has a mining permit for a tailings dam. The WSA licenced dam is the Mines tailings dam – two authorizations for the same dam! The existing dam is on a stream but has mine tailings in the reservoir. s.13

s.13

Can we discuss options?

John B

From: Narynski, Heather M EMPR:EX
Sent: Friday, March 9, 2018 12:56 PM
To: Baldwin, John FLNR:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Neale, Tina FLNR:EX; Howe, Diane J EMPR:EX; Narynski, Heather M EMPR:EX
Subject: FW: Valentine Dam

s.13

I have cc'd Lowell Constable and Tina Neale as I understand some discussions have taken place between the two Ministries s.22 regarding potential updates to the MOU.

Heather

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Thursday, March 1, 2018 10:26 AM
To: Howe, Diane J EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Jason Carvalho; Doug Underhill
Subject: Re: Valentine Dam

Hi Diane and a Heather.
Thanks very much. We will be in touch.

Domenico Iannidinardo
TimberWest
250 715 7387

On Mar 1, 2018, at 8:04 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Thank you for the update Domenico. Let us know if there is anything EMPR can do in supporting your conversation with the miner. There are a whole bunch of regulations that owners of tailings faculties are now responsible for that they/you should be aware of (Health Safety and Reclamation Code for Mines in BC; PART 10). I've cc'ed with this email Heather Narynski who manages the TSF compliance for the province. She is very much up on the regulations if you have any questions.

Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
www.gov.bc.ca/minepermitting

For all reports, please ensure you include EMPR Permitting and Reclamation group mailbox
PERMRECL@gov.bc.ca
<image001.jpg>

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Wednesday, February 28, 2018 3:36 PM
To: Howe, Diane J EMPR:EX
Subject: Re: Valentine Dam

Hi Diane,
We now plan to withdraw our abandonment request and work through some matters with the miner.
Does that help clarify the matter for you at this time?
Thank you

Domenico Iannidinardo
TimberWest
250 715 7387

On Feb 26, 2018, at 7:37 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Hi Domenico,
>
> Wondering if you have time for a call this week regarding the Valentine Dam. I understand Timberwest has a request in to have the water licence released and am just wondering about the relationship Timber West has with the mine permittee and how this may affect the conditions of this release.
>
> Regards, Diane
>
> **Diane Howe, M.A. Sc., P.Geo**
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Page 006 of 427 to/à Page 015 of 427

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From: Baldwin, John FLNR:EX
To: Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?
Date: March 12, 2018 10:18:16 AM

Tina – thanks for info – the dam is authorized in both "permits/licences".

This 8 metre high earth filled dam has a LOW consequence rating (impact TimberWest's own forest property) with moderate failure probability (issue with embankment stability).

John B

From: Neale, Tina FLNR:EX
Sent: Monday, March 12, 2018 10:03 AM
To: Baldwin, John FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

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TimberWest

250 715 7387

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>
> Regards, Diane
>
> **Diane Howe, M.A. Sc., P.Geo**
> Deputy Chief Inspector of Mines , Reclamation and Permitting
> Ministry of Energy, Mines and Petroleum Resources, Victoria
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To: Howe, Diane J EMPR:EX
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Domenico Iannidinardo
TimberWest
250 715 7387

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Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
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From:	McPherson, Alexis EMPR:EX
To:	Kevin Whelan
Cc:	Hoffman, Al EMPR:EX; Howe, Diane J EMPR:EX; Demchuk, Tania EMPR:EX; Rollo, Andrew EMPR:EX; Constable, Lowell EMPR:EX; Narynski, Heather M EMPR:EX; Caughill, David EMPR:EX; Dunkley, Jim R EMPR:EX; Baldwin, John FLNR:EX; Robinson, David FLNR:EX; Love, Mark P ENV:EX; "Glen Wallace"; jhoule06@shaw.ca
Subject:	EMPR Geotechnical Inspection (2) - MX-8-21 Valentine Mountain
Date:	November 22, 2018 3:11:36 PM
Attachments:	2018 11 14 EMPR Geotechnical Inspection (2) - MX-8-21 Valentine Mountain (with attach).pdf

Hello Mr. Whelan,

Please find the Report of the Geotechnical Inspector for the Valentine Mountain inspection on November 14, 2018 attached. There is one order that requires your response. Please fill in the area where a response is indicated and return a copy of the report directly to me.

Note under Section 15(6) of the Mines Act a written response is required from the Mine Manager within 15 days of the receipt of this Inspection Report.

We have discussed the contents of this inspection report with Glen Wallace, Great Thunder Gold Corp.'s CFO, and have included last week's inspection order (2018 11 14 EMPR Geotechnical Inspection (1) – MX-8-21 Valentine Mountain TSF) as an attachment to this report.

Please let me know if you have any questions, comments or concerns.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

Province of British Columbia

MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES

Report of Inspector of Mines

Geotechnical

(Issued pursuant to Section 15 of the *Mines Act*)

Inspection No.:	**109087**
Mine No.:	**0800265**
Permit No.:	**MX-8-21**
Total Orders:	**1**

Mine Name:	Valentine Mountain
Location:	Sooke, BC
Owner, Manager:	Kevin Whelan, Mine Manager
Company:	Great Thunder Gold Corp.
Address:	900-570 Granville Street Vancouver, BC V6C 3P1
Workers Contacted:	
Type of Mining:	Exploration - Surface (ES)
Date of Inspection:	2018-11-14
Inspector:	Alexis McPherson, M.Sc., P.Eng.,Geotechnical Inspector, EMPR Victoria
Accompanying Inspectors:	Jim Dunkley, P.Geo., Permitting Inspector, SW Region, EMPR Victoria
In Attendance:	Doug Underhill, P.Eng, RPF, Manager, Forest Hydrology and Infrastructure, TimberWest Jason, Carvalho, Couverdon Real Estate
Copies to:	Al Hoffman, Chief Inspector, EMPR Victoria Diane Howe, Deputy Chief Inspector, Reclamation and Permitting, EMPR Victoria Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria Dave Caughill, Regional Director, SW Region, EMPR Victoria Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria John Baldwin, Water Stewardship Officer, Regional Operations Division – Coast Area, FLNRORD David Robinson, Senior Authorizations Specialist – Water, Regional Operations Division – Coast Area, FLNRORD Mark Love, Authorization Section Head – Mining Team, Environmental Protection Division, ENV Glen Wallace, CFO, Great Thunder Gold Corp. Jacques Houle, P.Eng., Mineral Exploration Consulting

The Mine Manager is required to provide a written response within 15 days of receiving the inspection report. The Manager's response must outline the remedial steps taken by a specified date and the work still outstanding. A copy must be provided to the inspector, and in the case of health and safety matters, the occupational health and safety committee and the local union. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

Introduction

A geotechnical inspection of the Valentine Mountain Site was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., Geotechnical Inspector with the Ministry of Energy, Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Mr. Dunkley's report is issued under separate cover. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

Valentine Mountain is an exploration site near Sooke, BC. At least two bulk samples were processed onsite; a ~650 t sample by Valentine Gold in 1988 and a ~65 t sample by Beau Pre in 1998. Geotechnical infrastructure includes a tailings storage facility and bulk sample trenches. The inspection tour included the following locations:

- Tailings Storage Facility (TSF),
- Mill Site, and
- Trenches.

The following documents were referenced as part of the inspection preparation and follow-up:

- "Tailings Impoundment Construction Report – Valentine Mountain Project" dated December 1, 1987 by Peter Peart, P.Eng., Consulting Geotechnical Engineer.
- "Initial Geotechnical Assessment – Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC" dated December 23, 2003 by Jacques Whitford Environmental Consulting Limited (Jacques Whitford).
- "Decommissioning and Reclamation Plan – Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC" dated January 12, 2004 by Jacques Whitford.
- "Valentine Mountain Property – Preliminary Geotechnical Evaluation of Tailings Dam" dated November 30, 2010 Thurber Engineering Ltd. (Thurber).
- "Valentine Mountain Mine – Tailings Disposal Facility – 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber.

At the time of inspection, the weather was overcast, lightly raining and ~10ºC. All areas of interest were visible and accessible.

Preamble

The purpose of this inspection was to:

- Assess whether the Mine is meeting the intent of the geotechnical requirements of the Code;
- Assess whether the Mine is meeting the intent of the geotechnical conditions in its Mine Permit;
- Assess whether geotechnical engineering practices at the Mine are generally consistent with accepted practices at mines in British Columbia; and,
- Provide general comment on geotechnical conditions at the mine.

This report is governed by the conditions and limitations set forth in the Mines Act and Code. This report is based on a review of select reports and work areas at the Mine, and cannot practically cover the entire mine site. Professional reliance has been used throughout this inspection.

Please note EMPR expects that all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

This report summarizes EMPR's observations, comments, and recommendations based on the Mine site tour, preliminary review of annual geotechnical reports, and technical discussions with Mine staff. If required, inspection orders have been issued. For ease of reference the Mine Manager is asked to respond in red text in the space provided below each inspection order and information request.

Location: Tailings Storage Facility

The TSF is a side-hill impoundment, consisting of a single embankment. The embankment was constructed to its current elevation in 1987. The embankment has not been raised or otherwise modified since its original construction. The embankment has a maximum height of 9 m, crest width of 6 m, downstream slope of ~1.33H:1V and upstream slope of ~2H:1V. The upstream till zone is separated from the supporting downstream rip rap by a geotextile. Rip rap is located along the upstream embankment face and at the embankment crest, extending 0.5 m above the till. There is an underdrain system within the facility consisting of perforated pipe running parallel to the embankment along the upstream toe, connected to a solid pipe passing through the dam at the maximum dam height. The downstream outlet has a cap and the pipe has a pressure gauge at the downstream side.

The 2014 Dam Safety Inspection (DSI) noted that a leak in the underdrain system pressure gauge developed or increased in flowrate between 2010 and 2014. Photos from the 2014 DSI depict a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system flowrate had increased since July 2018. A photo of the flow during the inspection is included as Photo 2. Boulders had been placed over the underdrain system outlet pipe, so the condition of the outlet and the source of the flows (pressure gauge, end of pipe, and/or area surrounding the pipe) could not be identified (Photo 3).

The TSF is estimated to have ~ 1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation is growing in the spillway (Photo 4).

A slump in the downstream face of the embankment near the left abutment was documented in 2003, 2010, and 2014 (Jacques Whitford, 2003; Thurber, 2010; Thurber, 2014). The slump did not appear to increase in size between 2010 and 2014 (Thurber, 2014). The slump has not been repaired and was visible during the inspection.

An order under *Mines Act* Section 15(5) was issued November 16, 2018 to address concerns related to the underdrain system and outlet, and spillway. The November 16, 2018 order is attached and must be considered along with this inspection report.

Review of EMPR files indicate the mine is out of compliance with numerous Part 10 Code sections, including the following:

- Section 10.1.5 – Engineer of Record
  - An Engineer of Record (EoR) has not be retained.
- Section 10.1.7 – Consequence Classification
  - The EoR has not confirmed the consequence classification.
- Section 10.1.11 – Breach and Inundation Study/Failure Runout Assessment
  - A breach and inundation study has not been completed.
- Section 10.1.13 – Quantifiable Performance Objectives
  - Quantifiable Performance Objectives have not been determined and reviewed by the EoR and TSF Qualified Person (QP).
- Section 10.4.1 – Updated Plans
  - Mine plans, reclamation and closure plans, and water balance and water management plans have not been updated.
- Section 10.4.2 – Governance
  - The Mine Manager has not
- Section 10.4.3 – Register of Tailings Storage Facilities and Dams
  - The Mine Manager has not:
    - Developed and maintained a Tailings Management System,
    - Designated a TSF QP,
    - Established an Independent Tailings Review Board (ITRB),
    - Completed an annual review of the TSF risk assessment,
    - Maintained TSF emergency preparedness and response plans,

- Section 10.4.4 – Annual Reporting
  - The Mine Manager has not submitted the following annual reporting:
    - DSIs completed,
    - Report of ITRB activities, and
    - Summary of TSF and dam safety recommendations, including a scheduled completion date.
- Section 10.5.2 – Operations, Maintenance and Surveillance (OMS) Manual
  - An OMS manual has not been prepared.
- Section 10.5.3 – Annual Dam Safety Inspection
  - A DSI has not been completed since 2014.

Further, EMPR notes several engineering recommendations provided by Jacques Whitford (2003) and Thurber (2010, 2014) relating to geotechnical stability were not completed. As indicated in the preamble, EMPR expects that all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

Order 1:
Observation of Contravention:
The mine is out of compliance with Sections 10.1.5, 10.1.7, 10.1.11, 10.1.13, 10.4.1, 10.4.2, 10.4.3, 10.4.4, 10.5.2, and 10.5.3 of the Code.

Remedial Action/Results To Be Obtained:
The Mine shall prepare and submit a detailed work plan to address the Code requirements to which the Mine is out of compliance. The work plan shall be completed to the satisfaction of the Chief Inspector. The work plan shall include specific activities, deliverables, timelines and milestones to achieve compliance with the Code.

Rectify By: March 31, 2019

Manager Response:

Location: Mill Site

The mill site includes four shelters/containers in various states of disrepair, a small ball mill and milling supplies (i.e. balls). None of the shelters/containers are locked and all are easily accessible. One container contains core boxes, with open core boxes laid out on the ground in front of the container (Photo 5).

Location: Trenches

The trenches are located east of the Mill Site, along an overgrown road. These linear excavations are overgrown and water has accumulated in the low spots (Photo 6). Some iron staining was visible. The tour facilitators indicated the trenches visited were the largest trenches; there are additional, smaller trenches on site which were not inspected.

Closure

Please address the response to Alexis McPherson, Geotechnical Inspector at Alexis.McPherson@gov.bc.ca.

You are reminded that, as per Section 15(6) of the Mines Act, your response is required within 15 days of the days of receiving this report. In addition, Section 30 (1) of the Mines Act requires this Inspection Report to be posted in a conspicuous location at the mine site for 30 days.

Please feel free to contact Alexis McPherson with any questions or comments.

Received by _____ on _____
[Mine Manager Name, Title] [Date]

Signature: _____

Attachment:
2018 11 14 EMPR Geotechnical Inspection (1) – MX-8-21 Valentine Mountain TSF

Photo 1: TSF Pond

Photo 2: Flow from Underdrain System during the Inspection

Photo 3: Boulders Over the Underdrain System Outlet Pipe

Photo 4: Spillway at Invert

Photo 5: Core Shack and Open Core Boxes

Photo 6: Trench

Date: November 16, 2018

To: Kevin Whelan, Mine Manager, Great Thunder Gold Corp.

cc: Al Hoffman, Chief Inspector, EMPR Victoria
Diane Howe, Deputy Chief Inspector, EMPR Victoria
Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria
Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria
Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria
Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria
Dave Caughill, Regional Director, SW Region, EMPR Victoria
Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria
Glen Wallace, Director, Great Thunder Gold Corp.
Jacques Houle, P.Eng., Mineral Exploration Consulting

Re: Order under *Mines Act* Section 15(5) for the Valentine Mountain Tailings Storage Facility

A geotechnical inspection of the Valentine Mountain Tailings Storage Facility (MX-8-21) was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., with the Ministry of Energy and Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

There were two areas of immediate concern identified during the inspection. The first was the rate of discharge for the underdrain system outlet. Photos from the 2014 Dam Safety Inspection (DSI) by Thurber demonstrate a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system discharge flowrate has increased since July 2018. Since the 2014 DSI large boulders were placed over the underdrain system outlet pipe, so the condition of the outlet could not be verified. The second was the spillway. The tailings storage facility pond is estimated to have ~1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation growing in the spillway is reducing capacity.

These areas of concerns were identified in the 2014 DSI[1] text and recommendations, as demonstrated by the following excerpts:

> "Inclusion of the underdrain system is a serious design flaw in our opinion…Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure."
>
> "Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The

[1] "Valentine Mountain Mine – Tailings Disposal Facility – 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber Engineering Ltd.

development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.

"A response plan should be developed to address the possible increase in leakage from the outlet pipe over time."

"Vegetation must not be allowed to become re-established on the dam or along the spillway channel..."

Based on EMPR's recent geotechnical inspection, conditions which were raised as concerns in the 2014 DSI have not been addressed by the Permittee and have worsened since the 2014 DSI report was issued. Please note that EMPR expects all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

EMPR considers these conditions to represent a significant risk, and requires the facility be immediately assessed by a Professional Engineer. EMPR is thereby issuing the following order to take immediate remedial action.

Order 1:

Observation of contravention:

Pursuant to Mines Act Section 15(5)(a):

> *"If an inspector is of the opinion that a delay in remedying a hazard would be dangerous to persons or property, the inspector may issue an order for immediate remedial action."*

Remedial Action/Results to Be Obtained:

The Mine shall engage a Professional Engineer to conduct a risk assessment of the Valentine Mine tailings storage facility and prepare an assessment report containing recommendations for any remedial work required to mitigate the risks and monitoring requirements. The report shall be submitted to the satisfaction of the Chief Inspector and shall be accompanied by a letter of commitment from the Mine Manager to address the recommendations with a proposed schedule. The risk assessment shall include, but not be limited to, the following items of concern:

- *Underdrain system and outlet, and*
- *Spillway.*

Rectify By:

A Professional Engineer shall visit the site by November 21, 2018. The assessment report and accompanying letter of commitment shall be submitted no later than November 26, 2018.

This letter includes the areas of immediate concern identified during the inspection. A complete inspection report will follow.

Please confirm you have received this letter and direct any questions, comments or concerns to Alexis.McPherson@gov.bc.ca.

Regards,

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources

From: McPherson, Alexis EMPR:EX
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX
Subject: FW: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI
Date: December 11, 2018 10:48:34 AM

Hello John and David,

Can you please provide an update re. Valentine Mountain and TimberWest? EMPR has continued correspondence with Great Thunder over the past weeks. Great Thunder indicates that they are continuing to look for an engineer to address then immediate order yet maintains they are not responsible for the tailings facility. We're working to figure out a path forward and would appreciate an update from FLNRORD.

Thanks and best regards,
Alexis

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, November 20, 2018 12:43 PM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Howe, Diane J EMPR:EX
Subject: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Thank you for the call this morning. I expect will be having additional discussions in the coming days and weeks.

I have attached two documents as follows:

1. 2018 11 14 EMPR Geotechnical Inspection (1)
    - Order for immediate remedial action
    - We will cc both of you on the upcoming inspection reports
2. 2014 DSI cover letter
3. 2014 DSI Report
    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

Page 032 of 427

Withheld pursuant to/removed as

s.13; s.14

From: Baldwin, John FLNR:EX
Sent: Wednesday, December 12, 2018 11:22 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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Once the GTGC assessment report has been received then FLNRORD and EMPR staff need to review next steps.

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Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX
Subject: FW: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554	250-616-1909

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To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI
Date: January 29, 2019 2:01:00 PM
Attachments: image001.png

Alexis – I have contacted Doug Underhill (250-619-6794) at Mosaic (TimberWest and Island Timberland have joined) today regarding the Valentine structure. Doug will review options within Mosaic for the dam. Mosaic does not want the dam and is prepared to remove the dam. Any mining tailings within the dam reservoir will need to be addressed. Abandoned mining debris/equipment on the site is a concern to the landowner.
Doug will contact Jim Dunkley regarding Energy and Mines' position on the Great Thunder Gold Corp's risk assessment order and ownership of the structure appeal.
Mosiac has not been in contact with Great Thunder since mid December 2018 on this matter.
Doug confirmed that the site is accessible at this time.
This office is prepared to work with Mosaic to remove Valentine Creek Dam under the WSA.
John Baldwin
Dam Safety Officer

From: McPherson, Alexis EMPR:EX
Sent: Friday, January 18, 2019 3:10 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI
Hello John,
Thank you for participating in the meeting today, and providing the summary and contact below. I will pass Bruce's information on to GTG. I have attached the email correspondence which lists the consultants GTG has contacted and the associated responses for your reference
I'm looking forward to the update on TimberWest's position on this structure in the next week or so.
Best regards,
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Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
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Alexis – this is a follow up to our conference call today regarding Valentine Creek Dam/Valentine Mountain Tailings Storage Facility (structure).
This office understands that Great Thunder Gold Corp (Great Thunder) has appealed the Mines Act Orders issued in November 2018 and has not complete the ordered risk assessment of the structure that was due by November 26th 2018. The appeal is being adjudicated by the Chief Inspector of Mines at this time.
Great Thunder has indicated that they are experiencing difficulties in hiring a qualified engineering company to complete the ordered risk assessment.
This office does not normally recommend engineering companies but in this case will suggest

Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554	250-616-1909

Valentine Mountain Gold (mining company) built the structure on TimberWest private land. It is reported that Great Thunder removed the vegetation off the structure and TimberWest placed the rocks at the outlet of the low level pipe in this storage structure in the last few years.
The structure is holding water and tailings material at this time. The structure has two consequence classifications – significant under Mines Act and low under WSA. The difference is the impact of the tailings material in the reservoir if the structure should fail.
Both Great Thunder (current mine permit holder under Mines Act) and TimberWest (current water licence holder under Water Sustainability Act (WSA)) claim that they do not own the structure. The relationship between these companies is unknown to this office. TimberWest did confirm that they were prepared to provide equipment to complete any risk assessment studies, and are in contact with Great Thunder. This office has had no direct contact with Great Thunder on this matter.
There is typical winter weather conditions at the site at this time – full storage with saturated embankments. Access and snow conditions is unknown. This office is concerned about any major investigative digging on or near the structure at this time. Increased monitoring with emergency plan is recommended to allow for conditions to improve before undertaking any major invasive investigations of the structure.
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John Baldwin
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To: Baldwin, John FLNR:EX
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We would like to discuss the possible paths forward with yourself and David, next week if it works with your schedules. I'll follow this email up with a meeting invitation.
Thanks and best regards,
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John D

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Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI
Date: January 29, 2019 2:37:37 PM
Attachments: image001.png

Hello John,

Thanks for the update. I'm looking forward to speaking with Doug regarding the risk assessment and ownership.

We've continued correspondence with legal re. the appeal and will keep you up to date as this progresses.

Best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Tuesday, January 29, 2019 2:01 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
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Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554	250-616-1909

From: McPherson, Alexis EMPR:EX
To: Baldwin, John FLNR:EX
Subject: FW: Valentine Mtn
Date: February 1, 2019 9:36:39 AM

FYI

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, January 30, 2019 9:38 AM
To: Dunkley, Jim R EMPR:EX; Doug Underhill
Cc: McPherson, Alexis EMPR:EX
Subject: RE: Valentine Mtn

Good morning Jim and Alexis,

In speaking with John Baldwin regarding the Valentine Mountain Tailings Facility, we understand that Great Thunder Gold Corp. has responded to the Orders issued by Mines, with the position that they are not the owners of the dam and therefore are not responsible for having it assessed.

Can we please set up a call to discuss whether we are understanding this correctly, and if so, what actions mines may be considering against Great Thunder.

Are you available later today or tomorrow afternoon?

Thanks,

Jason

From: Dunkley, Jim R EMPR:EX [mailto:Jim.Dunkley@gov.bc.ca]
Sent: November 19, 2018 4:45 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>; Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Subject: Valentine Mtn

During our meeting and inspection of the Valentine Mtn. site last week I told you that I would keep you in the loop regarding orders to Great Thunder Gold Corp.(GTGC) resulting from the inspection.

Alexis McPherson has sent GTGC a letter ordering the company to engage a P. Eng. to conduct a risk assessment of the Tailings Storage Facility (TSF) and to prepare an assessment report with recommendations for any remedial work required to mitigate current ongoing risks. A written letter from GTGC committing to address any recommended remedial work is also required. This assessment is to take place no later than November 21, 2018 and the report and commitment letter required by November 26, 2018.

Still to come will be orders requiring a geochemical analysis of the water coming out of the drainpipe

as well as the spillway. A geochemical analysis of the tailings will be required next summer when the water level has come down. Clean up of the site will also be required.

I expect that GTGC, through either Kevin Whelan, Jacques Houle, or their consulting engineer will be in contact with TimberWest in order to secure access to the site.

Let me know if you have any questions regarding the above.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

This message is intended only for the individual or organization to which it is addressed. It may contain private, confidential or privileged information which is exempt from disclosure under applicable law. Any use, distribution or copying by anyone other than the intended recipient is prohibited. If you are not the intended recipient, or have received this message in error, please notify me by email, delete this message from your computer and permanently destroy any hard copies. Thank you.

Baldwin, John FLNR:EX

From: Johnson, David A FLNR:EX
Sent: Friday, October 20, 2017 11:09 AM
To: Slater, Darryl FLNR:EX; Baldwin, John FLNR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

8 JAN 2018
Dave Johnson
telephoned to
state that
Mining Company
maybe interested
in taking repairs
for dam.
John

Hi All,

I cannot attend on Monday, s.22

Dave J

From: Slater, Darryl FLNR:EX
Sent: Friday, October 20, 2017 11:08 AM
To: Baldwin, John FLNR:EX; Johnson, David A FLNR:EX
Subject: Re: Mine contact for Valentine Brook Dam questions

Hi John. s.22 am wondering if you could forward our meeting invite to Jim. If the time doesn't work, I will have to coordinate on Monday.

From: Baldwin, John FLNR:EX
Sent: October-20-17 10:39:18 AM
To: Slater, Darryl FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

I support having the Mines people attend the conference call on Monday 23rd 2017 at 3pm.

I assume this has been finalized? If so, do you have call in details?

From: Slater, Darryl FLNR:EX
Sent: Thursday, October 19, 2017 9:35 AM
To: Johnson, David A FLNR:EX
Cc: Baldwin, John FLNR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi John. Your thoughts re inviting MEM to this meeting?

Darryl Slater
Water Authorizations Section Head
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
P: 250.751.3239
F: 250.751.3103

From: Slater, Darryl FLNR:EX
Sent: Thursday, October 19, 2017 9:34 AM
To: 'Jason Carvalho'
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Jason. I will get back to you on this. In the meantime, do you have a mines contact that you have been working with?

Darryl Slater
Water Authorizations Section Head
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
P: 250.751.3239
F: 250.751.3103

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, October 18, 2017 2:58 PM
To: Slater, Darryl FLNR:EX; Baldwin, John FLNR:EX
Cc: Doug Underhill
Subject: RE: Mine contact for Valentine Brook Dam questions

Darryl and John, it may be worthwhile having someone from the Ministry of Energy and Mines participate in the discussion to get their perspective on responsibility of the dam structure.

The Dam was constructed by the original mineral tenure holder (Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd) in 1987, which pre-dates the issuance of our conditional water licence. The attached Tailings Impoundment Construction Report confirms when, how, and for whom the dam was constructed. Subsequent Dam Safety Inspection reports refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and removal.

The water licence was issued to Pacific Forest Products in 1989 and references the dam and reservoir as works authorised under the licence (section H), however, it goes on to say in Section (J) that the works have been constructed.

The dam currently serves two individual functions. The first being a tailings pond under the Ministry of Energy and Mines, and the second being the storage of water for our water licence.

If the Dam was constructed under the authorisation of the Ministry of Energy and Mines in 1987 to store water and act as a tailings pond for Mining purposes, how does abandonment of our water licence require decommissioning of the Dam, per John's email below? If this is the case, will deconstructing the dam put us in breach of the mine permit that authorised its construction?

Looking forward to our upcoming discussion.

Thanks

Jason

From: Slater, Darryl FLNR:EX [mailto:Darryl.Slater@gov.bc.ca]
Sent: October 17, 2017 3:43 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Jason. Does a conference call next Monday at 3:00pm work for you? I would like to include our dam safety officer s.22

Thanks,

Darryl Slater
Water Authorizations Section Head
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
P: 250.751.3239
F: 250.751.3103

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Tuesday, October 17, 2017 1:34 PM
To: Slater, Darryl FLNR:EX
Cc: Dianna Lau
Subject: FW: Mine contact for Valentine Brook Dam questions

Hey Darryl, hope all is well. s.22

I was forwarded the email below by Doug Underhill in our office and asked to look at the mechanics around how the current water licence can be transferred from TimberWest to the registered holder of Mineral Tenure on the lands (Great Thunder Gold Corp.), as well as what other options may exists for us.

I'm not sure how much history you have on this file but it is worth understanding as there are some complexities around the connection between the water licence and a tailing pond dam structure, the latter of which predates the water licence.

Do you have time later this week for a quick meeting to discuss the file and what options there are for dissolution of the water licence and/or transfer to the Mineral Tenure Holders? Particularly in the event they say they do not want to take the licence over.

Please let me know if you have any time later tomorrow, or Thursday/Friday .

Thanks,

JC

From: Baldwin, John FLNR:EX [mailto:John.Baldwin@gov.bc.ca]
Sent: September 11, 2017 11:53 AM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Slater, Darryl FLNR:EX <Darryl.Slater@gov.bc.ca>; Howe, Diane J MEM:EX <Diane.Howe@gov.bc.ca>
Subject: RE: Mine contact for Valentine Brook Dam questions

Doug
The current water licence C072277 under the BC Water Sustainability Act (WSA) **on Valentine Brook** held by TimberWest (under the WSA TimberWest is the current owner of the dam)
may be transferred to the owner of the Mine who may have an interest in the dam and reservoir. Any water licence transfer is based on willing giver and willing receiver! Any land access permission associated with private lands is to be negotiated between the land owner and Mine. The transfer details are to be negotiated between the current water licence holder and Mine.

The WSA water licence transfer process is through FrontCounterBC and info on this process can be obtained from provincial website at http://www.frontcounterbc.ca/guides/surface-water/water-licence-amendments/overview/

Water Licences Report

Scroll to bottom of page for unique count of licences and/or applications found in your search

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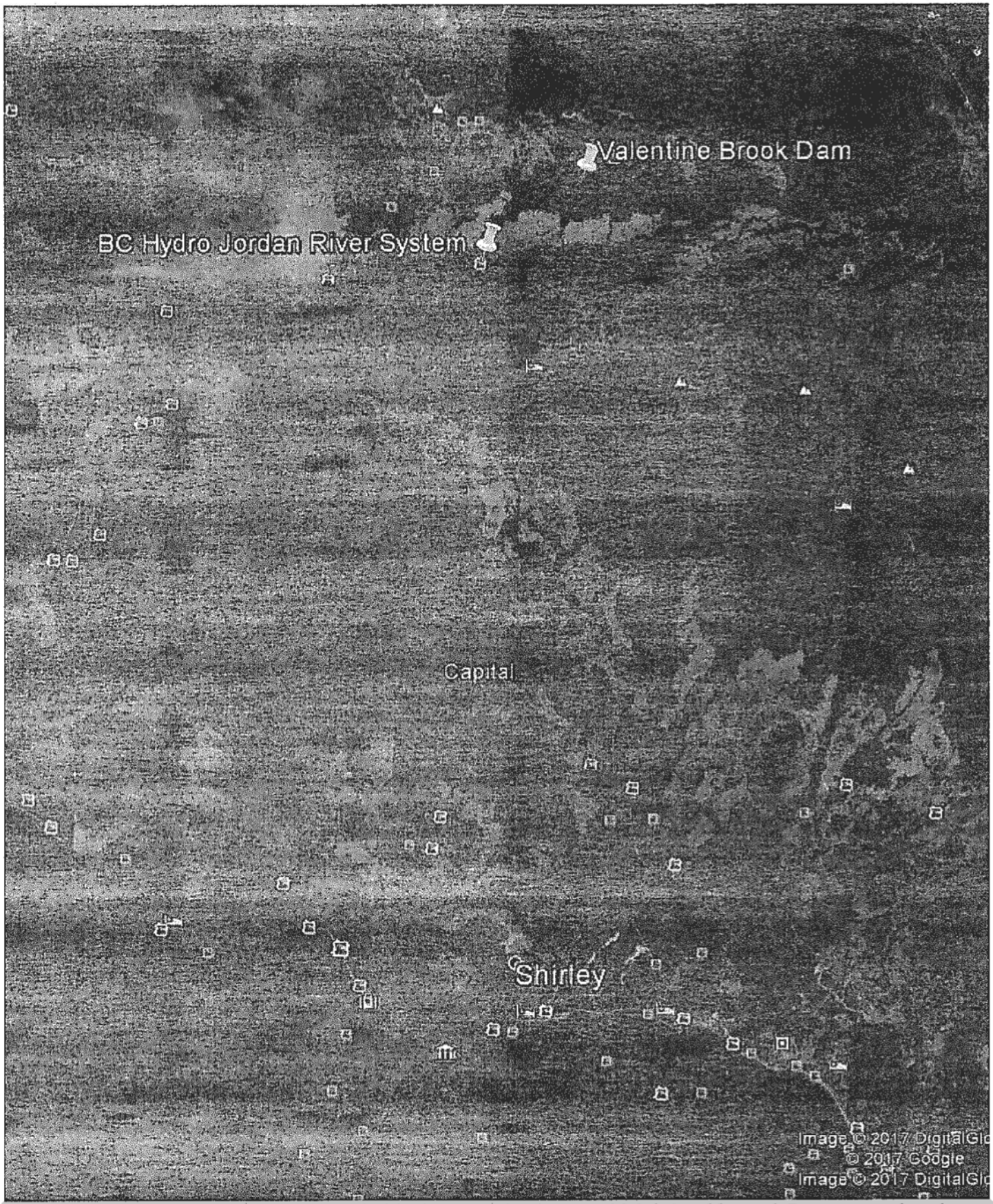

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DAM FILE
D7302277

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Monday, September 11, 2017 11:53 AM
To: 'Doug Underhill'
Cc: Slater, Darryl FLNR:EX; Howe, Diane J MEM:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Doug
The current water licence C072277 under the BC Water Sustainability Act (WSA) **on Valentine Brook** held by TimberWest (under the WSA TimberWest is the current owner of the dam)
may be transferred to the owner of the Mine who may have an interest in the dam and reservoir. Any water licence transfer is based on willing giver and willing receiver! Any land access permission associated with private lands is to be negotiated between the land owner and Mine. The transfer details are to be negotiated between the current water licence holder and Mine.

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BRITISH COLUMBIA
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BRITISH COLUMBIA Ministry of Energy, Mines and Petroleum Resources

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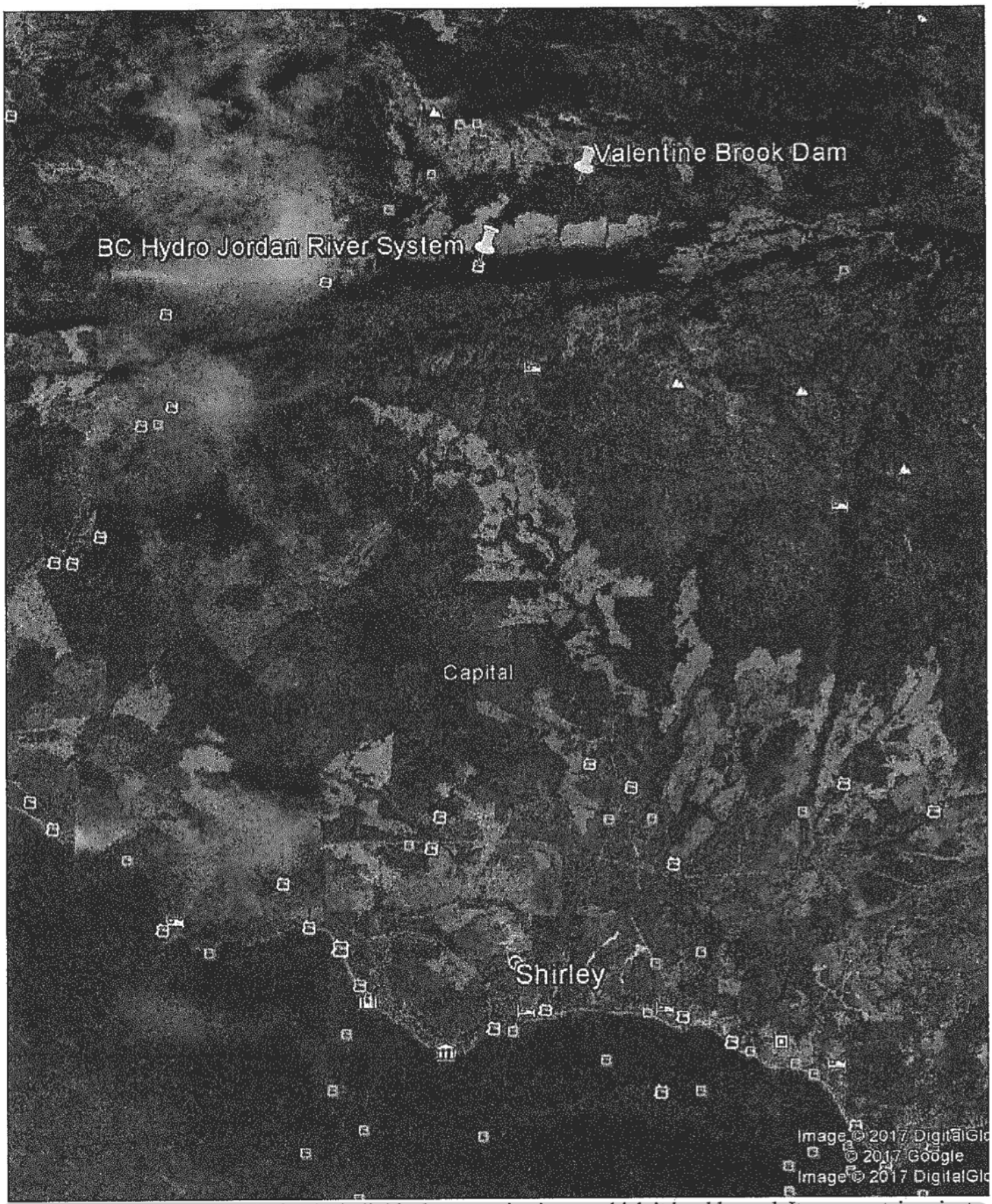

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DAM FILE!
D730227.

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Sent: Friday, September 8, 2017 9:44 AM
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Attachments: TEL-19-6819-0_2014_Valentine_Mine_DSI_Report_2014-12-01_FINAL.pdf

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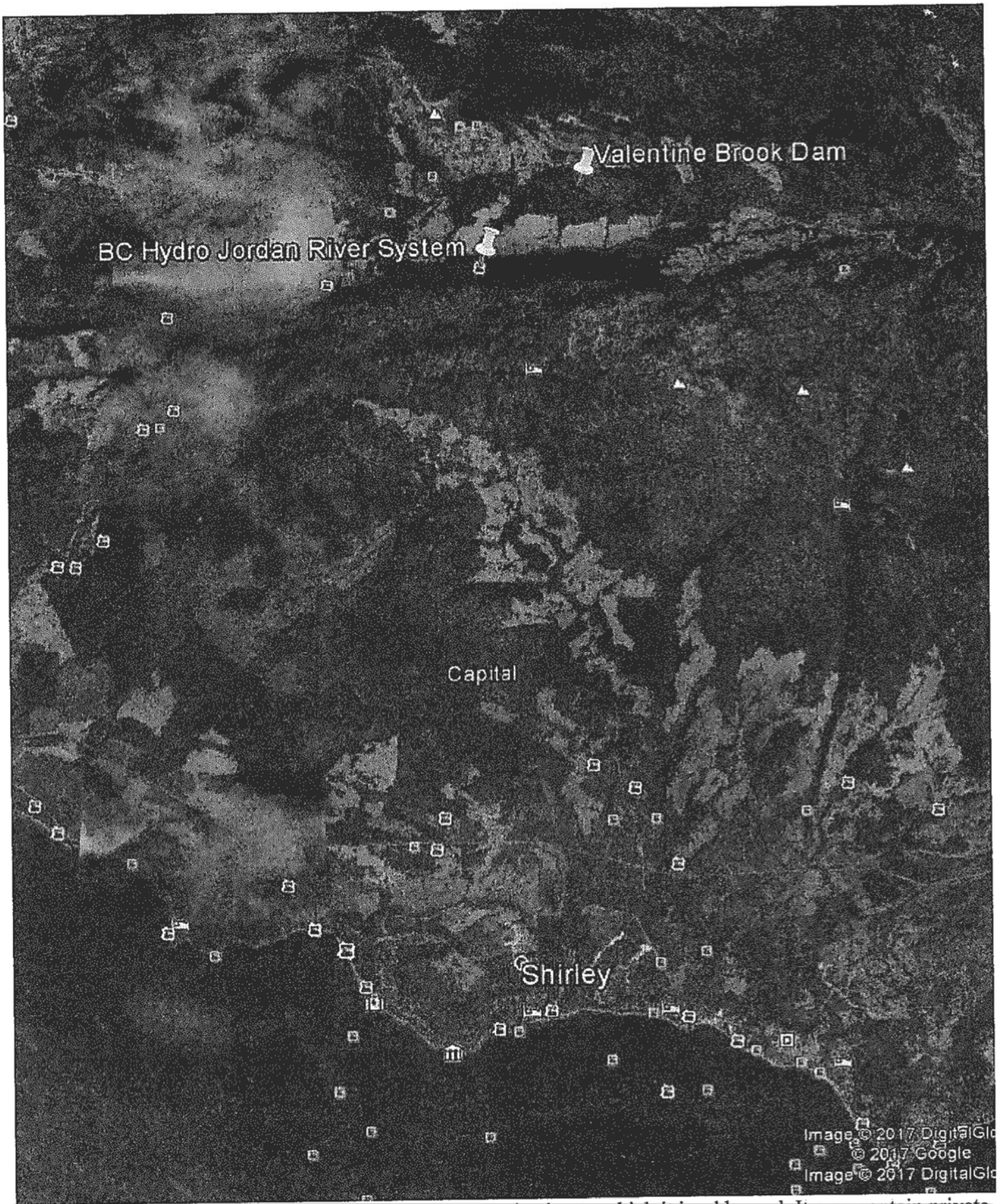

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THURBER ENGINEERING LTD.

DAM FILE:
D730 227.

Received
8 Sept 2017
John.

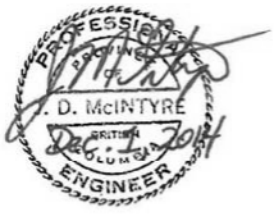
VALENTINE MOUNTAIN MINE
TAILINGS DISPOSAL FACILITY
2014 DAM SAFETY INSPECTION

Report

to

Great Thunder Gold Corp.

Kevin Sterne, M.Sc., P.Eng.
Review Engineer



Date: December 1, 2014
File: 19-6819-0

Jay McIntyre, M.A.Sc., P.Eng.
Project Engineer

100, 4396 West Saanich Road, Victoria, BC V8Z 3E9 T: 250 727 2201 F: 250 727 3710
thurber.ca

THURBER

EXECUTIVE SUMMARY

A Dam Safety Inspection has been completed for the tailings disposal facility at the Valentine Mountain Mine, located approximately 20 km northwest of Sooke, BC. A tailings dam was constructed at the site in the fall of 1987 in advance of a bulk sampling program. The dam has not been raised or otherwise modified since its original construction. The facility was reportedly constructed to contain approximately 6,700 m^3 of tailings, which were to be generated during the mineral exploration phase. It is believed the actual amount of tailings presently impounded is considerably less than this.

The following is a summary of significant observations and conclusions from this Dam Safety Inspection.

- Based on the 2007 CDA Dam Guidelines classification system and a review of current downstream land usage, the Valentine Mountain Mine tailings dam should be assigned a consequence rating of "Significant".
- The design operating freeboard is approximately 1.10 m, and is controlled by a spillway beyond the east abutment of the dam that was blasted into bedrock. The dam designer assigned a 6 hour storm delivering 135 mm of rainfall as the design event for the facility, and it appears the constructed spillway (if properly maintained) can pass the runoff associated with such an event with a significant factor of safety.
- The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.
- A review of the stability analysis results presented by the dam designer in the construction summary report indicates that individual may not have been familiar with standard stability analysis conventions, particularly with respect to the loading conditions considered. Furthermore, the seismic coefficient used for the original analysis is likely too low given subsequent changes to the regional seismic hazard maps.
- Based on a comparison between site inspection observations, it appears that the slump on the downstream face of the embankment near the east abutment has not increased in size in the 4-year period since 2010. The presence of the slump indicates the downstream slope of the embankment was constructed too steep.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed. Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure.

THURBER

- The pressure gauge connected immediately upstream of the underdrain outlet was observed to be leaking during the 2014 inspection. Comparing to images collected during the 2010 inspection, it appears the leak has developed (or increased in flow rate) since November of 2010.
- To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. If they can be located and are operational, data from these instruments would be useful in future stability analyses.
- Great Thunder Gold Corp recently assumed ownership of the mine and has since removed vegetation on the dam and in the spillway channel. This work was recommended during a previous site inspection carried out for the former mine owner.
- No active seepage was observed along the toe of the dam during Thurber's 2010 or 2014 inspections; however a localized wet spot was observed in front of the underdrain outlet area at the time of the October 24, 2014 inspection.

The following is a summary of the recommendations resulting from this DSI.

a) A survey should be carried out within the impoundment to investigate the level of the tailings. It is anticipated this would be completed using a row boat/canoe and a weighted tape or sounding line. Once completed, the tailings level should be compared to the as-constructed survey of the impoundment prior to filling to obtain a rough estimate of the volume of tailings in the facility.

b) Now that an as-built plan of the impoundment has been obtained (showing the locations of installed instrumentation) a renewed effort should be made to locate and collect water level readings at both observation wells and the piezometer. The piezometer reportedly consisted of a 1 cm diameter metal tube, so it is not clear if this instrument will be serviceable (due to possible damage during construction or subsequent corrosion).

c) An updated stability assessment should be carried out, including an evaluation of performance during a design earthquake. If water level data from existing instruments is unavailable, conservative assumptions should be made for the purposes of the analysis.

d) A remediation plan should be developed (such as a stabilizing toe berm) should the stability assessment determine that the factor of safety is unacceptable.

e) A qualified professional should evaluate whether the 6-hr storm assumed by the original dam designer is suitable and conforms to the inflow design flood recommended in the CDA guidelines. This assessment may require a survey of the existing spillway.

f) Great Thunder Gold Corp. should initiate a dam surveillance program that includes dam inspection visits at regular intervals throughout the year. Surveillance personnel should fill out a standard inspection form during these visits. Of particular importance would be the development of new seepage locations along the toe of the dam, as well as observations pertaining to the leakage at the underdrain outlet.

g) Vegetation must not be allowed to become re-established on the dam or along the spillway channel. Due to weather and frost effects, it is anticipated that rock falls will occasionally occur along the spillway channel, which was blasted through bedrock. Significant rock fall should be removed to prevent obstructions to flow.

THURBER

h) Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.

i) A response plan should be developed to address the possible increase in leakage from the outlet pipe over time.

The author of this DSI report is not considered to be the Engineer of Record for the structure and does not take professional responsibility for its design. Mr. Peter Peart, P.Eng. submitted the impoundment proposal report for the subject tailings dam to the Ministry of Mines in June of 1987. Mr. Peart also prepared the construction report for the structure, dated December 1, 1987. In this latter document, Mr. Peart clearly accepts professional responsibility for the design and construction of the structure. To our knowledge, no modifications to the dam have occurred since construction.

Use of this Executive Summary is subject to the Statement of Limitations and Conditions included at the end of the text of the report. Clause 4 of the statement identifies that unless written consent is provided, only the Client may use or rely on the contents of this report. With reference to Clause 4, the BC Ministry of Energy and Mines is also granted "Approved User" status.

THURBER

TABLE OF CONTENTS

1. INTRODUCTION 1
2. SCOPE OF WORK 1
3. REFERENCE DOCUMENTS 1
4. FACILITY DESCRIPTION 2
   - 4.1 Overview 2
   - 4.2 Location 2
   - 4.3 Tailings Dam 2
5. SUMMARY OF CLIMATE DATA 4
6. FINDINGS FROM PREVIOUS DAM INSPECTIONS 5
   - 6.1 2003 Jacques Whitford Inspection 5
   - 6.2 2010 Thurber Inspection 6
7. OBSERVATIONS FROM 2014 THURBER INSPECTION 8
8. SITE SEISMICITY 9
9. REVIEW OF CONSEQUENCE CLASSIFICATION 9
   - 9.1 CDA Classification System 9
   - 9.2 Valentine Mountain Tailings Facility 10
10. SUMMARY OF RECENT CONSTRUCTION 11
11. WATER BALANCE REVIEW 11
12. FREEBOARD AND AVAILABLE STORAGE 12
13. WATER DISCHARGE SYSTEMS 13
14. SEEPAGE OCCURRENCE 13
15. SURFACE WATER CONTROL AND SURFACE EROSION 13
16. INSTRUMENTATION REVIEW 14
17. COMMENTS REGARDING DESIGN, CONSTRUCTION AND PERFORMANCE 14
18. SUMMARY 16
19. RECOMMENDATIONS 18
20. ENGINEER OF RECORD 19
21. CLOSURE 19

STATEMENT OF LIMITATIONS AND CONDITIONS

THURBER

LIST OF DRAWINGS

Drawing No. 19-6819-0-1; Key Plan
Drawing No. 19-6819-0-2; Site Plan
Drawing No. 19-6819-0-3; Section A
Drawing No. 19-6819-0-4; Plan Showing the Anticipated Flow Direction Downstream of Dam

LIST OF TABLES

Table 4-1 – Summary of Measured Crest Width and Slope Angle
Table 5-1 – Summary of Climate Data
Table 8-1 – Classification in Terms of Failure Consequence (CDA 2007)

APPENDICES

APPENDIX A – REFERENCE DOCUMENTS
APPENDIX B – DRAWING
APPENDIX C – TABULATED CLIMATE DATA
APPENDIX D – PREVIOUS CONSULTANT INSPECTIONS & REPORTS
APPENDIX E –SITE INSPECTION PHOTOS
APPENDIX F – SEISMIC HAZARD CALCULATION
APPENDIX G – CONSTRUCTION PHOTOGRAPHS

THURBER

1. INTRODUCTION

Thurber Engineering Ltd. (Thurber) has undertaken a Dam Safety Inspection (DSI) of the tailings disposal facility at Valentine Mountain Mine, located approximately 20 km northwest of Sooke, BC.

This report is subject to the Statement of Limitations and Conditions, which is included at the end of the text. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

2. SCOPE OF WORK

Thurber's scope of work for this assignment was outlined in our proposal letter to Great Thunder Gold Corp. dated October 10, 2014. Authorization to proceed with the above noted work scope was received via e-mail on October 10, 2014.

Thurber's scope of work included a review of available background information pertaining to the dam as well as a site inspection completed on October 24, 2014.

3. REFERENCE DOCUMENTS

Prior to conducting the dam safety inspection, Thurber visited the Ministry of Energy and Mines (MEM) office in Victoria to review pertinent background information available in their files, including any design reports and as-built records for the dam. The following pertinent documents were obtained and reviewed as part of this assessment.

- Tailings Impoundment Proposal, Valentine Mountain, Prepared for Valentine Gold Corporation by Peter Peart, P.Eng.; June 1987.
- Tailings Impoundment Construction Report, Valentine Mountain Project, Prepared for Valentine Gold Corporation by Peter Peart, P.Eng.; December 1, 1987.
- Excerpt from report titled "Metallurgical Bulk Sampling Pilot Plan Programme for Valentine Mountain Property; Bacon, Donaldson & Associates; March 14, 1998.

In addition, the following engineering report was reviewed (provided by the former mine owner in 2010):

- Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC; report prepared by Jacques Whitford Environment Ltd.; December 23, 2003.

The proposal document referenced above contains design information, including the results of stability analyses completed during the design stage. The construction report contains as-built information. For convenience, the above documents are included in Appendix A of this report.

4. FACILITY DESCRIPTION

4.1 Overview

Valentine Mountain Mine has never been an operational mine. Since gold was discovered (circa 1976), works carried out at the site have been related to mineral exploration. A tailings dam was constructed at the site in the fall of 1987 in advance of a bulk sampling program. The dam has not been raised or otherwise modified since its original construction. The facility was reportedly constructed to contain approximately 6,700 m^3 of tailings, which were to be generated during the mineral exploration phase. It is believed the actual amount of tailings presently impounded is considerably less than this.

The June 1987 impoundment proposal report states that the location of the tailings impoundment is within the anticipated ore zone, and this would require its removal at some future time.

4.2 Location

The tailings dam is located at approximately elevation 780 m on the south side of Valentine Mountain at 48° 30' 57" N and 123° 53' 22" W. The impoundment is located above and to the north of Bear Creek Reservoir. The site is accessed by gravel logging roads from Sooke, BC, which is located approximately 20 km southwest of the dam. The site location is shown on the attached Drawing No. 19-6819-0-1 in Appendix B.

The dam is situation on the south side of a ridge oriented in the east-west direction. The local topography is bedrock-controlled with localized thin veneers of dense till-like soils. Based on information provided in the design document, the site is underlain by competent interbedded meta-sedimentary bedrock.

4.3 Tailings Dam

The tailings dam was constructed in the fall of 1987 by Valentine Gold Corporation. The construction report indicates the dam can contain approximately 6,700 m^3 of mine tailings. The report also states the facility has the capacity to store about 10,000 tonnes of mill feed provided the in-situ density of the tailings is approximately 1.77 g/cm^3 (1,770 kg/m^3). Based on an excerpt from the bulk sampling summary report prepared by Bacon, Donaldson Associates Ltd.

in March 1988, a total of approximately 650 tons of ore was sampled and processed at the on-site pilot plant during the 1998 bulk sampling program. We understand that another smaller sampling program occurred in 1998; however, there are no details in regards to the sample size.

The in-situ density of the tailings would depend on the achieved gradation following processing at the pilot plant, as well as the method of placement. The impoundment proposal report anticipated the tailings would have a gradation consistent with a silty sand, with approximately 50% of the materials passing the 0.075 mm sieve size. It is considered unlikely that the tailings would have achieved an in-situ density of 1,770 kg/m^3 when placed as a slurry, and that a more realistic density would be in the range of 1,200 to 1,400 kg/m^3. In any case, the available information indicates the impoundment likely is less than half full.

As part of this current assessment, Thurber completed a site inspection on October 24, 2014. The inspection was completed by Jay McIntyre, P.Eng. During this site inspection visit, the dam was measured as approximately 90 m long, with a nominal crest width of approximately 5 to 6 m and a maximum height of approximately 8 m. A plan of the tailings dam is shown on attached Drawing No. 19-6819-0-2 in Appendix B. The image shown on this drawing was scanned from a plan of the tailings dam prepared in November 1987, marked "As Constructed". The contours shown on the above noted plan were used to generate a section (Section A) through the dam at its maximum height. This cross-section is shown on Drawing No. 19-6819-0-3 in Appendix B.

Based on cross-sections provided in the June 1987 Tailings Impoundment Proposal report, both the upstream and downstream slopes of the embankment were to be constructed to a gradient of 1.7H to 1V (30.5°). However, a plan of the dam marked "As Constructed" and dated November 1987 indicates the dam's upstream slope is generally graded at 27° (2H to 1V), whereas the downstream slope angle is nominally sloped at 34° (1.46H to 1V). During the October 2014 site inspection, a handheld inclinometer was used to measure the embankment slopes. Based on these measurements, the downstream slope is generally graded at an angle of 37° (1.33H to 1V) from the horizontal, with localized steeper and flatter sections. The maximum slope was estimated as being 40° at approximately Sta. 0+30 where the dam is constructed atop outcropping bedrock. The upstream embankment slope (above the impoundment level) was estimated to be sloped at approximately 27° from the horizontal (2H to 1V). Table 4-1 summarizes the crest widths and embankment slope angles measured by Thurber along the length of the dam.

THURBER

TABLE 4-1
SUMMARY OF MEASURED CREST WIDTH AND SLOPE ANGLE

Dam Stationing (m)	Crest Width (m)	Measured Downstream Slope Angle
0+00	10.0	n/a
0+10	6.4	32°
0+20	6.0	38°
0+30	6.2	40°
0+40	5.1	37°
0+50	4.8	37°
0+60	5.3	37°
0+70	4.6	Excessive vegetation
0+80	7.2	Excessive vegetation
0+90	At bedrock spillway	n/a

Note: 1. Dam stationing measured from west abutment
2. Slope angles measured using handheld inclinometer
3. Thick vegetation precluded accurate estimate of slope angle.

The dam is aligned roughly in the East-West direction and curves slightly towards the south at the middle. A spillway, blasted through bedrock, is located beyond the east abutment of the dam. The ground surface in this area slopes downwards towards the south, with a nominal surface gradient of approximately 23°.

At the time of the October 24th inspection, water was flowing over the spillway and the available freeboard was measured as 1.05 m.

5. SUMMARY OF CLIMATE DATA

Climate records listing monthly precipitation and daily average air temperatures were obtained from the CRD weather station at Sooke Lake, located approximately 14 km east of Valentine Mountain. The location of Sooke Lake is shown on Drawing 19-6819-0-1 in Appendix B.

Monthly data is tabulated in Appendix C. Table 5-1 below summarizes the average monthly precipitation data for the past 40 years, and daily average temperatures for the past 10 years.

THURBER

TABLE 5-1
SUMMARY OF CLIMATE DATA

Average Monthly Precipitation in millimeters (1974 to 2013)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
263.0	174.4	161.4	90.7	53.6	34.5	23.1	35.0	55.7	157.7	298.8	266.5	1614
Average Daily Temperatures in °C (2004 to 2013)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2.8	3.5	4.9	7.3	11.3	14.4	17.7	17.2	13.6	8.7	4.8	2.4	

Based on 40 years of monitoring, the average yearly rainfall in the area is 1614 mm, with approximately half of this occurring in the three months of November to January. It is noted that the elevation of Sooke Lake is approximately 700 m lower than the Valentine Mountain tailings dam location. Thus, it is anticipated that average air temperatures at the mine site are slightly lower than indicated in the above table.

6. FINDINGS FROM PREVIOUS DAM INSPECTIONS

We are aware of two previous dam inspections. Details are provided below.

6.1 2003 Jacques Whitford Inspection

Jacques Whitford Environment Ltd. (JWEL) was retained by Beaupre Exploration Ltd. to complete a geotechnical assessment of the dam in 2003. JWEL (now Stantec) prepared a report on December 23, 2003 titled "Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC". This report was apparently prepared in response to a July 2002 letter from the Ministry of Energy and Mines (MEM), requiring that a geotechnical assessment of the tailings impoundment be carried out prior to authorizing the extraction and processing of a 3,000 tonne sample. The report was to be prepared by a qualified Professional Engineer and submitted for review by the Chief Inspector. The letter also specified that the assessment should include an acceptable plan for decommissioning and final reclamation of the tailings pond.

JWEL completed a site inspection on April 3, 2003. Key observations from the JWEL report are summarized as follows:

- There were no obvious cracks on the dam crest, however, "sloughing" was observed on the downstream face of the dam near the east abutment, extending approximately 0.3 m in depth. The slump covered an area extending between approximately Sta. 0+78 and the spillway.

- There was an open crack extending from approximately Sta. 0+72 and 0+75. At this location, the dam is approximately 5.9 m high.
- No seepage was observed along the seepage collection pond
- There was no noticeable water in the ditch along the toe of the dam.
- There are no records available of the tailings level within the impoundment.

The JWEL report commented that based on visual observations made during their inspection that the dam *"likely does not have the same factor of safety against slope instability as when it was constructed"*. The report also stated that the selection of a friction angle of 50° for the rip rap *"warrants review"* as does the selection of a seismic coefficient of 0.1g for the design earthquake. The report states that an appropriate peak horizontal ground acceleration value would be 0.349g. At the time of the JWEL assessment, this ground acceleration corresponded to an earthquake having an annual exceedance probability of 1 / 475.

Apart from the baseline readings of the settlement monuments, JWEL was unable to find any other monitoring data, including any readings of the piezometers. JWEL recommended that Beaupre Exploration Ltd. search their records for any subsequent instrument monitoring readings. A copy of the 2003 JWEL geotechnical assessment report is attached in Appendix D.

6.2 2010 Thurber Inspection

Thurber was retained by Mill Bay Ventures Inc. in 2010 to conduct a preliminary geotechnical evaluation of the tailings dam. The assessment focused primarily on the identified slump and did not constitute a formal dam safety review. Key observations made during the November 16, 2010 site inspection are summarized below:

- The reservoir was observed to have approximately 1.1 m of freeboard.
- The spillway (excavated into rock beyond the east abutment) was observed to be flowing. A log and some vegetation was observed in the entrance to the spillway. Vegetation and a length of perforated "Big-O" flexible piping was observed in the spillway channel.
- The crest and side slopes of the embankment are heavily vegetated with fir, alder and Scotch Broom. Trees exceeding 6 m height and butt diameters up to 150 mm were noted. The vegetation greatly impeded the inspection of the dam.
- The dam crest varies in width from approximately 5.5 to 6 m. The downstream slope was estimated at approximately 37° to 40°.
- The exposed portion of the upstream slope was estimated to have a gradient of approximately 30°.
- A slump was observed at the downstream crest near the east abutment. The scarp starts about 10 m away from the east abutment and extends roughly 17 m to the west. It

appears that a vertical displacement of up to 600 mm has occurred, and a crack in the rock fill was observed.

- The slope length at the scarp location was measured to be approximately 6 m and this equates to an embankment height of about 4.5 m.
- Near the center of the embankment, the slope length was measured at 13.8 m and this equates to height of approximately 9 m.
- A former logging road runs along the toe of the embankment. No seepage was observed exiting the downstream face of the dam. Nor was any seepage observed in the ditch between the road and the toe of the embankment.
- An apparent opening in the rip rap was observed at the downstream toe of the dam, and this may be the location of a reported clean-out cap, that connects to a "sub-drain" system. The cap was not visible, but the cavity was stuffed with insulation.

The following key comments and recommendations were provided in Thurber's 2010 geotechnical evaluation report:

- The downstream embankment slope was constructed steeper than the design called for.
- A slump on the downstream face of the dam occurred prior to April 2003 near the east abutment where the embankment is not at full height. The triggering mechanism is unclear. It is possible the contractor did not achieve the same level of compaction at the east end of the embankment compared to elsewhere. That is, the rock fill may have been pushed loosely over the edge of the crest.
- The slump appears to be relatively shallow, and likely does not significantly impact the global stability of the embankment at present. However, continued movements could be detrimental to embankment stability.
- It is anticipated that some modification of the embankment geometry (e.g., flattening of the downstream slope) will be required.
- An updated slope stability assessment should be conducted, and should reflect current seismic hazard values.
- Any existing piezometric monitoring data should be utilized for the proposed stability assessment. If such data is unavailable, new data sets should be collected.
- The trees and scotch broom should be removed from the crest and embankment slopes.
- The presence of a seepage collection system that apparently passes through the upstream till zone into the downstream rock fill zone is concerning, as this pipe would be a convenient flow path that could promote to internal erosion of the embankment. Given these design features, a monitoring and surveillance schedule should be established and maintained, to ensure the facility continues to perform as expected.

A copy of Thurber's preliminary geotechnical evaluation report, dated November 30, 2010, is attached in Appendix D.

THURBER

7. OBSERVATIONS FROM 2014 THURBER INSPECTION

As noted previously, Thurber completed a site inspection on October 24, 2014. The inspection was completed by Jay McIntyre, P.Eng. Selected photographs are included in Appendix E. The following key observations were made:

- At the time of the inspection, a crew was removing trees and vegetation from the dam and spillway area. The work was essentially complete except for a section of the spillway and downstream slope near the east abutment (below the slump area).
- The removal of vegetation greatly aided in the inspection. It was possible to see areas where the dam is constructed directly atop outcropping bedrock, (i.e., in the vicinity of Sta. 0+025 to 0+035). It was also possible to more easily inspect the outlet to the underdrain system.
- Water was flowing over the spillway and the freeboard was measured to be approximately 1.05 m.
- The shallow slump was observed near the east abutment, just downslope from the crest of the dam. It was measured to be approximately 12 m long, starting at approximately Sta. 0+64. It appears to have changed little since the 2010, except the scarp is less defined, and the crack in the face of the down has mostly closed (possibly related to disturbance from vegetation removal).
- No seepage was observed exiting the downstream toe of the dam, although a localized wet spot was observed downstream of the underdrain outlet.
- Metal bars of varying diameters were observed sticking out of the dam on the upstream side of the crest. They are typically spaced at interval of 4 to 6 m along the crest. Some of these bars are believed to be settlement monitoring hubs, but others may have been used to secure the tailings supply line coming from the mill (which ran along the upstream side of the crest).
- The piezometer and two observation wells could not be located.
- The outlet to the underdrain system was investigated. This outlet includes a 100 mm diameter solid ABS pipe with a threaded cleanout cap. Upstream of the outlet is a pressure gauge that was reportedly installed to allow for a direct reading of the hydrostatic head within the impoundment at the toe of the dam. The gauge and outlet pipe are protected by several tabular boulders, placed to form a crude shelter for the outlet assembly. The cavity is stuffed with fiberglass insulation, presumably to protect the pipe and gauge from freezing. The pressure gauge can be accessed from the top, through a gap between two boulders. The outlet pipe and threaded cap can apparently be accessed from the bottom, through a gap beneath a different boulder (see attached photos). Some of this insulation was removed from the top of the cavity to expose the pressure gauge. The gauge could not be read, as it was mostly covered by spray-on foam insulation, and the face of the gauge was installed facing the north (i.e., it faces away from the observer). Liquid was observed to be leaking from the gauge fitting at an estimated rate of 0.05 to 0.1 LPM.
- Neither the outlet pipe/cleanout cap nor the gate valve were exposed. This would have

required significant disturbance to the pipe installation. It appears that the liquid leaking from the pressure gauge (located above the outlet) is dripping down onto the insulation protecting the end of the outlet pipe. This has resulted in iron oxide (or other substances) precipitating onto the protective insulation. Photographs showing the appearance of the outlet in 2010 and 2014 are attached in Appendix E.

8. SITE SEISMICITY

The site is located in the seismically active area of southern Vancouver Island. Site seismicity is influenced both by nearby crustal earthquakes as well as potentially larger earthquakes along the Cascadia fault, located off the west coast of Vancouver Island. The most recent significant earthquake in the area was a magnitude 7.3 event that took place in 1946 to the northwest of Courtenay, BC.

In Canada, the seismic hazard for a particular site may be obtained from hazard maps prepared by the Geological Survey of Canada (GSC). These maps are derived from statistical analyses of past earthquakes and from advancing knowledge of Canada's tectonic and geological structure. On the maps, seismic hazard is expressed as the most powerful ground motion that is expected to occur in an area for a given probability level.

Ground motion probability values are given in terms of probable exceedance: that is, the likelihood of a given ground motion being exceeded during a particular time duration. The typical probabilities of exceedance provided by the GSC in the seismic hazard maps are the 2%, 5% and 10% probability of exceedance in a 50 year period, which corresponds to an annual likelihood of 1/2,475, 1/1,000 and 1/475, respectively. The GSC does not provide seismic hazard values for more extreme events (e.g., earthquakes having an annual probability of exceedance of 1/5000 or greater). These data are typically estimated by extrapolation. A copy of the Seismic Hazard Calculation for the Valentine Mountain site is attached in Appendix F.

9. REVIEW OF CONSEQUENCE CLASSIFICATION

9.1 CDA Classification System

The consequence classification of a dam is a means of establishing an adequate overall level of care in oversight, inspection, maintenance and safety of the facility. The consequence classification of a dam is based on the incremental consequences of failure, which is defined by the CDA Guidelines (2007) as being *"the total damage from an event with dam failure minus the damage that would have resulted from the same event had the dam not failed"*. The consequence classification is based on consideration of three loss criteria: 1) Loss of life,

2) Environment and cultural values, and 3) Infrastructure and economics. The current CDA classification system is shown in Table 8-1.

9.2 Valentine Mountain Tailings Facility

As noted previously, the tailings facility at Valentine Mountain is located on the south side of a ridge oriented in the east-west direction, at approximately elevation 780 m. Below the dam, the ground slopes down towards the south. Bear Creek Reservoir is located downstream of the facility, roughly 1.4 km to the south at approximately elevation 410 m. The attached Drawing No. 19-6819-0-4 in Appendix B shows the anticipated route that tailings and impounded water would take if a dam breach were to occur.

TABLE 8-1
CLASSIFICATION IN TERMS OF FAILURE CONSEQUENCE (CDA 2007)

Dam Class	Population at Risk	Incremental Loss		
		Loss of Life	Environmental & Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short-term loss. No long-term loss.	Low economic losses; area contains limited infrastructure or services.
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat. Loss of marginal habitat only. Restoration or compensation in kind highly possible.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes.
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat. Restoration or compensation in kind highly possible.	High economic losses affecting infrastructure, public transportation, and commercial facilities.
Very High	Permanent	100 or fewer	Significant loss or deterioration of *critical* fish or wildlife habitat. Restoration or compensation in kind possible but impractical.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances).
Extreme	Permanent	More than 100	Major loss of *critical* fish or wildlife habitat. Restoration or compensation in kind impossible	Extreme losses affecting important infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances).

The mine and the surrounding area are located on lands owned by Timberwest Forest Corp. and we understand that logging is carried out in the general area. There are no permanent dwellings or other structures located downstream of the dam. In terms of population at risk, this would be limited to temporary workers (e.g., log truck drivers) and recreational users (e.g., quads, etc.).

In terms of infrastructure, there are several logging roads located along the flow path, and it is expected that a dam breach would result in some or all of the roads downstream of the dam being locally washed out at the crossing locations. It is not uncommon for washouts to occur on logging roads, and it is anticipated that repairs could be implemented relatively quickly and that alternate routes (along the south side of Bear Creek Reservoir) could be utilized. Given the impoundment's small size and the anticipated attenuation of the flows during a dam breach scenario (i.e., a dam breach would be expected to occur over a period of approximately 30 minutes), it is not anticipated that a dam failure would have a significant impact on the water level at Bear Creek Reservoir.

A dam breach would result in the release of impounded water and mine tailings into the environment downstream of the dam, with some of the tailings entering Bear Creek Reservoir. There is insufficient information to accurately evaluate potential environmental impacts. However, given the very small size of the impoundment it is anticipated that losses to fish and wildlife habitat would not be significant.

On this basis, it is recommended that the facility be assigned a "Significant" downstream failure consequence classification.

10. SUMMARY OF RECENT CONSTRUCTION

As noted previously, Valentine Mountain Mine is still in the exploratory stage. We understand that a permit was issued in 2003 for another bulk sampling program, but that it ultimately did not proceed. There has been no modifications to the current tailings dam, apart from maintenance, since it was constructed in 1987.

11. WATER BALANCE REVIEW

The 1987 impoundment proposal report provided anticipated losses from evaporation and seepage, as well as inputs from rain and groundwater recharge. The report states it was assumed the bulk sampling program would continue as a (more or less) continuous operation for approximately 1 year and that the facility would be essentially full at the completion of that time. The report states that losses from seepage, evaporation and supplying the processing

plant would be approximately equal to gains from rainfall and groundwater recharge. As rainfall and evaporation estimates were based on data collected in the late spring and early summer, it appears there may have been a significant underestimation of water gains from rainfall, and an overestimation of losses from evaporation. The report states that water budget data would be collected at the tailings impoundment while the mill was in operation.

The proposal report suggests that the bedrock spillway was intended to prevent an overtopping of the facility as a result of a winter storm during the bulk sampling program. There is no discussion provided in either the proposal report or construction report concerning water balance estimates following cessation of sampling/processing activities. Given the annual rainfall for the area is approximately 1.6 m, it is likely that the impoundment was full and water was spilling over the spillway within several months of dam completion.

We understand that during the summer months, evaporation and leakage results in the water level dropping below the spillway level, but that for most of the year the impoundment level is controlled by the spillway. Based on inspection comments, there does not appear to be significant losses related to leakage through the dam.

12. FREEBOARD AND AVAILABLE STORAGE

The tailings facility incorporates a spillway excavated in bedrock at the east abutment. The design called for a minimum 1.0 m wide spillway, but the as-constructed width is approximately 2 m. After entering the spillway, water passes down a channel blasted through bedrock. The spillway channel has a variable cross section, but is approximately 1.2 m wide at the base and sloped at approximately 23°.

At the time of October 24, 2014 inspection, the measured freeboard was approximately 1.05 m. It was noted as being 1.1 m both at the time of the November 16, 2010 inspection. During both of these inspections, water was flowing over the spillway.

The impoundment proposal report identifies the design storm as being a "Maximum Probable" 6-hour storm delivering 135 mm of rain over the catchment area. The design engineer estimated the instantaneous inflow from the design storm would be approximately 0.3 m^3/s, and that flow over a 1 m wide spillway was expected to exceed this rate by a factor of 3.5.

The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of

failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.

13. WATER DISCHARGE SYSTEMS

The impoundment is being operated as an overflow structure, in that water is released passively by means of the spillway during all but the summer months. Released water is not measured or tested.

The dam design also incorporated a sub-drain system, consisting of 100 mm diameter perforated "Big-O" type perforated pipe, wrapped in filter cloth and placed at the base of the impoundment roughly parallel to the upstream toe. The sub-drain system was reportedly covered with a layer of well-graded (presumably fine) sand, produced using the pilot plant. The sub-drain system is connected to a solid 100 mm diameter Schedule 80 ABS plastic pipe that passes through the dam at its lowest point. The downstream end of the pipe is capped with a threaded cleanout cap, reportedly to allow sampling of the impoundment seepage. The impoundment proposal report states that another function of the sub-drain system was to "facilitate drainage of the entrained supernatant water at the time of abandonment", indicating that it may be used as a low-level outlet to drain the impoundment.

As noted in Section 7, the pressure valve connected to the downstream end of the outlet pipe was observed to be slowly leaking during the October 24, 2014 inspection. Leakage may have been occurring at the time of the 2010 inspection, but the rate of leakage (although still small) appears to have increased.

14. SEEPAGE OCCURRENCE

No seeps were observed on the downstream face or along the toe of the dam. One localized wet spot was observed in front of the underdrain outlet location.

15. SURFACE WATER CONTROL AND SURFACE EROSION

Surface water enters the impoundment from a small catchment area to the north side. A small groundwater fed spring is also located on the north side of the impoundment. Excess water flows over the spillway. There does not appear to be any obvious signs of surface erosion on the dam.

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16. INSTRUMENTATION REVIEW

Instrumentation installed at the dam during construction includes:

- Two 100 mm diameter standpipes/observation wells were installed near Sta. 0+30 and Sta. 0+60. The tips of the standpipes were installed in the rip rap zone, located downstream of the low permeability till zone.
- A 1 cm diameter steel cased piezometer was installed in the till near Sta. 0+50 with its tip at an elevation approximately 4 m below the crest of the dam. This instrument was installed to assist in establishing the phreatic surface within the till zone.
- Three settlement monuments were placed along the upstream crest of the embankment.

The construction report only contains baseline readings for the three settlement monitoring monuments. To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. However, during that visit it was assumed the instrument locations were as shown on Plate 3 of the June 1987 design report. It was confirmed afterwards that the instruments were installed at different locations.

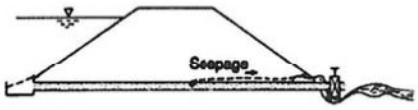
17. COMMENTS REGARDING DESIGN, CONSTRUCTION AND PERFORMANCE

The following comments are provided in regards to the geotechnical design and construction of the facility:

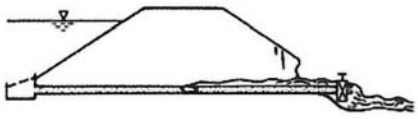
- The dam was originally designed to have a 4m wide crest and upstream and downstream slopes graded at 1.7H to 1V.
- The dam was ultimately constructed with a significantly wider crest (average ~5.7 m). However, the as-built downstream slope is significantly steeper and is typically sloped at 37° (approx. 1.33H to 1V) with localized steeper sections sloped up to 40°.
- The dam design incorporated a reasonably thick low permeability till zone, supported on the downstream side by a rock fill shell and also faced on the upstream side by rock fill.
- Thurber was retained as a testing agency for the dam designer and completed a number of laboratory tests, including gradation analysis, modified Proctor tests and tri-axial permeability testing of samples collected at the till borrow site. Based on gradation analyses on three samples, the composition of the borrow material varied from gravelly, silty sand to silty, sandy gravel. The fines content for all samples exceeded 30%. The tri-axial permeability test yielded a permeability of 3.05×10^{-6} cm/s.
- Apart from a localized wet spot in the vicinity of the underdrain outlet, the dam does not appear to leak appreciably.
- A geotextile fabric was placed between the till zone and downstream rock fill shell to act as a filter. These two zones are gradationally incompatible, and the filter fabric was included to limit the potential for migration of fines from the till zone into voids within the

downstream rock fill shell. As geotextile filters are subject to damage when placed against rock fill, they are not a preferred means of filtration. Additionally, they are of little use in areas where conduits pass through a dam.

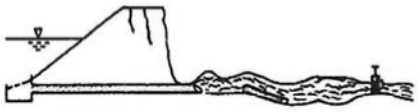
- The dam is believed to be founded on intact bedrock and/or very dense till-like soils over shallow bedrock. Several photos taken during construction are attached in Appendix F.
- The dam designer incorporated a perforated underdrain system within the impoundment, connected to a solid pipe that passes through the dam. Its inclusion suggests that it was intended to drain the impoundment at a future date, although this would now appear to be an unlikely scenario. The system includes a solid 100 mm diameter Schedule 80 ABS plastic pipe that passes through the dam at its highest point. As shown on Plate 2 of the construction report, the solid pipe was surrounded on all sides by compacted till along its entire length through the dam. This pipe is connected to a network of perforated "Big-O" type plastic pipes installed at the bottom of the impoundment. These pipes were reportedly wrapped in geotextile and covered with a layer of sand produced by the pilot processing plant.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed (it is shown on Plate 2 but is not mentioned in the report text). Furthermore, should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure. This process is illustrated in the following schematic.



A - Hole develops in conduit with downstream valve which is under constant pressure from reservoir head.



B - Hole enlarges allowing increased flow and a piping failure begins.



C - Reservoir drains through the conduit.

- Overall it appears that adequate compaction was carried out during fill placement and the materials selected for construction are not considered susceptible to liquefaction during an earthquake.
- The impoundment level is controlled by the bedrock spillway beyond the dam's east abutment, and there is approximately 1.1 m of freeboard between the spillway and the crest of the dam. It is not known if the design storm selected by the dam designer is consistent with a flood having an AEP falling within 1/100 and 1/1,000.
- A slump occurred on the downstream slope of the dam prior to 2003 resulting in the development of a tension crack up to 200 mm wide at the downstream edge of the crest and vertical movements of up to approximately 600 mm.
- The slump is located where the embankment is approximately half of its maximum height. Although the triggering mechanism is unclear, this portion of the embankment may have been slightly steeper than elsewhere, and/or the material exposed on the face of the dam may not have been adequately compacted.
- It does not appear that the slump has become enlarged in the intervening time between the 2010 and 2014 inspection visits.
- The presence of the slump indicates that the factor of safety of the fill along the face of the dam is marginal, although the global factor of safety for the overall embankment is higher.
- The design engineer used a seismic coefficient of 0.1g when conducting the stability analysis in 1987. This coefficient is a simplified means of evaluating the destabilizing forces resulting from an earthquake. Referring to the current (2010) seismic hazard values provided by the Geologic Survey of Canada (GSC) attached in Appendix F, an updated stability analysis would likely utilize a seismic coefficient ranging between 0.28g and 0.37g. These values correspond to earthquakes with an AEP of 1/100 and 1/1,000 respectively.
- Based on comments provided in the construction summary report, the designer apparently applied the seismic coefficient to all analysis cases, including the steady state seepage case. It is not clear why this was done, as this force should only be considered when evaluating loading conditions associated with an earthquake. It is also not clear how the "sudden drawdown" analysis case resulted in a higher factor of safety compared to the steady state seepage analysis case. In our experience, the sudden drawdown results should generally yield a factor of safety that is lower than the steady state analysis case.

18. SUMMARY

The following is a summary of significant observations and conclusions from this Dam Safety Inspection.

- Based on the 2007 CDA Dam Guidelines classification system and current downstream land usage, the Valentine Mountain Mine tailings dam should be assigned a consequence rating of "Significant".

- The design operating freeboard is approximately 1.10 m, and is controlled by a spillway beyond the east abutment of the dam that was blasted into bedrock. The dam designer assigned a 6 hour storm delivering 135 mm of rainfall as the design event for the facility, and it appears the constructed spillway (if properly maintained) can pass the runoff associated with such an event with a significant factor of safety.
- The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.
- A review of the stability analysis results presented by the dam designer in the construction summary report indicates that individual may not have been familiar with standard stability analysis conventions, particularly with respect to the loading conditions considered. Furthermore, the seismic coefficient used for the original analysis is likely too low given subsequent changes to the regional seismic hazard maps.
- Based on a comparison between site inspection observations, it appears that the slump on the downstream face of the embankment near the east abutment has not increased in size in the 4-year period since 2010. The presence of the slump indicates the downstream slope of the embankment was constructed too steep.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed. Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure.
- The pressure gauge connected immediately upstream of the underdrain outlet was observed to be leaking during the 2014 inspection. Comparing to images collected during the 2010 inspection, it appears the leak has developed (or increased in flow rate) since November of 2010.
- To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. If they can be located and are operational, data from these instruments would be useful in future stability analyses.
- No active seepage was observed along the toe of the dam during Thurber's 2010 or 2014 inspections; however a localized wet spot was observed in front of the underdrain outlet area at the time of the October 24, 2014 inspection.

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19. RECOMMENDATIONS

The following is a summary of the recommendations resulting from this DSI.

a) A survey should be carried out within the impoundment to investigate the level of the tailings. It is anticipated this would be completed using a row boat/canoe and a weighted tape or sounding line. Once completed, the tailings level should be compared to the as-constructed survey of the impoundment prior to filling to obtain a rough estimate of the volume of tailings in the facility.

b) Now that an as-built plan of the impoundment has been obtained (showing the locations of installed instrumentation) a renewed effort should be made to locate and collect water level readings at both observation wells and the piezometer. The piezometer reportedly consisted of a 1 cm diameter metal tube, so it is not clear if this instrument will be serviceable (due to possible damage during construction or subsequent corrosion).

c) An updated stability assessment should be carried out, including an evaluation of performance during a design earthquake. If water level data from existing instruments is unavailable, conservative assumptions should be made for the purposes of the analysis.

d) A remediation plan should be developed (such as a toe berm) should the stability assessment determine that the factor of safety is unacceptable.

e) A qualified professional should evaluate whether the 6-hr storm assumed by the original dam designer is suitable and conforms to the inflow design flood recommended in the CDA guidelines. This assessment may require a relatively detailed survey of the existing spillway.

f) Great Thunder Gold Corp. should initiate a dam surveillance program that includes dam inspection visits at regular intervals throughout the year. During the inspection visits, surveillance personnel should fill out a standard inspection form. Of particular importance would be the development of new seepage locations along the toe of the dam, along with observations about the leakage at the underdrain outlet.

g) Vegetation must not be allowed to become re-established on the dam or along the spillway channel. Due to weather and frost effects, it is anticipated that rock falls will occasionally occur along the spillway channel, which was blasted through bedrock. Significant rock fall should be removed to prevent obstructions to flow.

h) Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. This failure could occur during normal operating conditions (e.g., due to the ongoing deterioration of the plastic pipe and fittings) or as a result of embankment deformations (e.g., possibly earthquake-induced). A remediation plan should be developed to address this risk. One possible approach would be to construct a toe drain at the location of the outlet that incorporates a granular filter zone. The primary function of the toe drain would be to protect the outlet from future damage from frost action and shallow slumps, as well as to allow a controlled release of the impoundment should the pipe ultimately fail. However, installation of the toe drain would inherently involve risk. Depending on

the condition and fragility of the outlet, the placement of the filter zone and coarser toe drain fill could, in itself, trigger a rupture.

i) A response plan should be developed to address the possible increase in leakage from the outlet pipe over time.

20. ENGINEER OF RECORD

The 2013 MEM guidelines for annual DSI reports states that the professional engineer conducting the DSI will be deemed the Engineer of Record for the facility unless another engineer is identified as having this responsibility. The author of this DSI report is not considered to be the Engineer of Record for the structure and does not take professional responsibility for its design.

Peter Peart, P.Eng. submitted the impoundment proposal report for the subject tailings dam to the Ministry of Mines in June of 1987. Mr. Peart also prepared the construction report for the structure, dated December 1, 1987. In this document, Mr. Peart clearly accepts professional responsibility for the design and construction of the structure. A search of the APEGBC membership database indicates that there is no one by the name of Peter Peart practicing within the Province of British Columbia at this time.

21. CLOSURE

Use of this report is subject to the Statement of Limitations and Conditions included at the end of the text of the report. With reference to Clause 4 of the Statement, the BC Ministry of Energy and Mines is also granted "Approved User" status.

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STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over ...)

INTERPRETATION OF THE REPORT *(continued. . .)*

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

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APPENDIX A
REFERENCE DOCUMENTS

TAILINGS IMPOUNDMENT PROPOSAL REPORT
JUNE 1987

8.4.0

APPENDIX Z:

TAILINGS IMPOUNDMENT PROPOSAL, JUNE 1987.

GRIT
1803

TAILINGS IMPOUNDMENT PROPOSAL, VALENTINE MOUNTAIN

VALENTINE GOLD CORPORATION.

To Ministry of Energy, Mines and Petroleum Resources.

Valentine Gold Corporation.
666 Burrard St.
Vancouver, B.C.

By Peter Peart. P.Eng.

TABLE OF CONTENTS

PART ONE

1.0.0.	INTRODUCTION
1.1.0	TOPOGRAPHY
1.2.0	GEOLOGY OF THE AREA
1.2.1	Surficial Geology
1.2.2	General Geology
1.2.3	Previous Instability
1.2.4	Downstream Risk
1.3.0	CONSTRUCTION MATERIALS
1.3.1	Till
1.3.2	Rip-Rap Borrow
1.4.0	CLIMATE
1.5.0	HYDROLOGY
1.5.1	Catchment Area
1.5.2	Precipitation
1.6.0	SEISMICITY
1.7.0	DISPOSAL
1.7.1	Storage Capacity
2.0.0	DESIGN ANALYSIS
2.1.0	INVESTIGATION RESULTS
2.2.0	LABORATORY ANALYSIS
2.3.0	CONSTRUCTION MATERIALS SPECIFICATIONS
2.4.0	IMPOUNDMENT CONSTRUCTION
2.5.0	HYDROLOGY
2.5.1	Surface Hydrology
2.5.2	Water Balance
2.5.3	Subdrains
2.5.4	Spillway
2.5.5	Monitoring
2.6.0	STABILITY
2.7.0	DRAINAGE
2.8.0	INSTRUMENTATION AND MONITORING
2.9.0	SEEPAGE

PART TWO

3.0.0	CONSTRUCTION CONTROL
3.1.0	CONSTRUCTION SCHEDULE
3.2.0	DESIGN CONTROL
3.3.0	CONSTRUCTION OF PHASE 2
3.4.0	COLD WEATHER CONSTRUCTION

LIST OF PLATES

PLATE 1	SITE LOCATION
PLATE 2	MILL AND TAILINGS SITE
PLATE 3	SITE PLAN
PLATE 4	CENTRE-LINE SECTION
PLATE 5	STORAGE EVALUATION
PLATE 6	MAXIMUM CROSS-SECTION
PLATE 7	STABILITY MODEL 1
PLATE 8	STABILITY MODEL 2
PLATE 9	FINAL DAM PROFILE
PLATE 10	LOG OF TEST PITS
PLATE 11	GRADATION CURVES
PLATE 12	UNIFIED SOIL CLASSIFICATION
PLATE 13	STORM POTENTIAL DATA

APPENDICES

APPENDIX 1	PROSPECTUS FOR VALENTINE MOUNTAIN.
APPENDIX 2	SEISMIC HAZARD CALCULATION.
APPENDIX 3	STABILITY CALCULATIONS.

1.0.0 INTRODUCTION

Valentine Gold Corporation proposes to construct a tailings impoundment at the Valentine Mountain site north of Sooke on southern Vancouver Island during 1987. The location is shown on Plate 1.

Valentine Gold Corporation has completed a final design for the proposed tailings impoundment in the Discovery Zone on Valentine Mountain. The final design of the impoundment is based on recently completed field and laboratory investigations carried out in house by Valentine Gold Corporation. This design incorporated the criteria laid down in the Ministry of Energy Mines and Petroleum Resources guidelines for the Design, Construction and Operation of Tailings Impoundments.

The impoundment has been designed for an ultimate storage capacity of approximately 4,163 cubic metres. The starter dam has a capacity of approximately 1,200 cubic metres while the subsequent two metre lift will provide a total of approximately 4,163 cubic metres of impoundment storage. The impoundment will provide adequate storage for a 20 tonne per day mill to operate for approximately 300 days.

A general prospectus on the area and the 1987 program is included as Appendix A

1.1.0 TOPOGRAPHY

The site is located to the south of the Discovery Zone on Valentine Mountain as shown on Plate 2. The area proposed for the impoundment lies between the expected ore zone and pine plantations owned and developed by C.I.P. The logging company (C.I.P) has indicated that they are unwilling to allow the impoundment to be located within the confines of the plantation and placing the impoundment on the ore zone would require its removal at some future time.

The site is located at an elevation of approximately 800 metres on the ridge running down to the south west from Valentine Mountain. The water shed area above the potential impoundment is approximately 38,000 square metres. The maximum elevation in the water shed is approximately 804 metres while the minimum elevation is about 760 metres.

The water shed area has been recently logged and is presently covered with new growth that we understand was naturally seeded. In general the surface of the watershed area comprises about 50% exposed bedrock and 50% shallow soils covered with grasses and sparse timber.

1.2.0 GEOLOGY OF THE AREA

1.2.1 Surficial Geology

The site is located on a long east west trending ridge that is the surface expression of an anticlinal feature. The rock dips steeply to the south and strikes approximately 130 degrees. The area is underlain by meta sedimentary rocks that were over-ridden by glaciers as recently as 9,000 BP . The glacial action resulted in a generally rounded regional topography and a highly irregular local topography. A thin veneer of glacial till covers the low areas of the site and bedrock remains exposed over the remaining 50% of the site. The glacial till is in a dense to very dense state .

1.2.2 General geology

The antiform that underlies the site is made up of interbedded meta sedimentary rocks of the Cretaceous period. The geology of the area is discussed in detail in Appendix A, the Prospectus. The rock is tight, competent and very tough and is infrequently faulted or sheared. A number of shear zones have been noted to produce water along the ridge in the discovery zone in quantities in the order of about 5 to 10 litres per minute.. The rock in the area of the impoundment has been inspected and no groundwater discharge or recharge was noted in the period between March and June of 1987.

1.2.3 Previous Instability

A site investigation and an air photo study failed to reveal any evidence of previous landslides, mudslides, rockslides or avalanches. Given the nature of the bedrock and the overlying till it would be reasonable to expect that the surface materials would be stable.

1.2.4 Downstream Area

The proposed impoundment is approximately 1.5 kilometres north of the Bear Creek Reservoir and approximately 400 metres higher. The non perennial stream that runs from an area about 500 metres south of the dam into Bear Creek Reservoir has been observed and found to be dry from June until fall.

There in no risk of loss of structures below the impoundment and very low risk of loss of life in the area downstream of the impoundment.

1.3.0 CONSTRUCTION MATERIALS

1.3.1 Till

Two borrow sites for Dam construction Materials have been identified in the area of the proposed impoundment, these areas are indicated on Plate 2. Testing indicates that the soils available at the borrow sources are mixtures of clay, silt, sand and gravel in an overconsolidated state that would be suitable for use in the construction of the impoundment embankment. The

general characteristics of the material are indicated in Table 1 below.

TABLE 1

LOCATION	CLASSIF.	UNIT WT.	MOIST%	BORROW VOL.
Gvl Pit	SM/SC	2000Kg/m3	9.0%	3,200 cu m
Gvl pit	SC	2110Kg/m3	15%	4,000 cu m
B1	SM/SC		20%	1,200 cu m

1.3.2 Rip-Rap Borrow

Rip-rap is available in quantity from 2 existing rock quarries and a third potential quarry as shown on Plate 2 in quantities well in excess of that required for the impoundment embankment.

1.4.0 CLIMATE.

In general the site experiences coastal temperate weather however the isolated elevation of the site exposes it to summer and fall thunderstorms.

Data from the Ministry of Forests and Lands indicates that the average monthly summer precipitation is as shown on Table 5 below:

TABLE 5

MONTH	AVERAGE RAINFALL OVER 17 YEAR PERIOD. 1970, 1986
MAY	90.8mm
JUNE	61.6mm
JULY	39.2mm
AUGUST	45.2mm
SEPTEMBER	98.5mm

Snow may be expected in November and spring runoff may be expected in April. In recent years there has been little snow in the Valentine Mountain area and access to the site has been available all year around for four wheel drive vehicles.

Average annual temperatures range from lows of -2 degrees celcius to highs of 26 degrees celcius in winter and summer respectively.

1.5.0 HYDROLOGY.

1.5.1 Catchment Area.

The catchment area is shown on Plate 2. The total catchment area is approximately 38,000 square metres and extends along the ridge approximately 250 metres and down from the ridge for approximately 250 metres in an apex down triangular configuration culminating in the impoundment.

1.5.2 Precipitation.

The average annual precipitation is approximately 1.2 metres of which about 335 mm falls in the summer months as detailed in Section 1.4.0. About 200mm of precipitation is in the form of snow that falls over the winter period.

1.6.0 SEISMICITY

The Seismic Hazard Calculation was provided by Energy,Mines and Resources, Canada and is summarized in Table 2 below. The Hazard Calculation is included as Appendix 2.

TABLE 2

LOCATED AT 48.51 North, 123.90 West.

Probability of Exceedence per Annum	0.010	0.005	0.0021	0.001
Probability of Exceedence in 50 years	40%	22%	10%	5%
Peak Horizontal Ground Accel.	0.114	0.174	0.279	0.411
Peak Horizontal Ground Velocity	0.087	0.144	0.249	0.389

1.7.0 DISPOSAL

The tails will be introduced into impoundment in the form of a slurry with a specific gravity of approximately 1.3 to 1.4. Based on samples that have been tested at the time of writing we anticipate that the tails will have characteristics similar to those presented on Table 3 below.

TABLE 3

ELEMENT	CONCENTRATION	ELEMENT	CONCENTRATION
Al	1.13%	Ag	0.2 ppm
As	50.0 ppm	Ba	230.0 ppm
Be	<0.5 ppm	Bi	<2.0 ppm
Ca	0.12%	Cd	<0.5 ppm
Co	9.0 ppm	Cr	32.0 ppm
Cu	16 ppm	Fe	1.90 %
Ga	<10 ppm	Hg	1.0 ppm
K	0.66%	La	<10 ppm
Mg	0.60%	Mn	288 ppm
Mo	<1.0 ppm	Na	0.02 %
Ni	17 ppm	P	330 ppm
Pb	22 ppm	Sb	<5.0 ppm
Se	<10.0 ppm	Sr	8 ppm
Ti	0.12%	Tl	<10.0 ppm
U	<10.0 ppm	V	41.0 ppm
W	<5.0 ppm	Zn	36.0 ppm

The slurry will be introduced into the impoundment at a constant rate of approximately 80 litres per minute. The supernatent liquid will be recycled and it is anticipated that this system will reduce the quantity of xanthate and frother required in the milling process. The consumption of xanthate and frother is expected to be in the order of 0.1 pound and 0.05 pound per ton of ore milled.

The physical nature of the tailings is expected to similar to that of a silty sand in that 50% of the tails will pass the #200 seive. We anticipate that the settled tailings will be in the order of 30% to 50% solids by weight.

The physical nature of the supernatent can only be estimated at this time however we expect the following to be typical:

Total Dissolved Solids.....0.25%
Ph.....7.0 to 7.5
Residual Xanthate.....<0.00001 %
Residual Frother.....<0.00001 %

1.7.1 Storage capacity

The ultimate capacity of the impoundment is in the order of 4,150 cubic metres and the starter dam capacity is in the order of 1,200 cubic metres of tailings. The storage capacity curve is shown on Plate 5.

2.0.0 DESIGN ANALYSIS

2.1.0 RESULTS OF FIELD INVESTIGATION

Field work included investigation of the subsurface and hydrological conditions in the area of the proposed tailings impoundment. Clearing of the area for a proposed drill hole indicated that the bedrock is overlain by a thin veneer of glacial till in a dense state.

Four test pits were hand excavated and representative samples returned to our field office for analysis. The logs of the test pits are shown on Plate 10 and the locations of the test pits are shown on Plates 2 and 3. Some soft organic silts were encountered in the depression near the proposed centre of the embankment as shown on Plate 2. The soft silts were approximately 1 metre deep and covered an area of approximately 35 square metres. The soft material has been removed to allow placement of a Longyear 38 drill rig.

A small spring is located to the north east of the impoundment area. The watercourse resulting from this spring passes close to the impoundment area and flow measurements indicate approximately 15 litres per minute flows in the channel before the water is lost to groundwater recharge to the south of the impoundment.

2.2.0 LABORATORY ANALYSIS

Valentine Gold Corporation carried out a laboratory investigation on representative samples of the subsurface materials in the impoundment and the borrow sites. The results of the investigation are presented in Appendix ... of this report. A summary of the results of this investigation is presented below in Table 3.

TABLE 3

LOCN.	DEPTH metres	CLASS.	M%	UNIT WT Kg/m3	CALC. PERM cm/sec
impound.	1 m	SM/GM	14%	2350	0.00042 CM/SEC
Bear Ck Res.	1.5 m	SM/SC	15%	1980	0.00061 cm/sec
Borrow 1	2.0 m	SM/SC	21%	2100	0.00008 cm/sec
Quarry	0.5 m	rip-rap	--	1998	free draining

****

The soils underlying the impoundment are gravely tills in an overconsolidated state. The grain size analysis is shown on Plate 11 and the logs of the test pits are shown on Plate 10. The soils in the Bear Creek Reservoir area are sandy tills as shown on the grainsize analysis on Plate 11 and the test pit logs on plate 10.

The laboratory testing included Moisture Content determination, compaction testing, wet and dry densities and grain size analysis. The shear strength analysis is based on empirical data and is of necessity very conservative.

2.3.0 CONSTRUCTION MATERIALS SPECIFICATIONS

2.3.1 Till

The till shall be a mixture of clay, silt, sand, and gravel that conforms to the limits of grain size distribution as shown on Plate 11. The till shall have at least 15% of the total dry weight passing the #200 seive and no trace of organics. All material containing organics will be wasted off site in a proper fashion. The till shall not contain boulders larger than 30cm in diameter.

Rip-rap shall have less than 5% fines and no fragments larger than 50 cm in diameter. All rip-rap shall be angular to sub angular, blasted rock is preferred. Rip-rap shall not contain any organic or deleterious materials. All rock shall be competent and tough, no decomposed or friable rock may be used.

Filter fabric conforming to AASHO standards must be utilized in the embankment.

Schedule 80, 10cm diameter PVC pipe will be used to penetrate the embankment and 10cm diameter perforated Big O type pipe will be used to construct the upstream underdrain.

2.4.0 TYPE OF CONTAINMENT STRUCTURE

The tailings dam will be constructed in two stages using the centreline construction method as shown on Plates 3 to 9. The starter dam will be constructed of till and rockfill as shown on the Maximum Cross Section, Plate 6. The materials will be acquired from the appropriate borrow sites as described in Section 1.3.0. When the starter dam has been filled and the beach level raised a second phase will be added to the impoundment to increase the storage capacity as shown on Plate 3 and 9.

2.5.0 HYDROLOGY

The site hydrology was arrived at using data collected by the Ministry of Forests and Lands, B.C Hydro, the U.S Department of the Interior and C.I.P's local weather stations.

2.5.1 Surface Hydrology

The average annual precipitation in the site area is approximately 1.2 metres of which about 200 mm is in the form of snow. Average monthly rainfall over the summer months is documented in Section 1.4.0 of this report. In general the average monthly rainfall during the period of operation of the pilot plant will be in the order of 40mm to 90mm.

The site is located in an area that may be subject to a Maximum Probable 6 hour point storm that delivers 135mm of rain as indicated by the Bureau of Reclamations distribution map (Plate 13). The Maximum Storm values are suitably conservative to be considered without including snowpack in the peak discharge calculations. Given that the site is 50% bedrock, sparsely covered with vegetation and relatively steep it is reasonable to expect that the Lag relationship and the Retention Coefficient will be very small and for the purpose of estimating the spillway criteria, may be considered to approach zero.

The peak instantaneous discharge for the Probable Maximum 6 Hour Storm will be in the order of 0.3 cubic metres per second. A spillway with a cross sectional area of 1 square metre and a velocity of 1 metre per second will discharge approximately 1 cubic metre per second, giving a safety factor of 3.5 against being overtopped.

2.5.2 Water Balance

Data collected on site over the month of April, May and June indicate that evaporation losses will be in the order of 15 cm per month over the summer months while precipitation will be in the order of 4cm to 9cm. This indicates a net loss situation for water stored in the tailings impoundment of approximately 13 to 25 litres per minute.

A small spring to the north of the impoundment provides about 20 litres per minute which will makeup the potential deficit in the water budget.

It is proposed that a small 20 U.S gallon per minute pump located in Jasman Creek will provide makeup water to the system.

WATER BALANCE BUDGET

WATER LOSS		WATER GAIN	
To Evaporation	34 l/min	From rain	13 to 25 l/min
To Seepage	5 l/min	From spring	20 l/min
To Process	2 l/min		
TOTAL LOSS	41 l/min	TOTAL GAIN	33 to 45 l/min

PROJECTED WATER BUDGET.....8 l/min makeup to 5 l/min excess

2.5.3 Subdrains

It is proposed that 4" pvc perforated drain pipe will be placed beneath the impounded tailings to facilitate drainage of the entrained supernatent water at the time of abandonment.

2.5.4 Spillway

As shown on Plate 3 a spillway has been provided to prevent the impoundment structure from being overtopped in the event of a Maximum Probable 6 Hour Storm that delivers approximately 15 cm of rain. The spillway design calls for a minimum cross sectional area of 1 square metre and a minimum positive slope of 5% which will provide adequate protection against overtopping.

The spillway is to be constructed in bedrock and the downstream channel is to be rip-rap protected if it passes over or through material other than bedrock.

2.5.5 Monitoring

Stream flow will be monitored at Jasman Creek and the Spring to the north of the impoundment while the project continues. Total water budget data will be gathered at the tailings impoundment while the mill is in operation. The phreatic surface within the impoundment will be monitored during the life of the structure and the results reviewed by a qualified Engineer.

2.6.0 STABILITY ANALYSIS

The stability of the dam was evaluated with the aid of the STABR computer program for slope stability analysis with critical slip surfaces. The program employs the Modified Bishop method of analysis. The calculations were carried out using effective stress analysis in conjunction with the maximum anticipated pore water pressure conditions. Seismic conditions consistent with those estimated in Section 1.6.0 were incorporated into the analysis.

The analysis of the upstream slope was carried out for the anticipated conditions immediately following construction of the dam. Using a seismic coefficient of 0.1 and an Ru factor of 0.5 a Factor of Safety of the critical slip surface of approximately 1.72 was calculated. The configuration of the analysis is shown on Plate 7. We feel that this figure is acceptable as it is well in excess of the minimum accepted Safety Factor of approximately 1.15 for earth fill dams in this seismic area.

The analysis of the downstream slope was conducted for the

anticipated conditions at the maximum impoundment elevation as shown on Plate 8. Using a seismic coefficient of 0.1 and a pore water pressure distribution governed by the phreatic surface shown on Plate 8 the Factor of Safety for the critical slip surface is 2.21. This Factor of safety is considerably higher than the minimum acceptable value of 1.15 for dams in this seismic area.

2.7.0

The dam is constructed of till and rockfill in such a fashion as to allow a phreatic surface as shown on Plate 8. The calculated hydraulic conductivity of the till is approximately 0.00008 cm/sec while the rockfill will be in the order of approximately 0.01 cm/sec. A difference of two orders of magnitude in hydraulic conductivity may be treated as a free draining layer which will allow the phreatic surface to develop as shown on Plate 8. Under drains are to be constructed along the upstream toe of the embankment as shown on Plate 6 to allow drainage of the tails following the discharge period. This will allow maximum normal consolidation of the tails and facilitate the easy reclamation of the impoundment area.

2.8.0 INSTRUMENTATION AND MONITORING

Two settlement monuments an two standpipe piezometers will be installed in the embankment as shown on Plates 3 and 6. The settlement and phreatic surface will be monitored weekly for the duration of the initial filling period and less frequently after the discharge period has ended. The seepage collected from the downstream ditch, if any, will be monitored for water quality and treated or recycled. Should the water quality be within the discharge guidelines limits it may be returned to the environment.

2.9.0 SEEPAGE

Seepage through the dam will be collected in a downstream ditch and then conducted to a small settling pond where the seepage water may be sampled prior to possible discharge to the environment.

PART TWO

3.1.0 CONSTRUCTION SCHEDULE

The layout of the dam and site preparation will be completed in the last week of June 1987. Construction will commence at the receipt of the correct documents from the respective Ministries.

The total time required for construction will be approximately 14 working days. We anticipate the placement of approximately 200 cubic metres per day placed, spread and compacted.

We anticipate that construction of the impoundment will be essentially complete within 15 day of Ministerial Approval.

3.2.0 DESIGN CONTROL

A Professional Engineer will be on site for the construction period to supervise and monitor construction of the embankment and the associated facilities.

3.3.0 PHASE TWO CONSTRUCTION

The current exploration program will determine the feasibility of continuing the bulk sampling and the subsequent raising of the impoundment. Should the phase two plan be considered by Valentine Gold Corporation it will be raised as described in this report and within the guidelines provided by the Ministry of Energy, Mines and Petroleum Resources.

3.4.0 COLD WEATHER CONSTRUCTION

Construction will not be carried out when the temprature falls to below freezing for a considerable period of time. The length of time should be determined by a qualified Geotechnical Engineer.

No construction of the embankment should be undertaken in snowy conditions.

Should you have any questions regarding this report or the project in general we would be more than pleased to have you contact us.

Yours Sincerely

Peter Peart. P.Eng.

Valentine Gold Corporation
666 Burrard St
Vancouver,B.C.
V6C 2X8

Phone (604)669 1524
Sooke (604)642 6321

****

APPENDIX 1

APPENDIX 2

ENERGY, MINES AND
RESOURCES CANADA
GEOLOGICAL SURVEY OF CANADA

ENERGIE, MINES ET
RESSOURCES CANADA
COMMISSION GEOLOGIQUE DU CANADA

SEISMIC HAZARD CALCULATION *

CALCUL DE PERIL SEISMIQUE *

REQUESTED BY/ DEMANDE PAR: Peter Peart/Beauprey Expl./dhw

SITE: Sooke

LOCATED AT/ SITUE AU: 48.51 NORTH/NORD 123.90 WEST/OUEST

PROBABILITY OF EXCEEDENCE PER ANNUM/ PROBABILITE DE DEPASSEMENT PAR ANNEE	0.010	0.005	0.0021	0.001
PROBABILITY OF EXCEEDENCE IN 50 YEARS/ PROBABILITE DE DEPASSEMENT EN 50 ANS	40 %	22 %	10 %	5 %
PEAK HORIZONTAL GROUND ACCELERATION (G) / ACCELERATION HORIZONTALE MAXIMALE DU SOL (G)	0.114	0.174	0.279	0.411
PEAK HORIZONTAL GROUND VELOCITY (M/SEC) / VITESSE HORIZONTALE MAXIMALE DU SOL (M/SEC)	0.087	0.141	0.249	0.389

* REFERENCES

1. NEW PROBABILISTIC STRONG SEISMIC GROUND MOTION MAPS OF CANADA: A COMPILATION OF EARTHQUAKE SOURCE ZONES, METHODS AND RESULTS. P.W. BASHAM, D.H. WEICHERT, F.M. ANGLIN, AND M.J. BERRY EARTH PHYSICS BRANCH OPEN FILE NUMBER 82-33, OTTAWA, CANADA 1982.

2. ENGINEERING APPLICATIONS OF NEW PROBABILISTIC SEISMIC GROUND-MOTION MAPS OF CANADA. A.C. HEIDEBRECHT, P.W. BASHAM, J.H. RAINER, AND M.J. BERRY CANADIAN JOURNAL OF CIVIL ENGINEERING, VOL. 10, NO. 4, P. 670-680, 1983.

3. NEW PROBABILISTIC STRONG GROUND MOTION MAPS OF CANADA. P.W. BASHAM, D.H. WEICHERT, F.M. ANGLIN, AND M.J. BERRY, BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA, VOL. 75, NO. 2, P. 563-595, 1985.

4A. SUPPLEMENT TO THE NATIONAL BUILDING CODE OF CANADA 1985, NRCC NO. 23178. CHAPTER 1: CLIMATIC INFORMATION FOR BUILDING DESIGN IN CANADA. CHAPTER 4: COMMENTARY J: EFFECTS OF EARTHQUAKES.

4B. SUPPLEMENT DU CODE NATIONAL DU BATIMENT DU CANADA 1985, CNRC NO 23178F. CHAPITRE 1: DONNEES CLIMATIQUES POUR LE CALCUL DES BATIMENTS AU CANADA. CHAPITRE 4: COMMENTAIRE J: EFFETS DES SEISMES.

5-MAY-87 07:26:4(

SITE Sooke

ZONING FOR ABOVE SITE/ ZONAGE DU SITE CI-DESSUS

1985 NBCC/CNBC: ZA = 5; ZV = 5; V = 0.30 M/S

ACCELERATION ZONE/ ZONE D'ACCELERATION ZA=5
ZONAL ACCELERATION/ ACCELERATION ZONALE 0.30 G

VELOCITY ZONE/ ZONE DE VITESSE ZV=5
ZONAL VELOCITY/ VITESSE ZONALE 0.30 M/S

1985 NBCC/CNBC **
SEISMIC ZONING MAPS/ CARTES DU ZONAGE SEISMIQUE

PROBABILITY LEVEL: 10% IN 50 YEARS
NIVEAU DE PROBABILITE: 10% EN 50 ANNEES

G OR M/S	ZONE	ZONAL VALUE/ VALEUR ZONALE
0.00	0	0.00
0.04	1	0.05
0.08	2	0.10
0.11	3	0.15
0.16	4	0.20
0.23	5	0.30
0.32	6*	0.40

* ZONE 6: NOMINAL VALUE/ VALEUR NOMINALE 0.40;
SITE-SPECIFIC STUDIES SUGGESTED FOR IMPORTANT PROJECTS/
ETUDES COMPLEMENTAIRES SUGGEREES POUR DES PROJETS D'IMPORTANCE.

** For NBCC applications, when Zv=0 and Za>0, the values of Zv and v should be taken as 1 and 0.05, respectively. See NBCC 1985, Sentence 4.1.9.1 (4).

Pour applications selon le CNBC, lorsque Zv=0 et Za>0, les valeurs Zv et v deviendraient 1 et 0.05, respectivement. Voir CNBC 1985, paragraphe 4.1.9.1 (4).

