



**MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES**  
Mines and Mineral Resources Division

**REPORT OF GEOTECHNICAL INSPECTOR**  
(Issued pursuant to Section 15 of the Mines Act)

**Name of Property:** Myra Falls **Permit No.: M-26**

**General Manager:** Randy McMahon

**Company:** Nystar Myra Falls Ltd.  
**Address:** c/o Split Road  
P.O. Box 8000  
Campbell River, British Columbia  
Canada  
V9W 5E2

**Persons Contacted:** Randy McMahon – General Manager, Nyrstar  
Nicole Pesonen – Environmental Coordinator, Nyrstar  
Joe Armstrong – Mill and Surface Manager, Nyrstar  
Jaime Delgado – Project Manager, Nyrstar  
Nick Pohrivchak – Underground Manager, Nyrstar  
Kevin LeDrew – HSEC Manager, Nyrstar  
[REDACTED] – Onsite Engineering Ltd.  
Dan Hughes-Games – Amec Foster Wheeler  
Dave Johnson – Dumas Mine Contracting  
George Boutilier – Dumas Mine Contracting  
Cody MacDonald – Nyrstar  
Dave Williams – Nyrstar

**Copies To:** Al Hoffman – Chief Inspector of Mines, EMPR  
Diane Howe – Deputy Chief Inspector of Mines, Reclamation and Permitting, EMPR  
Tania Demchuk – Deputy Chief Inspector of Mines, Compliance and Enforcement, EMPR  
Lowell Constable – Manager Geotechnical Engineering, EMPR  
Kim Bellefontaine – Manager Environmental Geoscience & Permitting, EMPR  
Jennifer McConnachie – Reclamation Manager, EMPR  
Jennifer Brash – Geotechnical Engineer, EMPR  
Alexis McPherson – Geotechnical Engineer, EMPR  
Gerry Barcelona – Senior Inspector of Mines, Southwest Region, EMPR

**Date of Inspection:** January 18, 2018

In this report "Code" means the Health Safety and Reclamation Code for Mines in British Columbia

## Introduction

A geotechnical inspection of Myra Falls Mine (the Mine) was conducted on January 18, 2018 by Paul Hughes, PhD, P.Eng, Contract Inspector of Mines (Geotechnical) with The Ministry of Energy, Mines and Petroleum Resources (EMPR), accompanied by Jennifer Brash and Alexis McPherson (Geotechnical Engineers with EMPR).

The purpose of the inspection was as follows:

- To assess whether the Mine is meeting the intent of the geotechnical requirements of the Code.
- To assess whether the Mine is meeting the intent of the geotechnical conditions in its Mines Act Permit.
- To assess whether geotechnical engineering practices at the Mine are consistent with generally accepted practices at mines in British Columbia.
- To provide general comment on geotechnical conditions at the Mine.
- To perform a site reconnaissance in support of an ongoing EMPR review of a *Mines Act* Permit Amendment application for new facilities proposed as part of the mine restart.

The Mine is currently under care and maintenance with no underground production or ore milling occurring at time of the site visit. The mine is working towards a planned restart of operations in early 2018. This site visit occurred in conjunction with a January 17, 2018 Mine Review Committee (MRC) meeting, held to discuss outstanding review comments regarding the Mine Permit Amendment application. The MRC meeting was held in Campbell River and organized by the Major Mines Permitting Office.

Paul Hughes, Jennifer Brash and Alexis McPherson arrived at the Myra Falls Mine at approximately 8:45 am. Phylis Radchenko of Nyrstar provided a site specific health and safety orientation. Weather conditions at the Mine were approximately 1 to 5°C, foggy and rainy, with heavy rain at times.

