



Ministry of
Energy and Mines

Province of British Columbia
MINISTRY OF ENERGY AND MINES
Report of Inspector of Mines
Reclamation
(Issued pursuant to Section 15 of the *Mines Act*)

Inspection No.: 59777
File: «FILE_NO»
Mine No.: 0100019
Permit No.: M-232
Emp/Cont: 1
Orders : 2
Stop Work:

Mine Name: Tulsequah Chief
Location: Atlin MD / 58.737, -133.600
Owner, Manager: Keith Boyle, Terry Zanger

Company: Chieftain Metals Inc
Address: Unit 118, 1515 Broadway Street
Port Coquitlam BC V3C 6M2

Workers Contacted: 1

Type of Mining: METAL MINE UNDERGROUND
Date of Inspection: 2015/10/15
Accompanying Inspectors: Mark Love (MOE), Neil Bailey (MOE)

Copies to Al Hoffman, Doug Flynn, Heather Narynski, Mark Love (MOE), Chris Parks (EAO)

Written response is required from the Mine Manager within 15 days of receiving the report. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

This inspection of Tulsequah Chief Mine, owned by Chieftain Metals Inc (CMI) was conducted on October 15, 2015 by Diane Howe (MEM Deputy Chief Inspector-Permitting), Neil Bailey (MOE Compliance), and Mark Love (MOE Director), accompanied by Terry Zanger (Chieftain Mine Manager) and Rob Marsland (environmental engineer, Chieftain Contactor). Access to the site was via helicopter from Atlin (45 mins). The weather at the site was cloudy/overcast in the morning changing to a drizzle with snow predicted later in the afternoon in Atlin. Access using the helicopter limited the inspection to 3.5 hours.

At the time of the inspection, 2 employees and 1 contractor were in camp, completing their monthly monitoring requirements and preparing the camp for winter. The mine has been on a care and maintenance status since June 2012.

The purpose of this inspection was visit the surface works at the mine and provide an opportunity to become familiar with the site and specifically:

- To assess if the mine is meeting the intent of their mine permit (M-232), the HSR Code and Mines Act,
- To assess if mine monitoring and management practices at the mine are consistent with generally acceptable practices at mines in BC that are on care and maintenance; and

Diane Howe

Deputy Chief Inspector

6th Floor, 1810 Blanshard St., Victoria

Address

Signature – Inspector of Mines

Report Date: November 9, 2015

- To provide general comment on conditions at the mine.

The following areas were inspected during the mine visit:

- Lime Sludge Pit at Shaza airstrip
- 5400 portal area
- 5200 portal area
- Minesite exfiltration pond
- Mine Acid Water Treatment Plant (AWTP)
- Cleared areas around Rogers Creek (future location of HPAG, NAG waste rock dumps)

The following reports provided a general understanding of the current conditions of the site: the 2014 Annual Reclamation Report, 2014 Annual Environmental Monitoring report and the 2015 Closure Management Manual submitted to MEM, as well as the observations and discussion that occurred on-site and during the inspection. This report documents MEM's observations related to requirements of the M-232 permit, the *Health, Safety and Reclamation Code for Mines in BC*, and established best practices.

Note space has been provided after each Order/recommendation for the Mine managers response.

Background

The mine is a historical, small, underground base metal operation which saw production from 1951 to 1957; (pre reclamation legislation) at which time the mine closed due to low metal prices. There still remains today legacy metal leaching/acid mine drainage/ (ML/ARD) concerns with water moving through the underground workings picking up contamination and discharging through the lower portals, plus surface drainage from the historical PAG waste rock left on site. There are no tailings facilities on site. Total disturbance reported in the 2014 Annual Reclamation Report was 105.8 ha, with ~50% being road construction.

In 2007 the company (then Redfern Resources Ltd.) applied for and received a Mines Act permit for limited construction works. This application was to allow the company to start with the clean-up of historical waste rock and dumps and construct water management structures to support the water treatment plant (WTP). In 2008 the company applied for an amendment to their mine permit which would have led to a full production permit, however the company went into bankruptcy protection. A limited amount of construction works permitted have been completed to date, critical however was the purchase of the water treatment plant (WTP).

In early 2010 the mine acquired by Chieftain Metals Inc. (CMI), who have now responsible for all liability existing on site under the Mines Act. One of CMI's first actions was to construct and start operating the WTP. The WTP was commissioned in October 2011 but was suspended in June 2012 because the plant had been operating below design levels of efficiency resulting in higher than expected operating costs. The design flaw is in the sludge production not in the quality of effluent being produced. The plant remains idle pending an upgrade to the sludge settling efficiency. Of note is the long term plan for sludge management was to dispose underground, however with the underground not in operation the company had to find an alternative disposal location for high slurry sludge

The mine remains on care and maintenance and remains unattended with only bi-weekly surveillance and environmental sampling visits. Remote monitoring is provided by building alarms and security cameras with satellite communication connections. If alarms are triggered, personal based in Whitehorse or Atlin will attend the site.