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APPENDIX 3

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (END CONSTRUCTION)

CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	1
NUMBER OF VERTICAL SECTIONS	7
NUMBER OF SOIL LAYER BOUNDARIES	3
NUMBER OF PORE PRESSURE LINES	-1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

SEISMIC COEFFICIENT S1,S2 = .10, .00 ← LOAD APPLIED TO BOTTOM OF SLICE

UNIT WEIGHT OF WATER = 9.81

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (24.5, .5) WITH FINAL GRID OF .5

ALL CIRCLES TANGENT TO DEPTH, 11.0,

GEOMETRY

SECTIONS	.0	2.0	14.0	14.5	18.0	26.5	29.0
T. CRACKS	13.2	13.1	6.0	6.0	6.0	11.0	11.2
W IN CRACK	13.2	13.1	6.0	6.0	6.0	11.0	11.2
BOUNDARY 1	13.2	13.1	6.0	6.0	6.0	11.0	11.2
BOUNDARY 2	13.2	13.1	12.0	6.0	6.0	11.0	11.2
BOUNDARY 3	13.2	13.1	12.0	12.0	12.2	11.0	11.2

SOIL PROPERTIES

LAYER	COHESION	FRICTION ANGLE	DENSITY
1	.0	45.0	19.0
2	20.0	37.0	22.0

PORE PRESSURE SPECIFIED WITH THE RU FACTOR

RU = .500

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (END CONSTRUCTION)

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	11.0	10.5	24.5	.5	1.721	1.676
2	11.0	10.5	23.5	.5	1.742	1.675
3	11.0	11.5	24.5	-.5	1.726	1.685
4	11.0	10.5	25.5	.5	1.798	1.775
5	11.0	9.5	24.5	1.5	1.729	1.682
6	11.0	10.5	24.0	.5	1.723	1.667
7	11.0	11.0	24.5	.0	1.722	1.679
8	11.0	10.5	25.0	.5	1.743	1.709
9	11.0	10.0	24.5	1.0	1.723	1.676
10	11.0	11.0	24.0	.0	1.728	1.675
11	11.0	11.0	25.0	.0	1.738	1.703
12	11.0	10.0	25.0	1.0	1.753	1.719

13	11.0	10.0	24.0	1.0	1.719	1.661
14	11.0	10.0	23.5	1.0	1.735	1.666
15	11.0	9.5	24.0	1.5	1.719	1.659
16	11.0	9.5	23.5	1.5	1.731	1.658
17	11.0	9.5	24.5	1.5	1.729	1.682
18	11.0	9.0	24.0	2.0	1.722	1.661
19	11.0	10.0	23.5	1.0	1.735	1.666
20	11.0	10.0	24.5	1.0	1.723	1.676
21	11.0	9.0	24.5	2.0	1.739	1.694
22	11.0	9.0	23.5	2.0	1.729	1.654

F.S. MINIMUM= 1.719 FOR THE CIRCLE OF CENTER (24.0, 1.5)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (RESERVOIR FULL)

CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	1
NUMBER OF VERTICAL SECTIONS	8
NUMBER OF SOIL LAYER BOUNDARIES	4
NUMBER OF PORE PRESSURE LINES	1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

SEISMIC COEFFICIENT S1,S2 = .10, .00 ← LOAD APPLIED TO BOTTOM OF SLICE

UNIT WEIGHT OF WATER = 9.81

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (24.5, .5) WITH FINAL GRID OF .5

ALL CIRCLES TANGENT TO DEPTH, 12.5,

GEOMETRY

SECTIONS	.0	2.5	10.0	11.0	14.5	15.0	27.0	29.0
T. CRACKS	6.5	6.5	6.0	6.0	6.0	6.0	13.1	13.2
W IN CRACK	6.5	6.5	6.0	6.0	6.0	6.0	13.1	13.2
BOUNDARY 1	6.5	6.5	6.0	6.0	6.0	6.0	13.1	13.2
BOUNDARY 2	10.8	11.0	6.6	6.0	6.0	6.0	13.1	13.2
BOUNDARY 3	10.8	11.0	11.6	11.8	12.0	6.0	13.1	13.2
BOUNDARY 4	10.8	11.0	11.6	11.8	12.0	12.0	13.1	13.2

SOIL PROPERTIES

LAYER	COHESION	FRICTION ANGLE	DENSITY
1	.0	2.0	16.0
2	.0	45.0	19.0
3	20.0	37.0	22.0

PORE PRESSURE DATA

COORDINATES OF EQUI-PRESSURE LINES

SECTIONS	.0	2.5	10.0	11.0	14.5	15.0	27.0	29.0
LINE 1	6.5	6.5	6.5	7.6	10.5	11.5	13.1	13.2

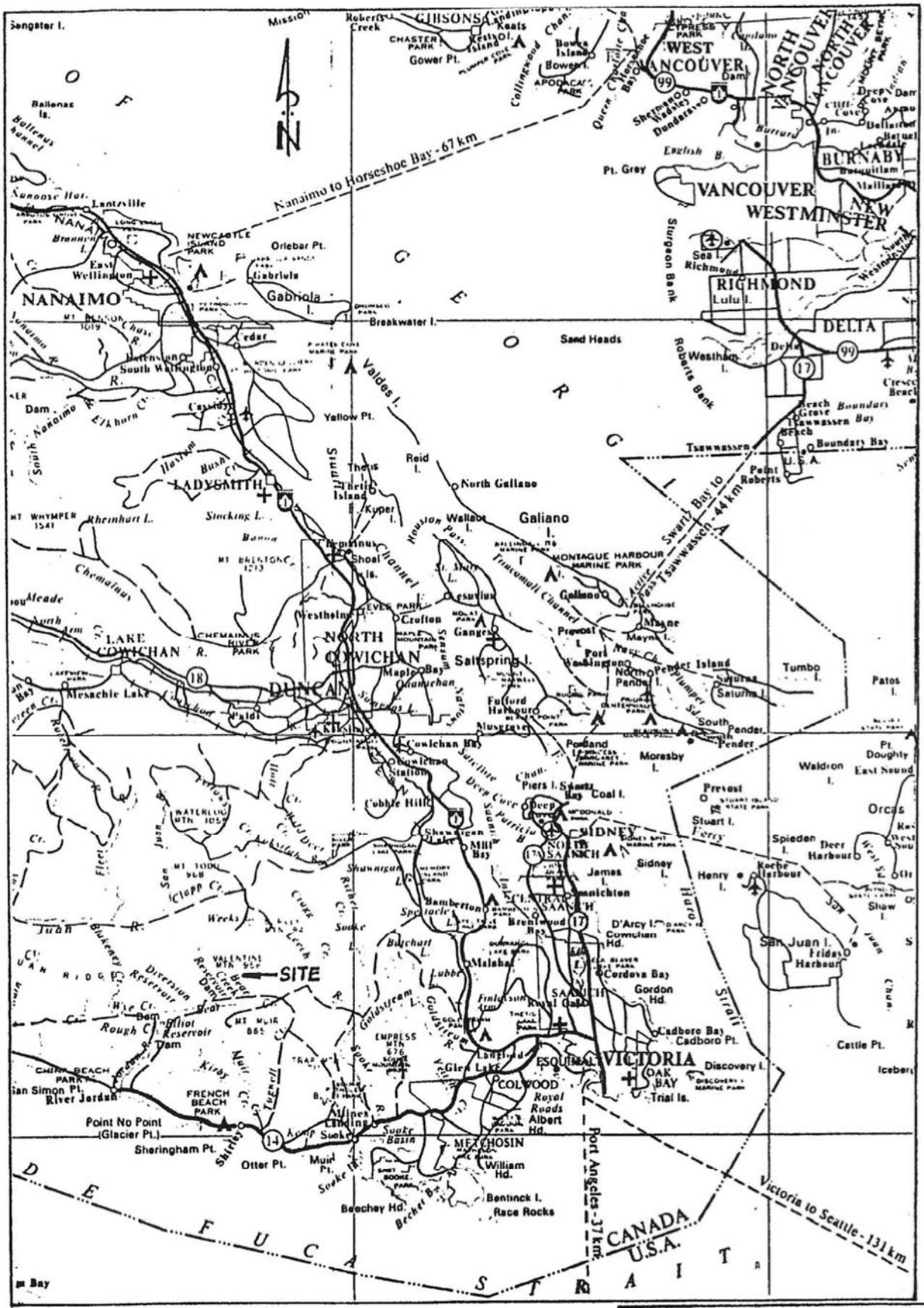
BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

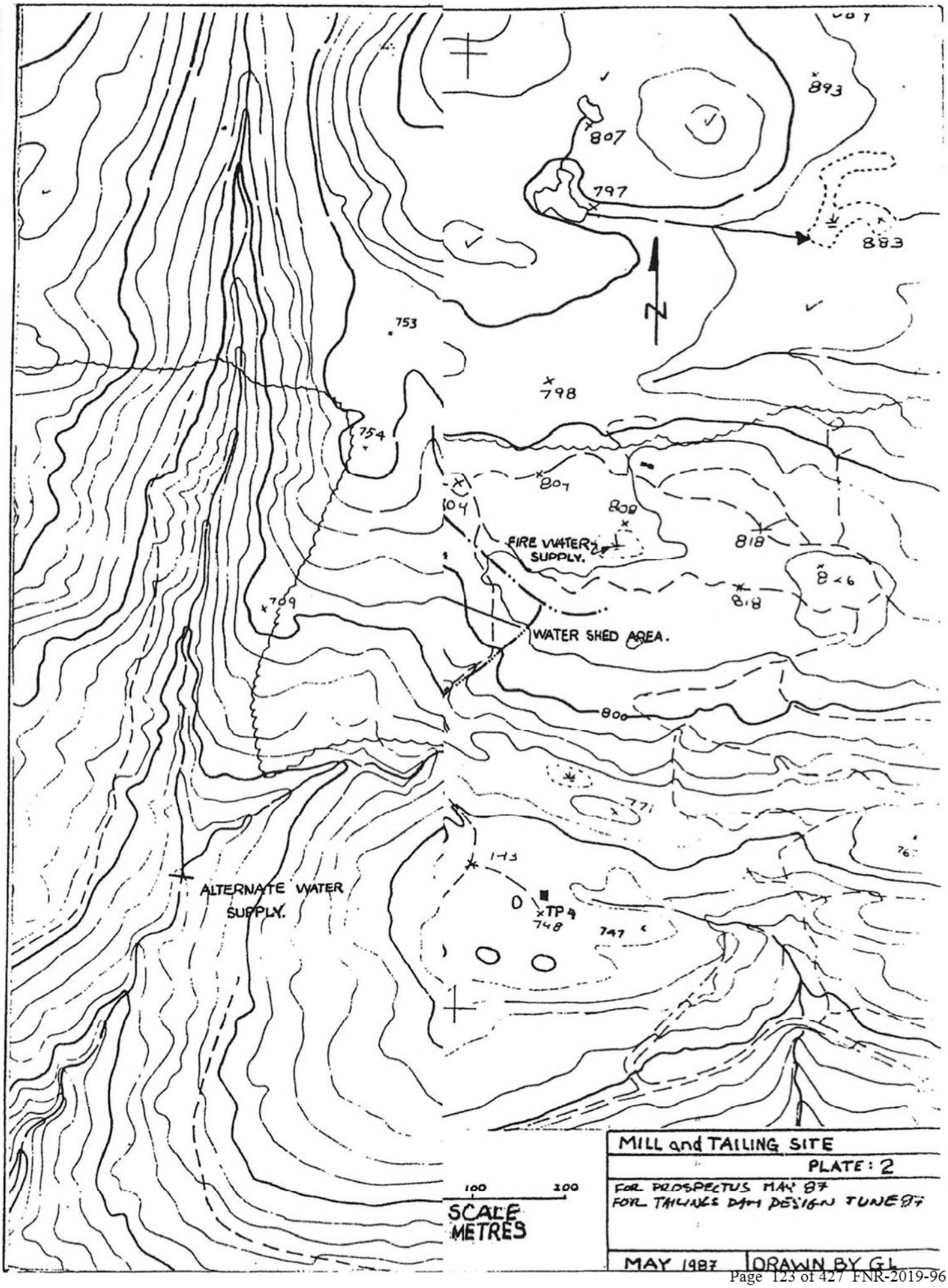
VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (RESERVOIR FULL)

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	12.5	12.0	24.5	.5	2.270	2.194
2	12.5	12.0	23.5	.5	2.234	2.125
3	12.5	13.0	24.5	-.5	2.229	2.152
4	12.5	12.0	25.5	.5	2.507	2.487
5	12.5	11.0	24.5	1.5	2.358	2.292
6	12.5	13.0	24.0	-.5	2.219	2.130
7	12.5	13.5	24.5	-1.0	2.218	2.144
8	12.5	13.0	25.0	-.5	2.271	2.210

13	11.0	10.0	24.0	1.0	1.719	1.661
14	11.0	10.0	23.5	1.0	1.735	1.666
15	11.0	9.5	24.0	1.5	1.719	1.659
16	11.0	9.5	23.5	1.5	1.731	1.658
17	11.0	9.5	24.5	1.5	1.729	1.682
18	11.0	9.0	24.0	2.0	1.722	1.661
	11.0	10.0	23.5	1.0	1.735	1.666
20	11.0	10.0	24.5	1.0	1.723	1.676
21	11.0	9.0	24.5	2.0	1.739	1.694
22	11.0	9.0	23.5	2.0	1.729	1.654

'.S. MINIMUM= 1.719 FOR THE CIRCLE OF CENTER (24.0, 1.5)


SITE
NANAIMO
LADYSMITH
DUNCAN
NORTH COWICHAN
LAKE COWICHAN
VICTORIA
ESQUIMALT
SAANICH
SIDNEY
COLWOOD
METCHOSIN
VANCOUVER
WEST VANCOUVER
NORTH VANCOUVER
BURNABY
NEW WESTMINSTER
RICHMOND
DELTA
Nanaimo to Horseshoe Bay - 67 km
Swartz Bay to Tsawwassen - 44 km
Victoria to Seattle - 131 km
Port Angeles - 37 km
CANADA
U.S.A.
STRAIT OF GEORGIA
STRAIT OF JUAN DE FUCA
Galiano I.
Saltspring I.
Pender Islands
Gabriola I.
Valdes I.
Reid I.
Thetis I.
Kuper I.
Moresby I.
Sidney I.
James I.
Mayne I.
Saturna I.
Tumbo I.
Patos I.
Prevost I.
Stuart I.
Orcas
San Juan I.
Lopez I.
Shaw I.
Waldron I.
Discovery I.
Trial Is.
Race Rocks
Beechey Hd.
William Hd.
Otter Pt.
Sheringham Pt.
Point No Point (Glacier Pt.)
Cattle Pt.
Cadboro Pt.
Gordon Hd.
Cordova Bay
Saanich Inlet
Finlayson Arm
Goldstream R.
Elliot Reservoir
Sooke Basin
Sooke R.
Juan de Fuca Strait
Georgia Strait
Sand Heads
Roberts Bank
Sturgeon Bank
Point Roberts
Tsawwassen
Boundary Bay
Crescent Beach
Ladner
Westham I.
Sea I.
Lulu I.
Deas I.
Iona I.
Lantzville
Nanoose Bay
Gabriola I.
Breakwater I.
Yellow Pt.
Chemainus
Crofton
Ganges
Fulford Harbour
Mesachie Lake
Cowichan Bay
Cowichan Station
Cobble Hill
Shawnigan Lake
Mill Bay
Brentwood Bay
Mt. Tzouhalem
Mt. Prevost
Mt. Maxwell
Mt. Whymper
Mt. Brenton
Mt. Muir
Mt. Wells
Empress Mtn.
Waterloo Mtn.
Gower Pt.
Howe Sound
Queen Charlotte Strait
Malaspina Strait
Georgia Strait
Strait of Juan de Fuca
Port Angeles - 37 km
Victoria to Seattle - 131 km
Nanaimo to Horseshoe Bay - 67 km
Swartz Bay to Tsawwassen - 44 km
N
0 10 20
SCALE
KILOMETERS
SITE LOCATION
PLATE 1

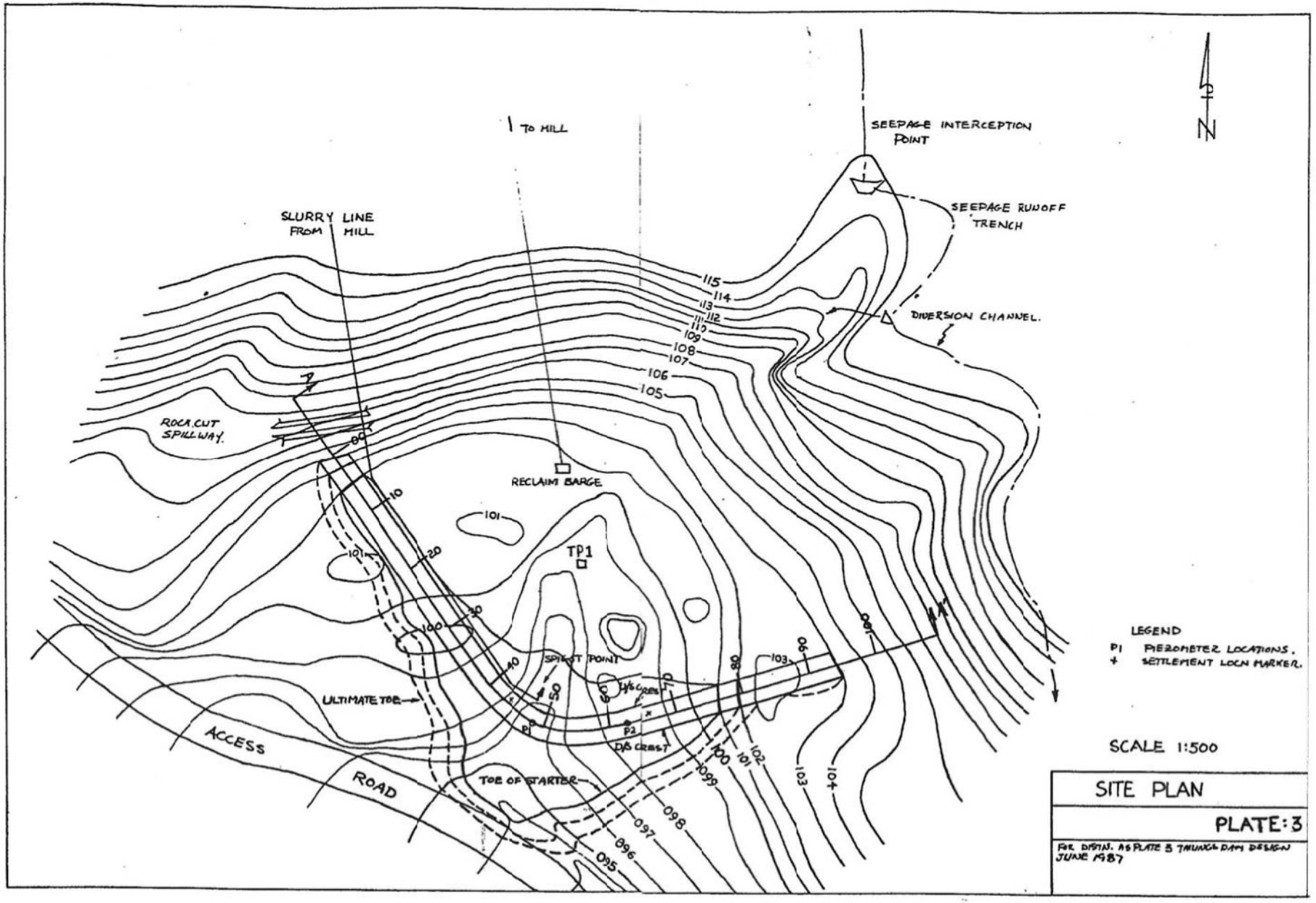


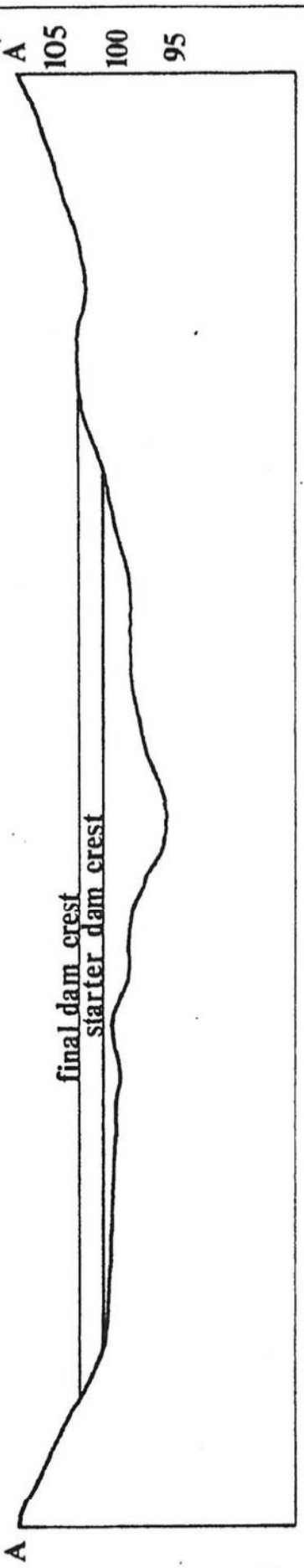
MILL and TAILING SITE

PLATE: 2

FOR PROSPECTUS MAY 87
FOR TAILINGS DAM DESIGN JUNE 87

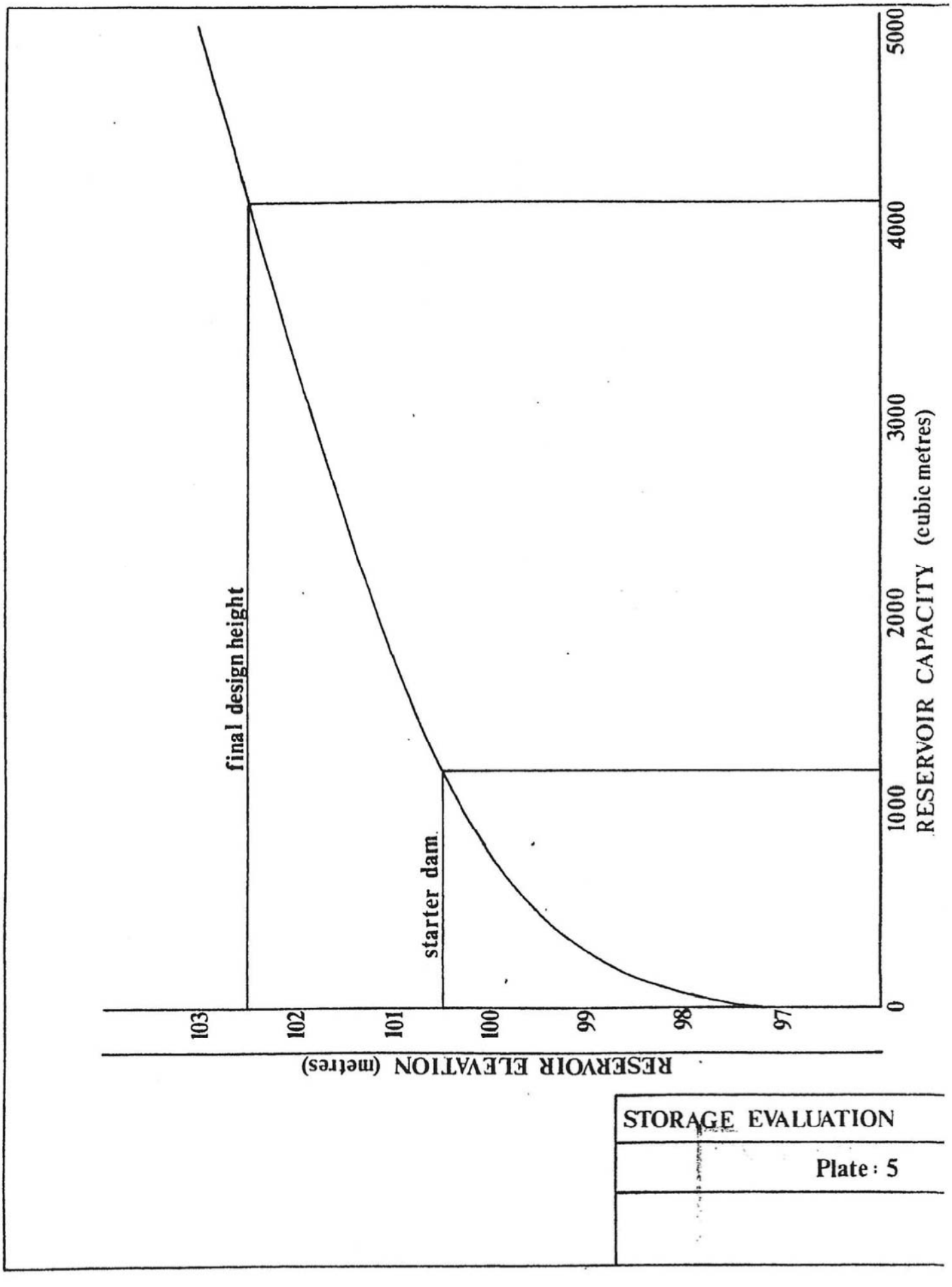
MAY 1987 DRAWN BY GL


TO MILL
SEEPAGE INTERCEPTION POINT
SEEPAGE RUNOFF TRENCH
SLURRY LINE FROM MILL
DIVERSION CHANNEL.
ROCK CUT SPILLWAY.
RECLAIM BARGE
TP1
ULTIMATE TOE
ACCESS ROAD
TOE OF STARTER
D/S CREST
SPIGOT POINT
LEGEND
P1 PIEZOMETER LOCATIONS.
+ SETTLEMENT LOCN MARKER.
SCALE 1:500
SITE PLAN
PLATE: 3
FOR DIGITIZING AS PLATE 5 TAILINGS DAM DESIGN JUNE 1987



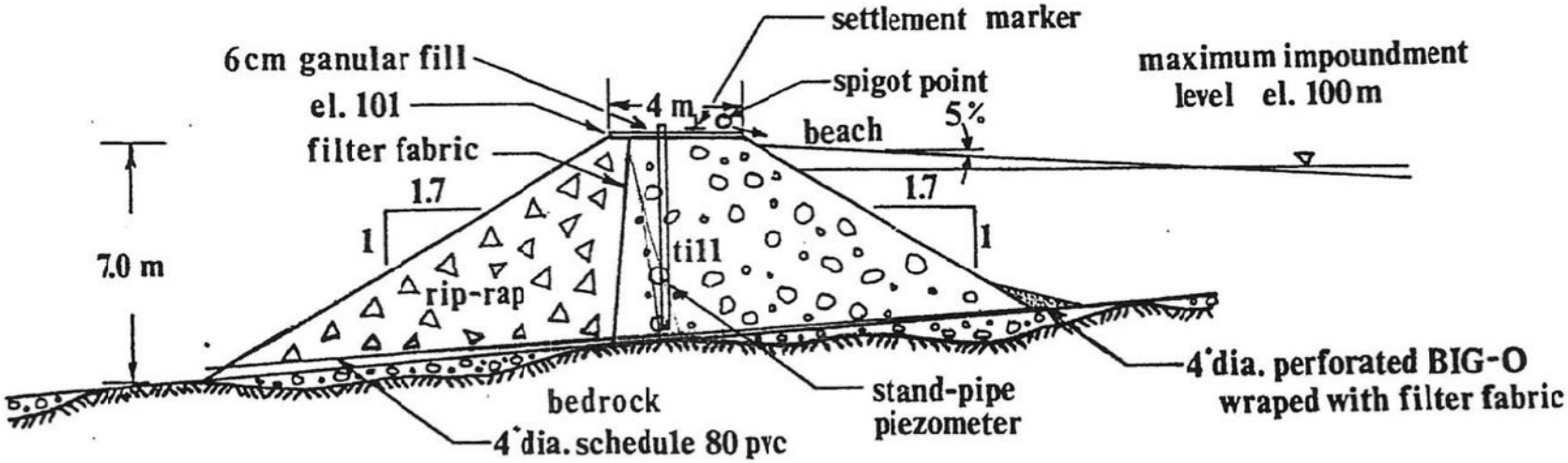
CENTRE-LINE SECTION

Plate: 4



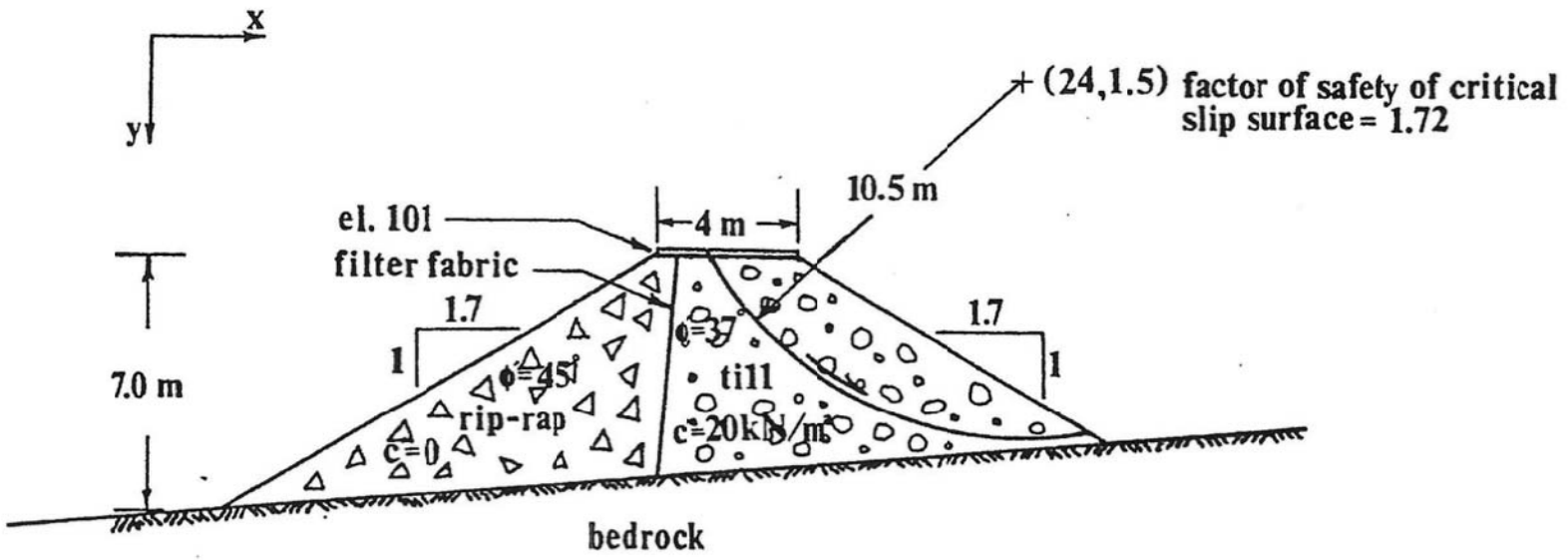
STORAGE EVALUATION

Plate : 5



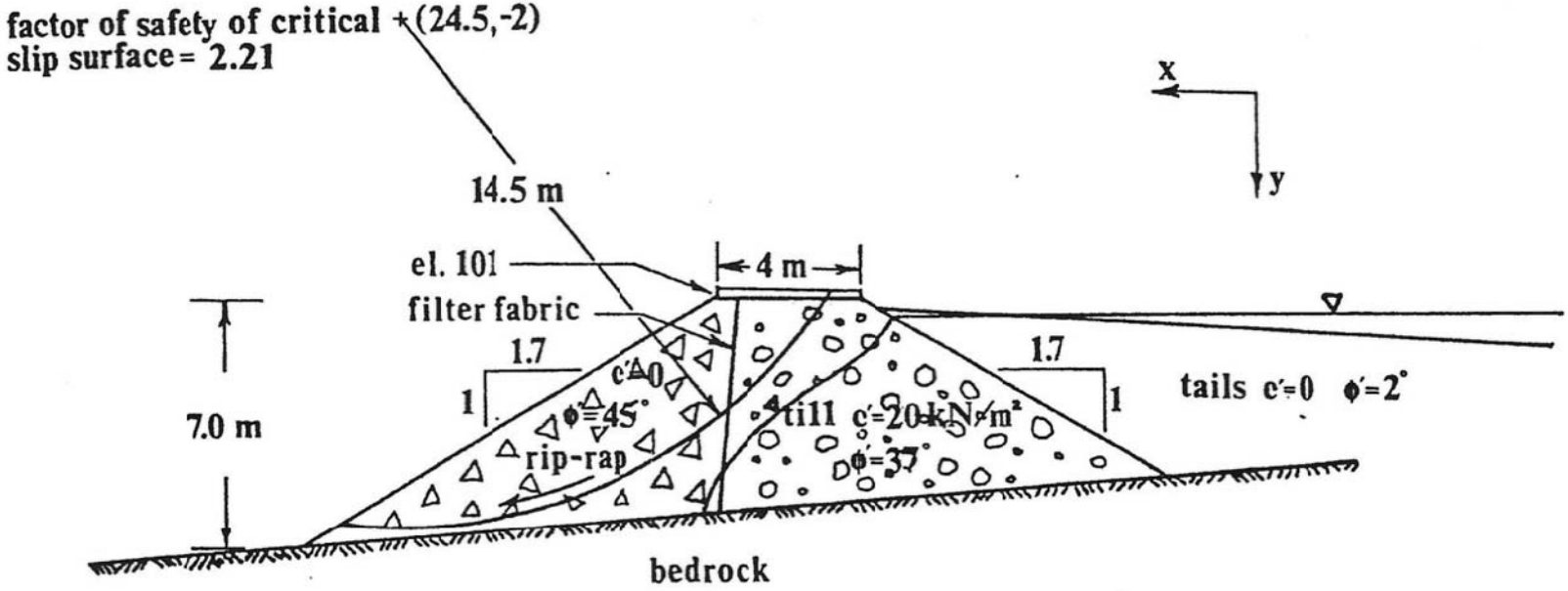
SCALE 1:200

MAXIMUM CROSS-SECTION
Plate: 6



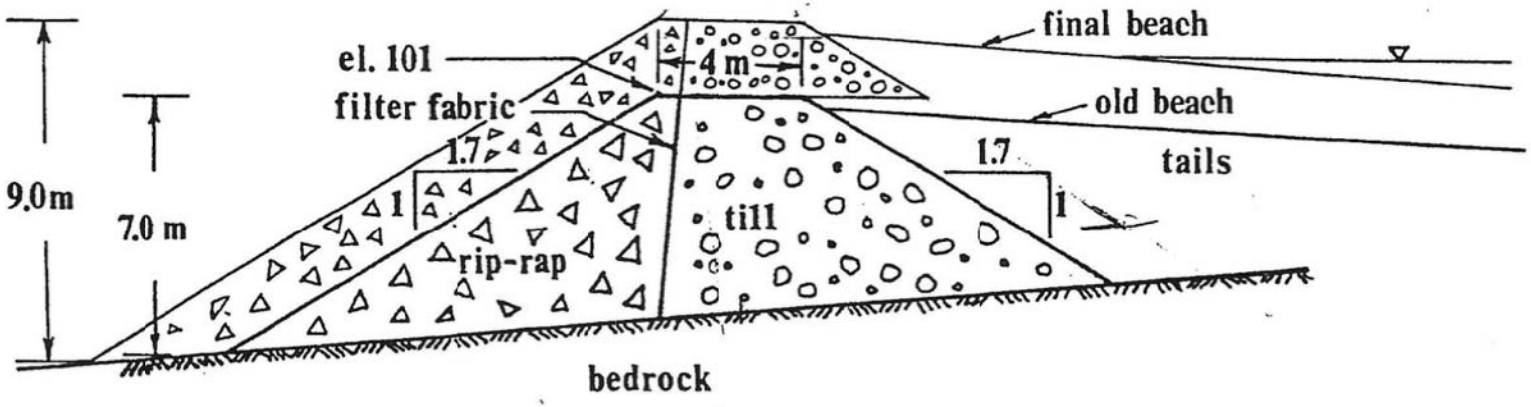
SCALE 1:200

STABILITY MODEL 1
Plate: 7



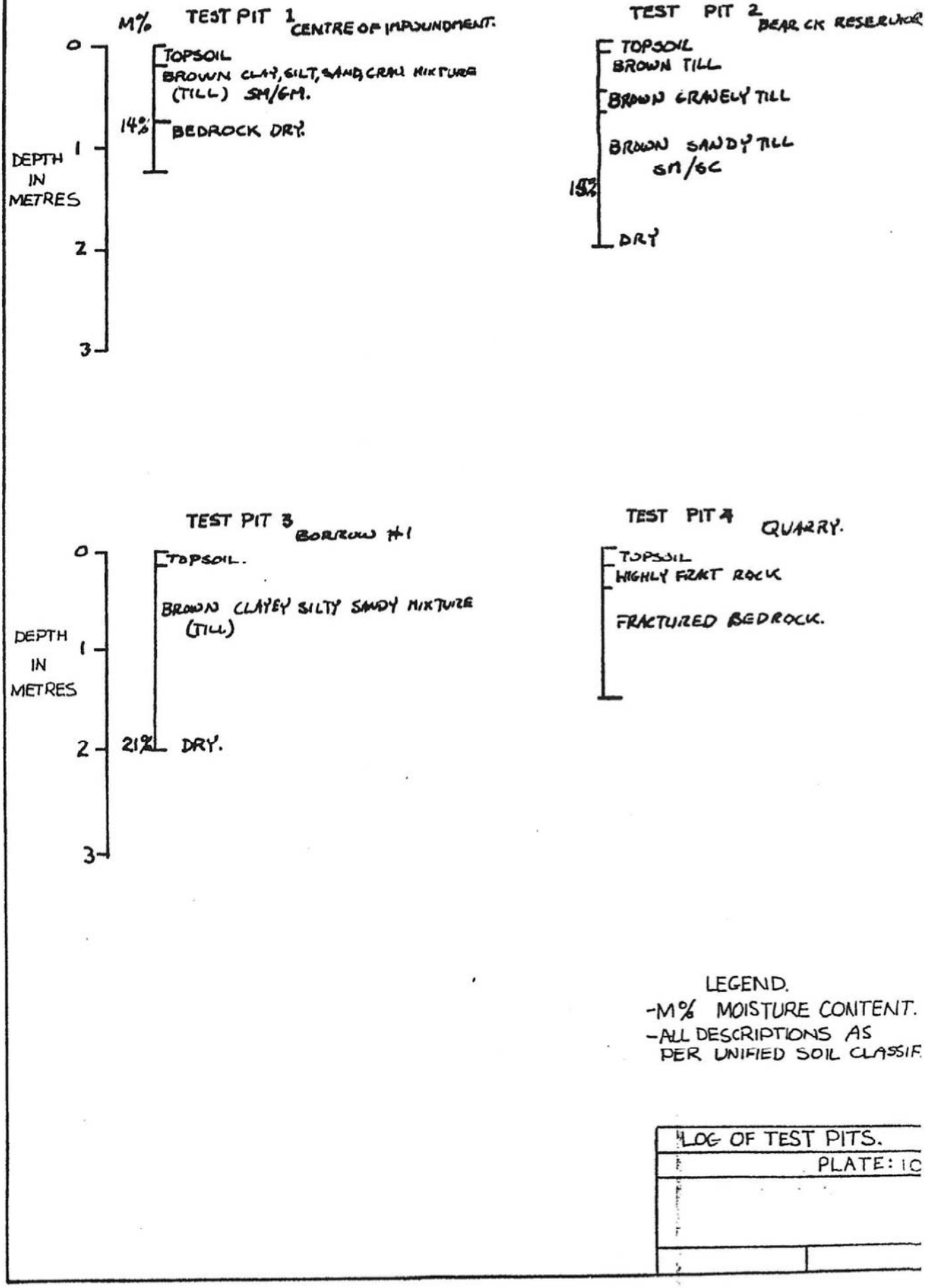
SCALE 1:200

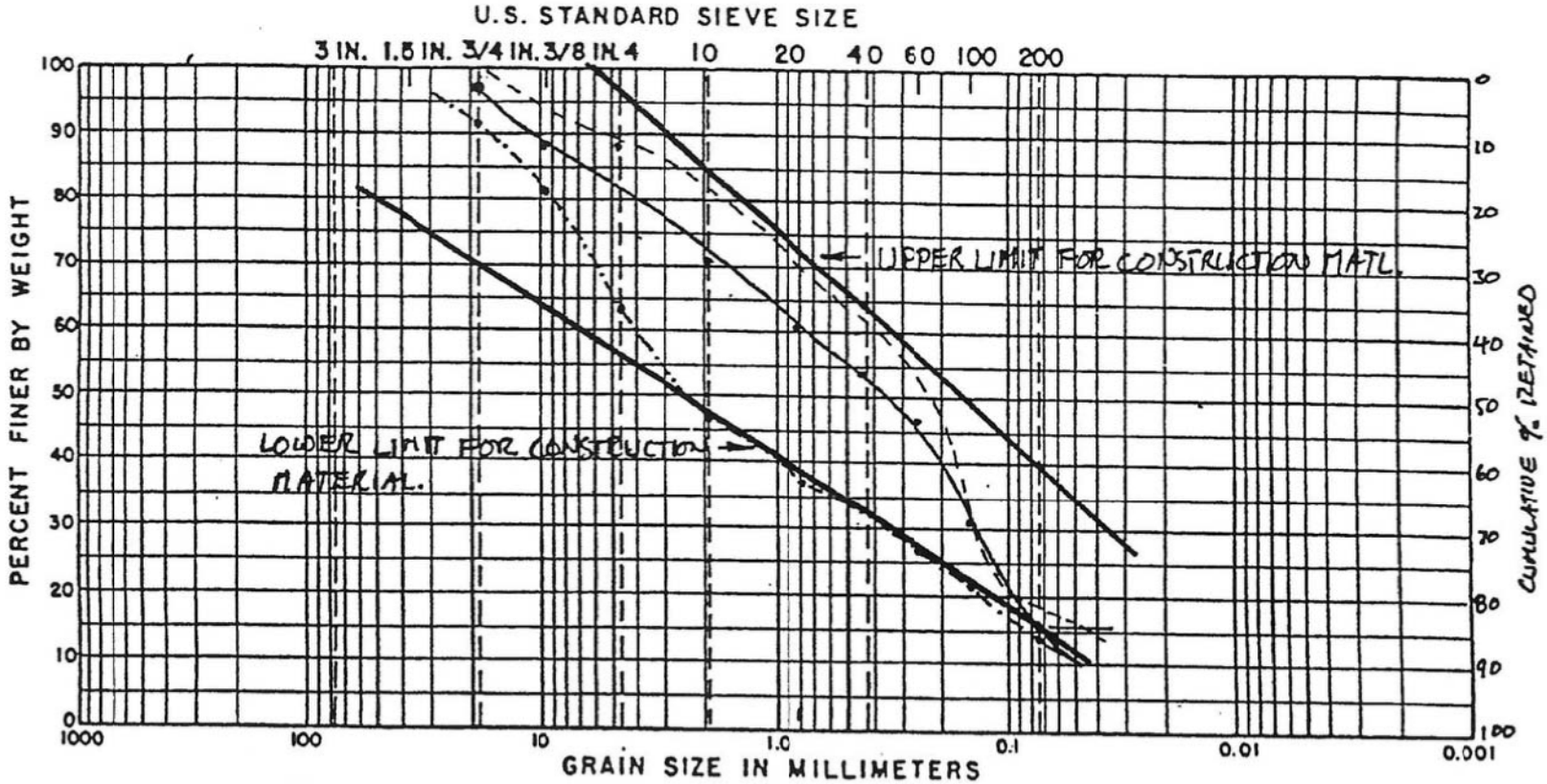
STABILITY MODEL 2
Plate: 8



SCALE 1:200

FINAL DAM PROFILE
Plate: 9


M%
TEST PIT 1 CENTRE OF IMPOUNDMENT.
0
1
2
3
DEPTH IN METRES
TOPSOIL
BROWN CLAY, SILT, SAND, GRAVEL MIXTURE (TILL) SM/GM.
14%
BEDROCK DRY.
TEST PIT 2 BEAR CK RESERVOIR
TOPSOIL
BROWN TILL
BROWN GRAVELY TILL
BROWN SANDY TILL SM/SC
15%
DRY
TEST PIT 3 BORROW #1
0
1
2
3
DEPTH IN METRES
TOPSOIL.
BROWN CLAYEY SILTY SANDY MIXTURE (TILL)
21%
DRY.
TEST PIT 4 QUARRY.
TOPSOIL
HIGHLY FRAT ROCK
FRACTURED BEDROCK.
LEGEND.
-M% MOISTURE CONTENT.
-ALL DESCRIPTIONS AS PER UNIFIED SOIL CLASSIF
LOG OF TEST PITS.
PLATE: 10

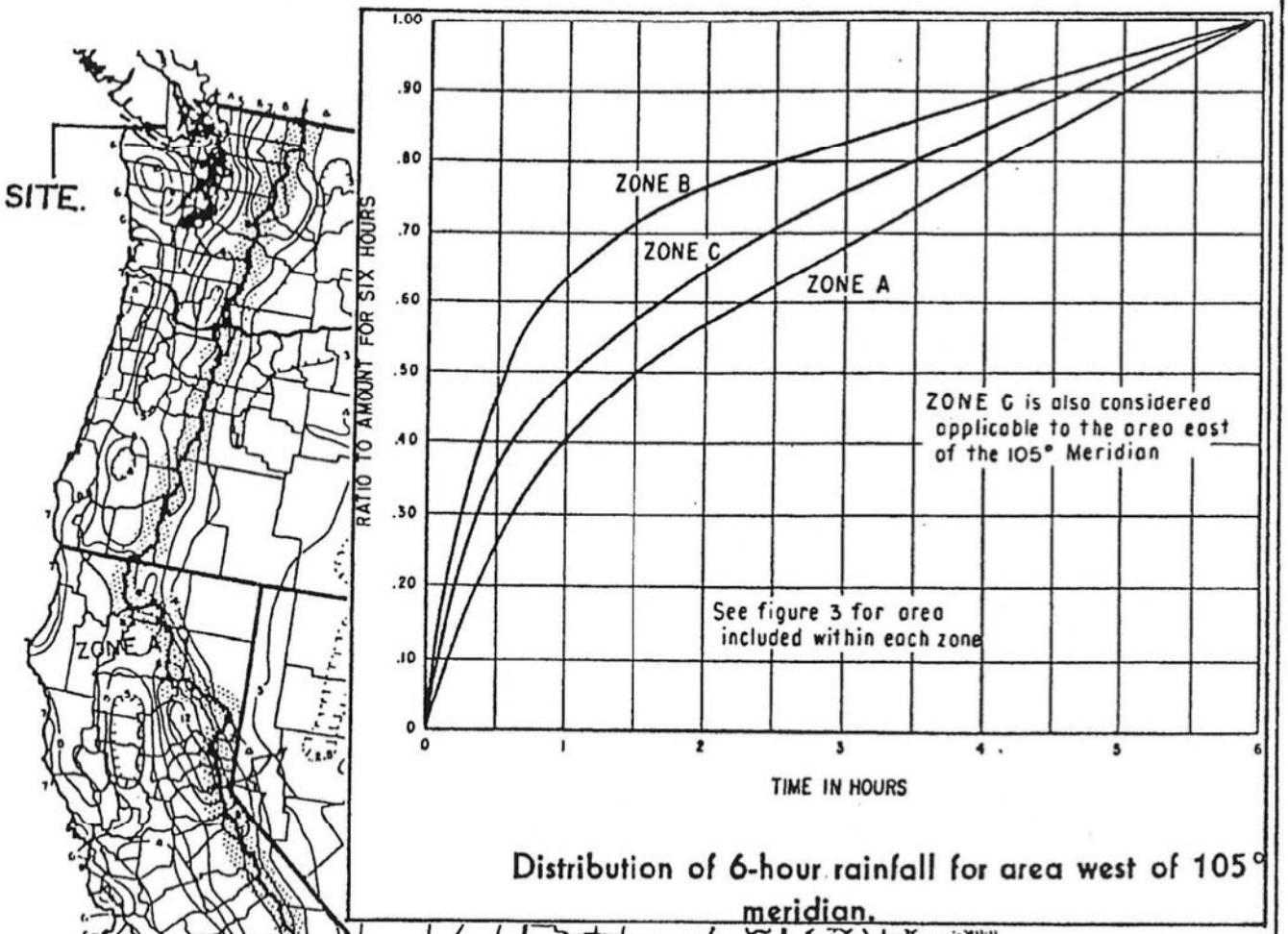


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE#	DEPTH	UNIF. CLASSIFICATION		NAT. WC	LL	PL	PI	LEGEND.
BR-2	1 metre	SM	Clayey silty Sand	9%				———
BR-3	1 metre	SM/SC	Silty Sand, Clayey, Sand	15%				-·-·-·-·-
BORROW 1	1 metre	SM/SC	clayey Silty Sands	21%				- - - - - -

GRADATION CURVE

Plate: 11



Distribution of 6-hour rainfall for area west of 105° meridian.

Probable maximum 6-hour point storm values (inches) west of the 105° meridian.

STORM POTENTIAL DATA	PLATE 13
MAY 1987	CRAWLEY P.P.

TAILINGS IMPOUNDMENT CONSTRUCTION REPORT
DECEMBER 1, 1987

PETER PEART. P.ENG.
consulting geotechnical engineer.

MINISTRY OF ENERGY, MINES
Rec'd DEC 3 1987

TAILINGS IMPOUNDMENT CONSTRUCTION REPORT
VALENTINE MOUNTAIN PROJECT

FOR
VALENTINE GOLD CORPORATION

By Peter Peart. P.Eng.

1st December, 1987.
Vancouver, B.C.

Victoria Mining District.
N.T.S 92B/12W

GRIT
1801

R.R#1, BOWEN ISLAND, BRITISH COLUMBIA. V0N 1G0. (604) 947 2342.

PETER PEART. P.ENG.
consulting geotechnical engineer.

Mr R. Bone, P.Eng.
Inspector of Mines
and Resident Engineer,
Parliament Buildings
Victoria
British Columbia
V8V 1X4

1st December 1987.

Dear Sir;

I am submitting this report to your Ministry on behalf of Valentine Mountain Gold Ltd, Sook, B.C. The Report details the satisfactory completion of the tailings impoundment on the Valentine Mountain Property near Sooke, B.C.

Should you have any questions regarding the content or intent of this report I would be more than happy to have you contact me.

Yours Sincerely

Peter Peart, P.Eng.

R.R#1, BOWEN ISLAND, BRITISH COLUMBIA. V0N 1G0. (604) 947 2342.

TABLE OF CONTENTS

1.0.0 SUMMARY

2.0.0 INTRODUCTION
- 2.1.0 NATURE OF PROJECT
- 2.2.0 SCOPE OF PROJECT
- 2.3.0 HISTORICAL BACKGROUND
  - 2.3.1 AUTHORIZATION
  - 2.3.2 PROJECT TIMES AND DURATION
  - 2.3.3 PRE CONSTRUCTION INVESTIGATIONS
- 2.4.0 ACKNOWLEDGMENTS

3.0.0 DISCUSSION
- 3.1.0 CONSTRUCTION MATERIALS
  - 3.1.1 RIP-RAP
  - 3.1.2 TILL
- 3.2.0 CONSTRUCTION
  - 3.2.1 SITE PREPARATION
  - 3.2.2 SUBDRAIN INSTALLATION
  - 3.2.3 WELL AND STANDPIPE INSTALLATION
  - 3.2.4 PLACING AND COMPACTING RIP-RAP
  - 3.2.5 PLACING AND COMPACTING TILL
- 3.3.0 CONSTRUCTION SEQUENCE
  - 3.3.1 MAIN EMBANKMENT
  - 3.3.2 SPILLWAY CONSTRUCTION
  - 3.3.3 SEEPAGE FINGERS
  - 3.3.4 SEEPAGE DITCH AND COLLECTION POND
- 3.4.0 MONITORING
  - 3.4.1 PIEZOMETERS
  - 3.4.2 SETTLEMENT MARKERS
- 3.5.0 STABILITY ANALYSIS
  - 3.5.1 AS CONSTRUCTED
  - 3.5.2 RAPID DRAWDOWN
  - 3.5.3 STEADY STATE SEEPAGE
  - 3.5.4 STABILITY SUMMARY

4.0.0 CONCLUSIONS

5.0.0 RECOMMENDATIONS

6.0.0 STATEMENT OF QUALIFICATION

7.0.0 STATEMENT OF SATISFACTORY COMPLETION

8.0.0 APPENDICES
- 8.1.0 APPENDIX A: MATERIAL PROPERTIES AND COMPACTION RESULTS.
- 8.2.0 APPENDIX B: INITIAL MONITORING DATA
- 8.3.0 APPENDIX Z: TAILINGS IMPOUNDMENT PROPOSAL, JUNE 1987.

LIST OF PLATES

PLATE 1.....GENERAL DAM LAYOUT

PLATE 2.....DAM CROSS-SECTIONS

PLATE 3.....STORAGE CAPACITY CURVE

LIST OF SHEETS

SHEET 1.....PLAN MAP OF TAILINGS DAM, AS CONSTRUCTED.

LIST OF TABLES

TABLE 1.....OPERATION DATES

TABLE 2.....TILL PROPERTIES

TABLE 3.....COMPACTION RESULTS

1.0.0

SUMMARY

Valentine Gold Corporation Ltd in an option agreement with Beau Pre Explorations Ltd caused a tailings impoundment to be constructed on the Valentine Mountain Property approximately 20km northwest of Victoria, British Columbia, during the late summer and fall of 1987.

The impoundment was constructed to contain approximately 6,700 cubic metres of mill tailings while maintaining a minimum of one metre of freeboard on the embankment by virtue of a rockcut spillway constructed on the east side of the impoundment.

The embankment was constructed as a two zone structure with a geotextile filter separating the rip-rap downstream zone and the sandy till upstream zone. A subdrain system was installed to enhance the stability of the structure upon abandonment.

Monitoring of the embankment is facilitated by the installed settlement markers, piezometers and a subdrain pressure monitoring system. Seepage volumes and quality may be monitored and contained before being recirculated to the impoundment or released to the environment.

The structure was completed and approved under the supervision of a Professional Engineer in the Province of British Columbia. Recommendations for the maintenance of the system and embankment are contained in this report.

This report has no addendums or attachments and none may be made or attached without the written permission of the author.

2.0.0

INTRODUCTION

2.1.0 NATURE OF PROJECT.

The construction of this tailings impoundment became necessary when Valentine Gold Corporation entered into a bulk sampling program during the fall of 1987. Valentine Gold anticipates that it will sample and process a maximum of ten thousand tonnes of rock from the Beau Pre, Valentine Mountain property under an option agreement during 1987 and 1988.

The impoundment has been constructed to contain approximately 6,700 cubic metres of tails and be capable of limiting fluid levels within the impoundment automatically by the installation of a set level spillway.

Recirculation of embankment seepage was necessary and a seepage collection pond with the ability to recirculate the seepage back into the impoundment was necessary.

Limited fine grained cohesive materials were available on site and a structure that required a small quantity of this material was necessary.

The nature of the operation indicated that a sturdy embankment with a potential to withstand considerable overtopping potential and extremes in weather was desirable. The impoundment was also required to meet the stability and environmental requirements of the various Federal and Provincial Ministries.

2.2.0 SCOPE OF PROJECT.

The scope of the project was limited to the design and construction of the embankment, spillway and seepage collection system.

2.3.0 HISTORICAL BACKGROUND.

The tailings impoundment was the subject of a detailed design report submitted to Valentine Gold in June, 1987. The report indicated that the embankment should be constructed in two phases; the first phase being able to contain approximately 1,200 cubic metres of tailings and the second phase being able to contain a total of approximately 4,150 cubic metres. The rational being that the mill is capable of processing 20 tonnes of rock in a 24 hour day and the mill was permitted to run a total of 365 days thus producing a total possible output of 7300 tonnes in one year. If the mill had a 90% operating time then the total drops to about 6,500 tonnes. Construction of the embankment in two stages would require very little soil and allow a larger storage capacity for any given area.

Valentine Gold Corporation elected to have Norecol Environmental Consultants Ltd. write an "addendum" to the June, 1987 Tailing Impoundment Report indicating to Ministry of Mines that the impoundment would be constructed to contain the tailings from 10,000 tonnes of mill feed. Norecol also indicated that the embankment for the impoundment could be constructed in one operation.

The result of Norecols "addendum" was to cause the Ministry of mines to issue permission for construction of the impoundment on the condition that it be capable of containing the tailings for 10,000 tonnes of mill feed. This would indicate a storage capacity 154% greater than initially designed for. The single stage construction of the embankment instead of a two phase approach required more construction time, greater quantities of construction material and less available storage in the given area.

In general the as built embankment was constructed in a manner similar to the initial design with the exception that the till core was thickened to allow for the extra height of the structure. The detailed drawings of the dam cross-sections are shown on Plate 2.

2.3.1. Authorization.

Authorization was given to Mr Peter Peart of Peart Geotechnical Ltd. to proceed with construction supervision and field engineering of the proposed impoundment embankment By Mr Peter Stokes, Vice President of Operations for Valentine Gold Corporation Ltd. Authorization was given on the 13th of August 1987, to proceed with the field engineering and construction supervision of the impoundment.

2.3.2 Project Timing and Duration.

The following table outlines the schedule that was maintained for the construction of the impoundment;

TABLE 1

DATE	OPERATION	PROFESSIONAL SUPERVISION
08/13	authorization to proceed with field engineering and construction of tailings facility	No
08/17	site preparation and clearing	Yes
08/18	underdrain installation	Yes
08/19	drilling for blast, rock borrow	Yes
08/20	borrow blasting and subdrain installation	Yes
08/21	placing and compacting rip-rap	Yes
08/22	placing and compacting rip-rap	Yes
08/23	" " " " " "	Yes
08/24	surveying and re-design	Yes
	forest closed to fire danger	
09/18		
09/19		
09/20		
09/21		
09/22		
09/23		
10/25	placing rip-rap and 2 lifts of till	No
10/26	placing 1 lift of till and compacting	No
10/27	repair to fill and filter blanket	Yes
10/28	repair to filter blanket and till layer	Yes
10/29	placing and compacting till, Thurber monitoring density of compacted fill.	Yes
10/30	placing and compacting rip-rap along dam	
10/31	placing and compacting fill, remove access road	Yes
11/01	laying filter blanket, placing and compacting till	
11/02		
11/03	clear spillway site, place rip-rap	
11/04		
11/05		
11/06	instrumentation installation, spillway cut	Yes
11/07	inspect and lay out spillway drill holes	Yes
11/09	placing and compacting fill and rip-rap.	
11/10	Dressing top of dam and upstream face rip-rap placement. layout spillway blast.	
11/11	instrumentation installation and spillway const.	Yes
11/23	construction inspection of finished dam	Yes

2.3.3 Pre Construction Investigations.

The results of the pre construction investigation are detailed in the Tailings Impoundment Proposal, Valentine Mountain dated June 1987. The report is included in this report as a Appendix Z.

2.4.0 ACKNOWLEDGMENTS

Acknowledgements are due to Mr Calvin Van Buskirk, E.I.T for his valuable and reliable assistance in design and construction supervision on this, his first project, which he handelled very well.

Acknowledgement is also due to Mr Ted Shaw and Mr Ed Shaw who constructed and instructed on this project with suitable skill and imagination.

3.0.0

DISCUSSION

3.1.0 CONSTRUCTION MATERIALS

3.1.1 Rip-Rap

The rip-rap borrow area was located within the impoundment area,as shown on Plate 1, to increase the storage capacity of the system and to minimize the haulage distance during construction. The borrow rock is a hard to very hard, competent, meta sedimentary material common to the area. The rock was blasted using a variety of drills and explosives, none of which produced very effective results. A percentage of the shot rock was too large to use as fill, this was due in part to the incorrect use of prill in wet holes, most of which did not totally burn.

The rip-rap was considered to be acceptable if it was smaller than 50cm in diameter and the rock was hard and competent. All soft or deleterious material was wasted away from the site in a proper fashion.

3.1.2 Till.

The till borrow area is located about 1.5km east of the impoundment as shown on plate 1 of the Tailings Dam Proposal included as appendix Z. The location of a large supply of till close to the impoundment site was difficult and the till material used on the embankment was slightly siltier than optimum. The till borrow area was developed by removing the organic top soil and stockpiling it for reclamation of the borrow area at a later date. The till was removed down to the level of the existing access road in such a way as to preclude the development of a ponded area. The borrow area drains naturally into the existing drainage system.

The grain size distribution curves representative of the soil are shown in appendix A of this report. The till may be described as a clayey, silty, gravely sand in a dense to very dense condition.

The Table below summarizes the major properties of the till used in the construction of the embankment.

TABLE 2

UNIT WEIGHT gm/cm3	OPTIMUM MOISTURE %	UNIFIED SOIL CLASSIFICATION	HYDRAULIC CONDUCTIVITY
1.95	9%	SM	3.05×10 -6

At completion of construction of the tailings dam the till borrow pit was essentially exhausted.

3.2.0 CONSTRUCTION

3.2.1 Site Preparation.

All soft and compressible soils and deleterious materials were removed from the site prior to construction and disposed of in a proper fashion. All timber and brush was stockpiled for burning in the winter months.

In the area beneath the embankment the soil was removed down to the bedrock. The soil was a mixture of clay, silt,sand and

gravel in a dense to very dense condition. This material is commonly referred to as till. The till was not totally removed from the surface of the bedrock but left as an infill for the numerous small irregularities on the rock surface. Since the till was over consolidated and at least equal in quality to the till being imported from the borrow area it was desirable to leave it in places where it was thick enough or infilling a potentially troublesome open joint or plane .

The stripping of the surface soils produced a very irregular foundation surface for the embankment with bedrock protuberances in the order of 2m to 3m in height. These protuberances were left in place as they were competent and provided excellent resistance to basal translation and provided a lengthened hydraulic path for any potential seepage along the dam base. Deep holes in the embankment foundation area were filled with till in 20cm layers and compacted with a hand operated plate compactor to approximately 95% of Maximum Dry Density, Modified Proctor.

A small diversion dam, 1 metre high, was placed in the small non perennial stream that enters the impoundment area. The dam was connected to a plastic diversion pipe that conducted water from the impoundment area during construction. This diversion assisted in keeping the foundation area free of excess moisture during the initial placement of soils. The record dry summer also assured that the foundation area was free of excess water and moisture.

3.2.2 Subdrain Installation.

A subdrain system was constructed as shown on Sheet 1 (in general on plate 1).The subdrain was constructed of schedule 80, 100mm, ABS plastic pipe cemented together in three metre lengths. The subdrain passes through the dam at the point of the deepest section of the embankment at a gradient of approximately 5%. The upstream end is connected to a feeder pipe of filter cloth wrapped 100mm perforated 'Big O' type drain pipe laid parallel to the upstream toe of the embankment as shown on Sheet 1 and Plate 1. The total length of the feeders is approximately 20 metres.

The downstream end of the pipe is plugged with a threaded clean out cap to facilitate sampling of the impoundment seepage. The downstream end of the pipe is also fitted with a pressure gauge to allow direct reading of the hydrostatic head within the impoundment at the toe of the upstream face.

The pipe was laid on a base of compacted till about 20cm thick and covered by a layer of protecting till approximately 50cm thick. The protecting till cover was then compacted to 95% of maximum Dry Density, Modified Proctor

A filter fabric membrane 3m high and 10m long was placed normal to the centre line of the underdrain pipe and in intimate connection with the pipe at the point of penetration. The membrane was placed to prevent the migration of fines along the pipe-soil interface.

3.2.3 Well Standpipe Installation.

Two 100mm schedule 80 ABS plastic standpipe piezometer/well assemblies were installed at the foundation level in the rip-rap zone prior to placement of any substantial quantity of rip-rap as shown on Sheet 1 of this report. It was felt that installation of a well into the rip-rap after completion of the embankment would be very difficult and that the extra construction difficulties of the installations would be worth while in the end.

3.2.4 Placing and Compacting Rip-Rap./

The rip-rap was pushed or end dumped in lifts approximately 1m thick before being compacted with a 60 series Bow mag compactor making a minimum of four passes in the vibratory mode. Experience indicates that a minimum of four passes with a vibratory compactor will compact rip-rap to its maximum density, extra passes tend to pulverize the rip -rap at the surface of the lift.

3.2.5 Placing and Compacting Till.

The till was placed in lifts approximately 50cm thick in it uncompacted state and compacted down to approximately 30cm per lift. A minimum of four passes with a 60 series Bow mag vibratory compactor was made on each lift. Extra attention to the area at the sides of each lift was taken to avoid soft and loose edges on the upstream side and against the filter fabric.

Compaction control was achieved by using a nuclear densometer to test the layers following a normal compaction process. The nuclear densometer was capable of producing direct readouts of the Maximum Dry Density, Modified proctor, and the in-situ moisture content.

A summary of the in-situ density results is shown below on Table 3.

TABLE 3

STATION	ELEV	MAX. DRY DENSITY	MOISTURE%	% MAX. DRY DENSITY.
0+20	98	125.5pcf	7	99.6
0+25	98	125.5	6.6	95.3
0+30	98.5	125.5	7.9	95.5
0+35	98.5	125.5	6.7	99.5
0+40	98.5	125.5	7.5	99.1
0+45	98.5	125.5	8.5	97.1
0+50	98.5	125.5	8.6	94.9
0+55	99.0	125.5	7.9	98.9
0+60	99.0	125.5	9.0	95.8
0+65	99.0	125.5	9.8	91.8
0+20	100	125.5	9.3	97.3
0+15	100	125.5	11.0	96.7
0+10	100	125.5	8.9	99.4
0+65	101	125.5	9.7	98.6
0+60	101	125.5	10.2	94.8
0+55	101	125.5	10.8	96.1
0+50	101	125.5	10.7	95.5
0+45	101	125.5	11.0	95.1
0+40	101	125.5	13.0	89.32
0+35	101	125.5	10.3	95.7
0+30	101	125.5	11.3	93.0
0+25	101	125.5	11.2	92.3
0+20	101	125.5	14.1	88.9
0+15	101	125.5	9.0	93.2
0+10	101	125.5	11.0	95.0
0+00	101	125.5	11.6	92
0+20	101	125.5	7.3	95
0+25	101	125.5	10.4	90
0+15	101	125.5	9.4	94
0+00	101	125.5	9.1	94
0+15	101	125.5	10.2	98.6

Where compaction was not up to the required 95% of Maximum Dry Density, Modified Proctor that section was recompacted with a minimum of four passes with a vibratory compactor.

The upstream section of the dam required approximately 1500 cubic metres of compacted till and a total of 31 density tests were carried out to produce a test frequency of one test per 50 cubic metres of placed and compacted till.

3.3.0 CONSTRUCTION SEQUENCE

3.3.1 Main Embankment.

Following the site preparation described in Section 3.2.1 and the subdrain installation described in section 3.2.2 an initial lift of rip-rap was placed in the area of the maximum section of the embankment. The initial lifts of rip-rap were placed and compacted in lifts of 1m in thickness or less until a height of approximately 2m was reached.

Following smoothing of the upstream face of the rip-rap the filter blanket was keyed into the foundation material and the existing filter fabric membrane described in Section 3.2.2. and laid against the 2m high rip-rap face in such a fashion as to allow a 1m flap to remain at the top of the rip-rap.

Till was then carefully laid and compacted in lifts of less than30cm in thickness and compacted to a minimum of 95% of Maximum Dry Density, Modified Proctor. In effect this procedure raised the area between stations 0+40 and 0+60 and brought that area up to level with the remainder of the dam foundation.

The filter blanket was then flipped over onto the till side of the embankment and the rip rap side of the embankment was raised another three meters in lifts not exceeding 1m and compacted as before. When the embankment had been raised to the new level another 3m wide section of filter blanket was keyed into the exposed flap of blanket from the initial layers and laid against the upstream rip-rap face, again leaving a 1m flap of filter fabric at the top of the berm free for attaching to the final layers of the embankment.

The till was then placed against the rip-rap and filter blanket in lifts not exceeding 30cm in thickness and compacted to a minimum of 95% of Maximum Dry Density, Modified Proctor.

The final lift was placed in the same fashion as the previous two until the embankment had reached an elevation of approximately 102.5m when the filter fabric left exposed was turned over onto the rip-rap and a final layer of rip-rap 50cm thick was placed on the top of the embankment to produce a final elevation of approximately 103m.

The upstream till face was then back scoured to remove any soft or uncompacted soil that had been out of reach of the compactor during construction. Once the loose soil had been removed a layer of rip-rap 1m thick was placed by an excavator against the upstream face to protect the upstream face against erosion for the periods when the water level is higher than the tailings beach.

3.3.2 Spillway Construction.

The Spillway was constructed after the dam was brought to full height, a situation that was neither desirable or likely to be repeated. The spillway was blasted into solid rock at the east

end of the tailings dam embankment in an attempt to produce a relatively maintenance free form of ultimate water level control.

Pre shear lines were laid out on either side of the spillway alignment to limit the amount of backbreak and to limit the transmitted shock from the production holes. The pre shear holes were laid out approximately 40cm apart and loaded with prima flex pre shear powder. The main production holes were laid out in a predetermined pattern and loaded with an appropriate explosive product. In general the pre shear holes were all fired before the main holes and the resulting blast produced a reasonably clean walled trench. The trench conducts water away from the impoundment at a minimum invert angle of 5%. A 1m wide culvert has been installed where the spillway water flows under the main access road as shown on Plate 1 and on Sheet 1.

3.3.3 Seepage Fingers.

The final operation in the dam construction was the covering of the seepage fingers with tailings from the mill. The tailings was selected as it provided a well graded material that would neither clog the filter fabric wrapping the seepage fingers or flow through the system. The sandy tails were also cheap and easily distributed over the seepage fingers.

3.3.4 Seepage Ditch and Collection Pond.

A seepage ditch and collection pond were constructed as shown on Sheet 1 and Plate 1. The seepage ditch runs along the downstream toe of the tailings dam and into a small holding pond where the water is recirculated into the tailings impoundment. After testing if the water is found to be compatible with the environment it may be permissible with Ministerial Approval to dispose of this water to the environment.

The seepage pond was excavated into native till that has a history of being able to pond water with negligible seepage. Just such a hole was formalized into a small holding facility by excavating with a hoe and then rip-rap lining the downstream face to prevent erosion in the event of overtopping during heavy rains. A recirculation pump has been fitted to this holding pond by Valentine Gold Corporation to pump water back into the impoundment when the level rises too high.

3.4.0 MONITORING

A storage impoundment requires continual professional monitoring to remain in good operating condition and data collected from this monitoring will be required for the annual report required by the Ministry of Energy Mines and Petroleum Resources. To enable this data to be gathered a basic set of monitoring systems have been installed.

3.4.1 Piezometers.

Two 100mm standpipe piezometers and sampling wells have been installed at stations 0+30 and 0+60 as shown on Sheet 1. The tips of these piezometers are installed into the rip-rap at the level of the foundation, their function is to allow for observation of any water in the unlikely event that the phreatic surface rises within the rip-rap zone. This would occur if the downstream face became frozen or otherwise blocked.

One 1cm diameter steel cased piezometer has been placed into

the till near station 0+50 with its tip at elevation 99m. The purpose of this piezometer is to assist in establishing the phreatic surface within the dam.

3.4.2 Settlement Monuments

Three settlement monuments were placed along the upstream crest of the embankment to enable monitoring of the most likely area of potential failure. The initial elevations of the three monuments are indicated in Appendix B of this report.

3.5.0 EMBANKMENT STABILITY

3.5.1 Stability Analysis.

The stability of the embankment has been calculated for a number of cases using the soil parameters established during construction of the dam. The stability analysis was carried out using the STABR stability program developed by the Virginia Polytechnic Institute. The program uses the Modified Bishop and the Ordinary Method of Slices to reduce the data to the Safety Factor.

3.5.2 End of Construction Analysis.

The safety factor at the end of construction and prior to the fluid level being raised in the impoundment has been calculated as 1.732 with a seismic coefficient of 0.10.

3.5.3 Sudden Drawdown.

The sudden drawdown analysis considers the stability of the dam should the water level be rapidly reduced. An example would be the rapid emptying of the dam during a large fire if the impoundment were used as the sole source of water and the level were to be reduced to zero in a few hours. In this situation a safety factor of 1.751 is indicated when a seismic coefficient of 0.10 is used.

3.5.4 Steady State Seepage.

The steady state seepage analysis is the condition that the dam will encounter when full and encounters a seismic event with a coefficient of 0.10. If a friction angle in the rip-rap of 45degrees is considered then a safety factor of 1.238 is indicated. However 45 degrees is rather conservative for rip-rap and a value of 50 degrees is more realistic. If a friction angle of 50 degrees is considered then a safety factor of 1.474 is indicated.

3.5.5 Stability Summary.

In general the stability of the dam is at its lowest when filled to elevation 102.0m with water and subjected to seismic event. However a safety factor of 1.474 indicates that the dam is suitably stable.

4.0.0

CONCLUSIONS

4.1.0 Satisfactory Completion

In general the impoundment constructed between August and December at Valentine Mountain Golds project at valentine Mountain near Sooke B.C. has been constructed to the standards considered normal and prudent by The Association of Professional Engineers of the Province of British Columbia.

4.2.0 Storage

The impoundment is capable of containing approximately 6180 cubic metres of mill tailings. The mass storage available will be in the order of 10,000 tonnes of mill feed if the in-situ density of the tailings is approximately 1.77 gm/cm3.

4.3.0 Monitoring.

A basic set of monitoring installations have been provided in the form of piezometers and settlement and translation markers. These systems are delicate and should provide good data if treated with care and respect.

5.0.0

RECOMMENDATIONS

5.0.1 I recommend that the dam be inspected by a professional geotechnical engineer on a monthly basis for the first three months of operation.

5.0.2 I recommend that settlement and translation data be gathered and recorded on a weekly basis for the first three months of operation and on a fortnightly basis for the following three months. The settlement and translation data should be gathered on a monthly basis following the first six months of operation.

5.0.3 I recommend that piezometer level data be gathered and recorded on a weekly basis for the first three months and on a fortnightly basis for the following three months of operation. The piezometer level data should be gathered and recorded on a monthly basis following the first six months of operation.

5.0.4 I recommend that the water level of the impoundment be checked and recorded by the mill crew on the way to thier shift every working day. The mill crew should also check that the spillway is clear of obstructions or potential obstructions at the same time they check the impoundment level. Any potential obstruction should be reported immediatly to the senior person on site and immediate action taken to clear the spillway.

5.0.5 I recommend that the spillway level be left at the existing level and that no attempt be made to raise the effective spillway level in any way, shape, or form. The existing level is a relative 102.00m elevation as shown on Sheet 1 of this report.

5.0.6 I recommend that the mine operator, Valentine Mountain Gold, become familiar with the Ministry of energy mines and Petroleum Resources guidelines for the Design, Construction and Abandonment of Tailings Impoundments and conform to those guidelines. Peter Peart Geotechnical Ltd. will not be responsible for failure or partial failure of the impoundment or connected services if these guidelines are not followed. Failure to follow these recommendations will also limit responsibility.

6.0.0

STATEMENT OF QUALIFICATION

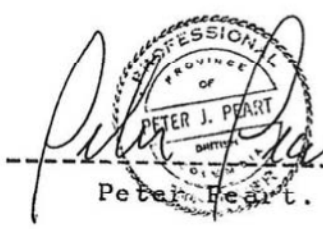
I, Peter Peart of the district of West Vancouver, British Columbia, certify that ;

1. I am a Professional Engineer in the Province of British Columbia and a Member in good standing of the Association Of Professional Engineers of the Province of British Columbia.

2. I have practiced my Profession, Geotechnical Engineering and Geological Engineering, in the Province of British Columbia since 1980.

3. I am a Graduate of the University of British columbia with a Degree in Applied Science, B.A.Sc.(1980) Geological/Geotechnical Engineering.

1st December 1987
Vancouver B.C.



Peter Peart. P.Eng.

7.0.0

STATEMENT OF SATISFACTORY COMPLETION

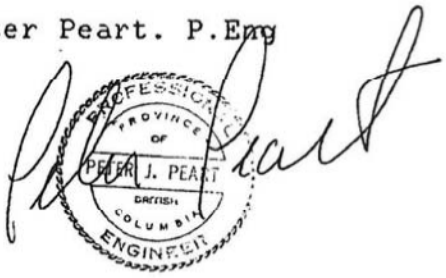
It is my Professional opinion that the impoundment described in this report, and the main subject of this construction report, has been constructed in a manner consistent with standard and prudent Engineering Practice in the Province of British Columbia.

It is my Professional opinion that the structure is well suited for its intended purpose of containing the mine tailings produced at the site by the existing milling facility and by the existing process.

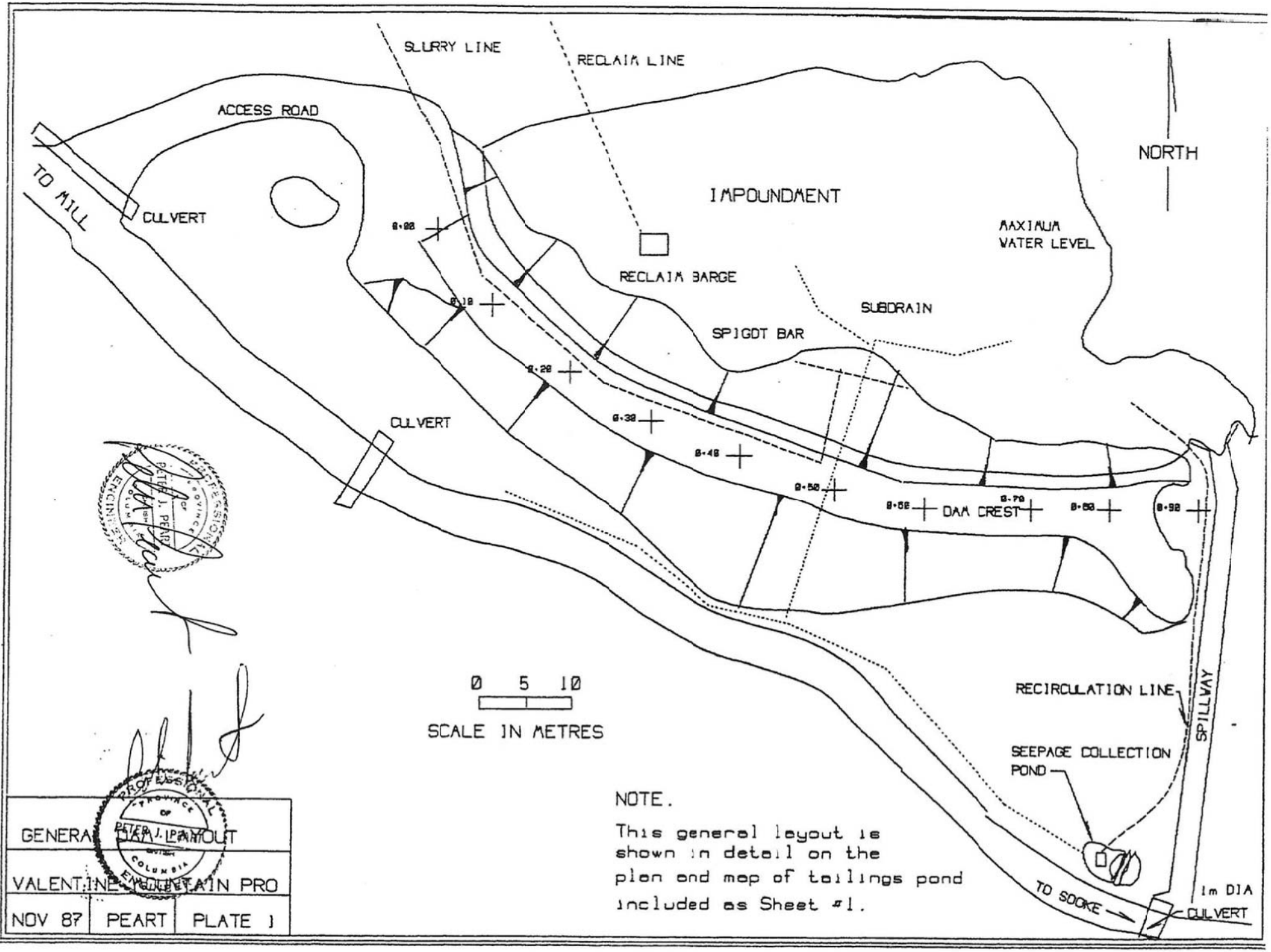
The construction of the impoundment was carried out under my supervision and the information contained in this report is , to the best of my knowledge, accurate.

To this effect I apply my Professional Engineers Stamp to this Document.

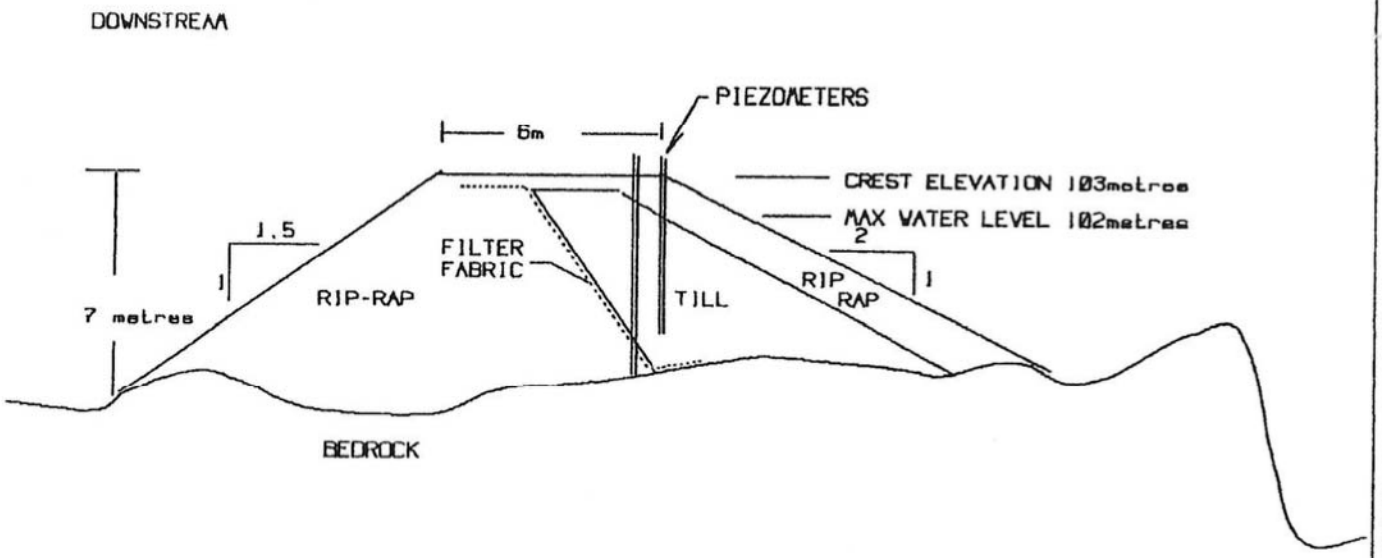
Signed and stamped by Peter Peart. P.Eng



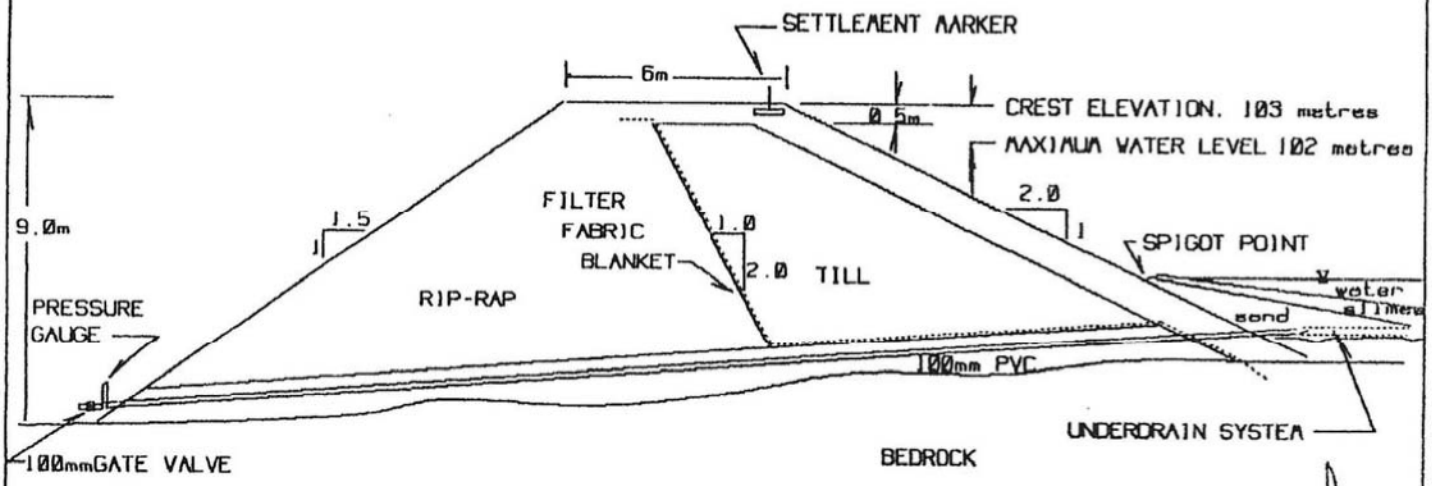
1st December 1987.



Page 154 of 427 FNR-2019-96139



CROSS-SECTION AT STATION 0+30m SCALE 1cm=2m



CROSS SECTION AT STATION 0+45m. SCALE 1cm=2m

MATERIALS

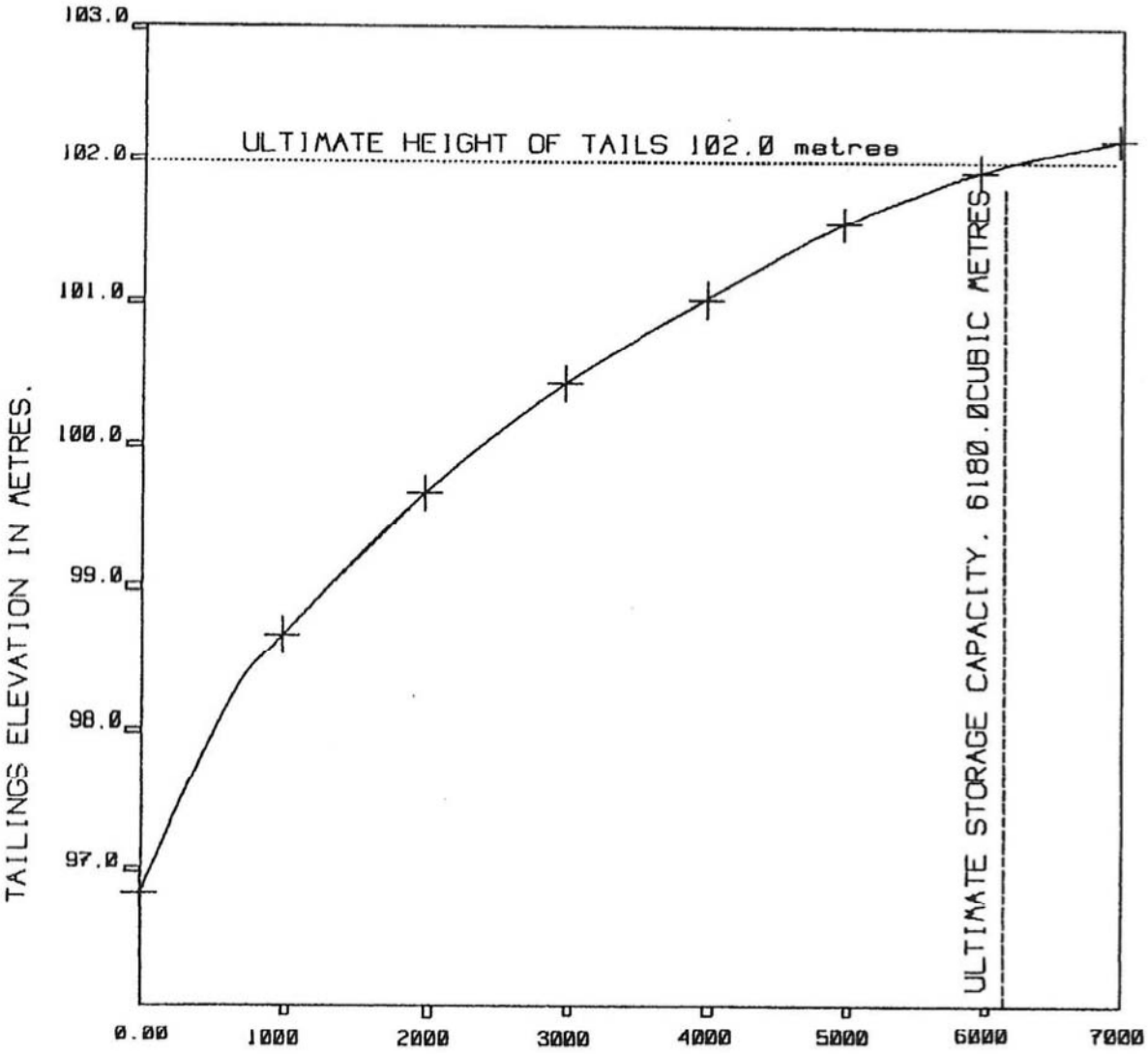
TILL. Clay, silt, sand, gravel mixture.
Compacted to min. of 95% max. dry density, Mod. Proctor.

RIP-RAP Blasted quarry rock.competent and hard to very hard.
Max size 50cm, No appreciable fines. Compacted

FILTER FABRIC. Texel 7612 non woven geotextile

TITLE: AS BUILT CROSS-SECTION		
PROJECT LOCATION: VALENTINE MOUNTAIN PRO.		
DATE: NOV. 87	DRAWN BY: PEART	PLATE 2

PETER PEART GEOTECHNICAL. LTD.



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
PETER E. PEART

PETER PEART GEOTECHNICAL. LTD.

STORAGE CAPACITY CURVE		
VALENTINE MOUNTAIN PRO		
NOV 87	PEART	PLATE3

8.1.0

APPENDIX A:

MATERIAL PROPERTIES AND COMPACTION RESULTS

NOTICE OF TRANSMITTAL

THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold
2038 Other Pt. Rd.
Sooke BC

Date: Sept. 4/87
Your File:
Our File: 19-547-C

Attention: Mr. C Van Buskirk

Reference: Permeability testing

(A) The following items results of triaxial permeability test on a compacted sample from the East side of Borrow

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☑ Mail ☐ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return
☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By: B. A. Engel

Valentine Gold
File 19-547-0
Triaxial Permeability Test #P-1
East Side of Borrow

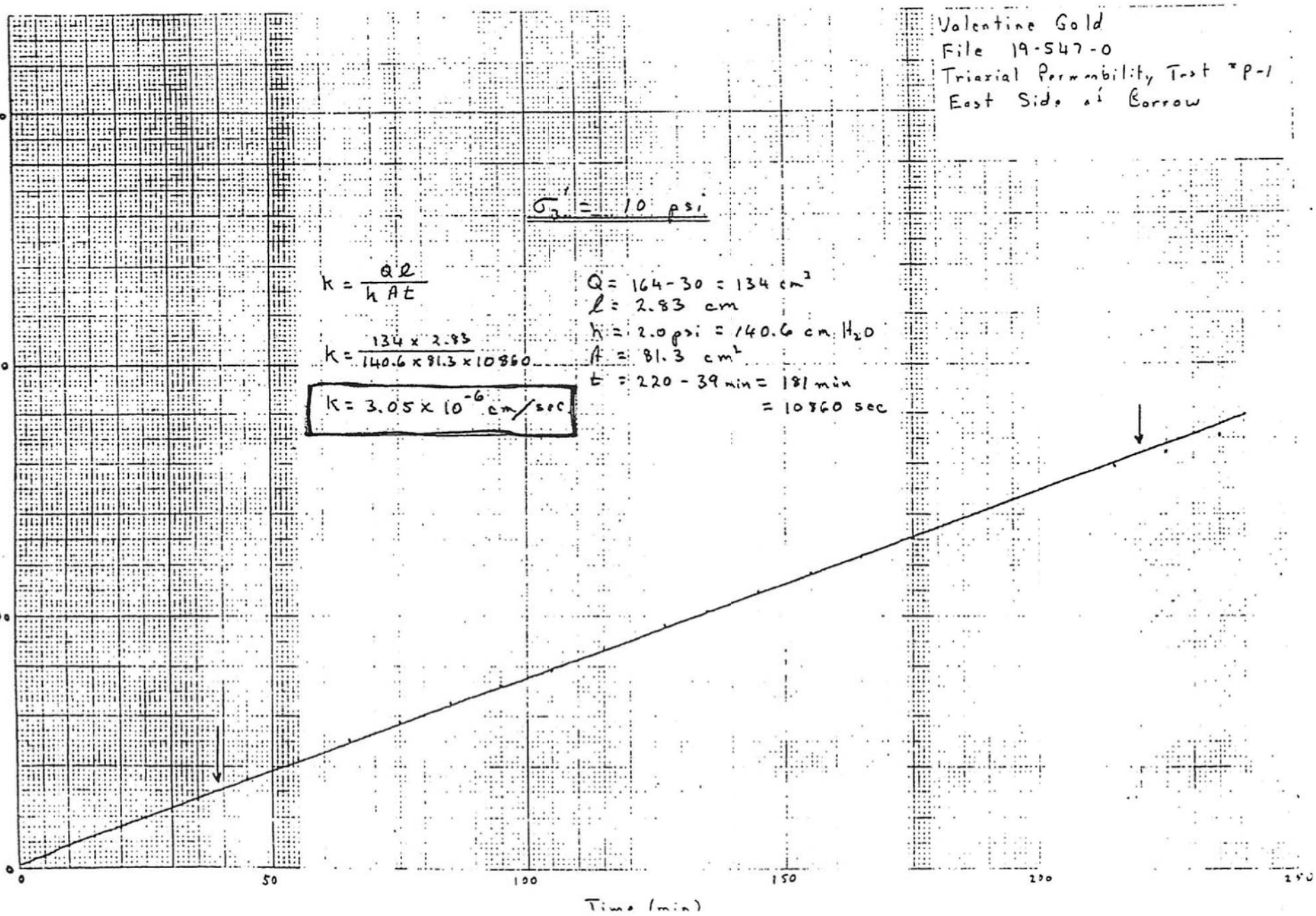
$\sigma_3' = 10$ psi

$k = \frac{Q\ell}{hAt}$

$k = \frac{134 \times 2.83}{140.6 \times 81.3 \times 10860}$

$k = 3.05 \times 10^{-6}$ cm/sec

$Q = 164 - 30 = 134$ cm³
$\ell = 2.83$ cm
$h = 2.0$ psi $= 140.6$ cm H_2O
$A = 81.3$ cm²
$t = 220 - 39$ min $= 181$ min
$= 10860$ sec



THURBER CONSULTANTS LTD., Geotechnical Engineers

Client _____ File No 19-547-0

Project Valentine Gold Date Sept. 2 1987

Calculation by RLC

Triaxial Permeability Test # PL-1 Sheet ___ of ___

h = 2 psi = 140.6 cm H_2O ; A = ___ ; l = ___

		Base of Sample			Top of Sample				
Time	e.t.	Burette LH	Burette RH	Flow Ini	Burette LH	Burette RH	Flow Out	Cell Pressure	Base Pressure	Top Pressure
1045	0				49.2		0	110.0 psi	101.0	99.0
1050	5				52.3		4.1			
1055	10				56.3		8.1			
1100	15				60.2		12.0			
1105	20				64.0		15.8			
1110	25				67.6		19.4			
1115	30				70.2	12.4	22.0			
1120	35					16.7	26.3			
1130	45					25.0	34.6			
1140	55					32.8	42.4			
1150	65					40.5	50.1			
1200	75					48.2	57.8			
1210	85					55.4	65.0			
1220	95					62.4	72.0			
1230	105				14.5	69.2	78.8			
1240	115				22.5		86.8			
1252	127				31.9		96.1			
1300	135				37.6		101.9			
1310	145				45.0		109.3			
1320	155				52.2		116.5			
1330	165				59.2		123.5			
1340	175				65.8	17.9	130.1			
1420	215					46.6	158.9			
1430	225					53.3	164.5			
1440	235					59.9	171.1			

FILE No.: 19-547-0

THURBER CONSULTANTS LTD.
Geotechnical Engineers
CALGARY EDMONTON VANCOUVER VICTORIA

CLIENT: Valentine Gold
PROJECT:
HOLE/PIT: SAMPLE:
DEPTH: SPECIMEN:
TEST DATES: TECH'N:
CK'D. BY:

P-1

TRIAXAL COMPRESSION TEST
CONSOLIDATION DATA

REQUIRED EFFECTIVE CONSOLIDATION 10 psi BACK PRESSURE 100.0 psi

PORE PRESSURE REACTION - PROCEDURE

		28 1405	29 0820	30 0910	31 0920	1 0909	Sept 10				
TIME		1550	0835	1015	0945	0940					
ELAPSED TIME (min.)		105	15	125	105	32					
CELL PRESSURE (kPa)	psi	20.0	40.0	60.0	80.0	100.0	110.0				
BACK PRESSURE (kPa)	psi	18.0	39.0	59.0	79.0		1				
PORE PRESSURE (kPa)	psi	3.8	25.5	49.7	78.1	98.7	108.7				
$\Delta\sigma_3$ - CHANGE CELL PRESSURE (kPa)	psi	20.0	20.0	20.0	19.8	20.0	10.0				
Δu - CHANGE PORE PRESSURE (kPa)	psi	3.8	7.5	10.7	19.1	19.7	10.0				
PORE PRESSURE PARAMETER, $B = \Delta u/\Delta\sigma_3$		0.19	0.38	0.54	0.96	0.99	1.00				
BURETTE READINGS — INITIAL	(ml)	39.2	23.2	31.5	42.0						
INITIAL HT. OF PISTON ____ FINAL HT. OF PISTON ____ CORR. - HT. OF SPEC. ____	FINAL (ml)	62.3	53.5	41.9	43.3						
	ΔVOLUME (ml)	24.1	30.3	10.0	1.3						

CONSOLIDATION STAGE — H_2O ADDED (De-Airing) ____ ml — TEMP. (Min. ____ °C, Max. ____ °C)

DATE	TIME	Δt (min.)	BURETTE READING (ml)	ΔVOLUME (ml)		DATE	TIME	Δt (min.)	BURETTE READING (ml)	ΔVOLUME (ml)	
Sept. 1	1340	0	42.0	0							
		6 sec.	44.8	2.8							
		15 sec.	45.0	3.0							
		30 sec.	45.0	3.0							
	1341	1 min.	45.1	3.1							
	1342	2 min.	45.2	3.2							
	1344	4 min.	45.2	3.2							
	1348	8 min.	45.2	3.2							
	1355	15 min.	45.3	3.3							
	1410	30 min.	45.4	3.4							
	1440	60 min.	45.7	3.7							
	1540	120 min.	45.8	3.8							
	1700	200	45.8	3.8							
	2020	400	45.8	3.8							
Sept. 2	0955	1215	45.8	3.8							

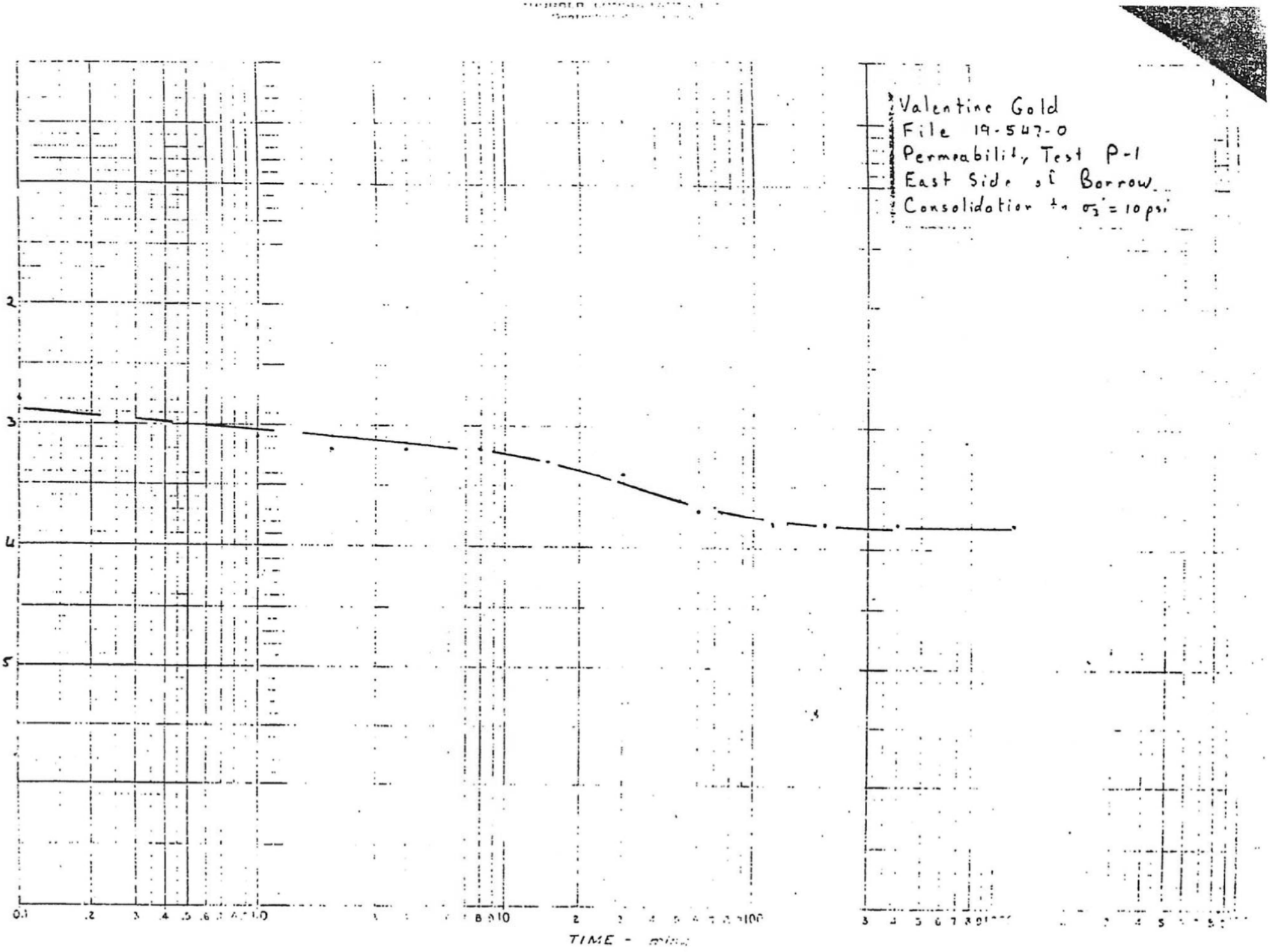
DIAL RDG. BEFORE CONSOLIDATION ____ cm
DIAL RDG. AFTER CONSOLIDATION ____ cm
ΔH ____ cm
ΔV = TOTAL VOLUME CHANGE AFTER CONSOLIDATION. ____ ml

$$A_c = \frac{1 + \Delta V/V_o}{1 + \Delta H/H_o} \times A_o$$

A_c = ____

A_c = ____

H_o = 2.83 cm
A_o = 82.6 cm²
V_o = 233.4 ml
H_c = 2.83 cm
A_c = 81.3 cm²
V_c = 230.0 ml


Valentine Gold
File 19-547-0
Permeability Test P-1
East Side of Borrow
Consolidation to σ3' = 10 psi
2
3
4
5
0.1
.2
.3
.4
.5
.6
1.0
8
10
2
100
TIME - min.

FILE No.: 19-547-0

THURBER CONSULTANTS LTD.
Geotechnical Engineers
CALGARY EDMONTON VANCOUVER VICTORIA

CLIENT: Valentine Gold
PROJECT:
HOLE/PIT: SAMPLE:
DEPTH: SPECIMEN:
TEST DATES: Aug 29/87 TECH'N: BH
CK'D. BY:

TRIAXIAL COMPRESSION ☐ TEST
SPECIMEN DATA

CELL No. 4" steel in frame #3

DESCRIPTION OF SAMPLE Grey silty gravelly SAND (SM) trace of clay, sbrd gravel
Till sample compacted to 95-100 % of mod. proctor density for permeability test

SPECIMEN TYPE ☐ Undisturbed ☐ Remoulded ☐ Precut ☑ Compacted

SPECIMEN DETAILS		INITIAL VALUES British* (I)	INITIAL VALUES Metric* (I)	PRE CONSOLIDATION Metric* (B)	PRE SHEAR Metric* (C)	FINAL VALUES (F) Metric*	FINAL VALUES (F) Metric*
Height	H		2.824			Mercury Immersion	
Diameters Top	D_1				During Consolidation	ΔW_w =	
Middle	D_2			ΔW_w = 25.9	ΔW_w = -3.1	ΔV =	
Bottom	D_3			ΔV = +4.1	ΔV = -3.1	Displ'd Hg =	g.
Mean Diameter	D		10.169			$V_F = \frac{Hg}{13.55}$ =	ml.
Total Weight	W_t		494.84	520.7	516.9		514.40
Area	$A = 0.7854 D^2$		81.22				
Dry Weight	W_s (~~Assumed~~ T)		450.9	450.9	450.9		448.40
Volume	$V = A \cdot H$		229.7	233.9	230.0		
Solid Volume	$V_s = W_s / G_s$		164.0	164.0	164.0		
Volume of Voids	$V_v = V - V_s$		65.7	69.8	66.0		66.0
Water Volume	$V_w = \frac{w W_s}{\delta_w}$		43.9	69.8	66.0		66.0
Void Ratio	$e = V_v / V_s$		0.401	0.426	0.402		
Saturation	$S_r = V_w / V_v$		67%	100%	100%		100%
Bulk Density (Mg/m³)	$\gamma_b = W_t / V$		2.154	2.227	2.247		

WATER CONTENT DETERMINATIONS	BEFORE TEST Trimmings (T)	BEFORE TEST Based on W_s from (T) and Wt. of Specimen	PRE SHEAR	AT END OF TEST (E)		
Tare No.	1					1
Wt. Sample Wet + Tare	452.65					666.04
Wt. Sample Dried + Tare	425.94					600.04
Tare	151.56					151.64
Wt. Water	26.71					66.00
Wt. Dry Sample	274.38					448.40
Water Content, w %	9.7		15.5	14.6		14.7
Dry Density (Mg/m³) $\gamma_d = \gamma_b / 1+w$		1.963	1.929	1.960		

CONSTANTS: G_s = 2.75 ☐ by test, or ☑ assumed

1 inch = 2.540 cm. 1 kg. = 2.205 lbs.
1 sq. in. = 6.452 sq. cm. 1 Mg/ml = 62.43 pcf.
1 cu. in. = 16.39 ml. (c.c.) 6.895 kPa = 1 p.s.i.

FAILURE CONDITION
H_f = cm.
D_1 =
D_2 =
D_3 =
D_f = cm.
A_f = cm.²
V_f = ml.

REMARKS 2 std. membranes, 2 way drainage, outside of specimen greased, Compacted to 98% of Mod. Proctor Max. Dens.

*Metric units are grams, centimeters, & millilitres; British units are lbs., ins., & pcf.
(I) Initial values in metric units based on $W_s = W_t / (1 + w_T)$.

File No.: 19-547-0

THURBER CONSULTANTS LTD.

COMPACTION TEST

Project Valentine Gold

Sample No. _____ Depth _____

Sampled by client Date _____

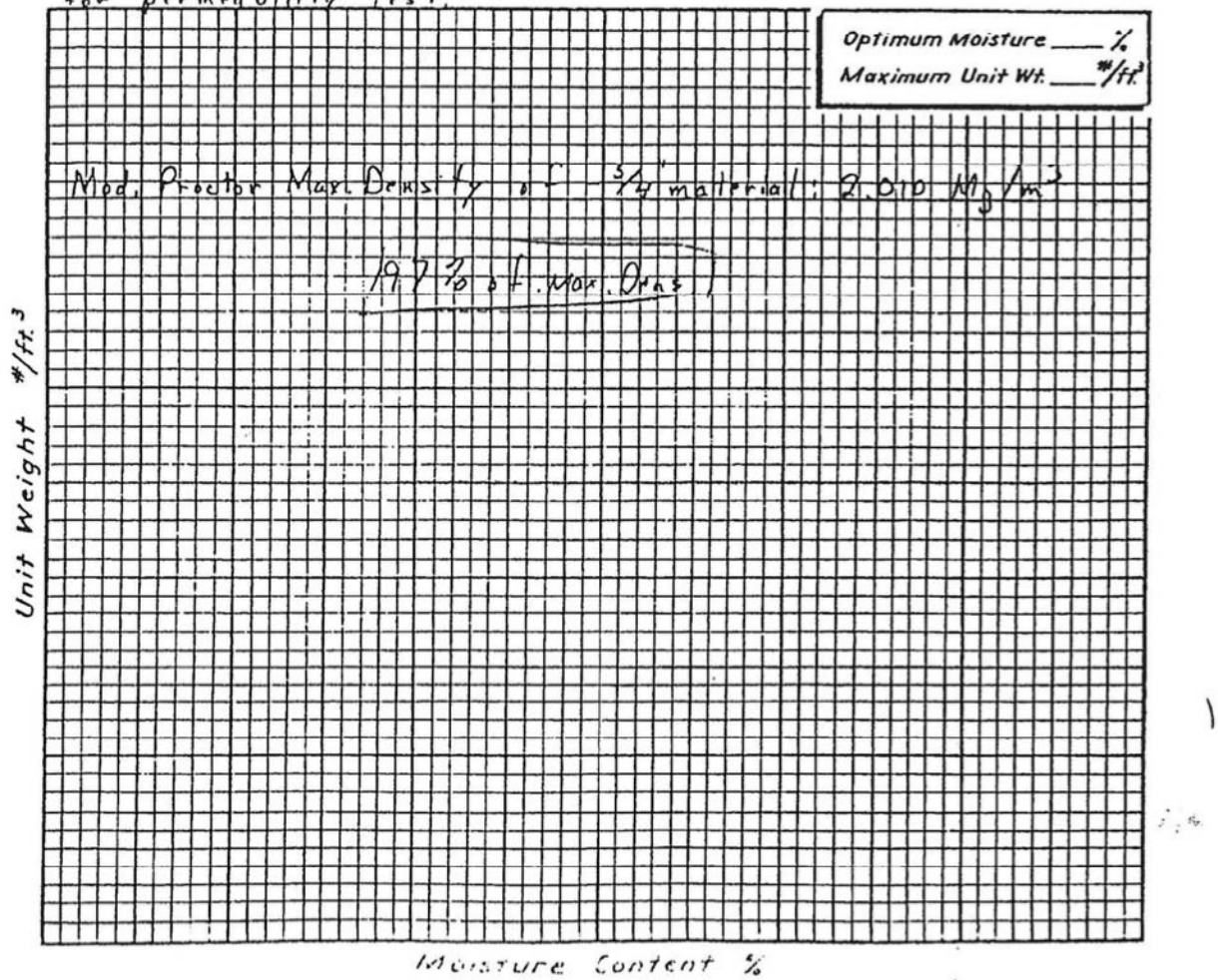
Tested by BK Date Aug 26/19

Checked by

Unit Weight	Trial No.	1						
	Wt. of Sample Wet+Mold	4830.3						
	Wt. of Mold	4206.0						
	Wt. of Sample Wet	624.3						
	Wet Density ~~#/ft.³~~ ~~Mg/m³~~	2.149						
	DRY DENSITY ~~#/ft.³~~ Mg/m³	1.959						
Moisture Content	MOISTURE ADDED							
	Container No.	11						
	Wt. of Sample Wet + Tare	727.28						
	Wt. of Sample Dry + Tare	672.43						
	Tare of Container	107.49						
	Wt. of Water	54.85						
	Wt. of Dry Soil	564.95						
	MOISTURE CONTENT	9.7						

Type of Mold 4" proctor Volume 290.5 cm³ Weight 4206.0

Remarks: East side of borrow; -3/4" material compacted in one layer for permeability test.



THURBER CONSULTANTS LTD.

MOISTURE CONTENT

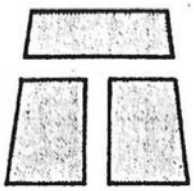
PROJECT Valentine Gold

Computed by .....
Checked by .....
Date .....

Test Hole	East Side of Borrow				East Side of Borrow							
Depth												
Sample No.												
Container No.	15				100							
Wt. Wet Soil & Container	494.71				467.28							
Wt. Moisture		28.99				25.09						
Wt. Dry Soil & Container	465.72				442.19							
Wt. Dry Soil		276.84				289.49						
Wt. Container	188.88				152.70							
Moisture Content %		10.5				8.7						

Test Hole												
Depth												
Sample No.												
Container No.												
Wt. Wet Soil & Container												
Wt. Moisture												
Wt. Dry Soil & Container												
Wt. Dry Soil												
Wt. Container												
Moisture Content %												

NOTICE OF TRANSMITTAL



THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold Date: Nov. 9/87

2038 Otter Pt. Rd. Your File:

Sooke B.C. Our File: 19-547-0

Attention: Calvin Van Buskirk

Reference:

(A) The following items grain size analysis of sample #3 borrow material

RECEIVED
NOV 10 1987
RESOURCES

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☑ Mail ☐ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return

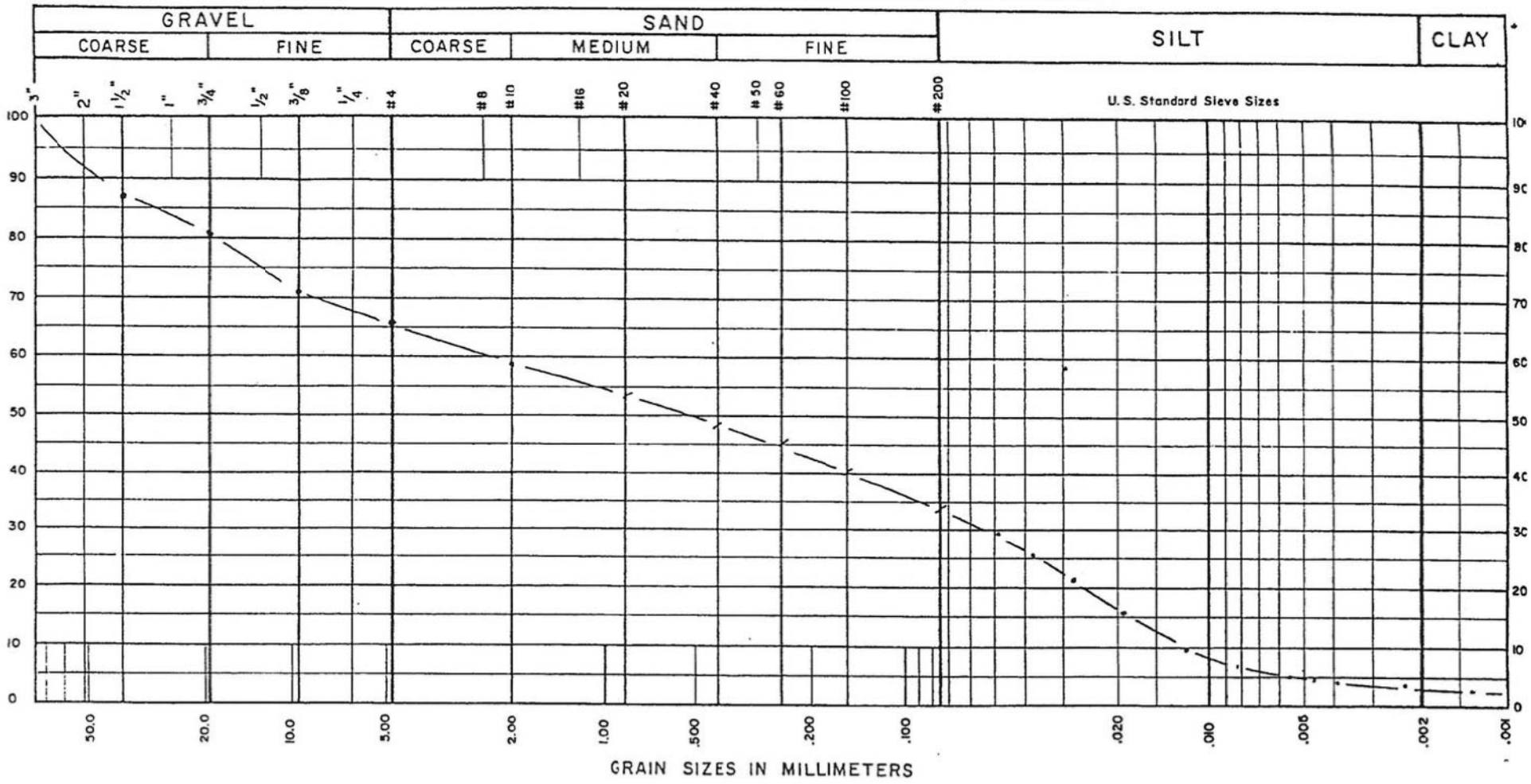
☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By: B L Empey

Unified Soil Classification System & N.R.C. Field Description (Modified with clay size at 0.002 mm)



Nat. Water Content	9.0	%	Clay		3.0 %
Liquid Limit			Silt		30.9
Plastic Limit			Sand		31.9
Plastic Index			Gravel		34.2

Classification SM. SW.
WELL GRADED GRAVELLY, SILTY SAND.

THURBER CONSULTANTS LTD., Geotechnical Engineers

CLIENT VALENTINE GOLD
PROJECT TAILINGS DAM - EARTH FILL
LOCATION SOOKE B.C.
SAMPLE SA 13, BORROW MAT'L AS PLACED
TEST DATE OCT. 29/87 FILE No 19-547-0

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VALENTINE GOLD

Tested by BBL

Date OCT. 29/87

Test Hole FROM DAM

Depth

Checked by

Dry Wt.of Coarse Sample = 23964.1			
Screen	Wt.Ret.	% Ret.	% Pass.
2-1/2"			
2"			
1-1/2"	1982.5	12.4	87.6
1"			
3/4"	4765.7	19.9	80.1
1/2"			
3/8"	186.9	28.9	71.1
1/4"	~		
#1	328.3	34.2	65.8
#10	492.0	41.4	58.6
Pass. 3/4 #10	19198.4 1348.0		
TOTALS	23964.1	1841	

HYDROMETER TEST Nov 2/87 Dry Wgt. of Sample = 99.51

Gs: 2.75 TC: -5.8 K = 101309 a: .98

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. o F.	Grain Size m.m.	% Passing
/	910		21		
1/2		56		.0495	29.0
1	:11	49.5		.0376	25.2
2	:12	42.5		.0283	21.2
5	:15	33		.0193	15.7
15	:25	23		.0120	9.9
34	:44	18.5		.0082	7.3
77	10:28	14.5		.0056	5.0
116	11:06	14		.0046	4.7
162	11:52	12.5		.0039	3.9
455	415	12		.0023	3.6
1380	810	10.5		.0013	2.7

Dry Wt.of 1/4'd Sample Passing No. = 99.51			
Screen #10	Wt. Ret.	% Ret.	% Pass.
#20	9.37		53.1
#40	16.71		43.8
#60	22.86		45.1
#100	31.40		40.1
#200	41.88		33.9
Pan.			
TOTALS			

269.37
TARE 47. 164.86
104.51
. 5
99.51

Classification

Remarks: 7113.8
4892.3
2360.5
7150.6

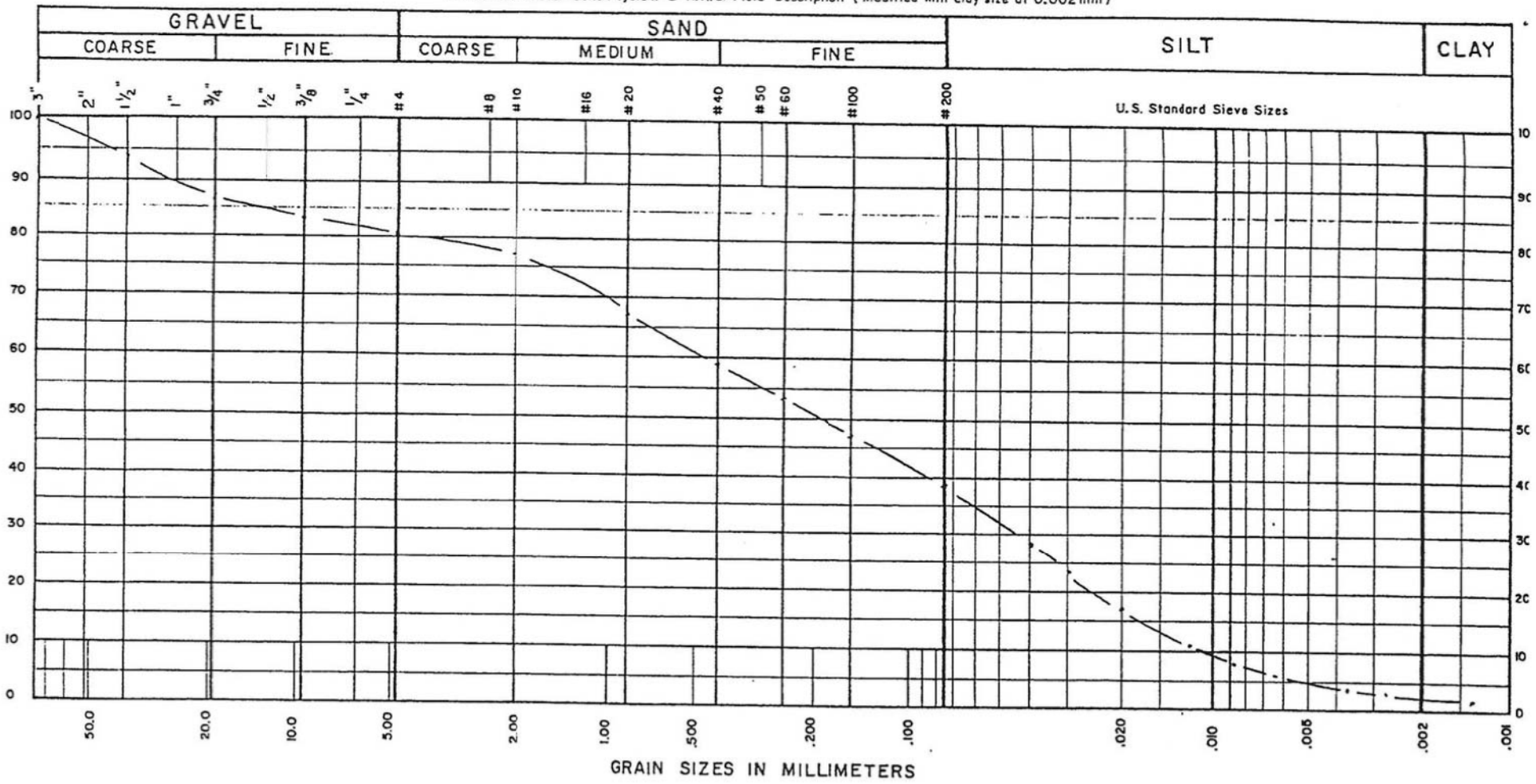
TARE #10 - 298.9 → 2360.4 → 2132.6

220.8/1840.9
12%

-3/4" 11502.2 WET → 19198.4

FILE No. 12-547-9

Unified Soil Classification System & N.R.C. Field Description (Modified with clay size at 0.002 mm)



Nat. Water Content			%
Liquid Limit			
Plastic Limit			
Plastic Index			

Clay	2.0		%
Silt	36.8		
Sand	41.6		
Gravel	19.6		

Classification _____

THURBER CONSULTANTS LTD., Geotechnical Engineers

CLIENT Valentine Gold
PROJECT
LOCATION
SAMPLE Borrow 1 - West Sample
TEST DATE July 23-27, 1987 FILE No 19-547-0

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VALENTINE GOLD

Test Hole / Depth BOREHOLE I – WEST SAMPLE

Tested by

Date July 21/87

Checked by

Dry Wt. of Coarse Sample =			
Screen	Wt. Ret.	% Ret.	% Pass.
~~2-1/2"~~	~~0~~		
~~2" 3"~~	~~0~~		100.0
1-1/2"	1811.7	5.9	94.1
~~1"~~	~~0~~		
3/4"	2499.1	8.1	86.0
~~1/2"~~	~~0~~		
3/8"	236.4		83.0
~~1/4"~~	~~0~~		
#4	201.9		80.4
#10	272.9		76.9
Pass. #10	1663.7		
TOTALS	6685.7		

HYDROMETER TEST

$G_s \cong 2.70$ $k = .01312$

$a = 0.99$ $t_c = -5.9$

Dry Wgt. of Sample = 101.75 g

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. ~~°F.~~	Grain Size m.m.	% Passing
0	1121		22°C		
1	1122	43.5		.0398	28.1
2	1123	37		.0297	23.3
5	1126	28.5		.0200	16.9
15	1136	20.0		.0122	10.5
30	1151	16.5		.0088	7.9
60	1221	13.5		.0064	5.7
180	1421	11.0		.0037	3.8
336	1657	10.0		.0027	3.1
1255	0816	8.5		.0014	1.9

Dry Wt. of 1/4'd Sample Passing No. = 101.75			
Screen #10	Wt. Ret.	% Ret.	% Pass.
#20	13.47		66.7
#40	23.46		59.2
#60	31.27		53.3
#100	39.41		47.1
#200	50.43		38.8
Pan.			
TOTALS			

SPECIFIC GRAVITY TEST

(1) Wt. of Flask + Soil			
(2) Wt. of Flask			
(3) Wt. of Soil = (1) - (2)			
(4) Wt. of Flask + Water			
(5) (3) + (4)			
(6) Wt. of Flask + Water + Soil			
(7) Vol. of Soil = (5) - (6)			
(8) Temp. & Corr. (Tc)			
Specific Grav. = (3) x Tc / (7)			

Classification

Remarks:

232.76

Tare 29: 126.01

+3/8 4827 gms

-3/4 28843 gms

TOTAL 33,670 gms

+3/4 4722 g – DRY

-3/4 26,079 g – DRY

TOTAL 30,801 g

FILE No.

File No.:

THURBER CONSULTANTS LTD.