The itinerary had been previously arranged with Randy McMahon (Nyrstar), and included the following areas:

1. Jim Mitchell Lake Road, and Price Mine 13 Portal and Loadout Area
2. Borrow and Quarry (note that the borrow was inaccessible so was not visited)
3. Old TDF
4. Lynx TDF
5. Proposed ore stockpile pad area
6. Myra Mine 2400 Level
7. Proposed Lynx/Arnica Haul Road
8. Lynx Mine 6 Portal and Waste Area
9. Proposed Ore/Waste Chute Alignment from Lynx Mine 6 Portal

The tour was completed in three segments. The surface tour (areas 1 through 5 listed above) was led by Nicole Pesonen (Nyrstar), with Joe Armstrong (Nyrstar) and [REDACTED] (Onsite); the underground tour (area 6 listed above) was led by Dave Johnston (Dumas Mine Contracting) with Nick Pohrivchuk, Cody MacDonald, and Dave Williams (Nyrstar); and the Lynx Haul Road and Portal tour (areas 7 through 9 listed above) was led by George Boutilier (Dumas Mine Contracting).

Paul Hughes debriefed the mine manager's designates, Nick Pohrivchuk and Kevin LeDrew, after all tours were complete.

This inspection report summarizes observations made during the site visit, and actions required for follow-up. Where applicable, inspection orders have been included in italics. The General Manager is asked to respond in red text in the space provided below each inspection order. All geotechnical inspection orders are made under section 18(a) of the Mines Act and/or under Part 1.1.2 of the Code.

This report is governed by the conditions and limitations set forth in the *Mines Act* and Code, and has been prepared in a manner consistent with the level of care and skill ordinarily exercised for such work at BC Mines subject to the time limits and physical constraints applicable to the work. This report is based on observations of select areas at the Mine.

## **OBSERVATIONS, COMMENTS AND INSPECTION ORDERS**

### **Location: Jim Mitchell Lake Road, and Price Mine 13 Loadout Area and Portal**

#### **Observations and Comments:**

The Jim Mitchell Lake Road is a public road. It is generally located between the adjacent creek and rocky slopes, which have been locally blasted (Photo 1). Nyrstar is proposing to use this road for hauling ore and waste to the mill area. As such, proposed upgrades to the roadway to incorporate berms and provide the required haul road dimensions were presented in the *Mines Act* permit amendment application. Work completed to date includes routine maintenance and marking of blast/scaling areas for road upgrades. Nicole Pesonen (Nyrstar) noted that mine ore and waste hauling would use highway trucks, and would occur on one weeknight per week, with public access fully restricted during these times.

The Price Mine 13 Loadout Area (Photo 2) is located off the Jim Mitchell road, previously allowing railcars from the Price 13 portal to dump to a loadout area. The Nyrstar identified Polishing Pond 2 is located downstream of the loadout area. The proposed upgrades to this area include provision of a turn-around area for trucks, realignment/grading of the roadway, culvert upgrades, and provision of separation between the loadout area and the public road.

The Price Mine 13 Portal appeared secured against entry, and has an existing headcover structure. The slope above the portal appeared to be overhanging with a wedge block visible (Photo 3).

A request to visit the other Price Mine Portals was denied due to safety concerns with the access road. Nyrstar discussed their plans to unblock an ore pass at the Price mine.

**Advisory 1:**

*EMPR advises that a notice of work will be required prior to unplugging the Price zone ore pass.*

*Manager's Response*

**Location: NAG Quarry**

**Observations and Comments:**

It was observed that several points of sediment-laden water were observed to be either entering Myra Creek or to have potential to enter Myra Creek. This includes flows off the South abutment of the bridge, ponding/flows near Pumphouse 4 (Photo 4), and ponding/flows near the end of the NAG Quarry road. An Inspection Order was previously issued with respect to erosion control and management of sediment laden waters (Site Inspection dated October 25, 2017 Inspection Order 1). At that time Nyrstar committed to redirection of sediment laden waters away from the creek immediately, and provision of an Operation Erosion Control Plan on March 31, 2018.

The NAG Quarry is currently inactive, however expansion of this quarry is proposed under the mine restart permitting application. At the time of inspection, the upslope diversion ditches were not operational and water was flowing down the quarry face and accumulating in low spots at the base of the quarry (Photos 5 and 6).

**Location: Old TDF**

**Observations and Comments:**

The Old TDF currently is not receiving tails. Ponding was observed on the impoundment; Nyrstar stated that this ponding drains to decant structures.

