MINISTRY OF ENERGY AND MINES
Mines and Mineral Resources Division

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

Name of Property: Equity Silver
Permit No.: M-114

Mine Manager: Mike Aziz
Company: Goldcorp, Equity Mine
Address: P.O Box 1450
Houston, BC
V0J 1Z0

Persons Contacted: Mike Aziz

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Heather Narynski, Senior Geotechnical Inspector, BCMEM

Date of Inspection: July 3, 2013

In this document, “Code” means the Health, Safety and Reclamation Code for Mines in British Columbia

INTRODUCTION

An inspection of the Equity Mine was conducted by Chris Carr on July 3, 2013 in the company of Doug Flynn and George Warnock (BC Ministry of Energy and Mines), and Mike Aziz (Manager, Equity Silver Operations). Observations made during the inspection, and actions required to follow-up on this inspection report are summarized below.

The purpose of this inspection was as follows:
- To determine if the mine is meeting the requirements of the Code.
- To determine if geotechnical practices at the mine are consistent with generally accepted engineering practices at mines in British Columbia.
- To identify potential ground stability hazards or concerns at the mine.

The following areas were inspected during the mine tour:
- Tailings Storage Facility dams
- ARD collection pond dams
- Bessemer Creek Silt Check Dam and spillway

The following areas were viewed from a distance:
- TSF No. 1 Seepage Pond Dam
- ARD storage ponds and dams
- Sludge ponds
The following areas were included in the mine tour:
- Southern Tail Pit Waste Dump
- Lu Lake water reservoir spillway
- Main Zone Pit

The Equity Silver Mine has continued ARD collection and treatment since the mine closed in 1994.

A brief meeting was held with the mine manager to review the layout of mine facilities and to discuss the geotechnical engineering management program.

Geotechnical services associated with dam safety and performance of the water management structures is provided by AMEC Earth and Environmental.

The following reports were reviewed prior to the mine inspection:
- 2010 Dam Safety Review Report prepared by AMEC dated 28 February 2011
- Assessment of Bessemer Creek Silt Check Spillway prepared by AMEC dated 17 August 2011.
- Interim Repair of Bessemer Creek Silt Check Spillway prepared by AMEC dated 20 October 2011.

**OBSERVATIONS AND INSPECTION ORDERS**

**Tailings Storage Facility Dams**

Observations at the crest of Dam No.1 and Diversion Dam did not reveal any adverse geotechnical stability conditions (see Photos 1 and 3). Rip rap placed on the upstream slope of Dam No. 1 appears to control erosion. The No.1 Seepage Pond Dam was viewed from the crest of Dam No.1 (see Photo 2).

It is understood that recommended upgrades to the TSF spillway have been completed.

The following dam classifications were assigned to the TSF dams based on the 2010 Dam Safety Review (DSR):

Dam No.1: Very High
Diversion Dam: Very High
Dam No. 2: Very High
No. 1 Seepage Pond Dam: Significant

The Incremental Consequence Classification (ICC) evaluation included in the 2010 DSR recommended that dam break analyses be completed for Dam No.1, Diversion Dam and Dam No. 2 to evaluate potential impacts and extent of flood inundation.

*A schedule for completing the recommended dam break analysis shall be provided to the Ministry by July 31, 2013.*

**ARD Collection Pond Dams**

The water level in most of the ARD collection ponds was relatively low and the dams appeared to be in good condition (see Photos 4, 5, 6 and 7).
Recommended upgrades to the spillways have not been completed.

A schedule for replacing or upgrading the spillways at each of the ARD collection ponds shall be provided to the Ministry by July 31, 2013.

The following dam classifications were assigned to the ARD collection pond dams based on the 2010 DSR:

ARD Surge Pond Dam: Significant
Main ARD Pond Dam: Significant
No. 1 Sump Dam: Significant
Getty Creek Sump Dam: Significant

The ICC evaluation included in the 2010 DSR recommended that a flood routing analysis from a cascade failure mode be completed for the ARD collection ponds.

A schedule for completing the recommended flood routing analysis shall be provided to the Ministry by July 31, 2013.

The dam classification for the ARD collection ponds shall be re-evaluated based on the results of the flood routing analysis.