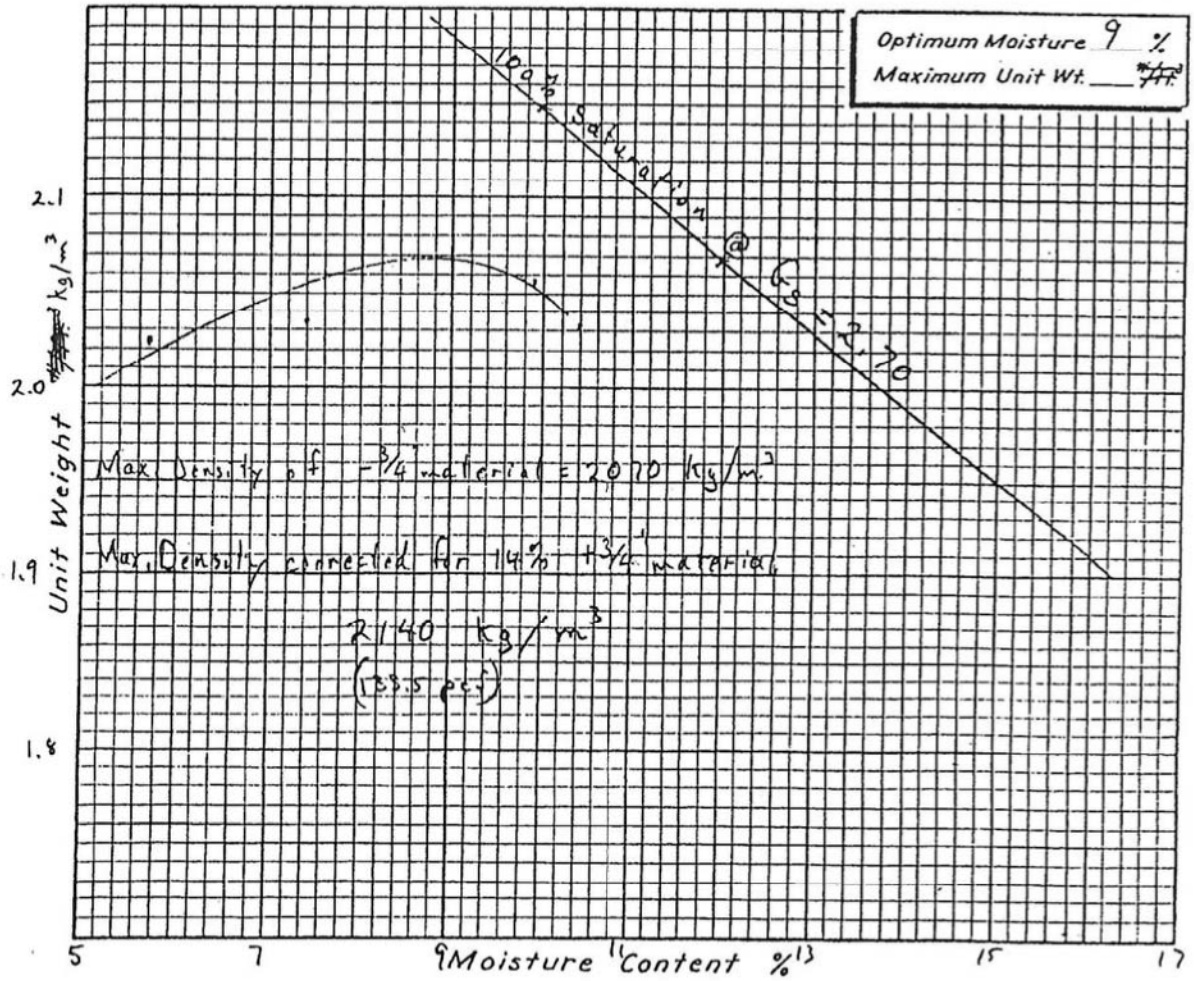
COMPACTION TEST

Project VALENTINE GOLD
BORROW I - WEST SAMPLE
Sample No. _____ Depth _____
Sampled by _____ Date _____
Tested by BS Date Jun 22/87
Checked by

	Trial No.	1	2	3	4			
Unit Weight	Wt. of Sample Wet+Mold	10734.3	10775.2	10635.2	10507.1			
	Wt. of Mold	5970.0	✓	✓	✓			
	Wt. of Sample Wet	4764.3	4805.2	4665.2	4637.1			
	Wet Density #/ft.^{3}	2,243	2,262	2,196	2,136			
	DRY DENSITY #/ft.^{3}	2,031	2,058	2,044	2,022			
		BLEEDING						
Moisture Content	MOISTURE ADDED	+0%	-0%	-2%	-4%			
	Container No.	0	100	758X	103			
	Wt. of Sample Wet + Tare	2759.7	2674.0	2715.3	3480.1			
	Wt. of Sample Dry + Tare	2520.9	2451.5	2542.2	3310.8			
	Tare of Container	236.7	202.3	210.7	318.7			
	Wt.of Water	238.8	222.5	173.1	169.3			
	Wt. of Dry Soil	2285.2	2249.2	2331.5	2992.1			
	MOISTURE CONTENT	10.4	9.9	7.4	5.7			

Type of Mold 6" Volume 2124 cm^3 Weight 5970 G.

Remarks: Grey, gravelly, silty SAND (SM), trace of clay, non plastic fines



THURBER CONSULTANTS LTD.

ATTERBERG LIMITS

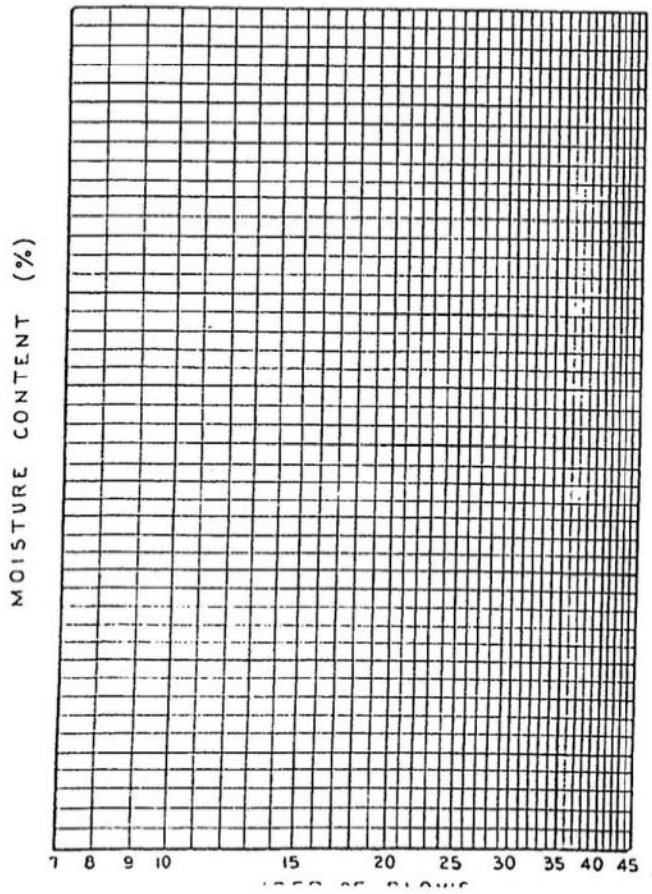
Project Valentine Gold

Test Hole _____ Sample No. West Borrow Tested by BLK

Depth _____ Date of Testing July 23/87 Checked by _____

LIQUID LIMIT									
Trial No.	1								
No. of Blows	9								
Container No.	22								
Wt. Wet Soil & Container	63.99								
Wt. Moisture		6.53							
Wt. Dry Soil & Container	57.46								
Wt. Dry Soil		27.88							
Wt. Container	29.58								
Moisture Content		23.4							

PLASTIC LIMIT									
Trial No.									
Container No.	73								
Wt. Wet Soil & Container	47.01								
Wt. Moisture		3.29							
Wt. Dry Soil & Container	43.72								
Wt. Dry Soil		13.85							
Wt. Container	29.87								
Moisture Content		23.8							

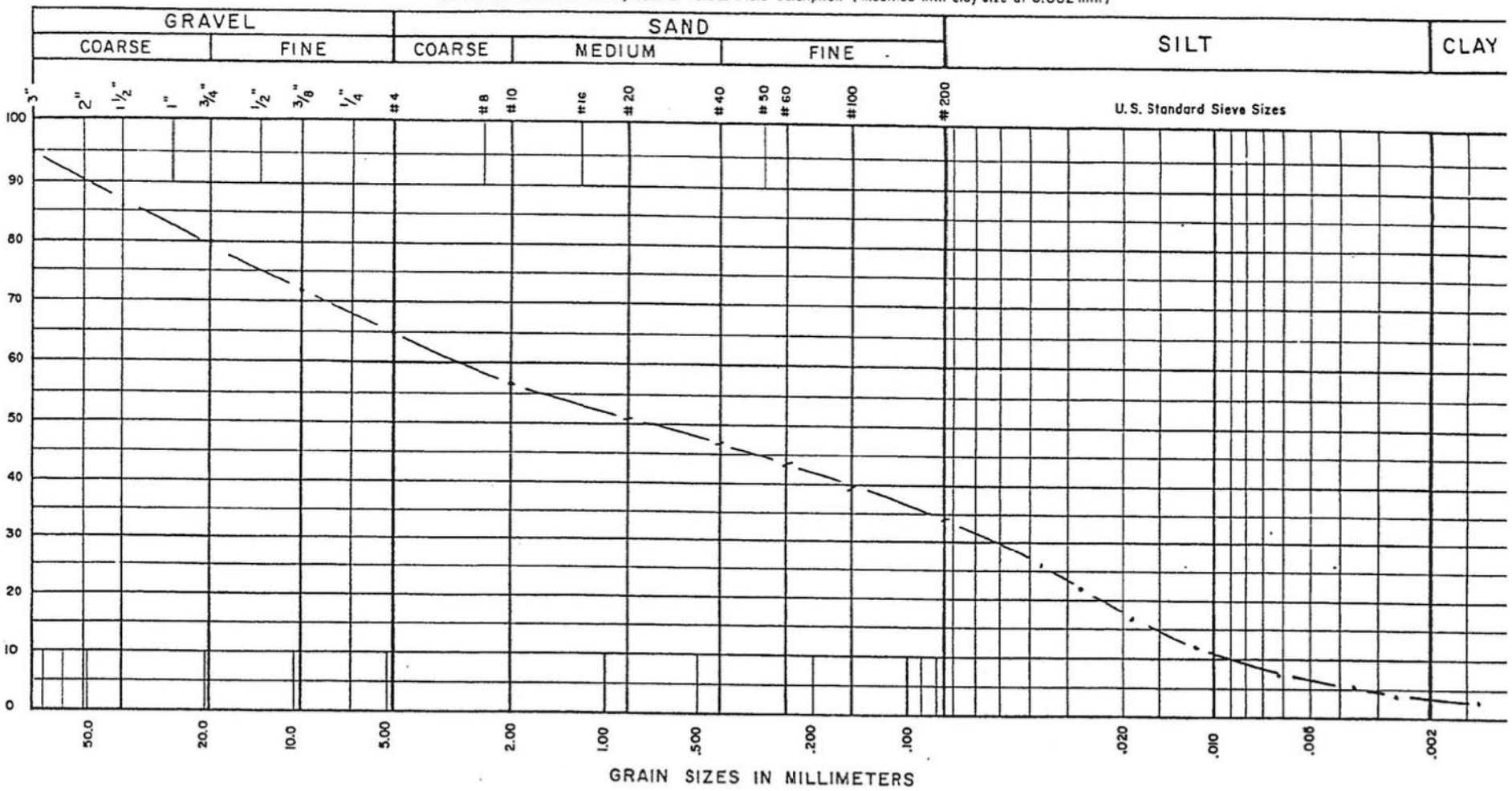


SUMMARY
Liquid Limit ____
Plastic Limit ____
Plastic Index ____

Note: Unable to roll a thread, at this moisture content.

Non - Plastic

Unified Soil Classification System & N.R.C. Field Description (Modified with clay size at 0.002 mm)



Nat. Water Content			%
Liquid Limit			
Plastic Limit			
Plastic Index			

Clay	3.0		%
Silt			
Sand			
Gravel	29.8		

Cobbles 5.5

Classification _____

Maximum size = 4"

CLIENT Valentine Gold

PROJECT

LOCATION

SAMPLE Borrow 1 - East Sample

TEST DATE July 23-27, 1987 FILE No 19-547-C

THURBER CONSULTANTS LTD., Geotechnical Engineers

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VALENTINE GOLD

Tested by _____

Date ~~JULY 21/87~~

Test Hole / Depth BORROW 1 - EAST SAMPLE.

Checked by _____

Dry Wt. of Coarse Sample = 31,906

Screen	Wt. Ret.	% Ret.	% Pass.
5"	~~0~~		100 %
4"	1764.2		94.5
~~2-1/2"~~	~~0~~		
~~2" 3"~~	~~0~~		94.5
1-1/2"	2877.6		85.5
~~1"~~	~~0~~		
3/4"	1790.9		79.8
~~1/2"~~	~~0~~		
3/8"	2217		71.5
~~1/4"~~	~~0~~		
#4	182.5		64.7
#10	203.4		57.0
Pass. #10	1523.3		
TOTALS			

HYDROMETER TEST — Dry Wgt. of Sample = 99.11 g

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. ~~°F.~~	Grain Size m.m.	% Passing
0	1115		22°C		
1	1116	51.0		.0371	25.7
2	1117	44.0		.0280	21.7
5	1120	35.5		.0190	16.9
15	1130	26.5		.0117	11.7
30	1145	22.0		.0085	9.2
60	1215	18.5		.0062	7.2
180	1415	15.0		.0036	5.2
340	1655	13.0		.0027	4.0
1260	0815	11.0		.0014	2.9

Dry Wt. of 1/4'd Sample Passing No. = 99.11

Screen #10	Wt. Ret. —	% Ret.	% Pass.
#20	11.04		50.7
#40	17.73		46.8
#60	23.53		43.5
#100	30.13		39.7
#200	39.76		34.1
Pan.			
TOTALS			

SPECIFIC GRAVITY TEST

(1) Wt. of Flask + Soil			
(2) Wt. of Flask			
(3) Wt. of Soil = (1) - (2)			
(4) Wt. of Flask + Water			
(5) (3) + (4)			
(6) Wt. of Flask + Water + Soil			
(7) Vol. of Soil = (5) - (6)			
(8) Temp. & Corr. (Tc)			
Specific Grav. = (3) x Tc / (7)			

Classification _____

Remarks: Tare 9 — 285.64 / 181.53

+3/4 6870 gms.
-3/4 28819 gms
TOTAL DRY WT 35689 gms.

+3/4 - 6,715 g - DRY
-3/4 - 25,191 g - DRY
TOTAL DRY WT - 31,9066.

FILE No. _____

File No.:

THURBER CONSULTANTS LTD.

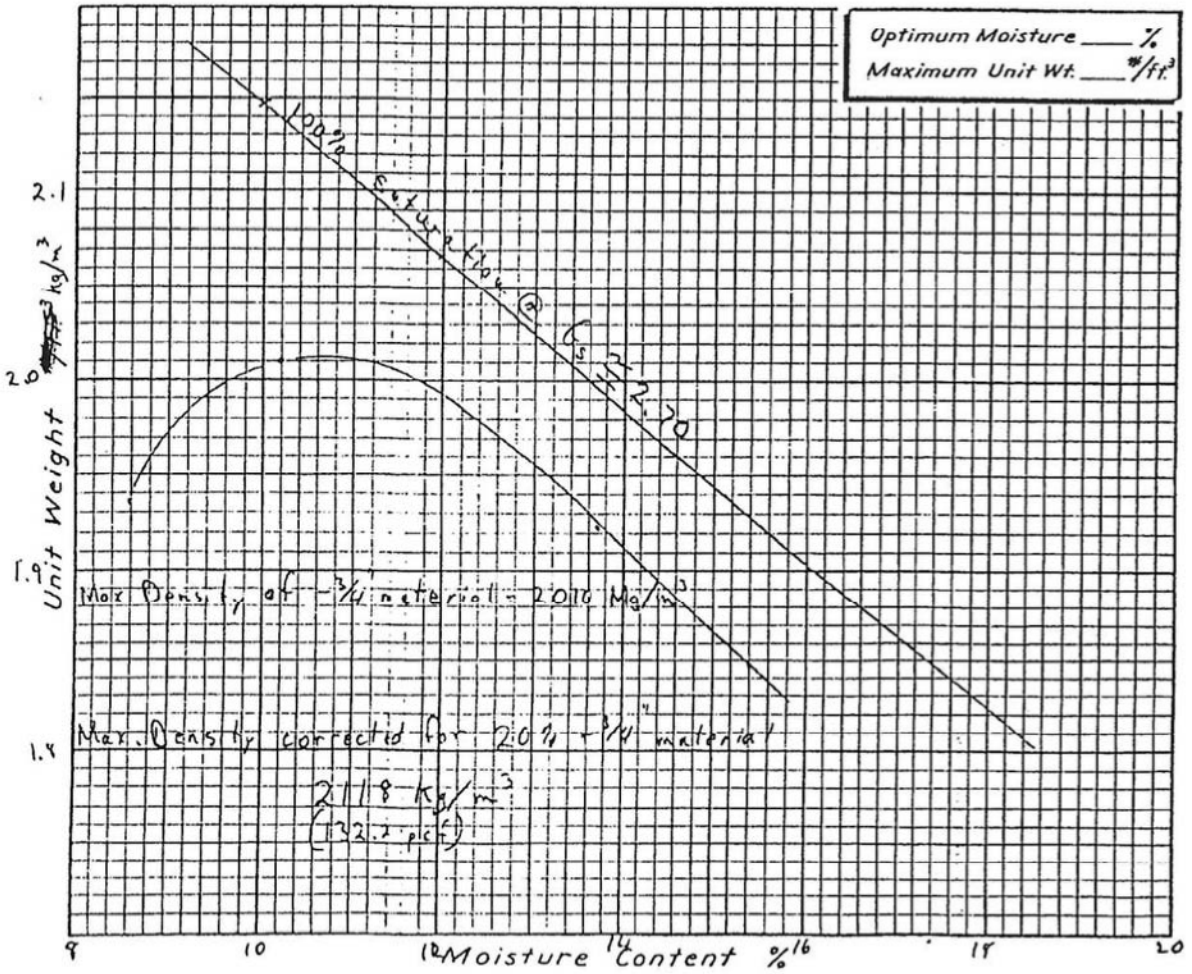
COMPACTION TEST

Project VALENTINE GOLD.
BORROW I - EAST SAMPLE
Sample No. _____ Depth _____
Sampled by _____ Date _____
Tested by SS Date Jan 22/87
Checked by

	Trial No.	1	2	3	4			
Unit Weight	Wt. of Sample Wet+Mold	10614.3	10502.4	10673.7	10433.9			
	Wt. of Mold	5970.0	✓	✓	✓			
	Wt. of Sample Wet	4644.3	4532.4	4703.7	4463.9			
	Wet Density ~~#/ft.³~~ kg/m³	2,187	2,134	2,215	2,102			
	DRY DENSITY ~~#/ft.³~~ kg/m³	1,923	1,849	2,010	1,936			
			BLEEDING					
Moisture Content	MOISTURE ADDED	+0%	+2%	-2%	-4%			
	Container No.	22	J	2C	42A			
	Wt. of Sample Wet + Tare	2398.7	2548.6	2596.7	3246.9			
	Wt. of Sample Dry + Tare	2132.9	2244.0	2375.3	3012.8			
	Tare of Container	195.8	266.4	199.1	285.5			
	Wt. of Water	265.8	304.6	221.4	234.1			
	Wt. of Dry Soil	1937.1	1977.6	2176.2	2727.3			
	MOISTURE CONTENT	13.7	15.4	10.2	8.6			

Type of Mold 6" Volume 2124 cm³ Weight 5970 g.

Remarks: Grey, gravelly, silty SAND (SM), trace of clay, non plastic fines



THURBER CONSULTANTS LTD.

ATTERBERG LIMITS

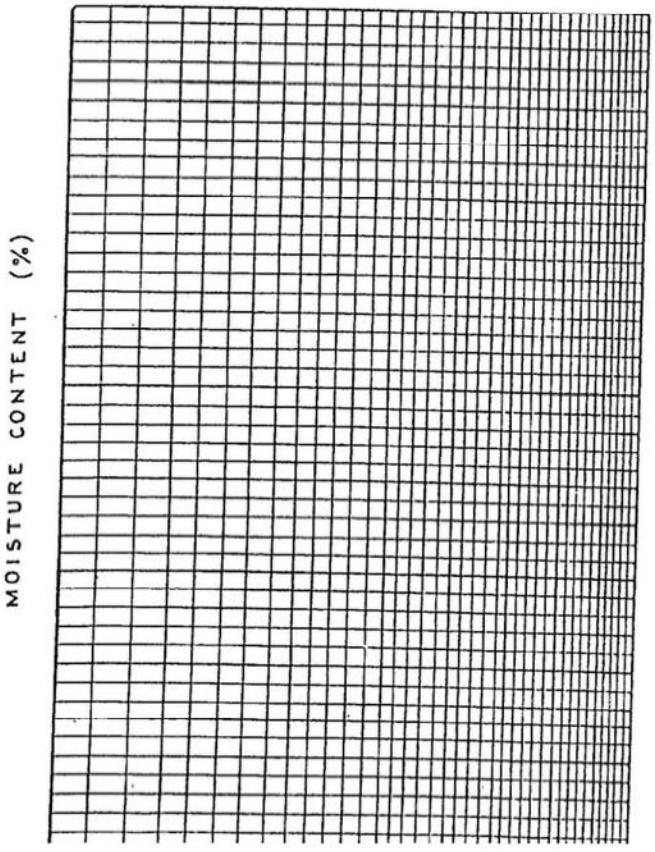
Project Valentine Gold

Test Hole _____ Sample No. East Borrow Tested by BLC

Depth _____ Date of Testing July 23/87 Checked by _____

LIQUID LIMIT									
Trial No.	1								
No. of Blows	15								
Container No.	5								
Wt. Wet Soil & Container	61.93								
Wt. Moisture		7.77							
Wt. Dry Soil & Container	54.16								
Wt. Dry Soil		26.93							
Wt. Container	27.23								
Moisture Content		28.9							

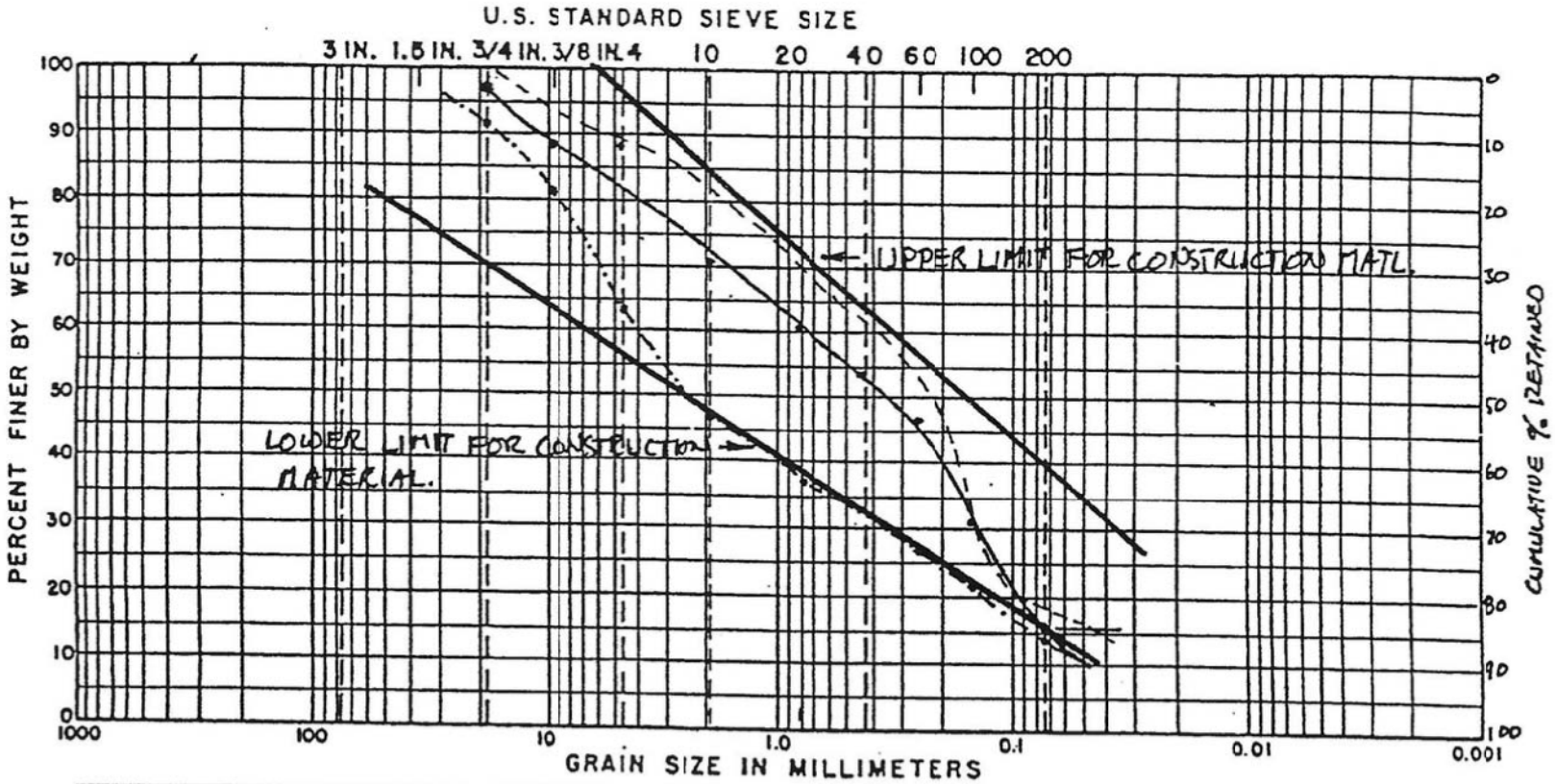
PLASTIC LIMIT									
Trial No.	1								
Container No.	77								
Wt. Wet Soil & Container	44.17								
Wt. Moisture		2.78							
Wt. Dry Soil & Container	41.39								
Wt. Dry Soil		10.09							
Wt. Container	31.30								
Moisture Content		27.6							



SUMMARY
Liquid Limit _____
Plastic Limit _____
Plastic Index _____

Note: Unable to roll thread, at this moisture content

Non - Plastic



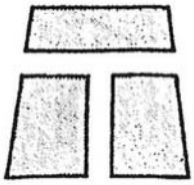
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE #	DEPTH	UNIF. CLASSIFICATION		NAT. WC	LL	PL	PI	LEGEND.
BR-2	1 metre	SM	Clayey silty Sand	9%				———
BR-3	1 metre	SM/SC	Silty Sand, Clayey, Sand	15%				-·-·-·-·-
BORROW 1	1 metre	SM/SC	clayey Silty Sands	21%				- - - - - -

GRADATION CURVE

Plate: 11

NOTICE OF TRANSMITTAL



THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold
2038 Otter Pt. Rd.
Sooke B.C.

Date: Nov. 2/87
Your File:
Our File: 19-547-0

Attention: Calvin Van Buskirk

Reference:

(A) The following items 1 modified proctor test and field density tests of (Oct. 29/87)

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☐ Mail ☑ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return
☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By: B. Thurber

	Density	Moisture
Standard count	3093	510
Compaction test results	125.5	

Project VALENTINE GOLD

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

Date Oct. 29/87

MOISTURE & DENSITY DATA

Test No.	1	2	3	4	5	6	7	8	9	10
Test location	STA 1	STA 2	STA 3	STA 4	[illegible]	STA 6	[illegible]	[illegible]		STA 9
Probe depth	30	30	30	30	30	30	30	30	20	30
ELEV.	3m	—	—	5	2m	—	—	—	—	.1'
Density count (DC/measure)	406	370	467	411	405	423	463	402	1372	504
Moisture count (MC/measure)	126	118	134	123	153	143	141	128	147	151
Wet density p.c.f. (WD)	133.7	127.6	129.4	123.3	133.7	122.2	129.3	133.9	131.0	126.5
Water p.c.f. (M)	8.6	7.9	9.5	2.3	9.3	10.4	10.2	9.8	10.8	11.3
% Moisture (%M)	6.9	6.6	7.9	1.9	7.5	8.5	8.6	7.9	9.0	9.8
Dry density p.c.f. (DD)	125.	120.6	[illegible]	24.9	124.2	121.9	120.1	124.1	120.2	115.2
Percent compaction	99.6	95.3	95.5	99.5	99.1	97.1	94.9	98.9	95.8	91.8

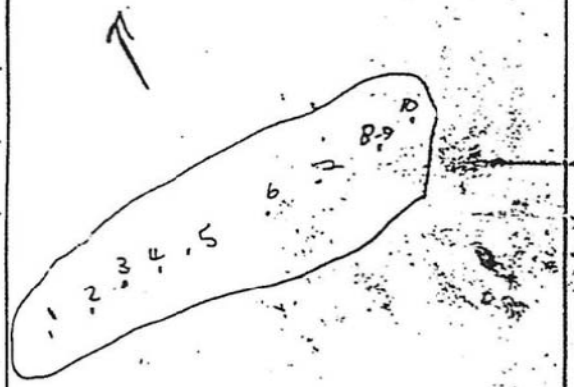
REMARKS

Moisture Correction -1.5%

Technician BJL

Checked by

LOCATION SKETCH



MOD. PROCTOR CURVE
GRAIN SIZE + ATD.
M.C.'S
TRIAXIAL (10 PSI)

File No. 19-547-0

File No.: 19-547-0

THURBER CONSULTANTS LTD.

COMPACTION TEST

Project: 117 VALENTINE GOLD

Sample No.: 3 Depth: Tion Dam

Sampled by: BJL Date: OCT. 29/84

Tested by: ✓ Date: ✓

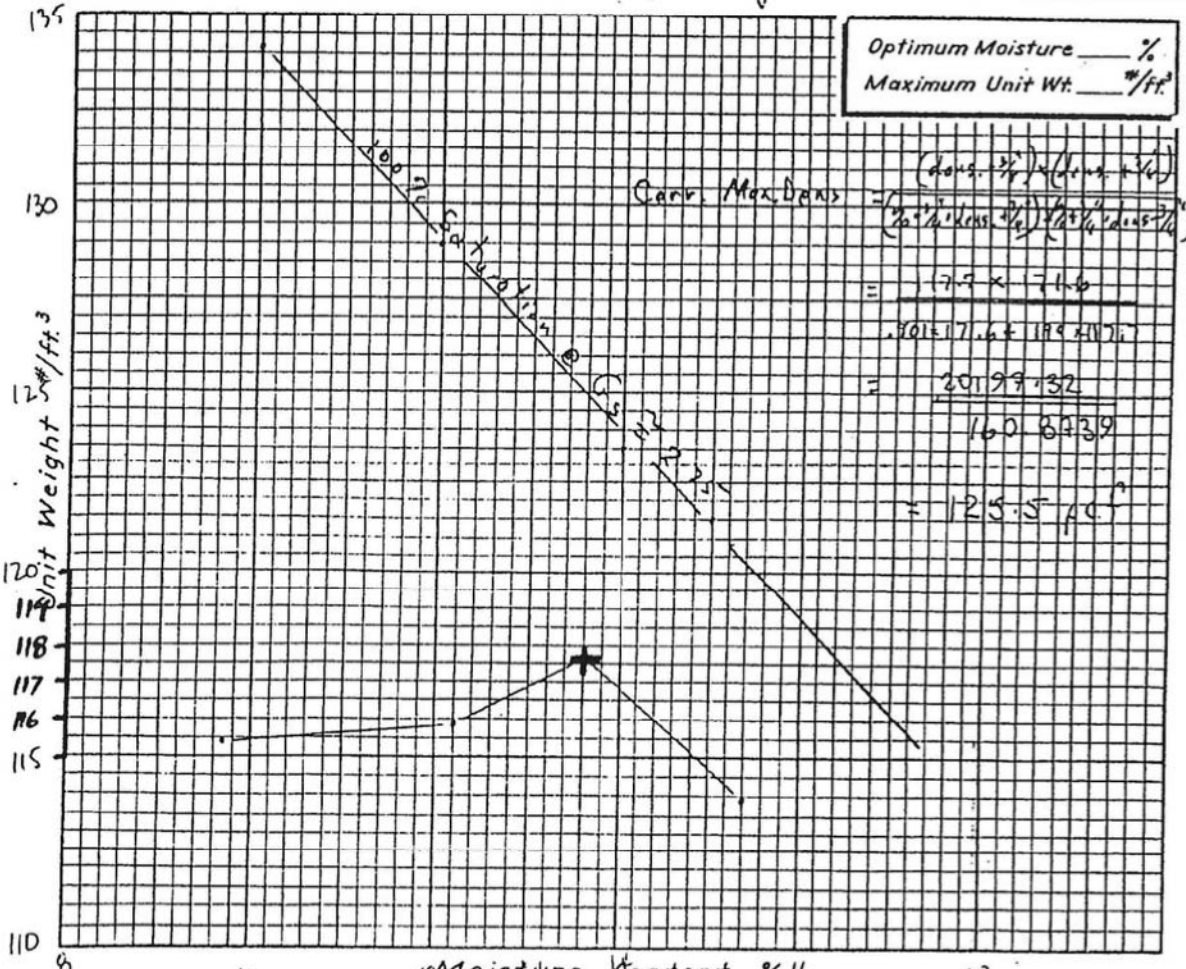
Checked by:

Unit Weight	Trial No.	1	2	3	4			
	Wt. of Sample Wet+Mold	5968	5968	5968	5868			
	Wt. of Mold	10391.8	10518.5	10440.8	10275.9			
	Wt. of Sample Wet	4423.8	4550.5	4477.8	4307.9			
	Wet Density #/ft.^{3}	130.0	133.7	131.4	126.6			
	DRY DENSITY #/ft.^{3}	115.9	117.7	113.9	115.4			
			SLIGHT BLEED					
Moisture Content	MOISTURE ADDED	WS174	+1.5%	+3%	N - 1.5%			
	Container No.	J	42A	A	291			
	Wt. of Sample Wet + Tare	991.4	1366.4	2135.7	2503.6			
	Wt. of Sample Dry + Tare	912.8	1287.3	1889.2	2307.4			
	Tare of Container	266.0	284.6	288.1	286.7			
	Wt.of Water	78.6	129.1	246.5	196.2			
	Wt. of Dry Soil	646.8	952.7	1601.1	2020.7			
	MOISTURE CONTENT	12.2	13.6	15.4	9.7			

Type of Mold: 6" MOD. Volume: 2124 cc Weight: 5968 g

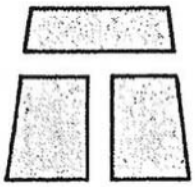
Remarks: BROWN F.N.C SAND & SILT (SOME GRAVEL). 34.2% GRAVEL

5003.7



137.4.1.2

NOTICE OF TRANSMITTAL



THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold Date: Nov. 16/87

2038 Otter Pt. Rd. Your File:

Sooke BC Our File: 19-547-0

Attention: Calvin van Bushirk

Reference: density testing

(A) The following items

field density test results from Nov. 4/87

RECEIVED
NOV 17 1987
RESOURCES

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☑ Mail ☐ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return

☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By: B. Longley

	Density	Moisture
Standard count	3096	

Project Valentine Gold

THURBER CONSULTANTS LTD.
Geotechnical Engineers

Compaction test results 130.6 pcf factor 1.041
SHOULD BE 125.5 pcf.

NUCLEAR DENSOMETER TESTS

Date Nov 4/87

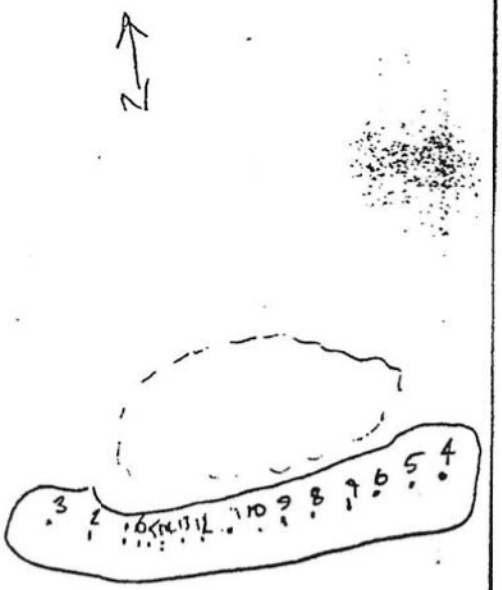
MOISTURE & DENSITY DATA

Test No.	1	2	3	4	5	6	7	8	9	10
Test location	0+20	0+15	0+10	65m	60m	55m	50m	45m	40m	35m
Probe depth	30	30	30	30				30	20	
	-1.8m									
Density count (DC/measure)	407	390	379	381	437	405	418	419	1523	417
Moisture count (MC/measure)	176	165	164	152	156	162	160	163	175	156
Wet density p.c.f. (WD)	133.5	131.8	131.8	135.6	131.1	133.1	132.6	132.1	126.5	132.4
Water p.c.f. (M)	11.4	13.3	11.1	12.0	12.1	13.0	12.8	13.2	14.5	12.4
% Moisture (%M)	9.3	11.0	9.2	9.2	10.2	10.6	10.3	11.2	13.0	10.3
Dry density p.c.f. (DD)	122.1	121.1	121.2	123.7	119.0	120.4	120.0	119.3	112.0	120.2
Percent compaction (CORRECTED TO MAX 125.5 pcf)	97.3 / 93.5	96.7 / 93.0	96.6 / 95.5	98.6 / 94.7	94.8 / 91.1	96.1 / 92.3	95.5 / 91.7	95.1 / 91.3	89.3 / 85.8	95.7 / 92.0

REMARKS 4 modified proctor tests have been run to date; the range of values is 125.4 - 133.5 pcf. The value obtained for material from this lift is 130.6 p.c.f.

Moisture Correction 1.05
Technician [illegible]
Checked by BHS and

LOCATION SKETCH



File No. 19-547-0

Page 182 of 427 FNR-2019-96139

	Density	Moisture
Standard count		
Compaction test results		

Project Valentine Gold

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

page 2 of 3

Date Nov. 4/87

MOISTURE & DENSITY DATA

Test No.	11	12	13	14	15	16	17	18	19	20
Test location	3m	3.5m	4m	4.5m	5m		0+13 0+20	0+23 0+25	0+14 0+15	0+16 0+00
Probe depth	30	30	30	30	30	30	30	30	30	
	-1.8m									→
Density count (DC/measure)	455	480	514	486	513	490	479	539	430	476
Moisture count (MC/measure)	163	155	184	178	163	164	186	196	172	150
Wet density p.c.f. (WD)	129.2	126.0	135.7	132.3	132.9	128.3	128.2	127.3	128.8	128.4
Water p.c.f. (M)	13.2	12.1	15.2	13.6	13.2	13.3	12.9	11.1	11.1	10.7
% Moisture (%M)	11.3	10.3	12.1	11.0	11.0	11.4	11.2	9.5	9.4	9.1
Dry density p.c.f. (DD)	116.5	114.6	123.2	121.1	119.2	116.4	119.3	117.8	117.7	117.2
Percent compaction	93/89.2	92/87.7	88/84.4	93/89.7	95/91.7	92/88.4	95/91.3	90/86.4	94/90.1	94/90.1

REMARKS * *

Moisture Correction * -1.5%

Technician

Checked by

LOCATION SKETCH

* TO BE RE-COMPACTED.

File No. 19-547-0

	Density	Moisture
Standard count		
Compaction test results		

Project Valentine Gold

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

page 3 of 3

Date Nov. 4/87

MOISTURE & DENSITY DATA

Test No.	21										
Test location	Access 15										
Probe depth	30										
	-1.8m										
Density count (DC/measure)	356										
Moisture count (MC/measure)	132										
Wet density p.c.f. (WD)	137.3										
Water p.c.f. (M)	12.8										
% Moisture (%M)	10.2										
Dry density p.c.f. (DD)	125.0										
Percent compaction	95.7 ✓										

REMARKS

Moisture Correction .....
Technician .....
Checked by .....

LOCATION SKETCH

File No. .....

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VAL · Gocn

Tested by BM

Date Nov·4/87

Test Hole SA 4

Depth

Checked by BM

Dry Wt.of Coarse Sample =			
Screen	Wt.Ret.	% Ret.	% Pass.
2-1/2"			
2"			
1-1/2"			
1"			
3/4"	5164.2	21.0	78.9
1/2"			
3/8"			
1/4"			
#4			
#10			
Pass. #10 3/4	19282.4		
TOTALS 24446			

HYDROMETER TEST — Dry Wgt. of Sample =

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. o F.	Grain Size m.m.	% Passing

Dry Wt.of 1/4'd Sample Passing No. =			
Screen #10	Wt. Ret.	% Ret.	% Pass.
#20			
#40			
#60			
#100			
#200			
Pan.			
TOTALS			

Classification

Remarks: 6868.7
7896.9
2078.4 x 1.115 = 19282.4

TRACE = 100 - 10.38 → 63.2 = 58.0

67.2/46.12

14.5%

FILE No. 19-5410

8.2.0

APPENDIX B:

INITIAL MONITORING DATA

Page 186 of 427 FNR-2019-96139

Initial settlement data

date	west monument	central monument	east monument
1st dec 87	103.72m	103.71	103.47

BULK SAMPLING REPORT (EXCERPT)
MARCH 14, 1988

BACON,
DONALDSON
& ASSOCIATES LTD.

2036 COLUMBIA STREET
VANCOUVER, B.C., CANADA V5Y 3E1
TELEPHONE (604) 879-8461
TELEX 04-53437

RECEIVED
JUL 09 2002
MINES BRANCH
NANAIMO

METALLURGICAL BULK SAMPLING PILOT PLANT PROGRAMME FOR VALENTINE MOUNTAIN PROPERTY

Prepared for:

VALENTINE GOLD CORP.
Suite 2000, Park Place
666 Burrard Street
Vancouver, B.C.
V6C 2X8

Attention: Michael J. Hopley

File Number: 7065
March 14, 1988

Kenneth B. DeGraaf, M.A.Sc., P.Eng.

1.0 INTRODUCTION

As part of an overall exploration program, Valentine Gold Corp. carried out a programme of bulk sampling at its Valentine Mountain property near Sooke, B.C. Due to the apparent "nugget" effect it was necessary to treat much larger samples than would be available from the planned drill program. Under Bacon Donaldson & Associates supervision, the bulk trench samples were processed on-site at the Valentine Mountain 20 ton/day gravity/flotation pilot plant.

The bulk sampling programme extended over a period from November 30, 1987 through to February 9, 1988. During this period three (3) bulk trench samples were processed through the pilot plant facility. The following report is a final account of the head grades calculated for each of the bulk trench samples handle.

In addition, a brief report is provided on the final mill status at the completion of this bulk sampling program.

2.0 SUMMARY

The following table summarizes the calculated head grade, the % gold recovery and the total sample weight for each of the three bulk samples.

Sample	Calculated Head Grade Au (oz/ton)	% Gold Recovery	Sample Weight (tons)
D-14	0.015	63.0	247.1
Vein 36 East	0.106	96.5	184.0
Vein 36 West	0.027	91.9	221.8

The 20 ton/d bulk sampling pilot plant remains intact, but has been temporarily decommissioned to reduce degradation of plant equipment. To recommission the pilot plant it is estimated that approximately 20 mandays will be required to reconnect pumps, motor, etc.

FROM: BACON DONALDSON REPORT 7065

MARCH 14, 1988

K. B. DE GRAAF

THURBER

APPENDIX B

NOTES:

1. Image from C.R.D. Natural Areas Atlas.

THURBER ENGINEERING LTD.

DESIGNED	DRAWN	APPROVED
JDM	RRS	

GREAT THUNDER GOLD CORPORATION

KEY PLAN

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DATE	SCALE	PROJECT No	DWG NO	REV
NOVEMBER 13, 2014	Not to Scale	19-6819-0 -1		-

Plotted: December 01, 2014
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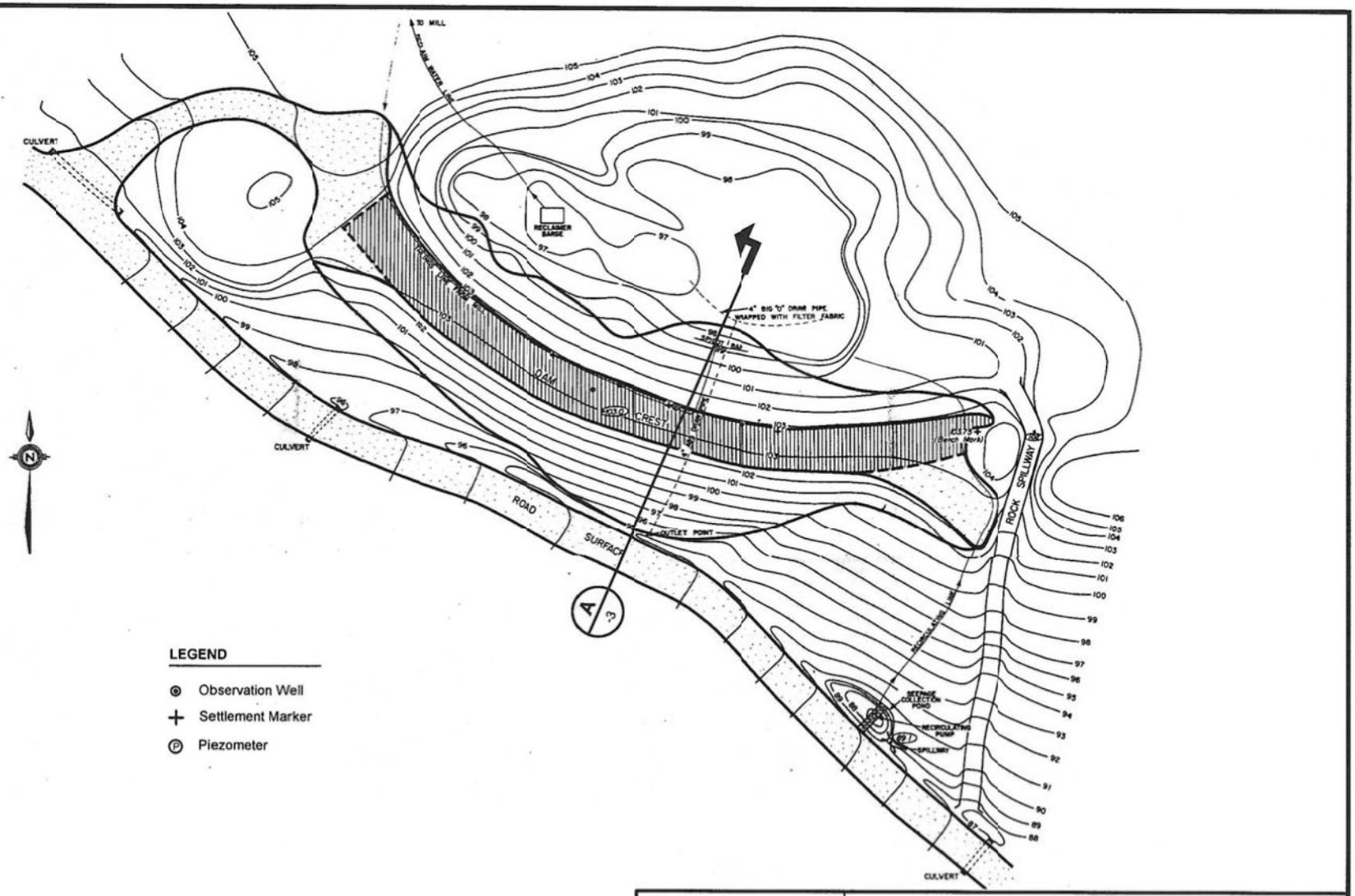
TED04375.dwg



NOTES:

1. Image scanned from drawing entited "PLAN MAP OF TAILINGS DAM (AS CONSTRUCTED)", dated November, 1987 and stamped by Peter J Peart, P.Eng.
2. Contours shown are 1 metre intervals.

0 5 10 15 20 25 30m
SCALE 1:500

THURBER ENGINEERING LTD.

GREAT THUNDER GOLD CORPORATION

SITE PLAN

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No	DWG NO	REV
JDM	RRS		NOVEMBER 13, 2014	1:500	19-3819-0 -2		-

TED04375.dwg

Plotted: December 01, 2014

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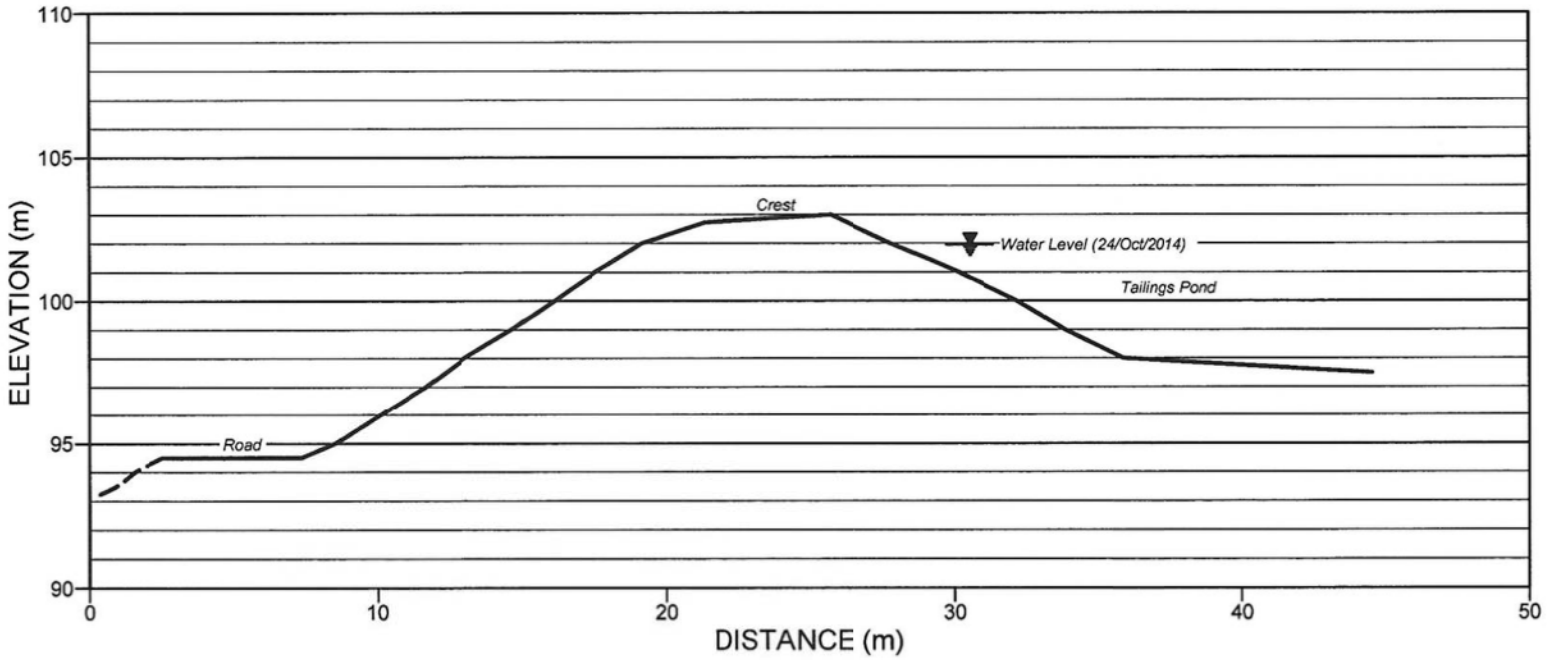


NOTE:

Section produced from contours shown on drawing entitled "PLAN MAP OF TAILINGS DAM (AS CONSTRUCTED)", dated November, 1987 and stamped by Peter J Peart, P.Eng.

0 2.5 5 7.5 10 12.5 15 m

SCALE 1:250

THURBER ENGINEERING LTD.

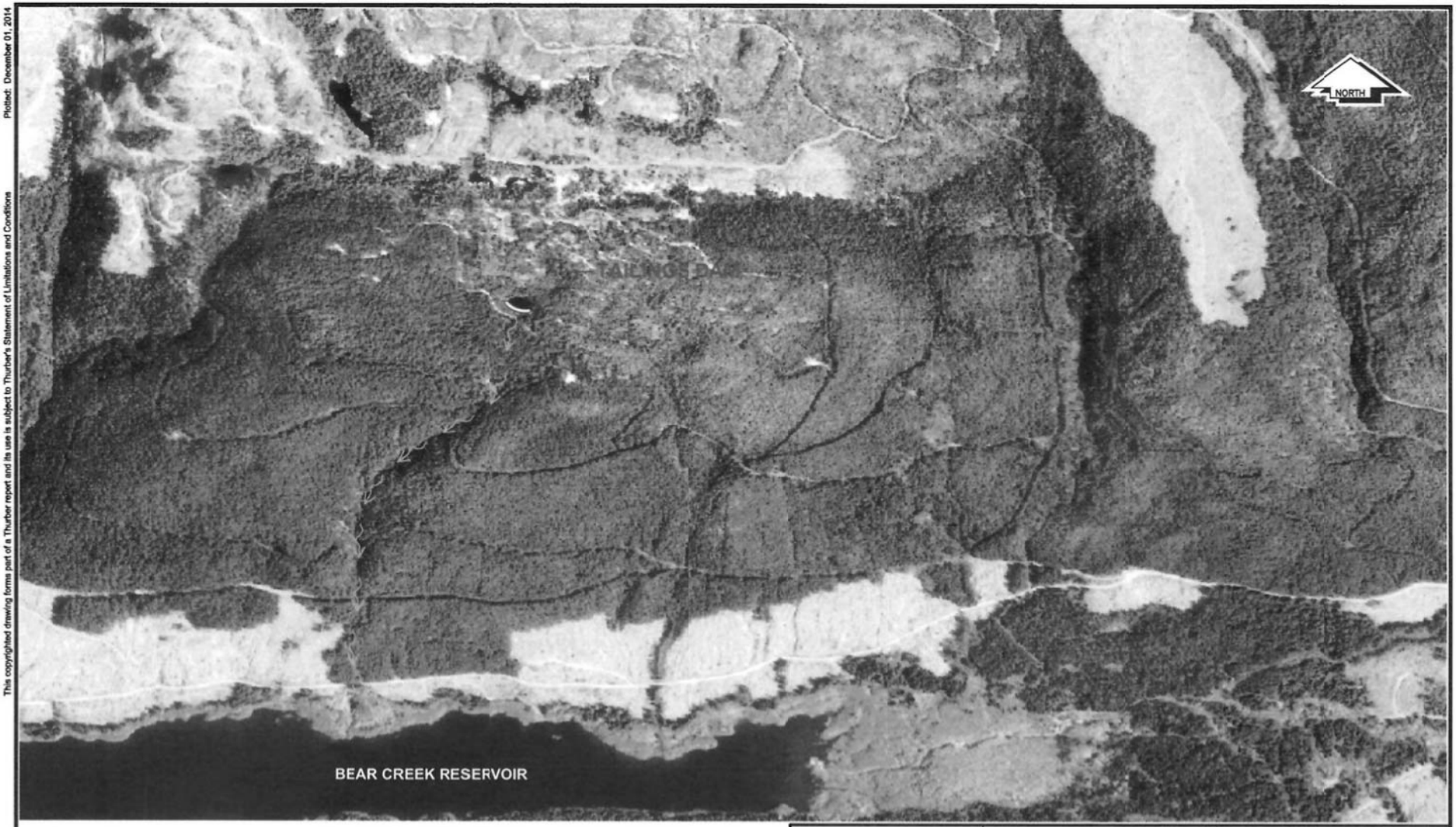
GREAT THUNDER GOLD CORPORATION

SECTION A

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No.	DWG. NO.	REV.
JDM	RRS		NOVEMBER 24, 2014	1:250	19-6819-0	-3	-



Plotted: December 01, 2014

This copyrighted drawing forms part of a Thurber report and its use is subject to Thurber's Statement of Limitations and Conditions

NOTES:

1. 2013 Ortho-photograph from C.R.D. Web Map Service.

0 100 200 300 400 500 600m
SCALE 1:10000

THURBER ENGINEERING LTD.

GREAT THUNDER GOLD CORPORATION

PLAN SHOWING ANTICIPATED FLOW DIRECTION DOWNSTREAM OF DAM

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No.	DWG. NO.	REV.
JDM	RRS		NOVEMBER 13, 2014	1:10,000 Approx.	19-3819-0 -4		-

TED04375.dwg

THURBER

APPENDIX C

TABLE C - 1
SUMMARY OF MONTHLY PRECIPITATION (1974 to 2013)

Year	Monthly Precipitation (mm)												Yearly Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1974	410.8	231.9	192.8	79.8	68.8	39.9	35.3	30.0	30.0	23.2	319.2	409.5	1871
1975	322.1	114.3	121.5	56.7	45.1	12.0	6.0	153.6	0.8	445.6	432.0	489.6	2199
1976	191.8	303.3	292.5	62.0	96.1	44.2	23.1	86.7	58.8	124.7	95.6	194.3	1573
1977	152.7	243.5	188.6	86.9	26.7	8.4	20.9	3.0	43.9	146.7	575.3	289.9	1787
1978	185.7	112.3	106.2	31.5	70.8	14.3	19.8	86.6	93.2	49.1	159.1	225.2	1154
1979	55.9	335.3	103.5	75.2	26.9	32.5	30.7	5.1	104.1	182.6	56.9	596.5	1605
1980	171.0	347.6	179.9	63.0	39.8	52.1	40.9	18.3	82.4	29.7	591.5	496.9	2113
1981	85.8	362.1	119.3	205.5	71.9	89.7	17.5	19.8	130.6	174.9	326.9	311.8	1916
1982	461.6	260.7	59.2	86.0	15.8	36.1	18.2	18.0	26.8	171.6	151.7	361.8	1668
1983	347.5	274.6	182.8	17.5	29.1	29.3	88.8	24.8	72.0	61.6	451.0	180.0	1759
1984	202.0	131.2	139.3	115.3	131.2	90.3	1.8	7.1	46.0	199.7	374.0	183.2	1621
1985	35.0	68.7	90.1	117.1	15.1	21.0	10.1	13.0	20.1	238.3	125.5	45.3	799
1986	402.2	292.9	99.6	71.5	75.4	16.8	19.1	0.0	35.0	81.0	399.3	143.4	1636
1987	257.3	95.2	138.6	114.2	61.2	8.2	13.3	16.0	17.3	16.5	198.8	310.0	1247
1988	169.1	124.6	264.3	146.1	61.1	29.4	15.8	14.5	79.2	139.9	317.0	225.4	1586
1989	304.2	61.0	195.3	108.1	45.8	25.3	18.0	28.2	8.3	107.7	215.1	193.5	1311
1990	359.5	351.6	102.5	72.8	34.9	53.1	10.6	32.7	8.1	240.4	680.5	370.6	2317
1991	165.7	257.9	91.3	176.9	40.1	10.7	33.2	161.3	3.0	23.8	325.9	245.4	1535
1992	485.5	136.8	22.0	142.9	9.4	13.9	30.2	17.9	45.2	106.5	225.7	115.2	1351
1993	169.6	9.5	192.2	124.7	92.9	45.8	61.6	32.9	1.2	72.8	122.6	191.0	1117
1994	132.8	247.7	224.3	56.3	51.4	45.0	18.5	6.7	67.0	197.5	297.5	404.2	1749
1995	175.2	272.5	143.2	70.3	17.3	35.1	33.8	58.1	30.1	225.7	559.7	326.7	1948
1996	284.2	158.0	54.0	191.5	48.0	11.2	12.0	14.2	42.2	257.2	225.9	355.0	1653
1997	456.1	119.2	382.8	122.2	80.6	115.5	73.0	39.3	139.8	312.2	196.3	231.5	2269
1998	350.4	136.4	104.6	20.6	30.5	18.6	42.9	0.8	32.2	105.4	619.0	385.0	1846
1999	401.6	447.0	168.5	22.9	33.8	45.9	5.9	17.0	20.4	255.2	256.7	326.3	2001
2000	184.3	83.3	118.7	47.1	81.1	53.4	33.3	9.5	53.8	112.1	118.5	163.5	1059
2001	146.0	47.8	115.5	78.2	52.6	25.8	6.6	97.3	36.2	168.4	256.3	342.1	1373
2002	355.0	247.7	202.6	109.9	33.8	40.8	9.2	20.3	29.6	18.1	229.8	224.9	1522
2003	289.0	40.1	269.6	68.4	39.6	7.1	21.1	3.9	41.8	587.3	299.2	175.8	1843
2004	166.1	63.4	149.4	19.9	37.4	29.5	5.3	98.4	108.5	131.9	213.2	239.1	1262
2005	272.3	35.3	157.1	108.2	73.2	26.4	34.2	12.6	61.5	154.3	178.0	194.0	1307
2006	464.2	128.0	76.9	62.0	54.4	39.7	9.2	4.9	48.3	66.0	686.2	286.1	1926
2007	495.7	163.4	343.8	102.3	24.0	37.6	41.1	33.0	64.4	195.9	136.3	323.1	1961
2008	202.6	101.6	116.8	38.4	12.6	29.9	15.5	76.5	23.7	82.8	233.3	130.4	1064
2009	164.4	54.8	125.9	74.2	87.4	13.6	11.2	38.0	88.5	223.4	529.7	106.3	1517
2010	277.1	72.8	139.7	132.0	130.3	30.3	2.0	25.0	152.9	168.7	176.3	327.0	1634
2011	290.7	187.6	231.8	147.8	86.4	10.4	13.8	30.3	95.6	120.8	260.5	161.1	1637
2012	326.2	131.6	235.1	77.5	30.1	54.7	20.1	1.1	5.4	250.1	219.8	310.4	1662
2013	150.6	123.9	212.6	123.5	81.4	38.1	0.0	42.2	178.6	37.9	115.6	69.9	1174
Avg:	**263.0**	**174.4**	**161.4**	**90.7**	**53.6**	**34.5**	**23.1**	**35.0**	**55.7**	**157.7**	**298.8**	**266.5**	**1614**

Note: Data provided by CRD Integrated Water Services and collected at Sooke Lake.

TABLE C - 2
SUMMARY OF AVERAGE DAILY AIR TEMPERATURE (2004 to 2013)

Year	Average Daily Air Temperature (°C)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	2.7	4.2	6.2	9.1	11.8	15.7	18.5	18.2	12.4	9.3	5.3	4.5
2005	3.0	2.6	6.2	8.3	12.7	13.9	16.8	17.6	12.4	8.9	3.9	3.4
2006	4.8	3.4	5.0	8.0	12.0	15.6	18.1	16.8	13.9	8.5	4.4	2.5
2007	1.7	4.3	5.8	7.1	11.2	13.6	18.2	16.4	12.7	8.1	4.3	2.0
2008	1.6	3.3	3.4	5.4	11.6	13.1	16.8	16.6	13.4	8.1	6.9	0.4
2009	1.3	2.4	2.9	7.2	11.1	16.0	19.4	17.0	13.9	8.4	5.9	0.8
2010	5.5	5.6	5.4	7.6	10.1	13.6	17.6	17.0	13.8	9.4	3.8	3.6
2011	3.1	1.8	4.9	5.1	9.7	14.0	16.1	17.1	14.8	8.1	3.3	2.3
2012	1.9	3.8	4.0	7.8	10.6	12.8	17.1	17.8	14.1	9.1	5.7	3.1
2013	2.0	4.0	5.6	7.6	12.5	15.5	18.5	17.7	14.5	8.7	4.8	1.6
Average	**2.8**	**3.5**	**4.9**	**7.3**	**11.3**	**14.4**	**17.7**	**17.2**	**13.6**	**8.7**	**4.8**	**2.4**

Note: Data provided by CRD Integrated Water Services and collected at Sooke Lake.

THURBER

APPENDIX D

APPENDIX D
PREVIOUS CONSULTANT INSPECTIONS & REPORTS

Jacques Whitford
Consulting Engineers
Environmental Scientists
Risk Consultants

715 Canada Avenue
Duncan, BC
V9L 1V1

Tel: (250) 715-2999
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December 23, 2003

Project No. BCI60004

Mr. Bob Beaupre
Beaupre Exploration Ltd
110 – 850 Blanshard St
Victoria, BC V8W 2H2

Dear Mr. Beaupre:

Re: Initial Geotechnical Assessment
Tailings Pond,Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC

Further to our proposed work plan dated April 28, 2003, Jacques Whitford Environment Limited (JWEL) is submitting this Initial Geotechnical Assessment report. This report has been prepared in general conformance to our April 28, 2003 work plan. The purpose of this report is to fulfil the B.C Ministry of Energy and Mines geotechnical permit requirements, as described in their July 17, 2002 letter and attached "Special Conditions". The report includes a summary of our review of existing information (primarily the 1987 report prepared by Peter Peart Geotechnical Ltd.), observations made during our site reconnaissance, and recommendations regarding the status of the existing tailings containment system.

1.0 SITE RECONNAISSANCE

The site is located to the south of Discovery Zone on Valentine Mountain, situated north of Sooke in southern Vancouver Island. Site elevation is approximately 800 m on the ridge running down to the south-west from Valentine Mountain. The watershed area located above the impoundment is approximately 38,000 m^2. The watershed has elevations in the range 760 – 804 m. No groundwater discharge or recharge was noted in the period between March and June 1987 at the time of Peter Peart's inspection of the rock in the area of the impoundment.

An initial visual assessment of the existing tailings impoundment was carried out on April 3, 2003. The site reconnaissance included a detailed surface examination of the facility to look for obvious signs of distress with a view to evaluating whether the structure had deteriorated over time. Observations made during the April 3, 2003 site reconnaissance may be summarised as follows:

- There was no obvious cracks on the crest
- One of the steel piezometers was found to be bent on the upstream side of the crest
- There was sloughing on the downstream side of the crest, extending approximately 0.3 m in depth. The sloughed area covered an areal extent between approximately station 0+78 and the spillway
- There was an open crack approximately between stations 0+72 and 0+75
- At the crack areas the dam is approximately 5.9 m in height
- No seepage was observed along the seepage collection pond
- There was no noticeable water in the ditch along the toe of the dam.

Based on our visual observations during the field visit, it would appear that the tailings dam likely does not have the same factor of safety against slope instability as when it was constructed. This is further discussed in the following sections in the context of the seismic coefficient and strength parameters utilised in the original slope stability analysis.

2.0 REVIEW OF PREVIOUS INFORMATION

As part of our initial geotechnical assessment we have reviewed the December 1, 1987 report for Valentine Gold Corporation titled "Tailings Impoundment Construction Report, Valentine Mountain Project", prepared by Peter Peart, P.Eng., Consulting Geotechnical Engineer. Appendix Z of the report contains the results of the pre-construction investigation that were detailed in "Tailings Impoundment Proposal, Valentine Mountain" dated June 1987. The December 1987 construction report is hereinafter referred to as the 1987 Report.

The 1987 Report states that the tailings impoundment was constructed between August and November of 1987. The design required a minimum of 1 m of freeboard for the embankment. The embankment was constructed as a two-zone structure with a geotextile filter separating the rip-rap downstream zone from the sandy till upstream zone. There was a rockcut spillway on the east side of the impoundment and a subdrain system that was monitored together with settlement markers and piezometers. The impoundment was constructed to have a capacity of approximately 10,000 cubic metres. The construction also included a seepage collection pond in order to re-circulate the embankment seepage back into the impoundment.

Field Investigation

The field investigation included four hand-dug test pits. Soft organic silts were encountered near the proposed centreline of the embankment. The soft silts were approximately 1 m deep and covered an area of approximately 35 m^2. The soft silt material was removed. The general subsurface conditions across the site were described as dense sandy tills overlying bedrock. The bedrock characteristics were not logged by means of appropriate drilling and rock coring methods.

Embankment Stability Analysis

Stability of the embankment was evaluated using the computer program STABR and Bishop's Modified method of analysis based on effective stress parameters. The following loading conditions were analysed:

- End of construction;
- Rapid drawdown; and
- Steady state seepage.

The results of stability analyses gave values of factor of safety for slope stability of at least 1.47 (corresponding to the steady seepage scenario and a tailings elevation of 102.0 m). The analyses were based on a friction angle of 2 degrees for the tailings, 37 degrees for the till, and 50 degrees for the rip-rap, with the value of the seismic coefficient being 0.10.

The selection of a friction angle of 50 degrees for the rip-rap warrants review as does the seismic coefficient of 0.10. This seismic coefficient corresponds to the 1 in 100 year earthquake event which in our opinion does not meet the industry standard for design of tailings impoundment facilities. The 1998 BC Building Code recommends a peak horizontal ground acceleration of 0.349g for the 1 in 475 year event; this event is what applies to structures such as the subject tailings impoundment.

There are no records available of the tailings levels within the impoundment.

Construction Materials

Construction materials comprised sandy till and rip-rap rock. The rip-rap that was used for construction of the downstream zone was borrowed from within the impoundment area. The rip-rap rock material was described as a hard to very hard, competent meta-sedimentary material common to the area. The rip-rap design required a maximum 50 cm diameter rock size.

The till borrow area was located about 1.5 km east of the impoundment. The till was described as a clayey silty gravelly sand with a relative density of dense to very dense. The 1987 Report describes the till material as having a 'higher silt content than optimum'. The till was found to be non-plastic. Results of particle size distribution analyses showed the borrowed till as containing gravel, silt and sand contents of 20%, 37% and 42% respectively. Grain size analysis on an as-placed sample (obtained from the borrow area) was described as a well-graded gravelly silty sand with respective percentages of 34%, 31% and 32%. The hydraulic conductivity of the till was reported as 3.05×10^{-8} m/sec corresponding to an effective confining stress of about 70 kPa.

Embankment Construction

The embankment foundation is reported to comprise bedrock and till (used to infill small irregularities on the rock surface). Bedrock protuberances (in the order of 2 – 3 m in height) were left in place while till infilling was carried out in 20 cm layers which were compacted to approximately 95% of Modified Proctor maximum dry density (MPMDD). Loose lifts of 50 cm were placed for construction of the upstream (till) zone whereas lifts of rip-rap did not exceed 1 metre.

The upstream and downstream slopes had both been designed to 1:1.7 (V:H) and were constructed to 1:2 (V:H) and 1:1.5 (V:H) respectively. The dam crest was designed as 4 m wide and constructed as 6 m wide. The maximum height of the dam was designed and constructed to 9m; refer to Plate 2 dated November 1987 which shows the cross section at station 0+45m.

Subdrain Installation

The subdrain comprised 100 mm ABS plastic pipe. The subdrain was installed through the embankment dam at the point of the deepest section at a gradient of approximately 5%. The upstream end of the subdrain was connected to a feeder pipe of filter-cloth-wrapped, 100-mm perforated 'Big O' pipe installed parallel to the upstream toe of the embankment. The feeder pipe had a total length of approximately 20 metres. Construction details of the downstream end of the subdrain included plugging it with a threaded clean-out cap to facilitate sampling of the impoundment seepage. In addition, there was a pressure gauge installed to monitor the hydrostatic head at the toe of the upstream face of the embankment dam. The subdrain pipe was wrapped around with filter fabric to prevent the migration of fines along the subdrain-soil interface.

Compaction Control

Compaction control during construction of the upstream (till) zone was achieved using a nuclear densometer and a test frequency of about one test per 50 m^3 of placed and compacted till. A review of the results shows that the required 95% MPMDD was generally met.

A method specification was used for compaction control of the downstream (rip-rap) zone.

Spillway Construction

The spillway was constructed after the dam was constructed to its full height. The spillway was blasted into solid rock at the east end of the embankment dam and it provides a conduit for flow from the impoundment at a minimum invert angle of 5%.

Seepage Pond

A seepage ditch was constructed along the downstream toe of the embankment dam which connects into the small holding pond. The seepage pond was excavated into native till with a potential for negligible seepage.

Instrumentation Installation & Monitoring

Two 100-mm ABS standpipe piezometers were installed at the foundation level of the rip-rap zone prior to placement of rip-rap. In addition, a 1-cm diameter steel-cased piezometer was installed into the till for monitoring the phreatic surface within the upstream zone of the dam. Further, three settlement monuments were placed along the upstream crest of the dam. The as-constructed Plan Map of Tailings Dam (Sheet #1 dated November 1987) does not show the locations of the above instrumentation. However, the locations of the instrumentation can be seen on the as-constructed cross section (Plate 2 dated November 1987) as well as on the design drawings (Plate 3 dated June 1987).

Initial settlement data were recorded on December 1, 1987, with readings in the range 103.47 – 103.72 m elevation for the three settlement monuments (west, central and east locations). However, no record is available of the base (initial) readings for the piezometers. Furthermore, there is no record available regarding the results of instrumentation (piezometers and settlement markers) monitoring since the initial

readings were taken. We therefore ask that Beaupre Exploration Ltd search their files to confirm whether any instrumentation readings were taken following installation in 1987.

3.0 DECOMMISSIONING & RECLAMATION PLAN

A concept plan for decommissioning and final reclamation of the tailings pond installation will be provided under separate cover.

4.0 CLOSURE

Based on the above review, it is our conclusion that further work is warranted to evaluate the current stability of the tailings impoundment. The key items that require re-evaluation relate to the strength parameters of the till and rip-rap as well as the seismic coefficient used in the slope stability analysis. Therefore, additional slope stability analysis is recommended using the current (1998) BC Code requirements regarding the magnitude of the seismic coefficient. Further, it is important to review the results of instrumentation monitoring following installation in 1987. At this time only the base (initial) readings of the three settlement markers have been made available to us for review. We would need to review the results of instrumentation monitoring if these were recorded and can be made available to us. Failing the availability of instrumentation monitoring results, we would recommend that a set of readings be taken in order to assist with the above-recommended slope stability analysis. The results of instrumentation monitoring will help explain the nature and cause of cracking that was observed along the dam crest during our April 3, 2003 site reconnaissance.

Depending on the results of the above-recommended instrumentation monitoring review and slope stability analysis, it may become necessary to undertake a field investigation program to assess the cause of the cracks along the dam crest. Such a field investigation program would include a drilling, sampling and monitoring program to establish the existing factor of safety and mode of potential instability of the embankment dam.

We trust that this information is sufficient for your requirements at this time. However, should you have any questions regarding the contents of this report or if require any additional information, please contact the undersigned at your convenience.

Yours truly,

JACQUES WHITFORD ENVIRONMENT LIMITED

Reviewed by:

Mahmoud Mahmoud, PhD, P.Eng.
Associate

Nigel Denby, M.Eng., P.Eng.
Manager, Geotechnical Engineering

MM/ND/adg

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

November 30, 2010 File: 19-5858-0

Mill Bay Ventures Inc.
400 – 455 Granville Street
Vancouver, B.C.
V6C 1T1

Attention: Mr. William Glasier, President

VALENTINE MOUNTAIN PROPERTY
PRELIMINARY GEOTECHNICAL EVALUATION OF TAILINGS DAM

Dear Mr. Glasier:

1. INTRODUCTION

As requested, this letter presents the results of a site inspection of the existing tailings facility located on the Valentine Mountain property north of Sooke, B.C. The scope of work for this assignment was outlined in our proposal letter dated October 27, 2010. Written authorization to proceed with the inspection was received on November 4, 2010.

The scope of work included a site visit by a professional engineer to conduct a visual inspection of the embankment. Following the visit we were to review any background information provided on the facility, including design drawings, construction records, and any pertinent operations/surveillance records. Following this review, Thurber would prepare a brief letter providing preliminary recommendations for additional investigation and/or repairs of the facility, if deemed warranted. The inspection and subsequent report was to focus on the identified embankment slump, and would not constitute a formal dam safety review as defined by the Ministry of Environment.

This letter is subject to the attached Statement of General Conditions.

2. THURBER SITE INSPECTION

Jay McIntyre, P.Eng. of Thurber Engineering Ltd. (Thurber) conducted the site inspection on November 16, 2010 along with yourself and others including Messrs Jacques Houle, Robert Beaupre and Andris Kikauka. The weather was overcast and cool at the time of the inspection, although it had rained the previous day.

The following observations were made during the reconnaissance:

- The reservoir was observed to have approximately 1.1 m of freeboard.
- The spillway (excavated into rock beyond the east abutment) was observed to be flowing. A log and some vegetation was observed in the entrance to the spillway. Vegetation and a length of perforated "Big-O" flexible piping was observed in the spillway channel.
- The crest and side slopes of the embankment are heavily vegetated with fir, alder and Scotch Broom. Trees exceeding 6 m height and butt diameters up to 150 mm were noted. The vegetation greatly impeded the inspection of the facility.
- The dam crest varies in width from approximately 5.5 to 6 m. The downstream slope was estimated at approximately 37° to 40°, with occasional steeper sections approaching 45°.
- The exposed portion of the upstream slope was estimated to have a gradient of approximately 30°.
- A slump was observed at the downstream crest near the east abutment. The scarp starts about 10 m away from the east abutment and extends roughly 17 m to the west. It appears that a vertical displacement of up to 600 mm has occurred, and a crack in the rock fill up to 200 mm wide ? was observed.
- The slope length at the scarp location was measured to be approximately 6 m and this equates to an embankment height of about 4.5 m.
- Near the centre of the embankment, the slope length was measured at 13.8 m and this equates to height of approximately 9 m.
- A former logging road runs along the toe of the embankment. No seepage was observed exiting the downstream face of the dam. Nor was any seepage observed in the ditch between the road and the toe of the embankment.
- An apparent opening in the rip rap was observed at the downstream toe of the dam, and this may be the location of a reported clean-out cap, that connects to a "sub-drain" system. The cap was not visible, but the cavity was stuffed with insulation.

Selected photographs are attached for your reference.

3. DOCUMENT REVIEW

Following the site inspection, the following information was provided by Mr. Houle:

- July 17, 2002 letter from Ministry of Energy and Mines titled: "RE: Proposed Amendment of Permit MX-8-21 – Valentine Mountain, Jordan River Area"
- December 23, 2003 letter report from Jacques Whitford titled: "Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC"
- January 12, 2004 letter report from Jacques Whitford titled: "Decommissioning and Reclamation Plan; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC"

In addition to the above, several photographs were provided by Mr. Beaupre showing the tailings dam both during construction in 1987 and reportedly in 2004. Several of these images are attached for your reference.

Thurber has contacted the Ministry of Natural Resource Operations (formerly the Ministry of Mines and Petroleum Resources) to inquire about the availability of construction records for the tailings facility. We understand the ministry has a report titled "Tailings Impoundment Construction Report, Valentine Mountain Project" dated 1987. Thurber has not reviewed the above noted report; however, we understand that Jacques Whitford Environment Limited (JWEL) carried out a review of this report as part of their 2003 geotechnical assessment.

The above noted reports by JWEL were apparently prepared in response to the July 2002 letter from MEM. Prior to authorizing the extraction and processing of a 3,000 tonne sample, the letter required that a geotechnical assessment of the tailings impoundment be prepared by a qualified Professional Engineer and submitted for review by the Chief Inspector. The letter also specified that the assessment should include an acceptable plan for decommissioning and final reclamation of the tailings pond.

The report by JWEL provides a summary of information pertaining to the tailings facility including the original field investigation work, the stability analyses / design criteria, construction materials data, embankment construction summary and details regarding installed instrumentation. The letter also provides a summary of observations made during a site reconnaissance on April 3, 2003. During this inspection, a slump/scarp was observed on the downstream face of the dam near the east embankment.

The following pertinent information was obtained from the December 2003 JWEL report:

- The slump on the downstream slope was present during their April 2003 site reconnaissance.
- The dam was constructed between August and November 1987.
- The design called for a minimum of 1.0 m of freeboard.
- For the stability analyses, the value of the seismic coefficient was selected as 0.1g, which would have been consistent with a 1 in 100 year event.
- The embankment is constructed to two materials. A gravelly, silty sand till material was used in the upstream zone and blast rock was used in the downstream zone. These two materials are separated by a geotextile filter.
- The spillway was constructed by blasting a channel in the bedrock beyond the east abutment.
- The embankment foundation was either bedrock or till (used to in-fill local depressions on the rock surface).
- The till-like soils were compacted in lifts to a target density of 95% of

Modified Proctor Maximum Dry Density (MPMDD). JWEL's review of the compaction data indicates the contractor generally achieved this compaction level.

- The upstream and downstream slopes were both designed to be 1.7H to 1V (30.5°). However, the downstream slope was apparently constructed steeper than this.
- The dam crest was designed to be 4 m wide, but was constructed closer to 6 m wide. The maximum embankment height is approximately 9 m.
- A sub-drain system is present within the dam at the deepest section. The upstream portion was reportedly installed parallel to the upstream toe of the embankment and consists of a 100 mm diameter geotextile-wrapped perforated 'Big-O' pipe. This perforated pipe is connected to a solid section of ABS pipe that passes through the embankment and day-lights at the downstream toe. The downstream end is plugged with a threaded clean-out cap to facilitate sampling of seepage water. The sub-drain pipe was wrapped with a geotextile filter fabric with the intention of preventing the migration of fines along the pipe-soil interface.
- Installed instrumentation included two standpipe piezometers at the foundation level of the downstream rip rap zone and a steel-cased piezometer within the embankment at the upstream (till) zone. Three settlement monuments were also installed on the upstream crest of the embankment. Apart from the baseline readings of the settlement monuments, JWEL was unable to find any other monitoring data, including any piezometer data.

The JWEL report recommended that additional work be carried out to evaluate the stability of the tailings impoundment. The report identifies the seismic coefficient assumed by the designer as one of the key reasons for the proposed "re-evaluation". Additionally, the December 2003 report recommends that a review of any monitoring data be carried out. If this data were not available, it was recommended that new sets of data be collected to assist with the recommended stability assessment. The report states that one of the objectives of the assessment would be to try and evaluate the nature and cause of the cracking observed during the April 2003 site reconnaissance.

4. PRELIMINARY ASSESSMENT AND RECOMMENDATIONS

The primary objective of Thurber's current assignment was to make an inspection of the embankment, evaluate the magnitude of the slump observed on the downstream slope and provide preliminary recommendations for additional investigation work and/or repairs to the facility, if deemed appropriate. The following comments and preliminary recommendations are provided.

- The embankment slopes are steeper than would be normally recommended for an facility of this type, and based on the JWEL report they were constructed steeper than the design called for.
- The slump occurred prior to April 2003 near the east abutment where the embankment is not at full height. The triggering mechanism is unclear, although it appears the downstream slope may be slightly steeper in this area than elsewhere on the dam. It is possible the contractor did not achieve the same level of compaction at the edges of the embankment. This would have been the case if rock fill was pushed loosely over the edge of the crest.
- Although impossible to confirm, the slump may possibly have been triggered by ground motions from the Nisqually Earthquake of February 28, 2001. This magnitude 6.8 earthquake, with an epicenter of 120 km southeast of Victoria, was felt in the Victoria area and caused minor damage at some locations.
- The slump appears to be relatively shallow, and likely does not significantly impact the global stability of the embankment at present. However, continued movements could be detrimental to embankment stability and it is anticipated that some modification of the embankment geometry (e.g., flattening of the downstream slope) will be required.
- As noted in the JWEL report, the seismic coefficient used for the original stability analysis for the embankment was 0.1 g and corresponded to the 1 in 100 year at that time. The seismic code has changed several times since the dam was constructed, and the current code would require that the 1 in 2475 year event be used for the analysis. This would correspond to a peak ground acceleration of 0.51g for the subject site. The impacts of the revised seismic loading on the dam stability needs to be evaluated. Therefore, we are in agreement with the JWEL report which recommends an updated slope stability assessment be conducted.
- In order to provide the most accurate indication of the current embankment stability, and to better predict the dam's performance during an earthquake, the phreatic levels within and below the embankment are needed. We therefore recommend that any existing instrumentation data be utilized for the proposed stability assessment. If such data is unavailable, we recommend that new data sets be collected.
- We also recommend that the existing trees and scotch broom be removed from the crest and embankment slopes. The removed vegetation should be placed well away from the embankment. In addition to making it difficult to properly inspect the facility, the tree roots tend to penetrate the embankment, and can ultimately travel through the embankment thus becoming convenient pathways for seepage. Care should be taken when removing the vegetation not to damage any existing standpipes or survey monuments. If the original instruments cannot be located or have been damaged, new instrumentation will likely be required.
- It is noted that the dam utilizes a geosynthetic filter between the upstream till zone and the downstream rock fill zone. Although the appeal of a geosynthetic filter can be understood given the remote location of the facility,

geotextile filters are generally not favoured in dam design, particularly when the geotextile completely replaces the granular filter (i.e., rather than reducing the thickness of the granular filter zone). Additionally, the presence of a seepage collection system that apparently passes through the upstream till zone into the downstream rock fill zone is concerning, as this pipe would be a convenient flow path that could promote internal erosion of the embankment. Given these design features, a monitoring and surveillance schedule should be established and maintained, to ensure the facility continues to perform as expected.

5. FURTHER WORK

We anticipate the following work will be required. We understand the timeline of the tasks will depend somewhat on the development plans for the resource.

- The site is now inaccessible until the spring. As soon as weather permits the embankment should be cleared of vegetation as described above. Vegetation and any logs or debris should also be removed from the spillway entrance and spillway channel.
- Any instrumentation readings collected since construction should be collated and forwarded to the geotechnical consultant for review. New readings may be required depending on the available records. It is anticipated an updated GPS elevation survey of the embankment and monuments will be required.
- A detailed review of the construction report is required. The Ministry of Natural Resource Operations (MNRO) has a copy at their Victoria office. This information would be used to develop typical design sections and estimate the material strength properties for the stability analysis.
- Conduct the stability analysis, focusing on a number of loading cases including seismic loading.
- Develop a decommissioning and reclamation plan as required by MNRO.

The above assumes there is sufficient as-built information and monitoring data to carry out a representative analysis of the embankment. If not, additional data would need to be collected.

If required, we can prepare a proposal and cost estimate to conduct the recommended work.

We trust this inspection report is satisfactory. Please call if you have any questions or wish to discuss this letter.

Yours truly,
Thurber Engineering Ltd.
Stephen Bean, P.Eng.
Review Principal

Jay McIntyre, P.Eng.
Project Engineer

Attachment

THURBER ENGINEERING LTD.

STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over . . . .)

INTERPRETATION OF THE REPORT *(continued . . . .)*

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

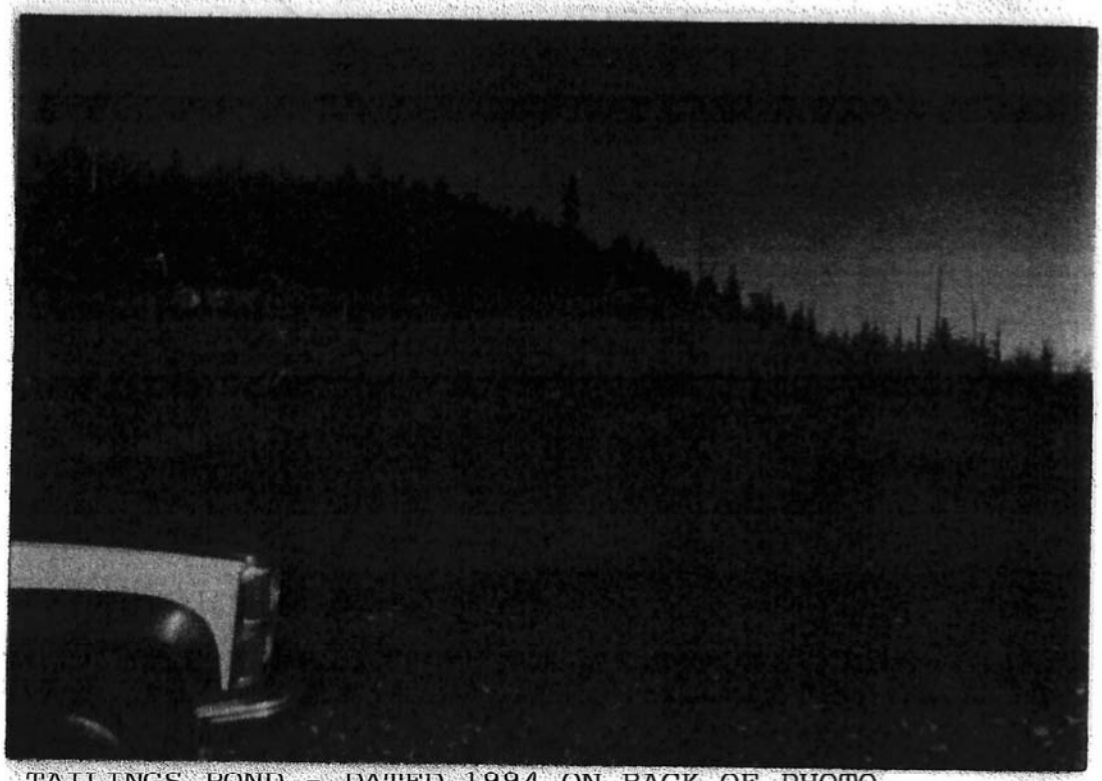
We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

TAILINGS POND CONSTRUCTION - 1987
LOOKING EAST
VALENTINE MOUNTAIN PROPERTY NEAR SOOKE, BC

TAILINGS POND CONSTRUCTION - 1987
LOOKING SOUTH
VALENTINE MOUNTAIN PROPERTY - NEAR SOOKE, BC



TAILINGS POND - DATED 1994 ON BACK OF PHOTO

UNDATED PHOTO OF TAILINGS POND

Photo 1: Looking east at vegetation along crest of dam (Nov. 16, 2010).

Photo 2: Looking west at downstream slope of embankment (Nov. 16, 2010).

Photo 3: Looking northeast at vegetation and flexible pipe at entrance of spillway.

Photo 4: Looking east along downstream crest at failure scarp (Nov. 16, 2010).

Photo 5: Looking up at embankment from toe. Note exposed rock fill that has migrated down slope and collected at base (Nov. 16, 2010).

Photo 6: Apparent opening in rip rap at base of embankment where suspected seepage monitoring port is located (Nov. 16, 2010).

2005 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: J. McIntyre, P.Eng., Thurber Engineering — November 30, 2010

Site Coordinates: 48.5159 North 123.8891 West

User File Reference: Valentine Mountain

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
1.041	0.721	0.358	0.179	0.508

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2005 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.*** Warning: You are in a region which would be affected by the ground motion from a Cascadia subduction event. The interpolator includes consideration of the deterministic ground motions from Cascadia for 0.0021, 0.001 and 0.000404 per annum probabilities, but not for 0.01 per annum.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.263	0.559	0.755
Sa(0.5)	0.175	0.379	0.512
Sa(1.0)	0.085	0.186	0.252
Sa(2.0)	0.040	0.090	0.124
PGA	0.133	0.277	0.370

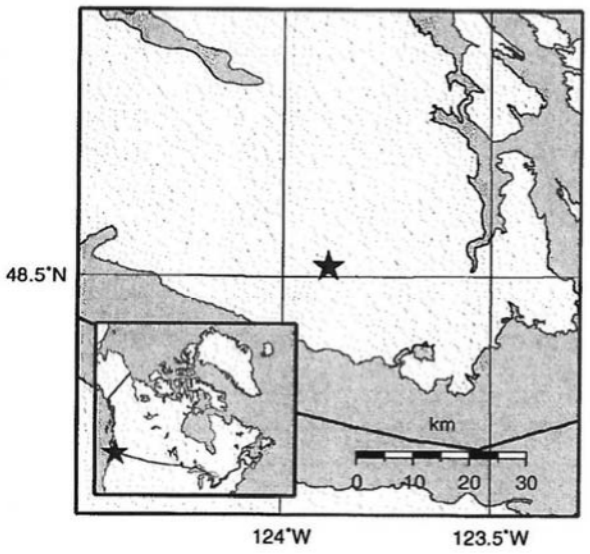
References

National Building Code of Canada 2005 NRCC no. 47666; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2005, Structural Commentaries NRCC no. 48192
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Grid values to be used with the 2005 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information



Aussi disponible en français

Natural Resources Canada — Ressources naturelles Canada

Canada

THURBER

APPENDIX E

THURBER

Photo 1: Valentine Mountain Tailings Dam from west abutment.

Photo 2: Tailings pond from west abutment.

THURBER

Photo 3: Tailings dam seen from east end.

Photo 4: Tension crack at downstream side of crest near east abutment.

Photo 5: Entrance to bedrock spillway prior to vegetation removal.

Photo 6: Spillway channel (Nov. 16, 2010).

Photo 7: Looking north at dam from downstream toe near Sta. 0+30.

Photo 8: Looking northeast at dam from downstream toe. Dam is at full height in this area.

Photo 9: Looking west along downstream toe near Sta. 0+50. No seepage observed.

Photo 10: Looking east along downstream toe near Sta. 0+50. No seepage observed.

Photo 11: Boulders stacked to protect outlet pipe and pressure gauge (October 24, 2014).

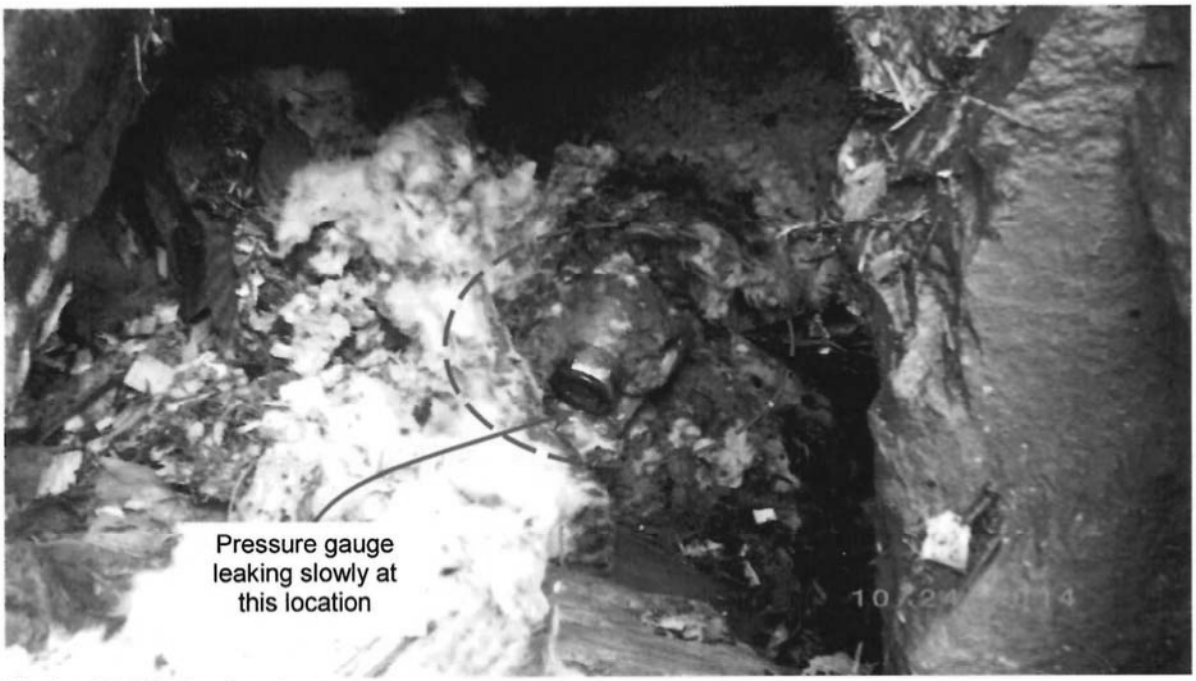


Photo 12: Photo showing pressure gauge.

THURBER

Photo 13: Downstream end of outlet pipe. Note precipitate (October 24, 2014).

Photo 14: Photo of pipe outlet during 2010 inspection (November 16, 2010).

THURBER

Photo 15: Localized wet spot in front of outlet pipe access location (October 24, 2014).

THURBER

APPENDIX F

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: Jay McIntyre, P.Eng., Thurber Engineering Ltd. November 28, 2014

Site Coordinates: 48.5158 North 123.8894 West

User File Reference: Valentine Mountain Mine

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
1.041	0.721	0.358	0.179	0.508

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.*** Warning: You are in a region which considers the hazard from a deterministic Cascadia subduction event for the National Building Code. Values determined for high probabilities (0.01 per annum) in this region do not consider the hazard from this type of earthquake.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.263	0.559	0.755
Sa(0.5)	0.175	0.379	0.512
Sa(1.0)	0.085	0.186	0.252
Sa(2.0)	0.040	0.090	0.124
PGA	0.133	0.277	0.370

References

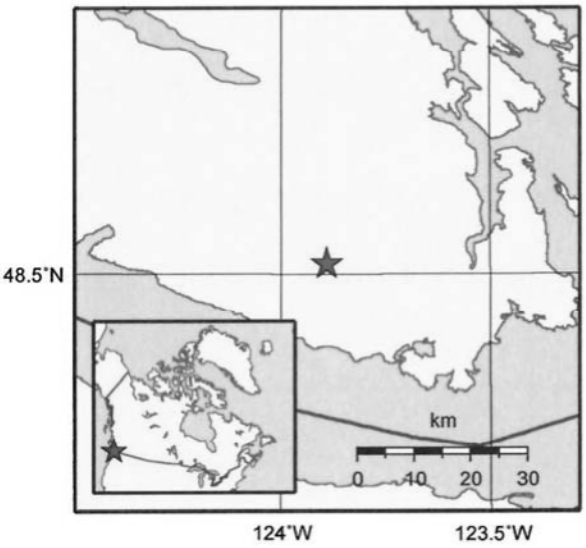
National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

Aussi disponible en français



THURBER

APPENDIX G

TAILINGS POND CONSTRUCTION - FALL 1987
VALENTINE MOUNTAIN PROPERTY - NEAR SOOKE, BC

TAILINGS POND CONSTRUCTION - FALL 1987
VALENTINE MOUNTAIN PROPERTY NEAR SOOKE, BC

DAM FILE
D730227

Baldwin, John FLNR:EX

From: Dunkley, Jim R EMPR:EX
Sent: Monday, May 27, 2019 2:32 PM
To: Baldwin, John FLNR:EX; McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Essentially no.

Great Thunder has appealed the EMPR orders and the appeal sits before the Chief Inspector of Mines.

I have spoken with Jason Carvalho of Couverdon (associated with Mosaic) about where EMPR is at currently.

Jim Dunkley, P. Geo
Senior Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

From: Baldwin, John FLNR:EX
Sent: May 27, 2019 2:25 PM
To: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Cc: Narynski, Heather M EMPR:EX <Heather.Narynski@gov.bc.ca>; Constable, Lowell EMPR:EX <Lowell.Constable@gov.bc.ca>; Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca>; Robinson, David FLNR:EX <David.Robinson@gov.bc.ca>; Johnson, David A FLNR:EX <David.A.Johnson@gov.bc.ca>; Lapcevic, Pat FLNR:EX <Pat.Lapcevic@gov.bc.ca>
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis – is there any update on this file? – John B

From: Baldwin, John FLNR:EX
Sent: Friday, February 1, 2019 11:15 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis – this is a follow up to our conference call today (Feb 1st 2019) regarding next steps on the Valentine structure.

Th: nderstands:

EMPR is working on the Great Thunder appeal of the EMPR November 16th 2018 Mines Act Order which ake same time to complete. Great Thunder Gold Corp (Great Thunder) is appealing on the grounds that not own the Valentine structure.

2. Mosaic (TimberWest - Jason Carvalho) has contacted EMPR requesting information about the Great Thunder appeal – EMPR is still to respond to this Mosaic request.

This office confirms that the BC Water Sustainability Act (WSA) water licence (C072277 on water file 1001142) associated with the Valentine structure held by TimberWest (Mosaic) is still current and identifies TimberWest as the owner of the Valentine structure. Regulation of the works authorized under the WSA still applies.

Due to the fact that the Valentine structure was constructed and maintained under the EMPR Mine Act permit and for **administrative clarity**, this office has supported the EMPR November 16 2018 Mines Act Order to Great Thunder for a risk assessment to be completed on the Valentine Structure. It was understood that TimberWest and Great Thunder were working together to complete the ordered risk assessment. This office understands that Great Thunder has appealed this Order on the grounds that Great Thunder does not own Valentine Structure. s.13
s.13

Please keep this office informed on the appeal.

John Baldwin
Assistant Water Manager

From: Baldwin, John FLNR:EX
Sent: Tuesday, January 29, 2019 2:01 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis – I have contacted Doug Underhill (250-619-6794) at Mosaic (TimberWest and Island Timberland have joined) today regarding the Valentine structure.

Doug will review options within Mosaic for the dam. Mosaic does not want the dam and is prepared to remove the dam. Any mining tailings within the dam reservoir will need to be addressed. Abandoned mining debris/equipment on the site is a concern to the landowner.
Doug will contact Jim Dunkley regarding Energy and Mines' position on the Great Thunder Gold Corp's risk assessment order and ownership of the structure appeal.
Mosiac has not been in contact with Great Thunder since mid December 2018 on this matter.
Doug confirmed that the site is accessible at this time.

This office is prepared to work with Mosaic to remove Valentine Creek Dam under the WSA.

John Baldwin
Dam Safety Officer

From: McPherson, Alexis EMPR:EX
Sent: Friday, January 18, 2019 3:10 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John,

Thank you for participating in the meeting today, and providing the summary and contact below. I will pass Bruce's information on to GTG. I have attached the email correspondence which lists the consultants GTG has contacted and the associated responses for your reference

I'm looking forward to the update on TimberWest's position on this structure in the next week or so.

Best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Friday, January 18, 2019 2:47 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis – this is a follow up to our conference call today regarding Valentine Creek Dam/Valentine Mountain Tailings Storage Facility (structure).

This office understands that Great Thunder Gold Corp (Great Thunder) has appealed the Mines Act Orders issued in November 2018 and has not complete the ordered risk assessment of the structure that was due by November 26th 2018. The appeal is being adjudicated by the Chief Inspector of Mines at this time.

Great Thunder has indicated that they are experiencing difficulties in hiring a qualified engineering company to complete the ordered risk assessment.
This office does not normally recommend engineering companies but in this case will suggest

Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554

Valentine Mountain Gold (mining company) built the structure on TimberWest private land. It is reported that Great Thunder removed the vegetation off the structure and TimberWest placed the rocks at the outlet of the low level pipe in this storage structure in the last few years.

The structure is holding water and tailings material at this time. The structure has two consequence classifications – significant under Mines Act and low under WSA. The difference is the impact of the tailings material in the reservoir if the structure should fail.

Both Great Thunder (current mine permit holder under Mines Act) and TimberWest (current water licence holder under Water Sustainability Act (WSA)) claim that they do not own the structure. The relationship between these companies is unknown to this office. TimberWest did confirm that they were prepared to provide equipment to complete any risk assessment studies, and are in contact with Great Thunder. This office has had no direct contact with Great Thunder on this matter.

There is typical winter weather conditions at the site at this time – full storage with saturated embankments. Access and snow conditions is unknown. This office is concerned about any major investigative digging on or near the structure at this time. Increased monitoring with emergency plan is recommended to allow for conditions to improve before undertaking any major invasive investigations of the structure.

This office will be contacting Doug Underhill and/or Steve Adams (TimberWest staff) regarding TimberWest's current position on this structure.

John Baldwin
Dam Safety Officer

From: McPherson, Alexis EMPR:EX
Sent: Thursday, January 10, 2019 3:43 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John,

EMPR has continued correspondence with Great Thunder since I sent the December 11, 2018 email (below); Great Thunder still indicates they are continuing to search for an engineer to address the immediate order, yet maintains they are not responsible for the tailings facility, and on December 14th they submitted a letter of appeal for all orders to the Chief Inspector. I've attached the letter of appeal for your reference.

We would like to discuss the possible paths forward with yourself and David, next week if it works with your schedules. I'll follow this email up with a meeting invitation.

Thanks and best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Wednesday, December 12, 2018 11:22 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis

FLNRORD Dam Safety has been in contact with TimberWest regarding EMPR's November 16th 2018 Risk Assessment Order to Great Thunder Gold Corp (GTGC) , and understand that TimberWest and GTGC are working together to complete the work required to satisfy the EMPR Order. This office is waiting for a copy of the final GTGC risk assessment report and any remedial work recommendations for the Valentine Mine tailings storage facility/Valentine Creek Dam.

Once the GTGC assessment report has been received then FLNRORD and EMPR staff need to review next steps.

John B

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, December 11, 2018 10:49 AM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX
Subject: FW: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Can you please provide an update re. Valentine Mountain and TimberWest? EMPR has continued correspondence with Great Thunder over the past weeks. Great Thunder indicates that they are continuing to look for an engineer to address

then immediate order yet maintains they are not responsible for the tailings facility. We're working to figure out a path forward and would appreciate an update from FLNRORD.

Thanks and best regards,
Alexis

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, November 20, 2018 12:43 PM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Howe, Diane J EMPR:EX
Subject: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Thank you for the call this morning. I expect will be having additional discussions in the coming days and weeks.

I have attached two documents as follows:

1. 2018 11 14 EMPR Geotechnical Inspection (1)
    - Order for immediate remedial action
    - We will cc both of you on the upcoming inspection reports
2. 2014 DSI cover letter
3. 2014 DSI Report
    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

DAMPLE
D730227.

Baldwin, John FLNR:EX

27 MAY 2019 - requested up date on file John

From: Baldwin, John FLNR:EX
Sent: Friday, February 1, 2019 11:15 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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This office understands:

1. that EMPR is working on the Great Thunder appeal of the EMPR November 16th 2018 Mines Act Order which may take same time to complete. Great Thunder Gold Corp (Great Thunder) is appealing on the grounds that they do not own the Valentine structure.
2. Mosaic (TimberWest - Jason Carvalho) has contacted EMPR requesting information about the Great Thunder appeal – EMPR is still to respond to this Mosaic request.

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To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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Dam Safety Officer

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Sent: Friday, January 18, 2019 3:10 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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Sent: Friday, January 18, 2019 2:47 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
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Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554

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John Baldwin
Dam Safety Officer

From: McPherson, Alexis EMPR:EX
Sent: Thursday, January 10, 2019 3:43 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John,

EMPR has continued correspondence with Great Thunder since I sent the December 11, 2018 email (below); Great Thunder still indicates they are continuing to search for an engineer to address the immediate order, yet maintains they are not responsible for the tailings facility, and on December 14th they submitted a letter of appeal for all orders to the Chief Inspector. I've attached the letter of appeal for your reference.

We would like to discuss the possible paths forward with yourself and David, next week if it works with your schedules. I'll follow this email up with a meeting invitation.

Thanks and best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Wednesday, December 12, 2018 11:22 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis

FLNRORD Dam Safety has been in contact with TimberWest regarding EMPR's November 16th 2018 Risk Assessment Order to Great Thunder Gold Corp (GTGC) , and understand that TimberWest and GTGC are working

together to complete the work required to satisfy the EMPR Order. This office is waiting for a copy of the final GTGC risk assessment report and any remedial work recommendations for the Valentine Mine tailings storage facility/Valentine Creek Dam.

Once the GTGC assessment report has been received then FLNRORD and EMPR staff need to review next steps.

John B

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, December 11, 2018 10:49 AM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX
Subject: FW: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Can you please provide an update re. Valentine Mountain and TimberWest? EMPR has continued correspondence with Great Thunder over the past weeks. Great Thunder indicates that they are continuing to look for an engineer to address then immediate order yet maintains they are not responsible for the tailings facility. We're working to figure out a path forward and would appreciate an update from FLNRORD.

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Alexis

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To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Howe, Diane J EMPR:EX
Subject: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Thank you for the call this morning. I expect will be having additional discussions in the coming days and weeks.

I have attached two documents as follows:

1. 2018 11 14 EMPR Geotechnical Inspection (1)
    - Order for immediate remedial action
    - We will cc both of you on the upcoming inspection reports
2. 2014 DSI cover letter
3. 2014 DSI Report
    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

1 FEB 2019

Conference call with E+M
(Alexis McPherson
- Heather
- Dave Johnson.

- E+M has received an email from JASON CARVALHO@MOSIAC
E+M reply and cc Water (will not discuss entitlement with third party)
- content of email in accordance with E+M - Mosiac want third party info.

- E+M retain an ORDER

- JASON wants a meeting with E+M

FN RORD positive → want fast MINE'S ORDER "to Run out"

no real appeal process → Appealed ORDER + process.
timeline? "as quickly as possible" - ownership of dam?

- E+M believe that Mining company (Great Thunder) own the structure.

E+M waiting for legal. ← E+M in clearing with. Mine's legal to refine ownership

Baldwin, John FLNR:EX

From: McPherson, Alexis EMPR:EX
Sent: Friday, February 1, 2019 9:37 AM
To: Baldwin, John FLNR:EX
Subject: FW: Valentine Mtn

FYI

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, January 30, 2019 9:38 AM
To: Dunkley, Jim R EMPR:EX; Doug Underhill
Cc: McPherson, Alexis EMPR:EX
Subject: RE: Valentine Mtn

Good morning Jim and Alexis,

In speaking with John Baldwin regarding the Valentine Mountain Tailings Facility, we understand that Great Thunder Gold Corp. has responded to the Orders issued by Mines, with the position that they are not the owners of the dam and therefore are not responsible for having it assessed.

Can we please set up a call to discuss whether we are understanding this correctly, and if so, what actions mines may be considering against Great Thunder.

Are you available later today or tomorrow afternoon?

Thanks,

Jason

From: Dunkley, Jim R EMPR:EX [mailto:Jim.Dunkley@gov.bc.ca]
Sent: November 19, 2018 1:15 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>; Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Subject: Valentine Mtn

During our meeting and inspection of the Valentine Mtn. site last week I told you that I would keep you in the loop regarding orders to Great Thunder Gold Corp.(GTGC) resulting from the inspection.

Alexis McPherson has sent GTGC a letter ordering the company to engage a P. Eng. to conduct a risk assessment of the Tailings Storage Facility (TSF) and to prepare an assessment report with recommendations for any remedial work required to mitigate current ongoing risks. A written letter from GTGC committing to address any recommended remedial work is also required. This assessment is to take place no later than November 21, 2018 and the report and commitment letter required by November 26, 2018.

Still to come will be orders requiring a geochemical analysis of the water coming out of the drainpipe as well as the spillway. A geochemical analysis of the tailings will be required next summer when the water level has come down. Clean up of the site will also be required.

I expect that GTGC, through either Kevin Whelan, Jacques Houle, or their consulting engineer will be in contact with TimberWest in order to secure access to the site.

Let me know if you have any questions regarding the above.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

This message is intended only for the individual or organization to which it is addressed. It may contain private, confidential or privileged information which is exempt from disclosure under applicable law. Any use, distribution or copying by anyone other than the intended recipient is prohibited. If you are not the intended recipient, or have received this message in error, please notify me by email, delete this message from your computer and permanently destroy any hard copies. Thank you.

DAM FILE
D730227

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Tuesday, January 29, 2019 2:01 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis – I have contacted Doug Underhill (250-619-6794) at Mosaic (TimberWest and Island Timberland have joined) today regarding the Valentine structure.

Doug will review options within Mosaic for the dam. Mosaic does not want the dam and is prepared to remove the dam. Any mining tailings within the dam reservoir will need to be addressed. Abandoned mining debris/equipment on the site is a concern to the landowner.
Doug will contact Jim Dunkley regarding Energy and Mines' position on the Great Thunder Gold Corp's risk assessment order and ownership of the structure appeal.
Mosiac has not been in contact with Great Thunder since mid December 2018 on this matter.
Doug confirmed that the site is accessible at this time.

This office is prepared to work with Mosaic to remove Valentine Creek Dam under the WSA.

John Baldwin
Dam Safety Officer

From: McPherson, Alexis EMPR:EX
Sent: Friday, January 18, 2019 3:10 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John,

Thank you for participating in the meeting today, and providing the summary and contact below. I will pass Bruce's information on to GTG. I have attached the email correspondence which lists the consultants GTG has contacted and the associated responses for your reference

I'm looking forward to the update on TimberWest's position on this structure in the next week or so.

Best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Friday, January 18, 2019 2:47 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis this is a follow up to our conference call today regarding Valentine Creek Dam/Valentine Mountain Tailings Storage Facility (structure).

This office understands that Great Thunder Gold Corp (Great Thunder) has appealed the Mines Act Orders issued in November 2018 and has not complete the ordered risk assessment of the structure that was due by November 26th 2018. The appeal is being adjudicated by the Chief Inspector of Mines at this time.

Great Thunder has indicated that they are experiencing difficulties in hiring a qualified engineering company to complete the ordered risk assessment.
This office does not normally recommend engineering companies but in this case will suggest

Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554	250-616-1909

Valentine Mountain Gold (mining company) built the structure on TimberWest private land. It is reported that Great Thunder removed the vegetation off the structure and TimberWest placed the rocks at the outlet of the low level pipe in this storage structure in the last few years.

The structure is holding water and tailings material at this time. The structure has two consequence classifications – significant under Mines Act and low under WSA. The difference is the impact of the tailings material in the reservoir if the structure should fail.

Both Great Thunder (current mine permit holder under Mines Act) and TimberWest (current water licence holder under Water Sustainability Act (WSA)) claim that they do not own the structure. The relationship between these companies is unknown to this office. TimberWest did confirm that they were prepared to provide equipment to complete any risk assessment studies, and are in contact with Great Thunder. This office has had no direct contact with Great Thunder on this matter.

There is typical winter weather conditions at the site at this time – full storage with saturated embankments. Access and snow conditions is unknown. This office is concerned about any major investigative digging on or near the structure at this time. Increased monitoring with emergency plan is recommended to allow for conditions to improve before undertaking any major invasive investigations of the structure.

This office will be contacting Doug Underhill and/or Steve Adams (TimberWest staff) regarding TimberWest's current position on this structure.

John Baldwin
Dam Safety Officer

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Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

DAM FILE
D730227

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Wednesday, January 23, 2019 8:45 AM
To: 'Doug Underhill'
Cc: Steve Adams (ádamss@timberwest.com); Robinson, David FLNR:EX
Subject: RE: message

Doug – further to my voice mail on your cell, I would like to review the status of the Valentine Brook Dam with TimberWest. Can you confirm a suitable date and time when you are available? I'm in my office today then away until Tuesday Jan 29th. John B

29 JAN 2019
second email requesting meeting
John S

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Monday, January 21, 2019 3:12 PM
To: Baldwin, John FLNR:EX
Subject: message

Hi John
s.22
Are you available tomorrow morning for a call?
Thanks

Mosaic Forest Management
Timberland Manager for TimberWest and Island Timberlands
Doug Underhill P.Eng RPF | Manager of Hydrology and Terrain
T 250-716-3721 C 250-619-6794 E doug.underhill@TimberWest.com

This message is intended only for the individual or organization to which it is addressed. It may contain private, confidential or privileged information which is exempt from disclosure under applicable law. Any use, distribution or copying by anyone other than the intended recipient is prohibited. If you are not the intended recipient, or have received this message in error, please notify me by email, delete this message from your computer and permanently destroy any hard copies. Thank you.

29 JAN 2019 (250-619-6794.)
- Contacted Doug Underhill.
Timberwest opened up road along toe of dam
- "oozing out" for a number of years.
- Mining company removed vegetation.
- Timber West do not want dam.
opted to remove dam.
- discussed mine tailings in reservoir.
P70

DAM FILE:
D730227.

23 JAN 2019 -
Valentine DAM.
Doug Underhill

250-716-3721 office

→ 250-619-6794 cell

left message

John

Page 258 of 427 to/à Page 260 of 427

Withheld pursuant to/removed as

s.14

Baldwin, John FLNR:EX

Subject:	Valentine Mountain - Follow up discussion re. Orders
Location:	Online Meeting
Start:	Fri 2019-01-18 1:00 PM
End:	Fri 2019-01-18 2:00 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	McPherson, Alexis EMPR:EX
Required Attendees:	Baldwin, John FLNR:EX; Robinson, David FLNR:EX; Constable, Lowell EMPR:EX; Narynski, Heather M EMPR:EX; Dunkley, Jim R EMPR:EX

Join online meeting

https://unite.gov.bc.ca/gov/meet/alexis.mcpherson/RLGW4N7Q

Join by Phone

Local - Victoria: +1 (250) 952-9304

Local - Vancouver: +1 (604) 398-9304

Toll-Free: +1 (888) 952-9304

Find a local number

Conference ID: s.15

Forgot your dial-in PIN? | First online meeting?

JAN 16 2019 - 8:30AM
- TIMBERWEST
— Doug Underwood
— 250-619-6794.
left message

JAN 18 2019 - 12:30 PM
Steve Adams
s.22

Steve called back → - Timberwest did not remove vegetation

left message.

John

Friday - Jan 18/L 2019 1pm
enforce call

① reviewed mine actions re dam.
to date

- company still looking for engineer to complete assessment

- company has appealled mine order

- Timberwest uses Golder engineering ← (working relationship)

work needed
- get assessment completed
- get following repair work if required.

- decommission dam?
- 2014 dam inspection
→ vegetation removed by Mine company.
→ Doug Underhill told contractor (4 months ago) to protect outlet - contractor placed rocks!!

MINE RECORDS → 700 tons of waste - tailings in pond re material processed by Mine

→ who built dam? ✱ construction report - Valentine Mountain Gold (Mine Company)

→ Mine order Appeal ← no timeline - mine waiting for internal legal ←

DAM FILE
- D730227

Great Thunder Gold Corp.

December 14, 2018

BY E-MAIL TO Al.Hoffman@gov.bc.ca

Ministry of Energy, Mines and Petroleum Resources
Mines and Mineral Resources Division
6th Floor, 1810 Blanshard Street
Victoria, BC
V8T 4J1

Attention: Mr. Al Hoffman, Chief Inspector of Mines

Dear Mr. Hoffman:

Re: Valentine Mountain – Appeal of Orders issued under Mines Act and Health, Safety and Reclamation Code for Mines in British Columbia

I write on behalf of Great Thunder Gold Corp. ("Great Thunder") to appeal the Geotechnical and Permitting Orders issued under the Mines Act, dated November 16, 21 and 22, 2018 (the "Orders"), which require Great Thunder to conduct various assessments, work and reports with respect to the Valentine Mountain pond. For ease of reference, the Orders are attached to this letter, as well as our correspondence with your inspectors.

Relief Sought

Great Thunder respectfully requests that you immediately suspend all of the Orders against Great Thunder. While you consider this appeal, Great Thunder respectfully requests that you stay the Orders pending the outcome of your decision.

Basis for Appeal

Below we briefly lay out the basis for this appeal. On your direction regarding the appeal process, we can provide further submissions to support this appeal.

In short, Great Thunder has been adversely affected by the Orders, which should not have been issued to Great Thunder because Great Thunder is not responsible for the Valentine Mountain pond.

Great Thunder Did Not Construct the Valentine Mountain Pond

Great Thunder did not construct the Valentine Mountain pond. The Valentine Mountain pond was constructed long before Great Thunder commenced its exploration at the site. Further, Great Thunder

has never conducted any bulk sampling at the Valentine Mountain site, nor has it ever manipulated or added anything to the Valentine Mountain pond. Put simply, Great Thunder's activities at the Valentine Mountain site have been and are limited to those authorized pursuant to its exploration permit.

Great Thunder's Exploration Permit Does Not Impose Responsibility for the Valentine Mountain Pond
Great Thunder's mine permit authorizes Great Thunder's limited exploration activities at the site, but does not impose any responsibility for the Valentine Mountain pond.

In 2010, Mill Bay Ventures Inc. (Great Thunder's name before 2013), acquired mine permit MX-8-21, which covers the Valentine Mountain exploration project. There are no conditions under the original version of MX-8-21, or in any subsequent amendments, that place any responsibility over the Valentine Mountain pond on the MX-8-21 permit holder. Concurrently, Mill Bay did not accept any responsibility for the Valentine Mountain pond when it acquired the mine permit.

Great Thunder is Not the Subject Land Owner and Great Thunder Does Not Hold the Water Licence
Great Thunder does not own the subject land, nor does Great Thunder hold a water licence for the Valentine Mountain pond. Conversely, TimberWest owns the land and holds the sole water licence issued for the Valentine Mountain pond (i.e. Conditional Water Licence C72277).