The upslope diversion ditch with concrete cloth erosion protection (Photo 7) and a debris catch barrier (Photo 8) were toured as part of the inspection. Several instances of upslope water entering the fill surrounding the ditch (and thus bypassing its containment) were observed. The debris catch area was empty, despite significant antecedent rain.

Nyrstar (Nicole Pesonen) noted that uncontrolled flows down the face of the dam (previously discussed in EMPR inspection report dated October 25, 2017) continue to occur. It was noted that the uncontrolled flows down the face of the Old TDF are not permitted discharges. In further conversation on this topic, Ms. Pesonen indicated that the ponding at the surface of the Old TDF was not thought to be the source of the discharges, but rather that they were associated with upslope seepage through the impoundment.



**Inspection Order 1:**

*Pursuant to Section 18(a) of the Mines Act, the Mine shall prepare an engineering assessment of the flows observed on the face of the Old TDF dam, including discussion of the source of the water, the potential for internal piping and other dam safety issues, prepared by the Old TDF Engineer-of-Record (EoR), and submit this document to the Chief Inspector by March 31, 2018. The report shall provide recommendations for mitigating or directing the flows as required.*

***Manager's Response***

**Location: Lynx TDF**

**Observations and Comments:**

At the time of the site visit, the EoR (Amec Foster Wheeler) was on site performing an inspection of the facility. A raise was recently completed on the Lynx TDF dam. Amec Foster Wheeler (Dan Hughes-Games) noted that the upper portion of the upstream zone was completed with till, as other material was not available. Adequate freeboard was noted in the Pond (Photo 9). Surface flows from the upslope waste rock dumps were reporting to the TDF pond (Photo 10).

**Location: Proposed Ore Stockpile Area**

**Observations and Comments:**

The proposed Ore Stockpile Area (Photo 11) is located near the mill and conveyors. The design of the stockpile pad is currently under review by EMPR as part of the ongoing *Mines Act* permit amendment process. However, at site, it was observed that the ore stockpile pad had already been largely constructed. Onsite [REDACTED] noted that the pad was constructed largely in accordance with the Rev. 4 IFC drawing plans that were submitted to the Ministry for permitting, with the addition of a retaining wall at the east limit of the pad. Remaining works to be constructed for the ore stockpile pad include placement of a rockfall fence and local site grading/backfilling. [REDACTED] Nyrstar's design engineer for the stockpile, reported that construction of the unpermitted ore stockpile pad occurred between early December 2017 and early January 2018.

During the inspection, EMPR notified Nyrstar staff that construction of the stockpile had yet to be approved as part of the Permit Amendment application and it is an unpermitted facility. Jaime Delgado (Nyrstar) explained that the decision was made to construct the stockpile pad without a permit in order to get the geomembrane liner installation done prior to the adverse

construction weather expected in the winter and to have the area ready in time for the planned ore production.

**Inspection Order 2:**

*Construction of the ore stockpile pad without a permit is in violation of Sections 10.1.2(2) and 10.1.18 of the Code. 'all construction works at the ore stockpile pad shall immediately cease and shall not resume until a Mines Act permit for this work has been granted by the Chief Inspector. The information requirements for permitting will be communicated through the ongoing permit application review process.*

**Manager's Response**

**Location: Myra Mine Shaft and 2400 Level**

**Observations and Comments:**

The slope behind the HW shaft is steep and has experienced raveling in the past. Nyrstar confirmed that Onsite Engineering Ltd. is designing a plan of work for slope stabilization.

**Advisory 2:**

*EMPR advises that the design report for stabilization of the slope above the HW shaft must be prepared and approved by a Professional Engineer and submitted to the Chief Inspector prior to the start of the proposed stabilization works.*

**Manager's Response**

Rehabilitation works were ongoing at the 2400 level of the HW mine. Dumas advised that they had 63 personnel working underground on various projects associated with the restart of operations. Crews from Dumas had advanced approximately 1 km into the workings (of a planned 4 km of rehabilitation). Dumas crews were removing old support, installing new support (1.2 m x 1.2 m pattern of full-resin grouted rebar bolts with mesh), removing old trolley lines, and removing and replacing water and air lines. Dumas reported that 2% of bolts were being pull-tested and to date all but one bolt has passed the pull test. One refuge station had been upgraded. Works on replacement of rail lines was to begin shortly. Nyrstar

advised that two existing chutes were to be decommissioned and 1 chute was to be retrofitted. Fire suppression system upgrades were underway.