Inspection Observations

Lime Sludge Pit at Shaza Strip

The temporary lime sludge storage pit, located just off the airstrip, contains approximate 35m³ of sludge generated from the WTP and is lined with a filter fabric to prevent migration of the sludge to the subsurface gravel. No deposition has occurred since the WTP shut down in June 2012. CMI maintains monitoring from 3 groundwater wells. CMI has committed, should mine operations not resume, to relocating the sludge to a secure location to the Rogers Creek area, which will be capped and re-vegetated.



Photo 1: Lime Sludge Pit Shaza AirStrip.

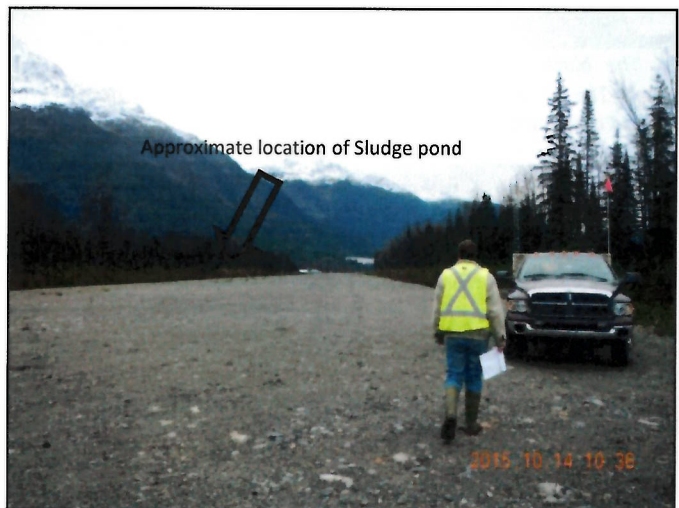


Photo 2: Shaza Airstrip location of Sludge Pit

5400 portal drainage

The 5400 portal, the upper most accessible portal, has been appropriately signed with "Danger No Entry" signage and is currently blocked by locked wooden doors. Limited work has been done at this portal site other than to remove the historic track from the underground and reconfigure the drainage exiting the portal. In 2011 CMI separated the acidic from non-acidic drainage inside the mine and today the non-acidic drainage (in black pipe Photo 3) is conveyed to Portal Creek where they are combined (photo 4) and directly discharged to the Tulsequah River via a buried (partial) 600mm HDPE pipeline.

The acidic drainage seen exiting the mine as an orange flow (approx. 1L/s)(Photo 3) is captured in a pipe near the portal and is directly conveyed by a buried pipeline to the exfiltration pond located near the Tulsequah River. All drainage from the 5400 portal has been directed away from the historical waste thus limiting contaminated flows. (Photos 5 and 6)

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Photo 3: The black pipe is diverting neutral drainage captured underground; The Fe stained drainage (acidic) is flowing freely from the portal and is captured in a pipe in the foreground.



Photo 4: The neutral drainage is combined with the Portal Creek drainage into a HDPE pipe and diverted away from historical waste rock to the Tulsequah River



Photo 5: The black pipe (arrow) is the acidic discharge from the 5400 portal. Portal Creek and the combined non-acidic drainage discharge to the left of the picture in an underground HDPE pipe.



Photo 6: showing the historical PAG rock left from early mining. The ~80,000 tonnes of material to be relocated once mining restarts to the PAG dump on Rogers Creek.

5200 Portal

The 5200 portal, the lower most accessible portal is appropriately signed with "Danger No Entry" signs but the wood door is open to allow the passage of the discharge pipe seen in photo (Photo 7). Within 300 meters inside the entrance however, is a 1.8 m high dam used as part of an inactive passive water treatment system and the tunnel beyond is partially flooded. Acidic flow from this portal; which also includes partial flow from the 5400 and 5900 levels, averages ~ 7L/s.

At the time of this inspection, the 5200 acidic discharge was being directly discharged to the Tulsequah River (Photo 8). MOE officials accompanying the author sampled at the end of pipe at this location. It is understood that the direct discharge to the Tulsequah River was also done last year during the high flow period in order to minimize sludge build up in the exfiltration pond thereby and reducing the hydraulic loading on the pond. (MEM understands this direct discharge has not approved by MOE and discussions are ongoing.)