Importantly, TimberWest's water licence includes the following conditions:

- "The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan." (h)
- "The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act." (i)
- "The construction of the said works has been completed and the water is being beneficially used." (j)

In addition to owning the subject lands and holding the only water licence for the Valentine Mountain pond, TimberWest is an "owner" under the Dam Safety Regulation. As an "owner" under that Regulation, TimberWest is subject to certain requirements, such as maintaining and exercising reasonable care to avoid the risk of significant harm at the Valentine Mountain pond.

work by TimberWest →

who cleaned off the riprap on dam?

Notably, TimberWest recently dumped boulders on the underdrain system outlet pipe of the Valentine Mountain pond, which created the current conditions identified in the geotechnical inspections associated with the Orders. TimberWest carried out these activities on its own accord, without any involvement of Great Thunder.

← Doug Underhill. 250-619-6794.

10 JAN 2019 - 4:08PM. left message.

16 JAN 2019 - 8:30AM left message.

Closing
In sum, Great Thunder should not be the subject of the Orders.

Great Thunder's mine permit MX-8-21 authorizes Great Thunder's limited exploration efforts, but does not impose responsibility for the Valentine Mountain pond. Further, Great Thunder:

- did not construct, manipulate or add anything to the Valentine Mountain pond;
- has never held any authorization for the Valentine Mountain pond;
- does not and has never owned the land on which the Valentine Mountain pond is located; and

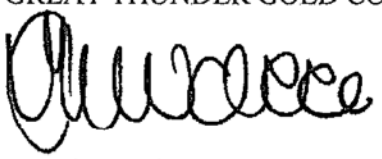
- is not a party responsible for carrying out any repair, maintenance or removal of the Valentine Mountain pond pursuant to the applicable legislation.

As such, Great Thunder respectfully requests that you exercise your powers under section 33 of the Mines Act and immediately suspend the operation of all of the Orders. While you consider this appeal, Great Thunder respectfully requests that you stay the Orders pursuant to your powers under section 33 of the Mines Act.

We appreciate your prompt consideration of this appeal. Please let us know if you require more information or if you have further direction on the process for hearing this appeal.

Yours truly,

GREAT THUNDER GOLD CORP.



per Glen Wallace, MBA, CPA, CGA
Chief Financial Officer

Date: November 16, 2018

To: Kevin Whelan, Mine Manager, Great Thunder Gold Corp.

cc: Al Hoffman, Chief Inspector, EMPR Victoria
Diane Howe, Deputy Chief Inspector, EMPR Victoria
Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria
Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria
Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria
Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria
Dave Caughill, Regional Director, SW Region, EMPR Victoria
Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria
Glen Wallace, Director, Great Thunder Gold Corp.
Jacques Houle, P.Eng., Mineral Exploration Consulting

Re: Order under *Mines Act* Section 15(5) for the Valentine Mountain Tailings Storage Facility

A geotechnical inspection of the Valentine Mountain Tailings Storage Facility (MX-8-21) was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., with the Ministry of Energy and Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

There were two areas of immediate concern identified during the inspection. The first was the rate of discharge for the underdrain system outlet. Photos from the 2014 Dam Safety Inspection (DSI) by Thurber demonstrate a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system discharge flowrate has increased since July 2018. Since the 2014 DSI large boulders were placed over the underdrain system outlet pipe, so the condition of the outlet could not be verified. The second was the spillway. The tailings storage facility pond is estimated to have ~1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation growing in the spillway is reducing capacity.

These areas of concerns were identified in the 2014 DSI[1] text and recommendations, as demonstrated by the following excerpts:

> "Inclusion of the underdrain system is a serious design flaw in our opinion...Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure."
>
> "Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The

[1] "Valentine Mountain Mine – Tailings Disposal Facility – 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber Engineering Ltd.

development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.

"A response plan should be developed to address the possible increase in leakage from the outlet pipe over time."

"Vegetation must not be allowed to become re-established on the dam or along the spillway channel..."

Based on EMPR's recent geotechnical inspection, conditions which were raised as concerns in the 2014 DSI have not been addressed by the Permittee and have worsened since the 2014 DSI report was issued. Please note that EMPR expects all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

EMPR considers these conditions to represent a significant risk, and requires the facility be immediately assessed by a Professional Engineer. EMPR is thereby issuing the following order to take immediate remedial action.

Order 1:
Observation of contravention:
Pursuant to Mines Act Section 15(5)(a):

> *"If an inspector is of the opinion that a delay in remedying a hazard would be dangerous to persons or property, the inspector may issue an order for immediate remedial action."*

Remedial Action/Results to Be Obtained:
The Mine shall engage a Professional Engineer to conduct a risk assessment of the Valentine Mine tailings storage facility and prepare an assessment report containing recommendations for any remedial work required to mitigate the risks and monitoring requirements. The report shall be submitted to the satisfaction of the Chief Inspector and shall be accompanied by a letter of commitment from the Mine Manager to address the recommendations with a proposed schedule. The risk assessment shall include, but not be limited to, the following items of concern:

- *Underdrain system and outlet, and*
- *Spillway.*

Rectify By:
A Professional Engineer shall visit the site by November 21, 2018. The assessment report and accompanying letter of commitment shall be submitted no later than November 26, 2018.

This letter includes the areas of immediate concern identified during the inspection. A complete inspection report will follow.

Please confirm you have received this letter and direct any questions, comments or concerns to Alexis.McPherson@gov.bc.ca.

Regards,

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources

Great Thunder Gold Corp.

November 20, 2018

Ministry of Energy, Mines and Petroleum Resources
Mines and Mineral Resources Division
6th Floor, 1810 Blanshard Street
Victoria, BC
V8T 4J1

BY E-MAIL

Attention: Ms. Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector

Dear Ms. McPherson:

Re: Order under Mines Act Section 15(5)
Valentine Mountain Tailings Storage Facility

I write on behalf of Great Thunder Gold Corp. and to respond to your letter received late in the afternoon on Friday, November 16, 2018.

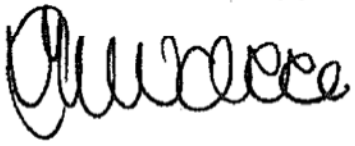
Your letter was the first time Great Thunder was informed of the November 14, 2018 inspection at the Valentine Mountain Tailings Storage Facility. As a matter of courtesy, we would expect the Ministry of Energy, Mines and Petroleum Resources ("EMPR") to notify Great Thunder of the inspection, which we now know was attended by EMPR, TimberWest and Couverdon Real Estate representatives. Great Thunder is also surprised to learn that based on this inspection, EMPR is ordering Great Thunder to have a Professional Engineer visit the site by November 21, 2018 (tomorrow) and prepare an assessment report and accompanying letter of commitment by November 26, 2018. Logistically, there is simply not enough time for Great Thunder to retain and arrange access for a Professional Engineer to attend the site by tomorrow and subsequently prepare an assessment report and letter of commitment by November 26, 2018.

Although Great Thunder is fully committed to complying with its Mines Act permits, Great Thunder needs time to consider its legal obligations and we request that EMPR provide us further information and rationale for issuing the order against Great Thunder. We also understand from Mr. Dunkley's email yesterday that EMPR is considering further orders against Great Thunder. Respectfully, we request that EMPR hold off from issuing these orders until after we have a chance to discuss these matters with you.

I am available for a phone call or an in person meeting at your convenience. Please let me know a time that works for you.

Yours truly,

GREAT THUNDER GOLD CORP.



per Glen Wallace, MBA, CPA, CGA
Chief Financial Officer

BRITISH COLUMBIA

Province of British Columbia

MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES

Report of Inspector of Mines

Geotechnical

(Issued pursuant to Section 15 of the *Mines Act*)

Inspection No.:	**109087**
Mine No.:	**0800265**
Permit No.:	**MX-8-21**
Total Orders:	**1**

Mine Name:	Valentine Mountain
Location:	Sooke, BC
Owner, Manager:	Kevin Whelan, Mine Manager
Company:	Great Thunder Gold Corp.
Address:	900-570 Granville Street Vancouver, BC V6C 3P1
Workers Contacted:	
Type of Mining:	Exploration - Surface (ES)
Date of Inspection:	2018-11-14
Inspector:	Alexis McPherson, M.Sc., P.Eng.,Geotechnical Inspector, EMPR Victoria
Accompanying Inspectors:	Jim Dunkley, P.Geo., Permitting Inspector, SW Region, EMPR Victoria
In Attendance:	Doug Underhill, P.Eng, RPF, Manager, Forest Hydrology and Infrastructure, TimberWest Jason, Carvalho, Couverdon Real Estate
Copies to:	Al Hoffman, Chief Inspector, EMPR Victoria Diane Howe, Deputy Chief Inspector, Reclamation and Permitting, EMPR Victoria Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria Dave Caughill, Regional Director, SW Region, EMPR Victoria Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria John Baldwin, Water Stewardship Officer, Regional Operations Division – Coast Area, FLNRORD David Robinson, Senior Authorizations Specialist – Water, Regional Operations Division – Coast Area, FLNRORD Mark Love, Authorization Section Head – Mining Team, Environmental Protection Division, ENV Glen Wallace, CFO, Great Thunder Gold Corp. Jacques Houle, P.Eng., Mineral Exploration Consulting

The Mine Manager is required to provide a written response within 15 days of receiving the inspection report. The Manager's response must outline the remedial steps taken by a specified date and the work still outstanding. A copy must be provided to the inspector, and in the case of health and safety matters, the occupational health and safety committee and the local union. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

Introduction

A geotechnical inspection of the Valentine Mountain Site was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., Geotechnical Inspector with the Ministry of Energy, Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Mr. Dunkley's report is issued under separate cover. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

Valentine Mountain is an exploration site near Sooke, BC. At least two bulk samples were processed onsite; a ~650 t sample by Valentine Gold in 1988 and a ~65 t sample by Beau Pre in 1998. Geotechnical infrastructure includes a tailings storage facility and bulk sample trenches. The inspection tour included the following locations:

- Tailings Storage Facility (TSF),
- Mill Site, and
- Trenches.

The following documents were referenced as part of the inspection preparation and follow-up:

- "Tailings Impoundment Construction Report – Valentine Mountain Project" dated December 1, 1987 by Peter Peart, P.Eng., Consulting Geotechnical Engineer.
- "Initial Geotechnical Assessment – Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC" dated December 23, 2003 by Jacques Whitford Environmental Consulting Limited (Jacques Whitford).
- "Decommissioning and Reclamation Plan – Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC" dated January 12, 2004 by Jacques Whitford.
- "Valentine Mountain Property – Preliminary Geotechnical Evaluation of Tailings Dam" dated November 30, 2010 Thurber Engineering Ltd. (Thurber).
- "Valentine Mountain Mine – Tailings Disposal Facility – 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber.

At the time of inspection, the weather was overcast, lightly raining and ~10°C. All areas of interest were visible and accessible.

Preamble

The purpose of this inspection was to:

- Assess whether the Mine is meeting the intent of the geotechnical requirements of the Code;
- Assess whether the Mine is meeting the intent of the geotechnical conditions in its Mine Permit;
- Assess whether geotechnical engineering practices at the Mine are generally consistent with accepted practices at mines in British Columbia; and,
- Provide general comment on geotechnical conditions at the mine.

This report is governed by the conditions and limitations set forth in the Mines Act and Code. This report is based on a review of select reports and work areas at the Mine, and cannot practically cover the entire mine site. Professional reliance has been used throughout this inspection.

Please note EMPR expects that all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

This report summarizes EMPR's observations, comments, and recommendations based on the Mine site tour, preliminary review of annual geotechnical reports, and technical discussions with Mine staff. If required, inspection orders have been issued. For ease of reference the Mine Manager is asked to respond in red text in the space provided below each inspection order and information request.

Location: Tailings Storage Facility

The TSF is a side-hill impoundment, consisting of a single embankment. The embankment was constructed to its current elevation in 1987. The embankment has not been raised or otherwise modified since its original construction. The embankment has a maximum height of 9 m, crest width of 6 m, downstream slope of ~1.33H:1V and upstream slope of ~2H:1V. The upstream till zone is separated from the supporting downstream rip rap by a geotextile. Rip rap is located along the upstream embankment face and at the embankment crest, extending 0.5 m above the till. There is an underdrain system within the facility consisting of perforated pipe running parallel to the embankment along the upstream toe, connected to a solid pipe passing through the dam at the maximum dam height. The downstream outlet has a cap and the pipe has a pressure gauge at the downstream side.

The 2014 Dam Safety Inspection (DSI) noted that a leak in the underdrain system pressure gauge developed or increased in flowrate between 2010 and 2014. Photos from the 2014 DSI depict a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system flowrate had increased since July 2018. A photo of the flow during the inspection is included as Photo 2. Boulders had been placed over the underdrain system outlet pipe, so the condition of the outlet and the source of the flows (pressure gauge, end of pipe, and/or area surrounding the pipe) could not be identified (Photo 3).

The TSF is estimated to have ~ 1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation is growing in the spillway (Photo 4).

A slump in the downstream face of the embankment near the left abutment was documented in 2003, 2010, and 2014 (Jacques Whitford, 2003; Thurber, 2010; Thurber, 2014). The slump did not appear to increase in size between 2010 and 2014 (Thurber, 2014). The slump has not been repaired and was visible during the inspection.

An order under *Mines Act* Section 15(5) was issued November 16, 2018 to address concerns related to the underdrain system and outlet, and spillway. The November 16, 2018 order is attached and must be considered along with this inspection report.

Review of EMPR files indicate the mine is out of compliance with numerous Part 10 Code sections, including the following:

- Section 10.1.5 – Engineer of Record
  - An Engineer of Record (EoR) has not be retained.
- Section 10.1.7 – Consequence Classification
  - The EoR has not confirmed the consequence classification.
- Section 10.1.11 – Breach and Inundation Study/Failure Runout Assessment
  - A breach and inundation study has not been completed.
- Section 10.1.13 – Quantifiable Performance Objectives
  - Quantifiable Performance Objectives have not been determined and reviewed by the EoR and TSF Qualified Person (QP).
- Section 10.4.1 – Updated Plans
  - Mine plans, reclamation and closure plans, and water balance and water management plans have not been updated.
- Section 10.4.2 – Governance
  - The Mine Manager has not
- Section 10.4.3 – Register of Tailings Storage Facilities and Dams
  - The Mine Manager has not:
    - Developed and maintained a Tailings Management System,
    - Designated a TSF QP,
    - Established an Independent Tailings Review Board (ITRB),
    - Completed an annual review of the TSF risk assessment,
    - Maintained TSF emergency preparedness and response plans,

- Section 10.4.4 – Annual Reporting
  - The Mine Manager has not submitted the following annual reporting:
    - DSIs completed,
    - Report of ITRB activities, and
    - Summary of TSF and dam safety recommendations, including a scheduled completion date.
- Section 10.5.2 – Operations, Maintenance and Surveillance (OMS) Manual
  - An OMS manual has not been prepared.
- Section 10.5.3 – Annual Dam Safety Inspection
  - A DSI has not been completed since 2014.

Further, EMPR notes several engineering recommendations provided by Jacques Whitford (2003) and Thurber (2010, 2014) relating to geotechnical stability were not completed. As indicated in the preamble, EMPR expects that all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

Order 1:
Observation of Contravention:
The mine is out of compliance with Sections 10.1.5, 10.1.7, 10.1.11, 10.1.13, 10.4.1, 10.4.2, 10.4.3, 10.4.4, 10.5.2, and 10.5.3 of the Code.

Remedial Action/Results To Be Obtained:
The Mine shall prepare and submit a detailed work plan to address the Code requirements to which the Mine is out of compliance. The work plan shall be completed to the satisfaction of the Chief Inspector. The work plan shall include specific activities, deliverables, timelines and milestones to achieve compliance with the Code.

Rectify By: March 31, 2019

Manager Response:

Location: Mill Site

The mill site includes four shelters/containers in various states of disrepair, a small ball mill and milling supplies (i.e. balls). None of the shelters/containers are locked and all are easily accessible. One container contains core boxes, with open core boxes laid out on the ground in front of the container (Photo 5).

Location: Trenches

The trenches are located east of the Mill Site, along an overgrown road. These linear excavations are overgrown and water has accumulated in the low spots (Photo 6). Some iron staining was visible. The tour facilitators indicated the trenches visited were the largest trenches; there are additional, smaller trenches on site which were not inspected.

Closure

Please address the response to Alexis McPherson, Geotechnical Inspector at Alexis.McPherson@gov.bc.ca.

You are reminded that, as per Section 15(6) of the Mines Act, your response is required within 15 days of the days of receiving this report. In addition, Section 30 (1) of the Mines Act requires this Inspection Report to be posted in a conspicuous location at the mine site for 30 days.

Please feel free to contact Alexis McPherson with any questions or comments.

Received by _____ on _____
[Mine Manager Name, Title] [Date]

Signature: _____

Attachment:
2018 11 14 EMPR Geotechnical Inspection (1) – MX-8-21 Valentine Mountain TSF

Photo 1: TSF Pond

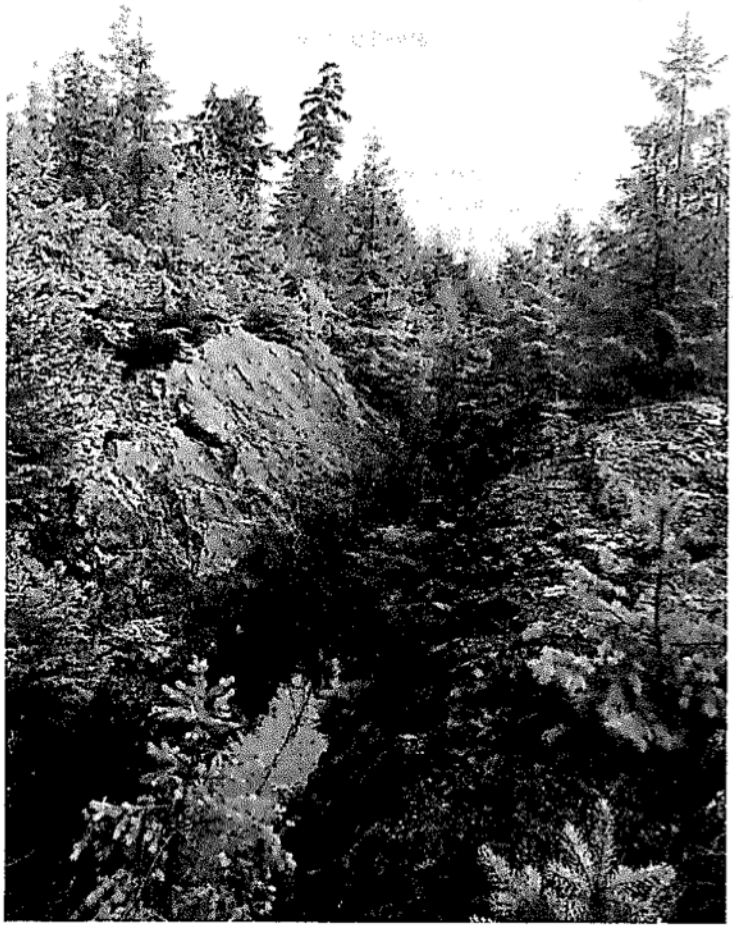
Photo 2: Flow from Underdrain System during the Inspection

Photo 3: Boulders Over the Underdrain System Outlet Pipe

Photo 4: Spillway at Invert

Photo 5: Core Shack and Open Core Boxes

Photo 6: Trench



BRITISH COLUMBIA
Ministry of Energy, Mines and Petroleum Resources

Inspection Number: 108949
File Number:
Permit Number: MX-8-21
Total Orders: 2

Report of Inspector of Mines - Permitting

Issued pursuant to Section 15 of the Mines Act

Mine Name/Number	Valentine Mountain 0800265	**Visit Date**	2018-11-14
Type of Mining	ES. EXPLORATION - SURFACE	**Location**	
Latitude/Longitude	48.51639, -123.88417	**Northing/Easting/Zone**	434706, 5374075, 10U
Manager	Jacques Houle	**Permittee**	Great Thunder Gold Corp.
Phone Numbers	(604) 682 3701	**Address**	900 - 570 Granville Street Vancouver BC V6C 3P1
Email			

Inspector	Jim Dunkley, INSPECTOR	**Accompanying Inspector**	Alexis McPherson, Inspector;
Address	PO Box 9395, STN PROV GOVT Victoria, B.C. V8W 9M9		
In Attendance	Doug Underhill, TimberWest; Jason Carvalho, TimberWest		
Copies to			

The Mine Manager is required to provide a written response within 15 days of receiving the inspection report. The Manager's response must outline the remedial steps taken by a specified date and the work still outstanding. A copy must be provided to the inspector, and in the case of health and safety matters, the occupational health and safety committee and the local union. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

General Observation: The Tailings Storage Facility dam, the structures including the drill core storage C-can, the mill
Latitude/Longitude: **Northing/Easting/Zone:**

There are concerns relating to the TSF dam that are addressed under separate cover. The rest of the site, including the mill and the various structures and trailers, is run down and not serviceable. Site clean up is required.

Order 1 (Inspection Mines): **Status: Open**

Issued Pursuant To: Mines Act Section 15(4)

Permit Conditions:
Section 7d) Processing

Observation of Contravention:

The mill site has a number of structures in disrepair that are required to be removed.

Remedial Action/Results To Be Obtained:

A plan to remove the structures and the remains of the mill shall be submitted to the Inspector by January 25, 2019. This plan will include a hard deadline for when all structures are to be removed, where disposal of structures and the mill will be, as well as a commitment to work with the land owner to co-ordinate land access and industrial road usage for the time period required to remove the debris.

Rectify By/Completion Date: 2019-01-25

Manager Response:

Order 2 (Inspection Mines): **Status: Open**

Issued Pursuant To: Mines Act Section 15(4)

Section 10.4.4, Health, Safety and Reclamation Code for Mines in BC (MA), Annual Reporting

Observation of Contravention:

Water coming from the drain in the TSF appears to be acidic based on the apparent precipitation of iron on the rocks the outflow water flows over. The water from the drainpipe, the constructed outflow channel and the water within the TSF require testing.

Remedial Action/Results To Be Obtained:

10.4.4 (g) states "other information required by the chief inspector." The requirement is for water from the drainpipe, the spillway and the water within the TSF to be sampled and analysis conducted for total and dissolved metals using low level detection, pH, and general ions. Sampling is to be conducted within 15 days: samples are to be sent to an accredited lab for analysis. Copies of the results are to be sent to the

Inspector within 2 business days of their receipt by the permit holder.

Rectify By/Completion Date: 2018-12-07

Manager Response:

Received by _____ on _____

[Mine Manager Name, Title] [Date]

Signature: _____

Great Thunder Gold Corp.

November 26, 2018

Ministry of Energy, Mines and Petroleum Resources
Mines and Mineral Resources Division
6th Floor, 1810 Blanshard Street
Victoria, BC
V8T 4J1

BY E-MAIL

Attention: Ms. Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector

Dear Ms. McPherson:

Re: Order under Mines Act Section 15(5)
Valentine Mountain Tailings Storage Facility

We write in response to your letter and order received on November 16, 2018 and to the geotechnical and permitting inspection reports received on November 22, 2018 and in furtherance to our telephone meeting of November 22, 2018.

As discussed in our meeting and addressed in our letter dated November 21, 2018, Great Thunder Gold Corp. ("Great Thunder") cannot meet the timelines issued under the November 16, 2018 order. We understand from our meeting that the Ministry of Energy, Mines and Petroleum Resources ("EMPR") acknowledges the difficulty posed by these extremely tight timelines, and that EMPR is willing to work with Great Thunder to determine an appropriate schedule for the assessment contemplated under the order. We also understand from our meeting that the priority focus for EMPR is to have an engineer assess the water flowing from the underdrain system outlet. As discussed in the meeting, Great Thunder cannot have an engineer assess this area until we secure access from TimberWest and TimberWest removes the boulders that they placed over the outlet. We understand that TimberWest would like to have Great Thunder's engineer present for the boulder removal. This will of course depend on when TimberWest plans to do this work and whether Great Thunder can find and retain an appropriate engineer in time. In that regard, Great Thunder has already contacted a few engineers to see if they have the requisite expertise and capacity to conduct an assessment of the underdrain system and is now waiting to hear back about their schedules. We expect to have more information regarding timing today or in the coming days. In the interim, please confirm that the dates contemplated under the November 16, 2018 order are

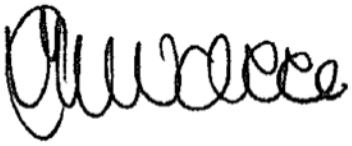
under review pending the above and that Great Thunder will not be deemed non-compliant for not meeting the November 26, 2018 deadline (the original deadline for Great Thunder to submit the assessment report and accompanying letter of commitment).

As indicated above, given EMPR's immediate concerns regarding the underdrain system outlet, Great Thunder is committed to conducting the above noted assessment on a good faith basis. This, however, cannot be taken as an acknowledgment by Great Thunder that Great Thunder holds primary or any responsibility for the dam or tailings facility. As indicated in the meeting, we remain concerned regarding EMPR's expectations of Great Thunder pursuant to its exploration permit MX-8-21. Prior to making any further commitments to undertake work at the dam or tailings facility, Great Thunder requests EMPR provide its position and support thereof regarding Great Thunder's responsibilities under its exploration permit and the interplay between that permit, TimberWest's Conditional Water Licence C72277 and any other authorization obtained for the actual construction of the dam and tailings facility (if any). As EMPR is aware, Great Thunder's involvement with the site began in 2008 and has been limited to very minor exploration activities. At no time did Great Thunder use, add to or manipulate the dam or tailings facility in any way. Accordingly, Great Thunder would appreciate some clarity from EMPR as to who is responsible for the various past, current and future activities involving the dam and tailings facility. Until this threshold issue is resolved, Great Thunder requests that EMPR confirm in writing that it will place the less immediate requirements under the orders on hold.

We appreciate your consideration of the above.

Yours truly,

GREAT THUNDER GOLD CORP.



per Glen Wallace, MBA, CPA, CGA
Chief Financial Officer

glen@wallace.pro

From: Glen Wallace <glen@wallace.pro>
Sent: Friday November 30, 2018 9:26 AM
To: 'McPherson, Alexis EMPR:EX'
Cc: Kevin Whelan s.22
Subject: RE: EMPR_InspectionReport_108949.pdf

Follow Up Flag: Copied to Worldox (Client Files\GTG\CLAIMS-VMORD\00024624.MSG)

Alexis:

Thank you for your emails. We continue to look for an engineer to attend the site to assess the underdrain system to address EMPR's immediate concerns at the site. To date, we have contacted four engineers, three of whom (including Thurber Engineering) have stated that they will not or cannot do the work under the deadlines. One is reviewing the various reports and we expect to hear early next week whether they can assist. In addition, we have reached out to two other engineers. We will continue to update you regarding our search.

As a general comment, your responses from your email of 3:39 p.m. Wednesday (below) do not satisfy our inquiries and we would appreciate further consideration of our November 26, 2018 letter given the scope and deadlines imposed in EMPR's orders.

More specifically, in response to items #2, 3 and 4 (below), Jim Dunkley provided only one letter since our last meeting. That February 11, 2010 letter does not address our concerns. That letter simply states that Great Thunder "... is responsible for all milling equipment, etc. located on the said tenure [506801]." This does not address who is responsible for the separate dam and tailings facility located on tenures 549331 and 549333, nor does it clarify EMPR's position regarding Great Thunder's responsibilities under its exploration permit. Further, it does not respond to our request for EMPR's position regarding the interplay between Great Thunder's exploration permit, TimberWest's water licence and any other authorization issued for the actual construction of the dam and tailings facility.

As you know, TimberWest holds the water licence, which authorized the construction of the dam and reservoir and required TimberWest to maintain same. TimberWest is also the land owner. Both of these facts make TimberWest an "owner" under the Dam Safety Regulations, which makes TimberWest subject to the requirements of an "owner" thereunder including the maintenance and exercise of reasonable care to avoid the risk of significant harm. Of course, part of these responsibilities includes removing the boulders that were placed on the underdrain system by TimberWest. In this regard, we trust that you are in constant contact with FLNRO with respect to these matters that fall within FLNRO's jurisdiction. Accordingly, we would appreciate an update with regards to the FLNRO/EMPR coordinated approach to the site, which would help to clarify our inquiries.

We would appreciate a prompt response to the aforementioned and our November 26, 2018 letter given the scope and deadlines imposed in EMPR's orders.

Regards.

From: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Sent: November 29, 2018 3:08 PM
To: 'Glen Wallace' <glen@wallace.pro>
Subject: FW: EMPR_InspectionReport_108949.pdf

Hello Glen,

Can you please provide an update re. your search for an engineer?

And can you send over your phone number? I searched quickly through our correspondence and am unable to locate it.

Thanks,
Alexis

From: McPherson, Alexis EMPR:FX
Sent: Wednesday, November 28, 2018 3:39 PM
To: 'Glen Wallace'; Dunkley, Jim R EMPR:EX
Cc: Kevin Whelan; Constable, Lowell EMPR:EX
Subject: RE: EMPR_InspectionReport_108949.pdf

Hello Glen,

Thank you for your email.

Please note the boulders do not have to be relocated by TimberWest; Great Thunder Gold can retain a contractor to complete this work if the engineer would like the boulders removed as part of the risk assessment.

I have included a summary of the issues raised in your November 26, 2018 below to outline what has and a has not been addressed. Please provide additions/clarification as required in green text.

1. "please confirm the dates contemplated under the November 16, 2018 order are under review pending the above and that Great Thunder will not be deemed non-compliant for not meeting the November 26, 2018 deadline (the original deadline for Great Thunder to submit the assessment report and accompanying letter of commitment)"

   EMPR acknowledges that Great Thunder is working to retain an engineer and has not been able to meet the deadlines outlined in the order. While I cannot rescind or change the order, I do not anticipate taking further action to escalate the order as you continue to search for an engineer.

2. "Prior to making any further commitments to undertake work at the dam or tailings facility, Great Thunder requests EMPR provide its position and support thereof regarding Great Thunder's responsibilities under its exploration permit and the interplay between that permit, TimberWest's Conditional Water Licence C72277 and any other authorization obtained for the actual construction of the dam and tailings facility (if any)."

   Jim Dunkely has provided a number of documents since our meeting last week; do these documents address your concerns or is further follow-up required?

3. "Great Thunder would appreciate some clarity from EMPR as to who is responsible for the various past, current and future activities involving the dam and tailings facility."

   Jim Dunkely has provided a number of documents since our meeting last week; do these documents address your concerns or is further follow-up required?

4. "Until this threshold issue is resolved, Great Thunder requests that EMPR confirm in writing that it will place the less immediate requirements under the orders on hold."

We cannot place the orders on hold. EMPR will continue to work with Great Thunder to provide supporting documentation as required.

Regards,
Alexis

From: Glen Wallace [mailto:glen@wallace.pro]
Sent: Tuesday, November 27, 2018 5:18 PM
To: McPherson, Alexis EMPR:EX; Dunkley, Jim R EMPR:EX
Cc: Kevin Whelan
Subject: RE: EMPR_InspectionReport_108949.pdf

Alexis and Jim:

We're at a standstill with TimberWest because of their requirement that our engineer be present for the removal of the boulders that TimberWest themselves placed over the underdrain system outlet pipe. Obviously, our engineer cannot inspect the system with the boulders in place and TimberWest's availability is now weather-dependent. We would note that an engineer's presence is not a pre-condition – or an EMPR condition – to TimberWest removing their boulders.

We have contacted several engineers so far without success: Either they're too busy at this time of the year to commit or they're not prepared to take on the project. We're now reaching out to our other business contacts for possible referrals. We still fully intend to fulfill our commitment to carry out the assessment.

Can you offer some direction?

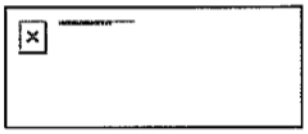
We are increasing concerned about the deadlines imposed under your orders and we'd appreciate knowing when we can expect a response to the issues we raised in our November 26 letter.

Thanks.

From: Doug Underhill <Doug.Underhill@TimberWest.com>
Sent: November 27, 2018 9:17 AM
To: Glen Wallace <glen@wallace.pro>
Cc: Kevin Whelan s.22 ; 'McPherson, Alexis EMPR:EX' <Alexis.McPherson@gov.bc.ca>; 'Constable, Lowell EMPR:EX' <Lowell.Constable@gov.bc.ca>; 'Dunkley, Jim R EMPR:EX' <Jim.Dunkley@gov.bc.ca>; Jason Carvalho <jason.carvalho@couverdon.com>
Subject: RE: EMPR_InspectionReport_108949.pdf

Hi Glen
We don't want to do anything without your representative onsite. The weather forecast looks favorable into next week so let me know when you have arranged for someone to meet us onsite.
Thanks

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com



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@TimberWest

TimberWest.com/news

From: Glen Wallace [mailto:glen@wallace.pro]
Sent: November 26, 2018 1:41 PM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Kevin Whelan s.22 ; 'McPherson, Alexis EMPR:EX' <Alexis.McPherson@gov.bc.ca>; 'Constable, Lowell EMPR:EX' <Lowell.Constable@gov.bc.ca>; 'Dunkley, Jim R EMPR:EX' <Jim.Dunkley@gov.bc.ca>
Subject: RE: EMPR_InspectionReport_108949.pdf

Doug:

I wanted to reach out to you as early in the week as possible, but it is seeming unlikely we'll be able to get an engineer on site before your roadbuilding contractor leaves on Friday. We've been in contact with three engineers so far and we're contacting a fourth, but so far none can meet your contractor's timeline.

Please instruct your contractor to carefully remove his boulders from the underdrain system outlet pipe before he leaves and kindly confirm when it has been done. If by chance we can arrange for an engineer to attend in time, we'll be in contact.

Thanks.

Glen Wallace, MBA, CPA, CGA
Chief Financial Officer
Great Thunder Gold Corp.

From: Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca>
Sent: November 23, 2018 1:42 PM
To: 'Glen Wallace' <glen@wallace.pro>
Cc: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>; Kevin Whelan <s.22
'doug.underhill@timberwest.com' <doug.underhill@timberwest.com>; Constable, Lowell EMPR:EX <Lowell.Constable@gov.bc.ca>
Subject: RE: EMPR_InspectionReport_108949.pdf

Hi Glen,

TimberWest feels that given the elevation, the work needs to be completed by Nov.30. I expect that their contractor may be pulling out after that.

I don't have a contact for the contractor but the TW contact is Doug Underhill who is copied on this email. TW also states that they would like 2 days' notice to coordinate the excavator being on site.

Jim

From: Glen Wallace [mailto:glen@wallace.pro]
Sent: Friday, November 23, 2018 12:17 PM
To: Dunkley, Jim R EMPR:EX
Cc: McPherson, Alexis EMPR:EX; Kevin Whelan
Subject: RE: EMPR_InspectionReport_108949.pdf

Thanks Jim.

We are considering TimberWest's request. When you speak with TimberWest, would you kindly clarify if they are available on fairly short notice to do the work to coincide with our engineer's schedule? If not, please ask TimberWest to give us several specific dates and times to choose from. Also, the contact information for their contractor would be helpful so the engineer and contractor can coordinate the final details.

Regards.

From: Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca>
Sent: November 23, 2018 11:19 AM
To: 'kcwhelan@shaw.ca' s.22 ; 'glen@wallace.pro' <glen@wallace.pro>
Cc: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Subject: RE: EMPR_InspectionReport_108949.pdf

Attached is the letter from Mill Bay Ventures that I missed attaching yesterday. Thanks Glen.

I have spoken with Doug Underhill of TimberWest about removing the boulders around the pipe so that the pipe and outflow can be properly assessed. He agreed to have this done but wants it done under the supervision of the consulting engineer. This is a reasonable request on his part. He is going to speak with TimberWest's contractor in the area to find out how long they plan to be working in the vicinity. Alexis or I will let you know as soon as I have that information (I will be out of the office next week.)

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

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Great Thunder Gold Corp.

December 5, 2018

Ministry of Energy, Mines and Petroleum Resources
Mines and Mineral Resources Division
6th Floor, 1810 Blanshard Street
Victoria, BC
V8T 4J1

BY E-MAIL

Attention: Ms. Alexis McPherson, Geotechnical Inspector
and Mr. Jim Dunkley, Permitting Inspector

Dear Ms. McPherson and Mr. Dunkley:

Re: Orders under Mines Act and Health, Safety and Reclamation Code for Mines
Valentine Mountain

We acknowledge receipt on November 22, 2018 of your Reports of Inspector of Mines dated November 14, 2018. Following is our response, as required:

Report of Inspector of Mines – Permitting
Order 1: Removal of Mill Site Equipment
We have attached a Mill Site Remediation Plan prepared by Mr. John Moraal, P.Eng., a principal of LamSar Engineers & Contractors and a director of Great Thunder Gold Corp. (the "Company"). Mr. Moraal's plan proposes removal of the mill equipment by May 31, 2019, demolition and removal of the wooden storage shed and debris by November 29, 2019 and final site clean-up by December 6, 2019. As you are aware, we are constrained by winter weather at that elevation and summer fire closures.

Report of Inspector of Mines – Permitting
Order 2: Tailings Facility Water Sampling
We understand from our November 22, 2018 telephone meeting that the Ministry of Energy, Mines and Petroleum Resources ("EMPR") acknowledges the difficulty posed by the tight timeline set out in the order, and that EMPR is willing to work with us to determine an appropriate schedule for the assessment contemplated under the order.

We also understand from our meeting that the priority focus for EMPR is to have an engineer assess the water flowing from the underdrain system outlet and that EMPR does not anticipate taking further action to escalate your orders as we search for an engineer qualified to evaluate the underdrain system.

Report of Inspector of Mines – Geotechnical
Order 1: Tailings Storage Facility Compliance
We acknowledge EMPR's order to prepare and submit a detailed work plan by March 31, 2019 to address the deficiencies identified relating to the tailings storage facility.

In our November 30, 2018 e-mail to Ms. McPherson, we summarized our progress on our search for an engineer qualified to assess the underdrain system outlet. As a further update, we advise that we have now contacted eight engineers on Vancouver Island and in Vancouver: four of whom have declined due to full schedules or because they are not qualified; one is still reviewing our materials; one indicated he is too busy but promised to speak with us tomorrow; and two have yet to return our e-mails and calls.

Report of Inspector of Mines – Geotechnical
Order 1: Mill Site Compliance
We acknowledge EMPR's order to prepare and submit a detailed work plan by March 31, 2019 to address the deficiencies identified relating to the Mill Site.

Thank you for bringing to our attention the condition of the storage shed and container on site. It appears that the site was vandalized since our last site inspection and clean-up on June 29, 2018. We have attached a photograph from that site inspection; all structures were securely locked on departure. As this is private property, the Company cannot control access and has only a limited ability to prevent vandalism.

In any event, we believe the Mill Site Remediation Plan referred to above addresses these concerns.

Report of Inspector of Mines – Geotechnical
Order 1: Trench Compliance
We acknowledge EMPR's order to prepare and submit a detailed work plan by March 31, 2019 to address the deficiencies identified relating to the trench.

The Mill Site Remediation Plan referred to above addresses these concerns.

November 16, 2018 Order – Geotechnical
Order 1: Assessment Report of the Tailings Storage Facility
We understand from the Report of Inspector Mines – Geotechnical dated November 14, 2018 and received by the Company on November 22, 2018, that the November 16, 2018 order issued by Ms. McPherson must also be considered along with said Report of Inspector Mines. As indicated above, we understand from our November 22, 2018 telephone meeting that EMPR acknowledges

the difficulty posed by the tight timeline set out in the order, and that EMPR is willing to work with us to determine an appropriate schedule for the assessment contemplated under the order.

Again we confirm that the priority focus for EMPR is to have an engineer assess the water flowing from the underdrain system outlet and that EMPR does not anticipate taking further action to escalate your orders as we search for an engineer qualified to evaluate the underdrain system. We also summarized above our progress on our search for an engineer qualified to assess the underdrain system outlet.

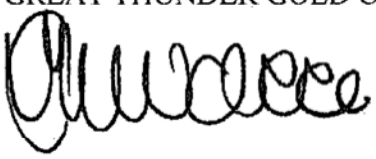
We will continue to update you on our search for engineers to conduct this work.

Closing
As a final comment, we would appreciate a response to our November 26, 2018 letter and November 30, 2018 follow up email to Ms. McPherson as it relates to the Company's overall responsibilities under its exploration permit MX-8-21.

We trust this is the information you require; however, if you have any questions or require additional information, please do not hesitate to contact us.

Yours truly,

GREAT THUNDER GOLD CORP.



per Glen Wallace, MBA, CPA, CGA
Chief Financial Officer

Great Thunder Gold Corp.

(the "Company")

Valentine Mountain Mill Site Remediation Plan

December 5, 2018

Scope:

The Company's scope of work will include salvage of the Jaw Crusher and Ball Mill, dismantling of the process train, inspection of components, and demolition and scrapping inessential equipment. Salvaged equipment will be stored at 2532 Sooke River Road and scrapped equipment will be transported to the nearest recycling facility.

The existing shipping container will be cleaned, securely locked and will remain on-site in support of the Company's exploration activities.

The wooden storage shed will be dismantled and it and the debris left by vandals will be disposed of at an approved landfill.

Schedule:

The salvage of equipment will be completed by May 31, 2019. Demolition and removal of remaining items will be completed by November 29, 2019. The mill site general clean-up will be completed by December 6, 2019.

Land Owner Coordination:

The landowner will be notified six weeks prior to the start of work to confirm access. The Company will require four weeks' notice if the proposed dates are unacceptable to the landowner. There are no special requirements for road usage as vehicle gross vehicle weight will not exceed 3,000 kg.

glen@wallace.pro

From: glen@wallace.pro
Sent: Monday December 10, 2018 12:57 PM
To: 'Dunkley, Jim R EMPR:EX'
Cc: 'Constable, Lowell EMPR:EX'; 'McPherson, Alexis EMPR:EX'; s.22
Subject: RE: EMPR_InspectionReport_108949.pdf

Thank you for your Friday email, Jim.

Respectfully, your email contains errors and does not support EMPR's position that Great Thunder is responsible for the tailings pond. First, you referred to "activities ... detailed in the Notice of Work dated July 1, 2002" as a source for imposing liability on Great Thunder through MBV. That Notice of Work, however, was about proposed activities (as you acknowledge later in your email). Importantly, you overlooked that those proposed activities were never in fact conducted (as confirmed by our geologist who has been involved with the Valentine Mine project since 2003). As such, the Notice of Work was merely about a proposal that never took place and thus has no effect in the circumstances.

Second, your conclusion that Great Thunder is responsible for the tailings pond is premised on the mistaken fact that tailings from that proposed bulk sampling were deposited in the tailings pond. As indicated above, that proposal never took place. In fact, Great Thunder has never conducted any bulk sampling at the mine and has never deposited any materials or waste water in the tailings pond. As previously indicated to EMPR, since it acquired the claims in 2008, Great Thunder's work at Valentine Mountain has been limited to three small drilling programs between 2009 and 2011 totalling 21 holes and 3,783 metres on mineral tenure 506801, and soil geochemistry sampling and prospecting across the 25-claim parcel. Put simply, Great Thunder has never conducted any activities related to the tailings pond nor has it ever accepted responsibility for the tailings pond.

We are surprised that after repeated requests, your last email and attachments, and February 11, 2010 letter you sent are the extent of the support for EMPR's position. In contrast, and with all respect, you overlook the clear importance of BC legislation – the Water Sustainability Act and the Dam Safety Regulation – which expressly places responsibility for dam safety on, as in this case, the holder of the applicable water licence and on the owner of the land. That licensee/landowner is TimberWest. Your documents do not show any efforts by EMPR to ensure that FLNRO, the regulator under that legislation, has taken the requisite steps to compel TimberWest to take appropriate actions.

If you have additional information supporting your position, kindly send it to us at your earliest convenience.

Regards,

Glen

From: Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca>
Sent: Friday December 7, 2018 3:05 PM
To: 'Glen Wallace' <glen@wallace.pro>
Cc: Constable, Lowell EMPR:EX <Lowell.Constable@gov.bc.ca>; McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Subject: RE: EMPR_InspectionReport_108949.pdf

Hello Glen,

Further to your claim that GTG does not have responsibility for the tailings facility, see the attached permit issued to MBV in 2010. The permit cover letter clearly states that the activities are those detailed in the Notice of Work dated July 1, 2002. That NoW is attached. The NoW states that tailings from the proposed bulk sample will be sent to the pond (tailings facility). Permit condition 4 d) states that test pit and mill area drainage shall go to the tailings facility. Permit condition 8 a) relates to under what conditions the tailings facility is to be used for the disposal of tailings.

It is the Ministry's position that the tailings facility is clearly the responsibility of GTG through its predecessor MBV.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

From: McPherson, Alexis EMPR:EX
Sent: Wednesday, December 5, 2018 12:56 PM
To: 'Glen Wallace'
Cc: Dunkley, Jim R EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: EMPR_InspectionReport_108949.pdf

Hello Glen,

Can you please provide an update re. your search for an engineer? And please send over your phone number.

I have forwarded your email below to Jim Dunkley to respond to your permitting questions.

Thanks,
Alexis

From: Glen Wallace [mailto:glen@wallace.pro]
Sent: Friday, November 30, 2018 9:26 AM
To: McPherson, Alexis EMPR:EX
Cc: Kevin Whelan
Subject: RE: EMPR_InspectionReport_108949.pdf

Alexis:

Thank you for your emails. We continue to look for an engineer to attend the site to assess the underdrain system to address EMPR's immediate concerns at the site. To date, we have contacted four engineers, three of whom (including Thurber Engineering) have stated that they will not or cannot do the work under the deadlines. One is reviewing the various reports and we expect to hear early next week whether they can assist. In addition, we have reached out to two other engineers. We will continue to update you regarding our search.

As a general comment, your responses from your email of 3:39 p.m. Wednesday (below) do not satisfy our inquiries and we would appreciate further consideration of our November 26, 2018 letter given the scope and deadlines imposed in EMPR's orders.

Baldwin, John FLNR:EX

From: McPherson, Alexis EMPR:EX
Sent: Thursday, January 10, 2019 3:43 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI
Attachments: Letter to Ministry of Energy Mines and Petroleum Resources - 2018.12.14 ....pdf

Hello John,

EMPR has continued correspondence with Great Thunder since I sent the December 11, 2018 email (below); Great Thunder still indicates they are continuing to search for an engineer to address the immediate order, yet maintains they are not responsible for the tailings facility, and on December 14th they submitted a letter of appeal for all orders to the Chief Inspector. I've attached the letter of appeal for your reference.

We would like to discuss the possible paths forward with yourself and David, next week if it works with your schedules. I'll follow this email up with a meeting invitation.

Thanks and best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Wednesday, December 12, 2018 11:22 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis

FLNRORD Dam Safety has been in contact with TimberWest regarding EMPR's November 16th 2018 Risk Assessment Order to Great Thunder Gold Corp (GTGC) , and understand that TimberWest and GTGC are working together to complete the work required to satisfy the EMPR Order. This office is waiting for a copy of the final GTGC risk assessment report and any remedial work recommendations for the Valentine Mine tailings storage facility/Valentine Creek Dam.

Once the GTGC assessment report has been received then FLNRORD and EMPR staff need to review next steps.

John B

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, December 11, 2018 10:49 AM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX
Subject: FW: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Can you please provide an update re. Valentine Mountain and TimberWest? EMPR has continued correspondence with Great Thunder over the past weeks. Great Thunder indicates that they are continuing to look for an engineer to address then immediate order yet maintains they are not responsible for the tailings facility. We're working to figure out a path forward and would appreciate an update from FLNRORD.

Thanks and best regards,
Alexis

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, November 20, 2018 12:43 PM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Howe, Diane J EMPR:EX
Subject: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Thank you for the call this morning. I expect will be having additional discussions in the coming days and weeks.

I have attached two documents as follows:

1. 2018 11 14 EMPR Geotechnical Inspection (1)
    - Order for immediate remedial action
    - We will cc both of you on the upcoming inspection reports
2. 2014 DSI cover letter
3. 2014 DSI Report
    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

- mid December 2010 contact with Mining Company re risk assessment.

- access to site at this time.

- Action - Doug to contact
  ① Jasa Timberwest (property)
  ② Miles (Jim) - who owns dam.
  - stop order to Mine company

DAM FILE
D730227.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Wednesday, December 12, 2018 11:22 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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Once the GTGC assessment report has been received then FLNRORD and EMPR staff need to review next steps.

John B

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Sent: Tuesday, December 11, 2018 10:49 AM
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Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX
Subject: FW: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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Thanks and best regards,
Alexis

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Sent: Tuesday, November 20, 2018 12:43 PM
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Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Howe, Diane J EMPR:EX
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    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Tuesday, December 11, 2018 5:20 PM
To: Robinson, David FLNR:EX
Subject: RE: update on Valentine Mountain

Dave – further to our discussion on this matter today, I suggest the following reply to EMPR:

s.13

Additions etc are welcome.
John B

From: Robinson, David FLNR:EX
Sent: Tuesday, December 11, 2018 2:30 PM
To: Baldwin, John FLNR:EX
Subject: RE: update on Valentine Mountain

Thanks John,

Here to discuss when you are able.

David Robinson
Senior Authorizations Specialist – Water
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: 250-751-7028

From: Baldwin, John FLNR:EX
Sent: Tuesday, December 11, 2018 2:09 PM
To: Robinson, David FLNR:EX
Subject: RE: update on Valentine Mountain

Dave – further to my voice mail today and the Mines e-mail regrading Valentine Creek Dam update. My understanding was that the two "permit" holders are working together on the dam safety issues (ie complete inspection work ordered by Mines). The WSA Dam Safety Regulation Section 16 requires acceptance of "invasive investigation" (ie drilling, excavating, trenching test pits in dam) plan by Dam Safety Officer before investigation work is undertaken. I have wavered this requirement for the work ordered by the EMPR.

The bigger picture is still how FLNRORD under WSA formally co-ordinates with EMPR under the Mines Act on these joint works.

s.16

Can we review options?

John B

From: Baldwin, John FLNR:EX
Sent: Friday, November 23, 2018 3:24 PM
To: 'Doug Underhill'; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: RE: update on Valentine Mountain

Doug – thanks for update – any digging in or near the embankment is to be undertaken with great care. – John B

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, November 23, 2018 12:53 PM
To: Baldwin, John FLNR:EX; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: update on Valentine Mountain

Good afternoon John & Jim
John - I spoke to Jim this morning. He has been in contact with Great Thunder Gold Corp. (GTGC) about their tailings pond and associated dam on Valentine Mountain. They have agreed to send a qualified professional to inspect the dam and the leaking pipe. I have offered on behalf of TimberWest to provide an excavator to assist the representative from GTGC in his investigation of the leaking pipe. The operator will take direction from the GTGC representative and in doing so, the operator, the company and TimberWest are not accepting any liability for the outcome of said inspection or any deficiencies in the dam structure.
Jim - Given the elevation and potential for snow, this work must be completed prior to Nov 30th. GTGC must give TimberWest 2 days' notice on when the excavator is required so we can coordinate with our contractor.
Thank you.

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com
Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

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DAM FILE
D730227.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Tuesday, December 11, 2018 2:09 PM
To: Robinson, David FLNR:EX — 751-7028
Subject: RE: update on Valentine Mountain

Dave – further to my voice mail today and the Mines e-mail regrading Valentine Creek Dam update. My understanding was that the two "permit" holders are working together on the dam safety issues (ie complete inspection work ordered by Mines). The WSA Dam Safety Regulation Section 16 requires acceptance of "invasive investigation" (ie drilling, excavating, trenching test pits in dam) plan by Dam Safety Officer before investigation work is undertaken. I have wavered this requirement for the work ordered by the EMPR.

The bigger picture is still how FLNRORD under WSA formally co-ordinates with EMPR under the Mines Act on these joint works.

s.16

Can we review options?

John B

Left msg rec'd. Dave R to call. John

From: Baldwin, John FLNR:EX
Sent: Friday, November 23, 2018 3:24 PM
To: 'Doug Underhill'; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: RE: update on Valentine Mountain

11 Dec 2018 – discussed with Dave today

Doug – thanks for update – any digging in or near the embankment is to be undertaken with great care. – John B

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, November 23, 2018 12:53 PM
To: Baldwin, John FLNR:EX; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: update on Valentine Mountain

email sent to Dave re reply wording John

Good afternoon John & Jim
John - I spoke to Jim this morning. He has been in contact with Great Thunder Gold Corp. (GTGC) about their tailings pond and associated dam on Valentine Mountain. They have agreed to send a qualified professional to inspect the dam and the leaking pipe. I have offered on behalf of TimberWest to provide an excavator to assist the representative from GTGC in his investigation of the leaking pipe. The operator will take direction from the GTGC representative and in doing so, the operator, the company and TimberWest are not accepting any liability for the outcome of said inspection or any deficiencies in the dam structure.
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Thank you.

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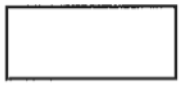
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com



Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

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11 Dec 2018 – 5pm
- Contacted Doug Underhill today.
- No work completed on dam to date
- snow still above dam site.

Thx.

20 NOV 2018

Valentine DAM. – DAM FILE: D730227.

Conference call with Mines + FLNRORA staff.

- dam constructed 1987 ←
- 9 m high dam ← } Mines statement.
- underdrain system – runs parallel and through dam
  - 2014 report – pressure gauge was leaking.
- Mines on site last Wednesday
  - leakage in area of toe of dam
  - July 2018 – rocks around gauge house moved – bubbling
    - → piping failure gauge with low level outlet.
  - high water level →
    - spillway (east abutment) main spillway – restricted spillway

last week – Mines has issued order for risk assessment of dam – deadline

→ Great Thunder Corp - mine permit holder.
- MINE not operating - 3.
Volume capacity - 5500 m³
tailings → 250 tons. - do not own dam.

challenge ? ORDOR.

→ Timber West, patricia !? Doug Underhill.
→ March 2018. withdrew abandonment application. by logging company
- knows about Mines ORDOR.

Consequence - Mine - Significant
FINRO - Low.

Mines to email → Docs to DS Office
→ inspection report from last week. ORDOR.

→ release water - concerns - tailings (water quality)
- pipe failure?
water quality ?
Bear Creek - 1300 m to BC Hydro reservoir.

Next steps

- Move forward - inspection
  - order
  - cc correspondence with Mining company.
- ANRO to follow up with Timberwest

Contacted
↓
→ Doug Underhill @ Timberwest (told water licence and damowner under WSA)
→ on site last Wednesday

- no agreement between Timberwest and Great Thunder Mining Company. (tried to get agreement) no success
- Mining Company built dam.
- discussed MINOS order to Mining Company
- low level pipe has been leaking for a number of years

→ no annual dam inspection has been undertaken by Timberwest
- Mine company own dam ← !!
- Timber West told water licence

Some if timber damaged. OLD PLAN
Timberwest

STOP out of roadway

- trucks & water hence to Mining Company
- Mining Company not responding
- Mining Company does not have formal access agreement and mining debris on site?

if Mining company does not comply with Mines order then Timberwest will fix.

- active logging in area
- public access to logging roads

??⇒ emergency plan to allow for time to sort out dam ownership -

Dang to review internal within Timber West and get back to FLNRO.

Mine company removed dam several years ago.

Deb.M.

MOU 2018
MOU
Re
MINE
DAMS

Memorandum of Understanding
Regulation of Impoundments and Diversions on a Mine Site

Memorandum of Understanding between the Ministry of Energy and Mines (MEM), the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO), and the Ministry of Environment (MoE), outlining the responsibilities for the Regulation of Impoundments and Diversions on a mine site including Tailing Storage Facilities (TSF), Flooded Impoundments (FI), Water Storage Facilities (WSF), Sedimentation Control Ponds (SED POND), Sludge Storage Ponds (SLUDGE POND) and Diversion Channels (DC).

Purpose

The purpose of this memorandum is to define the role of MEM, MFLNRO, and MoE in the siting, design, construction, operation, maintenance, abandonment, reclamation, and regulation of impoundments and diversions on a mine site, in order to protect the public, the environment and the users of water in the affected watershed.

Definitions

TSF (Tailings Storage Facility): A reservoir controlled by one or more embankments to store mine tailings and mine process water (supernatant). Tailings are fine rock materials in suspension, which are discharged from an ore concentrator or coal preparation plant. A TSF includes any starter dams, seepage collection dams and ponds located beyond the downstream toe of the main embankment(s).

FI (Flooded Impoundment): A reservoir controlled by one or more embankments required to submerge tailings, PAG waste rock, rock cuts or underground workings that have potential to generate acid if exposed to the atmosphere or a reservoir controlled by one or more embankments required to regulate the flow of ARD-contaminated water, including associated sludge storage from water treatment. A TSF may become a FI upon closure of the mine. A FI includes seepage collection dams and ponds beyond the downstream toe of the main embankment(s).

WSF (Water Storage Facility): A water storage reservoir, situated on a stream or off stream and storing water diverted from a stream, controlled by one or more embankments. A WSF does not include a TSF, FI, SED POND or SLUDGE POND. A water licence is required for surface water storage.

SED POND (Sedimentation Control Pond): A reservoir controlled by one or more embankments required to store surface water runoff and designed to facilitate the deposition of suspended solids and mitigate the release of sediment to the downstream environment.

SLUDGE POND (Sludge Storage Ponds): These ponds are developed to contain sludge from water treatment plants, and to prevent this material from entering the receiving environment.

DC (Diversion Channels): Diversion structures (dams or channels) developed to divert and control the annual inflow of the various watercourses around the mine site.

General Responsibilities

It is recognized that:

1. MEM is responsible for ensuring that no part of the mine, including a TSF, FI, SED POND and SLUDGE POND (not requiring a Water Licence or Waste Permit) represents a danger either to the health and safety of a person in or about the mine, or to the safety of the public. MEM is also responsible for the protection and reclamation of the land and watercourses on the mine site.
2. MFLNRO is responsible for the issuing of water licenses or approvals regulating the diversion, use and storage of surface water in or from a natural watercourse including any impoundments or diversion on a mine site. If a water licence is required and these works include a dam as defined under the Dam Safety Regulation, the regulation of the dam by MFLNRO will be commensurate with the downstream consequence classification rating under the Dam Safety Regulation.
3. MoE is responsible for the protection of human health and the environment from any adverse effects of mine wastes or impoundments, the use of hazardous materials, and the management of contaminated sites.

Specific Responsibilities

1. MEM, under the *Mines Act* and Health, Safety and Reclamation Code for Mines in BC (Code), is responsible for approving the siting, design, construction, modification, operation, maintenance, abandonment and reclamation of a TSF, FI, SED POND and SLUDGE POND, with some exceptions for any impoundment that requires a water licence (see Joint Responsibilities below). MEM uses the Canadian Dam Association (CDA) guidelines referenced under the Code. Prior to operation, MEM will ensure that sufficient security has been posted to undertake the necessary works to close the impoundments should the permittee default on its responsibilities. After mine closure MEM will ensure that the TSF, FI, SED POND and SLUDGE POND is either reclaimed or drained, and if necessary a permanent spillway installed. In the case of a TSF and FI, a valid *Mines Act* Permit and reclamation bond will be maintained to ensure long-term care, maintenance and/or treatment. In the case of a default, MEM will assume responsibility or find a third party to assume responsibility in exchange for the reclamation bond.
2. MFLNRO is responsible for licensing or approving any WSF or DC that requires a water licence or approval under the *Water Act* of BC and the Dam Safety Regulation. This will include the approval of siting, design, construction, modification, operation, maintenance and decommissioning with the exception of TSF, FI, SED POND and SLUDGE POND (see Joint Responsibilities).
3. MoE is responsible for regulating the quantity and quality of any discharge to the environment from activities relating to mining. MoE is not responsible for regulating the structural safety and integrity of impoundments at a mine site. Where the quantity or the quality of the discharge may be affected by proposed works or operational procedures, MoE may impose requirements for the siting, design, construction, modification, operation, maintenance, abandonment, and reclamation of a TSF, FI, DC, SED POND, or SLUDGE POND. All applications for *Environmental Management Act* permits and amendments dealing with mine tailings discharges and the development of any industry Codes of Practice applicable to mine tailings will be referred to MEM for comments and advice.

Notwithstanding the above, MFLNRO and MoE will seek to obtain agreement from MEM before permitting, licensing or requiring additional discharges into a TSF, FI, SED POND and SLUDGE POND anticipated in the design of the impoundment. In the event that agreement cannot be reached at the local level, this matter shall be referred to the appropriate Directors for a decision.

Joint Responsibilities

A TSF, FI, SED POND and SLUDGE POND that requires a water licence will be dealt with by MEM and MFLNRO on a case-by-case basis. Under such agreements, MEM will be the approving agency for the dam design, construction, operation, maintenance and reclamation. MFLNRO will be responsible for the licensing of water and storage. Prior to issuing a water licence, MFLNRO will confer with MEM to confirm that the process for approving the TSF, FI, SED POND and SLUDGE POND as noted above, will be undertaken under the Mines Permit.

If a water licence is required for a TSF, FI, SED POND and SLUDGE POND it shall be referenced to the closure plan in the *Mines Act* Permit. MFLNRO will refer to MEM for comments and advice on all applications for water diversions relating to a TSF, FI, SED POND and SLUDGE POND.

All signatories of this MOU will endeavor to ensure that copies of all permits or licence's (and any revisions) are made available to the other signatories with an interest in the permit or licence.

Consultation and Coordination

During the project review for an Environmental Assessment Certificate and *Mines Act* Permit, MEM, MFLNRO, and MoE shall jointly review any TSF, FI, WSF, DC, SED POND and SLUDGE POND as per the terms of this agreement. Review by the three agencies will be coordinated by their Ministry representatives on the project committees.

Where an emergency situation at a TSF, FI, SED POND or SLUDGE POND requires action that precludes prior consultation, notification of the actions taken by one party shall be given to the others as soon as possible. Copies of written orders, directives, approvals, licences, permits and amendments thereto, which include a TSF, FI, SED POND and SLUDGE POND shall be transmitted to the other parties at the time of issue.

In the event of the need for clarification of the Memorandum of Understanding or of unforeseen situations, the appropriate Directors shall consult with a view to resolving the matter.

This Memorandum of Understanding replaces the previous Memorandum of Understanding between MoE and MEM signed on April 22 and May 14, 2009.

Nothing contained in this Memorandum of Understanding abrogates responsibilities or duties assigned by the *Mines Act*, the *Environmental Management Act* or the *Water Act*.

SIGNATURE PAGE:
UPDATE OF 2009 MEMORANDUM: XX NOVEMBER 2013

Jan 7/14
Date

Deputy Minister
Ministry of Energy and Mines

Jan. 9/14
Date

Deputy Minister
Ministry of Environment

13·12·12
Date

Deputy Minister
Ministry of Forests, Lands and Natural Resource Operations

Page 314 of 427

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s.14; s.13

Page 315 of 427 to/à Page 317 of 427

Withheld pursuant to/removed as

s.13; s.14

Page 318 of 427 to/à Page 321 of 427

Withheld pursuant to/removed as

s.14

Baldwin, John FLNR:EX

From: Andrews, Jennifer L FLNR:EX
Sent: Tuesday, November 20, 2018 8:50 AM
To: Baldwin, John FLNR:EX
Subject: FW: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

---

From: Magliocco Rick EVO [mailto:Rick.Magliocco@teck.com]
Sent: Friday, November 16, 2018 2:37 PM
To: Kimber Alyssa CMO; Andrews, Jennifer L FLNR:EX
Cc: Musil Tiana SPO
Subject: FW: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

See highlighted below for Monty's interpretation of the MOU.

From: Miedreich, Monty FLNR:EX <Monty.Miedreich@gov.bc.ca>
Sent: Wednesday, April 5, 2017 2:24 PM
To: Magliocco Rick CMO <Rick.Magliocco@teck.com>; Johnstone, Pierre FLNR:EX <Pierre.Johnstone@gov.bc.ca>
Subject: RE: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

Hello Rick
Hi Pierre
Okay this should be the last email in this chain.

Rick
You are correct in that both MEM and FLNRO need to participate in your meeting. Of particular importance is clause (k) in the Water licence. Because these works are not identified as dams in our records my office would have no further involvement in this decommissioning project.

The FLNRO rep will be someone from the regional office.

Monty Miedreich

From: Magliocco Rick CMO [mailto:Rick.Magliocco@teck.com]
Sent: Wednesday, April 5, 2017 12:59 PM
To: Miedreich, Monty FLNR:EX
Subject: RE: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

The licence number is C100027 and the sources are Kovack, Peach, Kuta and Nivan creeks (attached).
Thanks very much, Monty.

Rick

From: Miedreich, Monty FLNR:EX [mailto:Monty.Miedreich@gov.bc.ca]
Sent: Wednesday, April 05, 2017 1:56 PM
To: Magliocco Rick CMO
Subject: RE: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

Could you tell me the licence number and the water source, please. Thanks

---

From: Magliocco Rick CMO [mailto:Rick.Magliocco@teck.com]
Sent: Wednesday, April 5, 2017 12:08 PM
To: Miedreich, Monty FLNR:EX
Subject: RE: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

This helps a lot thanks very much. To answer your questions below:

- Storage is for post-contact water; and
- Yes, there is a water licence for the ponds.

Would I be correct then in stating that MEM needs to be involved from a dam decommissioning perspective and FLNRO needs to be involved from a water licence perspective?

Thanks again,
Rick

From: Miedreich, Monty FLNR:EX [mailto:Monty.Miedreich@gov.bc.ca]
Sent: Wednesday, April 05, 2017 12:59 PM
To: Magliocco Rick CMO
Subject: RE: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

Thanks for the quick response. Many people are confused by who is the regulatory authority. An MOU was developed between MEM, FLNRO and MoE to help define the distinctions for who is responsible for what.

You can try the link below. If it doesn't work let me know and I can try to forward it another way.

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/dam-safety/mou_-_3dms_signed_20140116.pdf

To guide us we look at the following:

- Is the storage for pre-contact or post-contact water?
  - If post contact, i.e., is the water stored after it has passed through a portion of the mine operating site, the dam regulator is MEM
  - If precontact, i.e., is the water stored prior to being used for some mine related operation, it is then a FLNRO site . This implies there is or should be a water licence that authorizes this storage.
- Is there a Water Licence associated with these structures?
  - If yes then the regulator is FLNRO.

Hope that helps

From: Magliocco Rick CMO [mailto:Rick.Magliocco@teck.com]
Sent: Wednesday, April 5, 2017 11:42 AM
To: Miedreich, Monty FLNR:EX
Subject: RE: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project

Hi Monty,

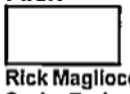
This does not include Corbin Creek Dam. 7 Pit Ponds are a group of settling ponds that have not been utilized for several years. They were removed from our effluent permit in I believe 2014. This project would essentially involve breaching the ponds, resloping and reclaiming the area, and restoring the watercourses (also twinning

some culverts). It's a fairly straightforward construction project but I think where the confusion lies for us is in who is the regulatory authority – MEM (i.e., approval can be granted under the Mines Act) or FLNRO. I received this from Kim Bellefontaine today:

There are two general clauses in the code that apply, including 10.6.14 (decommissioning of water structures) and 10.7.12(a) (reclaiming water courses). These are quite general in nature and likely don't answer the questions you have – so hopefully the meeting will be helpful.

Happy to discuss further on the phone if you'd like.

Best regards,
Rick



Rick Magliocco
Senior Environmental Coordinator
Coal Mountain Operations - Teck Coal Limited
Phone: +1.250.425.7367
Cell: +1.250.433.7311
email: rick.magliocco@teck.com
www.teck.com

-----Original Appointment-----
From: Miedreich, Monty FLNR:EX [mailto:Monty.Miedreich@gov.bc.ca]
Sent: Wednesday, April 05, 2017 12:33 PM
To: Magliocco Rick CMO
Subject: Tentative: Pre-application Discussion for Coal Mountain's Proposed 7 Pit Ponds Decommissioning Project
When: Wednesday, April 19, 2017 2:30 PM-3:30 PM (UTC-07:00) Mountain Time (US & Canada).
Where: Skype Meeting

Hi Rick

Thanks for the invite. Before I participate I would like to know what we are talking about here. Does this include Corbin Creek Dam? Correct me if I am wrong but the "7 Pit Ponds" are settling ponds? Please confirm

Page 325 of 427

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s.14

Page 326 of 427 to/à Page 329 of 427

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s.13; s.14

Page 330 of 427 to/à Page 333 of 427

Withheld pursuant to/removed as

s.14

Date: November 16, 2018

To: Kevin Whelan, Mine Manager, Great Thunder Gold Corp.

cc: Al Hoffman, Chief Inspector, EMPR Victoria
Diane Howe, Deputy Chief Inspector, EMPR Victoria
Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria
Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria
Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria
Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria
Dave Caughill, Regional Director, SW Region, EMPR Victoria
Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria
Glen Wallace, Director, Great Thunder Gold Corp.
Jacques Houle, P.Eng., Mineral Exploration Consulting

Re: Order under *Mines Act* Section 15(5) for the Valentine Mountain Tailings Storage Facility

A geotechnical inspection of the Valentine Mountain Tailings Storage Facility (MX-8-21) was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., with the Ministry of Energy and Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

There were two areas of immediate concern identified during the inspection. The first was the rate of discharge for the underdrain system outlet. Photos from the 2014 Dam Safety Inspection (DSI) by Thurber demonstrate a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system discharge flowrate has increased since July 2018. Since the 2014 DSI large boulders were placed over the underdrain system outlet pipe, so the condition of the outlet could not be verified. The second was the spillway. The tailings storage facility pond is estimated to have ~1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation growing in the spillway is reducing capacity.

These areas of concerns were identified in the 2014 DSI[1] text and recommendations, as demonstrated by the following excerpts:

> "Inclusion of the underdrain system is a serious design flaw in our opinion...Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure."
>
> "Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The

[1] "Valentine Mountain Mine – Tailings Disposal Facility – 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber Engineering Ltd.

development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.

"A response plan should be developed to address the possible increase in leakage from the outlet pipe over time."

"Vegetation must not be allowed to become re-established on the dam or along the spillway channel..."

Based on EMPR's recent geotechnical inspection, conditions which were raised as concerns in the 2014 DSI have not been addressed by the Permittee and have worsened since the 2014 DSI report was issued. Please note that EMPR expects all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

EMPR considers these conditions to represent a significant risk, and requires the facility be immediately assessed by a Professional Engineer. EMPR is thereby issuing the following order to take immediate remedial action.

Order 1:
Observation of contravention:
Pursuant to Mines Act Section 15(5)(a):

> *"If an inspector is of the opinion that a delay in remedying a hazard would be dangerous to persons or property, the inspector may issue an order for immediate remedial action."*

Remedial Action/Results to Be Obtained:
The Mine shall engage a Professional Engineer to conduct a risk assessment of the Valentine Mine tailings storage facility and prepare an assessment report containing recommendations for any remedial work required to mitigate the risks and monitoring requirements. The report shall be submitted to the satisfaction of the Chief Inspector and shall be accompanied by a letter of commitment from the Mine Manager to address the recommendations with a proposed schedule. The risk assessment shall include, but not be limited to, the following items of concern:

- *Underdrain system and outlet, and*
- *Spillway.*

Rectify By:
A Professional Engineer shall visit the site by November 21, 2018. The assessment report and accompanying letter of commitment shall be submitted no later than November 26, 2018.

This letter includes the areas of immediate concern identified during the inspection. A complete inspection report will follow.

Please confirm you have received this letter and direct any questions, comments or concerns to Alexis.McPherson@gov.bc.ca.

Regards,

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources

Great Thunder Gold Corp.

December 2, 2014

Ministry of Energy and Mines
1810 Blanshard Street
Victoria, BC
V8W 9N3

BY E-MAIL

Attention: Ms. Heather Narynski, P.Eng.
Senior Geotechnical Inspector

Re: Valentine Mountain Mine Tailings Facility
Dam Safety Inspection

Dear Ms. Narynski:

Great Thunder Gold Corp retained Thurber Engineering Ltd. to complete a dam safety inspection for the tailings pond located at our Valentine Mountain mine, located near Sooke, BC. The report may be downloaded from Thurber's secure website at https://file.ac/Ssc_Zb5KpjM/. We acquired the Valentine Mountain mine in 2008 and this management team assumed control of the company in 2013. To our knowledge, this is the first formal dam safety inspection report that has been prepared for the tailings pond since it was constructed.

As confirmed in your e-mail of December 1, 2014, Valentine Mountain mine was not included on the list of mines that received orders from the Chief Inspector of Mines in August 2014 requiring an independent review of dam safety and consequence classification. We therefore understand that an independent third party review of the attached report is not required.

We have carefully reviewed the dam safety inspection report and anticipate implementing the noted recommendations. We trust this is the information you require; however, if you have any questions or if you require additional information, please do not hesitate to contact us.

Yours truly,

GREAT THUNDER GOLD CORP.

per Kevin C. Whelan, President

THURBER ENGINEERING LTD.

VALENTINE MOUNTAIN MINE
TAILINGS DISPOSAL FACILITY
2014 DAM SAFETY INSPECTION

Report

to

Great Thunder Gold Corp.

Kevin Sterne, M.Sc., P.Eng.
Review Engineer

Date: December 1, 2014
File: 19-6819-0

Jay McIntyre, M.A.Sc., P.Eng.
Project Engineer

100, 4396 West Saanich Road, Victoria, BC V8Z 3E9 T: 250 727 2201 F: 250 727 3710
thurber.ca

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EXECUTIVE SUMMARY

A Dam Safety Inspection has been completed for the tailings disposal facility at the Valentine Mountain Mine, located approximately 20 km northwest of Sooke, BC. A tailings dam was constructed at the site in the fall of 1987 in advance of a bulk sampling program. The dam has not been raised or otherwise modified since its original construction. The facility was reportedly constructed to contain approximately 6,700 m^3 of tailings, which were to be generated during the mineral exploration phase. It is believed the actual amount of tailings presently impounded is considerably less than this.

The following is a summary of significant observations and conclusions from this Dam Safety Inspection.

- Based on the 2007 CDA Dam Guidelines classification system and a review of current downstream land usage, the Valentine Mountain Mine tailings dam should be assigned a consequence rating of "Significant".
- The design operating freeboard is approximately 1.10 m, and is controlled by a spillway beyond the east abutment of the dam that was blasted into bedrock. The dam designer assigned a 6 hour storm delivering 135 mm of rainfall as the design event for the facility, and it appears the constructed spillway (if properly maintained) can pass the runoff associated with such an event with a significant factor of safety.
- The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.
- A review of the stability analysis results presented by the dam designer in the construction summary report indicates that individual may not have been familiar with standard stability analysis conventions, particularly with respect to the loading conditions considered. Furthermore, the seismic coefficient used for the original analysis is likely too low given subsequent changes to the regional seismic hazard maps.
- Based on a comparison between site inspection observations, it appears that the slump on the downstream face of the embankment near the east abutment has not increased in size in the 4-year period since 2010. The presence of the slump indicates the downstream slope of the embankment was constructed too steep.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed. Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure.

- The pressure gauge connected immediately upstream of the underdrain outlet was observed to be leaking during the 2014 inspection. Comparing to images collected during the 2010 inspection, it appears the leak has developed (or increased in flow rate) since November of 2010.
- To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. If they can be located and are operational, data from these instruments would be useful in future stability analyses.
- Great Thunder Gold Corp recently assumed ownership of the mine and has since removed vegetation on the dam and in the spillway channel. This work was recommended during a previous site inspection carried out for the former mine owner.
- No active seepage was observed along the toe of the dam during Thurber's 2010 or 2014 inspections; however a localized wet spot was observed in front of the underdrain outlet area at the time of the October 24, 2014 inspection.

The following is a summary of the recommendations resulting from this DSI.

a) A survey should be carried out within the impoundment to investigate the level of the tailings. It is anticipated this would be completed using a row boat/canoe and a weighted tape or sounding line. Once completed, the tailings level should be compared to the as-constructed survey of the impoundment prior to filling to obtain a rough estimate of the volume of tailings in the facility.

b) Now that an as-built plan of the impoundment has been obtained (showing the locations of installed instrumentation) a renewed effort should be made to locate and collect water level readings at both observation wells and the piezometer. The piezometer reportedly consisted of a 1 cm diameter metal tube, so it is not clear if this instrument will be serviceable (due to possible damage during construction or subsequent corrosion).

c) An updated stability assessment should be carried out, including an evaluation of performance during a design earthquake. If water level data from existing instruments is unavailable, conservative assumptions should be made for the purposes of the analysis.

d) A remediation plan should be developed (such as a stabilizing toe berm) should the stability assessment determine that the factor of safety is unacceptable.

e) A qualified professional should evaluate whether the 6-hr storm assumed by the original dam designer is suitable and conforms to the inflow design flood recommended in the CDA guidelines. This assessment may require a survey of the existing spillway.

f) Great Thunder Gold Corp. should initiate a dam surveillance program that includes dam inspection visits at regular intervals throughout the year. Surveillance personnel should fill out a standard inspection form during these visits. Of particular importance would be the development of new seepage locations along the toe of the dam, as well as observations pertaining to the leakage at the underdrain outlet.

g) Vegetation must not be allowed to become re-established on the dam or along the spillway channel. Due to weather and frost effects, it is anticipated that rock falls will occasionally occur along the spillway channel, which was blasted through bedrock. Significant rock fall should be removed to prevent obstructions to flow.

THURBER

h) Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.

i) A response plan should be developed to address the possible increase in leakage from the outlet pipe over time.

The author of this DSI report is not considered to be the Engineer of Record for the structure and does not take professional responsibility for its design. Mr. Peter Peart, P.Eng. submitted the impoundment proposal report for the subject tailings dam to the Ministry of Mines in June of 1987. Mr. Peart also prepared the construction report for the structure, dated December 1, 1987. In this latter document, Mr. Peart clearly accepts professional responsibility for the design and construction of the structure. To our knowledge, no modifications to the dam have occurred since construction.

Use of this Executive Summary is subject to the Statement of Limitations and Conditions included at the end of the text of the report. Clause 4 of the statement identifies that unless written consent is provided, only the Client may use or rely on the contents of this report. With reference to Clause 4, the BC Ministry of Energy and Mines is also granted "Approved User" status.

THURBER

TABLE OF CONTENTS

1. INTRODUCTION 1
2. SCOPE OF WORK 1
3. REFERENCE DOCUMENTS 1
4. FACILITY DESCRIPTION 2
   - 4.1 Overview 2
   - 4.2 Location 2
   - 4.3 Tailings Dam 2
5. SUMMARY OF CLIMATE DATA 4
6. FINDINGS FROM PREVIOUS DAM INSPECTIONS 5
   - 6.1 2003 Jacques Whitford Inspection 5
   - 6.2 2010 Thurber Inspection 6
7. OBSERVATIONS FROM 2014 THURBER INSPECTION 8
8. SITE SEISMICITY 9
9. REVIEW OF CONSEQUENCE CLASSIFICATION 9
   - 9.1 CDA Classification System 9
   - 9.2 Valentine Mountain Tailings Facility 10
10. SUMMARY OF RECENT CONSTRUCTION 11
11. WATER BALANCE REVIEW 11
12. FREEBOARD AND AVAILABLE STORAGE 12
13. WATER DISCHARGE SYSTEMS 13
14. SEEPAGE OCCURRENCE 13
15. SURFACE WATER CONTROL AND SURFACE EROSION 13
16. INSTRUMENTATION REVIEW 14
17. COMMENTS REGARDING DESIGN, CONSTRUCTION AND PERFORMANCE 14
18. SUMMARY 16
19. RECOMMENDATIONS 18
20. ENGINEER OF RECORD 19
21. CLOSURE 19

STATEMENT OF LIMITATIONS AND CONDITIONS

THURBER

LIST OF DRAWINGS

Drawing No. 19-6819-0-1; Key Plan
Drawing No. 19-6819-0-2; Site Plan
Drawing No. 19-6819-0-3; Section A
Drawing No. 19-6819-0-4; Plan Showing the Anticipated Flow Direction Downstream of Dam

LIST OF TABLES

Table 4-1 – Summary of Measured Crest Width and Slope Angle
Table 5-1 – Summary of Climate Data
Table 8-1 – Classification in Terms of Failure Consequence (CDA 2007)

APPENDICES

APPENDIX A – REFERENCE DOCUMENTS
APPENDIX B – DRAWING
APPENDIX C – TABULATED CLIMATE DATA
APPENDIX D – PREVIOUS CONSULTANT INSPECTIONS & REPORTS
APPENDIX E –SITE INSPECTION PHOTOS
APPENDIX F – SEISMIC HAZARD CALCULATION
APPENDIX G – CONSTRUCTION PHOTOGRAPHS

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1. INTRODUCTION

Thurber Engineering Ltd. (Thurber) has undertaken a Dam Safety Inspection (DSI) of the tailings disposal facility at Valentine Mountain Mine, located approximately 20 km northwest of Sooke, BC.

This report is subject to the Statement of Limitations and Conditions, which is included at the end of the text. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

2. SCOPE OF WORK

Thurber's scope of work for this assignment was outlined in our proposal letter to Great Thunder Gold Corp. dated October 10, 2014. Authorization to proceed with the above noted work scope was received via e-mail on October 10, 2014.

Thurber's scope of work included a review of available background information pertaining to the dam as well as a site inspection completed on October 24, 2014.

3. REFERENCE DOCUMENTS

Prior to conducting the dam safety inspection, Thurber visited the Ministry of Energy and Mines (MEM) office in Victoria to review pertinent background information available in their files, including any design reports and as-built records for the dam. The following pertinent documents were obtained and reviewed as part of this assessment.

- Tailings Impoundment Proposal, Valentine Mountain, Prepared for Valentine Gold Corporation by Peter Peart, P.Eng.; June 1987.
- Tailings Impoundment Construction Report, Valentine Mountain Project, Prepared for Valentine Gold Corporation by Peter Peart, P.Eng.; December 1, 1987.
- Excerpt from report titled "Metallurgical Bulk Sampling Pilot Plan Programme for Valentine Mountain Property; Bacon, Donaldson & Associates; March 14, 1998.

In addition, the following engineering report was reviewed (provided by the former mine owner in 2010):

- Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC; report prepared by Jacques Whitford Environment Ltd.; December 23, 2003.

THURBER

The proposal document referenced above contains design information, including the results of stability analyses completed during the design stage. The construction report contains as-built information. For convenience, the above documents are included in Appendix A of this report.

4. FACILITY DESCRIPTION

4.1 Overview

Valentine Mountain Mine has never been an operational mine. Since gold was discovered (circa 1976), works carried out at the site have been related to mineral exploration. A tailings dam was constructed at the site in the fall of 1987 in advance of a bulk sampling program. The dam has not been raised or otherwise modified since its original construction. The facility was reportedly constructed to contain approximately 6,700 m^3 of tailings, which were to be generated during the mineral exploration phase. It is believed the actual amount of tailings presently impounded is considerably less than this.

The June 1987 impoundment proposal report states that the location of the tailings impoundment is within the anticipated ore zone, and this would require its removal at some future time.

4.2 Location

The tailings dam is located at approximately elevation 780 m on the south side of Valentine Mountain at 48° 30' 57" N and 123° 53' 22" W. The impoundment is located above and to the north of Bear Creek Reservoir. The site is accessed by gravel logging roads from Sooke, BC, which is located approximately 20 km southwest of the dam. The site location is shown on the attached Drawing No. 19-6819-0-1 in Appendix B.

The dam is situation on the south side of a ridge oriented in the east-west direction. The local topography is bedrock-controlled with localized thin veneers of dense till-like soils. Based on information provided in the design document, the site is underlain by competent interbedded meta-sedimentary bedrock.

4.3 Tailings Dam

The tailings dam was constructed in the fall of 1987 by Valentine Gold Corporation. The construction report indicates the dam can contain approximately 6,700 m^3 of mine tailings. The report also states the facility has the capacity to store about 10,000 tonnes of mill feed provided the in-situ density of the tailings is approximately 1.77 g/cm^3 (1,770 kg/m^3). Based on an excerpt from the bulk sampling summary report prepared by Bacon, Donaldson Associates Ltd.

in March 1988, a total of approximately 650 tons of ore was sampled and processed at the on-site pilot plant during the 1998 bulk sampling program. We understand that another smaller sampling program occurred in 1998; however, there are no details in regards to the sample size.

The in-situ density of the tailings would depend on the achieved gradation following processing at the pilot plant, as well as the method of placement. The impoundment proposal report anticipated the tailings would have a gradation consistent with a silty sand, with approximately 50% of the materials passing the 0.075 mm sieve size. It is considered unlikely that the tailings would have achieved an in-situ density of 1,770 kg/m^3 when placed as a slurry, and that a more realistic density would be in the range of 1,200 to 1,400 kg/m^3. In any case, the available information indicates the impoundment likely is less than half full.

As part of this current assessment, Thurber completed a site inspection on October 24, 2014. The inspection was completed by Jay McIntyre, P.Eng. During this site inspection visit, the dam was measured as approximately 90 m long, with a nominal crest width of approximately 5 to 6 m and a maximum height of approximately 8 m. A plan of the tailings dam is shown on attached Drawing No. 19-6819-0-2 in Appendix B. The image shown on this drawing was scanned from a plan of the tailings dam prepared in November 1987, marked "As Constructed". The contours shown on the above noted plan were used to generate a section (Section A) through the dam at its maximum height. This cross-section is shown on Drawing No. 19-6819-0-3 in Appendix B.

Based on cross-sections provided in the June 1987 Tailings Impoundment Proposal report, both the upstream and downstream slopes of the embankment were to be constructed to a gradient of 1.7H to 1V (30.5°). However, a plan of the dam marked "As Constructed" and dated November 1987 indicates the dam's upstream slope is generally graded at 27° (2H to 1V), whereas the downstream slope angle is nominally sloped at 34° (1.46H to 1V). During the October 2014 site inspection, a handheld inclinometer was used to measure the embankment slopes. Based on these measurements, the downstream slope is generally graded at an angle of 37° (1.33H to 1V) from the horizontal, with localized steeper and flatter sections. The maximum slope was estimated as being 40° at approximately Sta. 0+30 where the dam is constructed atop outcropping bedrock. The upstream embankment slope (above the impoundment level) was estimated to be sloped at approximately 27° from the horizontal (2H to 1V). Table 4-1 summarizes the crest widths and embankment slope angles measured by Thurber along the length of the dam.

THURBER

TABLE 4-1
SUMMARY OF MEASURED CREST WIDTH AND SLOPE ANGLE

Dam Stationing (m)	Crest Width (m)	Measured Downstream Slope Angle
0+00	10.0	n/a
0+10	6.4	32°
0+20	6.0	38°
0+30	6.2	40°
0+40	5.1	37°
0+50	4.8	37°
0+60	5.3	37°
0+70	4.6	Excessive vegetation
0+80	7.2	Excessive vegetation
0+90	At bedrock spillway	n/a

Note: 1. Dam stationing measured from west abutment
2. Slope angles measured using handheld inclinometer
3. Thick vegetation precluded accurate estimate of slope angle.

The dam is aligned roughly in the East-West direction and curves slightly towards the south at the middle. A spillway, blasted through bedrock, is located beyond the east abutment of the dam. The ground surface in this area slopes downwards towards the south, with a nominal surface gradient of approximately 23°.

At the time of the October 24th inspection, water was flowing over the spillway and the available freeboard was measured as 1.05 m.

5. SUMMARY OF CLIMATE DATA

Climate records listing monthly precipitation and daily average air temperatures were obtained from the CRD weather station at Sooke Lake, located approximately 14 km east of Valentine Mountain. The location of Sooke Lake is shown on Drawing 19-6819-0-1 in Appendix B.

Monthly data is tabulated in Appendix C. Table 5-1 below summarizes the average monthly precipitation data for the past 40 years, and daily average temperatures for the past 10 years.

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TABLE 5-1
SUMMARY OF CLIMATE DATA

Average Monthly Precipitation in millimeters (1974 to 2013)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
263.0	174.4	161.4	90.7	53.6	34.5	23.1	35.0	55.7	157.7	298.8	266.5	1614
Average Daily Temperatures in °C (2004 to 2013)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2.8	3.5	4.9	7.3	11.3	14.4	17.7	17.2	13.6	8.7	4.8	2.4	

Based on 40 years of monitoring, the average yearly rainfall in the area is 1614 mm, with approximately half of this occurring in the three months of November to January. It is noted that the elevation of Sooke Lake is approximately 700 m lower than the Valentine Mountain tailings dam location. Thus, it is anticipated that average air temperatures at the mine site are slightly lower than indicated in the above table.

6. FINDINGS FROM PREVIOUS DAM INSPECTIONS

We are aware of two previous dam inspections. Details are provided below.

6.1 2003 Jacques Whitford Inspection

Jacques Whitford Environment Ltd. (JWEL) was retained by Beaupre Exploration Ltd. to complete a geotechnical assessment of the dam in 2003. JWEL (now Stantec) prepared a report on December 23, 2003 titled "Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC". This report was apparently prepared in response to a July 2002 letter from the Ministry of Energy and Mines (MEM), requiring that a geotechnical assessment of the tailings impoundment be carried out prior to authorizing the extraction and processing of a 3,000 tonne sample. The report was to be prepared by a qualified Professional Engineer and submitted for review by the Chief Inspector. The letter also specified that the assessment should include an acceptable plan for decommissioning and final reclamation of the tailings pond.

JWEL completed a site inspection on April 3, 2003. Key observations from the JWEL report are summarized as follows:

- There were no obvious cracks on the dam crest, however, "sloughing" was observed on the downstream face of the dam near the east abutment, extending approximately 0.3 m in depth. The slump covered an area extending between approximately Sta. 0+78 and the spillway.

- There was an open crack extending from approximately Sta. 0+72 and 0+75. At this location, the dam is approximately 5.9 m high.
- No seepage was observed along the seepage collection pond
- There was no noticeable water in the ditch along the toe of the dam.
- There are no records available of the tailings level within the impoundment.

The JWEL report commented that based on visual observations made during their inspection that the dam *"likely does not have the same factor of safety against slope instability as when it was constructed"*. The report also stated that the selection of a friction angle of 50° for the rip rap *"warrants review"* as does the selection of a seismic coefficient of 0.1g for the design earthquake. The report states that an appropriate peak horizontal ground acceleration value would be 0.349g. At the time of the JWEL assessment, this ground acceleration corresponded to an earthquake having an annual exceedance probability of 1 / 475.

Apart from the baseline readings of the settlement monuments, JWEL was unable to find any other monitoring data, including any readings of the piezometers. JWEL recommended that Beaupre Exploration Ltd. search their records for any subsequent instrument monitoring readings. A copy of the 2003 JWEL geotechnical assessment report is attached in Appendix D.

6.2 2010 Thurber Inspection

Thurber was retained by Mill Bay Ventures Inc. in 2010 to conduct a preliminary geotechnical evaluation of the tailings dam. The assessment focused primarily on the identified slump and did not constitute a formal dam safety review. Key observations made during the November 16, 2010 site inspection are summarized below:

- The reservoir was observed to have approximately 1.1 m of freeboard.
- The spillway (excavated into rock beyond the east abutment) was observed to be flowing. A log and some vegetation was observed in the entrance to the spillway. Vegetation and a length of perforated "Big-O" flexible piping was observed in the spillway channel.
- The crest and side slopes of the embankment are heavily vegetated with fir, alder and Scotch Broom. Trees exceeding 6 m height and butt diameters up to 150 mm were noted. The vegetation greatly impeded the inspection of the dam.
- The dam crest varies in width from approximately 5.5 to 6 m. The downstream slope was estimated at approximately 37° to 40°.
- The exposed portion of the upstream slope was estimated to have a gradient of approximately 30°.
- A slump was observed at the downstream crest near the east abutment. The scarp starts about 10 m away from the east abutment and extends roughly 17 m to the west. It

appears that a vertical displacement of up to 600 mm has occurred, and a crack in the rock fill was observed.

- The slope length at the scarp location was measured to be approximately 6 m and this equates to an embankment height of about 4.5 m.
- Near the center of the embankment, the slope length was measured at 13.8 m and this equates to height of approximately 9 m.
- A former logging road runs along the toe of the embankment. No seepage was observed exiting the downstream face of the dam. Nor was any seepage observed in the ditch between the road and the toe of the embankment.
- An apparent opening in the rip rap was observed at the downstream toe of the dam, and this may be the location of a reported clean-out cap, that connects to a "sub-drain" system. The cap was not visible, but the cavity was stuffed with insulation.

The following key comments and recommendations were provided in Thurber's 2010 geotechnical evaluation report:

- The downstream embankment slope was constructed steeper than the design called for.
- A slump on the downstream face of the dam occurred prior to April 2003 near the east abutment where the embankment is not at full height. The triggering mechanism is unclear. It is possible the contractor did not achieve the same level of compaction at the east end of the embankment compared to elsewhere. That is, the rock fill may have been pushed loosely over the edge of the crest.
- The slump appears to be relatively shallow, and likely does not significantly impact the global stability of the embankment at present. However, continued movements could be detrimental to embankment stability.
- It is anticipated that some modification of the embankment geometry (e.g., flattening of the downstream slope) will be required.
- An updated slope stability assessment should be conducted, and should reflect current seismic hazard values.
- Any existing piezometric monitoring data should be utilized for the proposed stability assessment. If such data is unavailable, new data sets should be collected.
- The trees and scotch broom should be removed from the crest and embankment slopes.
- The presence of a seepage collection system that apparently passes through the upstream till zone into the downstream rock fill zone is concerning, as this pipe would be a convenient flow path that could promote to internal erosion of the embankment. Given these design features, a monitoring and surveillance schedule should be established and maintained, to ensure the facility continues to perform as expected.

A copy of Thurber's preliminary geotechnical evaluation report, dated November 30, 2010, is attached in Appendix D.

THURBER

7. OBSERVATIONS FROM 2014 THURBER INSPECTION

As noted previously, Thurber completed a site inspection on October 24, 2014. The inspection was completed by Jay McIntyre, P.Eng. Selected photographs are included in Appendix E. The following key observations were made:

- At the time of the inspection, a crew was removing trees and vegetation from the dam and spillway area. The work was essentially complete except for a section of the spillway and downstream slope near the east abutment (below the slump area).
- The removal of vegetation greatly aided in the inspection. It was possible to see areas where the dam is constructed directly atop outcropping bedrock, (i.e., in the vicinity of Sta. 0+025 to 0+035). It was also possible to more easily inspect the outlet to the underdrain system.
- Water was flowing over the spillway and the freeboard was measured to be approximately 1.05 m.
- The shallow slump was observed near the east abutment, just downslope from the crest of the dam. It was measured to be approximately 12 m long, starting at approximately Sta. 0+64. It appears to have changed little since the 2010, except the scarp is less defined, and the crack in the face of the down has mostly closed (possibly related to disturbance from vegetation removal).
- No seepage was observed exiting the downstream toe of the dam, although a localized wet spot was observed downstream of the underdrain outlet.
- Metal bars of varying diameters were observed sticking out of the dam on the upstream side of the crest. They are typically spaced at interval of 4 to 6 m along the crest. Some of these bars are believed to be settlement monitoring hubs, but others may have been used to secure the tailings supply line coming from the mill (which ran along the upstream side of the crest).
- The piezometer and two observation wells could not be located.
- The outlet to the underdrain system was investigated. This outlet includes a 100 mm diameter solid ABS pipe with a threaded cleanout cap. Upstream of the outlet is a pressure gauge that was reportedly installed to allow for a direct reading of the hydrostatic head within the impoundment at the toe of the dam. The gauge and outlet pipe are protected by several tabular boulders, placed to form a crude shelter for the outlet assembly. The cavity is stuffed with fiberglass insulation, presumably to protect the pipe and gauge from freezing. The pressure gauge can be accessed from the top, through a gap between two boulders. The outlet pipe and threaded cap can apparently be accessed from the bottom, through a gap beneath a different boulder (see attached photos). Some of this insulation was removed from the top of the cavity to expose the pressure gauge. The gauge could not be read, as it was mostly covered by spray-on foam insulation, and the face of the gauge was installed facing the north (i.e., it faces away from the observer). Liquid was observed to be leaking from the gauge fitting at an estimated rate of 0.05 to 0.1 LPM.
- Neither the outlet pipe/cleanout cap nor the gate valve were exposed. This would have

required significant disturbance to the pipe installation. It appears that the liquid leaking from the pressure gauge (located above the outlet) is dripping down onto the insulation protecting the end of the outlet pipe. This has resulted in iron oxide (or other substances) precipitating onto the protective insulation. Photographs showing the appearance of the outlet in 2010 and 2014 are attached in Appendix E.

8. SITE SEISMICITY

The site is located in the seismically active area of southern Vancouver Island. Site seismicity is influenced both by nearby crustal earthquakes as well as potentially larger earthquakes along the Cascadia fault, located off the west coast of Vancouver Island. The most recent significant earthquake in the area was a magnitude 7.3 event that took place in 1946 to the northwest of Courtenay, BC.

In Canada, the seismic hazard for a particular site may be obtained from hazard maps prepared by the Geological Survey of Canada (GSC). These maps are derived from statistical analyses of past earthquakes and from advancing knowledge of Canada's tectonic and geological structure. On the maps, seismic hazard is expressed as the most powerful ground motion that is expected to occur in an area for a given probability level.

Ground motion probability values are given in terms of probable exceedance: that is, the likelihood of a given ground motion being exceeded during a particular time duration. The typical probabilities of exceedance provided by the GSC in the seismic hazard maps are the 2%, 5% and 10% probability of exceedance in a 50 year period, which corresponds to an annual likelihood of 1/2,475, 1/1,000 and 1/475, respectively. The GSC does not provide seismic hazard values for more extreme events (e.g., earthquakes having an annual probability of exceedance of 1/5000 or greater). These data are typically estimated by extrapolation. A copy of the Seismic Hazard Calculation for the Valentine Mountain site is attached in Appendix F.

9. REVIEW OF CONSEQUENCE CLASSIFICATION

9.1 CDA Classification System

The consequence classification of a dam is a means of establishing an adequate overall level of care in oversight, inspection, maintenance and safety of the facility. The consequence classification of a dam is based on the incremental consequences of failure, which is defined by the CDA Guidelines (2007) as being *"the total damage from an event with dam failure minus the damage that would have resulted from the same event had the dam not failed"*. The consequence classification is based on consideration of three loss criteria: 1) Loss of life,

2) Environment and cultural values, and 3) Infrastructure and economics. The current CDA classification system is shown in Table 8-1.

9.2 Valentine Mountain Tailings Facility

As noted previously, the tailings facility at Valentine Mountain is located on the south side of a ridge oriented in the east-west direction, at approximately elevation 780 m. Below the dam, the ground slopes down towards the south. Bear Creek Reservoir is located downstream of the facility, roughly 1.4 km to the south at approximately elevation 410 m. The attached Drawing No. 19-6819-0-4 in Appendix B shows the anticipated route that tailings and impounded water would take if a dam breach were to occur.

TABLE 8-1
CLASSIFICATION IN TERMS OF FAILURE CONSEQUENCE (CDA 2007)

Dam Class	Population at Risk	Incremental Loss		
		Loss of Life	Environmental & Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short-term loss. No long-term loss.	Low economic losses; area contains limited infrastructure or services.
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat. Loss of marginal habitat only. Restoration or compensation in kind highly possible.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes.
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat. Restoration or compensation in kind highly possible.	High economic losses affecting infrastructure, public transportation, and commercial facilities.
Very High	Permanent	100 or fewer	Significant loss or deterioration of *critical* fish or wildlife habitat. Restoration or compensation in kind possible but impractical.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances).
Extreme	Permanent	More than 100	Major loss of *critical* fish or wildlife habitat. Restoration or compensation in kind impossible	Extreme losses affecting important infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances).

The mine and the surrounding area are located on lands owned by Timberwest Forest Corp. and we understand that logging is carried out in the general area. There are no permanent dwellings or other structures located downstream of the dam. In terms of population at risk, this would be limited to temporary workers (e.g., log truck drivers) and recreational users (e.g., quads, etc.).

In terms of infrastructure, there are several logging roads located along the flow path, and it is expected that a dam breach would result in some or all of the roads downstream of the dam being locally washed out at the crossing locations. It is not uncommon for washouts to occur on logging roads, and it is anticipated that repairs could be implemented relatively quickly and that alternate routes (along the south side of Bear Creek Reservoir) could be utilized. Given the impoundment's small size and the anticipated attenuation of the flows during a dam breach scenario (i.e., a dam breach would be expected to occur over a period of approximately 30 minutes), it is not anticipated that a dam failure would have a significant impact on the water level at Bear Creek Reservoir.

A dam breach would result in the release of impounded water and mine tailings into the environment downstream of the dam, with some of the tailings entering Bear Creek Reservoir. There is insufficient information to accurately evaluate potential environmental impacts. However, given the very small size of the impoundment it is anticipated that losses to fish and wildlife habitat would not be significant.

On this basis, it is recommended that the facility be assigned a "Significant" downstream failure consequence classification.

10. SUMMARY OF RECENT CONSTRUCTION

As noted previously, Valentine Mountain Mine is still in the exploratory stage. We understand that a permit was issued in 2003 for another bulk sampling program, but that it ultimately did not proceed. There has been no modifications to the current tailings dam, apart from maintenance, since it was constructed in 1987.

11. WATER BALANCE REVIEW

The 1987 impoundment proposal report provided anticipated losses from evaporation and seepage, as well as inputs from rain and groundwater recharge. The report states it was assumed the bulk sampling program would continue as a (more or less) continuous operation for approximately 1 year and that the facility would be essentially full at the completion of that time. The report states that losses from seepage, evaporation and supplying the processing

plant would be approximately equal to gains from rainfall and groundwater recharge. As rainfall and evaporation estimates were based on data collected in the late spring and early summer, it appears there may have been a significant underestimation of water gains from rainfall, and an overestimation of losses from evaporation. The report states that water budget data would be collected at the tailings impoundment while the mill was in operation.

The proposal report suggests that the bedrock spillway was intended to prevent an overtopping of the facility as a result of a winter storm during the bulk sampling program. There is no discussion provided in either the proposal report or construction report concerning water balance estimates following cessation of sampling/processing activities. Given the annual rainfall for the area is approximately 1.6 m, it is likely that the impoundment was full and water was spilling over the spillway within several months of dam completion.

We understand that during the summer months, evaporation and leakage results in the water level dropping below the spillway level, but that for most of the year the impoundment level is controlled by the spillway. Based on inspection comments, there does not appear to be significant losses related to leakage through the dam.

12. FREEBOARD AND AVAILABLE STORAGE

The tailings facility incorporates a spillway excavated in bedrock at the east abutment. The design called for a minimum 1.0 m wide spillway, but the as-constructed width is approximately 2 m. After entering the spillway, water passes down a channel blasted through bedrock. The spillway channel has a variable cross section, but is approximately 1.2 m wide at the base and sloped at approximately 23°.

At the time of October 24, 2014 inspection, the measured freeboard was approximately 1.05 m. It was noted as being 1.1 m both at the time of the November 16, 2010 inspection. During both of these inspections, water was flowing over the spillway.

The impoundment proposal report identifies the design storm as being a "Maximum Probable" 6-hour storm delivering 135 mm of rain over the catchment area. The design engineer estimated the instantaneous inflow from the design storm would be approximately 0.3 m^3/s, and that flow over a 1 m wide spillway was expected to exceed this rate by a factor of 3.5.

The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of

failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.

13. WATER DISCHARGE SYSTEMS

The impoundment is being operated as an overflow structure, in that water is released passively by means of the spillway during all but the summer months. Released water is not measured or tested.

The dam design also incorporated a sub-drain system, consisting of 100 mm diameter perforated "Big-O" type perforated pipe, wrapped in filter cloth and placed at the base of the impoundment roughly parallel to the upstream toe. The sub-drain system was reportedly covered with a layer of well-graded (presumably fine) sand, produced using the pilot plant. The sub-drain system is connected to a solid 100 mm diameter Schedule 80 ABS plastic pipe that passes through the dam at its lowest point. The downstream end of the pipe is capped with a threaded cleanout cap, reportedly to allow sampling of the impoundment seepage. The impoundment proposal report states that another function of the sub-drain system was to "facilitate drainage of the entrained supernatant water at the time of abandonment", indicating that it may be used as a low-level outlet to drain the impoundment.

As noted in Section 7, the pressure valve connected to the downstream end of the outlet pipe was observed to be slowly leaking during the October 24, 2014 inspection. Leakage may have been occurring at the time of the 2010 inspection, but the rate of leakage (although still small) appears to have increased.

14. SEEPAGE OCCURRENCE

No seeps were observed on the downstream face or along the toe of the dam. One localized wet spot was observed in front of the underdrain outlet location.

15. SURFACE WATER CONTROL AND SURFACE EROSION

Surface water enters the impoundment from a small catchment area to the north side. A small groundwater fed spring is also located on the north side of the impoundment. Excess water flows over the spillway. There does not appear to be any obvious signs of surface erosion on the dam.

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16. INSTRUMENTATION REVIEW

Instrumentation installed at the dam during construction includes:

- Two 100 mm diameter standpipes/observation wells were installed near Sta. 0+30 and Sta. 0+60. The tips of the standpipes were installed in the rip rap zone, located downstream of the low permeability till zone.
- A 1 cm diameter steel cased piezometer was installed in the till near Sta. 0+50 with its tip at an elevation approximately 4 m below the crest of the dam. This instrument was installed to assist in establishing the phreatic surface within the till zone.
- Three settlement monuments were placed along the upstream crest of the embankment.

The construction report only contains baseline readings for the three settlement monitoring monuments. To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. However, during that visit it was assumed the instrument locations were as shown on Plate 3 of the June 1987 design report. It was confirmed afterwards that the instruments were installed at different locations.

17. COMMENTS REGARDING DESIGN, CONSTRUCTION AND PERFORMANCE

The following comments are provided in regards to the geotechnical design and construction of the facility:

- The dam was originally designed to have a 4m wide crest and upstream and downstream slopes graded at 1.7H to 1V.
- The dam was ultimately constructed with a significantly wider crest (average ~5.7 m). However, the as-built downstream slope is significantly steeper and is typically sloped at 37° (approx. 1.33H to 1V) with localized steeper sections sloped up to 40°.
- The dam design incorporated a reasonably thick low permeability till zone, supported on the downstream side by a rock fill shell and also faced on the upstream side by rock fill.
- Thurber was retained as a testing agency for the dam designer and completed a number of laboratory tests, including gradation analysis, modified Proctor tests and tri-axial permeability testing of samples collected at the till borrow site. Based on gradation analyses on three samples, the composition of the borrow material varied from gravelly, silty sand to silty, sandy gravel. The fines content for all samples exceeded 30%. The tri-axial permeability test yielded a permeability of 3.05×10^{-6} cm/s.
- Apart from a localized wet spot in the vicinity of the underdrain outlet, the dam does not appear to leak appreciably.
- A geotextile fabric was placed between the till zone and downstream rock fill shell to act as a filter. These two zones are gradationally incompatible, and the filter fabric was included to limit the potential for migration of fines from the till zone into voids within the

downstream rock fill shell. As geotextile filters are subject to damage when placed against rock fill, they are not a preferred means of filtration. Additionally, they are of little use in areas where conduits pass through a dam.

- The dam is believed to be founded on intact bedrock and/or very dense till-like soils over shallow bedrock. Several photos taken during construction are attached in Appendix F.
- The dam designer incorporated a perforated underdrain system within the impoundment, connected to a solid pipe that passes through the dam. Its inclusion suggests that it was intended to drain the impoundment at a future date, although this would now appear to be an unlikely scenario. The system includes a solid 100 mm diameter Schedule 80 ABS plastic pipe that passes through the dam at its highest point. As shown on Plate 2 of the construction report, the solid pipe was surrounded on all sides by compacted till along its entire length through the dam. This pipe is connected to a network of perforated "Big-O" type plastic pipes installed at the bottom of the impoundment. These pipes were reportedly wrapped in geotextile and covered with a layer of sand produced by the pilot processing plant.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed (it is shown on Plate 2 but is not mentioned in the report text). Furthermore, should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure. This process is illustrated in the following schematic.

A - Hole develops in conduit with downstream valve which is under constant pressure from reservoir head.

B - Hole enlarges allowing increased flow and a piping failure begins.

C - Reservoir drains through the conduit.

- Overall it appears that adequate compaction was carried out during fill placement and the materials selected for construction are not considered susceptible to liquefaction during an earthquake.
- The impoundment level is controlled by the bedrock spillway beyond the dam's east abutment, and there is approximately 1.1 m of freeboard between the spillway and the crest of the dam. It is not known if the design storm selected by the dam designer is consistent with a flood having an AEP falling within 1/100 and 1/1,000.
- A slump occurred on the downstream slope of the dam prior to 2003 resulting in the development of a tension crack up to 200 mm wide at the downstream edge of the crest and vertical movements of up to approximately 600 mm.
- The slump is located where the embankment is approximately half of its maximum height. Although the triggering mechanism is unclear, this portion of the embankment may have been slightly steeper than elsewhere, and/or the material exposed on the face of the dam may not have been adequately compacted.
- It does not appear that the slump has become enlarged in the intervening time between the 2010 and 2014 inspection visits.
- The presence of the slump indicates that the factor of safety of the fill along the face of the dam is marginal, although the global factor of safety for the overall embankment is higher.
- The design engineer used a seismic coefficient of 0.1g when conducting the stability analysis in 1987. This coefficient is a simplified means of evaluating the destabilizing forces resulting from an earthquake. Referring to the current (2010) seismic hazard values provided by the Geologic Survey of Canada (GSC) attached in Appendix F, an updated stability analysis would likely utilize a seismic coefficient ranging between 0.28g and 0.37g. These values correspond to earthquakes with an AEP of 1/100 and 1/1,000 respectively.
- Based on comments provided in the construction summary report, the designer apparently applied the seismic coefficient to all analysis cases, including the steady state seepage case. It is not clear why this was done, as this force should only be considered when evaluating loading conditions associated with an earthquake. It is also not clear how the "sudden drawdown" analysis case resulted in a higher factor of safety compared to the steady state seepage analysis case. In our experience, the sudden drawdown results should generally yield a factor of safety that is lower than the steady state analysis case.

18. SUMMARY

The following is a summary of significant observations and conclusions from this Dam Safety Inspection.

- Based on the 2007 CDA Dam Guidelines classification system and current downstream land usage, the Valentine Mountain Mine tailings dam should be assigned a consequence rating of "Significant".

- The design operating freeboard is approximately 1.10 m, and is controlled by a spillway beyond the east abutment of the dam that was blasted into bedrock. The dam designer assigned a 6 hour storm delivering 135 mm of rainfall as the design event for the facility, and it appears the constructed spillway (if properly maintained) can pass the runoff associated with such an event with a significant factor of safety.
- The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.
- A review of the stability analysis results presented by the dam designer in the construction summary report indicates that individual may not have been familiar with standard stability analysis conventions, particularly with respect to the loading conditions considered. Furthermore, the seismic coefficient used for the original analysis is likely too low given subsequent changes to the regional seismic hazard maps.
- Based on a comparison between site inspection observations, it appears that the slump on the downstream face of the embankment near the east abutment has not increased in size in the 4-year period since 2010. The presence of the slump indicates the downstream slope of the embankment was constructed too steep.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed. Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure.
- The pressure gauge connected immediately upstream of the underdrain outlet was observed to be leaking during the 2014 inspection. Comparing to images collected during the 2010 inspection, it appears the leak has developed (or increased in flow rate) since November of 2010.
- To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. If they can be located and are operational, data from these instruments would be useful in future stability analyses.
- No active seepage was observed along the toe of the dam during Thurber's 2010 or 2014 inspections; however a localized wet spot was observed in front of the underdrain outlet area at the time of the October 24, 2014 inspection.

THURBER

19. RECOMMENDATIONS

The following is a summary of the recommendations resulting from this DSI.

a) A survey should be carried out within the impoundment to investigate the level of the tailings. It is anticipated this would be completed using a row boat/canoe and a weighted tape or sounding line. Once completed, the tailings level should be compared to the as-constructed survey of the impoundment prior to filling to obtain a rough estimate of the volume of tailings in the facility.

b) Now that an as-built plan of the impoundment has been obtained (showing the locations of installed instrumentation) a renewed effort should be made to locate and collect water level readings at both observation wells and the piezometer. The piezometer reportedly consisted of a 1 cm diameter metal tube, so it is not clear if this instrument will be serviceable (due to possible damage during construction or subsequent corrosion).

c) An updated stability assessment should be carried out, including an evaluation of performance during a design earthquake. If water level data from existing instruments is unavailable, conservative assumptions should be made for the purposes of the analysis.

d) A remediation plan should be developed (such as a toe berm) should the stability assessment determine that the factor of safety is unacceptable.

e) A qualified professional should evaluate whether the 6-hr storm assumed by the original dam designer is suitable and conforms to the inflow design flood recommended in the CDA guidelines. This assessment may require a relatively detailed survey of the existing spillway.

f) Great Thunder Gold Corp. should initiate a dam surveillance program that includes dam inspection visits at regular intervals throughout the year. During the inspection visits, surveillance personnel should fill out a standard inspection form. Of particular importance would be the development of new seepage locations along the toe of the dam, along with observations about the leakage at the underdrain outlet.

g) Vegetation must not be allowed to become re-established on the dam or along the spillway channel. Due to weather and frost effects, it is anticipated that rock falls will occasionally occur along the spillway channel, which was blasted through bedrock. Significant rock fall should be removed to prevent obstructions to flow.

h) Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. This failure could occur during normal operating conditions (e.g., due to the ongoing deterioration of the plastic pipe and fittings) or as a result of embankment deformations (e.g., possibly earthquake-induced). A remediation plan should be developed to address this risk. One possible approach would be to construct a toe drain at the location of the outlet that incorporates a granular filter zone. The primary function of the toe drain would be to protect the outlet from future damage from frost action and shallow slumps, as well as to allow a controlled release of the impoundment should the pipe ultimately fail. However, installation of the toe drain would inherently involve risk. Depending on

the condition and fragility of the outlet, the placement of the filter zone and coarser toe drain fill could, in itself, trigger a rupture.

i) A response plan should be developed to address the possible increase in leakage from the outlet pipe over time.

20. ENGINEER OF RECORD

The 2013 MEM guidelines for annual DSI reports states that the professional engineer conducting the DSI will be deemed the Engineer of Record for the facility unless another engineer is identified as having this responsibility. The author of this DSI report is not considered to be the Engineer of Record for the structure and does not take professional responsibility for its design.

Peter Peart, P.Eng. submitted the impoundment proposal report for the subject tailings dam to the Ministry of Mines in June of 1987. Mr. Peart also prepared the construction report for the structure, dated December 1, 1987. In this document, Mr. Peart clearly accepts professional responsibility for the design and construction of the structure. A search of the APEGBC membership database indicates that there is no one by the name of Peter Peart practicing within the Province of British Columbia at this time.

21. CLOSURE

Use of this report is subject to the Statement of Limitations and Conditions included at the end of the text of the report. With reference to Clause 4 of the Statement, the BC Ministry of Energy and Mines is also granted "Approved User" status.

THURBER

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over ...)

INTERPRETATION OF THE REPORT *(continued. . .)*

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

THURBER

APPENDIX A

APPENDIX A
REFERENCE DOCUMENTS

TAILINGS IMPOUNDMENT PROPOSAL REPORT
JUNE 1987

Baldwin, John FLNR:EX

From: McPherson, Alexis EMPR:EX
Sent: Thursday, November 22, 2018 3:12 PM
To: Kevin Whelan
Cc: Hoffman, Al EMPR:EX; Howe, Diane J EMPR:EX; Demchuk, Tania EMPR:EX; Rollo, Andrew EMPR:EX; Constable, Lowell EMPR:EX; Narynski, Heather M EMPR:EX; Caughill, David EMPR:EX; Dunkley, Jim R EMPR:EX; Baldwin, John FLNR:EX; Robinson, David FLNR:EX; Love, Mark P ENV:EX; 'Glen Wallace'; jhoule06@shaw.ca
Subject: EMPR Geotechnical Inspection (2) - MX-8-21 Valentine Mountain
Attachments: 2018 11 14 EMPR Geotechnical Inspection (2) - MX-8-21 Valentine Mountain (with attach).pdf

Hello Mr. Whelan,

Please find the Report of the Geotechnical Inspector for the Valentine Mountain inspection on November 14, 2018 attached. There is one order that requires your response. Please fill in the area where a response is indicated and return a copy of the report directly to me.

Note under Section 15(6) of the Mines Act a written response is required from the Mine Manager within 15 days of the receipt of this Inspection Report.

We have discussed the contents of this inspection report with Glen Wallace, Great Thunder Gold Corp.'s CFO, and have included last week's inspection order (2018 11 14 EMPR Geotechnical Inspection (1) – MX-8-21 Valentine Mountain TSF) as an attachment to this report.

Please let me know if you have any questions, comments or concerns.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

AM FILE: D730.227

– Nov. 19 2018

– Miners telephoned today Heather

→ Valentine Creek dam water license held by

→ ~~Heather~~ - local logging company.
- mine waste in reservoir

– law consequence

– Miners to contact Darryl Slater any water licence changes,

* → need to solve problem soon

– Great Thunder - mining company

– tailings material ← ??
(950 tonnes)
(4 to 5 metres of water)

* → higher Mines Regulations than WSA regulations.

John

BRITISH COLUMBIA

Province of British Columbia

MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES

Report of Inspector of Mines

Geotechnical

(Issued pursuant to Section 15 of the *Mines Act*)

Inspection No.:	**109087**
Mine No.:	**0800265**
Permit No.:	**MX-8-21**
Total Orders:	**1**

Mine Name:	Valentine Mountain
Location:	Sooke, BC
Owner, Manager:	Kevin Whelan, Mine Manager
Company:	Great Thunder Gold Corp.
Address:	900-570 Granville Street Vancouver, BC V6C 3P1
Workers Contacted:	
Type of Mining:	Exploration - Surface (ES)
Date of Inspection:	2018-11-14
Inspector:	Alexis McPherson, M.Sc., P.Eng.,Geotechnical Inspector, EMPR Victoria
Accompanying Inspectors:	Jim Dunkley, P.Geo., Permitting Inspector, SW Region, EMPR Victoria
In Attendance:	Doug Underhill, P.Eng, RPF, Manager, Forest Hydrology and Infrastructure, TimberWest Jason, Carvalho, Couverdon Real Estate
Copies to:	Al Hoffman, Chief Inspector, EMPR Victoria Diane Howe, Deputy Chief Inspector, Reclamation and Permitting, EMPR Victoria Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria Dave Caughill, Regional Director, SW Region, EMPR Victoria Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria John Baldwin, Water Stewardship Officer, Regional Operations Division – Coast Area, FLNRORD David Robinson, Senior Authorizations Specialist – Water, Regional Operations Division – Coast Area, FLNRORD Mark Love, Authorization Section Head – Mining Team, Environmental Protection Division, ENV Glen Wallace, CFO, Great Thunder Gold Corp. Jacques Houle, P.Eng., Mineral Exploration Consulting

The Mine Manager is required to provide a written response within 15 days of receiving the inspection report. The Manager's response must outline the remedial steps taken by a specified date and the work still outstanding. A copy must be provided to the inspector, and in the case of health and safety matters, the occupational health and safety committee and the local union. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

Introduction

A geotechnical inspection of the Valentine Mountain Site was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., Geotechnical Inspector with the Ministry of Energy, Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Mr. Dunkley's report is issued under separate cover. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

Valentine Mountain is an exploration site near Sooke, BC. At least two bulk samples were processed onsite; a ~650 t sample by Valentine Gold in 1988 and a ~65 t sample by Beau Pre in 1998. Geotechnical infrastructure includes a tailings storage facility and bulk sample trenches. The inspection tour included the following locations:

- Tailings Storage Facility (TSF),
- Mill Site, and
- Trenches.

