

Glacier Gulch Water Group's comments on Thompson Creek Metals' 2013 Davidson Project Care and Maintenance Plan and Closure Report Update

GGWG 1 June 2013

Thompson Creek Metals' (TCM) Davidson project property covers the upper portion of the Kathlyn creek community watershed that supplies domestic water to a number of residences in the area, including the members of Glacier Gulch Water Group (GGWG). The Davidson infrastructure, activities and closure plan have the potential to both directly and indirectly negatively impact GGWG's water source. In order to protect our watershed GGWG has remained engaged with TCM, The Ministry of Energy, Mines and Natural Gas (MEMNG), Ministry of the Environment (MOE) and other public officials through all phases of the Davidson Project. We continue that engagement with these comments on TCM's 2013 Davidson Project Care and Maintenance Plan and Closure Report Update (DPCMPCR). Thank you for this opportunity to comment.

1.1 Objectives from 2006 Closure Plan

In the DPCMPCR the objectives of the 2006 closure plan is described as "to reclaim significant portions of the Davidson property."

However, the objective for the 2006 Closure Plan as given in the original document reads, "to address issues raised by the Ministry of Energy, Mines and Petroleum Resources and thus return the Davidson property to a state comparable to that which existed prior to exploration." MEMNG accepted the 2006 Closure Plan as the reclamation part of the 19 May 2006 Notice of Work (NOW).

In the earlier NOW dated 5 Jul 2005 MEMNG accepted a reclamation plan that "would consist of scarifying the road surface and seeding the waste storage areas and the road surface."

After TCM abandoned the Davidson Project Environmental Assessment (EA) application GGWG discussed the NOW closure with MEMNG. In particular the implications of the new information about the Davidson project that became available as a result of the EA application studies and the process for public comments. GGWG was told that TCM would be asked to revise the 2006 closure plan to incorporate the new information and that the PLC members could comment on the closure plan after these revisions. The DPCMPCR and these comments are the result.

From GGWG's perspective the DPCMPCR deviates significantly from the objectives of the 2005 and 2006 reclamation/closure objectives and the intent of them being revised. GGWG finds the DPCMPCR significantly deficient and requests that the issues we raise below (numbered with a parenthesis) be addressed to our satisfaction.

- 1) GGWG's position is that after Closure we should no longer be burdened with domestic watershed concerns related to the Davidson project. In overview: After Closure there will no longer be metal rich (arsenic in particular) mine water entering our watershed, nor people entering the watershed along the adit access road to engage in inappropriate activities that could directly or indirectly affect the quantity or quality of our water. The ideal plan would make sure that, post closure there would be no need to rely on the ongoing actions of TCM (or another company) to ensure that all of our concerns are met over the long term. The DPCMPCR does not come close to meeting our concerns.
- 2) How will MEMNG and MOE ensure that TCM's Closure plan adequately reflects the ongoing use of the Kathlyn creek watershed as a community supply of domestic water? How will MEMNG and MOE relieve GGWG of the difficulties the current status of the Davidson project imposes on them in their attempts to protect and maintain their source of water?
- 3) Who is the corporate authority responsible for direct and indirect impacts on the watershed and

water during care and maintenance, closure and post closure? TCM or its wholly owned subsidiary Blue Pearl Mining (BPM)? How will the government ensure that the responsible authority will have sufficient funds to assume its long term responsibilities? Who is liable for undesirable consequences if the draft closure plan is implemented as proposed?

4) Many aspects of the Closure implementation procedures outlined in the 2006 Closure are missing from the DPCMPCR. Some of these omissions are noted in these comments.

5) In the DPCMPCR there is essentially no discussion about closure plan contingencies and alterations to the plan that may be required during implementation.

2. Closure Work Plan

2.1 Infrastructure Removal

2.1.1.3 Re-vegetation

6) GGWG requests that all re-vegetation efforts use indigenous seed. Synthetic fertilizer should not be used. The stockpiled unused organic material is available to supplement fertility.

- We request this because the plants from agronomic seed provide a greater than normal attractant for wild animals to enter our domestic watershed. Note that in TCM's Environmental Assessment submission, V. 1 page 4-16, TCM said they would use "native shrubs and plants" for reclamation work.
- TCM's previous use of synthetic fertilizer, despite our request for them not to, resulted in the access road ditches running green with an algal bloom. That excess fertilizer likely entered the watershed creeks from these ditches.