The dam classification for the ARD collection ponds shall consider the environmental effects of release of ARD on water quality in Bessemer Creek and the receiving environment downstream and shall confirm that there is no “important” or “critical” fish or wildlife habitat within the potential flood inundation area.

**ARD and Sludge Storage Ponds and Dykes**

The ARD storage ponds and dykes were observed from the crest of the TSF Diversion Dam (see Photo 8).

The following dam classifications were assigned to the ARD and Sludge Storage Pond dams based on the 2010 DSR:

Sludge Ponds: Low
ARD Storage Pond and South Dyke: High
Splitter Dyke: Significant
Dam No. 3: Significant

The ICC evaluation included in the 2010 DSR recommended that dam break analyses be completed on the ARD Storage Pond and South Dyke.

A schedule for completing the recommended dam break analysis shall be provided to the Ministry by July 31, 2013.

**Bessemer Creek Silt Check Dam**

The Bessemer Creek Silt Check pond is located on Bessemer Creek downstream of the ARD collection ponds. The pond has a water licence and is subject to the BC Dam Safety Regulations.

The dam and spillway appeared to be in good condition (see Photos 9 and 10).
Based on the 2010 DSR the dam has been classified as High consequence due to significant environmental impacts if silt is released.

The ICC evaluation included in the 2010 DSR recommended that dam break analyses be completed on the Bessemer Creek Silt Check Dam.

A schedule for completing the recommended dam break analysis shall be provided to the Ministry by July 31, 2013.

The height of the Bessemer Creek Silt Check Dam and the size of the spillway do not meet the design requirements for passing the design flood flow based on the Canadian Dam Association guidelines. Options are being considered including reconstruction of a new dam and spillway, complete removal of the dam and spillway and reduction in the height of the dam.

The Ministry shall be informed when a decision is made regarding plans for the Bessemer Creek Silt Check Dam.

**Waste Rock Dumps**

All waste rock dumps have been re-sloped/reclaimed and no high risk dumps have been identified.

Local seepage on the face of the Southern Tail Pit waste dump (see Photo 11) is monitored regularly as part of the annual inspection by AMEC.

*Waste dump stability in the area of the seepage shall continue to be monitored.*

**Lu Lake Dam**

The Lu Lake reservoir provides water supply for the Equity Mine. The reservoir and dam are subject to BC Dam Safety Regulations.

Action has been taken to increase the reservoir freeboard by removing some of the stop logs in the spillway weir (see Photo 12) however it is not clear if the water level has been lowered sufficiently to meet the design freeboard.

Lu Lake Dam is classified as Significant consequence.

**OMS and Emergency Preparedness Plan**

The OMS manual, including emergency preparedness, was last updated in 2012.

*The OMS manual shall be updated as necessary following re-evaluation of the dam classifications.*

*The EPP shall be updated as necessary based on the results of the dam break inundation study/flood routing analysis.*

The 2010 DSR recommended that an emergency simulation exercise be carried out to test the EPP.

*A schedule for completing the EPP emergency simulation shall be provided to the Ministry by July 31, 2013.*
**Dam Safety Review**

The next formal dam safety review is due to be completed in 2015.

**CLOSURE**

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. 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.

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*Chris Carr, P. Eng.*
*Geotechnical Mines Inspector*
*On behalf of Ministry of Energy and Mines*

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*Signature*

Dated: July 5, 2013
Photo 1: TSF Dam No.1 upstream crest view to east

Photo 2: TSF No. 1 Seepage Pond Dam view to north from TSF dam crest
Photo 3: TSF Diversion Dam downstream slope view to south

Photo 4: ARD Surge Pond Dam and spillway view to south
Photo 5: Main ARD Pond Dam and culvert spillway view to north

Photo 6: No.1 Sump view west from Main ARD Pond Dam
Photo 7: Getty Sump Dam and spillway view to south

Photo 8: ARD storage ponds and dykes view southwest from TSF
Photo 9: Bessemer Creek Silt Check Dam view to northeast

Photo 10: Bessemer Creek Silt Check Dam spillway view to north
Photo 11: Seepage from Southern Tail Pit Waste Dump

Photo 12: Lu Lake Dam spillway