The following documents were referenced as part of the inspection preparation and follow-up:

- "Tailings Impoundment Construction Report – Valentine Mountain Project" dated December 1, 1987 by Peter Peart, P.Eng., Consulting Geotechnical Engineer.
- "Initial Geotechnical Assessment – Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC" dated December 23, 2003 by Jacques Whitford Environmental Consulting Limited (Jacques Whitford).
- "Decommissioning and Reclamation Plan – Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC" dated January 12, 2004 by Jacques Whitford.
- "Valentine Mountain Property – Preliminary Geotechnical Evaluation of Tailings Dam" dated November 30, 2010 Thurber Engineering Ltd. (Thurber).
- "Valentine Mountain Mine – Tailings Disposal Facility – 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber.

At the time of inspection, the weather was overcast, lightly raining and ~10°C. All areas of interest were visible and accessible.

Preamble

The purpose of this inspection was to:

- Assess whether the Mine is meeting the intent of the geotechnical requirements of the Code;
- Assess whether the Mine is meeting the intent of the geotechnical conditions in its Mine Permit;
- Assess whether geotechnical engineering practices at the Mine are generally consistent with accepted practices at mines in British Columbia; and,
- Provide general comment on geotechnical conditions at the mine.

This report is governed by the conditions and limitations set forth in the Mines Act and Code. This report is based on a review of select reports and work areas at the Mine, and cannot practically cover the entire mine site. Professional reliance has been used throughout this inspection.

Please note EMPR expects that all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

This report summarizes EMPR's observations, comments, and recommendations based on the Mine site tour, preliminary review of annual geotechnical reports, and technical discussions with Mine staff. If required, inspection orders have been issued. For ease of reference the Mine Manager is asked to respond in red text in the space provided below each inspection order and information request.

Location: Tailings Storage Facility

The TSF is a side-hill impoundment, consisting of a single embankment. The embankment was constructed to its current elevation in 1987. The embankment has not been raised or otherwise modified since its original construction. The embankment has a maximum height of 9 m, crest width of 6 m, downstream slope of ~1.33H:1V and upstream slope of ~2H:1V. The upstream till zone is separated from the supporting downstream rip rap by a geotextile. Rip rap is located along the upstream embankment face and at the embankment crest, extending 0.5 m above the till. There is an underdrain system within the facility consisting of perforated pipe running parallel to the embankment along the upstream toe, connected to a solid pipe passing through the dam at the maximum dam height. The downstream outlet has a cap and the pipe has a pressure gauge at the downstream side.

The 2014 Dam Safety Inspection (DSI) noted that a leak in the underdrain system pressure gauge developed or increased in flowrate between 2010 and 2014. Photos from the 2014 DSI depict a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system flowrate had increased since July 2018. A photo of the flow during the inspection is included as Photo 2. Boulders had been placed over the underdrain system outlet pipe, so the condition of the outlet and the source of the flows (pressure gauge, end of pipe, and/or area surrounding the pipe) could not be identified (Photo 3).

The TSF is estimated to have ~ 1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation is growing in the spillway (Photo 4).

A slump in the downstream face of the embankment near the left abutment was documented in 2003, 2010, and 2014 (Jacques Whitford, 2003; Thurber, 2010; Thurber, 2014). The slump did not appear to increase in size between 2010 and 2014 (Thurber, 2014). The slump has not been repaired and was visible during the inspection.

An order under *Mines Act* Section 15(5) was issued November 16, 2018 to address concerns related to the underdrain system and outlet, and spillway. The November 16, 2018 order is attached and must be considered along with this inspection report.

Review of EMPR files indicate the mine is out of compliance with numerous Part 10 Code sections, including the following:

- Section 10.1.5 – Engineer of Record
  - An Engineer of Record (EoR) has not be retained.
- Section 10.1.7 – Consequence Classification
  - The EoR has not confirmed the consequence classification.
- Section 10.1.11 – Breach and Inundation Study/Failure Runout Assessment
  - A breach and inundation study has not been completed.
- Section 10.1.13 – Quantifiable Performance Objectives
  - Quantifiable Performance Objectives have not been determined and reviewed by the EoR and TSF Qualified Person (QP).
- Section 10.4.1 – Updated Plans
  - Mine plans, reclamation and closure plans, and water balance and water management plans have not been updated.
- Section 10.4.2 – Governance
  - The Mine Manager has not
- Section 10.4.3 – Register of Tailings Storage Facilities and Dams
  - The Mine Manager has not:
    - Developed and maintained a Tailings Management System,
    - Designated a TSF QP,
    - Established an Independent Tailings Review Board (ITRB),
    - Completed an annual review of the TSF risk assessment,
    - Maintained TSF emergency preparedness and response plans,

- Section 10.4.4 – Annual Reporting
  - The Mine Manager has not submitted the following annual reporting:
    - DSIs completed,
    - Report of ITRB activities, and
    - Summary of TSF and dam safety recommendations, including a scheduled completion date.
- Section 10.5.2 – Operations, Maintenance and Surveillance (OMS) Manual
  - An OMS manual has not been prepared.
- Section 10.5.3 – Annual Dam Safety Inspection
  - A DSI has not been completed since 2014.

Further, EMPR notes several engineering recommendations provided by Jacques Whitford (2003) and Thurber (2010, 2014) relating to geotechnical stability were not completed. As indicated in the preamble, EMPR expects that all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

Order 1:
Observation of Contravention:
The mine is out of compliance with Sections 10.1.5, 10.1.7, 10.1.11, 10.1.13, 10.4.1, 10.4.2, 10.4.3, 10.4.4, 10.5.2, and 10.5.3 of the Code.

Remedial Action/Results To Be Obtained:
The Mine shall prepare and submit a detailed work plan to address the Code requirements to which the Mine is out of compliance. The work plan shall be completed to the satisfaction of the Chief Inspector. The work plan shall include specific activities, deliverables, timelines and milestones to achieve compliance with the Code.

Rectify By: March 31, 2019

Manager Response:

Location: Mill Site

The mill site includes four shelters/containers in various states of disrepair, a small ball mill and milling supplies (i.e. balls). None of the shelters/containers are locked and all are easily accessible. One container contains core boxes, with open core boxes laid out on the ground in front of the container (Photo 5).

Location: Trenches

The trenches are located east of the Mill Site, along an overgrown road. These linear excavations are overgrown and water has accumulated in the low spots (Photo 6). Some iron staining was visible. The tour facilitators indicated the trenches visited were the largest trenches; there are additional, smaller trenches on site which were not inspected.

Closure

Please address the response to Alexis McPherson, Geotechnical Inspector at Alexis.McPherson@gov.bc.ca.

You are reminded that, as per Section 15(6) of the Mines Act, your response is required within 15 days of the days of receiving this report. In addition, Section 30 (1) of the Mines Act requires this Inspection Report to be posted in a conspicuous location at the mine site for 30 days.

Please feel free to contact Alexis McPherson with any questions or comments.

Received by _____ on _____
[Mine Manager Name, Title] [Date]

Signature: _____

Attachment:
2018 11 14 EMPR Geotechnical Inspection (1) – MX-8-21 Valentine Mountain TSF

Photo 1: TSF Pond

Photo 2: Flow from Underdrain System during the Inspection

Photo 3: Boulders Over the Underdrain System Outlet Pipe

Photo 4: Spillway at Invert

Photo 5: Core Shack and Open Core Boxes

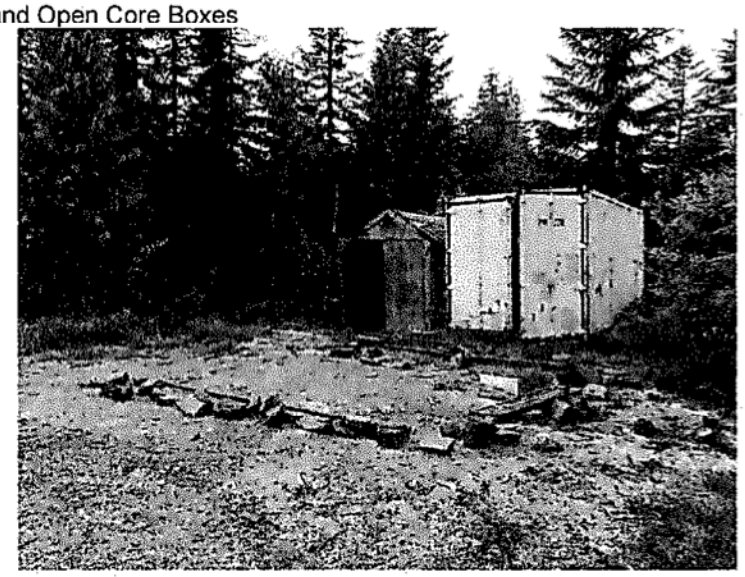
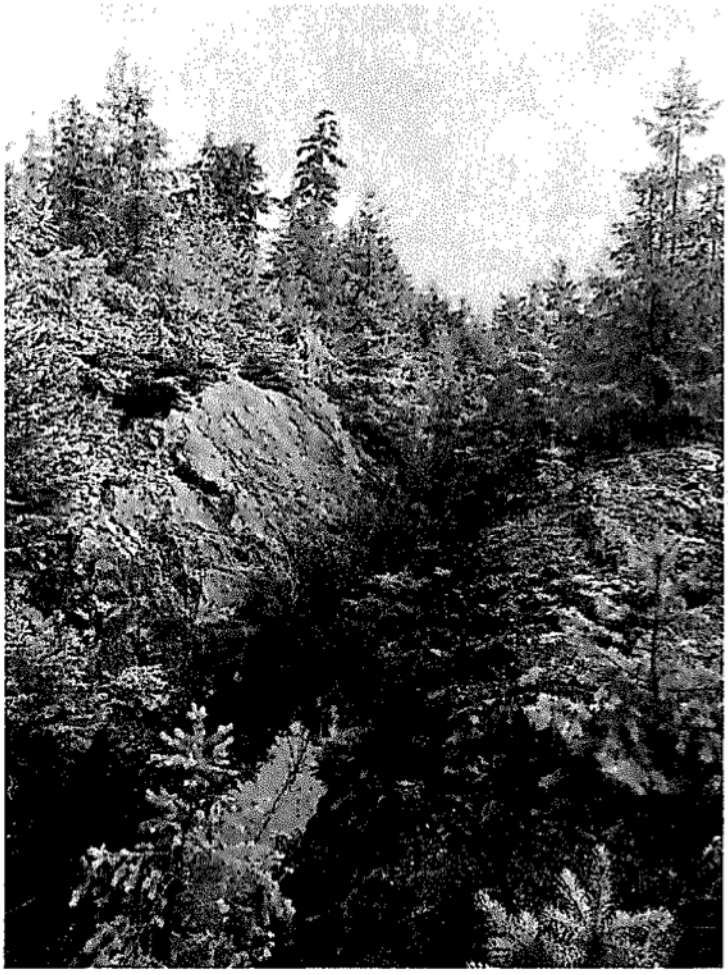


Photo 6: Trench



Date: November 16, 2018

To: Kevin Whelan, Mine Manager, Great Thunder Gold Corp.

cc: Al Hoffman, Chief Inspector, EMPR Victoria
Diane Howe, Deputy Chief Inspector, EMPR Victoria
Tania Demchuk, Deputy Chief Inspector, Compliance and Enforcement, EMPR Victoria
Andrew Rollo, Acting Executive Director, Major Mines, EMPR Victoria
Lowell Constable, Manager, Geotechnical Engineering, EMPR Victoria
Heather Narynski, Manager, Tailings Storage Facilities, EMPR Victoria
Dave Caughill, Regional Director, SW Region, EMPR Victoria
Jim Dunkley, Permitting Inspector, SW Region, EMPR Victoria
Glen Wallace, Director, Great Thunder Gold Corp.
Jacques Houle, P.Eng., Mineral Exploration Consulting

Re: Order under *Mines Act* Section 15(5) for the Valentine Mountain Tailings Storage Facility

A geotechnical inspection of the Valentine Mountain Tailings Storage Facility (MX-8-21) was conducted on November 14, 2018 by Alexis McPherson, M.Sc., P.Eng., with the Ministry of Energy and Mines and Petroleum Resources (EMPR), accompanied by Jim Dunkley, P.Geo., Regional Permitting Inspector with EMPR. Doug Underhill, Manager, Forest Hydrology and Infrastructure with TimberWest, and Jason Carvalho, Project Manager with Couverdon Real Estate, facilitated the inspection and lead the tour.

There were two areas of immediate concern identified during the inspection. The first was the rate of discharge for the underdrain system outlet. Photos from the 2014 Dam Safety Inspection (DSI) by Thurber demonstrate a lower flowrate than was observed during the inspection, and it was noted by the inspection facilitators that the underdrain system discharge flowrate has increased since July 2018. Since the 2014 DSI large boulders were placed over the underdrain system outlet pipe, so the condition of the outlet could not be verified. The second was the spillway. The tailings storage facility pond is estimated to have ~1 m of freeboard, although there is no measuring device on site to confirm this approximation. Water was discharging through the spillway, and vegetation growing in the spillway is reducing capacity.

These areas of concerns were identified in the 2014 DSI[1] text and recommendations, as demonstrated by the following excerpts:

> "Inclusion of the underdrain system is a serious design flaw in our opinion...Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure."
>
> "Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The

[1] "Valentine Mountain Mine – Tailings Disposal Facility -- 2014 Dam Safety Inspection" dated December 1, 2014 by Thurber Engineering Ltd.

development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.

"A response plan should be developed to address the possible increase in leakage from the outlet pipe over time."

"Vegetation must not be allowed to become re-established on the dam or along the spillway channel..."

Based on EMPR's recent geotechnical inspection, conditions which were raised as concerns in the 2014 DSI have not been addressed by the Permittee and have worsened since the 2014 DSI report was issued. Please note that EMPR expects all written recommendations made by a Professional Engineer, relating to geotechnical stability affecting health, safety, or environment, are followed by the Mine unless a suitable alternative written recommendation is provided by a Professional Engineer.

EMPR considers these conditions to represent a significant risk, and requires the facility be immediately assessed by a Professional Engineer. EMPR is thereby issuing the following order to take immediate remedial action.

Order 1:
Observation of contravention:
Pursuant to Mines Act Section 15(5)(a):

> *"If an inspector is of the opinion that a delay in remedying a hazard would be dangerous to persons or property, the inspector may issue an order for immediate remedial action."*

Remedial Action/Results to Be Obtained:
The Mine shall engage a Professional Engineer to conduct a risk assessment of the Valentine Mine tailings storage facility and prepare an assessment report containing recommendations for any remedial work required to mitigate the risks and monitoring requirements. The report shall be submitted to the satisfaction of the Chief Inspector and shall be accompanied by a letter of commitment from the Mine Manager to address the recommendations with a proposed schedule. The risk assessment shall include, but not be limited to, the following items of concern:

- *Underdrain system and outlet, and*
- *Spillway.*

Rectify By:
A Professional Engineer shall visit the site by November 21, 2018. The assessment report and accompanying letter of commitment shall be submitted no later than November 26, 2018.

This letter includes the areas of immediate concern identified during the inspection. A complete inspection report will follow.

Please confirm you have received this letter and direct any questions, comments or concerns to Alexis.McPherson@gov.bc.ca.

Regards,

Alexis McPherson, M.Sc., P.Eng.
Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources

DAM FILE
8730227.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Monday, March 12, 2018 11:47 AM
To: Narynski, Heather M EMPR:EX; Meret, Livia JAG:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

Heather – the consequence rating was determined by this office and did not include any impact of releasing tailings material into the environment. Amount and content of tailings material is not known by this office. It is the responsibility of the dam owner to review the consequence classification annually. Depending on new information and/or any land development, the consequence classification can change.

s.16

I have attached a copy of the water licence to try and answer Scott M's questions.

WATER MANAUEMENT BRANCH

MINISTRY OF ENVIRONMENT

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Canadian Pacific Forest Products Ltd., Tahsis Pacific Region, Eastern Woodlands of P.O. Box 910, Sooke, B.C., V0S 1N0

is hereby authorized to divert, use, and store water as follows:

(a) The source of the water-supply is Valentine Brook and storage is in a reservoir.

(b) The point of diversion and storage structure are located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 10th October, 1989.

(d) The purposes for which the water is to be used are storage and industrial (fire protection).

(e) The maximum quantity of water which may be held in storage is 8.5 acre foot per annum and the maximum quantity of water which may be diverted from storage for industrial (fire protection) purpose is 8.5 acre foot per annum.

(f) The period of the year during which the water may be held in storage is the whole year and the period of the year during which the water may be used for industrial (fire protection) purpose is the whole year.

(g) The land upon which the water is to be used and to which this licence is appurtenant is Westerly 120 Chains of Block 1221, Nelson District.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

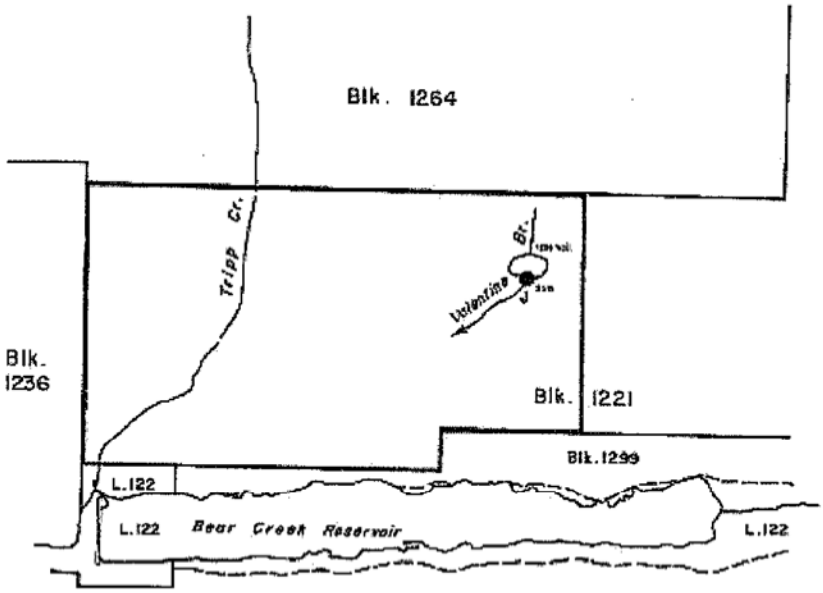
(i) The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act.

(j) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular, beneficial use of water in the manner authorized herein.

G. Hollingshead
Regional Water Manager

File: 1601142 November 5, 1990 Conditional Licence: 72277

Province of British Columbia



WATER DISTRICT : VICTORIA
PRECINCT : VICTORIA
LAND DISTRICT : MALAHAT

LEGEND
Scale : 1:20,000
Point of Diversion : ●
Map Number : WR 92 B/12 (d)

Signature
Date December 14, 1990

C.L. 72277
File 1001142

The boundaries of the land to which this licence is appurtenant are shown thus: ———

TimberWest is responsible/owner under the WSA of dam.

s.13; s.14; s.16

John B

From: Narynski, Heather M EMPR:EX
Sent: Monday, March 12, 2018 10:49 AM
To: Baldwin, John FLNR:EX; Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

That's my understanding as well- that the Valentine dam has been authorized under two different Acts/Regulations for the same aspects. Inspections have been carried out on this dam under the oversight of both EMPR and FLNRO.

John, was the "low" consequence designation made internally by FLNRO? I'm wondering whether this would have taken into account the potential volume and nature of tailings contained?

s.13

Heather

From: Baldwin, John FLNR:EX
Sent: Monday, March 12, 2018 11:18 AM
To: Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

Tina – thanks for info – the dam is authorized in both "permits/licences".

This 8 metre high earth filled dam has a LOW consequence rating (impact TimberWest's own forest property) with moderate failure probability (issue with embankment stability).

John B

From: Neale, Tina FLNR:EX
Sent: Monday, March 12, 2018 10:03 AM
To: Baldwin, John FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

Hi John,
s.13

Tina

From: Baldwin, John FLNR:EX
Sent: Monday, March 12, 2018 9:19 AM
To: Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX
Subject: FW: Valentine Dam - FLNRORD or Mines dam?

Tina/Scott – I have a dam on private land licenced under WSA to the owner of the land (TimberWest). This licence is for fire fighting purpose. TimberWest want to transfer the water licence thus ownership of the dam to a mining company. The mining company has a mining permit for a tailings dam. The WSA licenced dam is the Mines tailings dam – two authorizations for the same dam! The existing dam is on a stream but has mine tailings in the reservoir. s.13
s.13

Can we discuss options?

John B

From: Narynski, Heather M EMPR:EX
Sent: Friday, March 9, 2018 12:56 PM
To: Baldwin, John FLNR:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Neale, Tina FLNR:EX; Howe, Diane J EMPR:EX; Narynski, Heather M EMPR:EX
Subject: FW: Valentine Dam

Hi John,

s.13; s.16

I have cc'd Lowell Constable and Tina Neale as I understand some discussions have taken place between the two Ministries s.22 regarding potential updates to the MOU.

Heather

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Thursday, March 1, 2018 10:26 AM
To: Howe, Diane J EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Jason Carvalho; Doug Underhill
Subject: Re: Valentine Dam

Hi Diane and a Heather.

Thanks very much. We will be in touch.

Domenico Iannidinardo
TimberWest
250 715 7387

On Mar 1, 2018, at 8:04 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Thank you for the update Domenico. Let us know if there is anything EMPR can do in supporting your conversation with the miner. There are a whole bunch of regulations that owners of tailings faculties are now responsible for that they/you should be aware of (Health Safety and Reclamation Code for Mines in BC; PART 10). I've cc'ed with this email Heather Narynski who manages the TSF compliance for the province. She is very much up on the regulations if you have any questions.
>
> Regards, Diane
>
> **Diane Howe, M.A. Sc., P.Geo**
> Deputy Chief Inspector of Mines , Reclamation and Permitting
> Ministry of Energy, Mines and Petroleum Resources, Victoria
> 250-952-0183
> www.gov.bc.ca/minepermitting
>
> For all reports, please ensure you include EMPR Permitting and Reclamation group mailbox PERMRECL@gov.bc.ca
> <image001.jpg>

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Wednesday, February 28, 2018 3:36 PM
To: Howe, Diane J EMPR:EX
Subject: Re: Valentine Dam

Hi Diane,
We now plan to withdraw our abandonment request and work through some matters with the miner. Does that help clarify the matter for you at this time?
Thank you

Domenico Iannidinardo
TimberWest
250 715 7387

On Feb 26, 2018, at 7:37 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Hi Domenico,
>
> Wondering if you have time for a call this week regarding the Valentine Dam. I understand Timberwest has a request in to have the water licence released and am just wondering about the relationship Timber West has with the mine permittee and how this may affect the conditions of this release.
>
> Regards, Diane
>
> **Diane Howe, M.A. Sc., P.Geo**

Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
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s.13; s.16

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TimberWest
250 715 7387

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Page 389 of 427 to/à Page 391 of 427

Withheld pursuant to/removed as

s.13

Page 392 of 427 to/à Page 394 of 427

Withheld pursuant to/removed as

s.13; s.14

Page 395 of 427

Withheld pursuant to/removed as

s.14; s.13

Page 396 of 427 to/à Page 398 of 427

Withheld pursuant to/removed as

s.13

DAM FILE
D730227.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Monday, February 26, 2018 9:35 AM
To: Narynski, Heather M EMPR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mine Questions

Heather/Dave

Note dam decommissioning guide:

1. Pre-decommission drawdown of the water in the reservoir is to be undertaken in a manner that does not caus
2. Salvage/relocation of fish etc may be required.
3. Any breach in the dam is to be able to pass the 1 in 200 year maximum daily flow safely– minimum 4 metre wid
4. The breach side slopes are to be stable with recommended 3 to 1 slopes or better.
5. All spoil material is to be placed in a stable location and in a stable condition.
6. Breach is to be to the invert of the original stream bed.
7. Breach location should be at original stream location.
8. Any sediment in the reservoir bottom is to be stabilized.
9. All disturbed areas are to be seeded , and inspected within one year.
10. An engineer is to confirm that the dam has been breached as per specifications/approval.
11. The total removal of all the elements of a dam (ie spillway, all embankment, low level pipes and gates) depend
12. Timing of the dam decommission work may be impacted by weather and environmental concerns. Sediment/
13. Decommissioning of a dam needs approval under the new **BC Water Sustainability Act** (WSA) Dam Safety Reg

Decommission plans prepared by a qualified professional that include design criteria, sealed drawings, work schedule, environmental protection plan and name of project supervisor are to be submitted to the Dam Safety Officer in Nanaimo 90 days before on site work is proposed.

Amendment of any water licences is linked to the dam decommission approval but is a separate activity.

John B
Dam Safety Officer

From: Narynski, Heather M EMPR:EX
Sent: Friday, February 23, 2018 4:21 PM
To: Johnson, David A FLNR:EX
Cc: Baldwin, John FLNR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Mine Questions

Thanks David.

[John, It would be great to touch base next week].

Have a great weekend.

Heather

From: Johnson, David A FLNR:EX
Sent: Friday, February 23, 2018 5:45 PM

To: Narynski, Heather M EMPR:EX
Cc: Baldwin, John FLNR:EX
Subject: RE: Valentine Mine Questions

Hi Heather,

Nice chatting earlier. I have cc'ed John Baldwin our dam safety officer as well.

Answers below.

Dave

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Narynski, Heather M EMPR:EX
Sent: Friday, February 23, 2018 2:57 PM
To: Johnson, David A FLNR:EX
Cc: Narynski, Heather M EMPR:EX
Subject: Valentine Mine Questions

Hi David,

It was helpful speaking with you today.

I'm currently drafting an internal email regarding Valentine mine and a couple of questions came to mind that were not discussed on our phone call:

s.13

Thanks,
Heather

Heather Narynski, P.Eng
Manager, Tailings Storage Facilities

BC Ministry of Energy, Mines and Petroleum Resources
Office/Cell: 250-893-3396

DMFile
D730227

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Monday, February 26, 2018 1:46 PM
To: Johnson, David A FLNR:EX
Cc: Narynski, Heather M EMPR:EX
Subject: RE: Valentine Mine Questions

Dave – Heather Narynski contacted me today regarding the TimberWest Valentine water licence abandonment referral. The issue seems to be that authorizations have been issued for the dam under Mines Act to Great Thunder Mining Company **and** under the WSA to TimberWest. No information on any joint works agreement between any parties exists.

The existing 7 m earth filled high dam is storing water and has a stream flowing through the reservoir and dam spillway. Tailings have been reported to have been placed in the reservoir. Content and volume of tailings material is not known. Water quality in the reservoir is not known. The tailings material in the reservoir will need to be stabilized if the dam is decommissioned.

Both TimberWest and Great Thunder have been reported to be inspecting the dam.

Great Thunders position regarding the dam is not clear. The mine is not active at this time. Heather N will try to contact this company on this matter. If the dam is required for tailings in the future then relocation of the stream may be a solution!

The Chief Inspector of Mines is trying to contact TimberWest as well.

Mines (Heather N) is planning to reply to the water licence abandonment referral. May be a little late!

s.13; s.16

John B

From: Baldwin, John FLNR:EX
Sent: Monday, February 26, 2018 9:35 AM
To: Narynski, Heather M EMPR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mine Questions

Heather/Dave

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Subject: RE: Valentine Mine Questions

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Nice chatting earlier. I have cc'ed John Baldwin our dam safety officer as well.

Answers below.

Dave

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Narynski, Heather M EMPR:EX
Sent: Friday, February 23, 2018 2:57 PM
To: Johnson, David A FLNR:EX
Cc: Narynski, Heather M EMPR:EX
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Hi David,

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I'm currently drafting an internal email regarding Valentine mine and a couple of questions came to mind that were not discussed on our phone call:

s.13

Thanks,
Heather

Heather Narynski, P.Eng
Manager, Tailings Storage Facilities
BC Ministry of Energy, Mines and Petroleum Resources
Office/Cell: 250-893-3396

DAMFILE:
D730227.

26th Feb 2018 - 11.30 AM.

(manager contacted) Heather Narynski @ Mines. called (geotechnical engineer) today.

- Mines has contacted Timber West
- Timber West are landowners.
- FLNRO have been "regulating" the site.
- Mines has not been "regulating" the Site.
- tailings with water licence is not common.

no info on this company wants/plans → Great Thunder are owners under Mine II
- Mines to follow up.
- this company has completed a dam safety inspection, need testing of water !! evidence of tails placed in reservoir (volume and content not known)
→ surprised about fish heights & purpose
→ Chief Inspector of Mines to contact Timber West
- Heather to write to FLNRO re comment on abandoned application

DAM FILES
D730227

Baldwin, John FLNR:EX

From: Johnson, David A FLNR:EX
Sent: Tuesday, January 30, 2018 3:12 PM
To: 'Jason Carvalho'
Subject: RE: Water Licence C072277

Hi Jason,

Thanks for the phone calls and file information you've provided today.

As we have discussed the application you have put forward is for an abandonment of a water licence, under the Water *Sustainability Act*. **A requirement of this abandonment will be decommissioning of the dam.**

An alternative is to withdraw the application for abandonment, and continue operating the structure under the Dam Safely Regulation.

Another option is to withdraw the application for abandonment and then apply to transfer the licence to the mining company. As indicated the mining company would have to be in agreeance for a transfer such as this to occur.

I understand you are in contact with the mining company and that an agreement to transfer the licence is being proposed.

As per our mutual agreement we will allow another 30 days to receive your decision on this application. Please contact me prior to **March 2, 2018**.

As promised, I will continue to follow-up with Mines. Please don't hesitate to contact me if I can be of further assistance.

Thanks very much, Dave Johnson

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Tuesday, January 30, 2018 1:11 PM
To: Johnson, David A FLNR:EX
Cc: Dianna Lau
Subject: Water Licence C072277

David, this is email is further to our telephone conversation this morning.

Great Thunder Gold Corp. has recently contacted TimberWest to inquire about whether we would be interested in transferring our water licence to them.

I refer you specifically to the document titled 'Permit Amendment Conditions' (also attached). Section 8 of the Permit Amendment specifically states that the permit holder must provide a geotechnical report for the tailings facility, as well as an acceptable plan for decommission and final reclamation of the tailings pond installation. The Ministry should therefore have some record of the reclamation requirements for the Dam, which is clearly the responsibility of the Mines holder.

8: Tailings Disposal

a) A geotechnical assessment of the existing tailings impoundment shall prepared by a qualified Professional Engineer and submitted for review by the Chief Inspector prior to commencing site operations. Assessment shall include an acceptable plan for decommissioning and final reclamation of the tailings pond installation.

b) Spillway shall be cleared of all obstructions and

We will continue to explore the transfer of the water licence to Great Thunder Gold Corp. However, in the event that an agreement cannot be reached, it remains our belief that the Dam structure is the responsibility of the Mineral Tenure Holder. This is evidenced through the initial tailings construction report, as well as subsequent requirements from the Ministry to monitor, maintain and decommission the structure.

Can you please keep me apprised of your discussions with Mines.

I would also be happy to meet with you and a representative of Mines in person to further discuss this.

Regards,

Jason Carvalho, MCIP RPP
Project Manager
Couverdon Real Estate
201 – 648 Terminal Avenue
Nanaimo, BC V9R.5E2
(O) 250.716.3722
(M) 250.619.7655
(F) 250.716.3782

"Couverdon is the real estate business of TimberWest Forest Corp., the largest private landowner on Vancouver Island."

Couverdon

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DAM FILE 1
D730227.
Valentine Br. Dam.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Monday, December 4, 2017 8:48 AM
To: Johnson, David A FLNR:EX
Subject: RE: Referral Dam Safety, Water Licence File 1001142

Dave – Yes, responsibility for this existing 7 metre high earth filled dam will need to be addressed if the current water licence is abandoned. Solutions are to either decommission dam and stabilize any mine tailings in the reservoir or transfer ownership and regulation to third parties ie make it a tailings dam owned by a mining company regulated by Mines. The issue of a tailings dam located in Valentine Brook will need to be clarified –s.13
s.13

John B
Dam Safety Officer

From: Johnson, David A FLNR:EX
Sent: Wednesday, November 29, 2017 2:19 PM
To: Baldwin, John FLNR:EX
Subject: Referral Dam Safety, Water Licence File 1001142

Hello John;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

My understanding is that it will be a condition of the abandonment that the dam be decommissioned or otherwise addressed. Referrals have also gone out to Mines and Grant Bracher, Ecosystems.

Please return comments to me via email within 30 days from this email, making them due December 29, 2017.

Don't hesitate to contact me with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

Water Licence Amendment/Abandonment

Abandonment

Tracking Number: 100228238

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name:	TimberWest Forest Corp.
Doing Business As:	
Phone:	250-619-7655
Fax:	250-716-3782
Email:	
BC Incorporation Number:	
Extra Provincial Inc. No:	Nanaimo
Society Number:	
GST Registration Number:	
Contact Name:	Jason Carvalho
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

EMPLOYEE INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name:	TimberWest Forest Corp
Doing Business As:	
Phone:	250-716-3722
Fax:	250-716-3782
Email:	laud@timberwest.com
BC Incorporation Number:	
Extra Provincial Inc. No:	NANAIMO
Society Number:	
GST Registration Number:	87154 6842 RT0001
Contact Name:	Dianna Lau
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:	jason.carvalho@couverdon.com
Contact Name:	Jason Carvalho

TECHNICAL INFORMATION

WATER LICENCE

Please enter your water licence number to start your application. Click 'Verify' to check the number you have entered.

Licence Number:	C072277
Name of Source:	Valentine Brook

LICENCE HOLDER

Name	Billing Address
Timberwest Forest Corp	3 FLR-856 Homer Street, Vancouver BC V6B 2W5

LAND WHERE THE WATER IS USED

WESTERLY 120 CH OF BLK 1221 MALAHAT DIST

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

TYPE OF AMENDMENT

If you select Yes for one of the following options then you will not be able to select any other options.

Abandonment

This option allows you to request the abandonment of all or part of a water licence. There is no fee to abandon all or part of the licence.

Do you want to abandon your water rights?	Yes
Do you want to abandon all or just part of the water licence?	All
Please tell us why you would like to abandon your licence?	Water never used
Please describe what you would like to change and why:	Conditional Water Licence C072277 was issued to Pacific Forest Products on October 10th, 1989 for the purposes of Storage and Industrial Fire Protection. Water held under the licence was never used.

ABANDONMENT

This application allows you to request the abandonment of all or part of a water licence.

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

MORTGAGE SECURITY

Was a mortgage filed with the Comptroller of Water Rights or Regional Water Manager with respect to the land, mine or undertaking to which the licence is appurtenant?	No

PENDING SALES OR PURCHASE AGREEMENT

Is there a pending sales or purchase agreement for the appurtenant land, mine or undertaking?	No

WORKS

If you are abandoning all or part of the rights it is your responsibility to decommission the works associated with the water licence. If decommissioning of the works will require changes to the stream (e.g. dam and pond removal), you may require authorization under the Water Sustainability Act and/or other legislation before proceeding. We may provide related directions after reviewing your plan. Please list any works that are associated with the water licence, their status in the second column, and what you intend to do with them in the comment field.

EXISTING WORKS

Works	Status	Intention
Dam	Fully Constructed	

Comments: Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

Please describe what you want to do with the remaining works:

Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

ATTACHED DOCUMENTS

Document Type	Description	Filename
Other	Tailings Impoundment Construction report confirming when the Dam was constructed by Valentine Mountain Gold Corp.	Tailings Impoundment Constr...

PRIVACY DECLARATION

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FrontCounter BC Program Director
FrontCounter BC, Provincial Operation
441 Columbia Street
Kamloops, BC V2C 2T3

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the "Important Notices" below and then check the declaration at the bottom confirming that everything in this application is complete and accurate.

- The application may be subject to further requirements under the federal Fisheries Act. Please refer to Fisheries and Oceans Canada's "Projects Near Water" webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) for information on how to ensure your project complies with the Fisheries Act.
- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

☑ By submitting this application form, I declare that the information contained on this form is complete and accurate.

OFFICE

Office to submit application to:	Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC?	No

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Nanaimo	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Baldwin, John FLNR:EX

From: Bracher, Grant FLNR:EX
Sent: Monday, December 4, 2017 2:45 PM
To: Johnson, David A FLNR:EX
Cc: Baldwin, John FLNR:EX
Subject: RE: Referral Ecosystems, Valentine Brook, Water Licence File 1001142

Hello Dave,

s.13

Those are my thoughts for now. If you would like to discuss this further, please feel free to contact me.

Grant Bracher, Ph.D., P.Ag., R.P.Bio.
Ecosystem Biologist
Ministry of Forests, Lands and Natural Resource Operations
and Rural Development
2080 Labieux Road
Nanaimo BC V9T 6J9
Tel. 250 751-3221
Fax. 250 751-3103
Grant.Bracher@gov.bc.ca

From: Johnson, David A FLNR:EX
Sent: Wednesday, November 29, 2017 2:20 PM

To: Bracher, Grant FLNR:EX
Subject: Referral Ecosystems, Water Licence File 1001142

Hello Grant;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

My understanding is that it will be a condition of the abandonment that the dam be decommissioned or otherwise addressed. Referrals have also gone out to Mines (Jim Dunkley) and Dam Safety (John Baldwin).

Please return comments to me via email within 30 days from this email, making them due December 29, 2017.

Don't hesitate to contact me with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

Baldwin, John FLNR:EX

From: Johnson, David A FLNR:EX
Sent: Friday, October 20, 2017 11:09 AM
To: Slater, Darryl FLNR:EX; Baldwin, John FLNR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi All,

I cannot attend on Monday, s.22

Dave J

From: Slater, Darryl FLNR:EX
Sent: Friday, October 20, 2017 11:08 AM
To: Baldwin, John FLNR:EX; Johnson, David A FLNR:EX
Subject: Re: Mine contact for Valentine Brook Dam questions

Hi John. s.22 and am wondering if you could forward our meeting invite to Jim. If the time doesn't work, I will have to coordinate on Monday.

From: Baldwin, John FLNR:EX
Sent: October-20-17 10:39:18 AM
To: Slater, Darryl FLNR:EX; Johnson, David A FLNR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

I support having the Mines people attend the conference call on Monday 23rd 2017 at 3pm.

I assume this has been finalized? If so, do you have call in details?

From: Slater, Darryl FLNR:EX
Sent: Thursday, October 19, 2017 9:35 AM
To: Johnson, David A FLNR:EX
Cc: Baldwin, John FLNR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi John. Your thoughts re inviting MEM to this meeting?

Darryl Slater
Water Authorizations Section Head
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
P: 250.751.3239
F: 250.751.3103

From: Slater, Darryl FLNR:EX
Sent: Thursday, October 19, 2017 9:34 AM
To: 'Jason Carvalho'
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Jason. I will get back to you on this. In the meantime, do you have a mines contact that you have been working with?

Darryl Slater
Water Authorizations Section Head
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
P: 250.751.3239
F: 250.751.3103

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, October 18, 2017 2:58 PM
To: Slater, Darryl FLNR:EX; Baldwin, John FLNR:EX
Cc: Doug Underhill
Subject: RE: Mine contact for Valentine Brook Dam questions

Darryl and John, it may be worthwhile having someone from the Ministry of Energy and Mines participate in the discussion to get their perspective on responsibility of the dam structure.

The Dam was constructed by the original mineral tenure holder (Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd) in 1987, which pre-dates the issuance of our conditional water licence. The attached Tailings Impoundment Construction Report confirms when, how, and for whom the dam was constructed. Subsequent Dam Safety Inspection reports refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and removal.

The water licence was issued to Pacific Forest Products in 1989 and references the dam and reservoir as works authorised under the licence (section H), however, it goes on to say in Section (J) that the works have been constructed.

The dam currently serves two individual functions. The first being a tailings pond under the Ministry of Energy and Mines, and the second being the storage of water for our water licence.

If the Dam was constructed under the authorisation of the Ministry of Energy and Mines in 1987 to store water and act as a tailings pond for Mining purposes, how does abandonment of our water licence require decommissioning of the Dam, per John's email below? If this is the case, will deconstructing the dam put us in breach of the mine permit that authorised its construction?

Looking forward to our upcoming discussion.

Thanks

Jason

From: Slater, Darryl FLNR:EX [mailto:Darryl.Slater@gov.bc.ca]
Sent: October 17, 2017 3:43 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Jason. Does a conference call next Monday at 3:00pm work for you? I would like to include our dam safety officer and[s.16]

Thanks,

Darryl Slater
Water Authorizations Section Head
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
P: 250.751.3239
F: 250.751.3103

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Tuesday, October 17, 2017 1:34 PM
To: Slater, Darryl FLNR:EX
Cc: Dianna Lau
Subject: FW: Mine contact for Valentine Brook Dam questions

Hey Darryl, hope all is well. s.22

I was forwarded the email below by Doug Underhill in our office and asked to look at the mechanics around how the current water licence can be transferred from TimberWest to the registered holder of Mineral Tenure on the lands (Great Thunder Gold Corp.), as well as what other options may exists for us.

I'm not sure how much history you have on this file but it is worth understanding as there are some complexities around the connection between the water licence and a tailing pond dam structure, the latter of which predates the water licence.

Do you have time later this week for a quick meeting to discuss the file and what options there are for dissolution of the water licence and/or transfer to the Mineral Tenure Holders? Particularly in the event they say they do not want to take the licence over.

Please let me know if you have any time later tomorrow, or Thursday/Friday .

Thanks,

JC

From: Baldwin, John FLNR:EX [mailto:John.Baldwin@gov.bc.ca]
Sent: September 11, 2017 11:53 AM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Slater, Darryl FLNR:EX <Darryl.Slater@gov.bc.ca>; Howe, Diane J MEM:EX <Diane.Howe@gov.bc.ca>
Subject: RE: Mine contact for Valentine Brook Dam questions

Doug
The current water licence C072277 under the BC Water Sustainability Act (WSA) **on Valentine Brook** held by TimberWest (under the WSA TimberWest is the current owner of the dam)
may be transferred to the owner of the Mine who may have an interest in the dam and reservoir. Any water licence transfer is based on willing giver and willing receiver! Any land access permission associated with private lands is to be negotiated between the land owner and Mine. The transfer details are to be negotiated between the current water licence holder and Mine.

The WSA water licence transfer process is through FrontCounterBC and info on this process can be obtained from provincial website at http://www.frontcounterbc.ca/guides/surface-water/water-licence-amendments/overview/

Water Licences Report

Scroll to bottom of page for unique count of licences and/or applications found in your search

Licence No	WR Map/ Point Code	Stream Name	Purpose	Quantity	Units	Qty Flag	Rediv Flag	
C072277	92 B 051 B (PD61216)	Valentine Brook	Misc Ind'L: Fire Protecti	6784.14	MY	T	N	TI 3 I V6
"	"	Valentine Brook	Stream Storage: Non-Power	6784.14	MY	T	N	TI 3 I V6

Total number of Licences and/or Applications found is 1

Section 27 of the WSA deals with transfer of appurtenancy.

Transfer of appurtenancy

27 (1) On application by the holder in accordance with section 12 *[application and decisi* relation to the authorization, and the comptroller, a water manager or an engineer in conditions and on the terms and conditions the decision maker considers advisable, m

(a) to a person who is the owner of land, a mine or an undertaking and to approval and related permit, determining as the appurtenancy for the right

(b) to the holder, determining as the appurtenancy for some or all of the ri undertaking of that holder.

(2) An authorization, change approval or permit issued under subsection (1) (a) or (b) approval or permit, as modified, as applicable.

(3) Except in relation to a licence required to be registered under the *Water Protectior* appurtenancy that is not in British Columbia.

(4) If the land, mine or undertaking to which an authorization, change approval or pe or a water manager, a transfer of the appurtenancy of the authorization, change appr

(5) Despite subsection (1), the appurtenancy determined under subsection (**1**) for a li

TimberWest is advised to discuss any water licence transfer plans with the Nanaimo FLNRO Water Authorization Section Head – Daryl Salter at 250-751-3239.

The Valentine Brook dam has a consequence classification of LOW with a **8 metre** high dam licenced to store 6784 cubic metres. This dam does **not** meet Section 2 application of the dam safety regulation for minor dams. The WSA Dam Safety Regulation will apply to Valentine Brook Dam as long as there is a dam on the stream.

Abandonment of the water licence will require removal of the dam.

Hope this helps? John

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, September 8, 2017 9:44 AM
To: Baldwin, John FLNR:EX
Subject: FW: Mine contact for Valentine Brook Dam questions

Good morning John
Please see the attached report as well as the comments from Diane below.
Given that this was in fact purposely constructed as a tailings pond and the exploration company is assuming responsibility for the dam, what is the path for TimberWest to abandon their water licence 72277 on Valentine brook?
Thank you

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

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@TimberWest
TimberWest.com/news

From: Howe, Diane J MEM:EX [mailto:Diane.Howe@gov.bc.ca]
Sent: September 8, 2017 7:38 AM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Constable, Lowell MEM:EX <Lowell.Constable@gov.bc.ca>; Narynski, Heather M MEM:EX <Heather.Narynski@gov.bc.ca>
Subject: RE: Mine contact for Valentine Brook Dam questions

26 Oct 2017.
250-893-3396
– left message
– sent email
John

Hi Doug,

Thank you for bringing this to our attention.

I have cc'ed our Geotechnical Manager and TSF manager on this email just so the right folks are included. I have also attached the most recent report we have on the Valentine Dam. Indeed it was used as a tailings structure, and it looks like a small exploration company is assuming the responsibility for the dam. Just on my quick review of the report, it does look like the dam needs to be visited again. I'm not sure how that works with Timberwest being the land owner, there must have been some agreement in the past to allow this work on the Timberwest land?

Are there any immediate concerns you have observed with the structure? Do you have any recent pictures you could share?

26 Oct 2017 - Dmy'd to Diane
discussed setting up
Mines involved in
conference call today
okay will me contact
Diane Howe.
John

26 Oct 2017.
left message to call.
John

Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
www.gov.bc.ca/minepermitting

Ministry of
Energy, Mines and
Petroleum Resources

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, September 8, 2017 6:55 AM
To: Howe, Diane J MEM:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Good morning Diane
I am new to TimberWest and have been given the task of dealing with the Valentine dam located on TimberWest's private property. I spoke to John Baldwin about decommissioning the dam so that we can cancel the water licence. The issue is we do not have good records about past practices in this area. It is believed that this could have been used as a tailings pond by a small scale mining operation. John suggested that if it was used as a tailings pond, MoM would have a record of it as all tailings ponds had to be registered. At the site, there is some minor evidence that the mining operation did pipe water to this dam but it is inconclusive. TimberWest can't decommission a dam and allow the water and sediment to travel down into the Jordan River knowing that there could be contaminants present. I am looking for some direction from you and your staff on how I should proceed.
Thank you

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

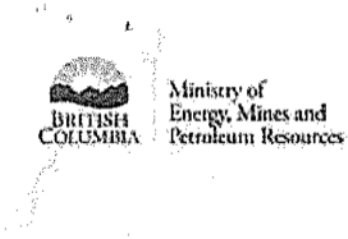
From: Howe, Diane J MEM:EX [mailto:Diane.Howe@gov.bc.ca]
Sent: September 7, 2017 6:00 PM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Doug,

No questions came through on this email, just the google map, can you please resend?

Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
www.gov.bc.ca/minepermitting



From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Wednesday, August 23, 2017 1:32 PM
To: Baldwin, John FLNR:EX
Cc: Howe, Diane J MEM:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Thank you for your info. I will follow up with Diane.

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

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@TimberWest
TimberWest.com/news

From: Baldwin, John FLNR:EX [mailto:John.Baldwin@gov.bc.ca]
Sent: August 23, 2017 1:25 PM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Howe, Diane J MEM:EX <Diane.Howe@gov.bc.ca>
Subject: Mine contact for Valentine Brook Dam questions

Diane Howe (250-952-0183) is a good contact at Ministry of Mines regarding your questions about mining impacts on Valentine Brook Dam.

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DAM FILE
D730227.

Baldwin, John FLNR:EX

From: Narynski, Heather M EMPR:EX
Sent: Tuesday, October 31, 2017 3:06 PM
To: Baldwin, John FLNR:EX; Howe, Diane J EMPR:EX
Cc: Johnson, David A FLNR:EX; Dunkley, Jim R EMPR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi John,

I will pursue an answer to your question regarding any background information EMPR has on Valentine and what materials may be contained within this facility. Detailed or corroborated information will likely take some time as most files would be archived off site.

[Diane, what information do you know about Valentine for preliminary discussions with FLNR as per their request below? I believe this site also goes by the name Ashlu?]

Thanks,
Heather

From: Baldwin, John FLNR:EX
Sent: Tuesday, October 31, 2017 2:59 PM
To: Narynski, Heather M EMPR:EX
Cc: Johnson, David A FLNR:EX; Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

JIM DUNKLEY.

Heather – please note that Jim Dunkley of EMPR attended the Oct 26th 2017 conference call with FLNRO staff and landowner/water licence holder/dam owner TimberWest (Jason Carvalho) related to Valentine Brook Dam. TimberWest was advised by FLNRO to make a water licence abandonment application, and the abandonment adjudication process should identify any third party interests in Valentine Brook Dam. Of interest is any relationship between the current the Mine Permit and the dam. Tailings deposits in the dam reservoir is not known. Draining the reservoir and decommissioning the dam may mobilize any tailings material in the reservoir. Has Mines any information on tailings material in the dam reservoir? John B

From: Baldwin, John FLNR:EX
Sent: Thursday, October 26, 2017 12:01 PM
To: Narynski, Heather M EMPR:EX
Cc: Johnson, David A FLNR:EX
Subject: FW: Valentine Brook Dam Conversation

Heather

Further to my voice mail today here are the conference call details for meeting today.

Diane Howe did cc you on the Valentine Brook dam issue on Sept 8 2017 at 7:38am.

MEM staff member attending this conference call would be appreciated as TimberWest (landowners and holders of water licence under WSA) want to transfer responsibility of the "tailings" dam to a mining company.

John Baldwin
Dam Safety Officer 250-751-3179

Baldwin, John FLNR:EX

Subject:	Valentine Brook Dam Conversation
Location:	TBD
Start:	Thu 2017-10-26 3:00 PM
End:	Thu 2017-10-26 4:00 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Johnson, David A FLNR:EX
Required Attendees:	Dunkley, Jim R EMPR:EX; Slater, Darryl FLNR:EX; Baldwin, John FLNR:EX; 'jason.carvalho@couverdon.com'

Update to this meeting invite.

The conference call information is:

1-877-353-9184
Part ID s.15

Looking forward to chatting at 3:00 today.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

History
1987 - Mine company built "tailings" pond with dam.
- to licensing licence

1989 - logging company took out water licence

today - logging company do not want responsibility for dam. → not use water.

Solutions
1 water licence abandonment will require removal dam

26th Oct 2017
Conference call today

- removal of dam impact Mine permit? 2 New mine holders take out water licence.
- what tailings in reservoir ? Risk!
country rock maybe stable (benign!)

26th Oct 2017

next steps:

- Timber West - make water licence abandonment applications
  - FLNRO will review. with all parties. (WSA Section 31)

Jim Dunkley @ Mines:
- Active Mine Permit - no work on site
  - abandoned equipment on site.
  - 1993 plots of reservoir
  - no tailings beach.

not for mining → exploration for drilling in 2015.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: Wednesday, October 25, 2017 4:02 PM
To: Johnson, David A FLNR:EX
Subject: Valentine Brook meeting - still on and if so, where do we meet?

Do we need to "scrum" before talking to outsiders?

Issue – TimberWest do not want responsibility for dam on their land but hold water licence. History on how TimberWest got the water licence is not clear. Original water use was associated with a mine – note mine is not working at this time but may start up again. Mine tailings may have been placed in dam reservoir.

Solutions;

1. transfer existing water licence (storage and industrial firefighting purposes) and dam on Valentine Brook to new mining company?
2. Abandon water licence and remove dam
3. Keep status quo
4. Abandon water licence and transfer dam to mining company as a tailings dam. Valentine Brook may need to be relocated.

Transfers are based on willing giver and taker.

26 Oct 2017
Dave J to do dk water licence file for details on water licence application and history.
John.

Water Licence Amendment/Abandonment

Abandonment

Tracking Number: 100228238

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name:	TimberWest Forest Corp.
Doing Business As:	
Phone:	250-619-7655
Fax:	250-716-3782
Email:	
BC Incorporation Number:	
Extra Provincial Inc. No:	Nanaimo
Society Number:	
GST Registration Number:	
Contact Name:	Jason Carvalho
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

EMPLOYEE INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name:	TimberWest Forest Corp
Doing Business As:	
Phone:	250-716-3722
Fax:	250-716-3782
Email:	laud@timberwest.com
BC Incorporation Number:	
Extra Provincial Inc. No:	NANAIMO
Society Number:	
GST Registration Number:	87154 6842 RT0001
Contact Name:	Dianna Lau
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:	jason.carvalho@couverdon.com
Contact Name:	Jason Carvalho

TECHNICAL INFORMATION

WATER LICENCE

Please enter your water licence number to start your application. Click 'Verify' to check the number you have entered.

Licence Number:	C072277
Name of Source:	Valentine Brook

LICENCE HOLDER

Name	Billing Address
Timberwest Forest Corp	3 FLR-856 Homer Street, Vancouver BC V6B 2W5

LAND WHERE THE WATER IS USED

WESTERLY 120 CH OF BLK 1221 MALAHAT DIST

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

TYPE OF AMENDMENT

If you select Yes for one of the following options then you will not be able to select any other options.

Abandonment

This option allows you to request the abandonment of all or part of a water licence. There is no fee to abandon all or part of the licence.

Do you want to abandon your water rights?	Yes
Do you want to abandon all or just part of the water licence?	All
Please tell us why you would like to abandon your licence?	Water never used
Please describe what you would like to change and why:	Conditional Water Licence C072277 was issued to Pacific Forest Products on October 10th, 1989 for the purposes of Storage and Industrial Fire Protection. Water held under the licence was never used.

ABANDONMENT

This application allows you to request the abandonment of all or part of a water licence.

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

MORTGAGE SECURITY

Was a mortgage filed with the Comptroller of Water Rights or Regional Water Manager with respect to the land, mine or undertaking to which the licence is appurtenant?	No

PENDING SALES OR PURCHASE AGREEMENT

Is there a pending sales or purchase agreement for the appurtenant land, mine or undertaking?	No

WORKS

If you are abandoning all or part of the rights it is your responsibility to decommission the works associated with the water licence. If decommissioning of the works will require changes to the stream (e.g. dam and pond removal), you may require authorization under the Water Sustainability Act and/or other legislation before proceeding. We may provide related directions after reviewing your plan. Please list any works that are associated with the water licence, their status in the second column, and what you intend to do with them in the comment field.

EXISTING WORKS

Works	Status	Intention
Dam	Fully Constructed	

Comments: Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

Please describe what you want to do with the remaining works:

Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

ATTACHED DOCUMENTS

Document Type	Description	Filename
Other	Tailings Impoundment Construction report confirming when the Dam was constructed by Valentine Mountain Gold Corp.	Tailings Impoundment Constr...

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FrontCounter BC Program Director
FrontCounter BC, Provincial Operation
441 Columbia Street
Kamloops, BC V2C 2T3

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the "Important Notices" below and then check the declaration at the bottom confirming that everything in this application is complete and accurate.

- The application may be subject to further requirements under the federal Fisheries Act. Please refer to Fisheries and Oceans Canada's "Projects Near Water" webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) for information on how to ensure your project complies with the Fisheries Act.
- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

☑ By submitting this application form, I declare that the information contained on this form is complete and accurate.

OFFICE

Office to submit application to: Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC? No

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Nanaimo	**File Number**	**Project Number**
	Disposition ID	**Client Number**

BRITISH COLUMBIA

November 22, 2017 **File: 1001142**

Timberwest Forest Corp.
ATTN Jason Carvalho
201-648 Terminal Avenue
Nanaimo BC V9R 5E2

Dear Sir:

Re: Water Licence Amendment ABN20171122-0003

Thank you for your application of November 7, 2017, advising you wish to abandon your Conditional Water Licence C072277 for storage and industrial (fire protection) purpose on Valentine Brook. Your application will be reviewed and considered, and you will be notified once a decision has been made. The length of time to complete an application review will vary and depends upon the complexity of the application.

Monies paid may be refunded, in whole or in part, as determined by the Comptroller of Water Rights. The refund may be credited toward rentals, fees, or charges under the *Water Sustainability Act* or applied to any outstanding debts to the Province in accordance with the *Financial Administration Act*.

Regardless of the abandonment of the rights held under this licence, the owner of the land, mine or undertaking to which the licence was appurtenant is not relieved of liability for damage resulting from the works constructed, operated or maintained by the owner, or from a defect, insufficiency or failure of the works.

If any works associated with the above licence are in place, please contact the office shown below to ensure that the proposed method of removal of those works is acceptable.

If you have any questions or comments, please contact this office.

Yours truly,

Barbara Sorensen
Water Information Technician

Ministry of Forests, Lands and Natural Resource Operations
Water Management

Mailing Address:
103-2100 Labieux Road
Nanaimo BC V9T 6E9

Location:
103-2100 Labieux Road
Nanaimo BC V9T 6E9

Phone: (250) 751-7220
Fax: (250) 751-7192
Web: http://www.gov.bc.ca/water

Great Thunder Gold Corp.

December 21, 2017

Sent Via Email

Province of British Columbia
Parliament Buildings
Victoria, British Columbia
V8V 1X4

To whom it may concern:

Re: Notice of agency

We write with regards to mineral claims 549331 and 549333, and *Mines Act* permits MX-8-21 and MX-8-263, which we hold for the Valentine Mountain property.

We have retained Gowling WLG (Canada) LLP to assist us with some matters related to the Valentine Mountain property.

By way of this letter, we appoint Gowling WLG (Canada) LLP as an agent for us with respect to the Valentine Mountain property.

Should you have any questions regarding this letter, please contact the undersigned.

Sincerely,

Glen Wallace
Chief Financial Officer
Great Thunder Gold Corp.

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: September 11, 2017 11:53 AM
To: 'Doug Underhill'
Cc: Slater, Darryl FLNR:EX; Howe, Diane J EMPR:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Doug
The current water licence C072277 under the BC Water Sustainability Act (WSA) **on Valentine Brook** held by TimberWest (under the WSA TimberWest is the current owner of the dam)
may be transferred to the owner of the Mine who may have an interest in the dam and reservoir. Any water licence transfer is based on willing giver and willing receiver! Any land access permission associated with private lands is to be negotiated between the land owner and Mine. The transfer details are to be negotiated between the current water licence holder and Mine.

The WSA water licence transfer process is through FrontCounterBC and info on this process can be obtained from provincial website at http://www.frontcounterbc.ca/guides/surface-water/water-licence-amendments/overview/

Water Licences Report

Scroll to bottom of page for unique count of licences and/or applications found in your search

Licence No	WR Map/ Point Code	Stream Name	Purpose	Quantity	Units	Qty Flag	Rediv Flag	
C072277	92 B 051 B (PD61216)	Valentine Brook	Misc Ind'L: Fire Protecti	6784.14	MY	T	N	TI 3 E V6
"	"	Valentine Brook	Stream Storage: Non-Power	6784.14	MY	T	N	TI 3 E V6

Total number of Licences and/or Applications found is **1**

Section 27 of the WSA deals with transfer of appurtenancy.

Transfer of appurtenancy

27 (1) On application by the holder in accordance with section 12 *[application and decisi* relation to the authorization, and the comptroller, a water manager or an engineer in r conditions and on the terms and conditions the decision maker considers advisable, m

(a) to a person who is the owner of land, a mine or an undertaking and to v approval and related permit, determining as the appurtenancy for the right:

(b) to the holder, determining as the appurtenancy for some or all of the ri undertaking of that holder.

(2) An authorization, change approval or permit issued under subsection (1) (a) or (b) approval or permit, as modified, as applicable.

(3) Except in relation to a licence required to be registered under the *Water Protectior* appurtenancy that is not in British Columbia.

(4) If the land, mine or undertaking to which an authorization, change approval or per or a water manager, a transfer of the appurtenancy of the authorization, change appr

(5) Despite subsection (1), the appurtenancy determined under subsection (1) for a li

TimberWest is advised to discuss any water licence transfer plans with the Nanaimo FLNRO Water Authorization Section Head – Daryl Salter at 250-751-3239.

The Valentine Brook dam has a consequence classification of LOW with a **8 metre** high dam licenced to store 6784 cubic metres. This dam does **not** meet Section 2 application of the dam safety regulation for minor dams. The WSA Dam Safety Regulation will apply to Valentine Brook Dam as long as there is a dam on the stream.

Abandonment of the water licence will require removal of the dam.

Hope this helps? John

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, September 8, 2017 9:44 AM
To: Baldwin, John FLNR:EX
Subject: FW: Mine contact for Valentine Brook Dam questions

Good morning John
Please see the attached report as well as the comments from Diane below.
Given that this was in fact purposely constructed as a tailings pond and the exploration company is assuming responsibility for the dam, what is the path for TimberWest to abandon their water licence 72277 on Valentine brook?
Thank you

TimberWest
Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

TimberWest
Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

From: Howe, Diane J MEM:EX [mailto:Diane.Howe@gov.bc.ca]
Sent: September 8, 2017 7:38 AM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Constable, Lowell MEM:EX <Lowell.Constable@gov.bc.ca>; Narynski, Heather M MEM:EX <Heather.Narynski@gov.bc.ca>
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Doug,

Thank you for bringing this to our attention.

I have cc'ed our Geotechnical Manager and TSF manager on this email just so the right folks are included. I have also attached the most recent report we have on the Valentine Dam. Indeed it was used as a tailings structure, and it looks like a small exploration company is assuming the responsibility for the dam. Just on my quick review of the report, it does look like the dam needs to be visited again. I'm not sure how that works with Timberwest being the land owner, there must have been some agreement in the past to allow this work on the Timberwest land?

Are there any immediate concerns you have observed with the structure? Do you have any recent pictures you could share?

Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
www.gov.bc.ca/minepermitting

BRITISH COLUMBIA | Ministry of Energy, Mines and Petroleum Resources

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, September 8, 2017 6:55 AM
To: Howe, Diane J MEM:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

Good morning Diane
I am new to TimberWest and have been given the task of dealing with the Valentine dam located on TimberWest's private property. I spoke to John Baldwin about decommissioning the dam so that we can cancel the water licence. The issue is we do not have good records about past practices in this area. It is believed that this could have been used as a tailings pond by a small scale mining operation. John suggested that if it was used as a tailings pond, MoM would have a record of it as all tailings ponds had to be registered. At the site, there is some minor evidence that the mining operation did pipe water to this dam but it is inconclusive. TimberWest can't decommission a dam and allow the water and sediment to travel down into the Jordan River knowing that there could be contaminants present. I am looking for some direction from you and your staff on how I should proceed.
Thank you

TimberWest
Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

TimberWest
Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

From: Howe, Diane J MEM:EX [mailto:Diane.Howe@gov.bc.ca]
Sent: September 7, 2017 6:00 PM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Subject: RE: Mine contact for Valentine Brook Dam questions

Hi Doug,

No questions came through on this email, just the google map, can you please resend?

Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
www.gov.bc.ca/minepermitting

BRITISH COLUMBIA | Ministry of Energy, Mines and Petroleum Resources

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From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Wednesday, August 23, 2017 1:32 PM
To: Baldwin, John FLNR:EX
Cc: Howe, Diane J MEM:EX
Subject: RE: Mine contact for Valentine Brook Dam questions

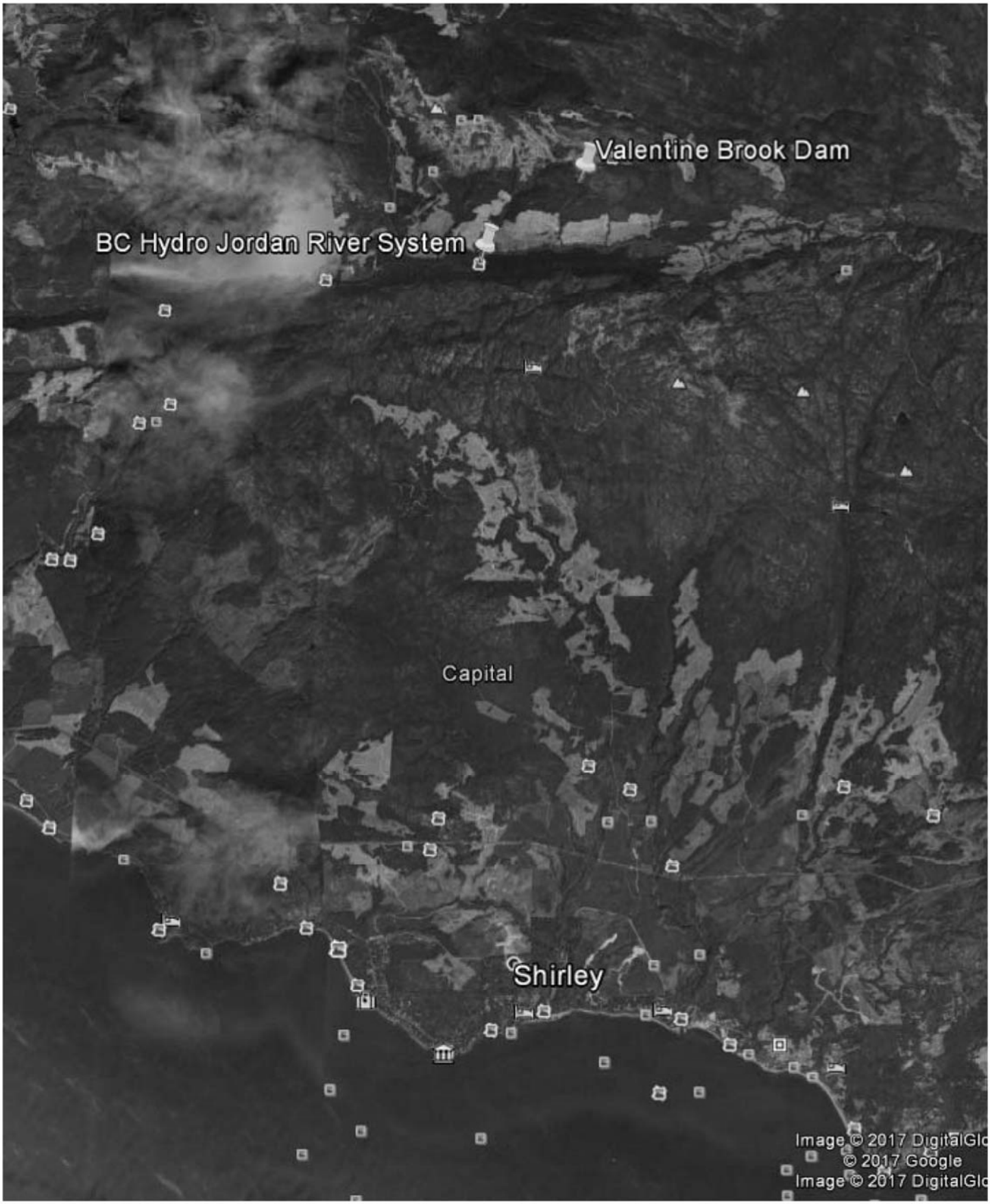
Thank you for your info. I will follow up with Diane.

TimberWest
Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

From: Baldwin, John FLNR:EX [mailto:John.Baldwin@gov.bc.ca]
Sent: August 23, 2017 1:25 PM
To: Doug Underhill <Doug.Underhill@TimberWest.com>
Cc: Howe, Diane J MEM:EX <Diane.Howe@gov.bc.ca>
Subject: Mine contact for Valentine Brook Dam questions

Diane Howe (250-952-0183) is a good contact at Ministry of Mines regarding your questions about mining impacts on Valentine Brook Dam.



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From: Northcote, Bruce EMPR:EX
To: Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Mtn
Date: November 1, 2017 11:12:48 AM

Unfortunately we have to complicate things for them, as the tailings facility apparently contains at least some material.
In 1983, 6 tons of sluiced fines and vein material were shipped to Trail
In 1987 Bacon, Donaldson and Associates built and operated a 20 tpd bulk sampling plant at the site. Recorded throughput June 1987 to Feb 1988 was 635.1 tons (Assessment Report 27726 page 9). The tailings impoundment facility was constructed for approximately 10,000 cubic meters capacity (AR 27360)
There is a mention of 68 tonnes milled in 1996, (AR 32500) but no details
There were 4 shipments totalling 2.1 tonnes to Mineral Associates in 2001. Not clear what processing may have occurred on site
There was environmental work and reclamation planning in 2002 toward permit requirements for a 3000 tonne bulk sample (assessment Report 27360), but I can find no record of the sample itself ever being collected or processed. The engineering report appended to the assessment report says there are no records available of the tailings levels within the impoundment as of 2003.
The upshot is there is something in the impoundment, though likely not a large volume. There were water samples collected and reported from the impoundment in 2003 (AR 27360)

Bruce Northcote
Regional Geologist, Mineral Development Office
Geological Survey Branch, British Columbia Ministry of Energy, Mines and Petroleum Resources
Suite 300 - 865 Hornby Street, Vancouver BC Canada V6Z 2G3
604-660-2713

From: Dunkley, Jim R EMPR:EX
Sent: Tuesday, October 31, 2017 4:58 PM
To: Northcote, Bruce EMPR:EX
Subject: RE: Valentine Mtn

Thanks. Agree that there appears to have been mill equipment on site.

From: Northcote, Bruce EMPR:EX
Sent: Tuesday, October 31, 2017 4:44 PM
To: Dunkley, Jim R EMPR:EX
Subject: Re: Valentine Mtn

Hi Jim, if memory serves and sometimes it doesn't, I saw an old ball mill out there and was told something about a bulk sample. If anything processed it should be mentioned in history sections of tech reports. Will check.

Bruce Northcote
Regional Geologist
BC Ministry of Energy, Mines and Petroleum Resources

On Oct 31, 2017, at 4:33 PM, Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca> wrote:

> Good afternoon Bruce,
> Valentine Mountain is a mineral occurrence in the Sooke area. Beau Pre resources operated the site for quite a while in the 80s, 90s and early 2000s. Early on there was

exploration work by Noranda and at least one other company. Current owner is Great Thunder Gold Corp.

In 1987 Beau Pre constructed a tailings dam capable of holding 10,000 tonnes of tailings. In 1989 the precursor to TimberWest got a water license for use of the water behind the dam for fire fighting purposes. The dam is still there as is the water license. TimberWest wishes to rid itself of the license which may mean they rid themselves of a dam they did not construct.

Our files show that Beau Pre applied for and then cancelled a 10,000 tonne bulk sample in 87-89. They also were permitted for a 3000 t bulk sample in the early 2000s. Our files do not show if this was completed. I am hoping you can look through government publications to see if there is any mention of actual production at this mine. I suspect that there may not have been and that the tailings facility actually holds no tailings. Would certainly make things easier for TimberWest.

Jim Dunkley, P. Geo
Inspector of Mines
300-1810 Blanshard St
Victoria, BC. V8W 9M9
250.953.4640

From: Barr, Brenda M FLNR:EX
To: Sorensen, Barb FLNR:EX
Subject: 2017-11-14 File Assignment 1001142
Date: November 14, 2017 12:56:00 PM
Importance: High

100228238

Hi Barb

The above abandonment application has been assigned to you for review.

Thanks
Regards

Brenda Barr | Water Information Technician | Water ~ Authorizations
West Coast Region | Ministry of Forests, Lands, Natural Resource Operations and Rural Development
2100 Labieux Rd | Nanaimo BC | V9T 6E9 | Tel: 250 751-3200 | Fax: 250 751-7079
Brenda.Barr@gov.bc.ca | Please consider the environment before printing this email

From: Dunkley, Jim R EMPR:EX
To: Johnson, David A FLNR:EX
Subject: RE: Valentine Brook Dam Conversation
Date: November 23, 2017 3:57:26 PM
Attachments: RE Valentine Mtn.msg

Hi David,

The mineral property is owned by Great Thunder Gold Corp.

Contacts there are :

Great Thunder Gold Corp.
Attn: Glen Wallace, CFO
1277 Rockhampton Close
Victoria, BC
V9B 6X5
Telephone: (250) 590-1166
Fax: (250) 590-1167
E-mail: glen@wallace.pro

or

Kevin Whelan
CEO Great Thunder Gold Corp
kcwhelan@shaw.ca

I have included an email from the Bruce Northcote, Regional Geologist, who did a search on activities relating to mining and tailings at the site. It would seem as though there are at least some tailings in the pond.

Potentially the amount of tailings is small, and depending upon the risk potential, there may be enough till in the tailings pond dam to adequately cover the tailings. This is just speculation at though.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

From: Johnson, David A FLNR:EX
Sent: Thursday, November 23, 2017 11:22 AM
To: Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi Jim,

As discussed I am hoping you can send me the information on the mining permit for Valentine Mountain, I need the contact information of the current mining company.

As discussed, I will get a referral out to you and Heather with a copy of the application and a 30day window for comment.

I appreciate your help, thank you very much, Dave.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Narynski, Heather M EMPR:EX
Sent: Tuesday, October 31, 2017 3:06 PM
To: Baldwin, John FLNR:EX; Howe, Diane J EMPR:EX
Cc: Johnson, David A FLNR:EX; Dunkley, Jim R EMPR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi John,

I will pursue an answer to your question regarding any background information EMPR has on Valentine and what materials may be contained within this facility. Detailed or corroborated information will likely take some time as most files would be archived off site.

[Diane, what information do you know about Valentine for preliminary discussions with FLNR as per their request below? I believe this site also goes by the name Ashlu?]

Thanks,
Heather

From: Baldwin, John FLNR:EX
Sent: Tuesday, October 31, 2017 2:59 PM
To: Narynski, Heather M EMPR:EX
Cc: Johnson, David A FLNR:EX; Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

s.13

From: Baldwin, John FLNR:EX
Sent: Thursday, October 26, 2017 12:01 PM
To: Narynski, Heather M EMPR:EX
Cc: Johnson, David A FLNR:EX
Subject: FW: Valentine Brook Dam Conversation

Heather

Further to my voice mail today here are the conference call details for meeting today.

Diane Howe did cc you on the Valentine Brook dam issue on Sept 8 2017 at 7:38am.

MEM staff member attending this conference call would be appreciated as TimberWest (landowners and holders of water licence under WSA) want to transfer responsibility of the "tailings" dam to a mining company.

John Baldwin
Dam Safety Officer 250-751-3179

From: Northcote, Bruce EMPR:EX []
To: Dunkley, Jim R EMPR:EX [Jim.Dunkley@gov.bc.ca]
Subject: RE: Valentine Mtn
Date: Wednesday, November 01, 2017 11:12:47

Unfortunately we have to complicate things for them, as the tailings facility apparently contains at least some material.

In 1983, 6 tons of sluiced fines and vein material were shipped to Trail

In 1987 Bacon, Donaldson and Associates built and operated a 20 tpd bulk sampling plant at the site. Recorded throughput June 1987 to Feb 1988 was 635.1 tons (Assessment Report 27726 page 9). The tailings impoundment facility was constructed for approximately 10,000 cubic meters capacity (AR 27360)

There is a mention of 68 tonnes milled in 1996, (AR 32500) but no details

There were 4 shipments totalling 2.1 tonnes to Mineral Associates in 2001. Not clear what processing may have occurred on site

There was environmental work and reclamation planning in 2002 toward permit requirements for a 3000 tonne bulk sample (assessment Report 27360), but I can find no record of the sample itself ever being collected or processed. The engineering report appended to the assessment report says there are no records available of the tailings levels within the impoundment as of 2003.

The upshot is there is something in the impoundment, though likely not a large volume. There were water samples collected and reported from the impoundment in 2003 (AR 27360)

Bruce Northcote
Regional Geologist, Mineral Development Office
Geological Survey Branch, British Columbia Ministry of Energy, Mines and Petroleum Resources
Suite 300 - 865 Hornby Street, Vancouver BC Canada V6Z 2G3
604-660-2713

From: Dunkley, Jim R EMPR:EX
Sent: Tuesday, October 31, 2017 4:58 PM
To: Northcote, Bruce EMPR:EX
Subject: RE: Valentine Mtn

Thanks. Agree that there appears to have been mill equipment on site.

From: Northcote, Bruce EMPR:EX
Sent: Tuesday, October 31, 2017 4:44 PM
To: Dunkley, Jim R EMPR:EX
Subject: Re: Valentine Mtn

Hi Jim, if memory serves and sometimes it doesn't, I saw an old ball mill out there and was told

something about a bulk sample. If anything processed it should be mentioned in history sections of tech reports. Will check.

Bruce Northcote
Regional Geologist
BC Ministry of Energy, Mines and Petroleum Resources

On Oct 31, 2017, at 4:33 PM, Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca> wrote:

Good afternoon Bruce,

Valentine Mountain is a mineral occurrence in the Sooke area. Beau Pre resources operated the site for quite a while in the 80s, 90s and early 2000s. Early on there was exploration work by Noranda and at least one other company. Current owner is Great Thunder Gold Corp.

In 1987 Beau Pre constructed a tailings dam capable of holding 10,000 tonnes of tailings. In 1989 the precursor to TimberWest got a water license for use of the water behind the dam for fire fighting purposes. The dam is still there as is the water license. TimberWest wishes to rid itself of the license which may mean they rid themselves of a dam they did not construct.

Our files show that Beau Pre applied for and then cancelled a 10,000 tonne bulk sample in 87-89. They also were permitted for a 3000 t bulk sample in the early 2000s. Our files do not show if this was completed. I am hoping you can look through government publications to see if there is any mention of actual production at this mine. I suspect that there may not have been and that the tailings facility actually holds no tailings. Would certainly make things easier for TimberWest.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

250.953.4640

From:	Jason Carvalho
To:	Dunkley, Jim R EMPR:EX; Johnson, David A FLNR:EX
Cc:	Dianna Lau; Doug Underhill
Subject:	RE: Valentine Brook Water Licence File 1001142
Date:	November 27, 2017 1:14:29 PM
Attachments:	TEL-19-6819-0_2014_Valentine_Mine_DSI_Report_2014-12-01_FINAL.PDF

Thanks David, I have reviewed the original application. I do not see where the connection is made that TimberWest would take over ownership and/or liability of the existing dam structure from this application.

We do not dispute the existence of a Dam on the lands; however, we strongly disagree with the inference that TimberWest assumed ownership / liability of the dam through an application for a water licence. The dam was built under authorisation of the Ministry of Energy and Mines to function as a tailings pond. This cannot be disputed as the construction drawings are explicit to the operation of a mining function. These construction reports pre-date the issuance of the water licence. Numerous safety inspections have also been carried out by the mining company based on their ownership of the tailings / dam structure (attached).

The water licence application in 1989 references the existing dam; however, there is no claim to ownership, nor was there a request for construction. The storage held under the licence 'piggy backed' on the storage held by the existing tailings structure / dam.

Jim – As the dam was constructed under authorisation of Mines, does the authority around its decommissioning not lie under Mines legislative purview? One can argue that if the dam is removed, Great Thunder Gold Corp. will be in conflict with their operating permit.

I can appreciate that considerations for abandonment of a water licence are spelled out in the Water Sustainability Act; however, I would challenge whether this applies where the Dam was constructed under a different legislative authority. Its important to remember that whether the water licence is abandoned or not, decommissioning of the dam will still be secured under the Mines Permit.

We are happy to meet again collectively as this matter appears to fall between two ministries. Please let us know what time / date works best for you.

Jason

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: November 15, 2017 4:37 PM

To: Jason Carvalho <jason.carvalho@couverdon.com>
Subject: Valentine Brook Water Licence File 1001142

Hi Jason,

Nice chatting this afternoon.

I have enquired and I am permitted to share the 1989 application with you.

Attached is a scan of the hardcopy documents we have in this regard, including the original application, acceptance letter, receipt and proof of notice served by the forest company.

I have instructed our staff to take this application in, and we will be getting back to you with an acceptance letter and our requirements for abandonment.

The provincial considerations for abandonment of a water licence are spelled out in the *Water Sustainability Act*, under section 31:
http://www.bclaws.ca/civix/document/id/complete/statreg/14015#section31

I would encourage you to contact the mining company and determine if they have an appetite for taking over this licence. It will very likely be a term of the abandonment process to serve notice to the company regardless.

Thanks again for the quick response on the phone today, I look forward to working with you on this application.

Dave

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

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THURBER ENGINEERING LTD.

VALENTINE MOUNTAIN MINE
TAILINGS DISPOSAL FACILITY
2014 DAM SAFETY INSPECTION

Report

to

Great Thunder Gold Corp.

Kevin Sterne, M.Sc., P.Eng.
Review Engineer

Date: December 1, 2014
File: 19-6819-0

Jay McIntyre, M.A.Sc., P.Eng.
Project Engineer

100, 4396 West Saanich Road, Victoria, BC V8Z 3E9 T: 250 727 2201 F: 250 727 3710
thurber.ca

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EXECUTIVE SUMMARY

A Dam Safety Inspection has been completed for the tailings disposal facility at the Valentine Mountain Mine, located approximately 20 km northwest of Sooke, BC. A tailings dam was constructed at the site in the fall of 1987 in advance of a bulk sampling program. The dam has not been raised or otherwise modified since its original construction. The facility was reportedly constructed to contain approximately 6,700 m^3 of tailings, which were to be generated during the mineral exploration phase. It is believed the actual amount of tailings presently impounded is considerably less than this.

The following is a summary of significant observations and conclusions from this Dam Safety Inspection.

- Based on the 2007 CDA Dam Guidelines classification system and a review of current downstream land usage, the Valentine Mountain Mine tailings dam should be assigned a consequence rating of "Significant".
- The design operating freeboard is approximately 1.10 m, and is controlled by a spillway beyond the east abutment of the dam that was blasted into bedrock. The dam designer assigned a 6 hour storm delivering 135 mm of rainfall as the design event for the facility, and it appears the constructed spillway (if properly maintained) can pass the runoff associated with such an event with a significant factor of safety.
- The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.
- A review of the stability analysis results presented by the dam designer in the construction summary report indicates that individual may not have been familiar with standard stability analysis conventions, particularly with respect to the loading conditions considered. Furthermore, the seismic coefficient used for the original analysis is likely too low given subsequent changes to the regional seismic hazard maps.
- Based on a comparison between site inspection observations, it appears that the slump on the downstream face of the embankment near the east abutment has not increased in size in the 4-year period since 2010. The presence of the slump indicates the downstream slope of the embankment was constructed too steep.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed. Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure.

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- The pressure gauge connected immediately upstream of the underdrain outlet was observed to be leaking during the 2014 inspection. Comparing to images collected during the 2010 inspection, it appears the leak has developed (or increased in flow rate) since November of 2010.
- To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. If they can be located and are operational, data from these instruments would be useful in future stability analyses.
- Great Thunder Gold Corp recently assumed ownership of the mine and has since removed vegetation on the dam and in the spillway channel. This work was recommended during a previous site inspection carried out for the former mine owner.
- No active seepage was observed along the toe of the dam during Thurber's 2010 or 2014 inspections; however a localized wet spot was observed in front of the underdrain outlet area at the time of the October 24, 2014 inspection.

The following is a summary of the recommendations resulting from this DSI.

a) A survey should be carried out within the impoundment to investigate the level of the tailings. It is anticipated this would be completed using a row boat/canoe and a weighted tape or sounding line. Once completed, the tailings level should be compared to the as-constructed survey of the impoundment prior to filling to obtain a rough estimate of the volume of tailings in the facility.

b) Now that an as-built plan of the impoundment has been obtained (showing the locations of installed instrumentation) a renewed effort should be made to locate and collect water level readings at both observation wells and the piezometer. The piezometer reportedly consisted of a 1 cm diameter metal tube, so it is not clear if this instrument will be serviceable (due to possible damage during construction or subsequent corrosion).

c) An updated stability assessment should be carried out, including an evaluation of performance during a design earthquake. If water level data from existing instruments is unavailable, conservative assumptions should be made for the purposes of the analysis.

d) A remediation plan should be developed (such as a stabilizing toe berm) should the stability assessment determine that the factor of safety is unacceptable.

e) A qualified professional should evaluate whether the 6-hr storm assumed by the original dam designer is suitable and conforms to the inflow design flood recommended in the CDA guidelines. This assessment may require a survey of the existing spillway.

f) Great Thunder Gold Corp. should initiate a dam surveillance program that includes dam inspection visits at regular intervals throughout the year. Surveillance personnel should fill out a standard inspection form during these visits. Of particular importance would be the development of new seepage locations along the toe of the dam, as well as observations pertaining to the leakage at the underdrain outlet.

g) Vegetation must not be allowed to become re-established on the dam or along the spillway channel. Due to weather and frost effects, it is anticipated that rock falls will occasionally occur along the spillway channel, which was blasted through bedrock. Significant rock fall should be removed to prevent obstructions to flow.

h) Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. A remediation plan should be developed to address this risk.
i) A response plan should be developed to address the possible increase in leakage from the outlet pipe over time.

The author of this DSI report is not considered to be the Engineer of Record for the structure and does not take professional responsibility for its design. Mr. Peter Peart, P.Eng. submitted the impoundment proposal report for the subject tailings dam to the Ministry of Mines in June of 1987. Mr. Peart also prepared the construction report for the structure, dated December 1, 1987. In this latter document, Mr. Peart clearly accepts professional responsibility for the design and construction of the structure. To our knowledge, no modifications to the dam have occurred since construction.

Use of this Executive Summary is subject to the Statement of Limitations and Conditions included at the end of the text of the report. Clause 4 of the statement identifies that unless written consent is provided, only the Client may use or rely on the contents of this report. With reference to Clause 4, the BC Ministry of Energy and Mines is also granted "Approved User" status.

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TABLE OF CONTENTS

1. INTRODUCTION 1
2. SCOPE OF WORK 1
3. REFERENCE DOCUMENTS 1
4. FACILITY DESCRIPTION 2
   - 4.1 Overview 2
   - 4.2 Location 2
   - 4.3 Tailings Dam 2
5. SUMMARY OF CLIMATE DATA 4
6. FINDINGS FROM PREVIOUS DAM INSPECTIONS 5
   - 6.1 2003 Jacques Whitford Inspection 5
   - 6.2 2010 Thurber Inspection 6
7. OBSERVATIONS FROM 2014 THURBER INSPECTION 8
8. SITE SEISMICITY 9
9. REVIEW OF CONSEQUENCE CLASSIFICATION 9
   - 9.1 CDA Classification System 9
   - 9.2 Valentine Mountain Tailings Facility 10
10. SUMMARY OF RECENT CONSTRUCTION 11
11. WATER BALANCE REVIEW 11
12. FREEBOARD AND AVAILABLE STORAGE 12
13. WATER DISCHARGE SYSTEMS 13
14. SEEPAGE OCCURRENCE 13
15. SURFACE WATER CONTROL AND SURFACE EROSION 13
16. INSTRUMENTATION REVIEW 14
17. COMMENTS REGARDING DESIGN, CONSTRUCTION AND PERFORMANCE 14
18. SUMMARY 16
19. RECOMMENDATIONS 18
20. ENGINEER OF RECORD 19
21. CLOSURE 19

STATEMENT OF LIMITATIONS AND CONDITIONS

THURBER

LIST OF DRAWINGS

Drawing No. 19-6819-0-1; Key Plan
Drawing No. 19-6819-0-2; Site Plan
Drawing No. 19-6819-0-3; Section A
Drawing No. 19-6819-0-4; Plan Showing the Anticipated Flow Direction Downstream of Dam

LIST OF TABLES

Table 4-1 – Summary of Measured Crest Width and Slope Angle
Table 5-1 – Summary of Climate Data
Table 8-1 – Classification in Terms of Failure Consequence (CDA 2007)

APPENDICES

APPENDIX A – REFERENCE DOCUMENTS
APPENDIX B – DRAWING
APPENDIX C – TABULATED CLIMATE DATA
APPENDIX D – PREVIOUS CONSULTANT INSPECTIONS & REPORTS
APPENDIX E –SITE INSPECTION PHOTOS
APPENDIX F – SEISMIC HAZARD CALCULATION
APPENDIX G – CONSTRUCTION PHOTOGRAPHS

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1. INTRODUCTION

Thurber Engineering Ltd. (Thurber) has undertaken a Dam Safety Inspection (DSI) of the tailings disposal facility at Valentine Mountain Mine, located approximately 20 km northwest of Sooke, BC.

This report is subject to the Statement of Limitations and Conditions, which is included at the end of the text. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

2. SCOPE OF WORK

Thurber's scope of work for this assignment was outlined in our proposal letter to Great Thunder Gold Corp. dated October 10, 2014. Authorization to proceed with the above noted work scope was received via e-mail on October 10, 2014.

Thurber's scope of work included a review of available background information pertaining to the dam as well as a site inspection completed on October 24, 2014.

3. REFERENCE DOCUMENTS

Prior to conducting the dam safety inspection, Thurber visited the Ministry of Energy and Mines (MEM) office in Victoria to review pertinent background information available in their files, including any design reports and as-built records for the dam. The following pertinent documents were obtained and reviewed as part of this assessment.

- Tailings Impoundment Proposal, Valentine Mountain, Prepared for Valentine Gold Corporation by Peter Peart, P.Eng.; June 1987.
- Tailings Impoundment Construction Report, Valentine Mountain Project, Prepared for Valentine Gold Corporation by Peter Peart, P.Eng.; December 1, 1987.
- Excerpt from report titled "Metallurgical Bulk Sampling Pilot Plan Programme for Valentine Mountain Property; Bacon, Donaldson & Associates; March 14, 1998.

In addition, the following engineering report was reviewed (provided by the former mine owner in 2010):

- Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC; report prepared by Jacques Whitford Environment Ltd.; December 23, 2003.

The proposal document referenced above contains design information, including the results of stability analyses completed during the design stage. The construction report contains as-built information. For convenience, the above documents are included in Appendix A of this report.

4. FACILITY DESCRIPTION

4.1 Overview

Valentine Mountain Mine has never been an operational mine. Since gold was discovered (circa 1976), works carried out at the site have been related to mineral exploration. A tailings dam was constructed at the site in the fall of 1987 in advance of a bulk sampling program. The dam has not been raised or otherwise modified since its original construction. The facility was reportedly constructed to contain approximately 6,700 m^3 of tailings, which were to be generated during the mineral exploration phase. It is believed the actual amount of tailings presently impounded is considerably less than this.

The June 1987 impoundment proposal report states that the location of the tailings impoundment is within the anticipated ore zone, and this would require its removal at some future time.

4.2 Location

The tailings dam is located at approximately elevation 780 m on the south side of Valentine Mountain at 48° 30' 57" N and 123° 53' 22" W. The impoundment is located above and to the north of Bear Creek Reservoir. The site is accessed by gravel logging roads from Sooke, BC, which is located approximately 20 km southwest of the dam. The site location is shown on the attached Drawing No. 19-6819-0-1 in Appendix B.

The dam is situation on the south side of a ridge oriented in the east-west direction. The local topography is bedrock-controlled with localized thin veneers of dense till-like soils. Based on information provided in the design document, the site is underlain by competent interbedded meta-sedimentary bedrock.

4.3 Tailings Dam

The tailings dam was constructed in the fall of 1987 by Valentine Gold Corporation. The construction report indicates the dam can contain approximately 6,700 m^3 of mine tailings. The report also states the facility has the capacity to store about 10,000 tonnes of mill feed provided the in-situ density of the tailings is approximately 1.77 g/cm^3 (1,770 kg/m^3). Based on an excerpt from the bulk sampling summary report prepared by Bacon, Donaldson Associates Ltd.

in March 1988, a total of approximately 650 tons of ore was sampled and processed at the on-site pilot plant during the 1998 bulk sampling program. We understand that another smaller sampling program occurred in 1998; however, there are no details in regards to the sample size.

The in-situ density of the tailings would depend on the achieved gradation following processing at the pilot plant, as well as the method of placement. The impoundment proposal report anticipated the tailings would have a gradation consistent with a silty sand, with approximately 50% of the materials passing the 0.075 mm sieve size. It is considered unlikely that the tailings would have achieved an in-situ density of 1,770 kg/m^3 when placed as a slurry, and that a more realistic density would be in the range of 1,200 to 1,400 kg/m^3. In any case, the available information indicates the impoundment likely is less than half full.

As part of this current assessment, Thurber completed a site inspection on October 24, 2014. The inspection was completed by Jay McIntyre, P.Eng. During this site inspection visit, the dam was measured as approximately 90 m long, with a nominal crest width of approximately 5 to 6 m and a maximum height of approximately 8 m. A plan of the tailings dam is shown on attached Drawing No. 19-6819-0-2 in Appendix B. The image shown on this drawing was scanned from a plan of the tailings dam prepared in November 1987, marked "As Constructed". The contours shown on the above noted plan were used to generate a section (Section A) through the dam at its maximum height. This cross-section is shown on Drawing No. 19-6819-0-3 in Appendix B.

Based on cross-sections provided in the June 1987 Tailings Impoundment Proposal report, both the upstream and downstream slopes of the embankment were to be constructed to a gradient of 1.7H to 1V (30.5°). However, a plan of the dam marked "As Constructed" and dated November 1987 indicates the dam's upstream slope is generally graded at 27° (2H to 1V), whereas the downstream slope angle is nominally sloped at 34° (1.46H to 1V). During the October 2014 site inspection, a handheld inclinometer was used to measure the embankment slopes. Based on these measurements, the downstream slope is generally graded at an angle of 37° (1.33H to 1V) from the horizontal, with localized steeper and flatter sections. The maximum slope was estimated as being 40° at approximately Sta. 0+30 where the dam is constructed atop outcropping bedrock. The upstream embankment slope (above the impoundment level) was estimated to be sloped at approximately 27° from the horizontal (2H to 1V). Table 4-1 summarizes the crest widths and embankment slope angles measured by Thurber along the length of the dam.

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TABLE 4-1
SUMMARY OF MEASURED CREST WIDTH AND SLOPE ANGLE

Dam Stationing (m)	Crest Width (m)	Measured Downstream Slope Angle
0+00	10.0	n/a
0+10	6.4	32°
0+20	6.0	38°
0+30	6.2	40°
0+40	5.1	37°
0+50	4.8	37°
0+60	5.3	37°
0+70	4.6	Excessive vegetation
0+80	7.2	Excessive vegetation
0+90	At bedrock spillway	n/a

Note: 1. Dam stationing measured from west abutment
2. Slope angles measured using handheld inclinometer
3. Thick vegetation precluded accurate estimate of slope angle.

The dam is aligned roughly in the East-West direction and curves slightly towards the south at the middle. A spillway, blasted through bedrock, is located beyond the east abutment of the dam. The ground surface in this area slopes downwards towards the south, with a nominal surface gradient of approximately 23°.

At the time of the October 24th inspection, water was flowing over the spillway and the available freeboard was measured as 1.05 m.

5. SUMMARY OF CLIMATE DATA

Climate records listing monthly precipitation and daily average air temperatures were obtained from the CRD weather station at Sooke Lake, located approximately 14 km east of Valentine Mountain. The location of Sooke Lake is shown on Drawing 19-6819-0-1 in Appendix B.

Monthly data is tabulated in Appendix C. Table 5-1 below summarizes the average monthly precipitation data for the past 40 years, and daily average temperatures for the past 10 years.

TABLE 5-1
SUMMARY OF CLIMATE DATA

Average Monthly Precipitation in millimeters (1974 to 2013)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
263.0	174.4	161.4	90.7	53.6	34.5	23.1	35.0	55.7	157.7	298.8	266.5	1614
Average Daily Temperatures in °C (2004 to 2013)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2.8	3.5	4.9	7.3	11.3	14.4	17.7	17.2	13.6	8.7	4.8	2.4	

Based on 40 years of monitoring, the average yearly rainfall in the area is 1614 mm, with approximately half of this occurring in the three months of November to January. It is noted that the elevation of Sooke Lake is approximately 700 m lower than the Valentine Mountain tailings dam location. Thus, it is anticipated that average air temperatures at the mine site are slightly lower than indicated in the above table.

6. FINDINGS FROM PREVIOUS DAM INSPECTIONS

We are aware of two previous dam inspections. Details are provided below.

6.1 2003 Jacques Whitford Inspection

Jacques Whitford Environment Ltd. (JWEL) was retained by Beaupre Exploration Ltd. to complete a geotechnical assessment of the dam in 2003. JWEL (now Stantec) prepared a report on December 23, 2003 titled "Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC". This report was apparently prepared in response to a July 2002 letter from the Ministry of Energy and Mines (MEM), requiring that a geotechnical assessment of the tailings impoundment be carried out prior to authorizing the extraction and processing of a 3,000 tonne sample. The report was to be prepared by a qualified Professional Engineer and submitted for review by the Chief Inspector. The letter also specified that the assessment should include an acceptable plan for decommissioning and final reclamation of the tailings pond.

JWEL completed a site inspection on April 3, 2003. Key observations from the JWEL report are summarized as follows:

- There were no obvious cracks on the dam crest, however, "sloughing" was observed on the downstream face of the dam near the east abutment, extending approximately 0.3 m in depth. The slump covered an area extending between approximately Sta. 0+78 and the spillway.

- There was an open crack extending from approximately Sta. 0+72 and 0+75. At this location, the dam is approximately 5.9 m high.
- No seepage was observed along the seepage collection pond
- There was no noticeable water in the ditch along the toe of the dam.
- There are no records available of the tailings level within the impoundment.

The JWEL report commented that based on visual observations made during their inspection that the dam *"likely does not have the same factor of safety against slope instability as when it was constructed"*. The report also stated that the selection of a friction angle of 50° for the rip rap *"warrants review"* as does the selection of a seismic coefficient of 0.1g for the design earthquake. The report states that an appropriate peak horizontal ground acceleration value would be 0.349g. At the time of the JWEL assessment, this ground acceleration corresponded to an earthquake having an annual exceedance probability of 1 / 475.

Apart from the baseline readings of the settlement monuments, JWEL was unable to find any other monitoring data, including any readings of the piezometers. JWEL recommended that Beaupre Exploration Ltd. search their records for any subsequent instrument monitoring readings. A copy of the 2003 JWEL geotechnical assessment report is attached in Appendix D.

6.2 2010 Thurber Inspection

Thurber was retained by Mill Bay Ventures Inc. in 2010 to conduct a preliminary geotechnical evaluation of the tailings dam. The assessment focused primarily on the identified slump and did not constitute a formal dam safety review. Key observations made during the November 16, 2010 site inspection are summarized below:

- The reservoir was observed to have approximately 1.1 m of freeboard.
- The spillway (excavated into rock beyond the east abutment) was observed to be flowing. A log and some vegetation was observed in the entrance to the spillway. Vegetation and a length of perforated "Big-O" flexible piping was observed in the spillway channel.
- The crest and side slopes of the embankment are heavily vegetated with fir, alder and Scotch Broom. Trees exceeding 6 m height and butt diameters up to 150 mm were noted. The vegetation greatly impeded the inspection of the dam.
- The dam crest varies in width from approximately 5.5 to 6 m. The downstream slope was estimated at approximately 37° to 40°.
- The exposed portion of the upstream slope was estimated to have a gradient of approximately 30°.
- A slump was observed at the downstream crest near the east abutment. The scarp starts about 10 m away from the east abutment and extends roughly 17 m to the west. It

appears that a vertical displacement of up to 600 mm has occurred, and a crack in the rock fill was observed.

- The slope length at the scarp location was measured to be approximately 6 m and this equates to an embankment height of about 4.5 m.
- Near the center of the embankment, the slope length was measured at 13.8 m and this equates to height of approximately 9 m.
- A former logging road runs along the toe of the embankment. No seepage was observed exiting the downstream face of the dam. Nor was any seepage observed in the ditch between the road and the toe of the embankment.
- An apparent opening in the rip rap was observed at the downstream toe of the dam, and this may be the location of a reported clean-out cap, that connects to a "sub-drain" system. The cap was not visible, but the cavity was stuffed with insulation.

The following key comments and recommendations were provided in Thurber's 2010 geotechnical evaluation report:

- The downstream embankment slope was constructed steeper than the design called for.
- A slump on the downstream face of the dam occurred prior to April 2003 near the east abutment where the embankment is not at full height. The triggering mechanism is unclear. It is possible the contractor did not achieve the same level of compaction at the east end of the embankment compared to elsewhere. That is, the rock fill may have been pushed loosely over the edge of the crest.
- The slump appears to be relatively shallow, and likely does not significantly impact the global stability of the embankment at present. However, continued movements could be detrimental to embankment stability.
- It is anticipated that some modification of the embankment geometry (e.g., flattening of the downstream slope) will be required.
- An updated slope stability assessment should be conducted, and should reflect current seismic hazard values.
- Any existing piezometric monitoring data should be utilized for the proposed stability assessment. If such data is unavailable, new data sets should be collected.
- The trees and scotch broom should be removed from the crest and embankment slopes.
- The presence of a seepage collection system that apparently passes through the upstream till zone into the downstream rock fill zone is concerning, as this pipe would be a convenient flow path that could promote to internal erosion of the embankment. Given these design features, a monitoring and surveillance schedule should be established and maintained, to ensure the facility continues to perform as expected.

A copy of Thurber's preliminary geotechnical evaluation report, dated November 30, 2010, is attached in Appendix D.

7. OBSERVATIONS FROM 2014 THURBER INSPECTION

As noted previously, Thurber completed a site inspection on October 24, 2014. The inspection was completed by Jay McIntyre, P.Eng. Selected photographs are included in Appendix E. The following key observations were made:

- At the time of the inspection, a crew was removing trees and vegetation from the dam and spillway area. The work was essentially complete except for a section of the spillway and downstream slope near the east abutment (below the slump area).
- The removal of vegetation greatly aided in the inspection. It was possible to see areas where the dam is constructed directly atop outcropping bedrock, (i.e., in the vicinity of Sta. 0+025 to 0+035). It was also possible to more easily inspect the outlet to the underdrain system.
- Water was flowing over the spillway and the freeboard was measured to be approximately 1.05 m.
- The shallow slump was observed near the east abutment, just downslope from the crest of the dam. It was measured to be approximately 12 m long, starting at approximately Sta. 0+64. It appears to have changed little since the 2010, except the scarp is less defined, and the crack in the face of the down has mostly closed (possibly related to disturbance from vegetation removal).
- No seepage was observed exiting the downstream toe of the dam, although a localized wet spot was observed downstream of the underdrain outlet.
- Metal bars of varying diameters were observed sticking out of the dam on the upstream side of the crest. They are typically spaced at interval of 4 to 6 m along the crest. Some of these bars are believed to be settlement monitoring hubs, but others may have been used to secure the tailings supply line coming from the mill (which ran along the upstream side of the crest).
- The piezometer and two observation wells could not be located.
- The outlet to the underdrain system was investigated. This outlet includes a 100 mm diameter solid ABS pipe with a threaded cleanout cap. Upstream of the outlet is a pressure gauge that was reportedly installed to allow for a direct reading of the hydrostatic head within the impoundment at the toe of the dam. The gauge and outlet pipe are protected by several tabular boulders, placed to form a crude shelter for the outlet assembly. The cavity is stuffed with fiberglass insulation, presumably to protect the pipe and gauge from freezing. The pressure gauge can be accessed from the top, through a gap between two boulders. The outlet pipe and threaded cap can apparently be accessed from the bottom, through a gap beneath a different boulder (see attached photos). Some of this insulation was removed from the top of the cavity to expose the pressure gauge. The gauge could not be read, as it was mostly covered by spray-on foam insulation, and the face of the gauge was installed facing the north (i.e., it faces away from the observer). Liquid was observed to be leaking from the gauge fitting at an estimated rate of 0.05 to 0.1 LPM.
- Neither the outlet pipe/cleanout cap nor the gate valve were exposed. This would have

required significant disturbance to the pipe installation. It appears that the liquid leaking from the pressure gauge (located above the outlet) is dripping down onto the insulation protecting the end of the outlet pipe. This has resulted in iron oxide (or other substances) precipitating onto the protective insulation. Photographs showing the appearance of the outlet in 2010 and 2014 are attached in Appendix E.

8. SITE SEISMICITY

The site is located in the seismically active area of southern Vancouver Island. Site seismicity is influenced both by nearby crustal earthquakes as well as potentially larger earthquakes along the Cascadia fault, located off the west coast of Vancouver Island. The most recent significant earthquake in the area was a magnitude 7.3 event that took place in 1946 to the northwest of Courtenay, BC.

In Canada, the seismic hazard for a particular site may be obtained from hazard maps prepared by the Geological Survey of Canada (GSC). These maps are derived from statistical analyses of past earthquakes and from advancing knowledge of Canada's tectonic and geological structure. On the maps, seismic hazard is expressed as the most powerful ground motion that is expected to occur in an area for a given probability level.

Ground motion probability values are given in terms of probable exceedance: that is, the likelihood of a given ground motion being exceeded during a particular time duration. The typical probabilities of exceedance provided by the GSC in the seismic hazard maps are the 2%, 5% and 10% probability of exceedance in a 50 year period, which corresponds to an annual likelihood of 1/2,475, 1/1,000 and 1/475, respectively. The GSC does not provide seismic hazard values for more extreme events (e.g., earthquakes having an annual probability of exceedance of 1/5000 or greater). These data are typically estimated by extrapolation. A copy of the Seismic Hazard Calculation for the Valentine Mountain site is attached in Appendix F.

9. REVIEW OF CONSEQUENCE CLASSIFICATION

9.1 CDA Classification System

The consequence classification of a dam is a means of establishing an adequate overall level of care in oversight, inspection, maintenance and safety of the facility. The consequence classification of a dam is based on the incremental consequences of failure, which is defined by the CDA Guidelines (2007) as being *"the total damage from an event with dam failure minus the damage that would have resulted from the same event had the dam not failed"*. The consequence classification is based on consideration of three loss criteria: 1) Loss of life,

2) Environment and cultural values, and 3) Infrastructure and economics. The current CDA classification system is shown in Table 8-1.

9.2 Valentine Mountain Tailings Facility

As noted previously, the tailings facility at Valentine Mountain is located on the south side of a ridge oriented in the east-west direction, at approximately elevation 780 m. Below the dam, the ground slopes down towards the south. Bear Creek Reservoir is located downstream of the facility, roughly 1.4 km to the south at approximately elevation 410 m. The attached Drawing No. 19-6819-0-4 in Appendix B shows the anticipated route that tailings and impounded water would take if a dam breach were to occur.

TABLE 8-1
CLASSIFICATION IN TERMS OF FAILURE CONSEQUENCE (CDA 2007)

Dam Class	Population at Risk	Incremental Loss		
		Loss of Life	Environmental & Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short-term loss. No long-term loss.	Low economic losses; area contains limited infrastructure or services.
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat. Loss of marginal habitat only. Restoration or compensation in kind highly possible.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes.
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat. Restoration or compensation in kind highly possible.	High economic losses affecting infrastructure, public transportation, and commercial facilities.
Very High	Permanent	100 or fewer	Significant loss or deterioration of *critical* fish or wildlife habitat. Restoration or compensation in kind possible but impractical.	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances).
Extreme	Permanent	More than 100	Major loss of *critical* fish or wildlife habitat. Restoration or compensation in kind impossible	Extreme losses affecting important infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances).

The mine and the surrounding area are located on lands owned by Timberwest Forest Corp. and we understand that logging is carried out in the general area. There are no permanent dwellings or other structures located downstream of the dam. In terms of population at risk, this would be limited to temporary workers (e.g., log truck drivers) and recreational users (e.g., quads, etc.).

In terms of infrastructure, there are several logging roads located along the flow path, and it is expected that a dam breach would result in some or all of the roads downstream of the dam being locally washed out at the crossing locations. It is not uncommon for washouts to occur on logging roads, and it is anticipated that repairs could be implemented relatively quickly and that alternate routes (along the south side of Bear Creek Reservoir) could be utilized. Given the impoundment's small size and the anticipated attenuation of the flows during a dam breach scenario (i.e., a dam breach would be expected to occur over a period of approximately 30 minutes), it is not anticipated that a dam failure would have a significant impact on the water level at Bear Creek Reservoir.

A dam breach would result in the release of impounded water and mine tailings into the environment downstream of the dam, with some of the tailings entering Bear Creek Reservoir. There is insufficient information to accurately evaluate potential environmental impacts. However, given the very small size of the impoundment it is anticipated that losses to fish and wildlife habitat would not be significant.

On this basis, it is recommended that the facility be assigned a "Significant" downstream failure consequence classification.

10. SUMMARY OF RECENT CONSTRUCTION

As noted previously, Valentine Mountain Mine is still in the exploratory stage. We understand that a permit was issued in 2003 for another bulk sampling program, but that it ultimately did not proceed. There has been no modifications to the current tailings dam, apart from maintenance, since it was constructed in 1987.

11. WATER BALANCE REVIEW

The 1987 impoundment proposal report provided anticipated losses from evaporation and seepage, as well as inputs from rain and groundwater recharge. The report states it was assumed the bulk sampling program would continue as a (more or less) continuous operation for approximately 1 year and that the facility would be essentially full at the completion of that time. The report states that losses from seepage, evaporation and supplying the processing

plant would be approximately equal to gains from rainfall and groundwater recharge. As rainfall and evaporation estimates were based on data collected in the late spring and early summer, it appears there may have been a significant underestimation of water gains from rainfall, and an overestimation of losses from evaporation. The report states that water budget data would be collected at the tailings impoundment while the mill was in operation.

The proposal report suggests that the bedrock spillway was intended to prevent an overtopping of the facility as a result of a winter storm during the bulk sampling program. There is no discussion provided in either the proposal report or construction report concerning water balance estimates following cessation of sampling/processing activities. Given the annual rainfall for the area is approximately 1.6 m, it is likely that the impoundment was full and water was spilling over the spillway within several months of dam completion.

We understand that during the summer months, evaporation and leakage results in the water level dropping below the spillway level, but that for most of the year the impoundment level is controlled by the spillway. Based on inspection comments, there does not appear to be significant losses related to leakage through the dam.

12. FREEBOARD AND AVAILABLE STORAGE

The tailings facility incorporates a spillway excavated in bedrock at the east abutment. The design called for a minimum 1.0 m wide spillway, but the as-constructed width is approximately 2 m. After entering the spillway, water passes down a channel blasted through bedrock. The spillway channel has a variable cross section, but is approximately 1.2 m wide at the base and sloped at approximately 23°.

At the time of October 24, 2014 inspection, the measured freeboard was approximately 1.05 m. It was noted as being 1.1 m both at the time of the November 16, 2010 inspection. During both of these inspections, water was flowing over the spillway.

The impoundment proposal report identifies the design storm as being a “Maximum Probable” 6-hour storm delivering 135 mm of rain over the catchment area. The design engineer estimated the instantaneous inflow from the design storm would be approximately 0.3 m^3/s, and that flow over a 1 m wide spillway was expected to exceed this rate by a factor of 3.5.

The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of “Significant” should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of “incremental flood analysis, exposure and consequence of

failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.

13. WATER DISCHARGE SYSTEMS

The impoundment is being operated as an overflow structure, in that water is released passively by means of the spillway during all but the summer months. Released water is not measured or tested.

The dam design also incorporated a sub-drain system, consisting of 100 mm diameter perforated "Big-O" type perforated pipe, wrapped in filter cloth and placed at the base of the impoundment roughly parallel to the upstream toe. The sub-drain system was reportedly covered with a layer of well-graded (presumably fine) sand, produced using the pilot plant. The sub-drain system is connected to a solid 100 mm diameter Schedule 80 ABS plastic pipe that passes through the dam at its lowest point. The downstream end of the pipe is capped with a threaded cleanout cap, reportedly to allow sampling of the impoundment seepage. The impoundment proposal report states that another function of the sub-drain system was to "facilitate drainage of the entrained supernatant water at the time of abandonment", indicating that it may be used as a low-level outlet to drain the impoundment.

As noted in Section 7, the pressure valve connected to the downstream end of the outlet pipe was observed to be slowly leaking during the October 24, 2014 inspection. Leakage may have been occurring at the time of the 2010 inspection, but the rate of leakage (although still small) appears to have increased.

14. SEEPAGE OCCURRENCE

No seeps were observed on the downstream face or along the toe of the dam. One localized wet spot was observed in front of the underdrain outlet location.

15. SURFACE WATER CONTROL AND SURFACE EROSION

Surface water enters the impoundment from a small catchment area to the north side. A small groundwater fed spring is also located on the north side of the impoundment. Excess water flows over the spillway. There does not appear to be any obvious signs of surface erosion on the dam.

16. INSTRUMENTATION REVIEW

Instrumentation installed at the dam during construction includes:

- Two 100 mm diameter standpipes/observation wells were installed near Sta. 0+30 and Sta. 0+60. The tips of the standpipes were installed in the rip rap zone, located downstream of the low permeability till zone.
- A 1 cm diameter steel cased piezometer was installed in the till near Sta. 0+50 with its tip at an elevation approximately 4 m below the crest of the dam. This instrument was installed to assist in establishing the phreatic surface within the till zone.
- Three settlement monuments were placed along the upstream crest of the embankment.

The construction report only contains baseline readings for the three settlement monitoring monuments. To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. However, during that visit it was assumed the instrument locations were as shown on Plate 3 of the June 1987 design report. It was confirmed afterwards that the instruments were installed at different locations.

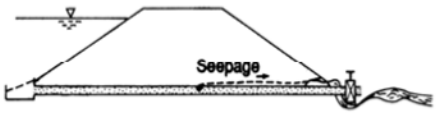
17. COMMENTS REGARDING DESIGN, CONSTRUCTION AND PERFORMANCE

The following comments are provided in regards to the geotechnical design and construction of the facility:

- The dam was originally designed to have a 4m wide crest and upstream and downstream slopes graded at 1.7H to 1V.
- The dam was ultimately constructed with a significantly wider crest (average ~5.7 m). However, the as-built downstream slope is significantly steeper and is typically sloped at 37° (approx. 1.33H to 1V) with localized steeper sections sloped up to 40°.
- The dam design incorporated a reasonably thick low permeability till zone, supported on the downstream side by a rock fill shell and also faced on the upstream side by rock fill.
- Thurber was retained as a testing agency for the dam designer and completed a number of laboratory tests, including gradation analysis, modified Proctor tests and tri-axial permeability testing of samples collected at the till borrow site. Based on gradation analyses on three samples, the composition of the borrow material varied from gravelly, silty sand to silty, sandy gravel. The fines content for all samples exceeded 30%. The tri-axial permeability test yielded a permeability of 3.05×10^{-6} cm/s.
- Apart from a localized wet spot in the vicinity of the underdrain outlet, the dam does not appear to leak appreciably.
- A geotextile fabric was placed between the till zone and downstream rock fill shell to act as a filter. These two zones are gradationally incompatible, and the filter fabric was included to limit the potential for migration of fines from the till zone into voids within the

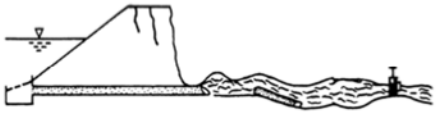
downstream rock fill shell. As geotextile filters are subject to damage when placed against rock fill, they are not a preferred means of filtration. Additionally, they are of little use in areas where conduits pass through a dam.

- The dam is believed to be founded on intact bedrock and/or very dense till-like soils over shallow bedrock. Several photos taken during construction are attached in Appendix F.
- The dam designer incorporated a perforated underdrain system within the impoundment, connected to a solid pipe that passes through the dam. Its inclusion suggests that it was intended to drain the impoundment at a future date, although this would now appear to be an unlikely scenario. The system includes a solid 100 mm diameter Schedule 80 ABS plastic pipe that passes through the dam at its highest point. As shown on Plate 2 of the construction report, the solid pipe was surrounded on all sides by compacted till along its entire length through the dam. This pipe is connected to a network of perforated "Big-O" type plastic pipes installed at the bottom of the impoundment. These pipes were reportedly wrapped in geotextile and covered with a layer of sand produced by the pilot processing plant.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed (it is shown on Plate 2 but is not mentioned in the report text). Furthermore, should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure. This process is illustrated in the following schematic.



A - Hole develops in conduit with downstream valve which is under constant pressure from reservoir head.

B - Hole enlarges allowing increased flow and a piping failure begins.



C - Reservoir drains through the conduit.

- Overall it appears that adequate compaction was carried out during fill placement and the materials selected for construction are not considered susceptible to liquefaction during an earthquake.
- The impoundment level is controlled by the bedrock spillway beyond the dam's east abutment, and there is approximately 1.1 m of freeboard between the spillway and the crest of the dam. It is not known if the design storm selected by the dam designer is consistent with a flood having an AEP falling within 1/100 and 1/1,000.
- A slump occurred on the downstream slope of the dam prior to 2003 resulting in the development of a tension crack up to 200 mm wide at the downstream edge of the crest and vertical movements of up to approximately 600 mm.
- The slump is located where the embankment is approximately half of its maximum height. Although the triggering mechanism is unclear, this portion of the embankment may have been slightly steeper than elsewhere, and/or the material exposed on the face of the dam may not have been adequately compacted.
- It does not appear that the slump has become enlarged in the intervening time between the 2010 and 2014 inspection visits.
- The presence of the slump indicates that the factor of safety of the fill along the face of the dam is marginal, although the global factor of safety for the overall embankment is higher.
- The design engineer used a seismic coefficient of 0.1g when conducting the stability analysis in 1987. This coefficient is a simplified means of evaluating the destabilizing forces resulting from an earthquake. Referring to the current (2010) seismic hazard values provided by the Geologic Survey of Canada (GSC) attached in Appendix F, an updated stability analysis would likely utilize a seismic coefficient ranging between 0.28g and 0.37g. These values correspond to earthquakes with an AEP of 1/100 and 1/1,000 respectively.
- Based on comments provided in the construction summary report, the designer apparently applied the seismic coefficient to all analysis cases, including the steady state seepage case. It is not clear why this was done, as this force should only be considered when evaluating loading conditions associated with an earthquake. It is also not clear how the "sudden drawdown" analysis case resulted in a higher factor of safety compared to the steady state seepage analysis case. In our experience, the sudden drawdown results should generally yield a factor of safety that is lower than the steady state analysis case.

18. SUMMARY

The following is a summary of significant observations and conclusions from this Dam Safety Inspection.

- Based on the 2007 CDA Dam Guidelines classification system and current downstream land usage, the Valentine Mountain Mine tailings dam should be assigned a consequence rating of "Significant".