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Photo 7: 5200 Portal. Acidic discharge is in smaller pipe exiting mine. 5400 non acidic and Portal creek water is contained in the larger pipe located above the portal.



Photo 8: 5200 acidic portal discharge to Tulsequah River

Notable in Photo 7 is the 600mm HDPE pipe over top of the 5200 Portal entrance which is conveying the Portal Creek and 5400 non-acidic drainage to the Tulsequah River. The pipe requires ongoing monitoring and maintenance because of rock falling onto the pipe and at times crushing the pipe causing leakage. From the photo it can be seen the pipe is currently leaking with water spilling down to pond in front of the Portal. This pond drains into the ex-filtration pond via ditching and a culvert under the road.

Ex Filtration Pond

The observed ex-filtration pond was constructed in 2011 and was reportedly built to capture site drainage from the PAG waste dumps (Photos 9-11). Currently it is being used to capture all drainage, including the portal drainage, where the contaminated discharge is allowed to ex-filtrate through the road berm to the Tulsequah River (Photo 12). A filter fabric is used to prevent the migration of the Fe sludge into the dam rock void spaces would effectively block the diffuse flow. As noted in the 2014 ARR the sludge built up in 2013/14 nearly causing the pond to overflow requiring remediation to be taken by the company. (Note this incident was not reported to MEM)

A review of the applications submitted to MEM show the current ex filtration pond has not been built in accordance with the designs provided to the province. (Note MEM has not approved the design, construction or operation of this pond.)

A significant concern is the proper operation of the pond given there is no spillway observed and there is no continuous onsite presence.

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Photo 9: Exfiltration pond receiving ditch water from the 5200 portal



Photo 10: Exfiltration pond receiving acidic discharge from the 5400 portal



Photo 11 Exfiltration pond. Note high water level of sludge.



Photo 12: Diffuse discharge location through berm onto the Tulsequah river floodplain.

Acid Water Treatment Plant (WTP)

The WTP was constructed in its current location in 2011 after receiving approvals from the province to relocate and upgrade the previously proposed WTP (Photos 13, 14). The WTP is designed to treat acidic discharge on a temporary basis until the upper mine workings could be backfilled as per the mine design proposed in 2009. The plant ran from October 2011 till June 22, 2012 at which time operations were suspended due to operational issues. Since that time the company has sought guidance on process modification strategies to address the high operating costs. CMI has stated they are committed to re-commissioning the WTP at the earliest time upon completion of full project financing.

Noted during the inspection, beside the WTP, was another sludge pond which has not been approved by MEM (Photo 15)

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Photo 13: Acid Water Treatment Plant



Photo 14: Inside the AWTP



Photo 15: Temporay Sludge pond beside AWTP



Photo 16: Site Collection Pond

Rogers Creek Area (HPAG and NAG areas)

Other than clearing, and some minor construction of berms the areas reserved for PAG and NAG waste rock storage has been minimal (Photo 18). Access to these areas from the main mine site is good; the causeway remains in good condition (Photo 17).

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Photo 17; Causeway between mine and Rogers Creek area.



Photo 18: Clearing for the PAG and NAG waste rock areas.

Orders

The following orders are summarized based on observations and discussions that occurred on-site:

1. Pursuant to HSRC 10.5.1 and 10.5.2, the company shall provide to the Chief Inspector by March 31, 2016, or earlier, an as-built report for the exfiltration pond signed by a qualified professional engineer.

Managers response:

2. Pursuant to HSRC 10.5.2, the company shall provide to the Chief Inspector by March 31, 2016, or earlier an Operation, Maintenance and Surveillance manual for the exfiltration pond operations to include all other water management structures, including diversion structures.

Managers response:

Information Requirements

The following information requirements are summarized based on observations and discussions that occurred on-site

3. Prior to resuming operations of the sludge pond located beside the WTP, CMI shall provide to the Chief Inspector a final "as built" for the pond, and an operations, maintenance and surveillance manual. This may be combined with the OMS for the WTP once operations resume.

Managers response:

4. CMI shall provide in the next annual report or upon restart of operations, which ever comes sooner, a plan for the decommissioning of this pond

Managers response:

5. Prior to resuming operations of the WTP, CMI shall provide to the Chief Inspector final electrical line diagrams and building construction plans signed and sealed by a qualified professional.

Managers response:

Conclusion

The October 15th, 2015 inspection provided an excellent overview of the current mine site conditions and ongoing activities. Although the mine is on care and maintenance CMI continues to fulfill their obligations for monitoring and maintenance of the site. While the company does remain vigilant in this regard, this inspection has found that communication with the Province with respect to obtaining approvals and reporting issues need to be improved.

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