2.1.2.2 Works Outstanding and Recommendations

7) How will the remaining monitoring wells and their collars be decommissioned?

8) Prior to the construction of the ML/ARD test pad at the portal the mines inspector requested that it be built near the 700m drill site (pers. com.). Will MEMNG request that the test pad be moved or removed?

9) During a TCM field visit to the adit flattened metal air ducting was seen lying in excavated ditches at the south end of the 1066m adit landing. In action item 7 (#93 in table) from the 23 June 2011 PLC minutes TCM said it would conduct tests to see if the duct work was buried there. If the tests reveal that the ductwork is still there then GGWG requests that it be removed.

2.2 Adit Closure

2.2.2.2 Works Outstanding and Recommendations

10) The claims made in this DPCMPCR section are misleading because they are incomplete.

- Possible future exploration activities may take a long time to occur. The time between the last NOW closure and the start of the present NOW exploration activity was 25 years.
- The arsenic content of the adit water only became common/public knowledge in 2005 with BPM's first water samples.

- The Kathlyn creek drainage above lake Kathlyn is now in the final stages of being declared a community watershed. For the duration of TCM's activities MEMNG has treated the watershed as a domestic water supply.
- The source of the water at A5 is the untreated metal rich, arsenic containing water from the mine workings (A1 water). It reaches A5 after flowing through the waste rock dump.
- The mine water at A5 now flows into Glacier Gulch creek. At the time TCM opened the adit access road the diversion ditch had silted up and the arsenic containing water at A5 was flowing into the Kathlyn creek watershed. TCM originally installed a culvert to facilitate this flow into the Kathlyn drainage (since removed).
- A portion of the A1 flow is unaccounted for at A5.
- The flow of water in the upper portion of the Kathlyn watershed has been acknowledged to be complex, partly sub surface and poorly understood (EA application reports and public comments).
- The drop in the arsenic content of A1 water before it reaches A5 was not principally caused by dilution as stated in TCMs Davidson Project 2012 Freshwater Baseline Report but by precipitation and filtering inside the dump (K. Morin. 2006. Aqueous migration of arsenic from the 1066m portal. Report for Blue Pearl Mining, pp. 1 – 23.).
- The nature of the decrease in arsenic between A5 and UK2 is unknown. We are not aware of any tests TCM has conducted to determine if the arsenic is being accumulated or diluted in its partially subsurface flow to UK2.
- TCMs suggestion that A1 water has little effect on Glacier Gulch creek takes no account of the possible future saturation/migration of the metals in the sludge within the adit or the dump, the possible release of metals (particularly arsenic) from the dump, or the fate of the arsenic between A5 and UK2.

11) The more complete information above shows that TCMs preferred, largely status quo closure plan for the adit is inadequate.

12) The current method of discharging A1 water is unacceptable.

13) GGWG expects that every effort will be made to reduced A1 water flow at source. We trust this will at least include an evaluation of the current drill hole cementing, the possibility of fracture/fault grouting and the possible use of a bulkhead. The ideal solution to water reduction would result in no residual flow and require no long term maintenance or monitoring.

- Did the previous unsuccessful efforts to reduce flow by drill hole sealing meet the criteria of the following references, or their equivalents?
 - Fuenkajorn, K. and Daemen, J. J. K. 1997. Mine sealing: Design guidelines and considerations. Tailings and Mine Waste '97, Proceedings of the fourth international conference on mine waste, pp. 59 – 68.
 - Daemen, J. J. K. and Fuenkajorn, K. 1996. Design of borehole seals: Process, criteria and considerations. Chapter 11, Sealing Boreholes and Underground Excavations in Rock. Chapman and Hall, London. pp. 267 – 279.
- The following references may prove helpful in making an evaluation of the mine workings making water.
 - Golder Associates. 2006. Site visit and stability assessment for the Davidson Molybdenum Project. Report 05-1413-060, section 4.7.

14) How does TCM plan to measure the success of its attempts to reduce A1 flow? Will it establish a flow baseline that adequately reflects the current variability of A1 water flow well before its flow

reduction attempts start? For example, re-establishing a continuous water flow monitor at A1.