- The design operating freeboard is approximately 1.10 m, and is controlled by a spillway beyond the east abutment of the dam that was blasted into bedrock. The dam designer assigned a 6 hour storm delivering 135 mm of rainfall as the design event for the facility, and it appears the constructed spillway (if properly maintained) can pass the runoff associated with such an event with a significant factor of safety.
- The CDA Dam Safety Guidelines (revised in 2013) recommend that a dam having a consequence classification of "Significant" should be designed to safely accommodate a flood with an annual exceedance probability (AEP) falling between 1/100 and 1/1,000, with the actual design flood selected on the basis of "incremental flood analysis, exposure and consequence of failure". It is not known whether the design storm selected by the dam designer is consistent with a flood having an AEP falling within the above noted range.
- A review of the stability analysis results presented by the dam designer in the construction summary report indicates that individual may not have been familiar with standard stability analysis conventions, particularly with respect to the loading conditions considered. Furthermore, the seismic coefficient used for the original analysis is likely too low given subsequent changes to the regional seismic hazard maps.
- Based on a comparison between site inspection observations, it appears that the slump on the downstream face of the embankment near the east abutment has not increased in size in the 4-year period since 2010. The presence of the slump indicates the downstream slope of the embankment was constructed too steep.
- Inclusion of the underdrain system is a serious design flaw in our opinion. The proposal to remove the threaded end cap to *"facilitate sampling of the impoundment seepage"* would be considered a very risky operation and is not recommended, particularly if the gate valve was not installed. Should this pipe rupture or develop a significant leak, it could result in a dam breach by means of a piping failure.
- The pressure gauge connected immediately upstream of the underdrain outlet was observed to be leaking during the 2014 inspection. Comparing to images collected during the 2010 inspection, it appears the leak has developed (or increased in flow rate) since November of 2010.
- To our knowledge, no monitoring data has ever been collected at the two observations wells or the piezometer. Neither the piezometer nor the two observation wells could be located during the October 24, 2014 inspection. If they can be located and are operational, data from these instruments would be useful in future stability analyses.
- No active seepage was observed along the toe of the dam during Thurber's 2010 or 2014 inspections; however a localized wet spot was observed in front of the underdrain outlet area at the time of the October 24, 2014 inspection.

19. RECOMMENDATIONS

The following is a summary of the recommendations resulting from this DSI.

a) A survey should be carried out within the impoundment to investigate the level of the tailings. It is anticipated this would be completed using a row boat/canoe and a weighted tape or sounding line. Once completed, the tailings level should be compared to the as-constructed survey of the impoundment prior to filling to obtain a rough estimate of the volume of tailings in the facility.

b) Now that an as-built plan of the impoundment has been obtained (showing the locations of installed instrumentation) a renewed effort should be made to locate and collect water level readings at both observation wells and the piezometer. The piezometer reportedly consisted of a 1 cm diameter metal tube, so it is not clear if this instrument will be serviceable (due to possible damage during construction or subsequent corrosion).

c) An updated stability assessment should be carried out, including an evaluation of performance during a design earthquake. If water level data from existing instruments is unavailable, conservative assumptions should be made for the purposes of the analysis.

d) A remediation plan should be developed (such as a toe berm) should the stability assessment determine that the factor of safety is unacceptable.

e) A qualified professional should evaluate whether the 6-hr storm assumed by the original dam designer is suitable and conforms to the inflow design flood recommended in the CDA guidelines. This assessment may require a relatively detailed survey of the existing spillway.

f) Great Thunder Gold Corp. should initiate a dam surveillance program that includes dam inspection visits at regular intervals throughout the year. During the inspection visits, surveillance personnel should fill out a standard inspection form. Of particular importance would be the development of new seepage locations along the toe of the dam, along with observations about the leakage at the underdrain outlet.

g) Vegetation must not be allowed to become re-established on the dam or along the spillway channel. Due to weather and frost effects, it is anticipated that rock falls will occasionally occur along the spillway channel, which was blasted through bedrock. Significant rock fall should be removed to prevent obstructions to flow.

h) Although it does not appear that any leakage is occurring along the underdrain outlet pipe that passes through the dam at its highest point, the pressure gauge located at the outlet is leaking. The development of a significant leak in, or the rupture of, the underdrain pipe probably represents the most likely failure mode for the impoundment. This failure could occur during normal operating conditions (e.g., due to the ongoing deterioration of the plastic pipe and fittings) or as a result of embankment deformations (e.g., possibly earthquake-induced). A remediation plan should be developed to address this risk. One possible approach would be to construct a toe drain at the location of the outlet that incorporates a granular filter zone. The primary function of the toe drain would be to protect the outlet from future damage from frost action and shallow slumps, as well as to allow a controlled release of the impoundment should the pipe ultimately fail. However, installation of the toe drain would inherently involve risk. Depending on

the condition and fragility of the outlet, the placement of the filter zone and coarser toe drain fill could, in itself, trigger a rupture.

i) A response plan should be developed to address the possible increase in leakage from the outlet pipe over time.

20. ENGINEER OF RECORD

The 2013 MEM guidelines for annual DSI reports states that the professional engineer conducting the DSI will be deemed the Engineer of Record for the facility unless another engineer is identified as having this responsibility. The author of this DSI report is not considered to be the Engineer of Record for the structure and does not take professional responsibility for its design.

Peter Peart, P.Eng. submitted the impoundment proposal report for the subject tailings dam to the Ministry of Mines in June of 1987. Mr. Peart also prepared the construction report for the structure, dated December 1, 1987. In this document, Mr. Peart clearly accepts professional responsibility for the design and construction of the structure. A search of the APEGBC membership database indicates that there is no one by the name of Peter Peart practicing within the Province of British Columbia at this time.

21. CLOSURE

Use of this report is subject to the Statement of Limitations and Conditions included at the end of the text of the report. With reference to Clause 4 of the Statement, the BC Ministry of Energy and Mines is also granted “Approved User” status.

THURBER

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over ...)

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

APPENDIX A
REFERENCE DOCUMENTS

TAILINGS IMPOUNDMENT PROPOSAL REPORT
JUNE 1987

8.4.0

APPENDIX Z:

TAILINGS IMPOUNDMENT PROPOSAL, JUNE 1987.

GRIT
1803

Page 54 of 337 FNR-2019-96139

TAILINGS IMPOUNDMENT PROPOSAL, VALENTINE MOUNTAIN

VALENTINE GOLD CORPORATION.

To Ministry of Energy, Mines and Petroleum Resources.

Valentine Gold Corporation.
666 Burrard St.
Vancouver, B.C.

By Peter Peart. P.Eng.

TABLE OF CONTENTS

PART ONE

1.0.0.	INTRODUCTION
1.1.0	TOPOGRAPHY
1.2.0	GEOLOGY OF THE AREA
1.2.1	Surficial Geology
1.2.2	General Geology
1.2.3	Previous Instability
1.2.4	Downstream Risk
1.3.0	CONSTRUCTION MATERIALS
1.3.1	Till
1.3.2	Rip-Rap Borrow
1.4.0	CLIMATE
1.5.0	HYDROLOGY
1.5.1	Catchment Area
1.5.2	Precipitation
1.6.0	SEISMICITY
1.7.0	DISPOSAL
1.7.1	Storage Capacity
2.0.0	DESIGN ANALYSIS
2.1.0	INVESTIGATION RESULTS
2.2.0	LABORATORY ANALYSIS
2.3.0	CONSTRUCTION MATERIALS SPECIFICATIONS
2.4.0	IMPOUNDMENT CONSTRUCTION
2.5.0	HYDROLOGY
2.5.1	Surface Hydrology
2.5.2	Water Balance
2.5.3	Subdrains
2.5.4	Spillway
2.5.5	Monitoring
2.6.0	STABILITY
2.7.0	DRAINAGE
2.8.0	INSTRUMENTATION AND MONITORING
2.9.0	SEEPAGE

PART TWO

3.0.0	CONSTRUCTION CONTROL
3.1.0	CONSTRUCTION SCHEDULE
3.2.0	DESIGN CONTROL
3.3.0	CONSTRUCTION OF PHASE 2
3.4.0	COLD WEATHER CONSTRUCTION

LIST OF PLATES

PLATE 1	SITE LOCATION
PLATE 2	MILL AND TAILINGS SITE
PLATE 3	SITE PLAN
PLATE 4	CENTRE-LINE SECTION
PLATE 5	STORAGE EVALUATION
PLATE 6	MAXIMUM CROSS-SECTION
PLATE 7	STABILITY MODEL 1
PLATE 8	STABILITY MODEL 2
PLATE 9	FINAL DAM PROFILE
PLATE 10	LOG OF TEST PITS
PLATE 11	GRADATION CURVES
PLATE 12	UNIFIED SOIL CLASSIFICATION
PLATE 13	STORM POTENTIAL DATA

APPENDICES

APPENDIX 1	PROSPECTUS FOR VALENTINE MOUNTAIN.
APPENDIX 2	SEISMIC HAZARD CALCULATION.
APPENDIX 3	STABILITY CALCULATIONS.

1.0.0 INTRODUCTION

Valentine Gold Corporation proposes to construct a tailings impoundment at the Valentine Mountain site north of Sooke on southern Vancouver Island during 1987. The location is shown on Plate 1.

Valentine Gold Corporation has completed a final design for the proposed tailings impoundment in the Discovery Zone on Valentine Mountain. The final design of the impoundment is based on recently completed field and laboratory investigations carried out in house by Valentine Gold Corporation. This design incorporated the criteria laid down in the Ministry of Energy Mines and Petroleum Resources guidelines for the Design, Construction and Operation of Tailings Impoundments.

The impoundment has been designed for an ultimate storage capacity of approximately 4,163 cubic metres. The starter dam has a capacity of approximately 1,200 cubic metres while the subsequent two metre lift will provide a total of approximately 4,163 cubic metres of impoundment storage. The impoundment will provide adequate storage for a 20 tonne per day mill to operate for approximately 300 days.

A general prospectus on the area and the 1987 program is included as Appendix A

1.1.0 TOPOGRAPHY

The site is located to the south of the Discovery Zone on Valentine Mountain as shown on Plate 2. The area proposed for the impoundment lies between the expected ore zone and pine plantations owned and developed by C.I.P. The logging company (C.I.P) has indicated that they are unwilling to allow the impoundment to be located within the confines of the plantation and placing the impoundment on the ore zone would require its removal at some future time.

The site is located at an elevation of approximately 800 metres on the ridge running down to the south west from Valentine Mountain. The water shed area above the potential impoundment is approximately 38,000 square metres. The maximum elevation in the water shed is approximately 804 metres while the minimum elevation is about 760 metres.

The water shed area has been recently logged and is presently covered with new growth that we understand was naturally seeded. In general the surface of the watershed area comprises about 50% exposed bedrock and 50% shallow soils covered with grasses and sparse timber.

1.2.0 GEOLOGY OF THE AREA

1.2.1 Surficial Geology

The site is located on a long east west trending ridge that is the surface expression of an anticlinal feature. The rock dips steeply to the south and strikes approximately 130 degrees. The area is underlain by meta sedimentary rocks that were over-ridden by glaciers as recently as 9,000 BP . The glacial action resulted in a generally rounded regional topography and a highly irregular local topography. A thin veneer of glacial till covers the low areas of the site and bedrock remains exposed over the remaining 50% of the site. The glacial till is in a dense to very dense state .

1.2.2 General geology

The antiform that underlies the site is made up of interbedded meta sedimentary rocks of the Cretaceous period. The geology of the area is discussed in detail in Appendix A, the Prospectus. The rock is tight, competent and very tough and is infrequently faulted or sheared. A number of shear zones have been noted to produce water along the ridge in the discovery zone in quantities in the order of about 5 to 10 litres per minute.. The rock in the area of the impoundment has been inspected and no groundwater discharge or recharge was noted in the period between March and June of 1987.

1.2.3 Previous Instability

A site investigation and an air photo study failed to reveal any evidence of previous landslides, mudslides, rockslides or avalanches. Given the nature of the bedrock and the overlying till it would be reasonable to expect that the surface materials would be stable.

1.2.4 Downstream Area

The proposed impoundment is approximately 1.5 kilometres north of the Bear Creek Reservoir and approximately 400 metres higher. The non perennial stream that runs from an area about 500 metres south of the dam into Bear Creek Reservoir has been observed and found to be dry from June until fall.

There in no risk of loss of structures below the impoundment and very low risk of loss of life in the area downstream of the impoundment.

1.3.0 CONSTRUCTION MATERIALS

1.3.1 Till

Two borrow sites for Dam construction Materials have been identified in the area of the proposed impoundment, these areas are indicated on Plate 2. Testing indicates that the soils available at the borrow sources are mixtures of clay, silt, sand and gravel in an overconsolidated state that would be suitable for use in the construction of the impoundment embankment. The

general characteristics of the material are indicated in Table 1 below.

TABLE 1

LOCATION	CLASSIF.	UNIT WT.	MOIST%	BORROW VOL.
Gvl Pit	SM/SC	2000Kg/m3	9.0%	3,200 cu m
Gvl pit	SC	2110Kg/m3	15%	4,000 cu m
B1	SM/SC		20%	1,200 cu m

1.3.2 Rip-Rap Borrow

Rip-rap is available in quantity from 2 existing rock quarries and a third potential quarry as shown on Plate 2 in quantities well in excess of that required for the impoundment embankment.

1.4.0 CLIMATE.

In general the site experiences coastal temperate weather however the isolated elevation of the site exposes it to summer and fall thunderstorms.

Data from the Ministry of Forests and Lands indicates that the average monthly summer precipitation is as shown on Table 5 below:

TABLE 5

MONTH	AVERAGE RAINFALL OVER 17 YEAR PERIOD. 1970, 1986
MAY	90.8mm
JUNE	61.6mm
JULY	39.2mm
AUGUST	45.2mm
SEPTEMBER	98.5mm

Snow may be expected in November and spring runoff may be expected in April. In recent years there has been little snow in the Valentine Mountain area and access to the site has been available all year around for four wheel drive vehicles.

Average annual temperatures range from lows of -2 degrees celcius to highs of 26 degrees celcius in winter and summer respectively.

1.5.0 HYDROLOGY.

1.5.1 Catchment Area.

The catchment area is shown on Plate 2. The total catchment area is approximately 38,000 square metres and extends along the ridge approximately 250 metres and down from the ridge for approximately 250 metres in an apex down triangular configuration culminating in the impoundment.

1.5.2 Precipitation.

The average annual precipitation is approximately 1.2 metres of which about 335 mm falls in the summer months as detailed in Section 1.4.0. About 200mm of precipitation is in the form of snow that falls over the winter period.

1.6.0 SEISMICITY

The Seismic Hazard Calculation was provided by Energy,Mines and Resources, Canada and is summarized in Table 2 below.

The Hazard Calculation is included as Appendix 2.

TABLE 2

LOCATED AT 48.51 North, 123.90 West.

Probability of Exceedence per Annum	0.010	0.005	0.0021	0.001
Probability of Exceedence in 50 years	40%	22%	10%	5%
Peak Horizontal Ground Accel.	0.114	0.174	0.279	0.411
Peak Horizontal Ground Velocity	0.087	0.144	0.249	0.389

1.7.0 DISPOSAL

The tails will be introduced into impoundment in the form of a slurry with a specific gravity of approximately 1.3 to 1.4. Based on samples that have been tested at the time of writing we anticipate that the tails will have characteristics similar to those presented on Table 3 below.

TABLE 3

ELEMENT	CONCENTRATION	ELEMENT	CONCENTRATION
Al	1.13%	Ag	0.2 ppm
As	50.0 ppm	Ba	230.0 ppm
Be	<0.5 ppm	Bi	<2.0 ppm
Ca	0.12%	Cd	<0.5 ppm
Co	9.0 ppm	Cr	32.0 ppm
Cu	16 ppm	Fe	1.90 %
Ga	<10 ppm	Hg	1.0 ppm
K	0.66%	La	<10 ppm
Mg	0.60%	Mn	288 ppm
Mo	<1.0 ppm	Na	0.02 %
Ni	17 ppm	P	330 ppm
Pb	22 ppm	Sb	<5.0 ppm
Se	<10.0 ppm	Sr	8 ppm
Ti	0.12%	Tl	<10.0 ppm
U	<10.0 ppm	V	41.0 ppm
W	<5.0 ppm	Zn	36.0 ppm

The slurry will be introduced into the impoundment at a constant rate of approximately 80 litres per minute. The supernatent liquid will be recycled and it is anticipated that this system will reduce the quantity of xanthate and frother required in the milling process. The consumption of xanthate and frother is expected to be in the order of 0.1 pound and 0.05 pound per ton of ore milled.

The physical nature of the tailings is expected to similar to that of a silty sand in that 50% of the tails will pass the #200 seive. We anticipate that the settled tailings will be in the order of 30% to 50% solids by weight.

The physical nature of the supernatent can only be estimated at this time however we expect the following to be typical:

Total Dissolved Solids.....0.25%
Ph.....7.0 to 7.5
Residual Xanthate.....<0.00001 %
Residual Frother.....<0.00001 %

1.7.1 Storage capacity

The ultimate capacity of the impoundment is in the order of 4,150 cubic metres and the starter dam capacity is in the order of 1,200 cubic metres of tailings. The storage capacity curve is shown on Plate 5.

2.1.0 RESULTS OF FIELD INVESTIGATION

Field work included investigation of the subsurface and hydrological conditions in the area of the proposed tailings impoundment. Clearing of the area for a proposed drill hole indicated that the bedrock is overlain by a thin veneer of glacial till in a dense state.

Four test pits were hand excavated and representative samples returned to our field office for analysis. The logs of the test pits are shown on Plate 10 and the locations of the test pits are shown on Plates 2 and 3. Some soft organic silts were encountered in the depression near the proposed centre of the embankment as shown on Plate 2. The soft silts were approximately 1 metre deep and covered an area of approximately 35 square metres. The soft material has been removed to allow placement of a Longyear 38 drill rig.

A small spring is located to the north east of the impoundment area. The watercourse resulting from this spring passes close to the impoundment area and flow measurements indicate approximately 15 litres per minute flows in the channel before the water is lost to groundwater recharge to the south of the impoundment.

2.2.0 LABORATORY ANALYSIS

Valentine Gold Corporation carried out a laboratory investigation on representative samples of the subsurface materials in the impoundment and the borrow sites. The results of the investigation are presented in Appendix ... of this report. A summary of the results of this investigation is presented below in Table 3.

TABLE 3

LOCN.	DEPTH metres	CLASS.	'M%	UNIT WT Kg/m3	CALC. PERM cm/sec
impound.	1 m	SM/GM	14%	2350	0.00042 CM/SEC
Bear Ck Res.	1.5 m	SM/SC	15%	1980	0.00061 cm/sec
Borrow 1	2.0 m	SM/SC	21%	2100	0.00008 cm/sec
Quarry	0.5 m	rip-rap	--	1998	free draining

****

The soils underlying the impoundment are gravely tills in an overconsolidated state. The grain size analysis is shown on Plate 11 and the logs of the test pits are shown on Plate 10. The soils in the Bear Creek Reservoir area are sandy tills as shown on the grainsize analysis on Plate 11 and the test pit logs on plate 10.

The laboratory testing included Moisture Content determination, compaction testing, wet and dry densities and grain size analysis. The shear strength analysis is based on empirical data and is of necessity very conservative.

2.3.0 CONSTRUCTION MATERIALS SPECIFICATIONS

2.3.1 Till

The till shall be a mixture of clay, silt, sand, and gravel that conforms to the limits of grain size distribution as shown on Plate 11. The till shall have at least 15% of the total dry weight passing the #200 seive and no trace of organics. All material containing organics will be wasted off site in a proper fashion. The till shall not contain boulders larger than 30cm in diameter.

Rip-rap shall have less than 5% fines and no fragments larger than 50 cm in diameter. All rip-rap shall be angular to sub angular, blasted rock is preferred. Rip-rap shall not contain any organic or deleterious materials. All rock shall be competent and tough, no decomposed or friable rock may be used.

Filter fabric conforming to AASHO standards must be utilized in the embankment.

Schedule 80, 10cm diameter PVC pipe will be used to penetrate the embankment and 10cm diameter perforated Big O type pipe will be used to construct the upstream underdrain.

2.4.0 TYPE OF CONTAINMENT STRUCTURE

The tailings dam will be constructed in two stages using the centreline construction method as shown on Plates 3 to 9. The starter dam will be constructed of till and rockfill as shown on the Maximum Cross Section, Plate 6. The materials will be acquired from the appropriate borrow sites as described in Section 1.3.0. When the starter dam has been filled and the beach level raised a second phase will be added to the impoundment to increase the storage capacity as shown on Plate 3 and 9.

2.5.0 HYDROLOGY

The site hydrology was arrived at using data collected by the Ministry of Forests and Lands, B.C Hydro, the U.S Department of the Interior and C.I.P's local weather stations.

2.5.1 Surface Hydrology

The average annual precipitation in the site area is approximately 1.2 metres of which about 200 mm is in the form of snow. Average monthly rainfall over the summer months is documented in Section 1.4.0 of this report. In general the average monthly rainfall during the period of operation of the pilot plant will be in the order of 40mm to 90mm.

The site is located in an area that may be subject to a Maximum Probable 6 hour point storm that delivers 135mm of rain as indicated by the Bureau of Reclamations distribution map (Plate 13). The Maximum Storm values are suitably conservative to be considered without including snowpack in the peak discharge calculations. Given that the site is 50% bedrock, sparsely covered with vegetation and relatively steep it is reasonable to expect that the Lag relationship and the Retention Coefficient will be very small and for the purpose of estimating the spillway criteria, may be considered to approach zero.

The peak instantaneous discharge for the Probable Maximum 6 Hour Storm will be in the order of 0.3 cubic metres per second. A spillway with a cross sectional area of 1 square metre and a velocity of 1 metre per second will discharge approximately 1 cubic metre per second, giving a safety factor of 3.5 against being overtopped.

2.5.2 Water Balance

Data collected on site over the month of April, May and June indicate that evaporation losses will be in the order of 15 cm per month over the summer months while precipitation will be in the order of 4cm to 9cm. This indicates a net loss situation for water stored in the tailings impoundment of approximately 13 to 25 litres per minute.

A small spring to the north of the impoundment provides about 20 litres per minute which will makeup the potential deficit in the water budget.

It is proposed that a small 20 U.S gallon per minute pump located in Jasman Creek will provide makeup water to the system.

WATER BALANCE BUDGET

WATER LOSS		WATER GAIN	
To Evaporation	34 l/min	From rain	13 to 25 l/min
To Seepage	5 l/min	From spring	20 l/min
To Process	2 l/min		
TOTAL LOSS	41 l/min	TOTAL GAIN	33 to 45 l/min

PROJECTED WATER BUDGET.....8 l/min makeup to 5 l/min excess

2.5.3 Subdrains

It is proposed that 4" pvc perforated drain pipe will be placed beneath the impounded tailings to facilitate drainage of the entrained supernatent water at the time of abandonment.

2.5.4 Spillway

As shown on Plate 3 a spillway has been provided to prevent the impoundment structure from being overtopped in the event of a Maximum Probable 6 Hour Storm that delivers approximately 15 cm of rain. The spillway design calls for a minimum cross sectional area of 1 square metre and a minimum positive slope of 5% which will provide adequate protection against overtopping.

The spillway is to be constructed in bedrock and the downstream channel is to be rip-rap protected if it passes over or through material other than bedrock.

2.5.5 Monitoring

Stream flow will be monitored at Jasman Creek and the Spring to the north of the impoundment while the project continues. Total water budget data will be gathered at the tailings impoundment while the mill is in operation. The phreatic surface within the impoundment will be monitored during the life of the structure and the results reviewed by a qualified Engineer.

2.6.0 STABILITY ANALYSIS

The stability of the dam was evaluated with the aid of the STABR computer program for slope stability analysis with critical slip surfaces. The program employs the Modified Bishop method of analysis. The calculations were carried out using effective stress analysis in conjunction with the maximum anticipated pore water pressure conditions. Seismic conditions consistent with those estimated in Section 1.6.0 were incorporated into the analysis.

The analysis of the upstream slope was carried out for the anticipated conditions immediately following construction of the dam. Using a seismic coefficient of 0.1 and an Ru factor of 0.5 a Factor of Safety of the critical slip surface of approximately 1.72 was calculated. The configuration of the analysis is shown on Plate 7. We feel that this figure is acceptable as it is well in excess of the minimum accepted Safety Factor of approximately 1.15 for earth fill dams in this seismic area.

The analysis of the downstream slope was conducted for the

anticipated conditions at the maximum impoundment elevation as shown on Plate 8. Using a seismic coefficient of 0.1 and a pore water pressure distribution governed by the phreatic surface shown on Plate 8 the Factor of Safety for the critical slip surface is 2.21. This Factor of safety is considerably higher than the minimum acceptable value of 1.15 for dams in this seismic area.

2.7.0

The dam is constructed of till and rockfill in such a fashion as to allow a phreatic surface as shown on Plate 8. The calculated hydraulic conductivity of the till is approximately 0.00008 cm/sec while the rockfill will be in the order of approximately 0.01 cm/sec. A difference of two orders of magnitude in hydraulic conductivity may be treated as a free draining layer which will allow the phreatic surface to develop as shown on Plate 8. Under drains are to be constructed along the upstream toe of the embankment as shown on Plate 6 to allow drainage of the tails following the discharge period. This will allow maximum normal consolidation of the tails and facilitate the easy reclamation of the impoundment area.

2.8.0 INSTRUMENTATION AND MONITORING

Two settlement monuments an two standpipe piezometers will be installed in the embankment as shown on Plates 3 and 6. The settlement and phreatic surface will be monitored weekly for the duration of the initial filling period and less frequently after the discharge period has ended. The seepage collected from the downstream ditch, if any, will be monitored for water quality and treated or recycled. Should the water quality be within the discharge guidelines limits it may be returned to the environment.

2.9.0 SEEPAGE

Seepage through the dam will be collected in a downstream ditch and then conducted to a small settling pond where the seepage water may be sampled prior to possible discharge to the environment.

PART TWO

3.1.0 CONSTRUCTION SCHEDULE

The layout of the dam and site preparation will be completed in the last week of June 1987. Construction will commence at the receipt of the correct documents from the respective Ministries.

The total time required for construction will be approximately 14 working days. We anticipate the placement of approximately 200 cubic metres per day placed, spread and compacted.

We anticipate that construction of the impoundment will be essentially complete within 15 day of Ministerial Approval.

3.2.0 DESIGN CONTROL

A Professional Engineer will be on site for the construction period to supervise and monitor construction of the embankment and the associated facilities.

3.3.0 PHASE TWO CONSTRUCTION

The current exploration program will determine the feasibility of continuing the bulk sampling and the subsequent raising of the impoundment. Should the phase two plan be considered by Valentine Gold Corporation it will be raised as described in this report and within the guidelines provided by the Ministry of Energy, Mines and Petroleum Resources.

3.4.0 COLD WEATHER CONSTRUCTION

Construction will not be carried out when the temprature falls to below freezing for a considerable period of time. The length of time should be determined by a qualified Geotechnical Engineer.

No construction of the embankment should be undertaken in snowy conditions.

Should you have any questions regarding this report or the project in general we would be more than pleased to have you contact us.

Yours Sincerely

Peter Peart. P.Eng.

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Vancouver,B.C.
V6C 2X8

Phone (604)669 1524
Sooke (604)642 6321

****

APPENDIX 1

APPENDIX 2

ENERGY, MINES AND RESOURCES CANADA
GEOLOGICAL SURVEY OF CANADA

ENERGIE, MINES ET RESSOURCES CANADA
COMMISSION GEOLOGIQUE DU CANADA

SEISMIC HAZARD CALCULATION *

CALCUL DE PERIL SEISMIQUE *

REQUESTED BY/ DEMANDE PAR: Peter Peart/Beauprey Expl. /dhw

SITE: Sooke

LOCATED AT/ SITUE AU: 48.51 NORTH/NORD 123.90 WEST/OUEST

PROBABILITY OF EXCEEDENCE PER ANNUM/ PROBABILITE DE DEPASSEMENT PAR ANNEE	0.010	0.005	0.0021	0.001
PROBABILITY OF EXCEEDENCE IN 50 YEARS/ PROBABILITE DE DEPASSEMENT EN 50 ANS	40 %	22 %	10 %	5 %
PEAK HORIZONTAL GROUND ACCELERATION (G) ACCELERATION HORIZONTALE MAXIMALE DU SOL (G)	0.114	0.174	0.279	0.411
PEAK HORIZONTAL GROUND VELOCITY (M/SEC) VITESSE HORIZONTALE MAXIMALE DU SOL (M/SEC)	0.087	0.141	0.249	0.389

* REFERENCES

1. NEW PROBABILISTIC STRONG SEISMIC GROUND MOTION MAPS OF CANADA: A COMPILATION OF EARTHQUAKE SOURCE ZONES, METHODS AND RESULTS.
P.W. BASHAM, D.H. WEICHERT, F.M. ANGLIN, AND M.J. BERRY
EARTH PHYSICS BRANCH OPEN FILE NUMBER 82-33, OTTAWA, CANADA 1982.

2. ENGINEERING APPLICATIONS OF NEW PROBABILISTIC SEISMIC GROUND-MOTION MAPS OF CANADA.
A.C. HEIDEBRECHT, P.W. BASHAM, J.H. RAINER, AND M.J. BERRY
CANADIAN JOURNAL OF CIVIL ENGINEERING, VOL. 10, NO. 4, P. 670-680, 1983.

3. NEW PROBABILISTIC STRONG GROUND MOTION MAPS OF CANADA.
P.W. BASHAM, D.H. WEICHERT, F.M. ANGLIN, AND M.J. BERRY, BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA, VOL. 75, NO. 2, P. 563-595, 1985.

4A. SUPPLEMENT TO THE NATIONAL BUILDING CODE OF CANADA 1985, NRCC NO. 23178.
CHAPTER 1: CLIMATIC INFORMATION FOR BUILDING DESIGN IN CANADA.
CHAPTER 4: COMMENTARY J: EFFECTS OF EARTHQUAKES.

B. SUPPLEMENT DU CODE NATIONAL DU BATIMENT DU CANADA 1985, CNRC NO 23178F.
CHAPITRE 1: DONNEES CLIMATIQUES POUR LE CALCUL DES BATIMENTS AU CANADA.
CHAPITRE 4: COMMENTAIRE J: EFFETS DES SEISMES.

5-MAY-87 07:26:4(

SITE Sooke

ZONING FOR ABOVE SITE/ ZONAGE DU SITE CI-DESSUS

1985 NBCC/CNBC: ZA = 5; ZV = 5; V = 0.30 M/S

ACCELERATION ZONE/ ZONE D'ACCELERATION ZA=5
ZONAL ACCELERATION/ ACCELERATION ZONALE 0.30 G

VELOCITY ZONE/ ZONE DE VITESSE ZV=5
ZONAL VELOCITY/ VITESSE ZONALE 0.30 M/S

1985 NBCC/CNBC **
SEISMIC ZONING MAPS/ CARTES DU ZONAGE SEISMIQUE

PROBABILITY LEVEL: 10% IN 50 YEARS
NIVEAU DE PROBABILITE: 10% EN 50 ANNEES

G OR M/S	ZONE	ZONAL VALUE/ VALEUR ZONALE
0.00	0	0.00
0.04	1	0.05
0.08	2	0.10
0.11	3	0.15
0.16	4	0.20
0.23	5	0.30
0.32	6*	0.40

* ZONE 6: NOMINAL VALUE/ VALEUR NOMINALE 0.40;
SITE-SPECIFIC STUDIES SUGGESTED FOR IMPORTANT PROJECTS/
ETUDES COMPLEMENTAIRES SUGGEREES POUR DES PROJETS D'IMPORTANCE.

** For NBCC applications, when Zv=0 and Za>0, the values of Zv and v should be taken as 1 and 0.05, respectively. See NBCC 1985, Sentence 4.1.9.1 (4).

Pour applications selon le CNBC, lorsque Zv=0 et Za>0, les valeurs Zv et v deviendraient 1 et 0.05, respectivement. Voir CNBC 1985, paragraphe 4.1.9.1 (4).

5-MAY-87 07:26:4

APPENDIX 3

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (END CONSTRUCTION)

CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	1
NUMBER OF VERTICAL SECTIONS	7
NUMBER OF SOIL LAYER BOUNDARIES	3
NUMBER OF PORE PRESSURE LINES	-1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

SEISMIC COEFFICIENT S1,S2 = .10, .00 ← LOAD APPLIED TO BOTTOM OF SLICE

UNIT WEIGHT OF WATER = 9.81

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (24.5, .5) WITH FINAL GRID OF .5

ALL CIRCLES TANGENT TO DEPTH, 11.0,

GEOMETRY

SECTIONS	.0	2.0	14.0	14.5	18.0	26.5	29.0
T. CRACKS	13.2	13.1	6.0	6.0	6.0	11.0	11.2
W IN CRACK	13.2	13.1	6.0	6.0	6.0	11.0	11.2
BOUNDARY 1	13.2	13.1	6.0	6.0	6.0	11.0	11.2
BOUNDARY 2	13.2	13.1	12.0	6.0	6.0	11.0	11.2
BOUNDARY 3	13.2	13.1	12.0	12.0	12.2	11.0	11.2

SOIL PROPERTIES

LAYER	COHESION	FRICTION ANGLE	DENSITY
1	.0	45.0	19.0
2	20.0	37.0	22.0

PORE PRESSURE SPECIFIED WITH THE RU FACTOR

RU = .500

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (END CONSTRUCTION)

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	11.0	10.5	24.5	.5	1.721	1.676
2	11.0	10.5	23.5	.5	1.742	1.675
3	11.0	11.5	24.5	-.5	1.726	1.685
4	11.0	10.5	25.5	.5	1.798	1.775
5	11.0	9.5	24.5	1.5	1.729	1.682
6	11.0	10.5	24.0	.5	1.723	1.667
7	11.0	11.0	24.5	.0	1.722	1.679
8	11.0	10.5	25.0	.5	1.743	1.709
9	11.0	10.0	24.5	1.0	1.723	1.676
10	11.0	11.0	24.0	.0	1.728	1.675
11	11.0	11.0	25.0	.0	1.738	1.703
12	11.0	10.0	25.0	1.0	1.753	1.719

13	11.0	10.0	24.0	1.0	1.719	1.681
14	11.0	10.0	23.5	1.0	1.735	1.666
15	11.0	9.5	24.0	1.5	1.719	1.659
16	11.0	9.5	23.5	1.5	1.731	1.658
17	11.0	9.5	24.5	1.5	1.729	1.682
18	11.0	9.0	24.0	2.0	1.722	1.661
19	11.0	10.0	23.5	1.0	1.735	1.666
20	11.0	10.0	24.5	1.0	1.723	1.676
21	11.0	9.0	24.5	2.0	1.739	1.694
22	11.0	9.0	23.5	2.0	1.729	1.654

.S. MINIMUM= 1.719 FOR THE CIRCLE OF CENTER (24.0, 1.5)

BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (RESERVOIR FULL)

CONTROL DATA

NUMBER OF SPECIFIED CENTERS	0
NUMBER OF DEPTH LIMITING TANGENTS	1
NUMBER OF VERTICAL SECTIONS	8
NUMBER OF SOIL LAYER BOUNDARIES	4
NUMBER OF PORE PRESSURE LINES	1
NUMBER OF POINTS DEFINING COHESION PROFILE	0

SEISMIC COEFFICIENT S1,S2 = .10, .00 ← LOAD APPLIED TO BOTTOM OF SLICE

UNIT WEIGHT OF WATER = 9.81

SEARCH IS BASED ON BISHOP MODIFIED METHOD

SEARCH STARTS AT CENTER (24.5, .5) WITH FINAL GRID OF .5

ALL CIRCLES TANGENT TO DEPTH, 12.5,

GEOMETRY

SECTIONS	.0	2.5	10.0	11.0	14.5	15.0	27.0	29.0
T. CRACKS	6.5	6.5	6.0	6.0	6.0	6.0	13.1	13.2
W IN CRACK	6.5	6.5	6.0	6.0	6.0	6.0	13.1	13.2
BOUNDARY 1	6.5	6.5	6.0	6.0	6.0	6.0	13.1	13.2
BOUNDARY 2	10.8	11.0	6.6	6.0	6.0	6.0	13.1	13.2
BOUNDARY 3	10.8	11.0	11.6	11.8	12.0	6.0	13.1	13.2
BOUNDARY 4	10.8	11.0	11.6	11.8	12.0	12.0	13.1	13.2

SOIL PROPERTIES

LAYER	COHESION	FRICTION ANGLE	DENSITY
1	.0	2.0	16.0
2	.0	45.0	19.0
3	20.0	37.0	22.0

PORE PRESSURE DATA

COORDINATES OF EQUI-PRESSURE LINES

SECTIONS	.0	2.5	10.0	11.0	14.5	15.0	27.0	29.0
LINE 1	6.5	6.5	6.5	7.6	10.5	11.5	13.1	13.2

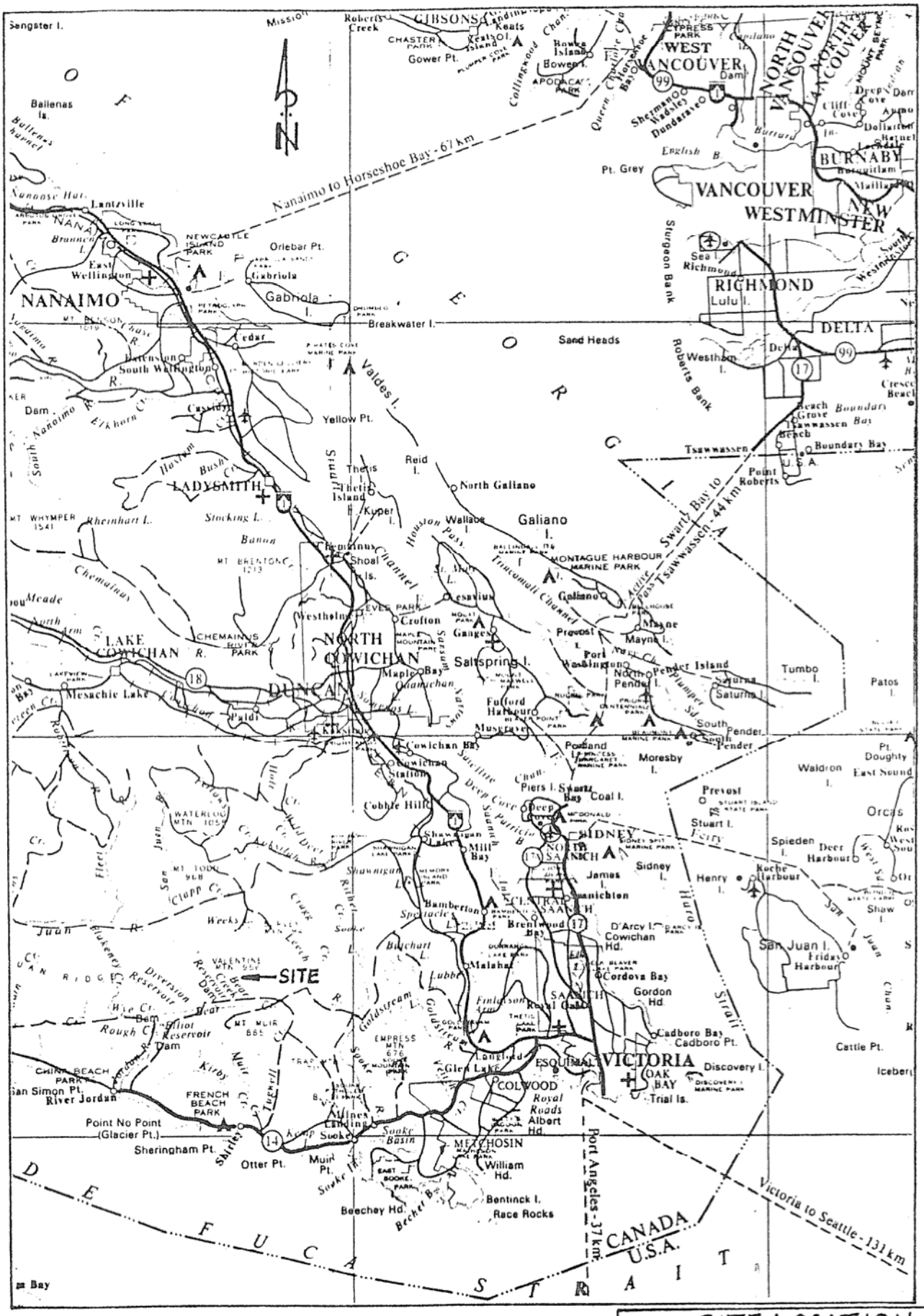
BISHOP MODIFIED AND/OR ORDINARY METHOD OF SLICES

VALENTINE GOLD CORP. TAILINGS DAM STABILITY ANALYSIS (RESERVOIR FULL)

NUMBER	TANGENT	RADIUS	(X) CENTER	(Y) CENTER	FS(BISHOP)	FS(OMS)
1	12.5	12.0	24.5	.5	2.270	2.194
2	12.5	12.0	23.5	.5	2.234	2.125
3	12.5	13.0	24.5	-.5	2.229	2.152
4	12.5	12.0	25.5	.5	2.507	2.487
5	12.5	11.0	24.5	1.5	2.358	2.292
6	12.5	13.0	24.0	-.5	2.219	2.130
7	12.5	13.5	24.5	-1.0	2.218	2.144
8	12.5	13.0	25.0	-.5	2.271	2.210

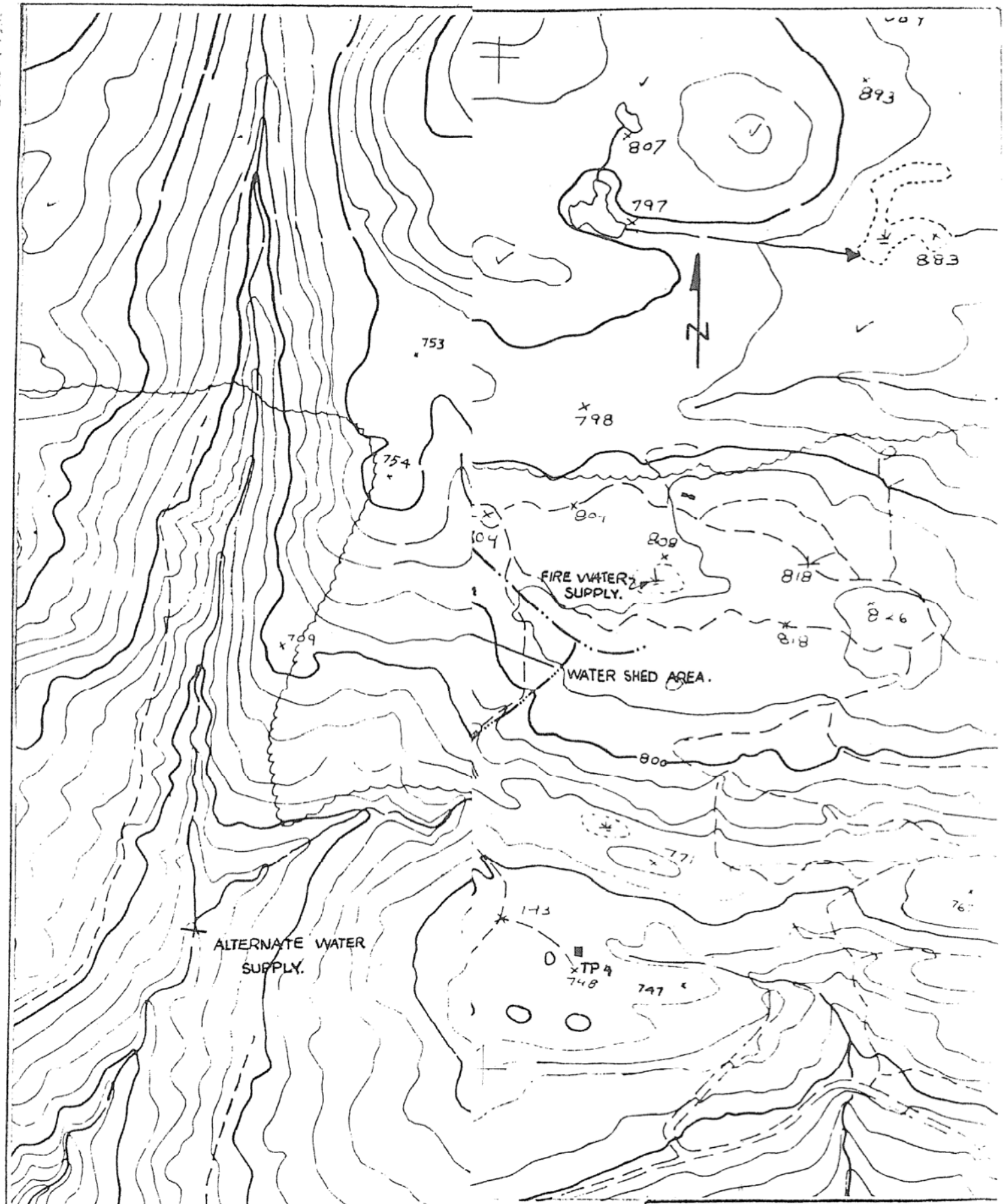
13	11.0	10.0	24.0	1.0	1.719	1.661
14	11.0	10.0	23.5	1.0	1.735	1.666
15	11.0	9.5	24.0	1.5	1.719	1.659
16	11.0	9.5	23.5	1.5	1.731	1.658
17	11.0	9.5	24.5	1.5	1.729	1.682
18	11.0	9.0	24.0	2.0	1.722	1.661
	11.0	10.0	23.5	1.0	1.735	1.666
20	11.0	10.0	24.5	1.0	1.723	1.676
21	11.0	9.0	24.5	2.0	1.739	1.694
22	11.0	9.0	23.5	2.0	1.729	1.654

.S. MINIMUM= 1.719 FOR THE CIRCLE OF CENTER (24.0, 1.5)



SITE LOCATION

PLATE 1

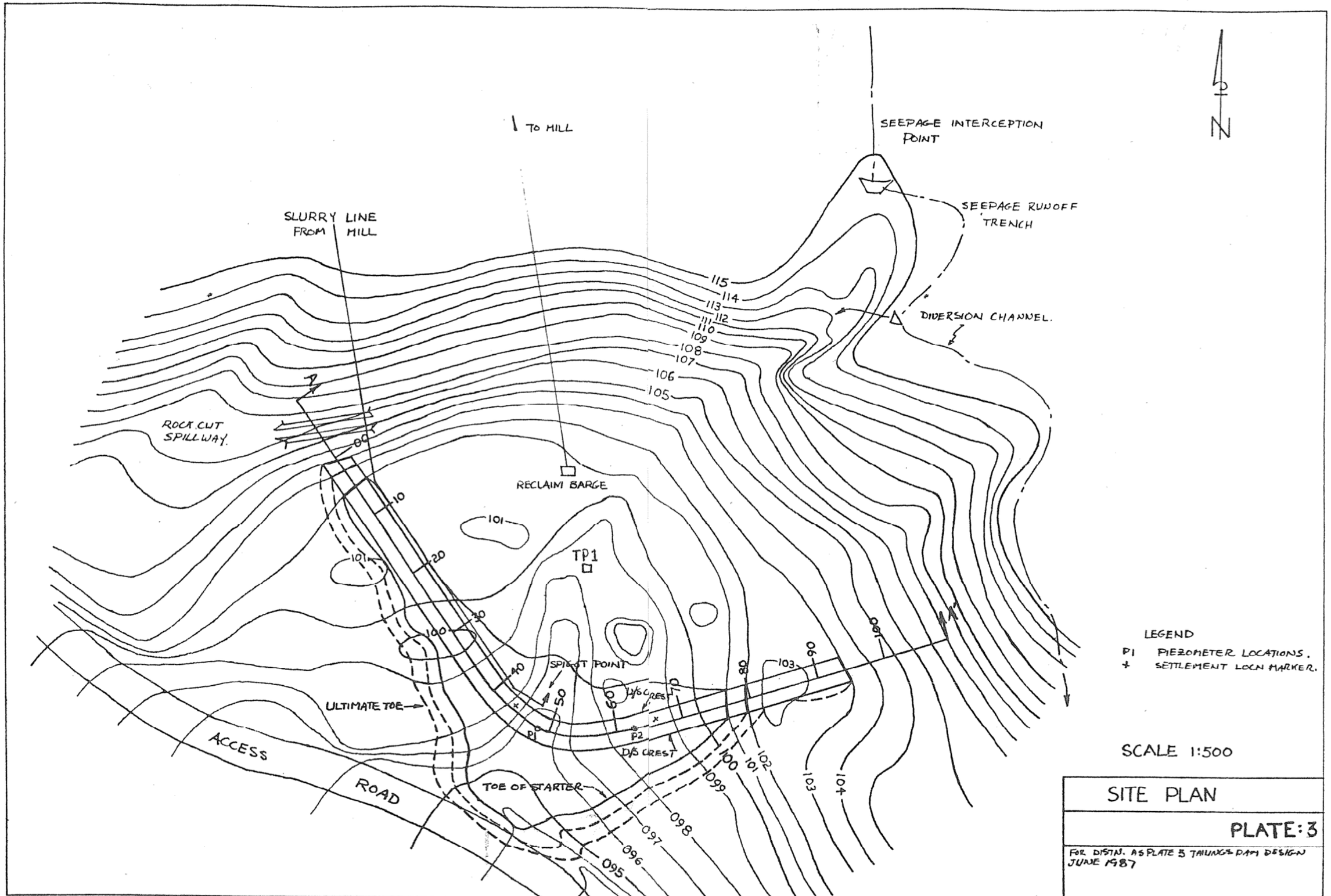


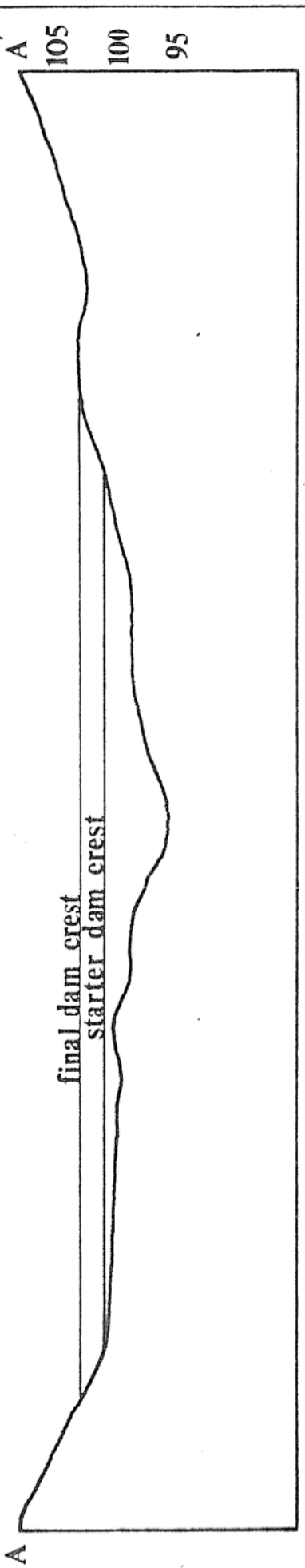
MILL and TAILING SITE

PLATE : 2

FOR PROSPECTUS MAY 87
FOR TAILINGS DAM DESIGN JUNE 87

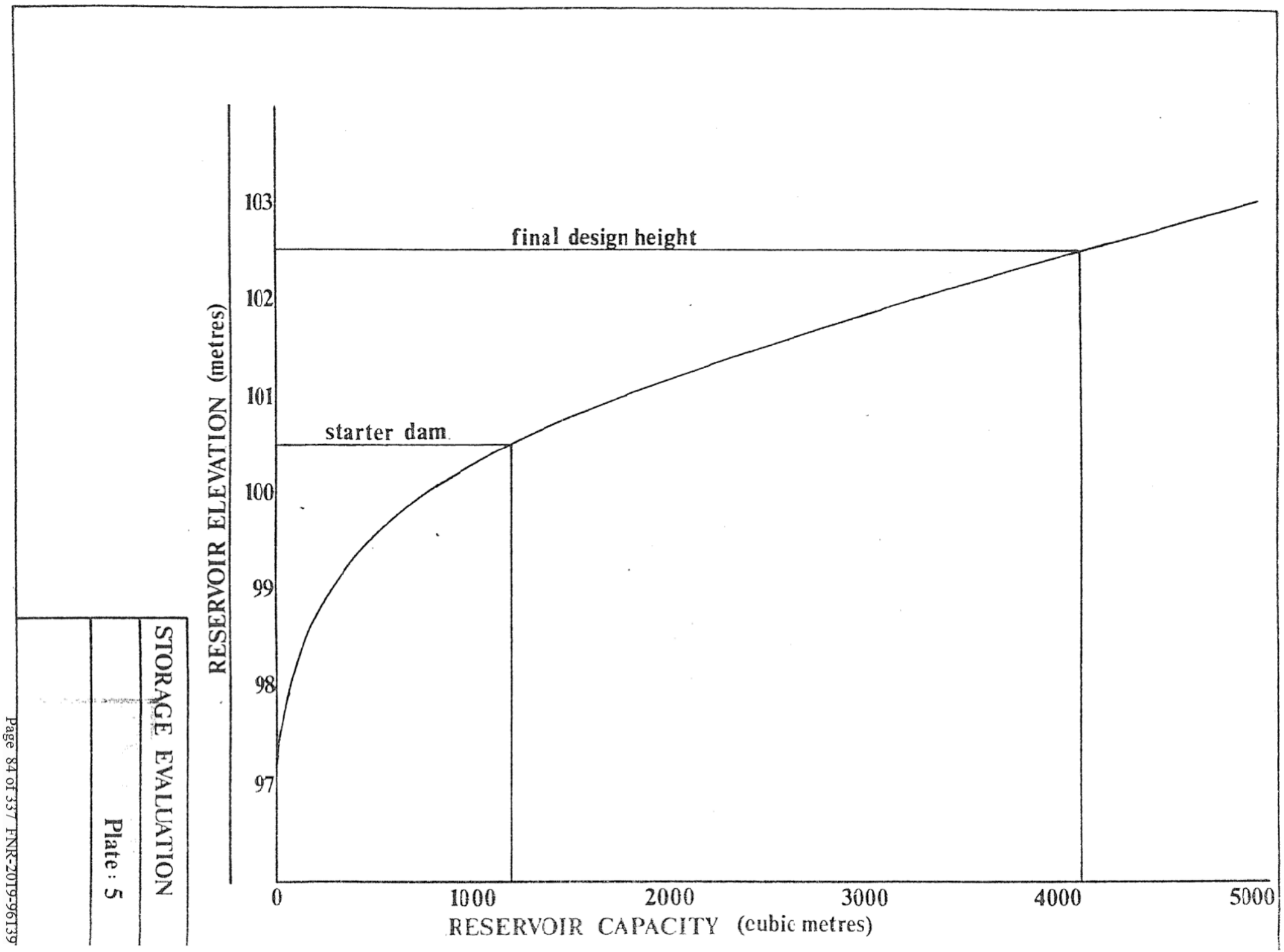
MAY 1987 DRAWN BY GL


TO MILL
SEEPAGE INTERCEPTION POINT
SEEPAGE RUNOFF TRENCH
SLURRY LINE FROM MILL
DIVERSION CHANNEL.
ROCK CUT SPILLWAY.
RECLAIM BARGE
TP1
SPIGOT POINT
ULTIMATE TOE
U/S CREST
D/S CREST
P1
P2
ACCESS ROAD
TOE OF STARTER
115
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
099
098
097
096
095
10
20
30
40
50
60
70
80
90
LEGEND
P1 PIEZOMETER LOCATIONS.
+ SETTLEMENT LOCN MARKER.
SCALE 1:500
SITE PLAN
PLATE: 3
FOR DISTN. AS PLATE 5 TAILINGS DAM DESIGN JUNE 1987



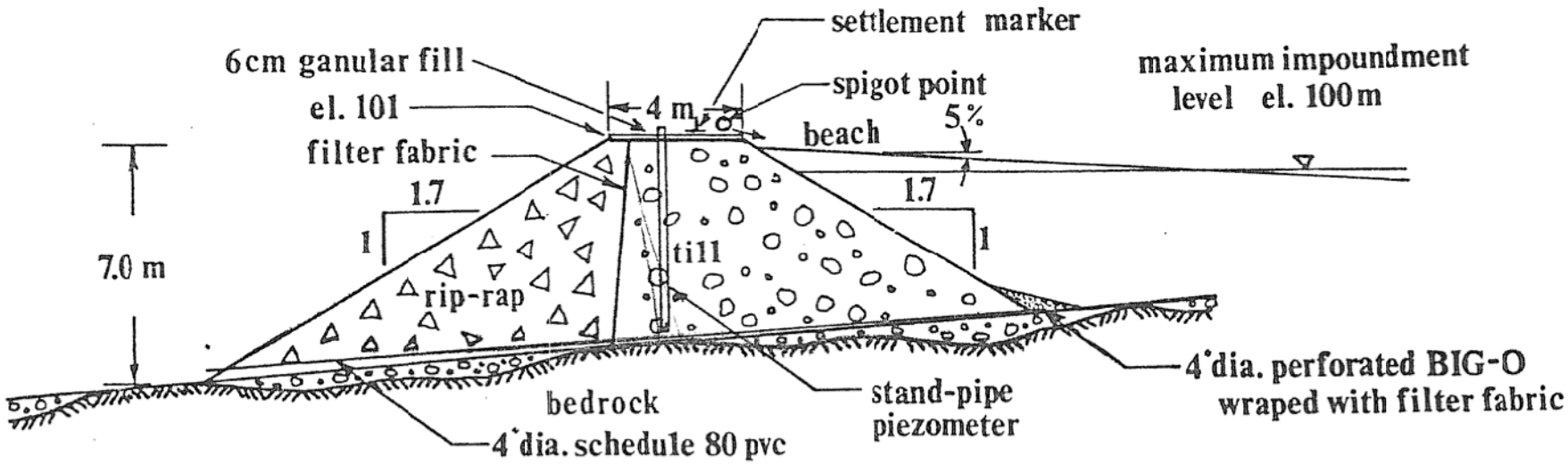
CENTRE-LINE SECTION

Plate: 4



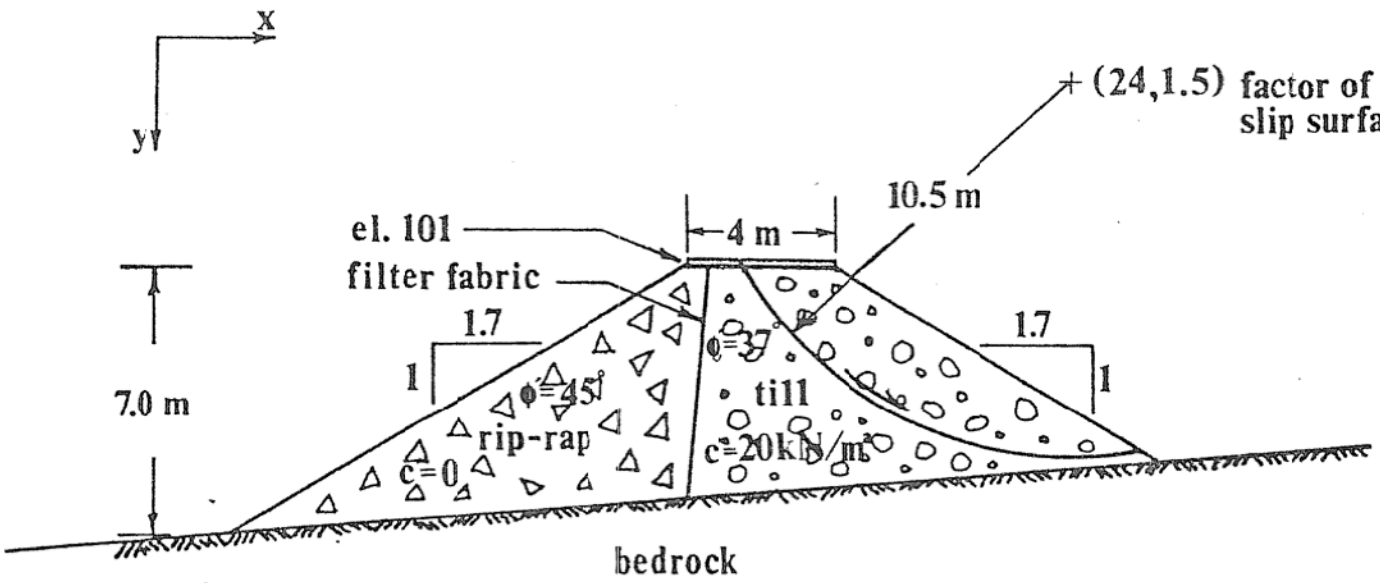
STORAGE EVALUATION

Plate : 5



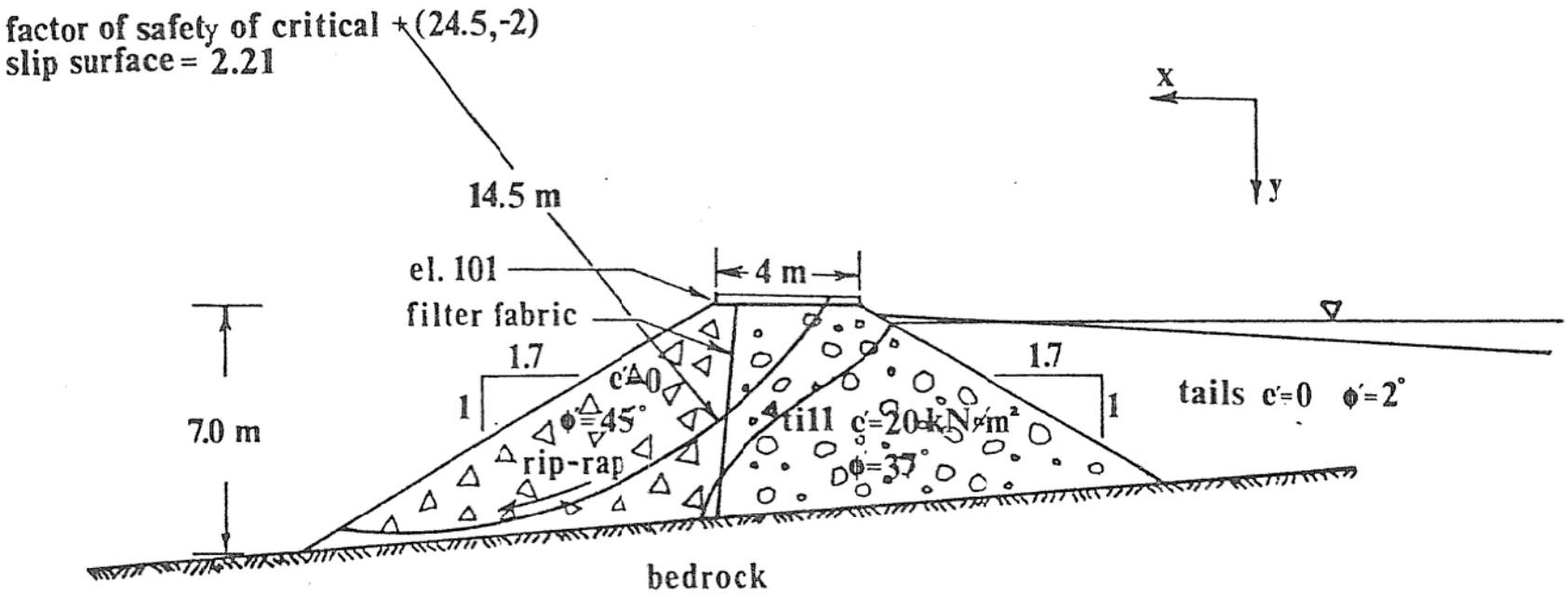
SCALE 1:200

MAXIMUM CROSS-SECTION
Plate: 6



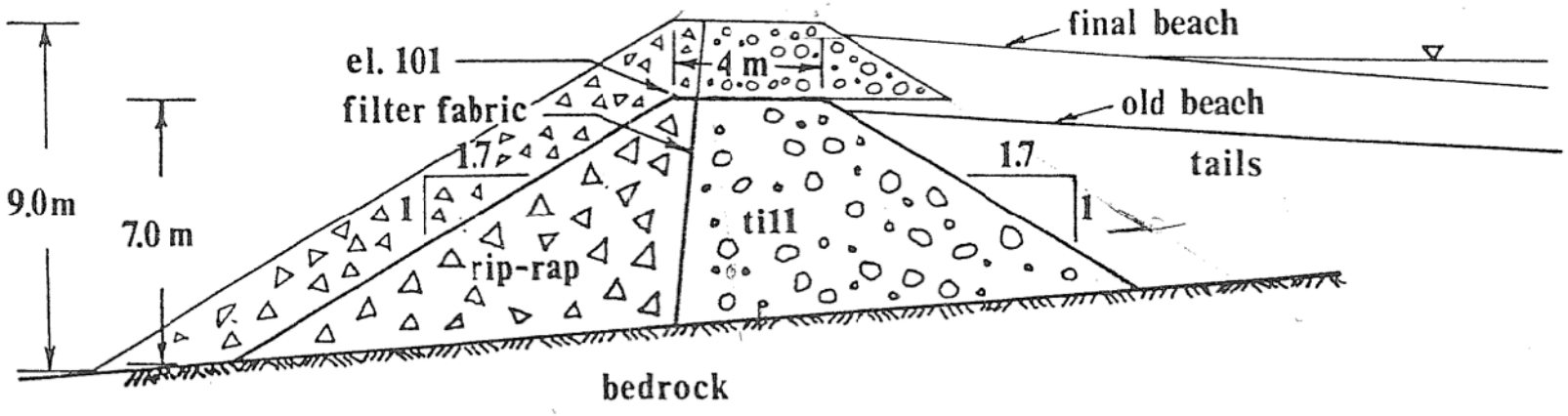
SCALE 1:200

STABILITY MODEL 1
Plate: 7



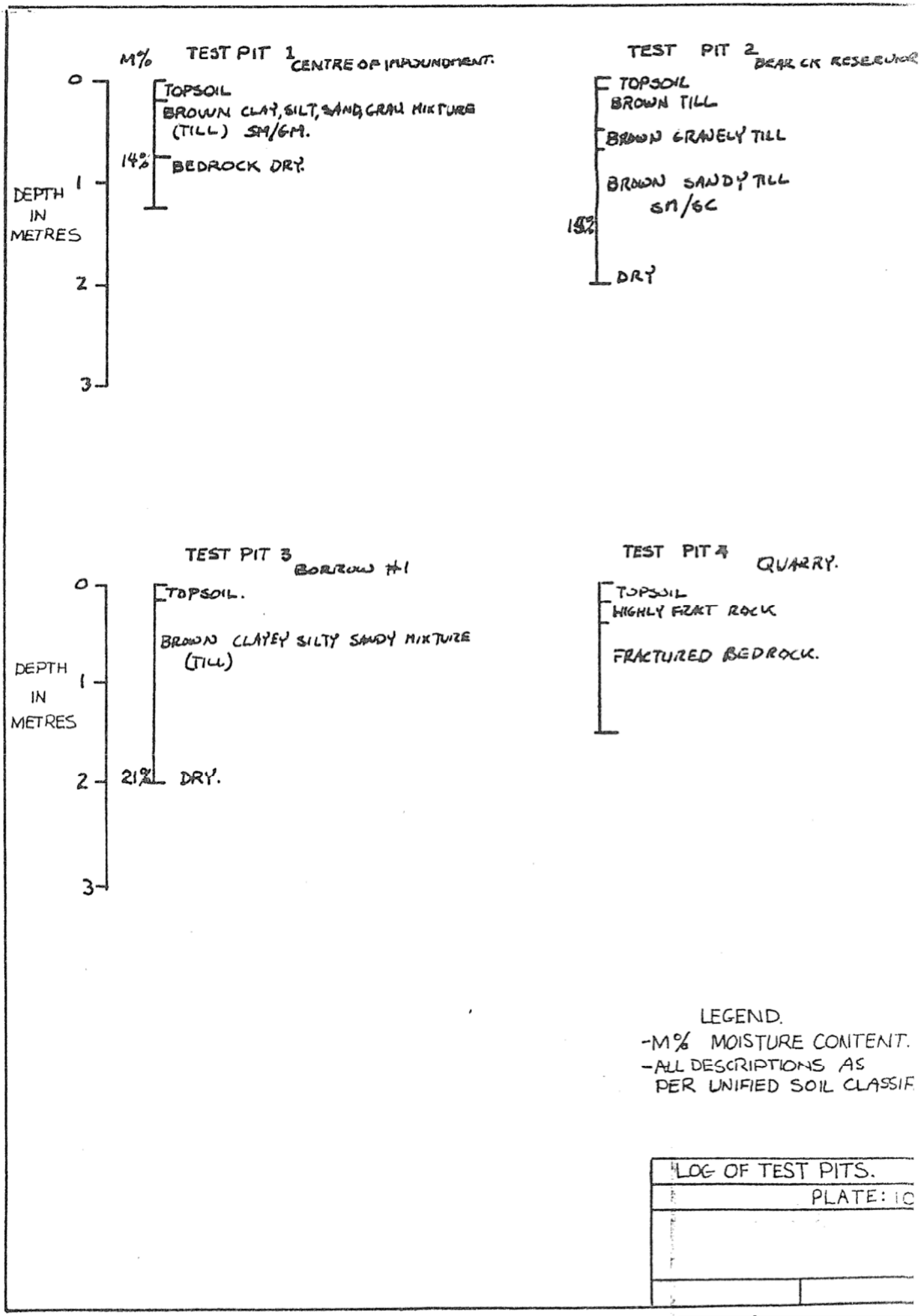
SCALE 1:200

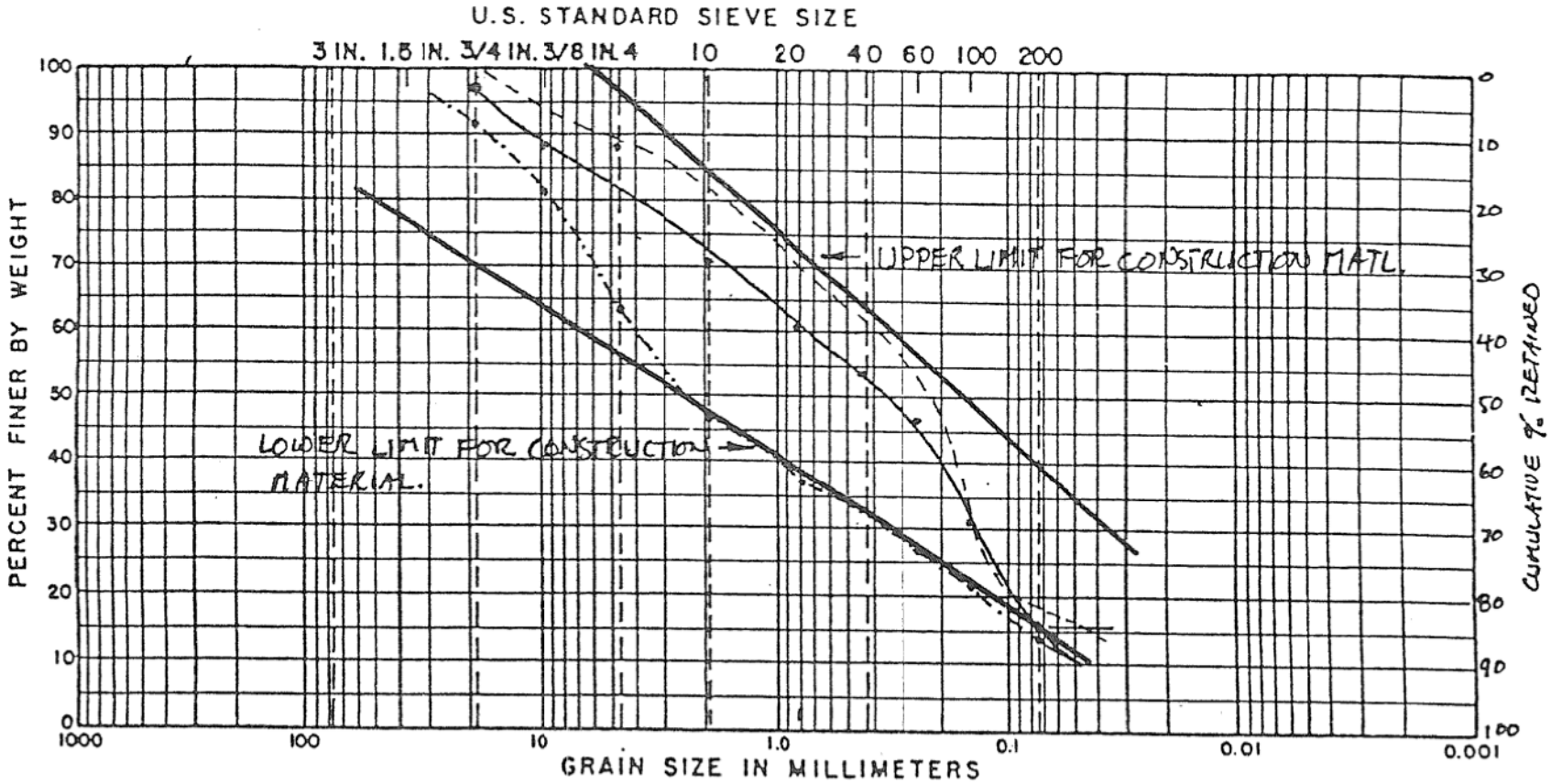
STABILITY MODEL 2
Plate: 8



SCALE 1:200

FINAL DAM PROFILE
Plate: 9

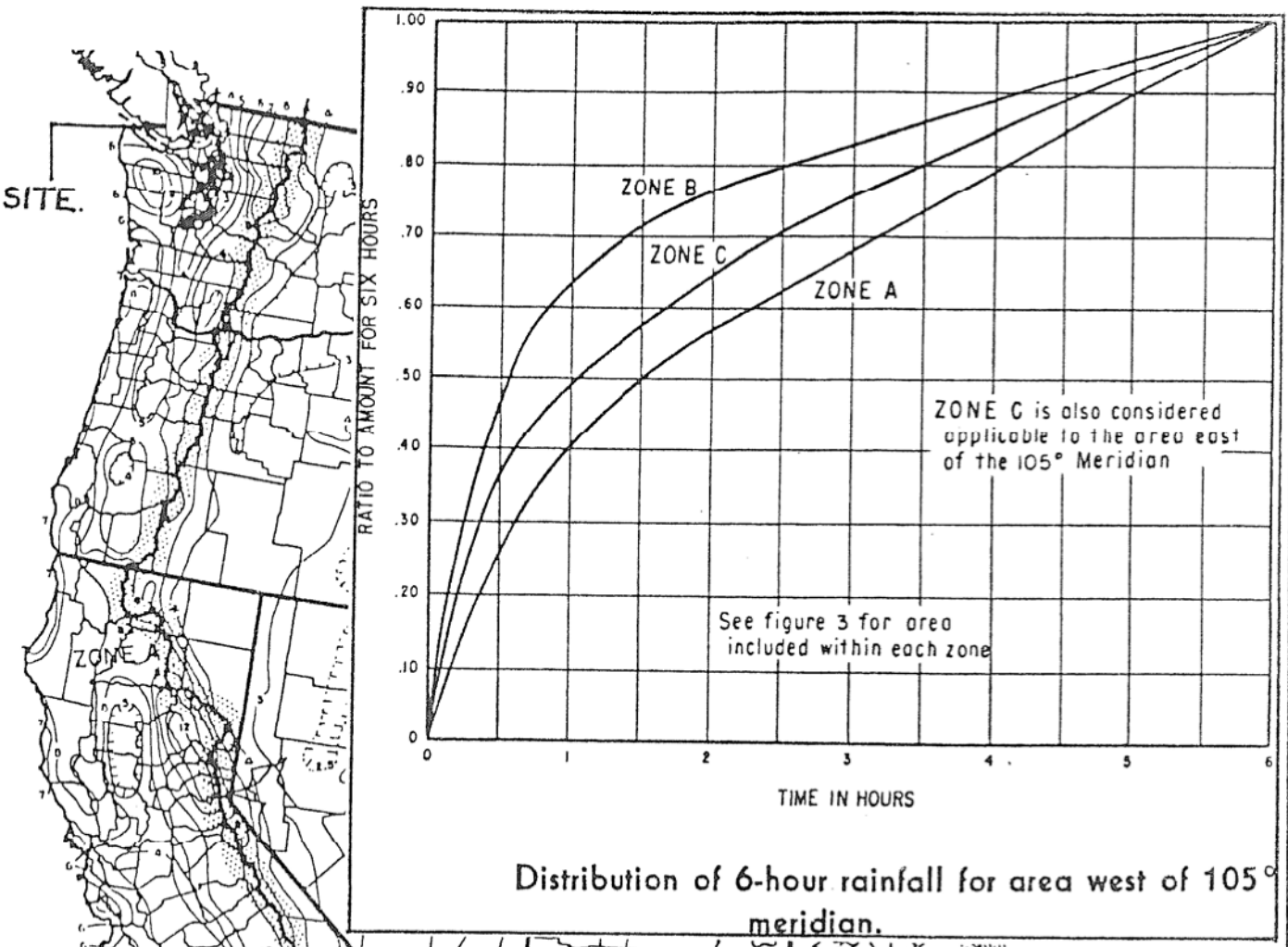

M%
TEST PIT 1
CENTRE OF IMPOUNDMENT.
0
1
2
3
DEPTH IN METRES
TOPSOIL
BROWN CLAY, SILT, SAND, GRAVEL MIXTURE (TILL) SM/GM.
14%
BEDROCK DRY.
TEST PIT 2
BEAR CK RESERVOIR
TOPSOIL
BROWN TILL
BROWN GRAVELY TILL
BROWN SANDY TILL
SM/SC
15%
DRY
TEST PIT 3
BORROW #1
0
1
2
3
DEPTH IN METRES
TOPSOIL.
BROWN CLAYEY SILTY SANDY MIXTURE (TILL)
21%
DRY.
TEST PIT 4
QUARRY.
TOPSOIL
HIGHLY FRACT ROCK
FRACTURED BEDROCK.
LEGEND.
-M% MOISTURE CONTENT.
-ALL DESCRIPTIONS AS PER UNIFIED SOIL CLASSIF
LOG OF TEST PITS.
PLATE: 10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE #	DEPTH	U.W.F.	CLASSIFICATION	NAT. W.C.	LL	PL	PI	LEGEND.
BR-2	1 metre	SM	Clayey silty Sand	9%				———
BR-3	1 metre	SM/SC	Silty Sand, Clayey, Sand	15%				—·—·—·—
BORROW 1	1 metre	SM/SC	clayey Silty Sands	21%				– – – – –

GRADATION CURVE



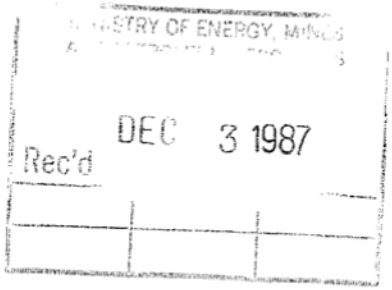
Distribution of 6-hour rainfall for area west of 105° meridian.

Probable maximum 6-hour point storm values (inches) west of the 105° meridian.

STORM POTENTIAL DATA	PLATE 13
MAY 1937	[illegible]

TAILINGS IMPOUNDMENT CONSTRUCTION REPORT
DECEMBER 1, 1987

PETER PEART. P.ENG.
consulting geotechnical engineer.



TAILINGS IMPOUNDMENT CONSTRUCTION REPORT
VALENTINE MOUNTAIN PROJECT

FOR
VALENTINE GOLD CORPORATION

By Peter Peart. P.Eng.

1st December, 1987.
Vancouver, B.C.

Victoria Mining District.
N.T.S 92B/12W

GRIT
1801

R.R#1, BOWEN ISLAND, BRITISH COLUMBIA. V0N 1G0. (604) 947 2342.

PETER PEART. P.ENG.
consulting geotechnical engineer.

Mr R. Bone, P.Eng.
Inspector of Mines
and Resident Engineer,
Parliament Buildings
Victoria
British Columbia
V8V 1X4

1st December 1987.

Dear Sir;

I am submitting this report to your Ministry on behalf of Valentine Mountain Gold Ltd, Sook, B.C. The Report details the satisfactory completion of the tailings impoundment on the Valentine Mountain Property near Sooke, B.C.

Should you have any questions regarding the content or intent of this report I would be more than happy to have you contact me.

Yours Sincerely

Peter Peart, P.Eng.

R.R#1, BOWEN ISLAND, BRITISH COLUMBIA. V0N 1G0. (604) 947 2342.

TABLE OF CONTENTS

1.0.0 SUMMARY

2.0.0 INTRODUCTION
- 2.1.0 NATURE OF PROJECT
- 2.2.0 SCOPE OF PROJECT
- 2.3.0 HISTORICAL BACKGROUND
  - 2.3.1 AUTHORIZATION
  - 2.3.2 PROJECT TIMES AND DURATION
  - 2.3.3 PRE CONSTRUCTION INVESTIGATIONS
- 2.4.0 ACKNOWLEDGMENTS

3.0.0 DISCUSSION
- 3.1.0 CONSTRUCTION MATERIALS
  - 3.1.1 RIP-RAP
  - 3.1.2 TILL
- 3.2.0 CONSTRUCTION
  - 3.2.1 SITE PREPARATION
  - 3.2.2 SUBDRAIN INSTALLATION
  - 3.2.3 WELL AND STANDPIPE INSTALLATION
  - 3.2.4 PLACING AND COMPACTING RIP-RAP
  - 3.2.5 PLACING AND COMPACTING TILL
- 3.3.0 CONSTRUCTION SEQUENCE
  - 3.3.1 MAIN EMBANKMENT
  - 3.3.2 SPILLWAY CONSTRUCTION
  - 3.3.3 SEEPAGE FINGERS
  - 3.3.4 SEEPAGE DITCH AND COLLECTION POND
- 3.4.0 MONITORING
  - 3.4.1 PIEZOMETERS
  - 3.4.2 SETTLEMENT MARKERS
- 3.5.0 STABILITY ANALYSIS
  - 3.5.1 AS CONSTRUCTED
  - 3.5.2 RAPID DRAWDOWN
  - 3.5.3 STEADY STATE SEEPAGE
  - 3.5.4 STABILITY SUMMARY

4.0.0 CONCLUSIONS

5.0.0 RECOMMENDATIONS

6.0.0 STATEMENT OF QUALIFICATION

7.0.0 STATEMENT OF SATISFACTORY COMPLETION

8.0.0 APPENDICES
- 8.1.0 APPENDIX A: MATERIAL PROPERTIES AND COMPACTION RESULTS.
- 8.2.0 APPENDIX B: INITIAL MONITORING DATA
- 8.3.0 APPENDIX Z: TAILINGS IMPOUNDMENT PROPOSAL, JUNE 1987.

LIST OF PLATES

PLATE 1.....GENERAL DAM LAYOUT

PLATE 2.....DAM CROSS-SECTIONS

PLATE 3.....STORAGE CAPACITY CURVE

LIST OF SHEETS

SHEET 1.....PLAN MAP OF TAILINGS DAM, AS CONSTRUCTED.

LIST OF TABLES

TABLE 1.....OPERATION DATES

TABLE 2.....TILL PROPERTIES

TABLE 3.....COMPACTION RESULTS

1.0.0

SUMMARY

Valentine Gold Corporation Ltd in an option agreement with Beau Pre Explorations Ltd caused a tailings impoundment to be constructed on the Valentine Mountain Property approximately 20km northwest of Victoria, British Columbia, during the late summer and fall of 1987.

The impoundment was constructed to contain approximately 6,700 cubic metres of mill tailings while maintaining a minimum of one metre of freeboard on the embankment by virtue of a rockcut spillway constructed on the east side of the impoundment.

The embankment was constructed as a two zone structure with a geotextile filter separating the rip-rap downstream zone and the sandy till upstream zone. A subdrain system was installed to enhance the stability of the structure upon abandonment.

Monitoring of the embankment is facilitated by the installed settlement markers, piezometers and a subdrain pressure monitoring system. Seepage volumes and quality may be monitored and contained before being recirculated to the impoundment or released to the environment.

The structure was completed and approved under the supervision of a Professional Engineer in the Province of British Columbia. Recommendations for the maintenance of the system and embankment are contained in this report.

This report has no addendums or attachments and none may be made or attached without the written permission of the author.

2.0.0

INTRODUCTION

2.1.0 NATURE OF PROJECT.

The construction of this tailings impoundment became necessary when Valentine Gold Corporation entered into a bulk sampling program during the fall of 1987. Valentine Gold anticipates that it will sample and process a maximum of ten thousand tonnes of rock from the Beau Pre, Valentine Mountain property under an option agreement during 1987 and 1988.

The impoundment has been constructed to contain approximately 6,700 cubic metres of tails and be capable of limiting fluid levels within the impoundment automatically by the installation of a set level spillway.

Recirculation of embankment seepage was necessary and a seepage collection pond with the ability to recirculate the seepage back into the impoundment was necessary.

Limited fine grained cohesive materials were available on site and a structure that required a small quantity of this material was necessary.

The nature of the operation indicated that a sturdy embankment with a potential to withstand considerable overtopping potential and extremes in weather was desirable. The impoundment was also required to meet the stability and environmental requirements of the various Federal and Provincial Ministries.

2.2.0 SCOPE OF PROJECT.

The scope of the project was limited to the design and construction of the embankment, spillway and seepage collection system.

2.3.0 HISTORICAL BACKGROUND.

The tailings impoundment was the subject of a detailed design report submitted to Valentine Gold in June, 1987. The report indicated that the embankment should be constructed in two phases; the first phase being able to contain approximately 1,200 cubic metres of tailings and the second phase being able to contain a total of approximately 4,150 cubic metres. The rational being that the mill is capable of processing 20 tonnes of rock in a 24 hour day and the mill was permitted to run a total of 365 days thus producing a total possible output of 7300 tonnes in one year. If the mill had a 90% operating time then the total drops to about 6,500 tonnes. Construction of the embankment in two stages would require very little soil and allow a larger storage capacity for any given area.

Valentine Gold Corporation elected to have Norecol Environmental Consultants Ltd. write an "addendum" to the June, 1987 Tailing Impoundment Report indicating to Ministry of Mines that the impoundment would be constructed to contain the tailings from 10,000 tonnes of mill feed. Norecol also indicated that the embankment for the impoundment could be constructed in one operation.

The result of Norecols "addendum" was to cause the Ministry of mines to issue permission for construction of the impoundment on the condition that it be capable of containing the tailings for 10,000 tonnes of mill feed. This would indicate a storage capacity 154% greater than initially designed for. The single stage construction of the embankment instead of a two phase approach required more construction time, greater quantities of construction material and less available storage in the given area.

In general the as built embankment was constructed in a manner similar to the initial design with the exception that the till core was thickened to allow for the extra height of the structure. The detailed drawings of the dam cross-sections are shown on Plate 2.

2.3.1. Authorization.

Authorization was given to Mr Peter Peart of Peart Geotechnical Ltd. to proceed with construction supervision and field engineering of the proposed impoundment embankment By Mr Peter Stokes, Vice President of Operations for Valentine Gold Corporation Ltd. Authorization was given on the 13th of August 1987, to proceed with the field engineering and construction supervision of the impoundment.

2.3.2 Project Timing and Duration.

The following table outlines the schedule that was maintained for the construction of the impoundment;

TABLE 1

DATE	OPERATION	PROFESSIONAL SUPERVISION
08/13	authorization to proceed with field engineering and construction of tailings facility	No
08/17	site preparation and clearing	Yes
08/18	underdrain installation	Yes
08/19	drilling for blast, rock borrow	Yes
08/20	borrow blasting and subdrain installation	Yes
08/21	placing and compacting rip-rap	Yes
08/22	placing and compacting rip-rap	Yes
08/23	" " " " " " "	Yes
08/24	surveying and re-design	Yes
	forest closed to fire danger	
09/18		
09/19		
09/20		
09/21		
09/22		
09/23		
10/25	placing rip-rap and 2 lifts of till	No
10/26	placing 1 lift of till and compacting	No
10/27	repair to fill and filter blanket	Yes
10/28	repair to filter blanket and till layer	Yes
10/29	placing and compacting till, Thurber monitoring density of compacted fill.	Yes
10/30	placing and compacting rip-rap along dam	
10/31	placing and compacting fill, remove access road	Yes
11/01	laying filter blanket, placing and compacting till	
11/02		
11/03	clear spillway site, place rip-rap	
11/04		
11/05		
11/06	instrumentation installation, spillway cut	Yes
11/07	inspect and lay out spillway drill holes	Yes
11/09	placing and compacting fill and rip-rap.	
11/10	Dressing top of dam and upstream face rip-rap placement. layout spillway blast.	
11/11	instrumentation installation and spillway const.	Yes
11/23	construction inspection of finished dam	Yes

2.3.3 Pre Construction Investigations.

The results of the pre construction investigation are detailed in the Tailings Impoundment Proposal, Valentine Mountain dated June 1987. The report is included in this report as a Appendix Z.

2.4.0 ACKNOWLEDGMENTS

Acknowledgements are due to Mr Calvin Van Buskirk, E.I.T for his valuable and reliable assistance in design and construction supervision on this, his first project, which he handelled very well.

Acknowledgement is also due to Mr Ted Shaw and Mr Ed Shaw who constructed and instructed on this project with suitable skill and imagination.

3.0.0

DISCUSSION

3.1.0 CONSTRUCTION MATERIALS

3.1.1 Rip-Rap

The rip-rap borrow area was located within the impoundment area,as shown on Plate 1, to increase the storage capacity of the system and to minimize the haulage distance during construction. The borrow rock is a hard to very hard, competent, meta sedimentary material common to the area. The rock was blasted using a variety of drills and explosives, none of which produced very effective results. A percentage of the shot rock was too large to use as fill, this was due in part to the incorrect use of prill in wet holes, most of which did not totally burn.

The rip-rap was considered to be acceptable if it was smaller than 50cm in diameter and the rock was hard and competent. All soft or deleterious material was wasted away from the site in a proper fashion.

3.1.2 Till.

The till borrow area is located about 1.5km east of the impoundment as shown on plate 1 of the Tailings Dam Proposal included as appendix Z. The location of a large supply of till close to the impoundment site was difficult and the till material used on the embankment was slightly siltier than optimum. The till borrow area was developed by removing the organic top soil and stockpiling it for reclamation of the borrow area at a later date. The till was removed down to the level of the existing access road in such a way as to preclude the development of a ponded area. The borrow area drains naturally into the existing drainage system.

The grain size distribution curves representative of the soil are shown in appendix A of this report. The till may be described as a clayey, silty, gravely sand in a dense to very dense condition.

The Table below summarizes the major properties of the till used in the construction of the embankment.

TABLE 2

UNIT WEIGHT gm/cm3	OPTIMUM MOISTURE %	UNIFIED SOIL CLASSIFICATION	HYDRAULIC CONDUCTIVITY
1.95	9%	SM	3.05*10 -6

At completion of construction of the tailings dam the till borrow pit was essentially exhausted.

3.2.0 CONSTRUCTION

3.2.1 Site Preparation.

All soft and compressible soils and deleterious materials were removed from the site prior to construction and disposed of in a proper fashion. All timber and brush was stockpiled for burning in the winter months.

In the area beneath the embankment the soil was removed down to the bedrock. The soil was a mixture of clay, silt,sand and

gravel in a dense to very dense condition. This material is commonly referred to as till. The till was not totally removed from the surface of the bedrock but left as an infill for the numerous small irregularities on the rock surface. Since the till was over consolidated and at least equal in quality to the till being imported from the borrow area it was desirable to leave it in places where it was thick enough or infilling a potentially troublesome open joint or plane .

The stripping of the surface soils produced a very irregular foundation surface for the embankment with bedrock protuberances in the order of 2m to 3m in height. These protuberances were left in place as they were competent and provided excellent resistance to basal translation and provided a lengthened hydraulic path for any potential seepage along the dam base. Deep holes in the embankment foundation area were filled with till in 20cm layers and compacted with a hand operated plate compactor to approximately 95% of Maximum Dry Density, Modified Proctor.

A small diversion dam, 1 metre high, was placed in the small non perennial stream that enters the impoundment area. The dam was connected to a plastic diversion pipe that conducted water from the impoundment area during construction. This diversion assisted in keeping the foundation area free of excess moisture during the initial placement of soils. The record dry summer also assured that the foundation area was free of excess water and moisture.

3.2.2 Subdrain Installation.

A subdrain system was constructed as shown on Sheet 1 (in general on plate 1).The subdrain was constructed of schedule 80, 100mm, ABS plastic pipe cemented together in three metre lengths. The subdrain passes through the dam at the point of the deepest section of the embankment at a gradient of approximately 5%. The upstream end is connected to a feeder pipe of filter cloth wrapped 100mm perforated 'Big O' type drain pipe laid parallel to the upstream toe of the embankment as shown on Sheet 1 and Plate 1. The total length of the feeders is approximately 20 metres.

The downstream end of the pipe is plugged with a threaded clean out cap to facilitate sampling of the impoundment seepage. The downstream end of the pipe is also fitted with a pressure gauge to allow direct reading of the hydrostatic head within the impoundment at the toe of the upstream face.

The pipe was laid on a base of compacted till about 20cm thick and covered by a layer of protecting till approximately 50cm thick. The protecting till cover was then compacted to 95% of maximum Dry Density, Modified Proctor

A filter fabric membrane 3m high and 10m long was placed normal to the centre line of the underdrain pipe and in intimate connection with the pipe at the point of penetration. The membrane was placed to prevent the migration of fines along the pipe-soil interface.

3.2.3 Well Standpipe Installation.

Two 100mm schedule 80 ABS plastic standpipe piezometer/well assemblies were installed at the foundation level in the rip-rap zone prior to placement of any substantial quantity of rip-rap as shown on Sheet 1 of this report. It was felt that installation of a well into the rip-rap after completion of the embankment would be very difficult and that the extra construction difficulties of the installations would be worth while in the end.

3.2.4 Placing and Compacting Rip-Rap./

The rip-rap was pushed or end dumped in lifts approximately 1m thick before being compacted with a 60 series Bow mag compactor making a minimum of four passes in the vibratory mode. Experience indicates that a minimum of four passes with a vibratory compactor will compact rip-rap to its maximum density, extra passes tend to pulverize the rip -rap at the surface of the lift.

3.2.5 Placing and Compacting Till.

The till was placed in lifts approximately 50cm thick in it uncompacted state and compacted down to approximately 30cm per lift. A minimum of four passes with a 60 series Bow mag vibratory compactor was made on each lift. Extra attention to the area at the sides of each lift was taken to avoid soft and loose edges on the upstream side and against the filter fabric.

Compaction control was achieved by using a nuclear densometer to test the layers following a normal compaction process. The nuclear densometer was capable of producing direct readouts of the Maximum Dry Density, Modified proctor, and the in-situ moisture content.

A summary of the in-situ density results is shown below on Table 3.

TABLE 3

STATION	ELEV	MAX. DRY DENSITY	MOISTURE%	% MAX. DRY DENSITY.
0+20	98	125.5pcf	7	99.6
0+25	98	125.5	6.6	95.3
0+30	98.5	125.5	7.9	95.5
0+35	98.5	125.5	6.7	99.5
0+40	98.5	125.5	7.5	99.1
0+45	98.5	125.5	8.5	97.1
0+50	98.5	125.5	8.6	94.9
0+55	99.0	125.5	7.9	98.9
0+60	99.0	125.5	9.0	95.8
0+65	99.0	125.5	9.8	91.8
0+20	100	125.5	9.3	97.3
0+15	100	125.5	11.0	96.7
0+10	100	125.5	8.9	99.4
0+65	101	125.5	9.7	98.6
0+60	101	125.5	10.2	94.8
0+55	101	125.5	10.8	96.1
0+50	101	125.5	10.7	95.5
0+45	101	125.5	11.0	95.1
0+40	101	125.5	13.0	89.32
0+35	101	125.5	10.3	95.7
0+30	101	125.5	11.3	93.0
0+25	101	125.5	11.2	92.3
0+20	101	125.5	14.1	88.9
0+15	101	125.5	9.0	93.2
0+10	101	125.5	11.0	95.0
0+00	101	125.5	11.6	92
0+20	101	125.5	7.3	95
0+25	101	125.5	10.4	90
0+15	101	125.5	9.4	94
0+00	101	125.5	9.1	94
0+15	101	125.5	10.2	98.6

Where compaction was not up to the required 95% of Maximum Dry Density, Modified Proctor that section was recompacted with a minimum of four passes with a vibratory compactor.

The upstream section of the dam required approximately 1500 cubic metres of compacted till and a total of 31 density tests were carried out to produce a test frequency of one test per 50 cubic metres of placed and compacted till.

3.3.0 CONSTRUCTION SEQUENCE

3.3.1 Main Embankment.

Following the site preparation described in Section 3.2.1 and the subdrain installation described in section 3.2.2 an initial lift of rip-rap was placed in the area of the maximum section of the embankment. The initial lifts of rip-rap were placed and compacted in lifts of 1m in thickness or less until a height of approximately 2m was reached.

Following smoothing of the upstream face of the rip-rap the filter blanket was keyed into the foundation material and the existing filter fabric membrane described in Section 3.2.2. and laid against the 2m high rip-rap face in such a fashion as to allow a 1m flap to remain at the top of the rip-rap.

Till was then carefully laid and compacted in lifts of less than30cm in thickness and compacted to a minimum of 95% of Maximum Dry Density, Modified Proctor. In effect this procedure raised the area between stations 0+40 and 0+60 and brought that area up to level with the remainder of the dam foundation.

The filter blanket was then flipped over onto the till side of the embankment and the rip rap side of the embankment was raised another three meters in lifts not exceeding 1m and compacted as before. When the embankment had been raised to the new level another 3m wide section of filter blanket was keyed into the exposed flap of blanket from the initial layers and laid against the upstream rip-rap face, again leaving a 1m flap of filter fabric at the top of the berm free for attaching to the final layers of the embankment.

The till was then placed against the rip-rap and filter blanket in lifts not exceeding 30cm in thickness and compacted to a minimum of 95% of Maximum Dry Density, Modified Proctor.

The final lift was placed in the same fashion as the previous two until the embankment had reached an elevation of approximately 102.5m when the filter fabric left exposed was turned over onto the rip-rap and a final layer of rip-rap 50cm thick was placed on the top of the embankment to produce a final elevation of approximately 103m.

The upstream till face was then back scoured to remove any soft or uncompacted soil that had been out of reach of the compactor during construction. Once the loose soil had been removed a layer of rip-rap 1m thick was placed by an excavator against the upstream face to protect the upstream face against erosion for the periods when the water level is higher than the tailings beach.

3.3.2 Spillway Construction.

The Spillway was constructed after the dam was brought to full height, a situation that was neither desirable or likely to be repeated. The spillway was blasted into solid rock at the east

Page 105 of 337 FNR-2019-96139

end of the tailings dam embankment in an attempt to produce a relatively maintenance free form of ultimate water level control.

Pre shear lines were laid out on either side of the spillway alignment to limit the amount of backbreak and to limit the transmitted shock from the production holes. The pre shear holes were laid out approximately 40cm apart and loaded with prima flex pre shear powder. The main production holes were laid out in a predetermined pattern and loaded with an appropriate explosive product. In general the pre shear holes were all fired before the main holes and the resulting blast produced a reasonably clean walled trench. The trench conducts water away from the impoundment at a minimum invert angle of 5%. A 1m wide culvert has been installed where the spillway water flows under the main access road as shown on Plate 1 and on Sheet 1.

3.3.3 Seepage Fingers.

The final operation in the dam construction was the covering of the seepage fingers with tailings from the mill. The tailings was selected as it provided a well graded material that would neither clog the filter fabric wrapping the seepage fingers or flow through the system. The sandy tails were also cheap and easily distributed over the seepage fingers.

3.3.4 Seepage Ditch and Collection Pond.

A seepage ditch and collection pond were constructed as shown on Sheet 1 and Plate 1. The seepage ditch runs along the downstream toe of the tailings dam and into a small holding pond where the water is recirculated into the tailings impoundment. After testing if the water is found to be compatible with the environment it may be permissible with Ministerial Approval to dispose of this water to the environment.

The seepage pond was excavated into native till that has a history of being able to pond water with negligible seepage. Just such a hole was formalized into a small holding facility by excavating with a hoe and then rip-rap lining the downstream face to prevent erosion in the event of overtopping during heavy rains. A recirculation pump has been fitted to this holding pond by Valentine Gold Corporation to pump water back into the impoundment when the level rises too high.

3.4.0 MONITORING

A storage impoundment requires continual professional monitoring to remain in good operating condition and data collected from this monitoring will be required for the annual report required by the Ministry of Energy Mines and Petroleum Resources. To enable this data to be gathered a basic set of monitoring systems have been installed.

3.4.1 Piezometers.

Two 100mm standpipe piezometers and sampling wells have been installed at stations 0+30 and 0+60 as shown on Sheet 1. The tips of these piezometers are installed into the rip-rap at the level of the foundation, their function is to allow for observation of any water in the unlikely event that the phreatic surface rises within the rip-rap zone. This would occur if the downstream face became frozen or otherwise blocked.

One 1cm diameter steel cased piezometer has been placed into

the till near station 0+50 with its tip at elevation 99m. The purpose of this piezometer is to assist in establishing the phreatic surface within the dam.

3.4.2 Settlement Monuments

Three settlement monuments were placed along the upstream crest of the embankment to enable monitoring of the most likely area of potential failure. The initial elevations of the three monuments are indicated in Appendix B of this report.

3.5.0 EMBANKMENT STABILITY

3.5.1 Stability Analysis.

The stability of the embankment has been calculated for a number of cases using the soil parameters established during construction of the dam. The stability analysis was carried out using the STABR stability program developed by the Virginia Polytechnic Institute. The program uses the Modified Bishop and the Ordinary Method of Slices to reduce the data to the Safety Factor.

3.5.2 End of Construction Analysis.

The safety factor at the end of construction and prior to the fluid level being raised in the impoundment has been calculated as 1.732 with a seismic coefficient of 0.10.

3.5.3 Sudden Drawdown.

The sudden drawdown analysis considers the stability of the dam should the water level be rapidly reduced. An example would be the rapid emptying of the dam during a large fire if the impoundment were used as the sole source of water and the level were to be reduced to zero in a few hours. In this situation a safety factor of 1.751 is indicated when a seismic coefficient of 0.10 is used.

3.5.4 Steady State Seepage.

The steady state seepage analysis is the condition that the dam will encounter when full and encounters a seismic event with a coefficient of 0.10. If a friction angle in the rip-rap of 45degrees is considered then a safety factor of 1.238 is indicated. However 45 degrees is rather conservative for rip-rap and a value of 50 degrees is more realistic. If a friction angle of 50 degrees is considered then a safety factor of 1.474 is indicated.

3.5.5 Stability Summary.

In general the stability of the dam is at its lowest when filled to elevation 102.0m with water and subjected to seismic event. However a safety factor of 1.474 indicates that the dam is suitably stable.

4.0.0

CONCLUSIONS

4.1.0 Satisfactory Completion

In general the impoundment constructed between August and December at Valentine Mountain Golds project at valentine Mountain near Sooke B.C. has been constructed to the standards considered normal and prudent by The Association of Professional Engineers of the Province of British Columbia.

4.2.0 Storage

The impoundment is capable of containing approximately 6180 cubic metres of mill tailings. The mass storage available will be in the order of 10,000 tonnes of mill feed if the in-situ density of the tailings is approximately 1.77 gm/cm3.

4.3.0 Monitoring.

A basic set of monitoring installations have been provided in the form of piezometers and settlement and translation markers. These systems are delicate and should provide good data if treated with care and respect.

Page 108 of 337 FNR-2019-96139

5.0.0

RECOMMENDATIONS

5.0.1 I recommend that the dam be inspected by a professional geotechnical engineer on a monthly basis for the first three months of operation.

5.0.2 I recommend that settlement and translation data be gathered and recorded on a weekly basis for the first three months of operation and on a fortnightly basis for the following three months. The settlement and translation data should be gathered on a monthly basis following the first six months of operation.

5.0.3 I recommend that piezometer level data be gathered and recorded on a weekly basis for the first three months and on a fortnightly basis for the following three months of operation. The piezometer level data should be gathered and recorded on a monthly basis following the first six months of operation.

5.0.4 I recommend that the water level of the impoundment be checked and recorded by the mill crew on the way to thier shift every working day. The mill crew should also check that the spillway is clear of obstructions or potential obstructions at the same time they check the impoundment level. Any potential obstruction should be reported immediatly to the senior person on site and immediate action taken to clear the spillway.

5.0.5 I recommend that the spillway level be left at the existing level and that no attempt be made to raise the effective spillway level in any way, shape, or form. The existing level is a relative 102.00m elevation as shown on Sheet 1 of this report.

5.0.6 I recommend that the mine operator, Valentine Mountain Gold, become familiar with the Ministry of energy mines and Petroleum Resources guidelines for the Design, Construction and Abandonment of Tailings Impoundments and conform to those guidelines. Peter Peart Geotechnical Ltd. will not be responsible for failure or partial failure of the impoundment or connected services if these guidelines are not followed. Failure to follow these recommendations will also limit responsibility.

Page 109 of 337 FNR-2019-96139

6.0.0

STATEMENT OF QUALIFICATION

I, Peter Peart of the district of West Vancouver, British Columbia, certify that ;

1. I am a Professional Engineer in the Province of British Columbia and a Member in good standing of the Association Of Professional Engineers of the Province of British Columbia.

2. I have practiced my Profession, Geotechnical Engineering and Geological Engineering, in the Province of British Columbia since 1980.

3. I am a Graduate of the University of British columbia with a Degree in Applied Science, B.A.Sc.(1980) Geological/Geotechnical Engineering.

1st December 1987
Vancouver B.C.

Peter Peart. P.Eng.

7.0.0

STATEMENT OF SATISFACTORY COMPLETION

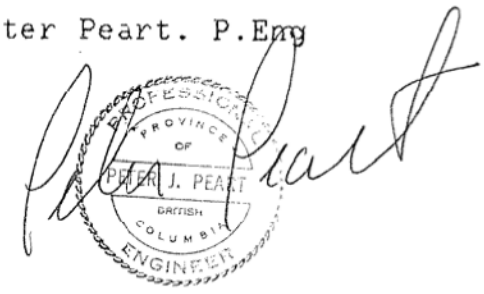
It is my Professional opinion that the impoundment described in this report, and the main subject of this construction report, has been constructed in a manner consistent with standard and prudent Engineering Practice in the Province of British Columbia.

It is my Professional opinion that the structure is well suited for its intended purpose of containing the mine tailings produced at the site by the existing milling facility and by the existing process.

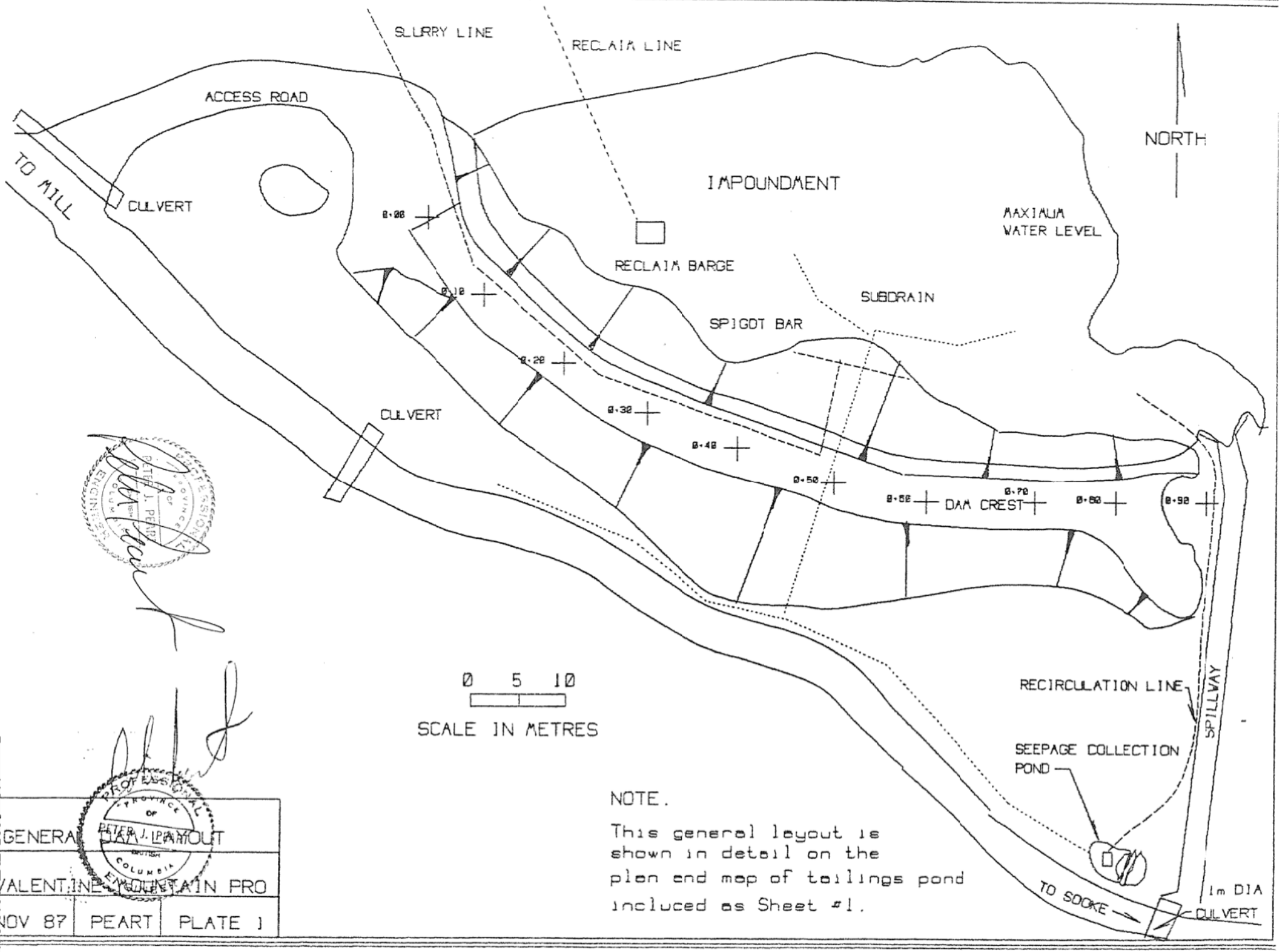
The construction of the impoundment was carried out under my supervision and the information contained in this report is , to the best of my knowledge, accurate.

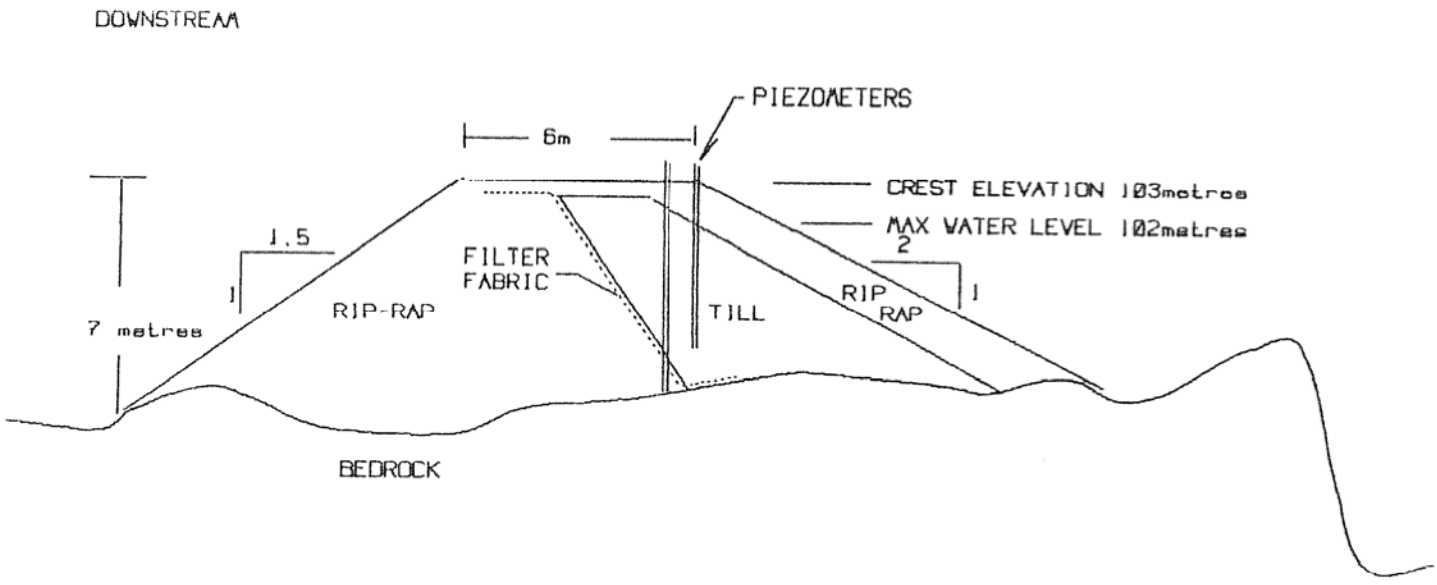
To this effect I apply my Professional Engineers Stamp to this Document.

Signed and stamped by Peter Peart. P.Eng

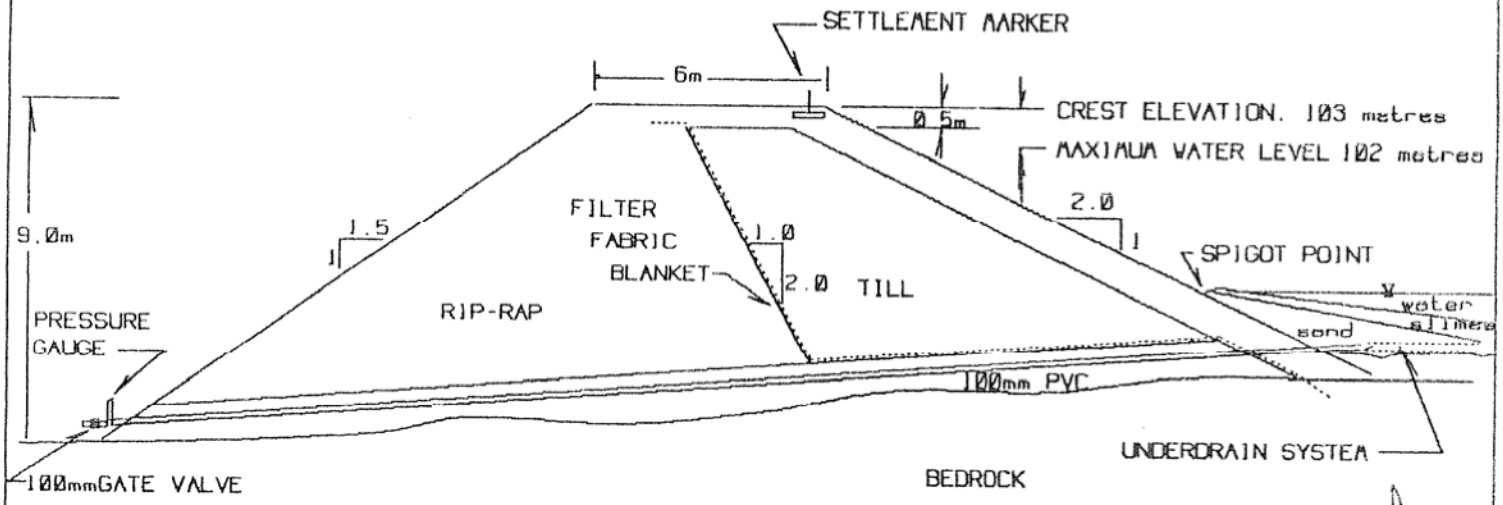


1st December 1987.


SLURRY LINE
RECLAIM LINE
ACCESS ROAD
TO MILL
CULVERT
NORTH
IMPOUNDMENT
MAXIMUM
WATER LEVEL
RECLAIM BARGE
SUBDRAIN
SPIGOT BAR
CULVERT
DAM CREST
0 5 10
SCALE IN METRES
RECIRCULATION LINE
SPILLWAY
SEEPAGE COLLECTION
POND
NOTE.
This general layout is shown in detail on the plan and map of tailings pond incluced as Sheet #1.
TO SOOKE
1m DIA
CULVERT
GENERAL DAM LAYOUT
VALENTINE MOUNTAIN PRO
NOV 87
PEART
PLATE 1



CROSS-SECTION AT STATION 0+30m SCALE 1cm=2m



CROSS SECTION AT STATION 0+45m. SCALE 1cm=2m

MATERIALS

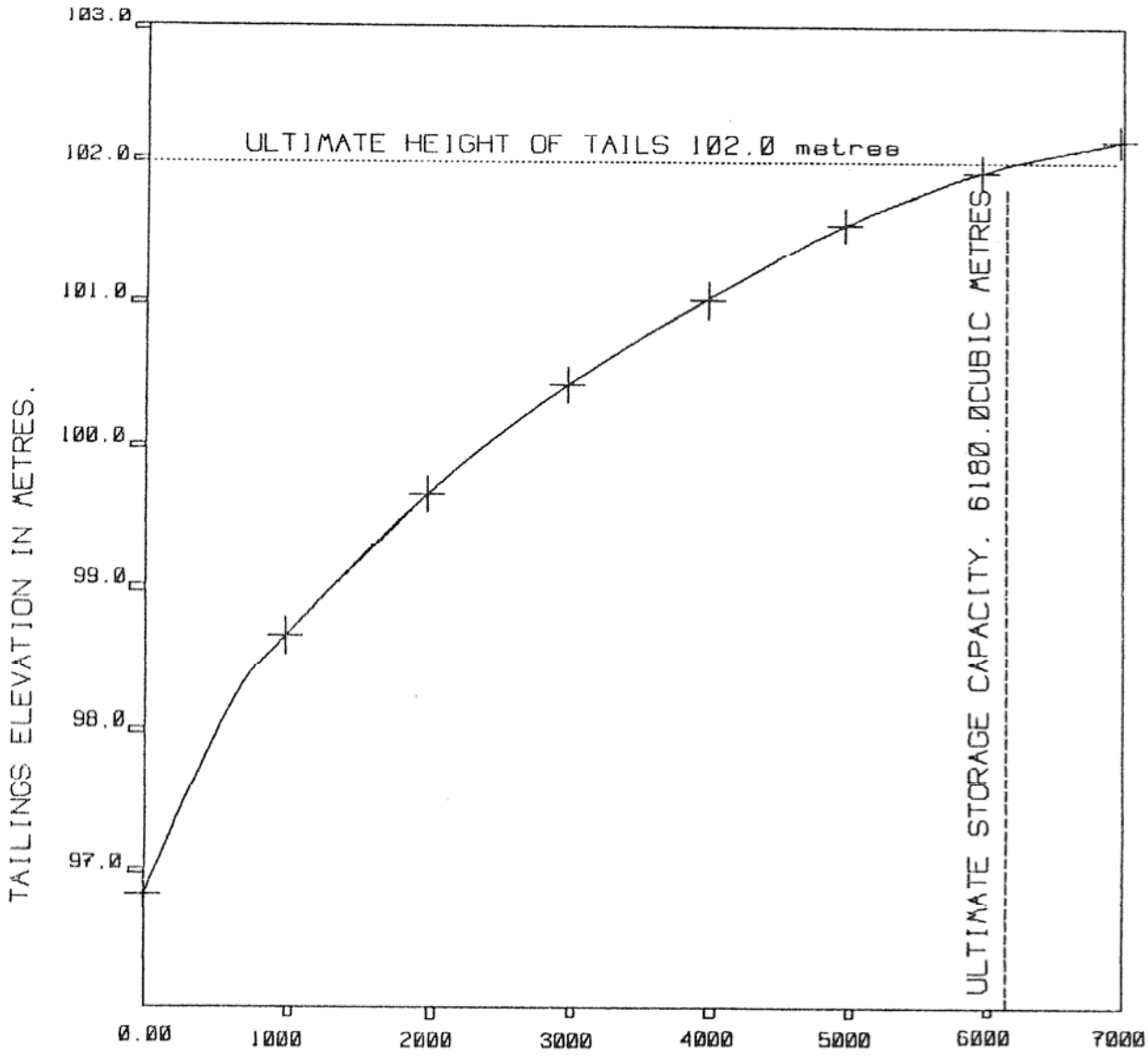
TILL. Clay, silt, sand, gravel mixture.
Compacted to min. of 95% max. dry density, Mod. Proctor.