EMPR is satisfied with the progress thus far and looks forward to continued proactive ground support planning at Myra Falls.

**Location: Lynx/Arnica Road**

**Observations and Comments:**

The road up to the Lynx 6 portal is cut into steep forested terrain. The road includes sections of steep grades and tight switchbacks, and required 4x4 truck access at the time of the site visit. Some cut slopes were steep to locally undercut/overhanging. This road is not suitable for use for hauling ore or waste material from the Lynx Portal without significant upgrades.

**Advisory 3:**

*EMPR advises that, to remain compliant with Section 6.9.1(2)(b)(ii) of the Code, the Lynx/Arnica road must not be used for waste or ore truck haulage until upgrades to the road are permitted and implemented.*

***Manager's Response***

**Location: Lynx Mine 6 Portal and Waste Area**

**Observations and Comments:**

The Lynx 6 portal is located in an overhanging rock face (Photo 12). Dumas crews have installed new support (strapping and bolts) at the portal area and portal nose. Slashing and installation of ground support had advanced approximately 20 m into the Lynx workings. Dumas advised that a headcover would be installed once the development within the portal has advanced a sufficient distance that fly rock would not damage the headcover.

Waste from the slashing is currently being piled at the portal area. At present, the Mine is nearing the physical limit of placing waste rock around the portal area. Nyrstar is now considering alternative options for waste handling (see commentary below).



**Inspection Order 3:**

*Per Section 6.1.1 of the Code, the Mine shall submit to the Chief Inspector the design and installation schedule for the Lynx 6 portal headcover, by March 31, 2018. No mining in the Lynx area is permitted without the installation of a head cover outside of the portal.*

***Manager's Response***

**Location: Ore/Waste Chute Alignment**

**Observations and Comments:**

The proposed alignment/location of the ore/waste chute connecting the Lynx 6 portal with the mill was viewed (as able) from the vantage of the Lynx TDF dam and from the Lynx 6 portal. The concept of an ore/waste chute arose from objections to tree clearing along the proposed Lynx-Arnica Haul Road, necessitating consideration of an alternate method of ore and waste rock transportation from the Lynx Mine 6 Portal to the Mill.

The proposed chute will run over very steep ground comprising areas of both natural ground and historic waste rock dumps.

**Advisory 4:**

*Nyrstar is reminded before construction activities begin that EMPR will require detailed designs of the ore/waste chute for permitting review. Pursuant to Sections 10.1.2(2)(1) and 10.1.2 18 of the Code, no work may proceed without the Chief Inspector granting a permit or authorization.*

***Manager's Response***

## **CLOSURE**

Under Section 15 (6) of the Mines Act, a written response is required from the General Manager within 15 days of the receipt of this Inspection Report. Please address response to undersigned with copies to Gerry Barcelona. 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 the undersigned with any questions or comments.



Paul Hughes, PhD, P.Eng.  
*Consulting Inspector of Mines (Geotechnical)*  
*Ministry of Energy, Mines and Petroleum Resources*  
Dated: January 25, 2018



**Photo 1: Jim Mitchell Lake Road**





**Photo 2: Price Portal Loadout**





**Photo 3: Price Portal**





**Photo 4: Sediment Discharge to Myra Creek near Pumphouse 4**



**Photo 5: NAG Quarry (1 of 2)**





**Photo 6: NAG Quarry (2 of 2)**



**Photo 7: Lower Lynx Diversion Ditch**





**Photo 8: Debris Catch Barrier**





**Photo 9: Lynx TDF Crest Looking SSE.**



**Photo 10: Lynx TDF Upslope Waste Rock Dumps**





**Photo 11: Ore Stockpile Area**





**Photo 12: Lynx Mine 6 Portal**