15) GGWG expects that any A1 water remaining after flow reduction would be managed in a manner that prevents its release into the Lake Kathlyn watershed. We also expect that any water discharged into the receiving environment would have a composition that meets all standards/guidelines. In particular that arsenic values would lie below both the BC drinking water and CCME water quality guidelines. The ideal solution to achieve this would require minimal if any long term maintenance or monitoring.

16) How does TCM plan to measure the success of its efforts to divert A1 flow out of the Kathlyn creek watershed and reduce the composition of the residual A1 flow?

17) GGWG asks to comment on the plan to reduce and manage A1 water before a decision is taken to implement it.

2.3 Existing Waste Rock

18) MacElhanney, 2006 is not included in the References.

19) Photos 2.3-1 and 2.3-2 of the dump in the DPCMP CRU are the same as Plate 3 and 4 in the 2006 Closure plan. Are these photographs representative of the dump status post the extension of the drifts?

20) The objectives for the waste rock dump closure needs to be revised based on new information that came to light during the EA process.

- Morin's review of the decline in the arsenic content of A1 water between A1 and A5 revealed that the arsenic is being trapped in the dump. He listed conditions which could release the trapped arsenic. These included a heavy rainfall, anaerobic conditions, mechanical movement.
- The time series trend in A5 arsenic level at a scale that displays individual water monitoring samples indicate that the arsenic levels have increased with time (figure 1). A limited arsenic carrying capacity for the dump is indicated.

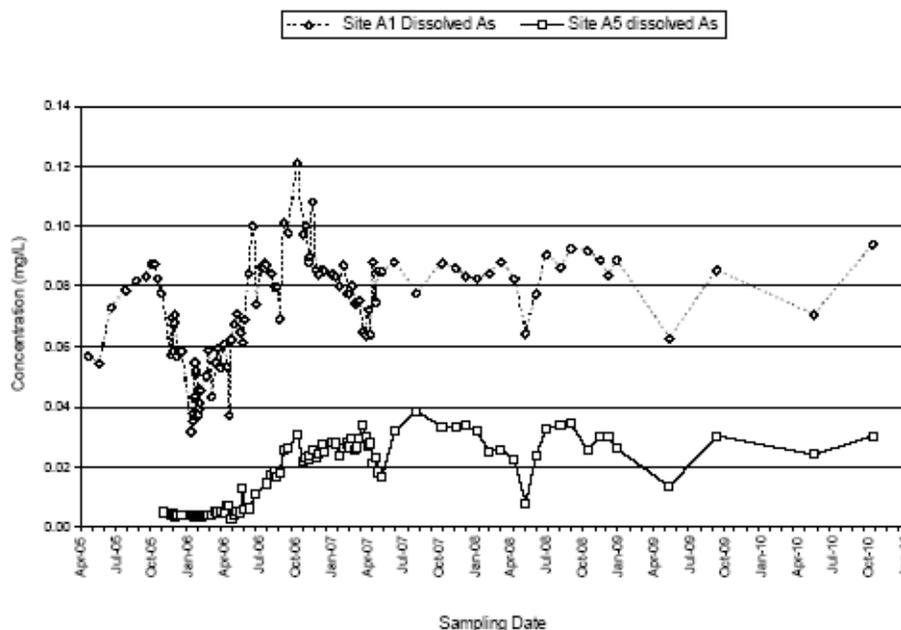


Figure 1: Time series of dissolved arsenic values at A1 (1066m portal) and A5 (below dump) between 2006 and 2011 showing an increase in A5 arsenic values (TCM file 11.13.10 Davidson WQ graphs).

21) How will TCM accommodate these new constraints in its dump closure plan?

2.3.2.1 Works Completed

22) A diversion ditch on the upslope side of the dump has been constructed to divert surface runoff from the dump. Has MEMNG seen and approved the plans for this ditch? In the light of Morin's report about the arsenic in the dump and its possible liberation the diversion ditch should be reevaluated for the closure plan. For example:

- Will it handle the heaviest rain on snow or rainfall event expected for this site?
- Is the ditch in the optimal location?
- Has it been constructed to function for many years unmaintained and unmonitored?
- What are its design contingencies for non standard events? For example increased rainfall over time.

23) How does TCM plan to measure the success of its closure attempts to reduce surface runoff through the dump? Will it establish an adequate baseline?