RIP-RAP Blasted quarry rock, competent and hard to very hard.
Max size 50cm, No appreciable fines, Compacted

FILTER FABRIC. Texel 7612 non woven geotextile

PETER PEART GEOTECHNICAL. LTD.

TITLE	
AS BUILT CROSS-SECTION	
PROJECT LOCATION	
VALENTINE MOUNTAIN PRO.	
DATE	DRAWN BY
NOV. [illegible]	PEART PLATE 2



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
PETER J. PEART

PETER PEART GEOTECHNICAL. LTD.

STORAGE CAPACITY CURVE	
VALENTINE MOUNTAIN PRO	
NOV 87	PEART PEATES

8.1.0

APPENDIX A:

MATERIAL PROPERTIES AND COMPACTION RESULTS

NOTICE OF TRANSMITTAL

THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold
2038 Other Pt. Rd.
Sooke BC

Date: Sept. 4/87

Your File:

Our File: 19-547-C

Attention: Mr. C Van Bastkirk

Reference: Permeability testing

(A) The following items results of triaxial permeability test on a compacted sample from the East side of Borrow

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☑ Mail ☐ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return
☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By: B. L. Eng

Valentine Gold
File 19-547-0
Triaxial Permeability Test TP-1
East Side of Borrow

$\sigma_3' = 10$ psi

$k = \frac{Q\ell}{hAt}$

$k = \frac{134 \times 2.83}{140.6 \times 81.3 \times 10860}$

$k = 3.05 \times 10^{-6}$ cm/sec

$Q = 164 - 30 = 134$ cm^3
$\ell = 2.83$ cm
$h = 2.0$ psi $= 140.6$ cm H_2O
$A = 81.3$ cm^2
$t = 220 - 39$ min $= 181$ min
$= 10860$ sec

300
200
100
0
0
50
100
150
200
250
Time (min)

THURBER CONSULTANTS LTD., Geotechnical Engineers

Client _____ File No 19-547-0

Project Valentine Gold Date Sept. 2 1997

Calculation by BLC

Triaxial Permeability Test # P-1

Sheet ____ of ____

h = 2 psi = 140.6 cm H_2O; A = ____ ; l = ____

		Base of Sample			Top of Sample					
		Burette		Flow	Burette		Flow	Cell	Base	Top
Time	e.t.	Lft	Rt	In	Lft	Rt	Out	Pressure	Pressure	Pressure
1045	0				48.2		0	110.0 psi	101.0	99.0
1050	5				52.3		4.1			
1055	10				56.3		8.1			
1100	15				60.2		12.0			
1105	20				64.0		15.8			
1110	25				67.6		19.4			
1115	30				70.2	12.4	22.0			
1120	35					16.7	26.3			
1130	45					25.0	34.6			
1140	55					32.8	42.4			
1150	65					40.5	50.1			
1200	75					48.2	57.8			
1210	85					55.4	65.0			
1220	95					62.4	72.0			
1230	105				14.5	69.2	78.8			
1240	115				22.5		86.8			
1252	127				31.9		96.1			
1300	135				37.6		101.9			
1310	145				45.0		109.3			
1320	155				52.2		116.5			
1330	165				59.2		123.5			
1340	175				65.8	17.9	130.1			
1420	215					46.6	158.9			
1430	225					53.3	164.5			
1440	235					59.9	171.1			

FILE No.: 19-547-0

THURBER CONSULTANTS LTD.
Geotechnical Engineers
CALGARY EDMONTON VANCOUVER VICTORIA

CLIENT: Valentine Gold
PROJECT: _____
HOLE/PIT: _____ SAMPLE: _____
DEPTH: _____ SPECIMEN: _____
TEST DATES: _____ TECH'N: _____
CK'D. BY: _____

P-1

TRIAXAL COMPRESSION TEST
CONSOLIDATION DATA

REQUIRED EFFECTIVE CONSOLIDATION 10 psi BACK PRESSURE 100.0 psi

PORE PRESSURE REACTION - PROCEDURE _____

		28 1405	29 0820	30 0910	31 0905	1 0909					
TIME		1550	0935	1015	0945	0940					
ELAPSED TIME (min.)		105	15	125	105	32					
CELL PRESSURE (kPa)	psi	20.0	40.0	60.0	80.0	100.0	110.0				
BACK PRESSURE (kPa)	psi	18.0	39.0	59.0	79.0		1				
PORE PRESSURE (kPa)	psi	3.8	25.5	49.7	78.1	98.7	108.7				
$\Delta\sigma_3$ - CHANGE CELL PRESSURE (kPa)	psi	20.0	20.0	20.0	19.8	20.0	10.0				
Δu - CHANGE PORE PRESSURE (kPa)	psi	3.8	7.5	10.7	19.1	19.7	10.0				
PORE PRESSURE PARAMETER, $B = \Delta u/\Delta\sigma_3$		0.19	0.38	0.54	0.96	0.99	1.00				
BURETTE READINGS — INITIAL	(ml)	39.2	23.2	31.5	42.0						
INITIAL HT. OF PISTON _____ FINAL HT. OF PISTON _____ CORR. - HT. OF SPEC _____ FINAL	(ml)	62.3	53.5	41.9	43.3						
ΔVOLUME	(ml)	24.1	30.3	10.0	1.3						

CONSOLIDATION STAGE — H_2O ADDED (De-Airing) ____ ml — TEMP. (Min. ____ °C, Max. ____ °C)

DATE	TIME	Δt (min.)	BURETTE READING (ml)	ΔVOLUME (ml)		DATE	TIME	Δt (min.)	BURETTE READING (ml)	ΔVOLUME (ml)	
Sept. 1	1340	0	42.0	0							
		6 sec.	44.8	2.8							
		15 sec.	45.0	3.0							
		30 sec.	45.0	3.0							
	1341	1 min.	45.1	3.1							
	1342	2 min.	45.2	3.2							
	1344	4 min.	45.2	3.2							
	1348	8 min.	45.2	3.2							
	1355	15 min.	45.3	3.3							
	1410	30 min.	45.4	3.4							
	1440	60 min.	45.7	3.7							
	1540	120 min.	45.8	3.8							
	1700	200	45.8	3.8							
	2020	400	45.8	3.8							
Sept. 2	0955	1215	45.8	3.8							

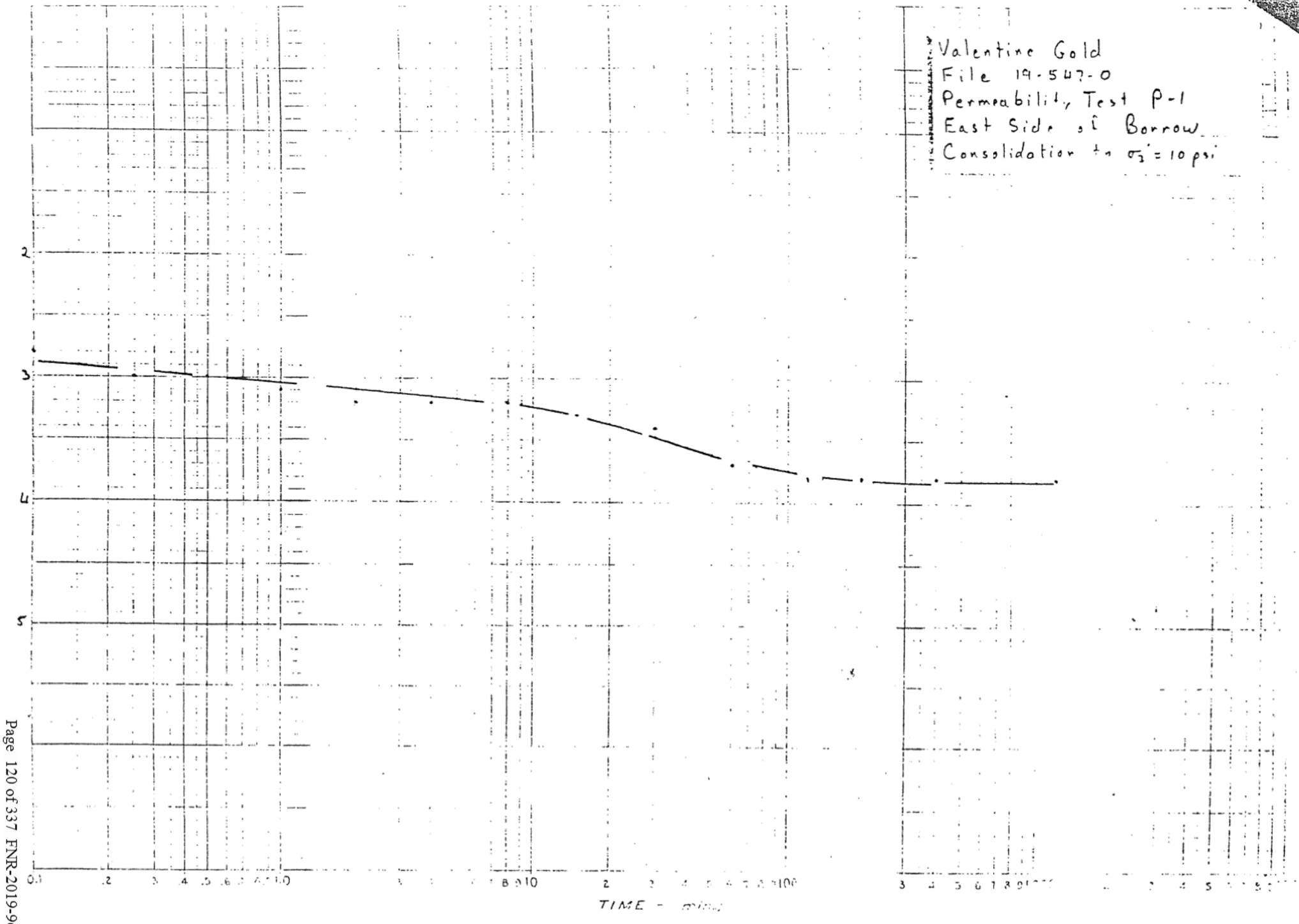
DIAL RDG. BEFORE CONSOLIDATION _____ cm
DIAL RDG. AFTER CONSOLIDATION _____ cm
ΔH _____ cm
ΔV = TOTAL VOLUME CHANGE AFTER CONSOLIDATION. _____ ml

$$A_c = \frac{1 + \Delta V/V_o}{1 + \Delta H/H_o} \times A_o$$

A_c = _____

A_c = _____

H_o = 2.83 cm
A_o = 82.6 cm^2
V_o = 233.8 ml
H_c = 2.83 cm
A_c = 81.3 cm^2
V_c 230.0 ml


Valentine Gold
File 19-547-0
Permeability Test P-1
East Side of Borrow
Consolidation to σ3' = 10 psi
2
3
4
5
0.1
.2
1.0
8 10
2
100
3
TIME -

FILE No.: 19-547-0

THURBER CONSULTANTS LTD.
Geotechnical Engineers
CALGARY EDMONTON VANCOUVER VICTORIA

CLIENT: Valentine Gold
PROJECT:
HOLE/PIT: SAMPLE:
DEPTH: SPECIMEN:
TEST DATES: Aug 29/87 TECH'N: BLL
CK'D. BY:

TRIAXIAL COMPRESSION ☐ TEST
SPECIMEN DATA

CELL No. 4" steel in frame σ_3

DESCRIPTION OF SAMPLE Grey silty gravelly SAND (SM) trace of clay, sbrd gravel
Till sample compacted to 95-100 % of mod. proctor density for permeability test

SPECIMEN TYPE ☐ Undisturbed ☐ Remoulded ☐ Precut ☑ Compacted

SPECIMEN DETAILS		INITIAL VALUES British* (Y)	INITIAL VALUES Metric* (I)	PRE CONSOLIDATION Metric* (B)	PRE SHEAR Metric* (C)	FINAL VALUES (F) Metric*	FINAL VALUES (F) Metric*
Height	H		2.824				
Diameters Top	D_1				During Consolidation ΔW_w = -3.1 ΔV = -3.9	Mercury Immersion ΔW_w = ΔV = Displ'd Hg = g. $V_f = \frac{Hg}{13.55}$ = ml.	
Middle	D_2			ΔW_w = 25.9 ΔV = +4.1			
Bottom	D_3						
Mean Diameter	D		10.169				
Total Weight	W_t		494.84	520.7	516.9		514.40
Area	$A = 0.7854 D^2$		81.22				
Dry Weight	W_s (~~Tarred~~)		450.9	450.9	450.9		448.40
Volume	$V = A \cdot H$		229.7	233.9	230.0		
Solid Volume	$V_s = W_s / G_s$		164.0	164.0	164.0		
Volume of Voids	$V_v = V - V_s$		65.7	69.8	66.0		66.0
Water Volume	$V_w = \frac{W_w}{\gamma_w}$		43.9	69.8	66.0		66.0
Void Ratio	$e = V_v / V_s$		0.401	0.426	0.402		
Saturation	$S_r = V_w / V_v$		67%	100%	100%		100%
Bulk Density (Mg/m³)	$\gamma_b = W_t / V$		2.154	2.227	2.247		

WATER CONTENT DETERMINATIONS	BEFORE TEST Trimmings (T)	BEFORE TEST Based on W_s from (T) and Wt. of Specimen	PRE SHEAR	AT END OF TEST (E)		
Tare No.	1					1
Wt. Sample Wet + Tare	452.65					666.04
Wt. Sample Dried + Tare	425.94					600.04
Tare	151.56					151.64
Wt. Water	26.71					66.00
Wt. Dry Sample	274.38					448.40
Water Content, w %	9.7		15.5	14.6		14.7
Dry Density (Mg/m³) $\gamma_d = \gamma_b / 1+w$		1.963	1.929	1.960		

CONSTANTS: G_s = 2.75 ☐ by test, or ☑ assumed

1 inch = 2.540 cm.
1 sq. in. = 6.452 sq. cm.
1 cu. in. = 16.39 ml. (c.c.)
1 kg. = 2.205 lbs.
1 Mg/ml = 62.43 pcf.
6.895 kPa = 1 p.s.i.

FAILURE CONDITION

H_f = _____ cm.
D_1 =
D_2 =
D_3 =
D_f = _____ cm.
A_f = _____ cm.²
V_f = _____ ml.

REMARKS 2 std. membranes, 2 way drainage. outside of specimen greased, Compacted to 98% of Mod. Proctor Max. Dens.

*Metric units are grams, centimeters, & millilitres; British units are lbs., ins., & pcf.
☐ Initial values in metric units based on $W_s = W_t / (1 + w_T)$.

File No.: 19-547-0

THURBER CONSULTANTS LTD.

COMPACTION TEST

Project Valentine Gold

Sample No. _____ Depth _____

Sampled by client Date _____

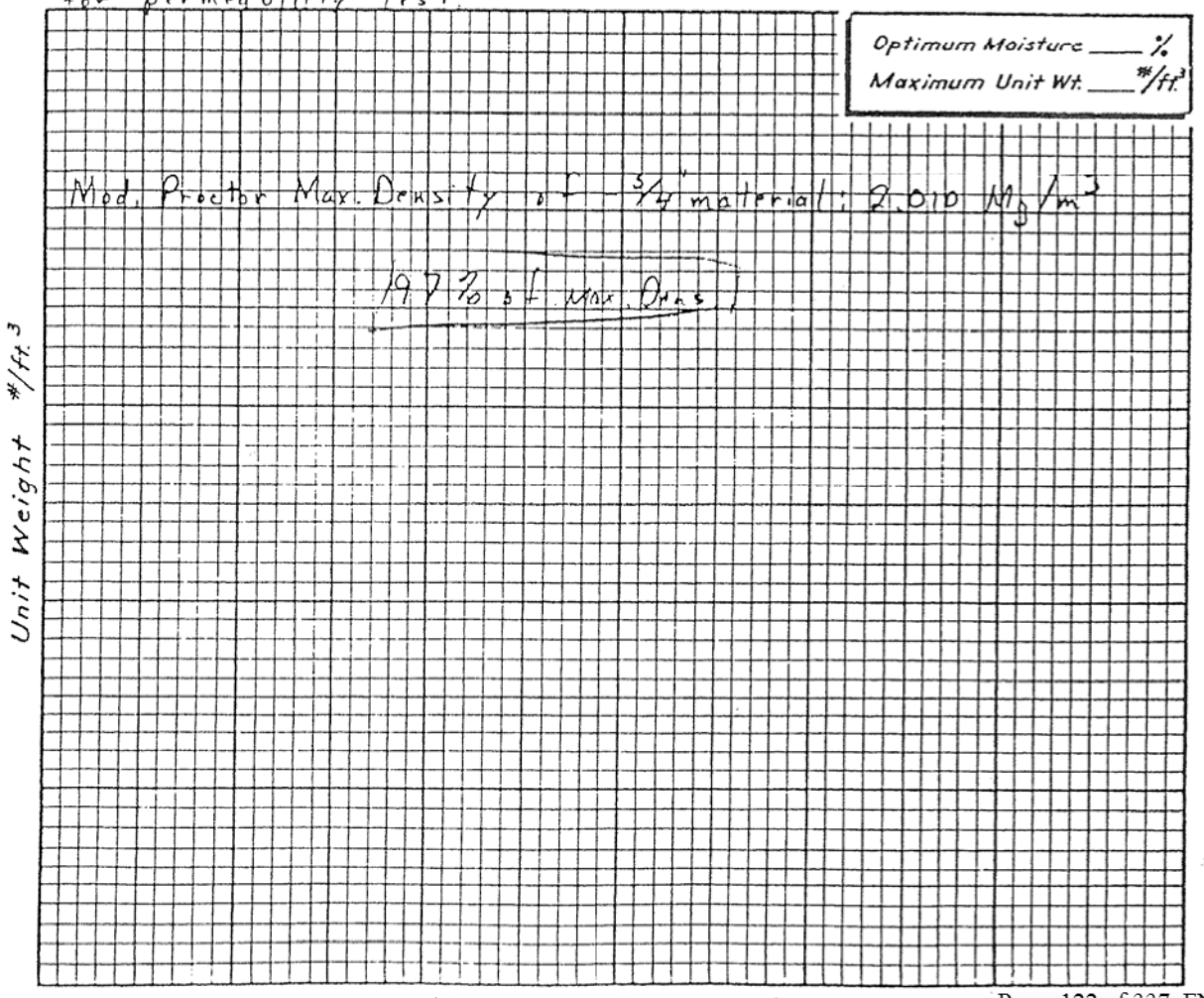
Tested by BK Date Aug 26/19

Checked by

Unit Weight	Trial No.	1						
	Wt. of Sample Wet+Mold	4830.3						
	Wt. of Mold	4206.0						
	Wt. of Sample Wet	624.3						
	Wet Density ~~#/ft.³~~ Mg/m³	2.149						
	DRY DENSITY ~~#/ft.³~~ Mg/m³	1.959						
Moisture Content	MOISTURE ADDED							
	Container No.	11						
	Wt. of Sample Wet + Tare	727.28						
	Wt. of Sample Dry + Tare	672.43						
	Tare of Container	107.48						
	Wt. of Water	54.85						
	Wt. of Dry Soil	564.95						
	MOISTURE CONTENT	9.7						

Type of Mold 4" proctor Volume 290.5 cm³ Weight 4206.0

Remarks: East side of borrow; -3/4" material compacted in one layer for permeability test.



THURBER CONSULTANTS LTD.

MOISTURE CONTENT

PROJECT Valentine Gold

Computed by .....
Checked by .....
Date .....

Test Hole	East Side				East							
Depth	of Borrow				side of Borrow							
Sample No.												
Container No.	15				100							
Wt. Wet Soil & Container	494.71				467.28							
Wt. Moisture		28.99				25.09						
Wt. Dry Soil & Container	465.72				442.19							
Wt. Dry Soil		276.84				289.49						
Wt. Container	188.88				152.70							
Moisture Content %		10.5				8.7						

Test Hole												
Depth												
Sample No.												
Container No.												
Wt. Wet Soil & Container												
Wt. Moisture												
Wt. Dry Soil & Container												
Wt. Dry Soil												
Wt. Container												
Moisture Content %												

NOTICE OF TRANSMITTAL

THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold Date: Nov. 9/87

2038 Otter Pt. Rd. Your File:

Sooke B.C. Our File: 19-547-0

Attention: Calvin Van Buskirk

Reference:

(A) The following items grain size analysis of sample #3 borrow material

RECEIVED
NOV 10 1987

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☑ Mail ☐ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return

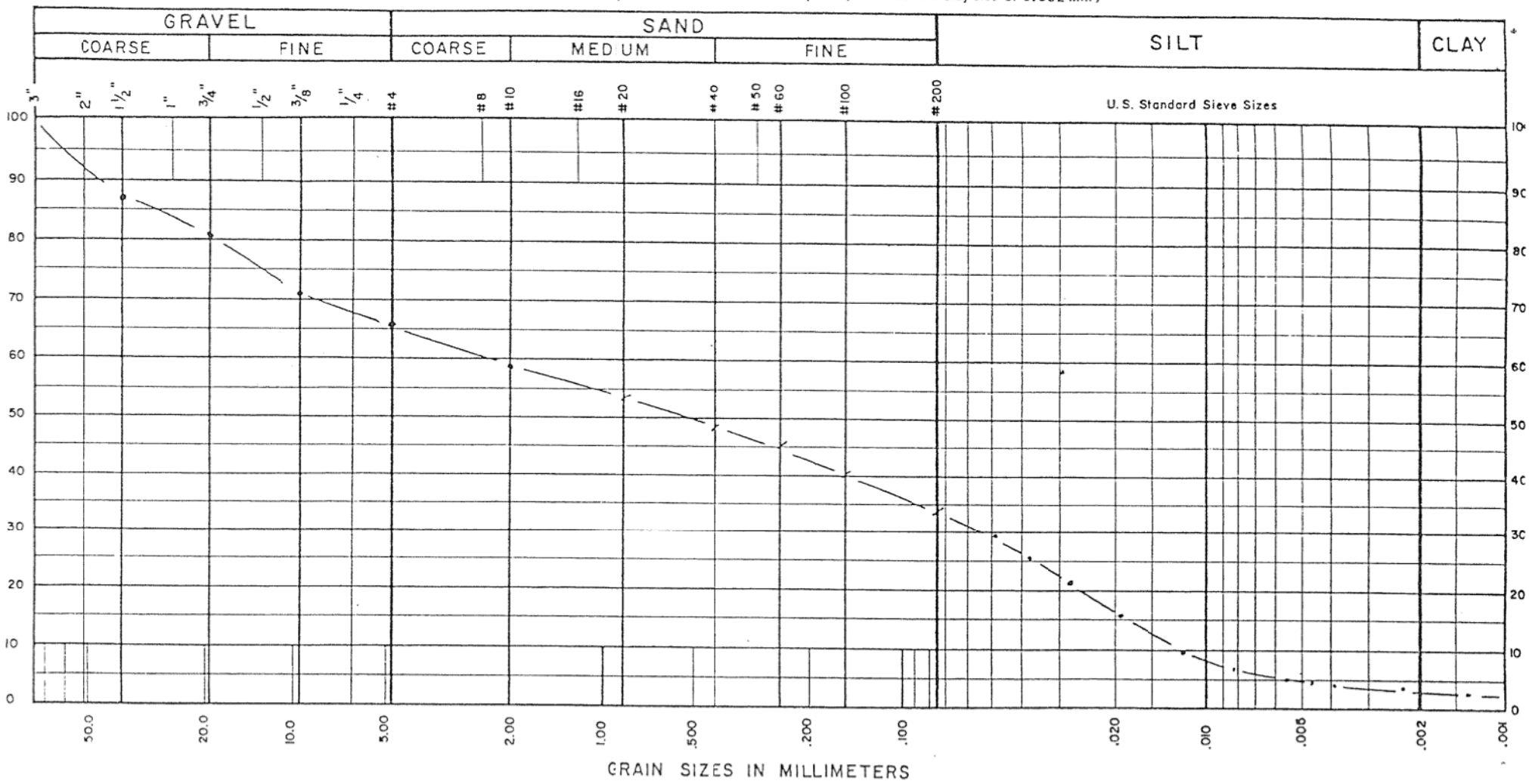
☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By: B.L. Empey

Unified Soil Classification System & N.R.C. Field Description (Modified with clay size at 0.002 mm)



Nat. Water Content	9.0	%
Liquid Limit		
Plastic Limit		
Plastic Index		

Clay	3.0 %
Silt	30.9
Sand	31.9
Gravel	34.2

Classification ~~SW~~ SW.

WELL GRADED GRAVELLY, SILTY, SAND.

THURBER CONSULTANTS LTD., Geotechnical Engineers

CLIENT VALENTINE GOLD

PROJECT TAILINGS DAM - EARTH FILL

LOCATION SOOKE, B.C.

SAMPLE SA #3, BORROW MAT'L AS PLACED

TEST DATE OCT. 29/87 FILE Nº 19-547-0

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VALENTINE GOLD

Tested by BRL

Date OCT. 22/87

Test Hole FROM DAM

Depth

Checked by

Dry Wt.of Coarse Sample = 23964.1			
Screen	Wt.Ret.	% Ret.	% Pass.
2-1/2"			
2"			
1-1/2"	2982.5	12.4	87.6
1"			
3/4"	4765.7	19.9	80.1
1/2"			
3/8"	186.9	28.9	71.1
1/4"	~		
#4	328.3	34.2	65.8
#10	492.0	41.4	58.6
Pass. 3/4 #10	19198.4 1348.0		
TOTALS	23964.1	1841	

HYDROMETER TEST Nov 2/87 Dry Wgt. of Sample = 99.51

Gs: 2.76

TC: -5.8 K = .01309 a: .98

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. o F.	Grain Size m.m.	% Passing
/	910		21		
1/2		56		.0495	29.0
1	:11	49.5		.0376	25.2
2	:12	42.5		.0283	21.2
5	:15	33		.0193	15.7
15	:25	23		.0120	9.9
34	:44	18.5		.0082	7.3
77	10:28	14.5		.0056	5.0
116	1:06	14		.0046	4.7
162	112	12.5		.0039	3.9
455	415	12		.0023	3.6
1380	810	10.5		.0013	2.7

Dry Wt.of 1/4'd Sample Passing No. = 99.51			
Screen #10	Wt. Ret.	% Ret.	% Pass.
#20	9.37		13.1
#40	16.71		49.8
#60	22.56		45.1
#100	31.40		40.1
#200	41.88		33.9
Pan.			
TOTALS			

269.37

TARE 47. 164.86

104.51

.5

99.51

Classification

Remarks: 7113.8

4828.3

2360.4

7150.6

-3/4" 4502.2 wet → 19198.4

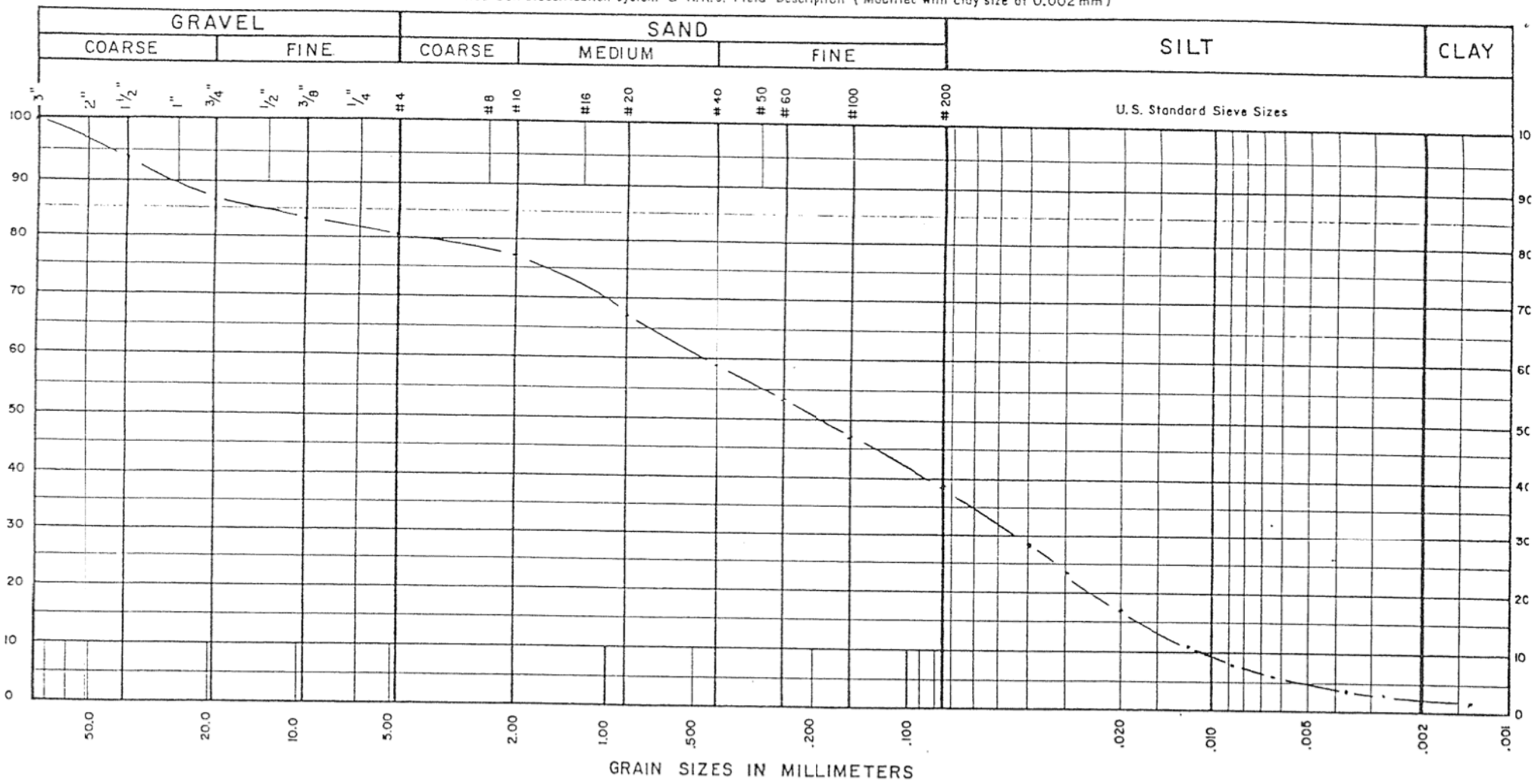
TARE 10 - 298.9 → 2360.4 → 2137.6

220.8/1840.9

12%

FILE No. 12-543-10

Unified Soil Classification System & N.R.C. Field Description (Modified with clay size at 0.002 mm)



Nat. Water Content			%
Liquid Limit			
Plastic Limit			
Plastic Index			

Clay	2.0		%
Silt	36.8		
Sand	41.6		
Gravel	19.6		

Classification _____

THURBER CONSULTANTS LTD., Geotechnical Engineers

CLIENT Valentine Gold
PROJECT
LOCATION
SAMPLE Borrow 1 - West Sample
TEST DATE July 23-27, 1987 FILE No 19-547-0

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VALENTINE GOLD

Test Hole / Depth BORROW I – WEST SAMPLE

Tested by

Date July 21/87

Checked by

Dry Wt. of Coarse Sample =			
Screen	Wt. Ret.	% Ret.	% Pass.
~~2-1/2"~~	~~0~~		
~~2" 3"~~	~~0~~		100.0
1-1/2"	1811.7	5.9	94.1
~~1"~~	~~0~~		
3/4"	2499.1	8.1	86.0
~~1/2"~~	~~0~~		
3/8"	236.4		83.0
~~1/4"~~	~~0~~		
#4	201.9		80.4
#10	272.9		76.9
Pass. #10	1663.7		
TOTALS	6685.7		

HYDROMETER TEST — Dry Wgt. of Sample = 101.75 g

$G_s \cong 2.70$ $k = .01312$ $a = 0.99$ $t_c = -5.9$

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. ~~°F.~~	Grain Size m.m.	% Passing
0	1121		22°C		
1	1122	43.5		.0398	28.1
2	1123	37		.0297	23.3
5	1126	28.5		.0200	16.9
15	1136	20.0		.0122	10.5
30	1151	16.5		.0088	7.9
60	1221	13.5		.0064	5.7
180	1421	11.0		.0037	3.8
336	1657	10.0		.0027	3.1
1255	0816	8.5		.0014	1.9

Dry Wt. of 1/4'd Sample Passing No. = 101.75			
Screen	Wt. Ret.	% Ret.	% Pass.
#10	–		
#20	13.47		66.7
#40	23.46		59.2
#60	31.27		53.3
#100	39.41		47.1
#200	50.43		38.8
Pan.			
TOTALS			

SPECIFIC GRAVITY TEST

(1) Wt. of Flask + Soil			
(2) Wt. of Flask			
(3) Wt. of Soil = (1) - (2)			
(4) Wt. of Flask + Water			
(5) (3) + (4)			
(6) Wt. of Flask + Water + Soil			
(7) Vol. of Soil = (5) - (6)			
(8) Temp. & Corr. (Tc)			
Specific Grav. = (3) x Tc / (7)			

Classification

Remarks:

232.76

Tare 29: 126.01

+3/4 4837 gms

-3/4 28843 gms

TOTAL 33180 gms

+3/4 4,722 g – DRY

-3/4 26,079 g – DRY

TOTAL 30801 g

File No.:

THURBER CONSULTANTS LTD.

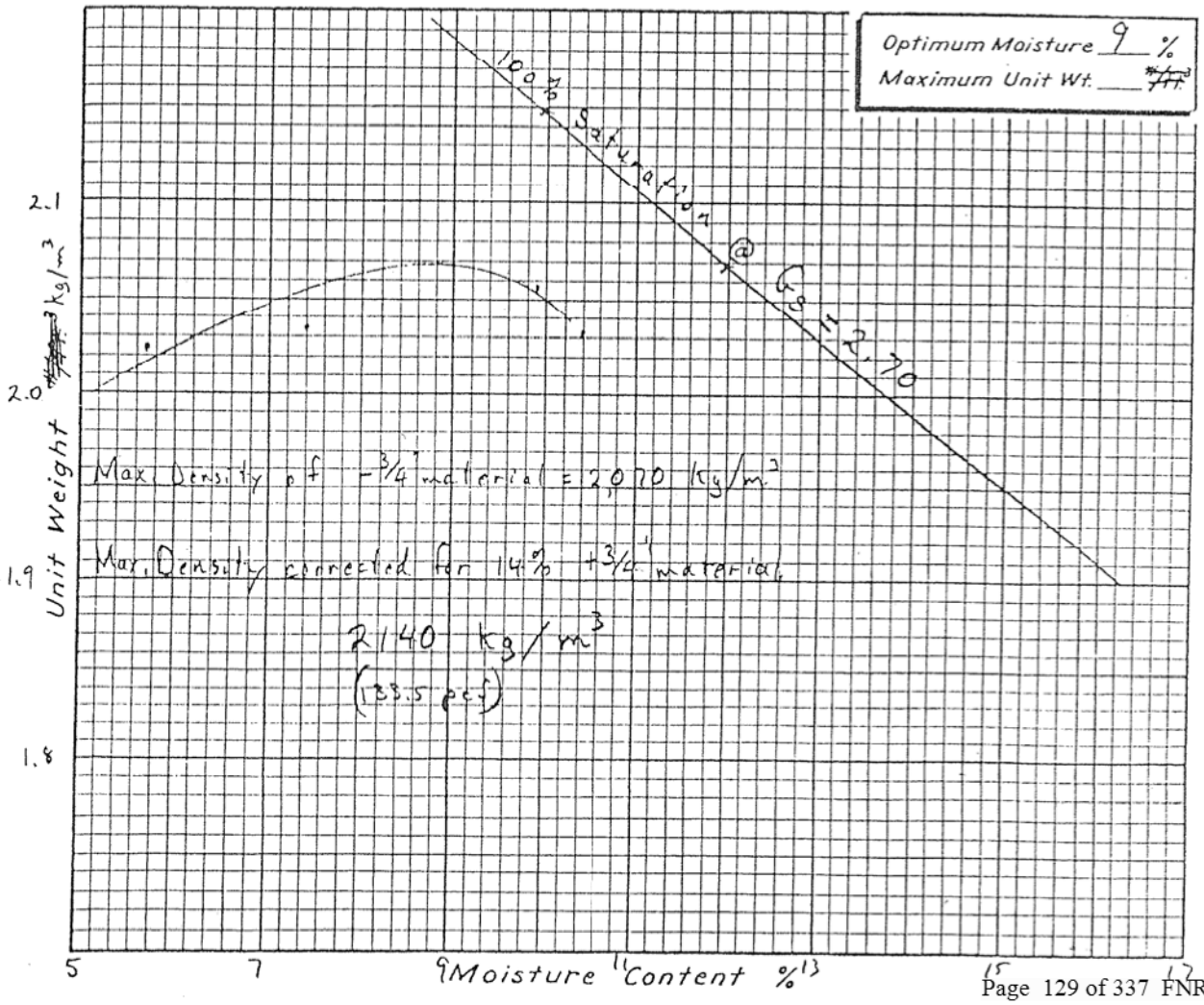
COMPACTION TEST

Project VALENTINE GOLD
BORROW I - WEST SAMPLE
Sample No. _____ Depth _____
Sampled by _____ Date _____
Tested by BS Date Jan 22/87
Checked by

	Trial No.	1	2	3	4			
Unit Weight	Wt. of Sample Wet+Mold	10734.3	10775.2	10635.2	10507.1			
	Wt. of Mold	5970.0	✓	✓	✓			
	Wt. of Sample Wet	4764.3	4805.2	4665.2	4537.1			
	Wet Density #/ft.^{3}	2,243	2,262	2,196	2,136			
	DRY DENSITY #/ft.^{3}	2,031	2,058	2,044	2,022			
		BLEEDING						
Moisture Content	MOISTURE ADDED	+0%	-0%	-2%	-4%			
	Container No.	0	100	758X	103			
	Wt. of Sample Wet + Tare	2759.7	2674.0	2715.3	3480.1			
	Wt. of Sample Dry + Tare	2520.9	2451.5	2542.2	3310.8			
	Tare of Container	236.7	202.3	210.7	318.7			
	Wt. of Water	238.8	222.5	173.1	169.3			
	Wt. of Dry Soil	2285.2	2249.2	2331.5	2992.1			
	MOISTURE CONTENT	10.4	9.9	7.4	5.7			

Type of Mold 6" Volume 2124 cm^3 Weight 5970 G.

Remarks: Grey, gravelly, silty SAND (SM), trace of clay, non plastic fines



THURBER CONSULTANTS LTD.

ATTERBERG LIMITS

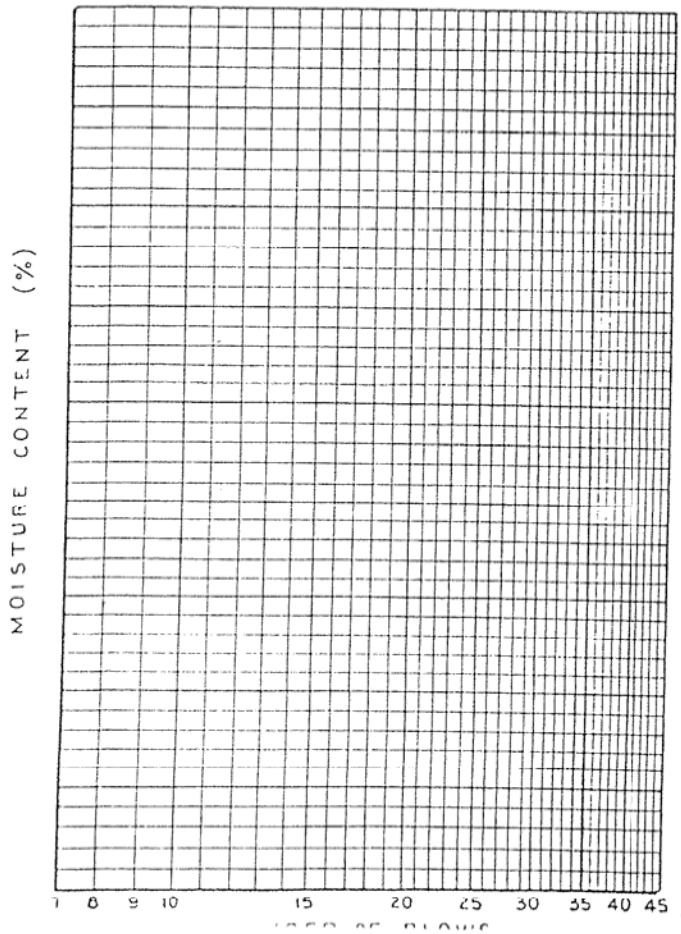
Project Valentine Gold

Test Hole ..... Sample No. West Borrow Tested by BLL

Depth ..... Date of Testing July 23/87 Checked by .....

LIQUID LIMIT								
Trial No.	1							
No. of Blows	9							
Container No.	22							
Wt. Wet Soil & Container	63.99							
Wt. Moisture		6.53						
Wt. Dry Soil & Container	57.46							
Wt. Dry Soil		27.88						
Wt. Container	29.58							
Moisture Content		23.4						

PLASTIC LIMIT								
Trial No.								
Container No.	73							
Wt. Wet Soil & Container	47.01							
Wt. Moisture		3.29						
Wt. Dry Soil & Container	43.72							
Wt. Dry Soil		13.85						
Wt. Container	29.87							
Moisture Content		23.8						

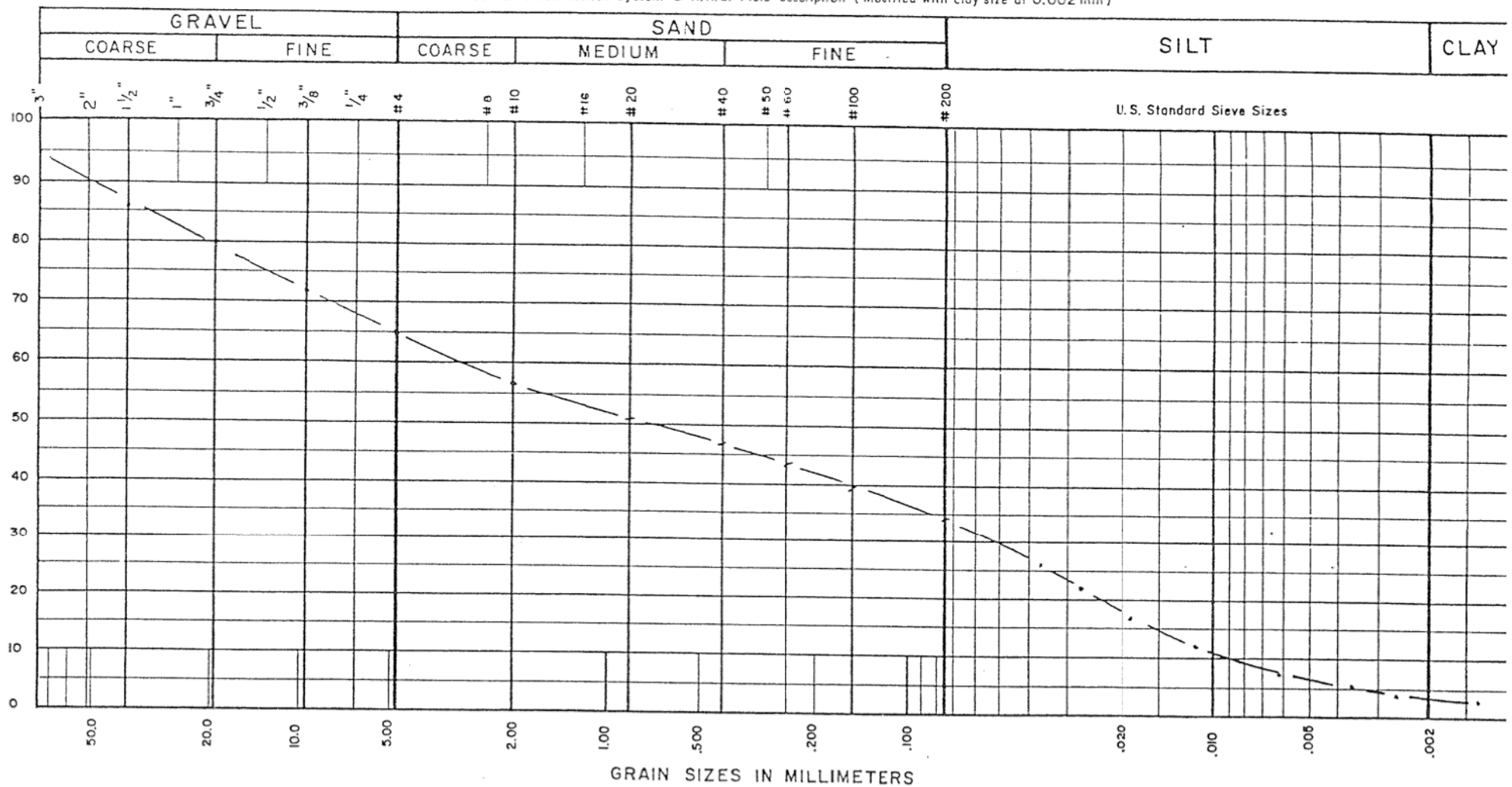


SUMMARY
Liquid Limit .....
Plastic Limit .....
Plastic Index .....

Note: Unable to roll a thread, at this moisture content.

Non - Plastic

Unified Soil Classification System & N.R.C. Field Description (Modified with clay size at 0.002 mm)



Nat. Water Content			%
Liquid Limit			
Plastic Limit			
Plastic Index			

Clay	3.0		%
Silt			
Sand			
Gravel	29.8		

Cobbles 5.5

Classification _____

Maximum size = 4"

CLIENT Valentine Gold

PROJECT

LOCATION

SAMPLE Borrow 1 - East Sample

TEST DATE July 23-27, 1987 FILE No 19-547-C

THURBER CONSULTANTS LTD., Geotechnical Engineers

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VALENTINE GOLD

Test Hole / Depth BORROW 1 - EAST SAMPLE.

Tested by _____

Date July 21/87

Checked by _____

Dry Wt. of Coarse Sample = 31,906

Screen	Wt. Ret.	% Ret.	% Pass.
~~5"~~	~~0~~		100 %
4"	1764.2		94.5
~~2-1/2"~~	~~0~~		
~~2" 3"~~	~~0~~		94.5
1-1/2"	2877.6		85.5
~~1"~~	~~0~~		
3/4"	1790.9		79.8
~~1/2"~~	~~0~~		
3/8"	221.7		71.5
~~1/4"~~	~~0~~		
#4	182.5		64.7
#10	203.4		57.0
Pass. #10	1523.3		
TOTALS			

HYDROMETER TEST

Dry Wgt. of Sample = 99.11 g

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. ~~°F.~~	Grain Size m.m.	% Passing
0	1115		22°C		
1	1116	51.0		.0371	25.7
2	1117	44.0		.0280	21.7
5	1120	35.5		.0190	16.9
15	1130	26.5		.0117	11.7
30	1145	22.0		.0085	9.2
60	1215	18.5		.0062	7.2
180	1415	15.0		.0036	5.2
340	1655	13.0		.0027	4.0
1260	0815	11.0		.0014	2.9

Dry Wt. of 1/4'd Sample Passing No. = 99.11

Screen #10	Wt. Ret. —	% Ret.	% Pass.
#20	11.04		50.7
#40	17.73		46.8
#60	23.53		43.5
#100	30.13		39.7
#200	39.76		34.1
Pan.			
TOTALS			

SPECIFIC GRAVITY TEST

(1) Wt. of Flask + Soil			
(2) Wt. of Flask			
(3) Wt. of Soil = (1) - (2)			
(4) Wt. of Flask + Water			
(5) (3) + (4)			
(6) Wt. of Flask + Water + Soil			
(7) Vol. of Soil = (5) - (6)			
(8) Temp. & Corr. (Tc)			
Specific Grav. = (3) x Tc / (7)			

Classification _____

Remarks: Tare #9 285.64 181.53

+3/4 6870 gms.
-3/4 28819 gms
TOTAL WET WT 35689 gms.

+3/4 - 6,715 g - DRY
-3/4 - 25,191 g - DRY
TOTAL DRY WT - 31,906 g.

FILE No. _____

File No.:

THURBER CONSULTANTS LTD.

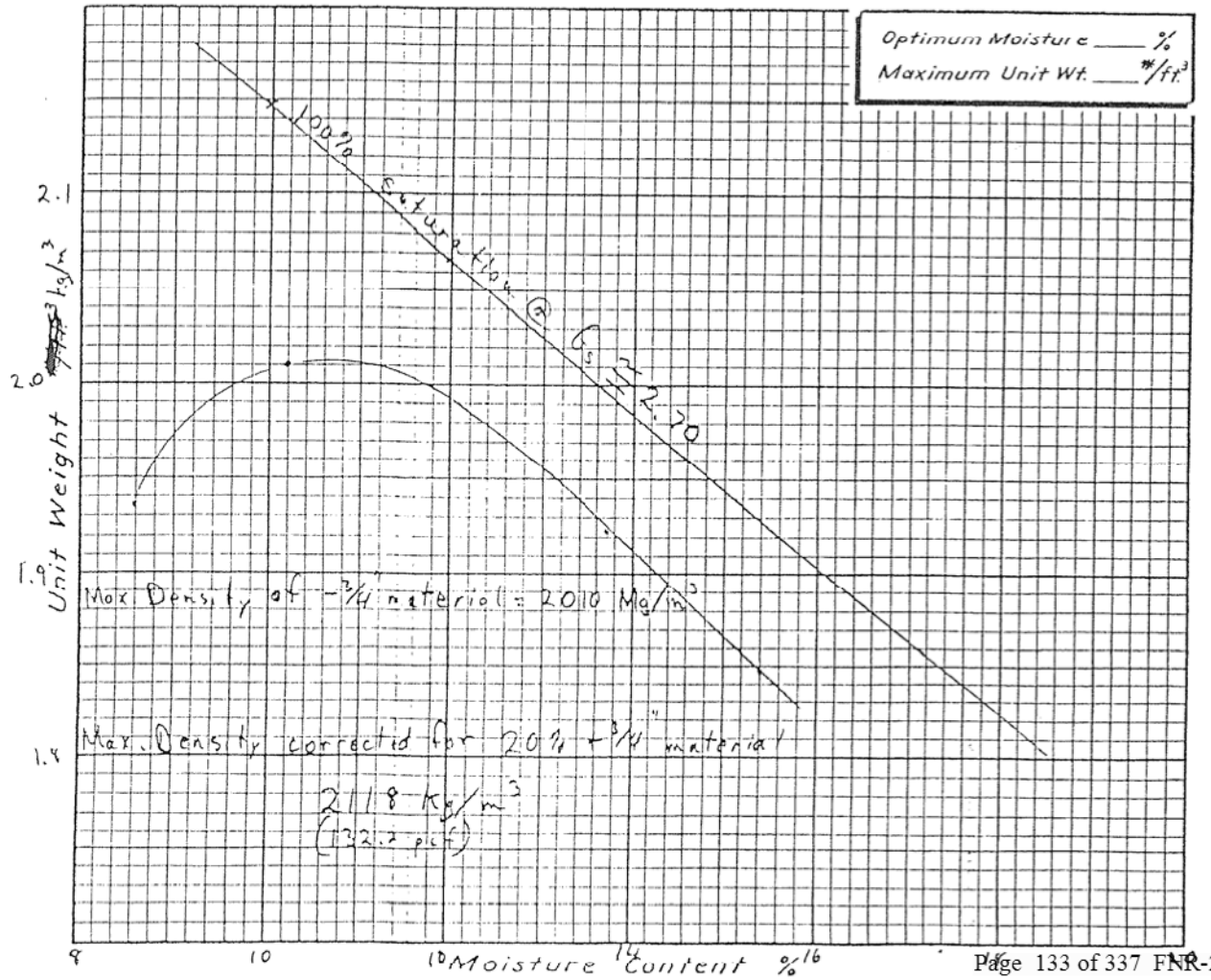
COMPACTION TEST

Project VALENTINE GOLD.
BORROW I - EAST SAMPLE
Sample No. _____ Depth _____
Sampled by _____ Date _____
Tested by JG Date Jan 22/87
Checked by

	Trial No.	1	2	3	4			
Unit Weight	Wt. of Sample Wet+Mold	10614.3	10502.4	10673.7	10433.9			
	Wt. of Mold	5970.0	✓	✓	✓			
	Wt. of Sample Wet	4644.3	4532.4	4703.7	4463.9			
	Wet Density ~~#/ft.³~~ kg/m³	2,187	2,134	2,215	2,102			
	DRY DENSITY ~~#/ft.³~~ kg/m³	1,923	1,849	2,010	1,936			
			BLEEDING					
Moisture Content	MOISTURE ADDED	+0%	+2%	-2%	-4%			
	Container No.	22	J	2C	42A			
	Wt. of Sample Wet + Tare	2398.7	2548.6	2596.7	3246.9			
	Wt. of Sample Dry + Tare	2132.9	2244.0	2375.3	3012.8			
	Tare of Container	195.8	266.4	199.1	285.5			
	Wt. of Water	265.8	304.6	221.4	234.1			
	Wt. of Dry Soil	1937.1	1977.6	2176.2	2727.3			
	MOISTURE CONTENT	13.7	15.4	10.2	8.6			

Type of Mold 6" Volume 2124 cm³ Weight 5970 g.

Remarks: Grey, gravelly, silty SAND (SM), trace of clay, non plastic fines



THURBER CONSULTANTS LTD.

ATTERBERG LIMITS

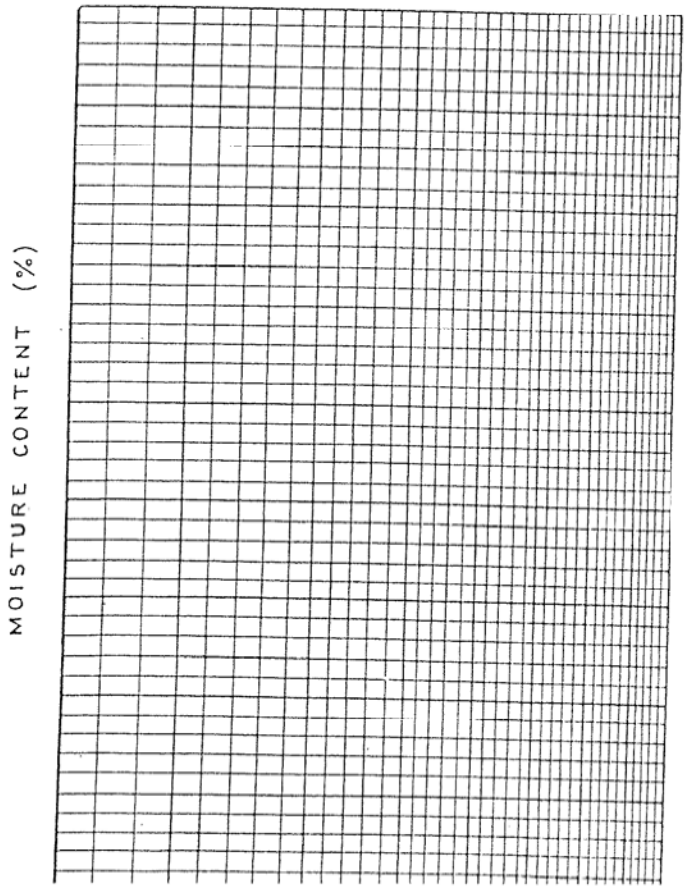
Project Valentine Gold

Test Hole ..... Sample No. East Borrow Tested by BLC

Depth ..... Date of Testing July 23/87 Checked by .....

LIQUID LIMIT									
Trial No.	1								
No. of Blows	15								
Container No.	5								
Wt. Wet Soil & Container	61.93								
Wt. Moisture		7.77							
Wt. Dry Soil & Container	54.16								
Wt. Dry Soil		26.93							
Wt. Container	27.23								
Moisture Content		28.9							

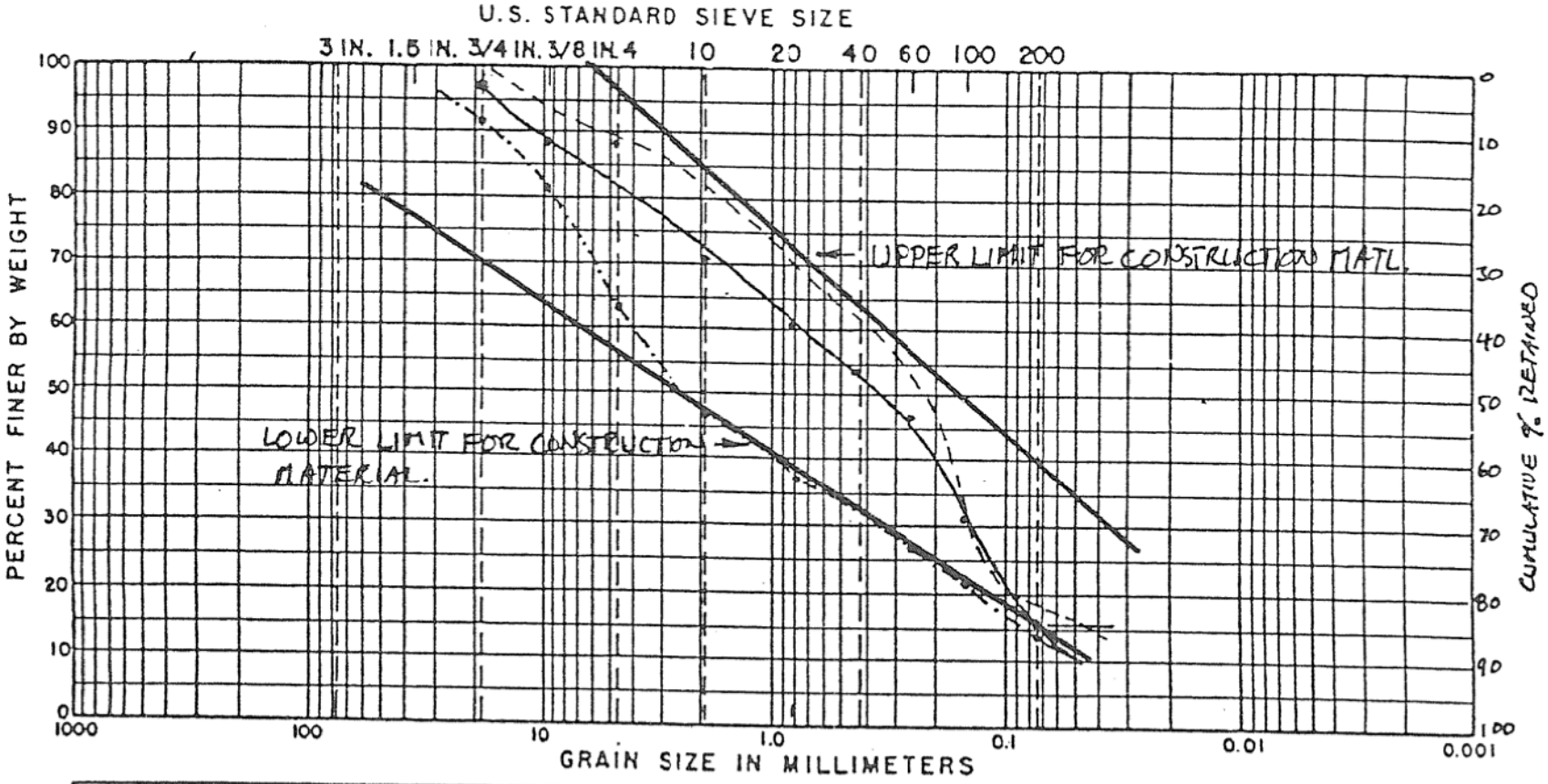
PLASTIC LIMIT									
Trial No.	1								
Container No.	77								
Wt. Wet Soil & Container	44.17								
Wt. Moisture		2.78							
Wt. Dry Soil & Container	41.39								
Wt. Dry Soil		10.09							
Wt. Container	31.30								
Moisture Content		27.6							



SUMMARY
Liquid Limit .....
Plastic Limit .....
Plastic Index .....

Note: Unable to roll thread, at this moisture content

Non - Plastic

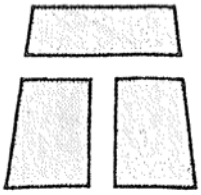


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE #	DEPTH	UNIF. CLASSIFICATION		NAT. W.C.	LL	PL	PI	LEGEND.
BR-2	1 metre	SM	Clayey silty Sand	9%				———
BR-3	1 metre	SM/SC	Silty Sand, Clayey, Sand	15%				—·—·—·—
BORROW 1	1 metre	SM/SC	clayey Silty Sands	21%				– – – – –

GRADATION CURVE

NOTICE OF TRANSMITTAL



THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold Date: Nov. 2/87

2038 Other Pt. Rd. Your File:

Sooke B.C. Our File: 14-547-0

Attention: Calvin Van Buskirk

Reference:

(A) The following items 1 modified proctor test and field density tests of Oct. 29/87

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☐ Mail ☑ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return

☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By:

	Density	Moisture
Standard count	3093	510
Compaction test results	125.5	

Project VALENTINE GOLD

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

Date OCT. 29/87

MOISTURE & DENSITY DATA

Test No.	1	2	3	4	5	6	7	8	9	10
Test location	STA 1	STA 2	STA 3	STA 4	[illegible]	STA 6	[illegible]	STA [illegible]		STA 9
Probe depth	30	30	30	30	30	30	30	30	20	30
ELEV.	-3m			-5	-2m					-1'
Density count (DC/measure)	406	420	462	411	404	423	463	402	1372	504
Moisture count (MC/measure)	126	118	134	123	153	143	141	138	147	151
Wet density p.c.f. (WD)	133.7	127.6	129.4	123.3	133.7	132.2	129.3	133.9	131.0	126.5
Water p.c.f. (M)	8.6	7.9	9.5	2.3	9.3	10.4	10.2	9.8	10.8	11.3
% Moisture (%M)	6.9	6.6	7.9	[illegible]	7.5	8.5	8.6	7.9	9.0	9.8
Dry density p.c.f. (DD)	125.	119.6	122.3	114.9	126.4	121.9	120.1	124.1	120.2	115.2
Percent compaction	99.6	95.3	95.5	99.5	99.1	97.1	94.9	98.9	95.8	91.8

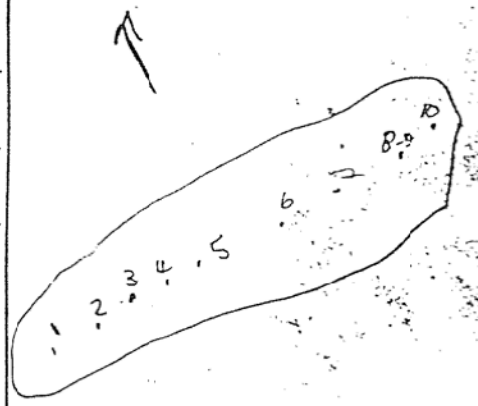
REMARKS

Moisture Correction -1.5%

Technician BL

Checked by

LOCATION SKETCH



MOD. PROCTOR CURVE
GRAIN SIZE + ATD.
W.C.'S
TRIAXIAL (10 PSI)

File No. 19-547-0

File No.: 19-547-0

THURBER CONSULTANTS LTD.

COMPACTION TEST

Project '12 VALENTINE GOLD

Sample No. 3 Depth Main Dam

Sampled by BJL Date OCT. 29/19

Tested by ✓ Date ✓

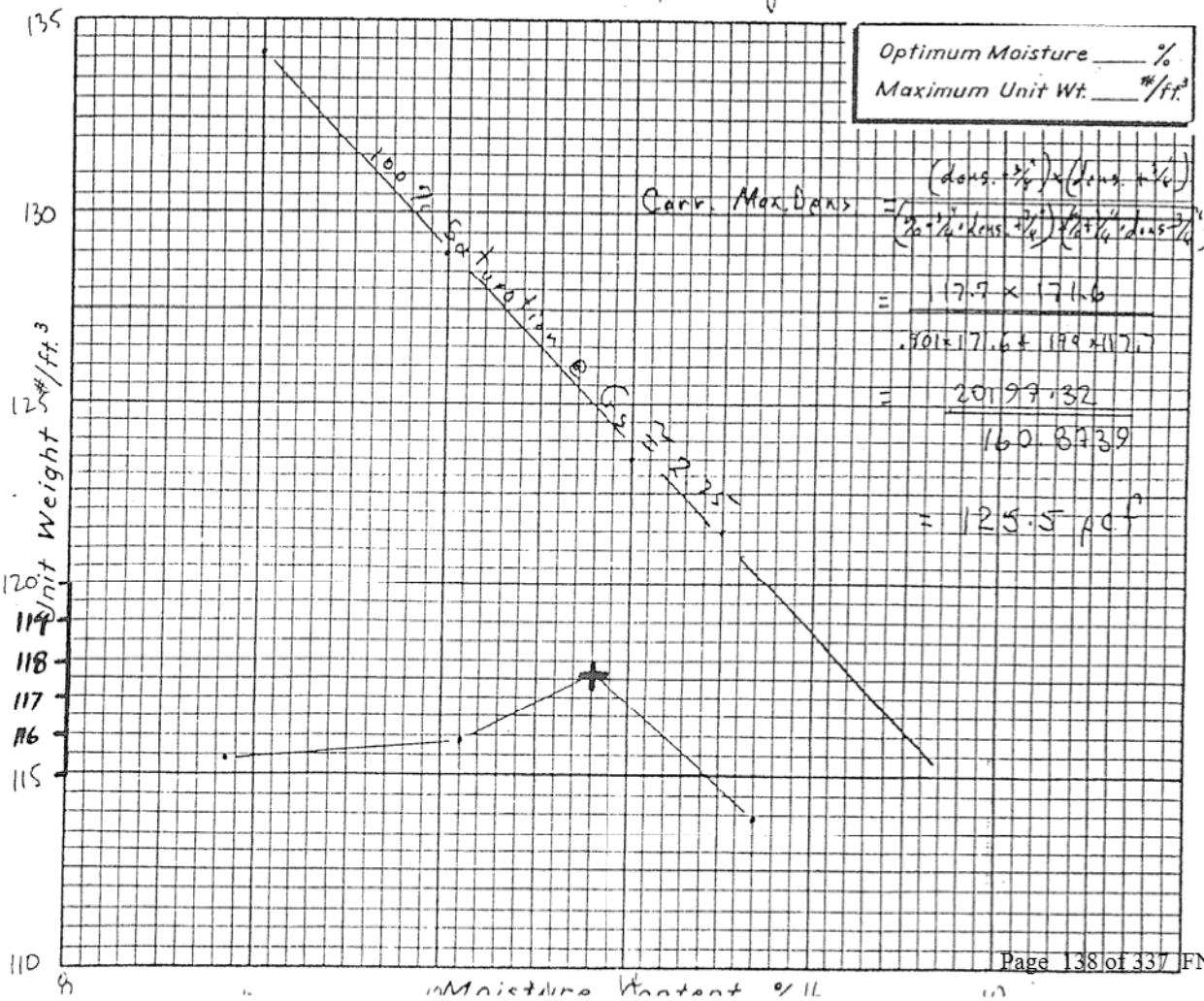
Checked by

	Trial No.	1	2	3	4			
Unit Weight	Wt. of Sample Wet+Mold	5968	5968	5968	5868			
	Wt. of Mold	10391.8	10518.5	10440.8	10275.9			
	Wt. of Sample Wet	4423.8	4550.5	4472.8	4307.9			
	Wet Density #/ft.^{3}	130.0	133.7	131.4	126.6			
	DRY DENSITY #/ft.^{3}	115.9	117.7	113.9	115.4			
				SLIGHT BLEED				
Moisture Content	MOISTURE ADDED	INSITU	+1.5%	+3%	N - 1.5%			
	Container No.	J	42A	A	291			
	Wt. of Sample Wet + Tare	991.4	1366.4	2135.7	2503.6			
	Wt. of Sample Dry + Tare	912.8	1287.3	1889.2	2307.4			
	Tare of Container	266.0	284.6	288.1	286.7			
	Wt.of Water	78.6	129.1	246.5	196.2			
	Wt. of Dry Soil	646.8	952.7	1601.1	2020.7			
	MOISTURE CONTENT	12.2	13.6	15.4	9.7			

Type of Mold 6" MOD. Volume 2124 cc Weight 5968 g

Remarks: BROWN F-M SAND + SILT (some gravel) 34.2% GRAVEL

5003.7



137.4 pcf

NOTICE OF TRANSMITTAL

THURBER CONSULTANTS LTD.

Suite 210-4475 Viewmont Ave.
VICTORIA B.C. V8Z 6L8
Phone (604) 727-2201

TO: Valentine Gold
2038 Otter Pt. Rd.
Sooke BC

Date: Nov. 16/87
Your File:
Our File: 19-547-0

Attention: Calvin van Bushirk

Reference: density testing

(A) The following items
field density test results from Nov. 4/87

RECEIVED
NOV 17 1987
RESOURCES

(B) ☑ Are enclosed ☐ Under separate cover

(C) Forwarded by: ☑ Mail ☐ Messenger ☐ Special Delivery

(D) For: ☑ Information ☐ Approval ☐ And Return
☐ Comments ☐ Action ☐ Approved

(E) Remarks:

THURBER CONSULTANTS LTD.

By:

	Density	Moisture
Standard count	3026	
Compaction test results	130.6 pcf	factor 1.041

SHOULD BE 125.5 pcf.

Project Valentine Gold

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

Date Nov 4/87

MOISTURE & DENSITY DATA

Test No.	1	2	3	4	5	6	7	8	9	10
Test location	0+20	0+15	0+10	65m	60m	55m	50m	45m	40m	35m
Probe depth	30	30	30	30				30	20	
	-1.8m									
Density count (DC/measure)	407	390	379	381	437	405	418	419	1528	417
Moisture count (MC/measure)	146	165	141	152	150	162	160	163	175	156
Wet density p.c.f. (WD)	133.5	134.8	135.8	135.6	131.1	133.2	132.5	132.1	126.5	132.4
Water p.c.f. (M)	11.4	13.3	11.1	12.0	12.1	13.0	12.8	13.2	14.5	12.1
% Moisture (%M)	9.3	11.0	8.9	9.2	10.2	10.8	10.2	11.2	13.0	10.3
Dry density p.c.f. (DD)	122.1	121.1	124.2	123.7	119.0	120.0	120.0	119.3	117.0	120.2
Percent compaction	CORRECTED TO MAX 125.5 pcf 97.3 / 93.5	96.7 / 93.0	99.4 / 95.5	98.6 / 94.7	94.8 / 91.1	96.1 / 92.3	95.5 / 91.7	95.1 / 91.3	89.3 / 85.8	95.7 / 92.0

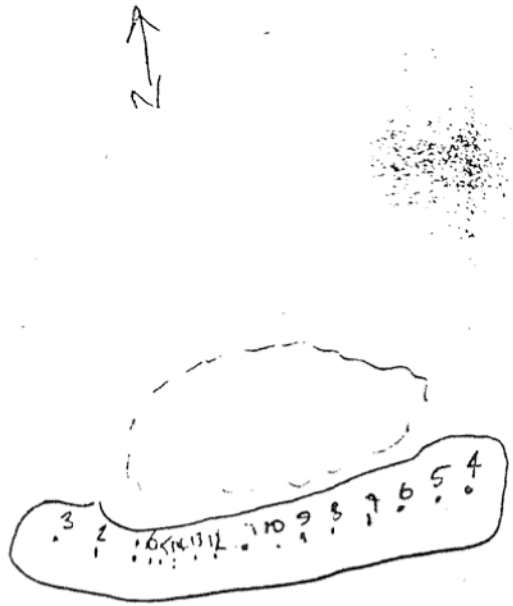
REMARKS 4 modified proctor tests have been run to date, the range of values is 125.4 - 133.5 pcf. The value obtained for material from this lift is 130.6 pcf.

Moisture Correction 1.5%

Technician EG

Checked by BAS and

LOCATION SKETCH



File No. 19-547-0

	Density	Moisture
Standard count		
Compaction test results		

Project Valentine Gold

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

Date Nov. 4/87

MOISTURE & DENSITY DATA

Test No.	11	12	13	14	15	16	17	18	19	20
Test location	30m	25m	20m	15m	10m		Ramp 13 0+20	Ramp 13 0+25	Ramp 14 0+15	Ramp 14 0+00
Probe depth	30	30	30	30	30	30	30	30	30	
	-1.8m									→
Density count (DC/measure)	454	480	514	486	463	470	479	539	430	476
Moisture count (MC/measure)	163	155	184	138	163	164	136	146	142	150
Wet density p.c.f. (WD)	129.0	128.0	129.7	130.0	132.9	128.3	128.2	124.3	128.8	128.4
Water p.c.f. (M)	13.2	12.1	15.2	10.6	13.2	13.3	8.9	11.4	11.1	10.7
% Moisture (%M)	11.3	10.2	14.1	9.0	11.0	11.6	7.5	9.6	9.4	9.1
Dry density p.c.f. (DD)	116.5	114.6	115.2	121.1	119.2	116.4	119.7	113.8	117.7	117.2
Percent compaction	93 89.2	92 87.7	88 84.4	93 89.7	95 91.7	92 88.4	95 91.3	90 86.4	94 90.1	94 90.1

REMARKS * *

Moisture Correction * -1.5 %

Technician

Checked by

* TO BE RE-COMPACTED.

LOCATION SKETCH

File No. 19-547-0

	Density	Moisture
Standard count		
Compaction test results		

Project Valentine Gold

THURBER CONSULTANTS LTD.
Geotechnical Engineers

NUCLEAR DENSOMETER TESTS

page 3 of 3

Date Nov. 4/87

MOISTURE & DENSITY DATA

Test No.	21										
Test location	Access 15										
Probe depth	30										
	1.8m										
Density count (DC/measure)	356										
Moisture count (MC/measure)	132										
Wet density p.c.f. (WD)	137.3										
Water p.c.f. (M)	12.8										
% Moisture (%M)	10.2										
Dry density p.c.f. (DD)	125.0										
Percent compaction	95.7 ✓										

REMARKS

Moisture Correction .....
Technician .....
Checked by .....

LOCATION SKETCH

File No. .....

THURBER CONSULTANTS LTD.

GRAIN SIZE ANALYSIS

Project VAL · Gold

Tested by BM

Date Nov 4/87

Test Hole TH 4

Depth

Checked by BM

Dry Wt.of Coarse Sample =			
Screen	Wt.Ret.	% Ret.	% Pass.
2-1/2"			
2"			
1-1/2"			
1"			
3/4"	5164.2	21.4	78.9
1/2"			
3/8"			
1/4"			
#4			
#10			
Pass. #10 3/4	19282.4		
TOTALS	24446.6		

HYDROMETER TEST — Dry Wgt. of Sample =

Time Interval	Clock Reading	hyd'mtr. Reading	Temp. o F.	Grain Size m.m.	% Passing

Dry Wt.of 1/4'd Sample Passing No. =			
Screen	Wt. Ret.	% Ret.	% Pass.
#10			
#20			
#40			
#60			
#100			
#200			
Pan.			
TOTALS			

Classification

Remarks: 6868.7 + 1896.9 = 8765.6

7.12 B

22078.4 x 1.15 = 19282.4

TRAC = 100 − 10.88 → 63.2 = 58.0

67.2/46.12

14.5%

FILE No. 19-SU1-D

8.2.0

APPENDIX B:

INITIAL MONITORING DATA

Initial settlement data

date	west monument	central monument	east monument
1st dec 87	103.72m	103.71	103.47

BULK SAMPLING REPORT (EXCERPT)
MARCH 14, 1988

BACON,
DONALDSON
& ASSOCIATES LTD.

2050 COLUMBIA STREET
VANCOUVER, B.C., CANADA V5Y 3E1
TELEPHONE (604) 879-8461
TELEX 04-53437

RECEIVED
JUL 09 2002
MINES BRANCH
NANAIMO

METALLURGICAL BULK SAMPLING PILOT PLANT PROGRAMME FOR VALENTINE MOUNTAIN PROPERTY

Prepared for:

VALENTINE GOLD CORP.
Suite 2000, Park Place
666 Burrard Street
Vancouver, B.C.
V6C 2X8

Attention: Michael J. Hopley

File Number: 7065
March 14, 1988

Kenneth B. DeGraaf, M.A.Sc., P.Eng.

1.0 INTRODUCTION

As part of an overall exploration program, Valentine Gold Corp. carried out a programme of bulk sampling at its Valentine Mountain property near Sooke, B.C. Due to the apparent "nugget" effect it was necessary to treat much larger samples than would be available from the planned drill program. Under Bacon Donaldson & Associates supervision, the bulk trench samples were processed on-site at the Valentine Mountain 20 ton/day gravity/flotation pilot plant.

The bulk sampling programme extended over a period from November 30, 1987 through to February 9, 1988. During this period three (3) bulk trench samples were processed through the pilot plant facility. The following report is a final account of the head grades calculated for each of the bulk trench samples handle.

In addition, a brief report is provided on the final mill status at the completion of this bulk sampling program.

2.0 SUMMARY

The following table summarizes the calculated head grade, the % gold recovery and the total sample weight for each of the three bulk samples.

Sample	Calculated Head Grade Au (oz/ton)	% Gold Recovery	Sample Weight (tons)
D-14	0.015	63.0	247.1
Vein 36 East	0.106	96.5	184.0
Vein 36 West	0.027	91.9	221.8

The 20 ton/d bulk sampling pilot plant remains intact, but has been temporarily decommissioned to reduce degradation of plant equipment. To recommission the pilot plant it is estimated that approximately 20 mandays will be required to reconnect pumps, motor, etc.

FROM: BACON DONALDSON REPORT 7065

MARCH 14, 1988

K. B. DE GRAAF

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Plotted: December 01 2014

NOTES:

1. Image from C.R.D. Natural Areas Atlas.

THURBER ENGINEERING LTD.

GREAT THUNDER GOLD CORPORATION

KEY PLAN

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No.	DWG. NO.	REV.
JDM	RRS		NOVEMBER 13, 2014	Not to Scale	19-6819-0 -1		-

TED04375.dwg

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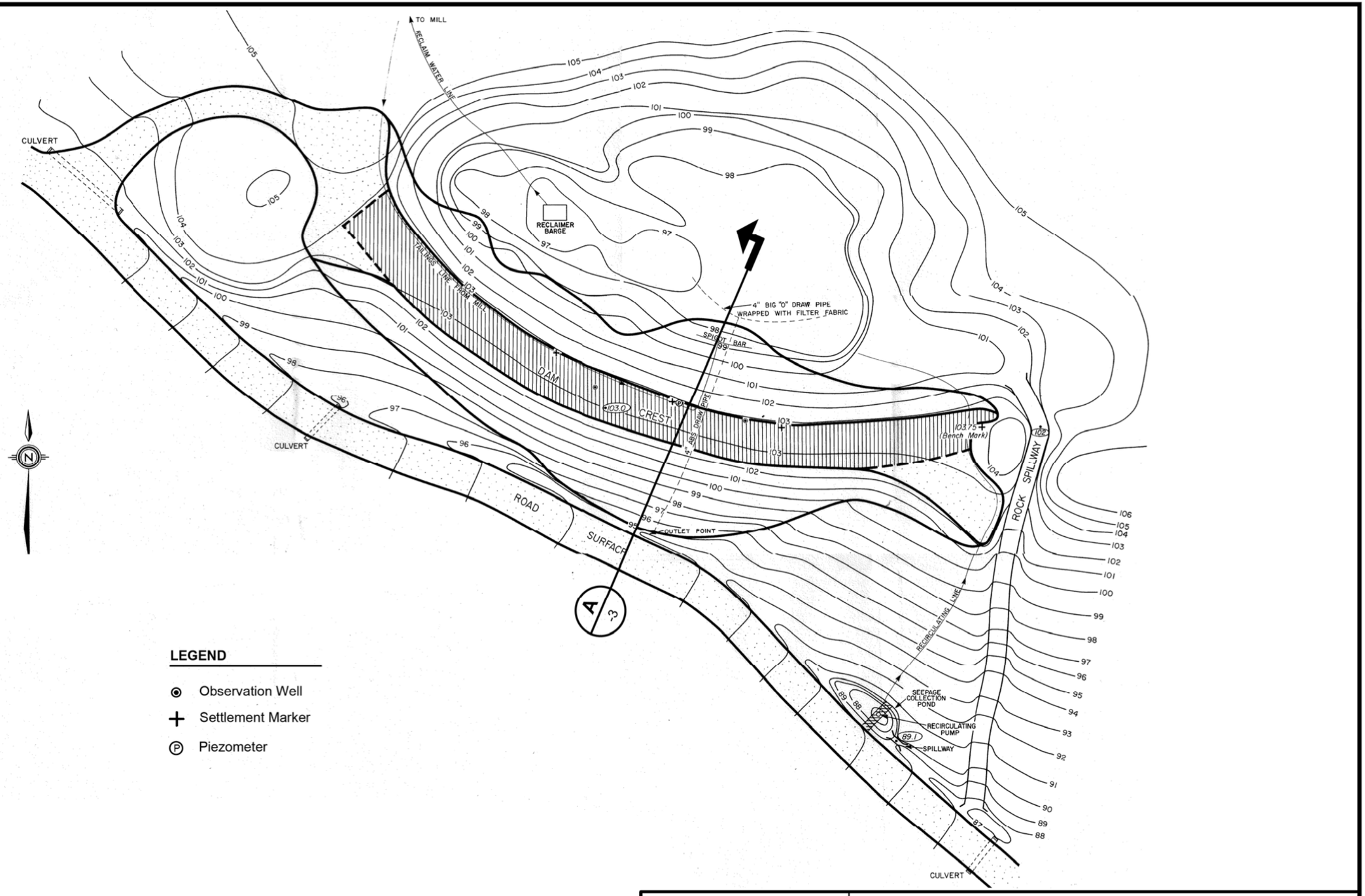
Plotted: December 01 2014



LEGEND

- Observation Well
- Settlement Marker
- Piezometer

NOTES:

1. Image scanned from drawing entitled "PLAN MAP OF TAILINGS DAM (AS CONSTRUCTED)", dated November, 1987 and stamped by Peter J Peart, P.Eng.
2. Contours shown are 1 metre intervals.

0 5 10 15 20 25 30m
SCALE 1:500

THURBER ENGINEERING LTD.

GREAT THUNDER GOLD CORPORATION

SITE PLAN

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No.	DWG. NO.	REV.
JDM	RRS		NOVEMBER 13, 2014	1:500	19-6819-0 -2		-

TED04375.dwg

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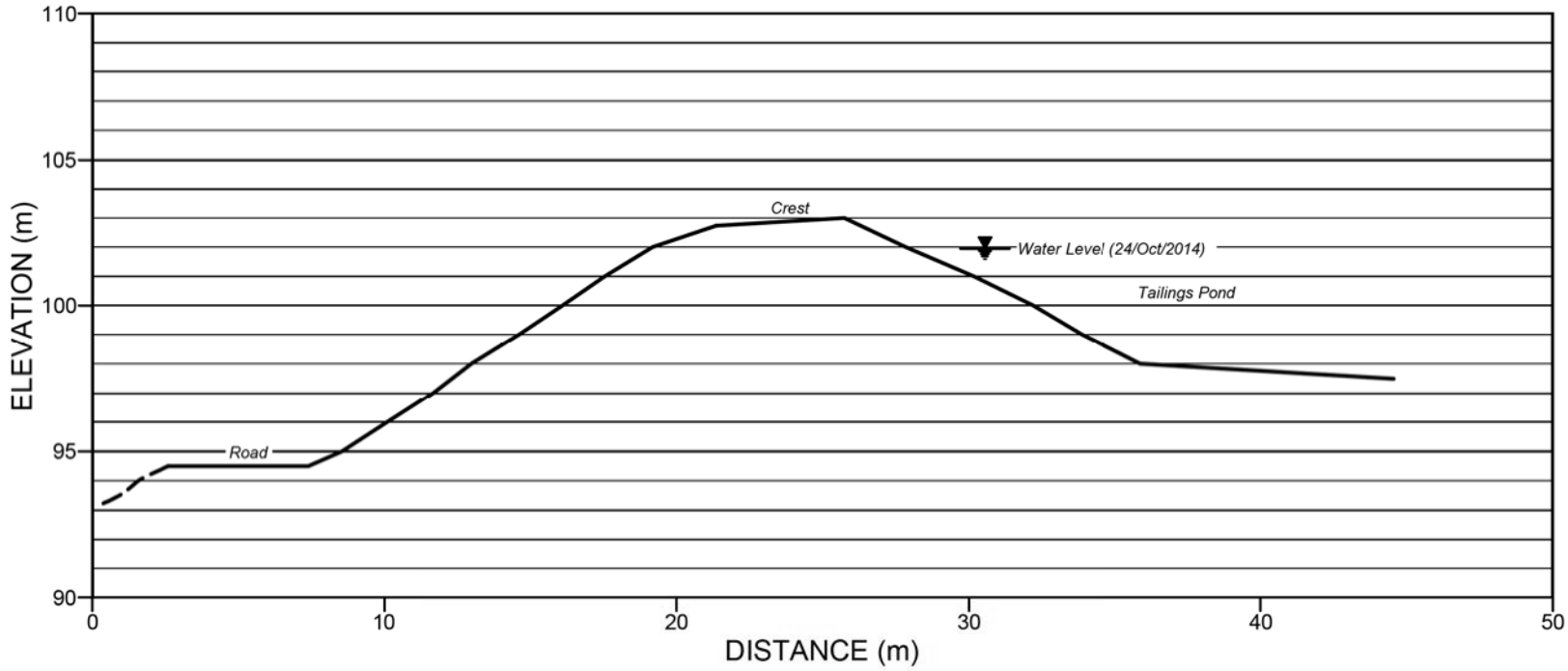

NOTE:

Section produced from contours shown on drawing entitled "PLAN MAP OF TAILINGS DAM (AS CONSTRUCTED)", dated November, 1987 and stamped by Peter J Peart, P.Eng.

0 2.5 5 7.5 10 12.5 15 m

SCALE 1:250

THURBER ENGINEERING LTD.

GREAT THUNDER GOLD CORPORATION

SECTION A

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No.	DWG. NO.	REV.
JDM	RRS		NOVEMBER 24, 2014	1:250	19-6819-0	-3	-

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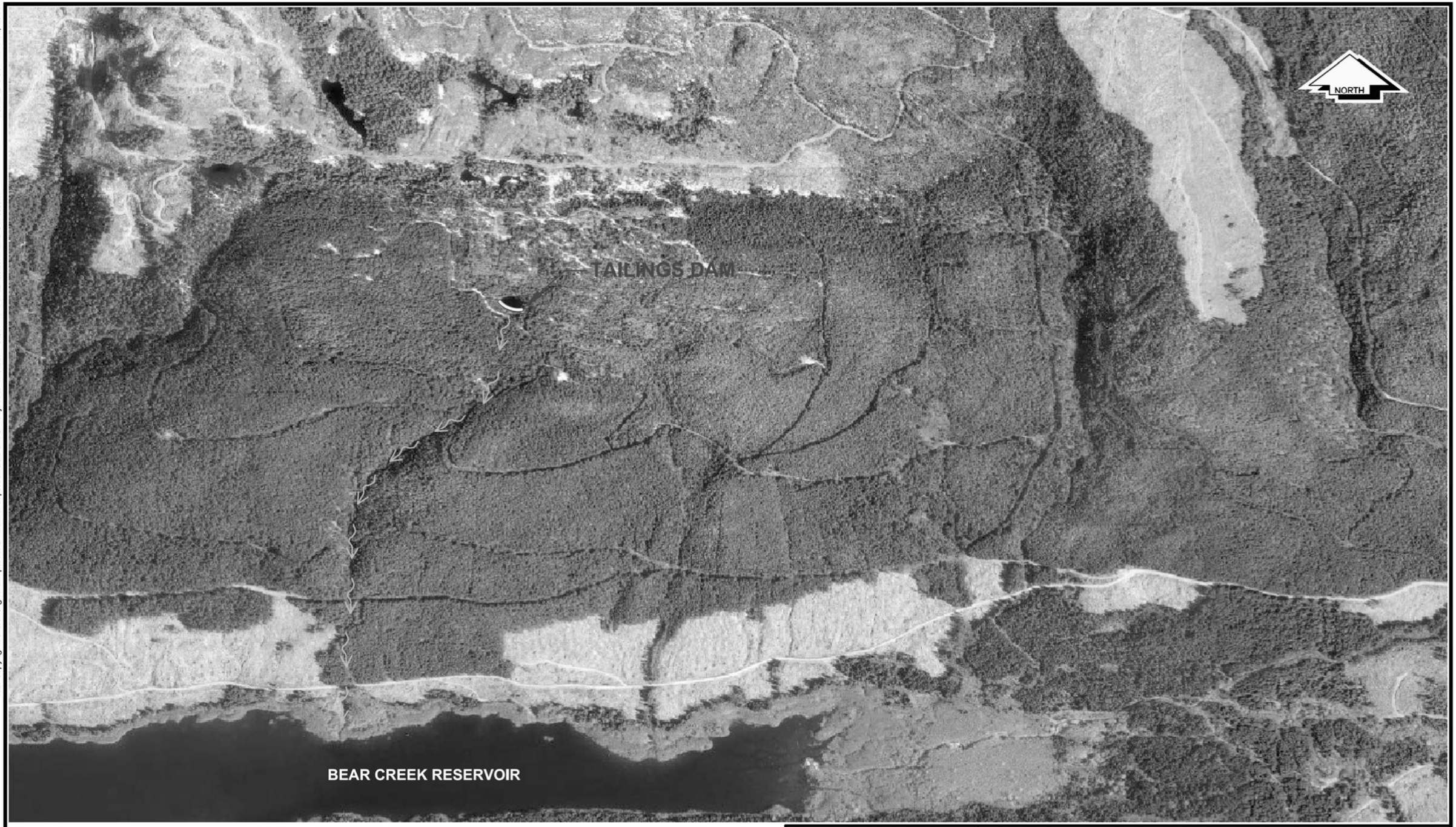
Plotted: December 01, 2014



NOTES:

1. 2013 Ortho-photograph from C.R.D. Web Map Service.

0 100 200 300 400 500 600m

SCALE 1:10000

THURBER ENGINEERING LTD.

GREAT THUNDER GOLD CORPORATION

PLAN SHOWING ANTICIPATED FLOW DIRECTION DOWNSTREAM OF DAM

VALENTINE MOUNTAIN MINE
DAM SAFETY INSPECTION

JUAN DE FUCA ELECTORAL DISTRICT, B.C.

DESIGNED	DRAWN	APPROVED	DATE	SCALE	PROJECT No.	DWG. NO.	REV.
JDM	RRS		NOVEMBER 13, 2014	1:10,000 Approx.	19-6819-0	-4	-

TED04375.dwg

THURBER

TABLE C - 1
SUMMARY OF MONTHLY PRECIPITATION (1974 to 2013)

	Monthly Precipitation (mm)												Yearly
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1974	410.8	231.9	192.8	79.8	68.8	39.9	35.3	30.0	30.0	23.2	319.2	409.5	1871
1975	322.1	114.3	121.5	56.7	45.1	12.0	6.0	153.6	0.8	445.6	432.0	489.6	2199
1976	191.8	303.3	292.5	62.0	96.1	44.2	23.1	86.7	58.8	124.7	95.6	194.3	1573
1977	152.7	243.5	188.6	86.9	26.7	8.4	20.9	3.0	43.9	146.7	575.3	289.9	1787
1978	185.7	112.3	106.2	31.5	70.8	14.3	19.8	86.6	93.2	49.1	159.1	225.2	1154
1979	55.9	335.3	103.5	75.2	26.9	32.5	30.7	5.1	104.1	182.6	56.9	596.5	1605
1980	171.0	347.6	179.9	63.0	39.8	52.1	40.9	18.3	82.4	29.7	591.5	496.9	2113
1981	85.8	362.1	119.3	205.5	71.9	89.7	17.5	19.8	130.6	174.9	326.9	311.8	1916
1982	461.6	260.7	59.2	86.0	15.8	36.1	18.2	18.0	26.8	171.6	151.7	361.8	1668
1983	347.5	274.6	182.8	17.5	29.1	29.3	88.8	24.8	72.0	61.6	451.0	180.0	1759
1984	202.0	131.2	139.3	115.3	131.2	90.3	1.8	7.1	46.0	199.7	374.0	183.2	1621
1985	35.0	68.7	90.1	117.1	15.1	21.0	10.1	13.0	20.1	238.3	125.5	45.3	799
1986	402.2	292.9	99.6	71.5	75.4	16.8	19.1	0.0	35.0	81.0	399.3	143.4	1636
1987	257.3	95.2	138.6	114.2	61.2	8.2	13.3	16.0	17.3	16.5	198.8	310.0	1247
1988	169.1	124.6	264.3	146.1	61.1	29.4	15.8	14.5	79.2	139.9	317.0	225.4	1586
1989	304.2	61.0	195.3	108.1	45.8	25.3	18.0	28.2	8.3	107.7	215.1	193.5	1311
1990	359.5	351.6	102.5	72.8	34.9	53.1	10.6	32.7	8.1	240.4	680.5	370.6	2317
1991	165.7	257.9	91.3	176.9	40.1	10.7	33.2	161.3	3.0	23.8	325.9	245.4	1535
1992	485.5	136.8	22.0	142.9	9.4	13.9	30.2	17.9	45.2	106.5	225.7	115.2	1351
1993	169.6	9.5	192.2	124.7	92.9	45.8	61.6	32.9	1.2	72.8	122.6	191.0	1117
1994	132.8	247.7	224.3	56.3	51.4	45.0	18.5	6.7	67.0	197.5	297.5	404.2	1749
1995	175.2	272.5	143.2	70.3	17.3	35.1	33.8	58.1	30.1	225.7	559.7	326.7	1948
1996	284.2	158.0	54.0	191.5	48.0	11.2	12.0	14.2	42.2	257.2	225.9	355.0	1653
1997	456.1	119.2	382.8	122.2	80.6	115.5	73.0	39.3	139.8	312.2	196.3	231.5	2269
1998	350.4	136.4	104.6	20.6	30.5	18.6	42.9	0.8	32.2	105.4	619.0	385.0	1846
1999	401.6	447.0	168.5	22.9	33.8	45.9	5.9	17.0	20.4	255.2	256.7	326.3	2001
2000	184.3	83.3	118.7	47.1	81.1	53.4	33.3	9.5	53.8	112.1	118.5	163.5	1059
2001	146.0	47.8	115.5	78.2	52.6	25.8	6.6	97.3	36.2	168.4	256.3	342.1	1373
2002	355.0	247.7	202.6	109.9	33.8	40.8	9.2	20.3	29.6	18.1	229.8	224.9	1522
2003	289.0	40.1	269.6	68.4	39.6	7.1	21.1	3.9	41.8	587.3	299.2	175.8	1843
2004	166.1	63.4	149.4	19.9	37.4	29.5	5.3	98.4	108.5	131.9	213.2	239.1	1262
2005	272.3	35.3	157.1	108.2	73.2	26.4	34.2	12.6	61.5	154.3	178.0	194.0	1307
2006	464.2	128.0	76.9	62.0	54.4	39.7	9.2	4.9	48.3	66.0	686.2	286.1	1926
2007	495.7	163.4	343.8	102.3	24.0	37.6	41.1	33.0	64.4	195.9	136.3	323.1	1961
2008	202.6	101.6	116.8	38.4	12.6	29.9	15.5	76.5	23.7	82.8	233.3	130.4	1064
2009	164.4	54.8	125.9	74.2	87.4	13.6	11.2	38.0	88.5	223.4	529.7	106.3	1517
2010	277.1	72.8	139.7	132.0	130.3	30.3	2.0	25.0	152.9	168.7	176.3	327.0	1634
2011	290.7	187.6	231.8	147.8	86.4	10.4	13.8	30.3	95.6	120.8	260.5	161.1	1637
2012	326.2	131.6	235.1	77.5	30.1	54.7	20.1	1.1	5.4	250.1	219.8	310.4	1662
2013	150.6	123.9	212.6	123.5	81.4	38.1	0.0	42.2	178.6	37.9	115.6	69.9	1174
Avg:	**263.0**	**174.4**	**161.4**	**90.7**	**53.6**	**34.5**	**23.1**	**35.0**	**55.7**	**157.7**	**298.8**	**266.5**	**1614**

Note: Data provided by CRD Integrated Water Services and collected at Sooke Lake.

TABLE C - 2
SUMMARY OF AVERAGE DAILY AIR TEMPERATURE (2004 to 2013)

Year	Average Daily Air Temperature (°C)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	2.7	4.2	6.2	9.1	11.8	15.7	18.5	18.2	12.4	9.3	5.3	4.5
2005	3.0	2.6	6.2	8.3	12.7	13.9	16.8	17.6	12.4	8.9	3.9	3.4
2006	4.8	3.4	5.0	8.0	12.0	15.6	18.1	16.8	13.9	8.5	4.4	2.5
2007	1.7	4.3	5.8	7.1	11.2	13.6	18.2	16.4	12.7	8.1	4.3	2.0
2008	1.6	3.3	3.4	5.4	11.6	13.1	16.8	16.6	13.4	8.1	6.9	0.4
2009	1.3	2.4	2.9	7.2	11.1	16.0	19.4	17.0	13.9	8.4	5.9	0.8
2010	5.5	5.6	5.4	7.6	10.1	13.6	17.6	17.0	13.8	9.4	3.8	3.6
2011	3.1	1.8	4.9	5.1	9.7	14.0	16.1	17.1	14.8	8.1	3.3	2.3
2012	1.9	3.8	4.0	7.8	10.6	12.8	17.1	17.8	14.1	9.1	5.7	3.1
2013	2.0	4.0	5.6	7.6	12.5	15.5	18.5	17.7	14.5	8.7	4.8	1.6
Average	**2.8**	**3.5**	**4.9**	**7.3**	**11.3**	**14.4**	**17.7**	**17.2**	**13.6**	**8.7**	**4.8**	**2.4**

Note: Data provided by CRD Integrated Water Services and collected at Sooke Lake.

THURBER

APPENDIX D
PREVIOUS CONSULTANT INSPECTIONS & REPORTS

Jacques Whitford
Consulting Engineers
Environmental Scientists
Risk Consultants

715 Canada Avenue
Duncan, BC
V9L 1V1

Tel: (250) 715-2999
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December 23, 2003

Project No. BCI60004

Mr. Bob Beaupre
Beaupre Exploration Ltd
110 – 850 Blanshard St
Victoria, BC V8W 2H2

Dear Mr. Beaupre:

Re: Initial Geotechnical Assessment
Tailings Pond,Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC

Further to our proposed work plan dated April 28, 2003, Jacques Whitford Environment Limited (JWEL) is submitting this Initial Geotechnical Assessment report. This report has been prepared in general conformance to our April 28, 2003 work plan. The purpose of this report is to fulfil the B.C Ministry of Energy and Mines geotechnical permit requirements, as described in their July 17, 2002 letter and attached "Special Conditions". The report includes a summary of our review of existing information (primarily the 1987 report prepared by Peter Peart Geotechnical Ltd.), observations made during our site reconnaissance, and recommendations regarding the status of the existing tailings containment system.

1.0 SITE RECONNAISSANCE

The site is located to the south of Discovery Zone on Valentine Mountain, situated north of Sooke in southern Vancouver Island. Site elevation is approximately 800 m on the ridge running down to the south-west from Valentine Mountain. The watershed area located above the impoundment is approximately 38,000 m^2. The watershed has elevations in the range 760 – 804 m. No groundwater discharge or recharge was noted in the period between March and June 1987 at the time of Peter Peart's inspection of the rock in the area of the impoundment.

An initial visual assessment of the existing tailings impoundment was carried out on April 3, 2003. The site reconnaissance included a detailed surface examination of the facility to look for obvious signs of distress with a view to evaluating whether the structure had deteriorated over time. Observations made during the April 3, 2003 site reconnaissance may be summarised as follows:

- There was no obvious cracks on the crest
- One of the steel piezometers was found to be bent on the upstream side of the crest
- There was sloughing on the downstream side of the crest, extending approximately 0.3 m in depth. The sloughed area covered an areal extent between approximately station 0+78 and the spillway
- There was an open crack approximately between stations 0+72 and 0+75
- At the crack areas the dam is approximately 5.9 m in height
- No seepage was observed along the seepage collection pond
- There was no noticeable water in the ditch along the toe of the dam.

Based on our visual observations during the field visit, it would appear that the tailings dam likely does not have the same factor of safety against slope instability as when it was constructed. This is further discussed in the following sections in the context of the seismic coefficient and strength parameters utilised in the original slope stability analysis.

2.0 REVIEW OF PREVIOUS INFORMATION

As part of our initial geotechnical assessment we have reviewed the December 1, 1987 report for Valentine Gold Corporation titled "Tailings Impoundment Construction Report, Valentine Mountain Project", prepared by Peter Peart, P.Eng., Consulting Geotechnical Engineer. Appendix Z of the report contains the results of the pre-construction investigation that were detailed in "Tailings Impoundment Proposal, Valentine Mountain" dated June 1987. The December 1987 construction report is hereinafter referred to as the 1987 Report.

The 1987 Report states that the tailings impoundment was constructed between August and November of 1987. The design required a minimum of 1 m of freeboard for the embankment. The embankment was constructed as a two-zone structure with a geotextile filter separating the rip-rap downstream zone from the sandy till upstream zone. There was a rockcut spillway on the east side of the impoundment and a subdrain system that was monitored together with settlement markers and piezometers. The impoundment was constructed to have a capacity of approximately 10,000 cubic metres. The construction also included a seepage collection pond in order to re-circulate the embankment seepage back into the impoundment.

Field Investigation

The field investigation included four hand-dug test pits. Soft organic silts were encountered near the proposed centreline of the embankment. The soft silts were approximately 1 m deep and covered an area of approximately 35 m^2. The soft silt material was removed. The general subsurface conditions across the site were described as dense sandy tills overlying bedrock. The bedrock characteristics were not logged by means of appropriate drilling and rock coring methods.

Embankment Stability Analysis

Stability of the embankment was evaluated using the computer program STABR and Bishop's Modified method of analysis based on effective stress parameters. The following loading conditions were analysed:

- End of construction;
- Rapid drawdown; and
- Steady state seepage.

The results of stability analyses gave values of factor of safety for slope stability of at least 1.47 (corresponding to the steady seepage scenario and a tailings elevation of 102.0 m). The analyses were based on a friction angle of 2 degrees for the tailings, 37 degrees for the till, and 50 degrees for the rip-rap, with the value of the seismic coefficient being 0.10.

The selection of a friction angle of 50 degrees for the rip-rap warrants review as does the seismic coefficient of 0.10. This seismic coefficient corresponds to the 1 in 100 year earthquake event which in our opinion does not meet the industry standard for design of tailings impoundment facilities. The 1998 BC Building Code recommends a peak horizontal ground acceleration of 0.349g for the 1 in 475 year event; this event is what applies to structures such as the subject tailings impoundment.

There are no records available of the tailings levels within the impoundment.

Construction Materials

Construction materials comprised sandy till and rip-rap rock. The rip-rap that was used for construction of the downstream zone was borrowed from within the impoundment area. The rip-rap rock material was described as a hard to very hard, competent meta-sedimentary material common to the area. The rip-rap design required a maximum 50 cm diameter rock size.

The till borrow area was located about 1.5 km east of the impoundment. The till was described as a clayey silty gravelly sand with a relative density of dense to very dense. The 1987 Report describes the till material as having a 'higher silt content than optimum'. The till was found to be non-plastic. Results of particle size distribution analyses showed the borrowed till as containing gravel, silt and sand contents of 20%, 37% and 42% respectively. Grain size analysis on an as-placed sample (obtained from the borrow area) was described as a well-graded gravelly silty sand with respective percentages of 34%, 31% and 32%. The hydraulic conductivity of the till was reported as 3.05×10^{-8} m/sec corresponding to an effective confining stress of about 70 kPa.

Embankment Construction

The embankment foundation is reported to comprise bedrock and till (used to infill small irregularities on the rock surface). Bedrock protuberances (in the order of 2 – 3 m in height) were left in place while till infilling was carried out in 20 cm layers which were compacted to approximately 95% of Modified Proctor maximum dry density (MPMDD). Loose lifts of 50 cm were placed for construction of the upstream (till) zone whereas lifts of rip-rap did not exceed 1 metre.

The upstream and downstream slopes had both been designed to 1:1.7 (V:H) and were constructed to 1:2 (V:H) and 1:1.5 (V:H) respectively. The dam crest was designed as 4 m wide and constructed as 6 m wide. The maximum height of the dam was designed and constructed to 9m; refer to Plate 2 dated November 1987 which shows the cross section at station 0+45m.

Subdrain Installation

The subdrain comprised 100 mm ABS plastic pipe. The subdrain was installed through the embankment dam at the point of the deepest section at a gradient of approximately 5%. The upstream end of the subdrain was connected to a feeder pipe of filter-cloth-wrapped, 100-mm perforated 'Big O' pipe installed parallel to the upstream toe of the embankment. The feeder pipe had a total length of approximately 20 metres. Construction details of the downstream end of the subdrain included plugging it with a threaded clean-out cap to facilitate sampling of the impoundment seepage. In addition, there was a pressure gauge installed to monitor the hydrostatic head at the toe of the upstream face of the embankment dam. The subdrain pipe was wrapped around with filter fabric to prevent the migration of fines along the subdrain-soil interface.

Compaction Control

Compaction control during construction of the upstream (till) zone was achieved using a nuclear densometer and a test frequency of about one test per 50 m^3 of placed and compacted till. A review of the results shows that the required 95% MPMDD was generally met.

A method specification was used for compaction control of the downstream (rip-rap) zone.

Spillway Construction

The spillway was constructed after the dam was constructed to its full height. The spillway was blasted into solid rock at the east end of the embankment dam and it provides a conduit for flow from the impoundment at a minimum invert angle of 5%.

Seepage Pond

A seepage ditch was constructed along the downstream toe of the embankment dam which connects into the small holding pond. The seepage pond was excavated into native till with a potential for negligible seepage.

Instrumentation Installation & Monitoring

Two 100-mm ABS standpipe piezometers were installed at the foundation level of the rip-rap zone prior to placement of rip-rap. In addition, a 1-cm diameter steel-cased piezometer was installed into the till for monitoring the phreatic surface within the upstream zone of the dam. Further, three settlement monuments were placed along the upstream crest of the dam. The as-constructed Plan Map of Tailings Dam (Sheet #1 dated November 1987) does not show the locations of the above instrumentation. However, the locations of the instrumentation can be seen on the as-constructed cross section (Plate 2 dated November 1987) as well as on the design drawings (Plate 3 dated June 1987).

Initial settlement data were recorded on December 1, 1987, with readings in the range 103.47 – 103.72 m elevation for the three settlement monuments (west, central and east locations). However, no record is available of the base (initial) readings for the piezometers. Furthermore, there is no record available regarding the results of instrumentation (piezometers and settlement markers) monitoring since the initial

readings were taken. We therefore ask that Beaupre Exploration Ltd search their files to confirm whether any instrumentation readings were taken following installation in 1987.

3.0 DECOMMISSIONING & RECLAMATION PLAN

A concept plan for decommissioning and final reclamation of the tailings pond installation will be provided under separate cover.

4.0 CLOSURE

Based on the above review, it is our conclusion that further work is warranted to evaluate the current stability of the tailings impoundment. The key items that require re-evaluation relate to the strength parameters of the till and rip-rap as well as the seismic coefficient used in the slope stability analysis. Therefore, additional slope stability analysis is recommended using the current (1998) BC Code requirements regarding the magnitude of the seismic coefficient. Further, it is important to review the results of instrumentation monitoring following installation in 1987. At this time only the base (initial) readings of the three settlement markers have been made available to us for review. We would need to review the results of instrumentation monitoring if these were recorded and can be made available to us. Failing the availability of instrumentation monitoring results, we would recommend that a set of readings be taken in order to assist with the above-recommended slope stability analysis. The results of instrumentation monitoring will help explain the nature and cause of cracking that was observed along the dam crest during our April 3, 2003 site reconnaissance.

Depending on the results of the above-recommended instrumentation monitoring review and slope stability analysis, it may become necessary to undertake a field investigation program to assess the cause of the cracks along the dam crest. Such a field investigation program would include a drilling, sampling and monitoring program to establish the existing factor of safety and mode of potential instability of the embankment dam.

We trust that this information is sufficient for your requirements at this time. However, should you have any questions regarding the contents of this report or if require any additional information, please contact the undersigned at your convenience.

Yours truly,

JACQUES WHITFORD ENVIRONMENT LIMITED

Reviewed by:

Mahmoud Mahmoud, PhD, P.Eng.
Associate

Nigel Denby, M.Eng., P.Eng.
Manager, Geotechnical Engineering

MM/ND/adg

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

November 30, 2010 File: 19-5858-0

Mill Bay Ventures Inc.
400 – 455 Granville Street
Vancouver, B.C.
V6C 1T1

Attention: Mr. William Glasier, President

VALENTINE MOUNTAIN PROPERTY
PRELIMINARY GEOTECHNICAL EVALUATION OF TAILINGS DAM

Dear Mr. Glasier:

1. INTRODUCTION

As requested, this letter presents the results of a site inspection of the existing tailings facility located on the Valentine Mountain property north of Sooke, B.C. The scope of work for this assignment was outlined in our proposal letter dated October 27, 2010. Written authorization to proceed with the inspection was received on November 4, 2010.

The scope of work included a site visit by a professional engineer to conduct a visual inspection of the embankment. Following the visit we were to review any background information provided on the facility, including design drawings, construction records, and any pertinent operations/surveillance records. Following this review, Thurber would prepare a brief letter providing preliminary recommendations for additional investigation and/or repairs of the facility, if deemed warranted. The inspection and subsequent report was to focus on the identified embankment slump, and would not constitute a formal dam safety review as defined by the Ministry of Environment.

This letter is subject to the attached Statement of General Conditions.

2. THURBER SITE INSPECTION

Jay McIntyre, P.Eng. of Thurber Engineering Ltd. (Thurber) conducted the site inspection on November 16, 2010 along with yourself and others including Messrs Jacques Houle, Robert Beaupre and Andris Kikauka. The weather was overcast and cool at the time of the inspection, although it had rained the previous day.

The following observations were made during the reconnaissance:

- The reservoir was observed to have approximately 1.1 m of freeboard.
- The spillway (excavated into rock beyond the east abutment) was observed to be flowing. A log and some vegetation was observed in the entrance to the spillway. Vegetation and a length of perforated "Big-O" flexible piping was observed in the spillway channel.
- The crest and side slopes of the embankment are heavily vegetated with fir, alder and Scotch Broom. Trees exceeding 6 m height and butt diameters up to 150 mm were noted. The vegetation greatly impeded the inspection of the facility.
- The dam crest varies in width from approximately 5.5 to 6 m. The downstream slope was estimated at approximately 37° to 40°, with occasional steeper sections approaching 45°.
- The exposed portion of the upstream slope was estimated to have a gradient of approximately 30°.
- A slump was observed at the downstream crest near the east abutment. The scarp starts about 10 m away from the east abutment and extends roughly 17 m to the west. It appears that a vertical displacement of up to 600 mm has occurred, and a crack in the rock fill up to 200 mm wide ? was observed.
- The slope length at the scarp location was measured to be approximately 6 m and this equates to an embankment height of about 4.5 m.
- Near the centre of the embankment, the slope length was measured at 13.8 m and this equates to height of approximately 9 m.
- A former logging road runs along the toe of the embankment. No seepage was observed exiting the downstream face of the dam. Nor was any seepage observed in the ditch between the road and the toe of the embankment.
- An apparent opening in the rip rap was observed at the downstream toe of the dam, and this may be the location of a reported clean-out cap, that connects to a "sub-drain" system. The cap was not visible, but the cavity was stuffed with insulation.

Selected photographs are attached for your reference.

3. DOCUMENT REVIEW

Following the site inspection, the following information was provided by Mr. Houle:

- July 17, 2002 letter from Ministry of Energy and Mines titled: "RE: Proposed Amendment of Permit MX-8-21 – Valentine Mountain, Jordan River Area"
- December 23, 2003 letter report from Jacques Whitford titled: "Initial Geotechnical Assessment; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC"
- January 12, 2004 letter report from Jacques Whitford titled: "Decommissioning and Reclamation Plan; Tailings Pond, Valentine Mine, Valentine Mountain Au Deposit, Sooke, BC"

In addition to the above, several photographs were provided by Mr. Beaupre showing the tailings dam both during construction in 1987 and reportedly in 2004. Several of these images are attached for your reference.

Thurber has contacted the Ministry of Natural Resource Operations (formerly the Ministry of Mines and Petroleum Resources) to inquire about the availability of construction records for the tailings facility. We understand the ministry has a report titled "Tailings Impoundment Construction Report, Valentine Mountain Project" dated 1987. Thurber has not reviewed the above noted report; however, we understand that Jacques Whitford Environment Limited (JWEL) carried out a review of this report as part of their 2003 geotechnical assessment.

The above noted reports by JWEL were apparently prepared in response to the July 2002 letter from MEM. Prior to authorizing the extraction and processing of a 3,000 tonne sample, the letter required that a geotechnical assessment of the tailings impoundment be prepared by a qualified Professional Engineer and submitted for review by the Chief Inspector. The letter also specified that the assessment should include an acceptable plan for decommissioning and final reclamation of the tailings pond.

The report by JWEL provides a summary of information pertaining to the tailings facility including the original field investigation work, the stability analyses / design criteria, construction materials data, embankment construction summary and details regarding installed instrumentation. The letter also provides a summary of observations made during a site reconnaissance on April 3, 2003. During this inspection, a slump/scarp was observed on the downstream face of the dam near the east embankment.

The following pertinent information was obtained from the December 2003 JWEL report:

- The slump on the downstream slope was present during their April 2003 site reconnaissance.
- The dam was constructed between August and November 1987.
- The design called for a minimum of 1.0 m of freeboard.
- For the stability analyses, the value of the seismic coefficient was selected as 0.1g, which would have been consistent with a 1 in 100 year event.
- The embankment is constructed to two materials. A gravelly, silty sand till material was used in the upstream zone and blast rock was used in the downstream zone. These two materials are separated by a geotextile filter.
- The spillway was constructed by blasting a channel in the bedrock beyond the east abutment.
- The embankment foundation was either bedrock or till (used to in-fill local depressions on the rock surface).
- The till-like soils were compacted in lifts to a target density of 95% of

Modified Proctor Maximum Dry Density (MPMDD). JWEL's review of the compaction data indicates the contractor generally achieved this compaction level.

- The upstream and downstream slopes were both designed to be 1.7H to 1V (30.5°). However, the downstream slope was apparently constructed steeper than this.
- The dam crest was designed to be 4 m wide, but was constructed closer to 6 m wide. The maximum embankment height is approximately 9 m.
- A sub-drain system is present within the dam at the deepest section. The upstream portion was reportedly installed parallel to the upstream toe of the embankment and consists of a 100 mm diameter geotextile-wrapped perforated 'Big-O' pipe. This perforated pipe is connected to a solid section of ABS pipe that passes through the embankment and day-lights at the downstream toe. The downstream end is plugged with a threaded clean-out cap to facilitate sampling of seepage water. The sub-drain pipe was wrapped with a geotextile filter fabric with the intention of preventing the migration of fines along the pipe-soil interface.
- Installed instrumentation included two standpipe piezometers at the foundation level of the downstream rip rap zone and a steel-cased piezometer within the embankment at the upstream (till) zone. Three settlement monuments were also installed on the upstream crest of the embankment. Apart from the baseline readings of the settlement monuments, JWEL was unable to find any other monitoring data, including any piezometer data.

The JWEL report recommended that additional work be carried out to evaluate the stability of the tailings impoundment. The report identifies the seismic coefficient assumed by the designer as one of the key reasons for the proposed "re-evaluation". Additionally, the December 2003 report recommends that a review of any monitoring data be carried out. If this data were not available, it was recommended that new sets of data be collected to assist with the recommended stability assessment. The report states that one of the objectives of the assessment would be to try and evaluate the nature and cause of the cracking observed during the April 2003 site reconnaissance.

4. PRELIMINARY ASSESSMENT AND RECOMMENDATIONS

The primary objective of Thurber's current assignment was to make an inspection of the embankment, evaluate the magnitude of the slump observed on the downstream slope and provide preliminary recommendations for additional investigation work and/or repairs to the facility, if deemed appropriate. The following comments and preliminary recommendations are provided.

- The embankment slopes are steeper than would be normally recommended for an facility of this type, and based on the JWEL report they were constructed steeper than the design called for.
- The slump occurred prior to April 2003 near the east abutment where the embankment is not at full height. The triggering mechanism is unclear, although it appears the downstream slope may be slightly steeper in this area than elsewhere on the dam. It is possible the contractor did not achieve the same level of compaction at the edges of the embankment. This would have been the case if rock fill was pushed loosely over the edge of the crest.
- Although impossible to confirm, the slump may possibly have been triggered by ground motions from the Nisqually Earthquake of February 28, 2001. This magnitude 6.8 earthquake, with an epicenter of 120 km southeast of Victoria, was felt in the Victoria area and caused minor damage at some locations.
- The slump appears to be relatively shallow, and likely does not significantly impact the global stability of the embankment at present. However, continued movements could be detrimental to embankment stability and it is anticipated that some modification of the embankment geometry (e.g., flattening of the downstream slope) will be required.
- As noted in the JWEL report, the seismic coefficient used for the original stability analysis for the embankment was 0.1 g and corresponded to the 1 in 100 year at that time. The seismic code has changed several times since the dam was constructed, and the current code would require that the 1 in 2475 year event be used for the analysis. This would correspond to a peak ground acceleration of 0.51g for the subject site. The impacts of the revised seismic loading on the dam stability needs to be evaluated. Therefore, we are in agreement with the JWEL report which recommends an updated slope stability assessment be conducted.
- In order to provide the most accurate indication of the current embankment stability, and to better predict the dam's performance during an earthquake, the phreatic levels within and below the embankment are needed. We therefore recommend that any existing instrumentation data be utilized for the proposed stability assessment. If such data is unavailable, we recommend that new data sets be collected.
- We also recommend that the existing trees and scotch broom be removed from the crest and embankment slopes. The removed vegetation should be placed well away from the embankment. In addition to making it difficult to properly inspect the facility, the tree roots tend to penetrate the embankment, and can ultimately travel through the embankment thus becoming convenient pathways for seepage. Care should be taken when removing the vegetation not to damage any existing standpipes or survey monuments. If the original instruments cannot be located or have been damaged, new instrumentation will likely be required.
- It is noted that the dam utilizes a geosynthetic filter between the upstream till zone and the downstream rock fill zone. Although the appeal of a geosynthetic filter can be understood given the remote location of the facility,

geotextile filters are generally not favoured in dam design, particularly when the geotextile completely replaces the granular filter (i.e., rather than reducing the thickness of the granular filter zone). Additionally, the presence of a seepage collection system that apparently passes through the upstream till zone into the downstream rock fill zone is concerning, as this pipe would be a convenient flow path that could promote internal erosion of the embankment. Given these design features, a monitoring and surveillance schedule should be established and maintained, to ensure the facility continues to perform as expected.

5. FURTHER WORK

We anticipate the following work will be required. We understand the timeline of the tasks will depend somewhat on the development plans for the resource.

- The site is now inaccessible until the spring. As soon as weather permits the embankment should be cleared of vegetation as described above. Vegetation and any logs or debris should also be removed from the spillway entrance and spillway channel.
- Any instrumentation readings collected since construction should be collated and forwarded to the geotechnical consultant for review. New readings may be required depending on the available records. It is anticipated an updated GPS elevation survey of the embankment and monuments will be required.
- A detailed review of the construction report is required. The Ministry of Natural Resource Operations (MNRO) has a copy at their Victoria office. This information would be used to develop typical design sections and estimate the material strength properties for the stability analysis.
- Conduct the stability analysis, focusing on a number of loading cases including seismic loading.
- Develop a decommissioning and reclamation plan as required by MNRO.

The above assumes there is sufficient as-built information and monitoring data to carry out a representative analysis of the embankment. If not, additional data would need to be collected.

If required, we can prepare a proposal and cost estimate to conduct the recommended work.

We trust this inspection report is satisfactory. Please call if you have any questions or wish to discuss this letter.

Yours truly,
Thurber Engineering Ltd.
Stephen Bean, P.Eng.
Review Principal

Jay McIntyre, P.Eng.
Project Engineer

Attachment

THURBER ENGINEERING LTD.

STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over . . . .)

INTERPRETATION OF THE REPORT *(continued . . . .)*

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

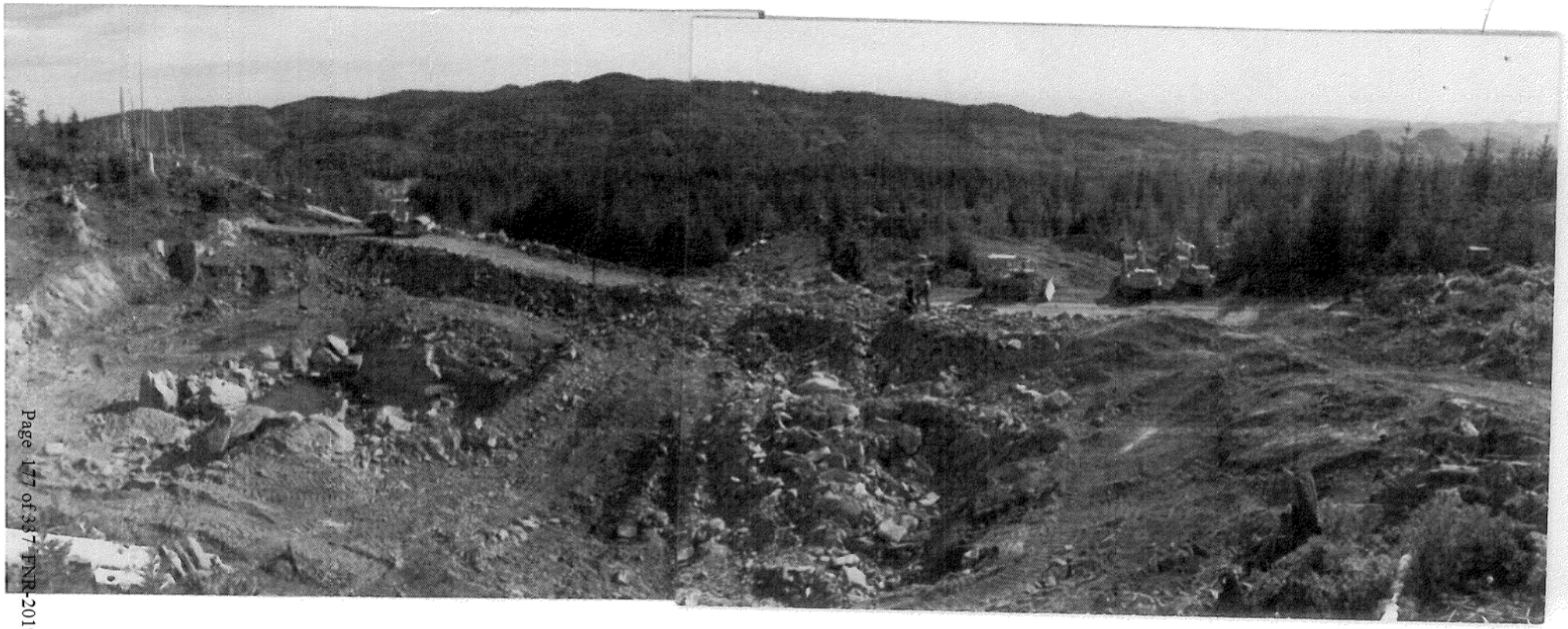
We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

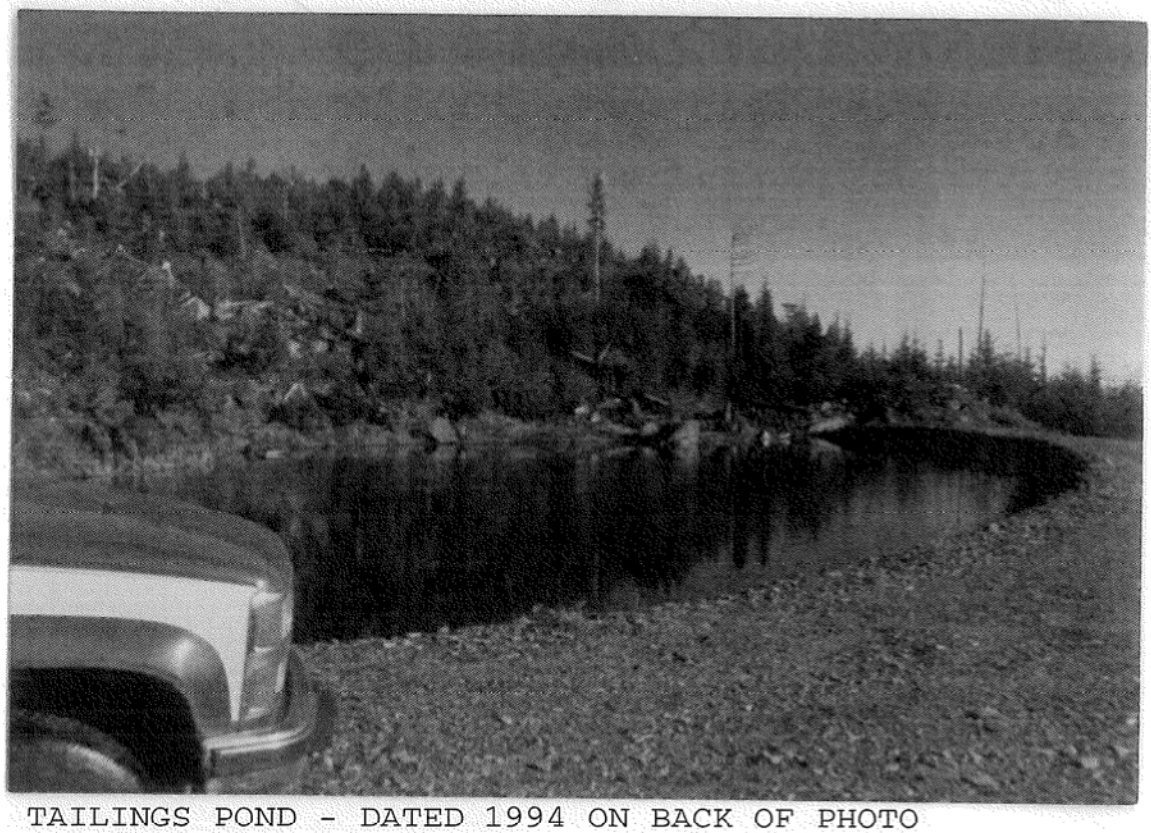
The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

TAILINGS POND CONSTRUCTION - 1987
LOOKING EAST
VALENTINE MOUNTAIN PROPERTY NEAR SOOKE, BC

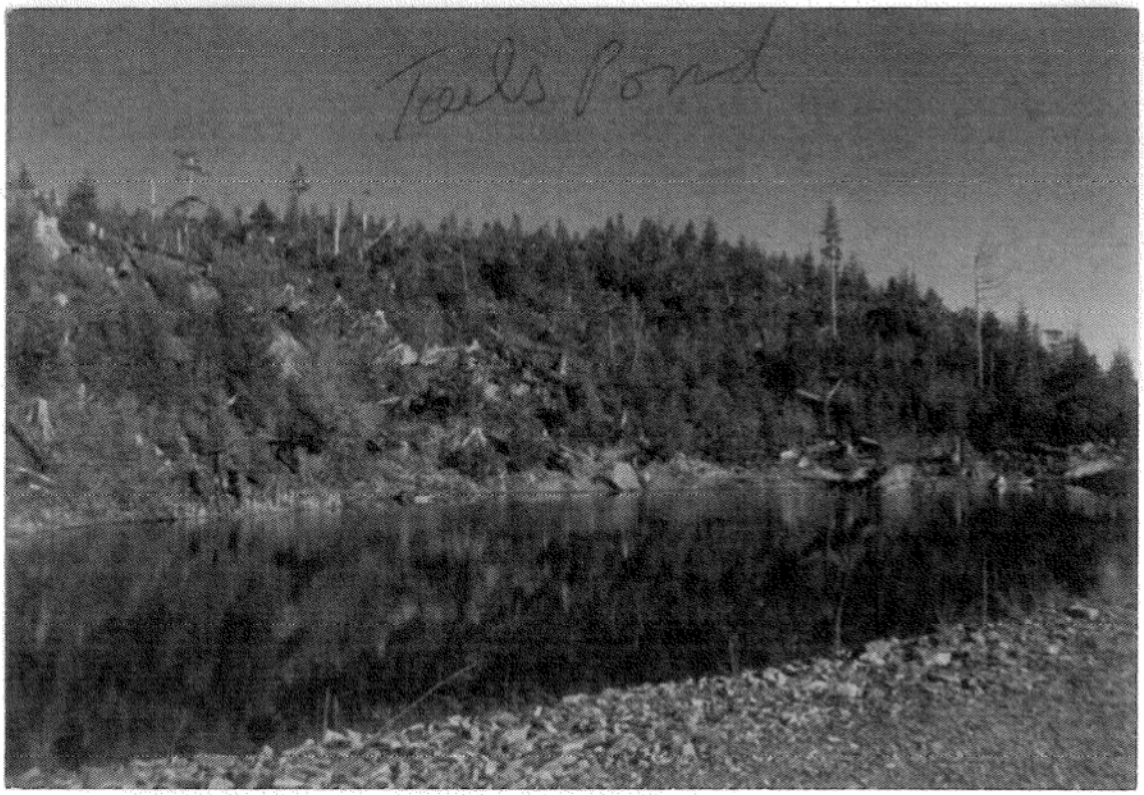
TAILINGS POND CONSTRUCTION - 1987
LOOKING SOUTH
VALENTINE MOUNTAIN PROPERTY - NEAR SOOKE, BC



Page 177 of 337 FNR-2019-96139



TAILINGS POND - DATED 1994 ON BACK OF PHOTO



UNDATED PHOTO OF TAILINGS POND

Photo 1: Looking east at vegetation along crest of dam (Nov. 16, 2010).

Photo 2: Looking west at downstream slope of embankment (Nov. 16, 2010).

Photo 3: Looking northeast at vegetation and flexible pipe at entrance of spillway.

Photo 4: Looking east along downstream crest at failure scarp (Nov. 16, 2010).

Photo 5: Looking up at embankment from toe. Note exposed rock fill that has migrated down slope and collected at base (Nov. 16, 2010).

Photo 6: Apparent opening in rip rap at base of embankment where suspected seepage monitoring port is located (Nov. 16, 2010).

2005 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: J. McIntyre, P.Eng., Thurber Engineering

November 30, 2010

Site Coordinates: 48.5159 North 123.8891 West

User File Reference: Valentine Mountain

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
1.041	0.721	0.358	0.179	0.508

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2005 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.*** Warning: You are in a region which would be affected by the ground motion from a Cascadia subduction event. The interpolator includes consideration of the deterministic ground motions from Cascadia for 0.0021, 0.001 and 0.000404 per annum probabilities, but not for 0.01 per annum.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.263	0.559	0.755
Sa(0.5)	0.175	0.379	0.512
Sa(1.0)	0.085	0.186	0.252
Sa(2.0)	0.040	0.090	0.124
PGA	0.133	0.277	0.370

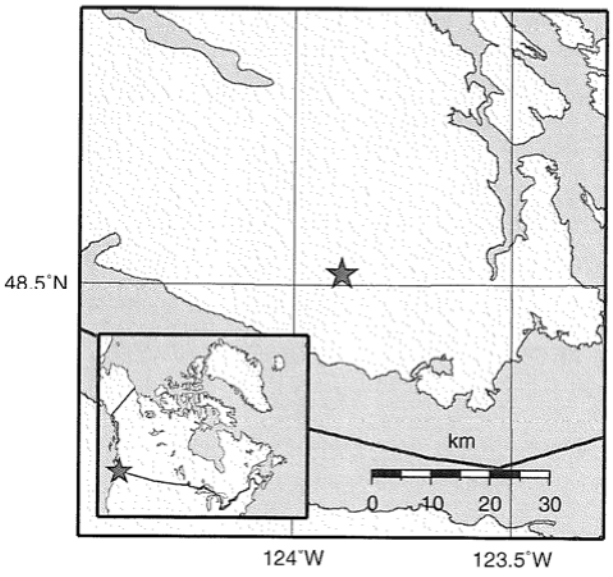
References

National Building Code of Canada 2005 NRCC no. 47666; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2005, Structural Commentaries NRCC no. 48192
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Grid values to be used with the 2005 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information



Aussi disponible en français

Natural Resources Canada | Ressources naturelles Canada

Canada

THURBER

THURBER

Photo 1: Valentine Mountain Tailings Dam from west abutment.

Photo 2: Tailings pond from west abutment.

Photo 3: Tailings dam seen from east end.

Photo 4: Tension crack at downstream side of crest near east abutment.

Photo 5: Entrance to bedrock spillway prior to vegetation removal.

Photo 6: Spillway channel (Nov. 16, 2010).

Photo 7: Looking north at dam from downstream toe near Sta. 0+30.

Photo 8: Looking northeast at dam from downstream toe. Dam is at full height in this area.

Photo 9: Looking west along downstream toe near Sta. 0+50. No seepage observed.

Photo 10: Looking east along downstream toe near Sta. 0+50. No seepage observed.

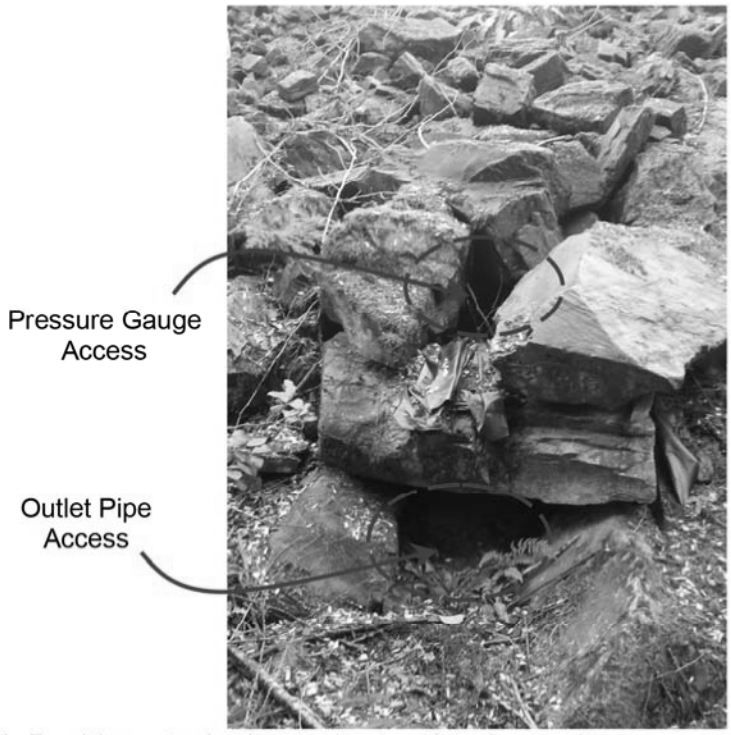


Photo 11: Boulders stacked to protect outlet pipe and pressure gauge (October 24, 2014).

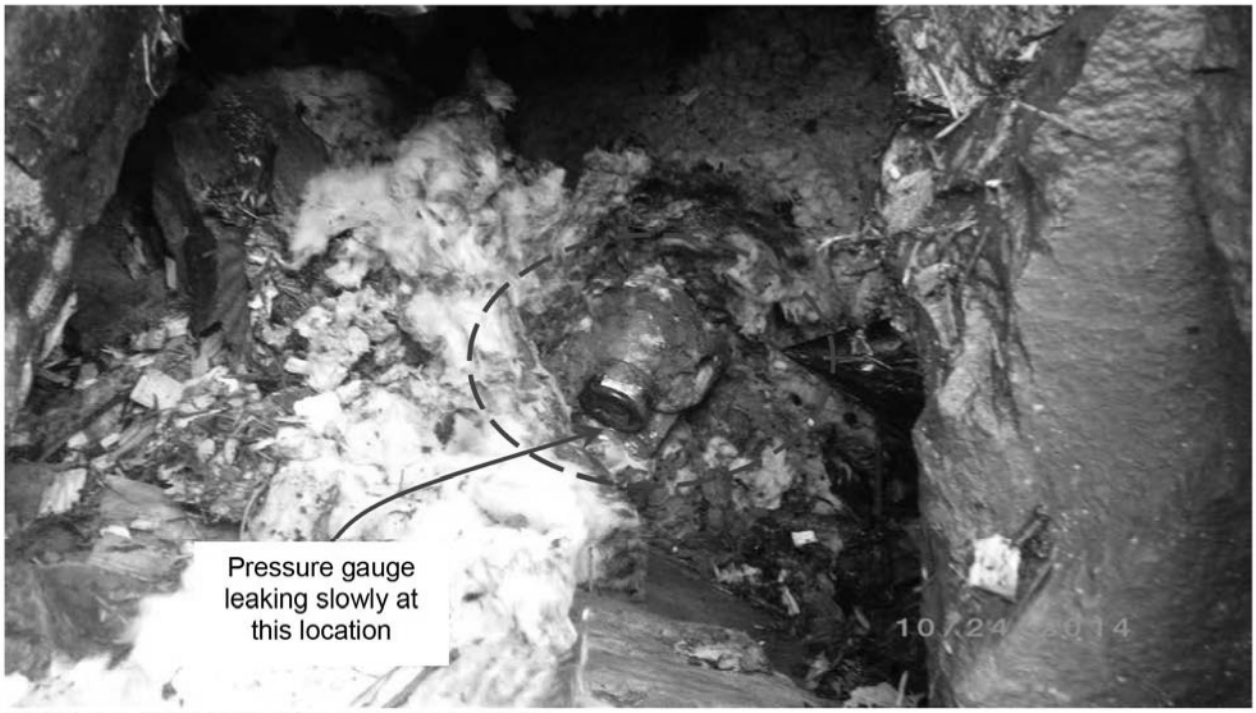


Photo 12: Photo showing pressure gauge.

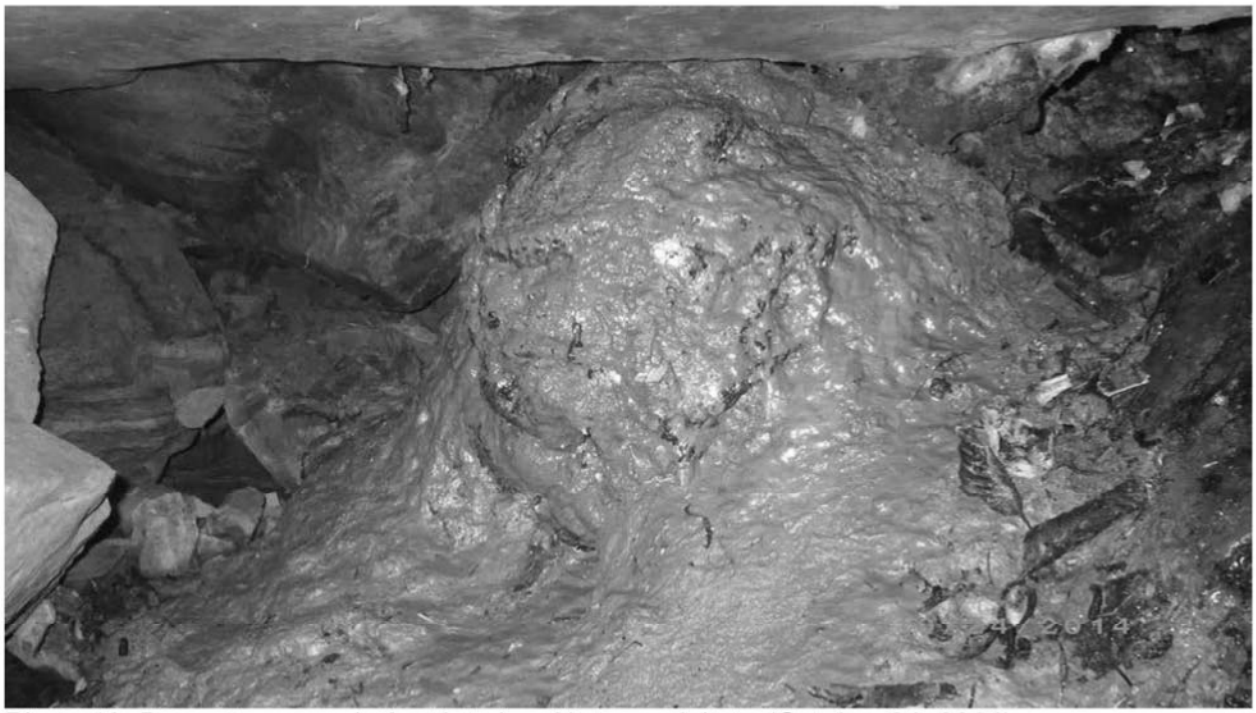


Photo 13: Downstream end of outlet pipe. Note precipitate (October 24, 2014).

Photo 14: Photo of pipe outlet during 2010 inspection (November 16, 2010).

Photo 15: Localized wet spot in front of outlet pipe access location (October 24, 2014).

THURBER

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: Jay McIntyre, P.Eng., Thurber Engineering Ltd. November 28, 2014

Site Coordinates: 48.5158 North 123.8894 West

User File Reference: Valentine Mountain Mine

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
1.041	0.721	0.358	0.179	0.508

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.*** Warning: You are in a region which considers the hazard from a deterministic Cascadia subduction event for the National Building Code. Values determined for high probabilities (0.01 per annum) in this region do not consider the hazard from this type of earthquake.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.263	0.559	0.755
Sa(0.5)	0.175	0.379	0.512
Sa(1.0)	0.085	0.186	0.252
Sa(2.0)	0.040	0.090	0.124
PGA	0.133	0.277	0.370

References

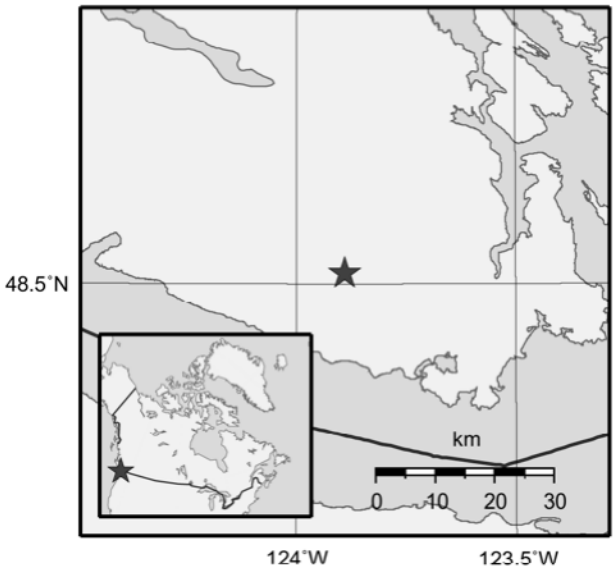
National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

Aussi disponible en français



TAILINGS POND CONSTRUCTION - FALL 1987
VALENTINE MOUNTAIN PROPERTY - NEAR SOOKE, BC

TAILINGS POND CONSTRUCTION - FALL 1987
VALENTINE MOUNTAIN PROPERTY NEAR SOOKE, BC

From: Glen Wallace
To: Johnson, David A FLNR:EX
Cc: Kevin Whelan
Subject: RE: Valentine Mountain Mine, water licence
Date: November 27, 2017 9:28:34 PM

Thank you for letting us know, Dave. Please send the notice of application to me by e-mail. If you need to deliver a hard copy, kindly send it to my attention at:

Great Thunder Gold Corp.
c/o Compliance Solutions Inc.
1300 Saltspring Place
Parksville, BC, V9P 2X6
Telephone: (250) 586-9299
Fax: (250) 590-1167

If TimberWest's intentions with respect to the dam and reservoir are not stated in the notice, would you kindly shed some light on what their plans are?

Regards.

Glen Wallace
Chief Financial Officer
Great Thunder Gold Corp.

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: November 27, 2017 3:12 PM
To: 'glen@wallace.pro' <glen@wallace.pro>; s.22
Subject: Valentine Mountain Mine, water licence

Hello Glen, Kevin;

I am writing with regard to a water licence that permits the dam/reservoir at the Valentine Mountain Property.

We have received an application to abandon that water licence from the licensee (TImberWest).

I am looking for the appropriate party with Great Thunder Gold Corp. to serve notice of the application.

Don't hesitate to call at the number below for more information.

Thank you very much, Dave

Dave Johnson

Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From:	Johnson, David A FLNR:EX
To:	Bracher, Grant FLNR:EX
Subject:	Referral Ecosystems, Water Licence File 1001142
Date:	November 29, 2017 2:19:00 PM
Attachments:	!C072277 Licence Plan 1001142.tiff !C072277 Licence 1001142.tiff 2017-11-21 App Aban 1001142.pdf Valentine Brook Dam.kmz

Hello Grant;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

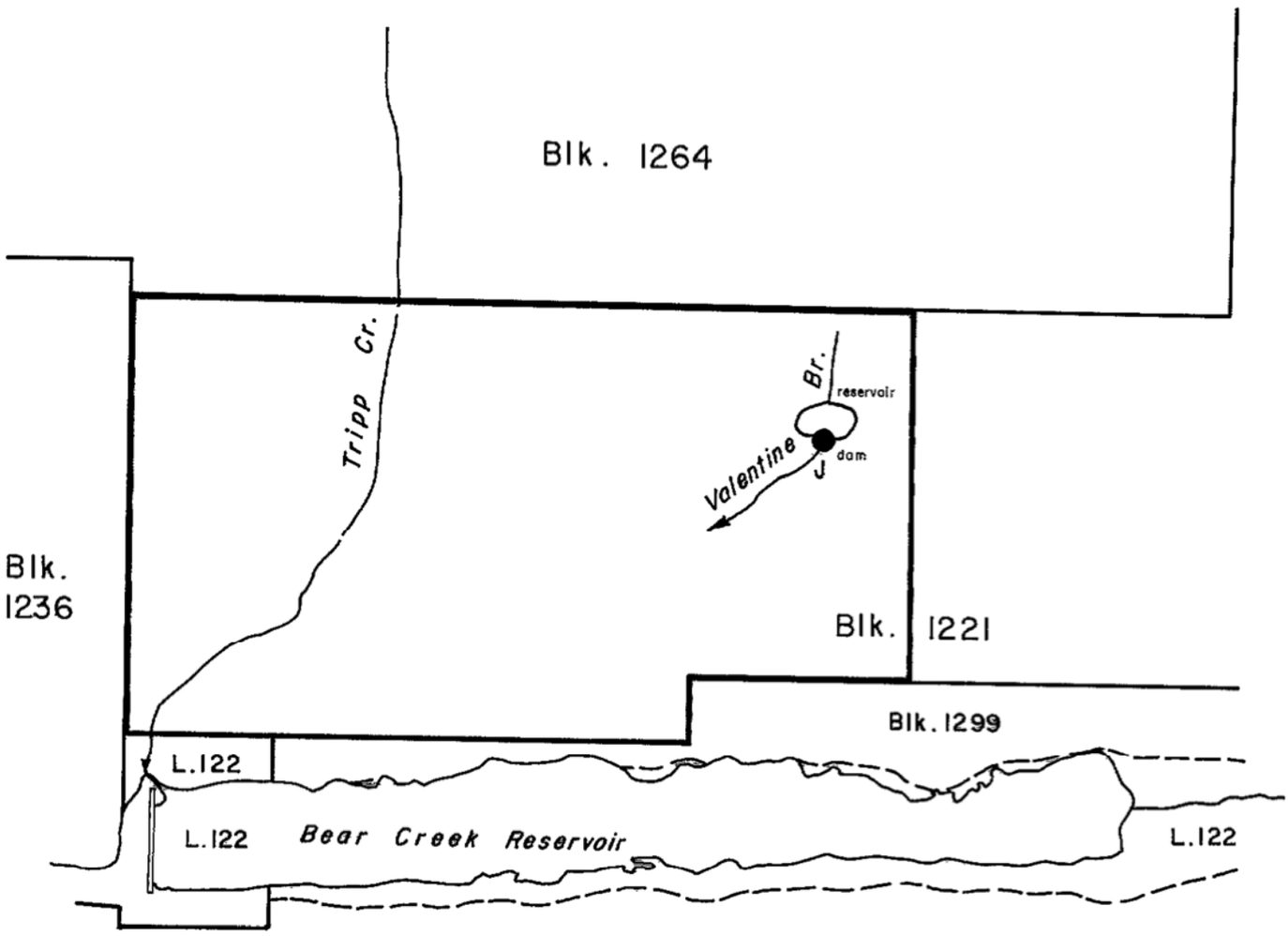
My understanding is that it will be a condition of the abandonment that the dam be decommissioned or otherwise addressed. Referrals have also gone out to Mines (Jim Dunkley) and Dam Safety (John Baldwin).

Please return comments to me via email within 30 days from this email, making them due December 29, 2017.

Don't hesitate to contact me with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

Province of British Columbia



WATER DISTRICT : VICTORIA
PRECINCT : VICTORIA
LAND DISTRICT : MALAHAT

LEGEND

Scale : 1:20,000
Point of Diversion : ●
Map Number : WR 92 B/12 (d)

Signature

Date December 14, 1990

C.L. 72277
File 1001142

The boundaries of the land to which this licence is appurtenant are shown thus: ———

WATER MANAGEMENT BRANCH

MINISTRY OF ENVIRONMENT

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Canadian Pacific Forest Products Ltd., Tahsis Pacific Region, Eastern Woodlands of P.O. Box 910, Sooke, B.C., V0S 1N0

is hereby authorized to divert, use, and store water as follows:

(a) The source of the water-supply is Valentine Brook and storage is in a reservoir.

(b) The point of diversion and storage structure are located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 10th October, 1989.

(d) The purposes for which the water is to be used are storage and industrial (fire protection).

(e) The maximum quantity of water which may be held in storage is 5.5 acre foot per annum and the maximum quantity of water which may be diverted from storage for industrial (fire protection) purpose is 5.5 acre foot per annum.

(f) The period of the year during which the water may be held in storage is the whole year and the period of the year during which the water may be used for industrial (fire protection) purpose is the whole year.

(g) The land upon which the water is to be used and to which this licence is appurtenant is Westerly 120 Chains of Block 1221, Malahat District.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

(i) The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act.

(j) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular, beneficial use of water in the manner authorized herein.

B. Hollingshead
Regional Water Manager

File: 1001142 November 5, 1990 Conditional Licence: 72277

Water Licence Amendment/Abandonment

Abandonment

Tracking Number: 100228238

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name:	TimberWest Forest Corp.
Doing Business As:	
Phone:	250-619-7655
Fax:	250-716-3782
Email:	
BC Incorporation Number:	
Extra Provincial Inc. No:	Nanaimo
Society Number:	
GST Registration Number:	
Contact Name:	Jason Carvalho
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

EMPLOYEE INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name:	TimberWest Forest Corp
Doing Business As:	
Phone:	250-716-3722
Fax:	250-716-3782
Email:	laud@timberwest.com
BC Incorporation Number:	
Extra Provincial Inc. No:	NANAIMO
Society Number:	
GST Registration Number:	87154 6842 RT0001
Contact Name:	Dianna Lau
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:	jason.carvalho@couverdon.com
Contact Name:	Jason Carvalho

TECHNICAL INFORMATION

WATER LICENCE

Please enter your water licence number to start your application. Click 'Verify' to check the number you have entered.

Licence Number:	C072277
Name of Source:	Valentine Brook

LICENCE HOLDER

Name	Billing Address
Timberwest Forest Corp	3 FLR-856 Homer Street, Vancouver BC V6B 2W5

LAND WHERE THE WATER IS USED

WESTERLY 120 CH OF BLK 1221 MALAHAT DIST

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

TYPE OF AMENDMENT

If you select Yes for one of the following options then you will not be able to select any other options.

Abandonment

This option allows you to request the abandonment of all or part of a water licence. There is no fee to abandon all or part of the licence.

Do you want to abandon your water rights?	Yes
Do you want to abandon all or just part of the water licence?	All
Please tell us why you would like to abandon your licence?	Water never used
Please describe what you would like to change and why:	Conditional Water Licence C072277 was issued to Pacific Forest Products on October 10th, 1989 for the purposes of Storage and Industrial Fire Protection. Water held under the licence was never used.

ABANDONMENT

This application allows you to request the abandonment of all or part of a water licence.

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

MORTGAGE SECURITY

Was a mortgage filed with the Comptroller of Water Rights or Regional Water Manager with respect to the land, mine or undertaking to which the licence is appurtenant?	No

PENDING SALES OR PURCHASE AGREEMENT

Is there a pending sales or purchase agreement for the appurtenant land, mine or undertaking?	No

WORKS

If you are abandoning all or part of the rights it is your responsibility to decommission the works associated with the water licence. If decommissioning of the works will require changes to the stream (e.g. dam and pond removal), you may require authorization under the Water Sustainability Act and/or other legislation before proceeding. We may provide related directions after reviewing your plan. Please list any works that are associated with the water licence, their status in the second column, and what you intend to do with them in the comment field.

EXISTING WORKS

Works	Status	Intention
Dam	Fully Constructed	

Comments: Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

Please describe what you want to do with the remaining works:

Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

ATTACHED DOCUMENTS

Document Type	Description	Filename
Other	Tailings Impoundment Construction report confirming when the Dam was constructed by Valentine Mountain Gold Corp.	Tailings Impoundment Constr...

PRIVACY DECLARATION

PRIVACY NOTE FOR THE COLLECTION, USE AND DISCLOSURE OF PERSONAL INFORMATION

Personal information is collected by FrontCounter BC under the legal authority of section 26 (c) and 27 (1)(a)(i) of the Freedom of Information and Protection of Privacy Act (the Act).

The collection, use, and disclosure of personal information is subject to the provisions of the Act. The personal information collected by FrontCounter BC will be used to process your inquiry or application(s). It may also be shared when strictly necessary with partner agencies that are also subject to the provisions of the Act. The personal information supplied in the application package may be used for referrals or notifications as required. Personal information may be used by FrontCounter BC for survey purposes.For more information regarding the collection, use, and/or disclosure of your personal information by FrontCounter BC, please contact FrontCounter BC at 1-877-855-3222 or at:

FrontCounter BC Program Director
FrontCounter BC, Provincial Operation
441 Columbia Street
Kamloops, BC V2C 2T3

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the "Important Notices" below and then check the declaration at the bottom confirming that everything in this application is complete and accurate.

- The application may be subject to further requirements under the federal Fisheries Act. Please refer to Fisheries and Oceans Canada's "Projects Near Water" webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) for information on how to ensure your project complies with the Fisheries Act.
- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

☑ By submitting this application form, I declare that the information contained on this form is complete and accurate.

OFFICE

Office to submit application to: Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC? No

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Nanaimo	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Attachment Valentine Brook Dam.kmz (736 Bytes) cannot be converted to PDF format.

From:	Johnson, David A FLNR:EX
To:	Baldwin, John FLNR:EX
Subject:	Referral Dam Safety, Water Licence File 1001142
Date:	November 29, 2017 2:19:00 PM
Attachments:	!C072277 Licence Plan 1001142.tiff !C072277 Licence 1001142.tiff 2017-11-21 App Aban 1001142.pdf Valentine Brook Dam.kmz

Hello John;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

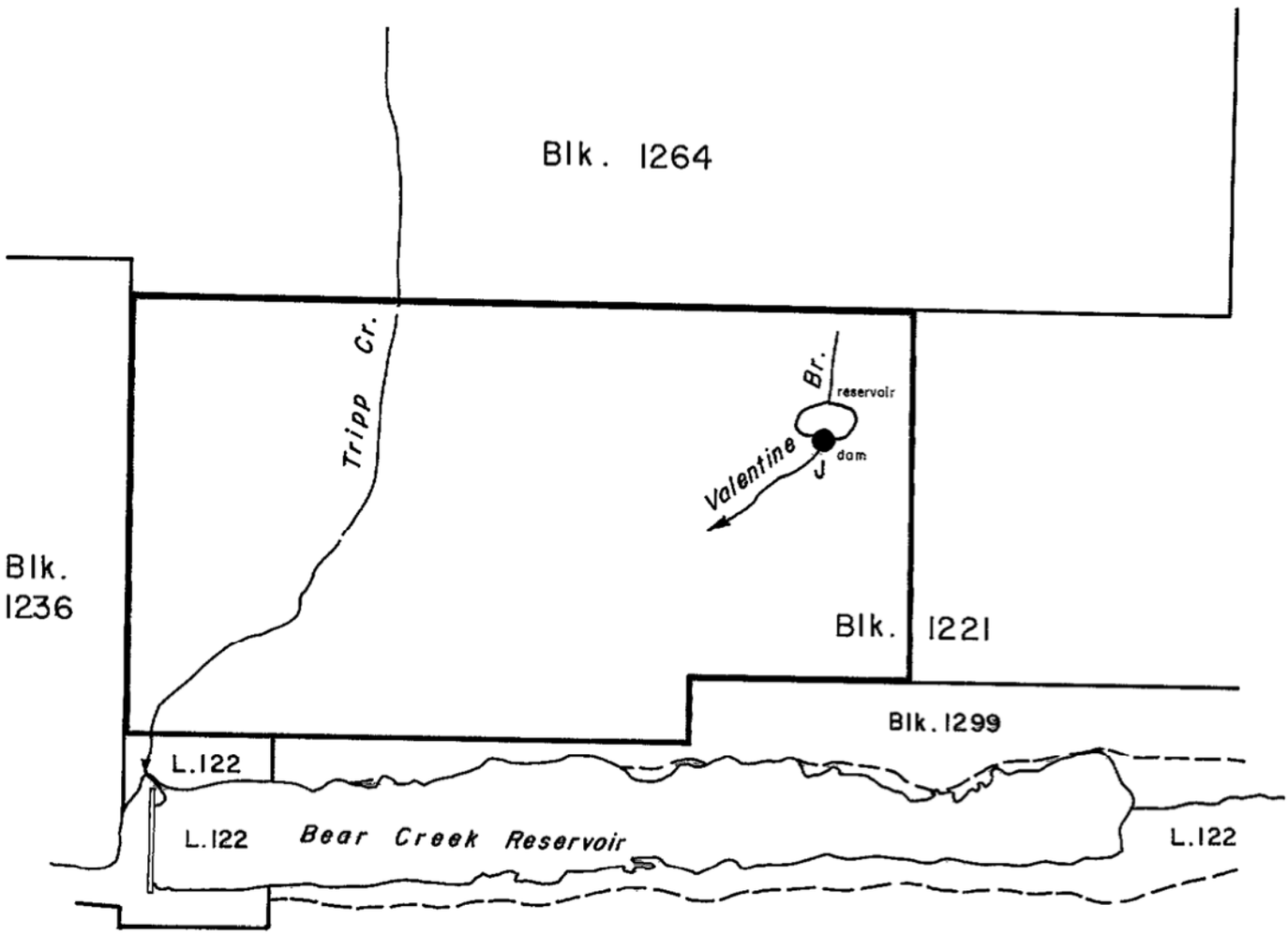
My understanding is that it will be a condition of the abandonment that the dam be decommissioned or otherwise addressed. Referrals have also gone out to Mines and Grant Bracher, Ecosystems.

Please return comments to me via email within 30 days from this email, making them due December 29, 2017.

Don't hesitate to contact me with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

Province of British Columbia



WATER DISTRICT : VICTORIA
PRECINCT : VICTORIA
LAND DISTRICT : MALAHAT

LEGEND

Scale : 1:20,000
Point of Diversion : ●
Map Number : WR 92 B/12 (d)

Signature

Date December 14, 1990

C.L. 72277
File 1001142

The boundaries of the land to which this licence is appurtenant are shown thus: ———

WATER MANAGEMENT BRANCH

MINISTRY OF ENVIRONMENT

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Canadian Pacific Forest Products Ltd., Tahsis Pacific Region, Eastern Woodlands of P.O. Box 910, Sooke, B.C., V0S 1N0

is hereby authorized to divert, use, and store water as follows:

(a) The source of the water-supply is Valentine Brook and storage is in a reservoir.

(b) The point of diversion and storage structure are located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 10th October, 1989.

(d) The purposes for which the water is to be used are storage and industrial (fire protection).

(e) The maximum quantity of water which may be held in storage is 5.5 acre foot per annum and the maximum quantity of water which may be diverted from storage for industrial (fire protection) purpose is 5.5 acre foot per annum.

(f) The period of the year during which the water may be held in storage is the whole year and the period of the year during which the water may be used for industrial (fire protection) purpose is the whole year.

(g) The land upon which the water is to be used and to which this licence is appurtenant is Westerly 120 Chains of Block 1221, Malahat District.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

(i) The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act.

(j) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular, beneficial use of water in the manner authorized herein.

B. Hollingshead
Regional Water Manager

File: 1001142 November 5, 1990 Conditional Licence: 72277

Water Licence Amendment/Abandonment

Abandonment

Tracking Number: 100228238

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name:	TimberWest Forest Corp.
Doing Business As:	
Phone:	250-619-7655
Fax:	250-716-3782
Email:	
BC Incorporation Number:	
Extra Provincial Inc. No:	Nanaimo
Society Number:	
GST Registration Number:	
Contact Name:	Jason Carvalho
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

EMPLOYEE INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name:	TimberWest Forest Corp
Doing Business As:	
Phone:	250-716-3722
Fax:	250-716-3782
Email:	laud@timberwest.com
BC Incorporation Number:	
Extra Provincial Inc. No:	NANAIMO
Society Number:	
GST Registration Number:	87154 6842 RT0001
Contact Name:	Dianna Lau
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:	jason.carvalho@couverdon.com
Contact Name:	Jason Carvalho

TECHNICAL INFORMATION

WATER LICENCE

Please enter your water licence number to start your application. Click 'Verify' to check the number you have entered.

Licence Number:	C072277
Name of Source:	Valentine Brook

LICENCE HOLDER

Name	Billing Address
Timberwest Forest Corp	3 FLR-856 Homer Street, Vancouver BC V6B 2W5

LAND WHERE THE WATER IS USED

WESTERLY 120 CH OF BLK 1221 MALAHAT DIST

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

TYPE OF AMENDMENT

If you select Yes for one of the following options then you will not be able to select any other options.

Abandonment

This option allows you to request the abandonment of all or part of a water licence. There is no fee to abandon all or part of the licence.

Do you want to abandon your water rights?	Yes
Do you want to abandon all or just part of the water licence?	All
Please tell us why you would like to abandon your licence?	Water never used
Please describe what you would like to change and why:	Conditional Water Licence C072277 was issued to Pacific Forest Products on October 10th, 1989 for the purposes of Storage and Industrial Fire Protection. Water held under the licence was never used.

ABANDONMENT

This application allows you to request the abandonment of all or part of a water licence.

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

MORTGAGE SECURITY

Was a mortgage filed with the Comptroller of Water Rights or Regional Water Manager with respect to the land, mine or undertaking to which the licence is appurtenant?	No

PENDING SALES OR PURCHASE AGREEMENT

Is there a pending sales or purchase agreement for the appurtenant land, mine or undertaking?	No

WORKS

If you are abandoning all or part of the rights it is your responsibility to decommission the works associated with the water licence. If decommissioning of the works will require changes to the stream (e.g. dam and pond removal), you may require authorization under the Water Sustainability Act and/or other legislation before proceeding. We may provide related directions after reviewing your plan. Please list any works that are associated with the water licence, their status in the second column, and what you intend to do with them in the comment field.

EXISTING WORKS

Works	Status	Intention
Dam	Fully Constructed	

Comments: Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

Please describe what you want to do with the remaining works:

Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

ATTACHED DOCUMENTS

Document Type	Description	Filename
Other	Tailings Impoundment Construction report confirming when the Dam was constructed by Valentine Mountain Gold Corp.	Tailings Impoundment Constr...

PRIVACY DECLARATION

PRIVACY NOTE FOR THE COLLECTION, USE AND DISCLOSURE OF PERSONAL INFORMATION

Personal information is collected by FrontCounter BC under the legal authority of section 26 (c) and 27 (1)(a)(i) of the Freedom of Information and Protection of Privacy Act (the Act).

The collection, use, and disclosure of personal information is subject to the provisions of the Act. The personal information collected by FrontCounter BC will be used to process your inquiry or application(s). It may also be shared when strictly necessary with partner agencies that are also subject to the provisions of the Act. The personal information supplied in the application package may be used for referrals or notifications as required. Personal information may be used by FrontCounter BC for survey purposes.For more information regarding the collection, use, and/or disclosure of your personal information by FrontCounter BC, please contact FrontCounter BC at 1-877-855-3222 or at:

FrontCounter BC Program Director
FrontCounter BC, Provincial Operation
441 Columbia Street
Kamloops, BC V2C 2T3

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the "Important Notices" below and then check the declaration at the bottom confirming that everything in this application is complete and accurate.

- The application may be subject to further requirements under the federal Fisheries Act. Please refer to Fisheries and Oceans Canada's "Projects Near Water" webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) for information on how to ensure your project complies with the Fisheries Act.
- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

☑ By submitting this application form, I declare that the information contained on this form is complete and accurate.

OFFICE

Office to submit application to: Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC? No

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Nanaimo	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Attachment Valentine Brook Dam_1.kmz (736 Bytes) cannot be converted to PDF format.

From:	Johnson, David A FLNR:EX
To:	Narynski, Heather M EMPR:EX; Dunkley, Jim R EMPR:EX
Subject:	Referral Mines, Water Licence File 1001142
Date:	November 29, 2017 2:20:00 PM
Attachments:	!C072277 Licence 1001142.tiff !C072277 Licence Plan 1001142.tiff 2017-11-21 App Aban 1001142.pdf Valentine Brook Dam.kmz

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Hello Jim, Heather;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

It will be a condition of the abandonment that the dam be decommissioned or otherwise addressed.

Our water licence file only goes back to 1989, which is after the dam was constructed. We do not have a water license that precedes the current one. I am interested in any information you may have on this mine, including:

If there is a requirement under the current mine tenure for the mining company to maintain the tailings pond? Or to remediate?

Does Mines have any information on the original permission from mines to build the dam and reservoir?

Does Mines object to the decommissioning of the dam?

Please return comments to me via email within 30 days from this email, making them due **December 29, 2017**.

Don't hesitate to contact me via phone or email with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development

West Coast Region
250-751-7074

WATER MANAGEMENT BRANCH

MINISTRY OF ENVIRONMENT

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Canadian Pacific Forest Products Ltd., Tahsis Pacific Region, Eastern Woodlands of P.O. Box 910, Sooke, B.C., V0S 1N0

is hereby authorized to divert, use, and store water as follows:

(a) The source of the water-supply is Valentine Brook and storage is in a reservoir.

(b) The point of diversion and storage structure are located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 10th October, 1989.

(d) The purposes for which the water is to be used are storage and industrial (fire protection).

(e) The maximum quantity of water which may be held in storage is 5.5 acre foot per annum and the maximum quantity of water which may be diverted from storage for industrial (fire protection) purpose is 5.5 acre foot per annum.

(f) The period of the year during which the water may be held in storage is the whole year and the period of the year during which the water may be used for industrial (fire protection) purpose is the whole year.

(g) The land upon which the water is to be used and to which this licence is appurtenant is Westerly 120 Chains of Block 1221, Malahat District.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

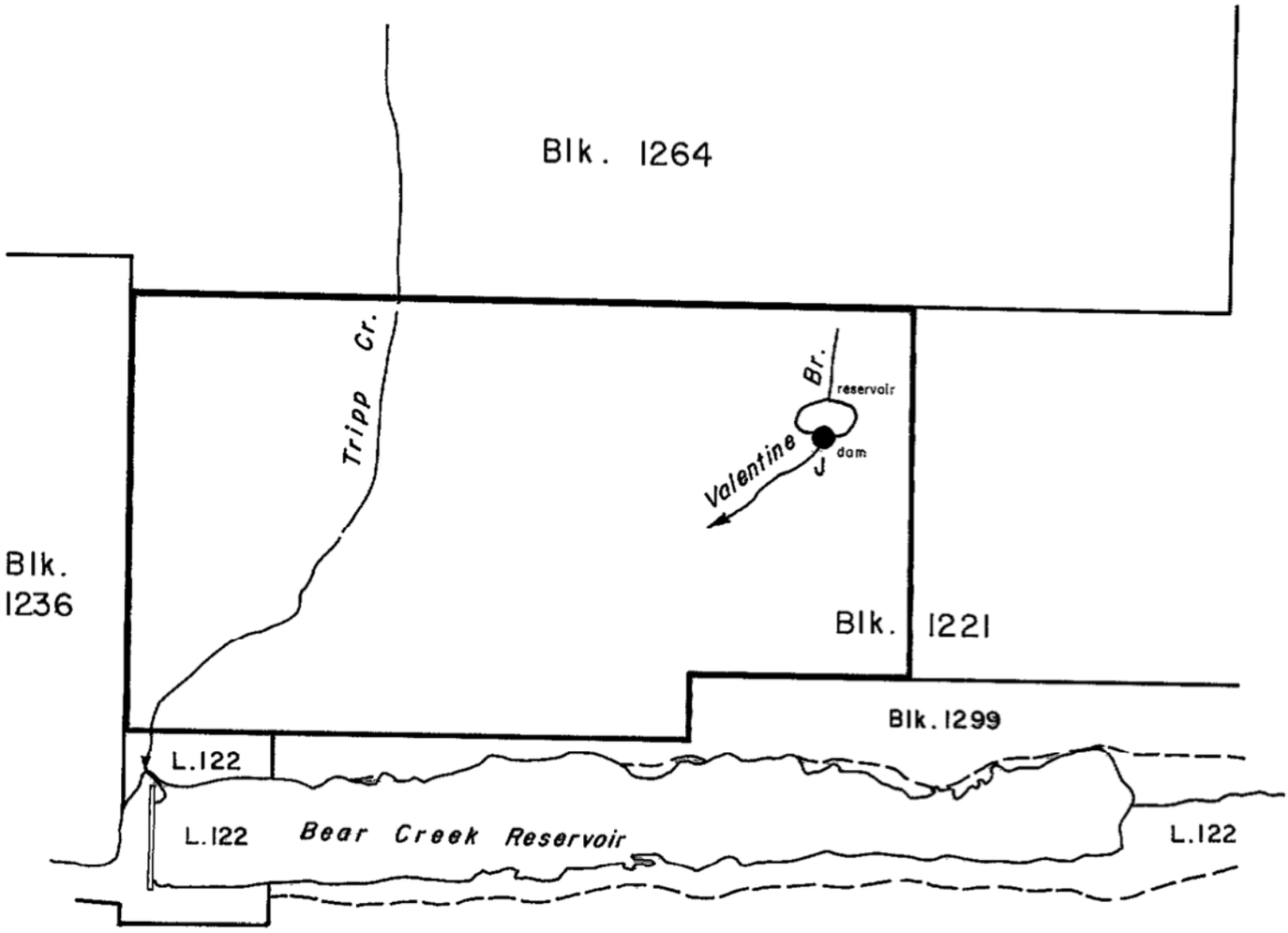
(i) The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act.

(j) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular, beneficial use of water in the manner authorized herein.

B. Hollingshead
Regional Water Manager

File: 1001142 November 5, 1990 Conditional Licence: 72277

Province of British Columbia



WATER DISTRICT : VICTORIA
PRECINCT : VICTORIA
LAND DISTRICT : MALAHAT

LEGEND

Scale : 1:20,000
Point of Diversion : ●
Map Number : WR 92 B/12 (d)

Signature

Date December 14, 1990

C.L. 72277
File 1001142

The boundaries of the land to which this licence is appurtenant are shown thus: ———

Water Licence Amendment/Abandonment

Abandonment

Tracking Number: 100228238

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name:	TimberWest Forest Corp.
Doing Business As:	
Phone:	250-619-7655
Fax:	250-716-3782
Email:	
BC Incorporation Number:	
Extra Provincial Inc. No:	Nanaimo
Society Number:	
GST Registration Number:	
Contact Name:	Jason Carvalho
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

EMPLOYEE INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name:	TimberWest Forest Corp
Doing Business As:	
Phone:	250-716-3722
Fax:	250-716-3782
Email:	laud@timberwest.com
BC Incorporation Number:	
Extra Provincial Inc. No:	NANAIMO
Society Number:	
GST Registration Number:	87154 6842 RT0001
Contact Name:	Dianna Lau
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:	jason.carvalho@couverdon.com
Contact Name:	Jason Carvalho

TECHNICAL INFORMATION

WATER LICENCE

Please enter your water licence number to start your application. Click 'Verify' to check the number you have entered.

Licence Number:	C072277
Name of Source:	Valentine Brook

LICENCE HOLDER

Name	Billing Address
Timberwest Forest Corp	3 FLR-856 Homer Street, Vancouver BC V6B 2W5

LAND WHERE THE WATER IS USED

WESTERLY 120 CH OF BLK 1221 MALAHAT DIST

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

TYPE OF AMENDMENT

If you select Yes for one of the following options then you will not be able to select any other options.

Abandonment

This option allows you to request the abandonment of all or part of a water licence. There is no fee to abandon all or part of the licence.

Do you want to abandon your water rights?	Yes
Do you want to abandon all or just part of the water licence?	All
Please tell us why you would like to abandon your licence?	Water never used
Please describe what you would like to change and why:	Conditional Water Licence C072277 was issued to Pacific Forest Products on October 10th, 1989 for the purposes of Storage and Industrial Fire Protection. Water held under the licence was never used.

ABANDONMENT

This application allows you to request the abandonment of all or part of a water licence.

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

MORTGAGE SECURITY

Was a mortgage filed with the Comptroller of Water Rights or Regional Water Manager with respect to the land, mine or undertaking to which the licence is appurtenant?	No

PENDING SALES OR PURCHASE AGREEMENT

Is there a pending sales or purchase agreement for the appurtenant land, mine or undertaking?	No

WORKS

If you are abandoning all or part of the rights it is your responsibility to decommission the works associated with the water licence. If decommissioning of the works will require changes to the stream (e.g. dam and pond removal), you may require authorization under the Water Sustainability Act and/or other legislation before proceeding. We may provide related directions after reviewing your plan. Please list any works that are associated with the water licence, their status in the second column, and what you intend to do with them in the comment field.

EXISTING WORKS

Works	Status	Intention
Dam	Fully Constructed	

Comments: Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

Please describe what you want to do with the remaining works:

Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

ATTACHED DOCUMENTS

Document Type	Description	Filename
Other	Tailings Impoundment Construction report confirming when the Dam was constructed by Valentine Mountain Gold Corp.	Tailings Impoundment Constr...

PRIVACY DECLARATION

PRIVACY NOTE FOR THE COLLECTION, USE AND DISCLOSURE OF PERSONAL INFORMATION

Personal information is collected by FrontCounter BC under the legal authority of section 26 (c) and 27 (1)(a)(i) of the Freedom of Information and Protection of Privacy Act (the Act).

The collection, use, and disclosure of personal information is subject to the provisions of the Act. The personal information collected by FrontCounter BC will be used to process your inquiry or application(s). It may also be shared when strictly necessary with partner agencies that are also subject to the provisions of the Act. The personal information supplied in the application package may be used for referrals or notifications as required. Personal information may be used by FrontCounter BC for survey purposes.For more information regarding the collection, use, and/or disclosure of your personal information by FrontCounter BC, please contact FrontCounter BC at 1-877-855-3222 or at:

FrontCounter BC Program Director
FrontCounter BC, Provincial Operation
441 Columbia Street
Kamloops, BC V2C 2T3

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the "Important Notices" below and then check the declaration at the bottom confirming that everything in this application is complete and accurate.

- The application may be subject to further requirements under the federal Fisheries Act. Please refer to Fisheries and Oceans Canada's "Projects Near Water" webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) for information on how to ensure your project complies with the Fisheries Act.
- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

☑ By submitting this application form, I declare that the information contained on this form is complete and accurate.

OFFICE

Office to submit application to: Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC? No

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Nanaimo	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Attachment Valentine Brook Dam_2.kmz (736 Bytes) cannot be converted to PDF format.

From:	Johnson, David A FLNR:EX
To:	"Glen Wallace"; "Kevin Whelan"
Subject:	RE: Valentine Mountain Mine, water licence
Date:	November 29, 2017 2:57:00 PM
Attachments:	!C072277 Licence 1001142.tiff !C072277 Licence Plan 1001142.tiff 2017-11-21 App Aban 1001142.pdf Valentine Brook Dam.kmz

Hi Glen, Kevin;

Please respond to this email to confirm receipt ASAP. If I have receipt confirmed I do not need to send a hardcopy.

You are receiving this email as Notice under Section 13, *Water Sustainability Act*, of an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file (Google Earth).

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

It will be a condition of the abandonment that the dam be decommissioned or otherwise addressed.

Our water licence file only goes back to 1989, which is after the dam was constructed. We do not have a water license that precedes the current one. I am interested in any information you may have on this dam, including:

If there is a requirement under your current mine tenure for the mining company to maintain the tailings pond? Or to remediate the site?

Do you have any documentation of the original permission from Mines to build the dam and reservoir?

Does Great Thunder Gold Corp wish to pursue some or all of the rights under this water licence? If so an opportunity may exist to transfer the licence to Great Thunder Gold Corp.

If not, does Great Thunder Gold Corp. object to the decommissioning of the dam, and the resultant loss of storage? Will this action create a liability or hardship for Great Thunder Gold Corp.?

The name of the decision maker for this application is:

Darryl Slater, Water Manager

Objections to this application may be delivered to:

Darryl Slater, Water Manager
103-2100 Labieux Road
Nanaimo, BC
V9T 6E9

Objections to the above address must be received within 30 days of this email, making them due **December 29, 2017**. Comments may be received at this email address any time prior to December 29, 2017.

Don't hesitate to contact me via phone or email with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Glen Wallace [mailto:glen@wallace.pro]
Sent: Monday, November 27, 2017 9:28 PM
To: Johnson, David A FLNR:EX
Cc: Kevin Whelan
Subject: RE: Valentine Mountain Mine, water licence

Thank you for letting us know, Dave. Please send the notice of application to me by e-mail. If you need to deliver a hard copy, kindly send it to my attention at:

Great Thunder Gold Corp.
c/o Compliance Solutions Inc.
1300 Saltspring Place
Parksville, BC, V9P 2X6
Telephone: (250) 586-9299
Fax: (250) 590-1167

If TimberWest's intentions with respect to the dam and reservoir are not stated in the notice, would you kindly shed some light on what their plans are?

Regards.

Glen Wallace
Chief Financial Officer
Great Thunder Gold Corp.

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: November 27, 2017 3:12 PM
To: 'glen@wallace.pro' <glen@wallace.pro>; s.22
Subject: Valentine Mountain Mine, water licence

Hello Glen, Kevin;

I am writing with regard to a water licence that permits the dam/reservoir at the Valentine Mountain Property.

We have received an application to abandon that water licence from the licensee (TImberWest).

I am looking for the appropriate party with Great Thunder Gold Corp. to serve notice of the application.

Don't hesitate to call at the number below for more information.

Thank you very much, Dave

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

WATER MANAGEMENT BRANCH

MINISTRY OF ENVIRONMENT

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Canadian Pacific Forest Products Ltd., Tahsis Pacific Region, Eastern Woodlands of P.O. Box 910, Sooke, B.C., V0S 1N0

is hereby authorized to divert, use, and store water as follows:

(a) The source of the water-supply is Valentine Brook and storage is in a reservoir.

(b) The point of diversion and storage structure are located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 10th October, 1989.

(d) The purposes for which the water is to be used are storage and industrial (fire protection).

(e) The maximum quantity of water which may be held in storage is 5.5 acre foot per annum and the maximum quantity of water which may be diverted from storage for industrial (fire protection) purpose is 5.5 acre foot per annum.

(f) The period of the year during which the water may be held in storage is the whole year and the period of the year during which the water may be used for industrial (fire protection) purpose is the whole year.

(g) The land upon which the water is to be used and to which this licence is appurtenant is Westerly 120 Chains of Block 1221, Malahat District.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

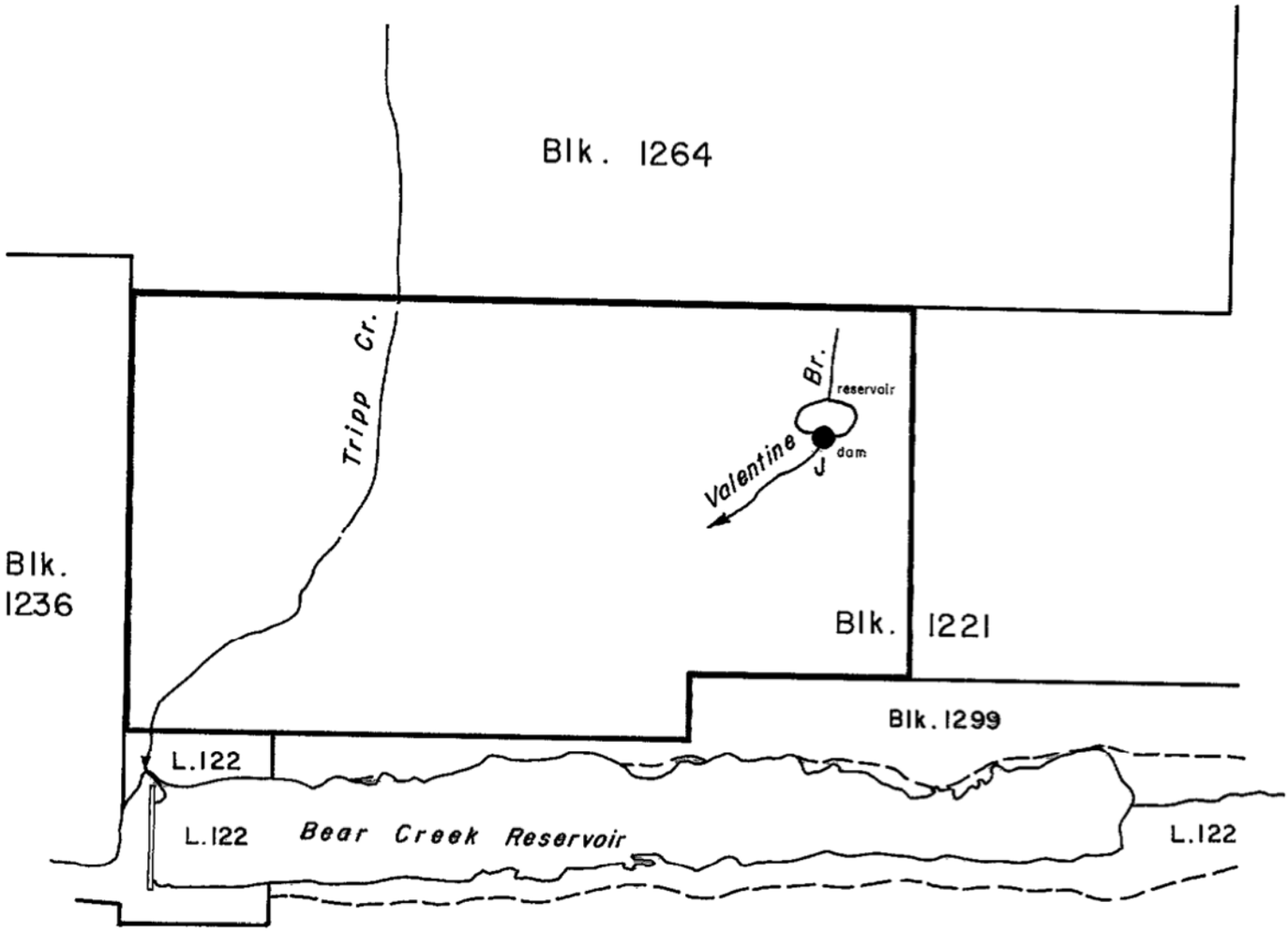
(i) The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act.

(j) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular, beneficial use of water in the manner authorized herein.

B. Hollingshead
Regional Water Manager

File: 1001142 November 5, 1990 Conditional Licence: 72277

Province of British Columbia



WATER DISTRICT : VICTORIA
PRECINCT : VICTORIA
LAND DISTRICT : MALAHAT

LEGEND

Scale : 1:20,000
Point of Diversion : ●
Map Number : WR 92 B/12 (d)

Signature

Date December 14, 1990

C.L. 72277
File 1001142

The boundaries of the land to which this licence is appurtenant are shown thus: ———

Water Licence Amendment/Abandonment

Abandonment

Tracking Number: 100228238

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit / Tenure / Licence will be issued, if approved.

Name:	TimberWest Forest Corp.
Doing Business As:	
Phone:	250-619-7655
Fax:	250-716-3782
Email:	
BC Incorporation Number:	
Extra Provincial Inc. No:	Nanaimo
Society Number:	
GST Registration Number:	
Contact Name:	Jason Carvalho
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

EMPLOYEE INFORMATION

Please enter the contact information of the Individual/Organization who is acting on behalf of the applicant.

Name:	TimberWest Forest Corp
Doing Business As:	
Phone:	250-716-3722
Fax:	250-716-3782
Email:	laud@timberwest.com
BC Incorporation Number:	
Extra Provincial Inc. No:	NANAIMO
Society Number:	
GST Registration Number:	87154 6842 RT0001
Contact Name:	Dianna Lau
Mailing Address:	201-648 Terminal Avenue Nanaimo BC V9R 5E2

CORRESPONDENCE E-MAIL ADDRESS

If you would like to receive correspondence at a different email address than shown above, please provide the correspondence email address here. If left blank, all correspondence will be sent to the above given email address.

Email:	jason.carvalho@couverdon.com
Contact Name:	Jason Carvalho

TECHNICAL INFORMATION

WATER LICENCE

Please enter your water licence number to start your application. Click 'Verify' to check the number you have entered.

Licence Number:	C072277
Name of Source:	Valentine Brook

LICENCE HOLDER

Name	Billing Address
Timberwest Forest Corp	3 FLR-856 Homer Street, Vancouver BC V6B 2W5

LAND WHERE THE WATER IS USED

WESTERLY 120 CH OF BLK 1221 MALAHAT DIST

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

TYPE OF AMENDMENT

If you select Yes for one of the following options then you will not be able to select any other options.

Abandonment

This option allows you to request the abandonment of all or part of a water licence. There is no fee to abandon all or part of the licence.

Do you want to abandon your water rights?	Yes
Do you want to abandon all or just part of the water licence?	All
Please tell us why you would like to abandon your licence?	Water never used
Please describe what you would like to change and why:	Conditional Water Licence C072277 was issued to Pacific Forest Products on October 10th, 1989 for the purposes of Storage and Industrial Fire Protection. Water held under the licence was never used.

ABANDONMENT

This application allows you to request the abandonment of all or part of a water licence.

PURPOSES

We have the following purposes for your licence on record:

Purpose	Quantity	Irrigated Area
02I12 - Misc Ind'l: Fire Protection	6784.14 m3/year	0 ha
08A - Stream Storage: Non-Power	6784.14 m3/year	0 ha

MORTGAGE SECURITY

Was a mortgage filed with the Comptroller of Water Rights or Regional Water Manager with respect to the land, mine or undertaking to which the licence is appurtenant?	No

PENDING SALES OR PURCHASE AGREEMENT

Is there a pending sales or purchase agreement for the appurtenant land, mine or undertaking?	No

WORKS

If you are abandoning all or part of the rights it is your responsibility to decommission the works associated with the water licence. If decommissioning of the works will require changes to the stream (e.g. dam and pond removal), you may require authorization under the Water Sustainability Act and/or other legislation before proceeding. We may provide related directions after reviewing your plan. Please list any works that are associated with the water licence, their status in the second column, and what you intend to do with them in the comment field.

EXISTING WORKS

Works	Status	Intention
Dam	Fully Constructed	

Comments: Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

Please describe what you want to do with the remaining works:

Water held under the licence was stored behind a pre-existing dam structure that was constructed in 1987 under the authorization of the Ministry of Energy and Mines. The Dam was built by the original mineral tenure holder - Beau Pre Explorations Ltd and Valentine Gold Corp. Ltd - to serve as a tailing impoundment for a bulk mineral sample program approved by the Ministry of Mines.

No works were constructed under the conditional water licence.

Dam Safety Inspection reports issued by the Province refer to the Mineral Tenure Holder as being the owner of the Dam and responsible for its maintenance and decommissioning.

Abandonment of the conditional water licence should therefore not require decommissioning of the Dam works.

ATTACHED DOCUMENTS

Document Type	Description	Filename
Other	Tailings Impoundment Construction report confirming when the Dam was constructed by Valentine Mountain Gold Corp.	Tailings Impoundment Constr...

PRIVACY DECLARATION

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FrontCounter BC Program Director
FrontCounter BC, Provincial Operation
441 Columbia Street
Kamloops, BC V2C 2T3

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

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Please review the "Important Notices" below and then check the declaration at the bottom confirming that everything in this application is complete and accurate.

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- Once you click 'Next' the application will be locked down and you will NOT be able to edit it any more.

DECLARATION

☑ By submitting this application form, I declare that the information contained on this form is complete and accurate.

OFFICE

Office to submit application to: Nanaimo

PROJECT INFORMATION

Is this application for an activity or project which requires more than one natural resource authorization from the Province of BC? No

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Nanaimo	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Attachment Valentine Brook Dam_3.kmz (736 Bytes) cannot be converted to PDF format.

From: Baldwin, John FLNR:EX
To: Johnson, David A FLNR:EX
Subject: RE: Referral Dam Safety, Water Licence File 1001142
Date: December 4, 2017 8:48:31 AM

s.13

John B
Dam Safety Officer

From: Johnson, David A FLNR:EX
Sent: Wednesday, November 29, 2017 2:19 PM
To: Baldwin, John FLNR:EX
Subject: Referral Dam Safety, Water Licence File 1001142

Hello John;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

My understanding is that it will be a condition of the abandonment that the dam be decommissioned or otherwise addressed. Referrals have also gone out to Mines and Grant Bracher, Ecosystems.

Please return comments to me via email within 30 days from this email, making them due December 29, 2017.

Don't hesitate to contact me with questions. Thank you very much.

Dave Johnson

Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Bracher, Grant FLNR:EX
To: Johnson, David A FLNR:EX
Cc: Baldwin, John FLNR:EX
Subject: RE: Referral Ecosystems, Valentine Brook, Water Licence File 1001142
Date: December 4, 2017 2:44:53 PM
Attachments: image001.png

Hello Dave,

s.13

Those are my thoughts for now. If you would like to discuss this further, please feel free to contact me.

Grant Bracher, Ph.D., P.Ag., R.P.Bio.
Ecosystem Biologist
Ministry of Forests, Lands and Natural Resource Operations
and Rural Development
2080 Labieux Road
Nanaimo BC V9T 6J9
Tel. 250 751-3221
Fax. 250 751-3103
Grant.Bracher@gov.bc.ca

From: Johnson, David A FLNR:EX
Sent: Wednesday, November 29, 2017 2:20 PM
To: Bracher, Grant FLNR:EX
Subject: Referral Ecosystems, Water Licence File 1001142

Hello Grant;

You are receiving this email as a referral for an application for the abandonment of a water licence. Attached are a copy of the Water Licence, including Plat. A copy of the application for abandonment, and a .kmz location file.

This application proposes the abandonment of Conditional Water Licence C72277 on file 1001142. This water licences authorizes storage and industrial (fire protection) use of 5.5 acre/feet of water per year on Valentine Brook. Valentine Brook is a tributary to the Jordan River system. It flows into Bear reservoir.

A dam and reservoir are authorized under this water licence. The reservoir was constructed to contain mine tailings from the nearby Valentine Mountain mine (currently held by Great Thunder Gold Corp.) The dam was constructed in 1987. It is likely that an unknown quantity of mine tailings remains in the reservoir.

My understanding is that it will be a condition of the abandonment that the dam be decommissioned or otherwise addressed. Referrals have also gone out to Mines (Jim Dunkley) and Dam Safety (John Baldwin).

Please return comments to me via email within 30 days from this email, making them due December 29, 2017.

Don't hesitate to contact me with questions. Thank you very much.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

British Columbia
Forests, Lands and Natural Resource Operations

From: Dunkley, Jim R EMPR:EX
To: Johnson, David A FLNR:EX
Subject: RE: Valentine Brook Dam Conversation
Date: December 5, 2017 12:27:12 PM

Hi David,

Sorry for the delay on this. Currently the mine tenure owner has responsibility to maintain the tailings pond dam and ensure that there is no release of the tailings to the environment.

In reality, this is a junior mining company with few immediate prospects of funding for work on the site.

There may be potential to use the till that the dam is constructed of to safely cover the tailings currently stored in the facility but I am not the person to make that call.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

From: Johnson, David A FLNR:EX
Sent: Monday, November 27, 2017 3:01 PM
To: Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi Jim,

Thanks for this I will send you a referral, when I get going.

I am wondering if there is a requirement under the current mine tenure for the mining company to maintain the tailings pond? Or to remediate ?

Also, do you have any information on the original permission from mines to build the dam and reservoir?

Our application only goes back to 1989, which is after the dam was constructed. We do not have a license that preceded the current one.

Thanks very much, Dave.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Dunkley, Jim R EMPR:EX
Sent: Thursday, November 23, 2017 3:57 PM
To: Johnson, David A FLNR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi David,

The mineral property is owned by Great Thunder Gold Corp.

Contacts there are :

Great Thunder Gold Corp.
Attn: Glen Wallace, CFO
1277 Rockhampton Close
Victoria, BC
V9B 6X5
Telephone: (250) 590-1166
Fax: (250) 590-1167
E-mail: glen@wallace.pro

or

Kevin Whelan
CEO Great Thunder Gold Corp
s.22

I have included an email from the Bruce Northcote, Regional Geologist, who did a search on activities relating to mining and tailings at the site. It would seem as though there are at least some tailings in the pond.

Potentially the amount of tailings is small, and depending upon the risk potential, there may be enough till in the tailings pond dam to adequately cover the tailings. This is just speculation at though.

Jim Dunkley, P. Geo
Inspector of Mines

300-1810 Blanshard St

Victoria, BC. V8W 9M9

778 698-7294

From: Johnson, David A FLNR:EX
Sent: Thursday, November 23, 2017 11:22 AM
To: Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi Jim,

As discussed I am hoping you can send me the information on the mining permit for Valentine Mountain, I need the contact information of the current mining company.

As discussed, I will get a referral out to you and Heather with a copy of the application and a 30day window for comment.

I appreciate your help, thank you very much, Dave.

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Narynski, Heather M EMPR:EX
Sent: Tuesday, October 31, 2017 3:06 PM
To: Baldwin, John FLNR:EX; Howe, Diane J EMPR:EX
Cc: Johnson, David A FLNR:EX; Dunkley, Jim R EMPR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

Hi John,

I will pursue an answer to your question regarding any background information EMPR has on Valentine and what materials may be contained within this facility. Detailed or corroborated information will likely take some time as most files would be archived off site.

[Diane, what information do you know about Valentine for preliminary discussions with FLNR as per their request below? I believe this site also goes by the name Ashlu?]

Thanks,
Heather

From: Baldwin, John FLNR:EX
Sent: Tuesday, October 31, 2017 2:59 PM
To: Narynski, Heather M EMPR:EX
Cc: Johnson, David A FLNR:EX; Dunkley, Jim R EMPR:EX
Subject: RE: Valentine Brook Dam Conversation

s.13

From: Baldwin, John FLNR:EX
Sent: Thursday, October 26, 2017 12:01 PM
To: Narynski, Heather M EMPR:EX
Cc: Johnson, David A FLNR:EX
Subject: FW: Valentine Brook Dam Conversation

Heather

Further to my voice mail today here are the conference call details for meeting today.

Diane Howe did cc you on the Valentine Brook dam issue on Sept 8 2017 at 7:38am.

MEM staff member attending this conference call would be appreciated as TimberWest (landowners and holders of water licence under WSA) want to transfer responsibility of the "tailings" dam to a mining company.

John Baldwin
Dam Safety Officer 250-751-3179

Baldwin, John FLNR:EX

From: Baldwin, John FLNR:EX
Sent: February 26, 2018 1:46 PM
To: Johnson, David A FLNR:EX
Cc: Narynski, Heather M EMPR:EX
Subject: RE: Valentine Mine Questions

Dave – Heather Narynski contacted me today regarding the TimberWest Valentine water licence abandonment referral. The issue seems to be that authorizations have been issued for the dam under Mines Act to Great Thunder Mining Company **and** under the WSA to TimberWest. No information on any joint works agreement between any parties exists.

The existing 7 m earth filled high dam is storing water and has a stream flowing through the reservoir and dam spillway. Tailings have been reported to have been placed in the reservoir. Content and volume of tailings material is not known. Water quality in the reservoir is not known. The tailings material in the reservoir will need to be stabilized if the dam is decommissioned.

Both TimberWest and Great Thunder have been reported to be inspecting the dam.

Great Thunders position regarding the dam is not clear. The mine is not active at this time. Heather N will try to contact this company on this matter. If the dam is required for tailings in the future then relocation of the stream may be a solution!

The Chief Inspector of Mines is trying to contact TimberWest as well.

Mines (Heather N) is planning to reply to the water licence abandonment referral. May be a little late!

s.13

John B

From: Baldwin, John FLNR:EX
Sent: Monday, February 26, 2018 9:35 AM
To: Narynski, Heather M EMPR:EX; Johnson, David A FLNR:EX
Subject: RE: Valentine Mine Questions

Heather/Dave

Note dam decommissioning guide:

1. Pre-decommission drawdown of the water in the reservoir is to be undertaken in a manner that does not caus
2. Salvage/relocation of fish etc may be required.
3. Any breach in the dam is to be able to pass the 1 in 200 year maximum daily flow safely– minimum 4 metre wid
4. The breach side slopes are to be stable with recommended 3 to 1 slopes or better.
5. All spoil material is to be placed in a stable location and in a stable condition.
6. Breach is to be to the invert of the original stream bed.
7. Breach location should be at original stream location.
8. Any sediment in the reservoir bottom is to be stabilized.
9. All disturbed areas are to be seeded , and inspected within one year.
10. An engineer is to confirm that the dam has been breached as per specifications/approval.
11. The total removal of all the elements of a dam (ie spillway, all embankment, low level pipes and gates) depend
12. Timing of the dam decommission work may be impacted by weather and environmental concerns. Sediment/
13. Decommissioning of a dam needs approval under the new **BC Water Sustainability Act** (WSA) Dam Safety Reg

Decommission plans prepared by a qualified professional that include design criteria, sealed drawings, work schedule, environmental protection plan and name of project supervisor are to be submitted to the Dam Safety Officer in Nanaimo 90 days before on site work is proposed.

Amendment of any water licences is linked to the dam decommission approval but is a separate activity.

John B
Dam Safety Officer

From: Narynski, Heather M EMPR:EX
Sent: Friday, February 23, 2018 4:21 PM
To: Johnson, David A FLNR:EX
Cc: Baldwin, John FLNR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Mine Questions

Thanks David.

[John, It would be great to touch base next week].

Have a great weekend.

Heather

From: Johnson, David A FLNR:EX
Sent: Friday, February 23, 2018 5:45 PM
To: Narynski, Heather M EMPR:EX
Cc: Baldwin, John FLNR:EX
Subject: RE: Valentine Mine Questions

Hi Heather,

Nice chatting earlier. I have cc'ed John Baldwin our dam safety officer as well.

Answers below.

Dave

Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Narynski, Heather M EMPR:EX
Sent: Friday, February 23, 2018 2:57 PM
To: Johnson, David A FLNR:EX
Cc: Narynski, Heather M EMPR:EX
Subject: Valentine Mine Questions

Hi David,

It was helpful speaking with you today.

I'm currently drafting an internal email regarding Valentine mine and a couple of questions came to mind that were not discussed on our phone call:

s.13

Thanks,
Heather

Heather Narynski, P.Eng
Manager, Tailings Storage Facilities
BC Ministry of Energy, Mines and Petroleum Resources
Office/Cell: 250-893-3396

Page 246 of 337 to/à Page 248 of 337

Withheld pursuant to/removed as

s.14

From: Jason Carvalho
To: Johnson, David A FLNR:EX
Subject: RE: Water Licence C072277
Date: March 1, 2018 2:01:07 PM

Thanks David.
JC

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: March 1, 2018 1:58 PM
To: Jason Carvalho
Subject: RE: Water Licence C072277
Received,
Thank you very much Jason, I appreciate you getting this to me in a timely manner.
The abandonment application is withdrawn.

Dave
Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Thursday, March 1, 2018 1:28 PM
To: Johnson, David A FLNR:EX
Subject: RE: Water Licence C072277
David, please find enclosed a sign application to formally withdraw our application to abandon water licence No. C072277.
Please contact me should you have any questions.
Regards,
Jason Carvalho, MCIP RPP
Project Manager
Couverdon Real Estate
201 – 648 Terminal Avenue
Nanaimo, BC V9R.5E2
(O) 250.716.3722
(M) 250.619.7655
(F) 250.716.3782

"Couverdon is the real estate business of TimberWest Forest Corp., the largest private landowner on Vancouver Island."

Couverdon

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: February 28, 2018 4:03 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>
Subject: RE: Water Licence C072277
Hi Jason,
Good news.

I have attached the form to abandon an application, you can print, sign, scan and return to me via email.
Thanks, Dave
Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, February 28, 2018 3:14 PM
To: Johnson, David A FLNR:EX
Subject: Re: Water Licence C072277

Thanks,
Yes we have provided them with a draft agreement that outlines conditions for transferring the licence. We have communicated back and forth on a few things since and are trying to get a few final points confirmed.
We've also spoken with Mines and they are researching the history of the Dam. Unfortunately they have not gotten back to us yet.
Discussions with Great Thunder appear positive and it looks like we are working toward a transferring the licence.
To this end, it is very likely that we will be withdrawing our abandonment application.
I will contact you tomorrow once I am back in the office to officially confirm this. Is an email requesting the application be withdrawn all you need?
Thx
JC
Sent from my iPhone

On Feb 28, 2018, at 2:35 PM, Johnson, David A FLNR:EX <David.A.Johnson@gov.bc.ca> wrote:

> Hi Jason,
> No info from mines other than a phonecall.
> Have further discussions been had with Great thunder?
>
> Thanks, Dave
>
> ---
>
> **From:** Jason Carvalho [mailto:jason.carvalho@couverdon.com]
> **Sent:** Wednesday, February 28, 2018 2:34 PM
> **To:** Johnson, David A FLNR:EX
> **Subject:** Re: Water Licence C072277
> I'm out in the Bush up Island. Service is spotty at best. Can you send me an email with any information you have from mines.
> Thx
>
> Sent from my iPhone
>
> On Feb 28, 2018, at 2:30 PM, Johnson, David A FLNR:EX <David.A.Johnson@gov.bc.ca> wrote:
>
> > Hi Jason,

Just left you a message, give me a shout when you get an opportunity.

Thanks, Dave 250-751-7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, February 28, 2018 2:27 PM
To: Johnson, David A FLNR:EX
Subject: RE: Water Licence C072277

David, have you heard anything from Mines regarding this file.
Thanks,
Jason

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: February 7, 2018 1:16 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>
Subject: RE: Water Licence C072277

Hi Jason,

s.13

Dave.
Dave Johnson

Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Wednesday, February 7, 2018 10:04 AM
To: Johnson, David A FLNR:EX
Cc: Dianna Lau
Subject: RE: Water Licence C072277

Thanks David, it is important to know what conditions the Ministry would impose as part of a transfer as these have cost implications for both parties that may affect the decision making process. Withdrawing the abandonment and then proceeding with a transfer application, only to find out it is cost prohibitive for both parties, serves no benefit to the Ministry, TimberWest or Great Thunder.

We would appreciate having some visibility on what the Ministry's expectations would be for a licence transfer of this nature. What typical/standard conditions have been imposed on other parties when transferring water licences?

Thanks,
Jason

From: Johnson, David A FLNR:EX [mailto:David.A.Johnson@gov.bc.ca]
Sent: February 6, 2018 3:19 PM
To: Jason Carvalho <jason.carvalho@couverdon.com>
Subject: RE: Water Licence C072277

Hi Jason,

Thanks for this enquiry. I received a similar enquiry from Great Thunder Gold in early Jan.

This is a hypothetical situation at this time. We would want to see an withdrawal of the abandonment application, and a new application made for a transfer of appurtenancy to come from the current Licensee (TimberWest); prior to providing a comprehensive list of terms or conditions.

That said, any application can be withdrawn at any time by the applicant, and terms and conditions imposed in a new licence (if any) would certainly be discussed with the applicant and the receiver of rights/obligations prior to the issuance of that new licence.

I hope this is of some value.

Thanks again, Dave
Dave Johnson
Licenced Authorizations Officer
Forests, Lands, Natural Resource Operations and Rural Development
West Coast Region
250-751-7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Tuesday, February 6, 2018 2:13 PM
To: Johnson, David A FLNR:EX
Cc: Dianna Lau
Subject: Re: Water Licence C072277

David, can you confirm what requirements would be imposed on both TimberWest and Great Thunder as a condition of transferring the water licence ?
Thanks
Jason

Sent from my iPhone

On Jan 30, 2018, at 3:12 PM, Johnson, David A FLNR:EX <David.A.Johnson@gov.bc.ca> wrote:

> Hi Jason,
> Thanks for the phone calls and file information you've provided today.
> As we have discussed the application you have put forward is for an abandonment of a water licence, under the Water *Sustainability Act*. **A requirement of this abandonment will be decommissioning of the dam**.
> An alternative is to withdraw the application for abandonment, and continue operating the structure under the Dam Safely Regulation.
> Another option is to withdraw the application for abandonment and then apply to transfer the licence to the mining company. As indicated the mining company would have to be in agreeance for a transfer such as this to occur. I understand you are in contact with the mining company and that an agreement to transfer the licence is being proposed.
> As per our mutual agreement we will allow another 30 days to receive your decision on this application. Please contact me prior to **March 2, 2018**.
> As promised, I will continue to follow-up with Mines. Please don't hesitate to contact me if I can be of further assistance.
>
> Thanks very much, Dave Johnson
> Dave Johnson
> Licenced Authorizations Officer
> Forests, Lands, Natural Resource Operations and Rural Development
> West Coast Region
> 250 751 7074

From: Jason Carvalho [mailto:jason.carvalho@couverdon.com]
Sent: Tuesday, January 30, 2018 1:11 PM
To: Johnson, David A FLNR:EX
Cc: Dianna Lau
Subject: Water Licence C072277

David, this is email is further to our telephone conversation this morning.

Great Thunder Gold Corp. has recently contacted TimberWest to inquire about whether we would be interested in transferring our water licence to them.

I refer you specifically to the document titled 'Permit Amendment Conditions' (also attached). Section 8 of the Permit Amendment specifically states that the permit holder must provide a geotechnical report for the tailings facility, as well as an acceptable plan for decommission and final reclamation of the tailings pond installation. The Ministry should therefore have some record of the reclamation requirements for the Dam, which is clearly the responsibility of the Mines holder.

We will continue to explore the transfer of the water licence to Great Thunder Gold Corp. However, in the event that an agreement cannot be reached, it remains our belief that the Dam structure is the responsibility of the Mineral Tenure Holder. This is evidenced through the initial tailings construction report, as well as subsequent requirements from the Ministry to monitor, maintain and decommission the structure.

Can you please keep me apprised of your discussions with Mines.

I would also be happy to meet with you and a representative of Mines in person to further discuss this.

Regards,

Jason Carvalho, MCIP RPP
Project Manager
Couverdon Real Estate
201 – 648 Terminal Avenue
Nanaimo, BC V9R.5E2
(O) 250.716.3722
(M) 250.619.7655
(F) 250.716.3782

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From: Narynski, Heather M EMPR:EX
To: Baldwin, John FLNR:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Neale, Tina ENV:EX; Howe, Diane J EMPR:EX; Narynski, Heather M EMPR:EX
Subject: FW: Valentine Dam
Date: March 9, 2018 12:55:57 PM

Hi John,

s.13; s.16

I have cc'd Lowell Constable and Tina Neale as I understand some discussions have taken place between the two Ministries s.22 regarding potential updates to the MOU.

Heather

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Thursday, March 1, 2018 10:26 AM
To: Howe, Diane J EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Jason Carvalho; Doug Underhill
Subject: Re: Valentine Dam

Hi Diane and a Heather.
Thanks very much. We will be in touch.

Domenico Iannidinardo
TimberWest
250 715 7387

On Mar 1, 2018, at 8:04 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Thank you for the update Domenico. Let us know if there is anything EMPR can do in supporting your conversation with the miner. There are a whole bunch of regulations that owners of tailings faculties are now responsible for that they/you should be aware of (Health Safety and Reclamation Code for Mines in BC; PART 10). I've cc'ed with this email Heather Narynski who manages the TSF compliance for the province. She is very much up on the regulations if you have any questions.

Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
www.gov.bc.ca/minepermitting

For all reports, please ensure you include EMPR Permitting and Reclamation group mailbox
PERMRECL@gov.bc.ca
<image001.jpg>

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Wednesday, February 28, 2018 3:36 PM
To: Howe, Diane J EMPR:EX
Subject: Re: Valentine Dam

Hi Diane,
We now plan to withdraw our abandonment request and work through some matters with the miner.
Does that help clarify the matter for you at this time?
Thank you

Domenico Iannidinardo
TimberWest
250 715 7387

On Feb 26, 2018, at 7:37 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Hi Domenico,
>
> Wondering if you have time for a call this week regarding the Valentine Dam. I understand Timberwest has a request in to have the water licence released and am just wondering about the relationship Timber West has with the mine permittee and how this may affect the conditions of this release.
>
> Regards, Diane
>
> **Diane Howe, M.A. Sc., P.Geo**
> Deputy Chief Inspector of Mines , Reclamation and Permitting
> Ministry of Energy, Mines and Petroleum Resources, Victoria
> 250-952-0183
> www.gov.bc.ca/minepermitting

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<image001.jpg>

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Page 260 of 337 to/à Page 264 of 337

Withheld pursuant to/removed as

s.14

John B

From: Narynski, Heather M EMPR:EX
Sent: Monday, March 12, 2018 10:49 AM
To: Baldwin, John FLNR:EX; Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Narynski, Heather M EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

That's my understanding as well- that the Valentine dam has been authorized under two different Acts/Regulations for the same aspects. Inspections have been carried out on this dam under the oversight of both EMPR and FLNRO.

John, was the "low" consequence designation made internally by FLNRO? I'm wondering whether this would have taken into account the potential volume and nature of tailings contained?

s.16

Heather

From: Baldwin, John FLNR:EX
Sent: Monday, March 12, 2018 11:18 AM
To: Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

Tina – thanks for info – the dam is authorized in both "permits/licences".

This 8 metre high earth filled dam has a LOW consequence rating (impact TimberWest's own forest property) with moderate failure probability (issue with embankment stability).

John B

From: Neale, Tina FLNR:EX
Sent: Monday, March 12, 2018 10:03 AM
To: Baldwin, John FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX
Subject: RE: Valentine Dam - FLNRORD or Mines dam?

Hi John,

s.13

Tina

From: Baldwin, John FLNR:EX
Sent: Monday, March 12, 2018 9:19 AM
To: Neale, Tina FLNR:EX; Morgan, Scott FLNR:EX
Cc: Johnson, David A FLNR:EX; Narynski, Heather M EMPR:EX

Subject: FW: Valentine Dam - FLNRORD or Mines dam?

Tina/Scott – I have a dam on private land licenced under WSA to the owner of the land (TimberWest). This licence is for fire fighting purpose. TimberWest want to transfer the water licence thus ownership of the dam to a mining company. The mining company has a mining permit for a tailings dam. The WSA licenced dam is the Mines tailings dam – two authorizations for the same dam! The existing dam is on a stream but has mine tailings in the reservoir. s.13

s.13

Can we discuss options?

John B

From: Narynski, Heather M EMPR:EX
Sent: Friday, March 9, 2018 12:56 PM
To: Baldwin, John FLNR:EX
Cc: Johnson, David A FLNR:EX; Constable, Lowell EMPR:EX; Neale, Tina FLNR:EX; Howe, Diane J EMPR:EX; Narynski, Heather M EMPR:EX
Subject: FW: Valentine Dam

Hi John,

s.13

I have cc'd Lowell Constable and Tina Neale as I understand some discussions have taken place between the two Ministries s.22 regarding potential updates to the MOU.

Heather

From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Thursday, March 1, 2018 10:26 AM
To: Howe, Diane J EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Jason Carvalho; Doug Underhill
Subject: Re: Valentine Dam

Hi Diane and a Heather.

Thanks very much. We will be in touch.

Domenico Iannidinardo
TimberWest
250 715 7387

On Mar 1, 2018, at 8:04 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Thank you for the update Domenico. Let us know if there is anything EMPR can do in supporting your conversation with the miner. There are a whole bunch of regulations that owners of tailings faculties are now responsible for that they/you should be aware of (Health Safety and Reclamation Code for Mines in BC; PART 10). I've cc'ed with this email Heather Narynski who manages the TSF compliance for the province. She is very

much up on the regulations if you have any questions.
Regards, Diane

Diane Howe, M.A. Sc., P.Geo
Deputy Chief Inspector of Mines , Reclamation and Permitting
Ministry of Energy, Mines and Petroleum Resources, Victoria
250-952-0183
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From: Domenico Iannidinardo [mailto:IannidinardoD@TimberWest.com]
Sent: Wednesday, February 28, 2018 3:36 PM
To: Howe, Diane J EMPR:EX
Subject: Re: Valentine Dam

Hi Diane,
We now plan to withdraw our abandonment request and work through some matters with the miner.
Does that help clarify the matter for you at this time?
Thank you

Domenico Iannidinardo
TimberWest
250 715 7387

On Feb 26, 2018, at 7:37 AM, Howe, Diane J EMPR:EX <Diane.Howe@gov.bc.ca> wrote:

> Hi Domenico,
> Wondering if you have time for a call this week regarding the Valentine Dam. I understand Timberwest has a request in to have the water licence released and am just wondering about the relationship Timber West has with the mine permittee and how this may affect the conditions of this release.
> Regards, Diane
>
> **Diane Howe, M.A. Sc., P.Geo**
> Deputy Chief Inspector of Mines , Reclamation and Permitting
> Ministry of Energy, Mines and Petroleum Resources, Victoria
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WATER MANAGEMENT BRANCH

MINISTRY OF ENVIRONMENT

THE PROVINCE OF BRITISH COLUMBIA— WATER ACT

CONDITIONAL WATER LICENCE

Canadian Pacific Forest Products Ltd., Tahsis Pacific Region, Eastern Woodlands of P.O. Box 910, Sooke, B.C., V0S 1N0

is hereby authorized to divert, use, and store water as follows:

(a) The source of the water-supply is Valentine Brook and storage is in a reservoir.

(b) The point of diversion and storage structure are located as shown on the attached plan.

(c) The date from which this Licence shall have precedence is 10th October, 1989.

(d) The purposes for which the water is to be used are storage and industrial (fire protection).

(e) The maximum quantity of water which may be held in storage is 5.5 acre foot per annum and the maximum quantity of water which may be diverted from storage for industrial (fire protection) purpose is 5.5 acre foot per annum.

(f) The period of the year during which the water may be held in storage is the whole year and the period of the year during which the water may be used for industrial (fire protection) purpose is the whole year.

(g) The land upon which the water is to be used and to which this licence is appurtenant is Westerly 120 Chains of Block 1221, Malahat District.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

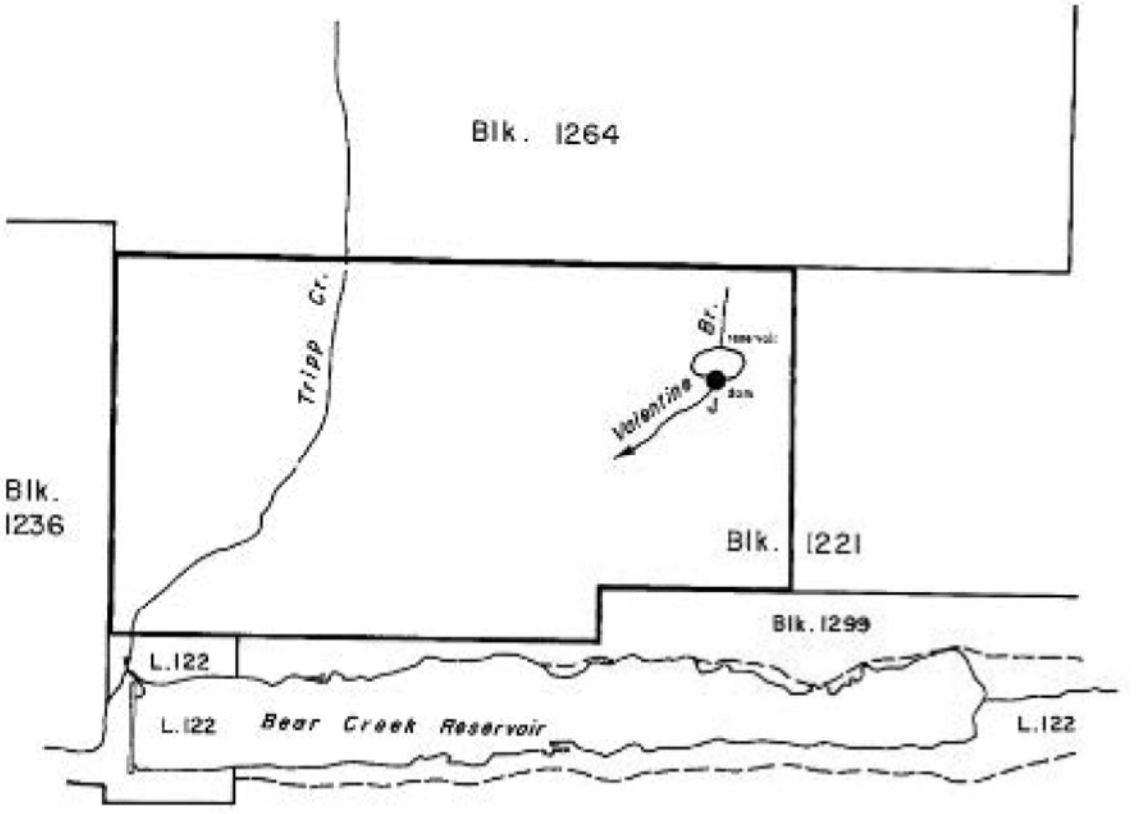
(i) The dam and reservoir authorized under clause (h) of this licence shall be maintained to the satisfaction of the Engineer under the Water Act.

(j) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make a regular, beneficial use of water in the manner authorized herein.

B. Hollingshead
Regional Water Manager

File: 1001142 November 5, 1990 Conditional Licence: 72277

Province of British Columbia



WATER DISTRICT : VICTORIA
PRECINCT : VICTORIA
LAND DISTRICT : MALAHAT

LEGEND

Scale : 1:20,000
Point of Diversion : ●
Map Number : WR 92 B/12 (d)

Signature

Date December 14, 1990

C.L. 72277
File 1001142

The boundaries of the land to which this licence is appurtenant are shown thus: ———

Page 271 of 337 to/à Page 296 of 337

Withheld pursuant to/removed as

s.14

From: Robinson, David FLNR:EX
To: Baldwin, John FLNR:EX
Subject: RE: update on Valentine Mountain
Date: December 11, 2018 2:29:00 PM

Thanks John,

Here to discuss when you are able.

David Robinson
Senior Authorizations Specialist – Water
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: 250-751-7028

From: Baldwin, John FLNR:EX
Sent: Tuesday, December 11, 2018 2:09 PM
To: Robinson, David FLNR:EX
Subject: RE: update on Valentine Mountain

Dave – further to my voice mail today and the Mines e-mail regrading Valentine Creek Dam update. My understanding was that the two "permit" holders are working together on the dam safety issues (ie complete inspection work ordered by Mines). The WSA Dam Safety Regulation Section 16 requires acceptance of "invasive investigation" (ie drilling, excavating, trenching test pits in dam) plan by Dam Safety Officer before investigation work is undertaken. I have wavered this requirement for the work ordered by the EMPR.

The bigger picture is still how FLNRORD under WSA formally co-ordinates with EMPR under the Mines Act on these joint works.

The Mining Company (Great Thunder Gold Corp) has stated that they are NOT responsible for the tailings facility (ie dam and reservoir). Not sure how EMPR will handle this claim – are "we" back to TimberWest as the dam owner under WSA?

Can we review options?

John B

From: Baldwin, John FLNR:EX
Sent: Friday, November 23, 2018 3:24 PM
To: 'Doug Underhill'; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: RE: update on Valentine Mountain

Doug – thanks for update – any digging in or near the embankment is to be undertaken with great care. – John B

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]

Sent: Friday, November 23, 2018 12:53 PM
To: Baldwin, John FLNR:EX; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: update on Valentine Mountain

Good afternoon John & Jim

John - I spoke to Jim this morning. He has been in contact with Great Thunder Gold Corp. (GTGC) about their tailings pond and associated dam on Valentine Mountain. They have agreed to send a qualified professional to inspect the dam and the leaking pipe. I have offered on behalf of TimberWest to provide an excavator to assist the representative from GTGC in his investigation of the leaking pipe. The operator will take direction from the GTGC representative and in doing so, the operator, the company and TimberWest are not accepting any liability for the outcome of said inspection or any deficiencies in the dam structure.

Jim - Given the elevation and potential for snow, this work must be completed prior to Nov 30th. GTGC must give TimberWest 2 days' notice on when the excavator is required so we can coordinate with our contractor.

Thank you.

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure
T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

Facebook.com/TimberWest-Forest-Corp
@TimberWest
TimberWest.com/news

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From: Robinson, David FLNR:EX
To: Baldwin, John FLNR:EX
Subject: RE: update on Valentine Mountain
Date: December 12, 2018 8:32:00 AM

I was thinking more about this after our conversation yesterday, and in consideration that EMPR has identified a higher consequence than FLNRORD, our approach to have them lead initial attempts with their Order to Great Thunder makes sense.

Your response looks satisfactory for now, John. Those "next steps" are important should remedial work not occur in a timely fashion. Let's stay on top of their progress and if we need to hold TimberWest accountable via WSA, we can do so.

David Robinson
Senior Authorizations Specialist – Water
West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: 250-751-7028

From: Baldwin, John FLNR:EX
Sent: Tuesday, December 11, 2018 5:20 PM
To: Robinson, David FLNR:EX
Subject: RE: update on Valentine Mountain

Dave – further to our discussion on this matter today, I suggest the following reply to EMPR:

s.13; s.16

Additions etc are welcome.
John B

From: Robinson, David FLNR:EX
Sent: Tuesday, December 11, 2018 2:30 PM
To: Baldwin, John FLNR:EX
Subject: RE: update on Valentine Mountain

Thanks John,

Here to discuss when you are able.

David Robinson
Senior Authorizations Specialist – Water

West Coast Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: 250-751-7028

From: Baldwin, John FLNR:EX
Sent: Tuesday, December 11, 2018 2:09 PM
To: Robinson, David FLNR:EX
Subject: RE: update on Valentine Mountain

s.13

The bigger picture is still how FLNRORD under WSA formally co-ordinates with EMPR under the Mines Act on these joint works.

The Mining Company (Great Thunder Gold Corp) has stated that they are NOT responsible for the tailings facility (ie dam and reservoir). Not sure how EMPR will handle this claim – are "we" back to TimberWest as the dam owner under WSA?

Can we review options?

John B

From: Baldwin, John FLNR:EX
Sent: Friday, November 23, 2018 3:24 PM
To: 'Doug Underhill'; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: RE: update on Valentine Mountain

Doug – thanks for update – any digging in or near the embankment is to be undertaken with great care. – John B

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Friday, November 23, 2018 12:53 PM
To: Baldwin, John FLNR:EX; Dunkley, Jim R EMPR:EX
Cc: Jason Carvalho; McPherson, Alexis EMPR:EX
Subject: update on Valentine Mountain

Good afternoon John & Jim
John - I spoke to Jim this morning. He has been in contact with Great Thunder Gold Corp. (GTGC) about their tailings pond and associated dam on Valentine Mountain. They have agreed to send a qualified professional to inspect the dam and the leaking pipe. I have offered on behalf of TimberWest to provide an excavator to assist the representative from GTGC in his investigation of the leaking pipe. The operator will take direction from the GTGC representative and in doing so, the

operator, the company and TimberWest are not accepting any liability for the outcome of said inspection or any deficiencies in the dam structure.

Jim - Given the elevation and potential for snow, this work must be completed prior to Nov 30th. GTGC must give TimberWest 2 days' notice on when the excavator is required so we can coordinate with our contractor.

Thank you.

Doug Underhill P.Eng. RPF Manager of Forest Hydrology and Infrastructure

T 250 716 3721 C: 250-619-6794 E Doug.Underhill@TimberWest.com

Facebook.com/TimberWest-Forest-Corp

@TimberWest

TimberWest.com/news

This message is intended only for the individual or organization to which it is addressed. It may contain private, confidential or privileged information which is exempt from disclosure under applicable law. Any use, distribution or copying by anyone other than the intended recipient is prohibited. If you are not the intended recipient, or have received this message in error, please notify me by email, delete this message from your computer and permanently destroy any hard copies. Thank you.

From:	Baldwin, John FLNR:EX
To:	McPherson, Alexis EMPR:EX
Cc:	Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject:	RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI
Date:	January 10, 2019 3:52:33 PM

Alexis – I'm available all day for Tuesday 15th Jan, Friday 18th Jan, Tuesday 22nd Jan or Wednesday 23rd Jan – John B

From: McPherson, Alexis EMPR:EX
Sent: Thursday, January 10, 2019 3:43 PM
To: Baldwin, John FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John,

EMPR has continued correspondence with Great Thunder since I sent the December 11, 2018 email (below); Great Thunder still indicates they are continuing to search for an engineer to address the immediate order, yet maintains they are not responsible for the tailings facility, and on December 14th they submitted a letter of appeal for all orders to the Chief Inspector. I've attached the letter of appeal for your reference.

We would like to discuss the possible paths forward with yourself and David, next week if it works with your schedules. I'll follow this email up with a meeting invitation.

Thanks and best regards,
Alexis

From: Baldwin, John FLNR:EX
Sent: Wednesday, December 12, 2018 11:22 AM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

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FLNRORD Dam Safety has been in contact with TimberWest regarding EMPR's November 16th 2018 Risk Assessment Order to Great Thunder Gold Corp (GTGC) , and understand that TimberWest and GTGC are working together to complete the work required to satisfy the EMPR Order. This office is waiting for a copy of the final GTGC risk assessment report and any remedial work recommendations for the Valentine Mine tailings storage facility/Valentine Creek Dam.

Once the GTGC assessment report has been received then FLNRORD and EMPR staff need to review next steps.

John B

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Hello John and David,

Can you please provide an update re. Valentine Mountain and TimberWest? EMPR has continued correspondence with Great Thunder over the past weeks. Great Thunder indicates that they are continuing to look for an engineer to address then immediate order yet maintains they are not responsible for the tailings facility. We're working to figure out a path forward and would appreciate an update from FLNRORD.

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    - Order for immediate remedial action
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    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

Alexis McPherson, M.Sc., P.Eng.

Geotechnical Inspector
Ministry of Energy, Mines and Petroleum Resources
1810 Blanshard Street | Victoria BC | V8W 9N3
778-698-4779 (office) | 250-360-7371 (cell)

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This office understands that Great Thunder Gold Corp (Great Thunder) has appealed the Mines Act Orders issued in November 2018 and has not complete the ordered risk assessment of the structure that was due by November 26th 2018. The appeal is being adjudicated by the Chief Inspector of Mines at this time.

Great Thunder has indicated that they are experiencing difficulties in hiring a qualified engineering company to complete the ordered risk assessment.
This office does not normally recommend engineering companies but in this case will suggest

Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554

Valentine Mountain Gold (mining company) built the structure on TimberWest private land. It is reported that Great Thunder removed the vegetation off the structure and TimberWest placed the rocks at the outlet of the low level pipe in this storage structure in the last few years.

The structure is holding water and tailings material at this time. The structure has two consequence classifications – significant under Mines Act and low under WSA. The difference is the impact of the tailings material in the reservoir if the structure should fail.

Both Great Thunder (current mine permit holder under Mines Act) and TimberWest (current water licence holder under Water Sustainability Act (WSA)) claim that they do not own the structure. The relationship between these companies is unknown to this office. TimberWest did confirm that they were prepared to provide equipment to complete any risk assessment studies, and are in contact with Great Thunder. This office has had no direct contact with Great Thunder on this matter.

There is typical winter weather conditions at the site at this time – full storage with saturated embankments. Access and snow conditions is unknown. This office is concerned about any major investigative digging on or near the structure at this time. Increased monitoring with emergency plan is recommended to allow for conditions to improve before undertaking any major invasive investigations of the structure.

This office will be contacting Doug Underhill and/or Steve Adams (TimberWest staff) regarding TimberWest's current position on this structure.

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Page 308 of 337 to/à Page 310 of 337

Withheld pursuant to/removed as

s.14

McPherson, Alexis EMPR:EX

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Attachments: RE: Great Thunder Gold - Update re. Engineer for Valentine Mountain

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778-698-4779 (office) | 250-360-7371 (cell)

From: McPherson, Alexis EMPR:EX []
To: 'glen@wallace.pro' [glen@wallace.pro]
Subject: RE: Great Thunder Gold - Update re. Engineer for Valentine Mountain
Date: Monday, January 07, 2019 16:13:57

Thanks for the update. You may also want to follow up the consultants who previously indicated they were too busy to take on the work. Consultants can be very busy in December trying to issue reports before the end of year and have lighter workloads in January and February.

Alexis

From: glen@wallace.pro [mailto:glen@wallace.pro]
Sent: Monday, January 7, 2019 11:46 AM
To: McPherson, Alexis EMPR:EX
Cc: 'Kevin Whelan'
Subject: RE: Great Thunder Gold - Update re. Engineer for Valentine Mountain

s.13

From: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Sent: Monday January 7, 2019 11:05 AM
To: 'glen@wallace.pro' <glen@wallace.pro>
Subject: RE: Great Thunder Gold - Update re. Engineer for Valentine Mountain

Hello Glen,

Can you please provide an update re. your search for an engineer?

Regards,

Alexis

From: McPherson, Alexis EMPR:EX
Sent: Monday, December 17, 2018 11:04 AM
To: 'glen@wallace.pro'
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Rollo, Andrew EMPR:EX; Dunkley, Jim R EMPR:EX; Caughill, David EMPR:EX; 'Kevin Whelan'
Subject: RE: Great Thunder Gold - Update re. Engineer for Valentine Mountain

Hello Glen,

s.13

Regards,

Alexis

From: glen@wallace.pro [mailto:glen@wallace.pro]
Sent: Friday, December 14, 2018 3:45 PM
To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Rollo, Andrew EMPR:EX; Dunkley, Jim R EMPR:EX; Caughill, David EMPR:EX; 'Kevin Whelan'
Subject: RE: Great Thunder Gold - Update re. Engineer for Valentine Mountain

Alexis:

We have now been in touch with nine engineering firms and none are prepared to take on this project this month or at all. Here are the firms we have contacted:

Firm

Status

Westrek Geotechnical Services

Declined

Doug Bright, PhD

Advised he is not qualified to do the work

Thurber Engineering

Too busy to take on more work in the short term

Golder Associates

Possible client conflict. Declined.

Tetra Tech

Too busy with existing clients. Declined.

Amec Foster Wheeler

Never replied to voicemail and email messages

BGC Engineering

Never replied to voicemail and email messages

Klohn Crippen Berger

Fully committed on existing projects. Declined.

SNC Lavalin

Offered some preliminary comments, but have not responded to follow-ups

Our search is continuing, but we are exhausting our contacts. Can you offer any additional names, Alexis? Obviously we're not seeking a recommendation from you, just some names we might have overlooked.

Regards.

From: McPherson, Alexis EMPR:EX <Alexis.McPherson@gov.bc.ca>
Sent: Friday December 14, 2018 11:12 AM
To: 'Glen Wallace' <glen@wallace.pro>
Cc: Narynski, Heather M EMPR:EX <Heather.Narynski@gov.bc.ca>; Constable, Lowell EMPR:EX <Lowell.Constable@gov.bc.ca>; Rollo, Andrew EMPR:EX <Andrew.Rollo@gov.bc.ca>; Dunkley, Jim R EMPR:EX <Jim.Dunkley@gov.bc.ca>; Caughill, David EMPR:EX <David.Caughill@gov.bc.ca>
Subject: Great Thunder Gold - Update re. Engineer for Valentine Mountain

Hello Glen,

Can you provide an update on your search for an engineer? Your December 5th reply to EMPR's orders states you had contacted eight engineers at the time of issue; four declined and you were waiting for replies from four others. I'm also interested in which consultants you have contacted.

Regards,

Alexis

Alexis McPherson, M.Sc., P.Eng.

Geotechnical Inspector

Ministry of Energy, Mines and Petroleum Resources

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From: Baldwin, John FLNR:EX
To: "Doug Underhill"
Cc: Steve Adams (adamss@timberwest.com); Robinson, David FLNR:EX
Subject: RE: message
Date: January 23, 2019 8:45:10 AM

Doug – further to my voice mail on your cell, I would like to review the status of the Valentine Brook Dam with TimberWest. Can you confirm a suitable date and time when you are available? I'm in my office today then s.22 John B

From: Doug Underhill [mailto:Doug.Underhill@TimberWest.com]
Sent: Monday, January 21, 2019 3:12 PM
To: Baldwin, John FLNR:EX
Subject: message

Hi John
s.22 I am stuck in meetings all day today.
Are you available tomorrow morning for a call?
Thanks

Mosaic Forest Management
Timberland Manager for TimberWest and Island Timberlands
Doug Underhill P.Eng RPF | Manager of Hydrology and Terrain
T 250-716-3721 C 250-619-6794 E doug.underhill@TimberWest.com

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To: McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
Subject: RE: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Alexis – I have contacted Doug Underhill (250-619-6794) at Mosaic (TimberWest and Island Timberland have joined) today regarding the Valentine structure.

Doug will review options within Mosaic for the dam. Mosaic does not want the dam and is prepared to remove the dam. Any mining tailings within the dam reservoir will need to be addressed. Abandoned mining debris/equipment on the site is a concern to the landowner.
Doug will contact Jim Dunkley regarding Energy and Mines' position on the Great Thunder Gold Corp's risk assessment order and ownership of the structure appeal.
Mosiac has not been in contact with Great Thunder since mid December 2018 on this matter.
Doug confirmed that the site is accessible at this time.

This office is prepared to work with Mosaic to remove Valentine Creek Dam under the WSA.

John Baldwin
Dam Safety Officer

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Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Robinson, David FLNR:EX
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We've continued correspondence with legal re. the appeal and will keep you up to date as this progresses.

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Bruce Musgrave, BMA Engineering (dam engineer)	250 751-7554

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Dunkley, Jim R EMPR:EX

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Sent: May 27, 2019 2:32 PM
To: Baldwin, John FLNR:EX; McPherson, Alexis EMPR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Robinson, David FLNR:EX; Johnson, David A FLNR:EX; Lapcevic, Pat FLNR:EX
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I have spoken with Jason Carvalho of Couverdon (associated with Mosaic) about where EMPR is at currently.

Jim Dunkley, P. Geo
Senior Inspector of Mines

300-1810 Blanshard St
Victoria, BC. V8W 9M9

778 698-7294

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Hello John and David,

Can you please provide an update re. Valentine Mountain and TimberWest? EMPR has continued correspondence with Great Thunder over the past weeks. Great Thunder indicates that they are continuing to look for an engineer to address then immediate order yet maintains they are not responsible for the tailings facility. We're working to figure out a path forward and would appreciate an update from FLNRORD.

Thanks and best regards,
Alexis

From: McPherson, Alexis EMPR:EX
Sent: Tuesday, November 20, 2018 12:43 PM
To: Baldwin, John FLNR:EX; Robinson, David FLNR:EX
Cc: Narynski, Heather M EMPR:EX; Constable, Lowell EMPR:EX; Dunkley, Jim R EMPR:EX; Howe, Diane J EMPR:EX
Subject: Valentine Mountain TSF - EMPR Inspection Order and 2014 DSI

Hello John and David,

Thank you for the call this morning. I expect will be having additional discussions in the coming days and weeks.

I have attached two documents as follows:

1. 2018 11 14 EMPR Geotechnical Inspection (1)
    - Order for immediate remedial action
    - We will cc both of you on the upcoming inspection reports
2. 2014 DSI cover letter
3. 2014 DSI Report
    - Please refer to the figure on pg 131 of the pdf which shown the proximity of the TSF to Bear Creek Reservoir, and the main gully leading to the reservoir.

Please let me know if you have questions.

Best regards,
Alexis

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