2.3.2.2 Works Outstanding and Recommendations

24) TCM proposes to maintain the current A1 - A5 flow. The current level of arsenic in the water at A5 is above both BC and CCME water quality guidelines. The source of this arsenic is the A1 water that flows through the dump, which lies within the Kathlyn creek watershed. How will TCM ensure that in the long term the composition of the water, especially the arsenic content will fall below guideline levels at the toe of the dump, i.e. before it reaches A5?

25) What are the long term contingency plans TCM will implement in its designs to ensure that in the event of increased arsenic release from the dump that the water composition at the toe of the dump and at A5 will remain below guidelines?

26) If TCM proposes to reduce the A1 flow through the dump how will it monitor its attempts? Will it establish an adequate baseline that considers the variation in A1 and A5 flow?

27) Assume that A1 water and surface runoff through the dump are significantly reduced. How will TCM ensure that the portion of the water at A5 that originates from flow through the dump (i.e. the residual surface or A1 flow) will not enter the Kathlyn creek watershed in the long term? The solution preferred by GGWG would ensure that no ongoing maintenance and minimal monitoring would be required.

28) What are the geochemical and flow criteria which will require TCM to remove the arsenic rich material trapped in the dump and the portion of the waste rock that trapped it?

2.4 Adit Access Road

2.4.2.2 Works Outstanding and Recommendations

29) TCM's road closure proposal is to maintain the adit access road in its present state, except for increased signage, increased inspections and stabilizing unstable/failed areas. In this section GGWG will clearly establish the importance of deactivating and reclaiming the road to a degree that minimal

inspections and maintenance are needed to ensure that vehicular traffic cannot and do not use it over the long term. The inability to use the road is required to protect the integrity of the domestic watershed over the long term. Ensuring that this need is met falls within the mandate of MEMNG and MOE. It is also in keeping with the 2005 and the 2006 NOW reclamation (closure) objectives 2.4.1.

30) Section 10.7.12 of the Health, Safety and Reclamation Code for Mines in British Columbia (2008) requires drainage be restored to a state that is self sustaining without maintenance. The removal of culverts is a normal part of reaching that objective.

31) The adit access road has been a major headache for GGWG and other Kathlyn creek domestic water users since the last NOW Closure. The travel that the road provides has led to a number of activities that are not in keeping with efforts to maintain domestic water quality and quantity. A few examples of the more serious incidents occurring on the adit road above its Twin Falls turn off over the last two decades are given below (GGWG records).

- Before 2005: Illegal logging removed trees between bend 1, 2 and the edge of the creek flowing from between bend 2 and 3 to bend 1. Other inappropriate activities included: Discarding of a car battery, bags of household garbage, 5 litres of used motor oil, 1 litre of sudsy ammonia. Disposal of whole carcasses or parts of: moose, fish, chicken, deer and dog. A truck crashing into a creek near the 700m adit leaked its hydraulic fluid into the creek. The road barrier of the time was repeatedly vandalised and on occasions removed.
- After 2005: Discarding of 2 domestic garbage containers with garbage (figure 2), sex and drug related paraphernalia. Disposal of whole carcasses or parts of: deer, cow, moose, porcupine and cat. Campers deposited human excrement in a 50 m radius around the lower barrier. Both barriers have been circumvented or removed on a number of occasions (figures 3 and 4).
- An accessible 1066m portal provides an incentive for people to remove or circumvent road barriers. Their removal further increases the opportunity for other inappropriate activities within the watershed. Historically the complete burial of the portal, as seen at the time TCM reopened it has proved to be the only method to removed the portal access incentive.

32) It is TCM's not GGWG's responsibility to monitor the road or respond to the types of issues listed in comment 31)). However, by default GGWG, other water users and the public have ended up identifying and dealing with most of these incidences in order to protect their watershed. This imposition is an additional and unnecessary burden on GGWG's members and other water users that has had a negative impact on our quality of life.

33) The company proposes that increased signage and barrier inspections will provide sufficient security for closure.

- Regarding inspections, it has been our experience that it is usually the public who notifies the company of incidence at the barriers, cleans up garbage etc. We have had almost no experience of the company dealing with inappropriate activity issues on their own initiative (see comment 49))
- TCM promised to provide the monthly site inspection reports to the PLC. To date we have received no reports (see comment 50)). Has TCM been conducting inspections?
- It is unlikely that TCM can realistically promise to maintain adequate, vigilant, frequent inspections of the barriers and maintain their integrity for decades. Based on experience nor is it likely that MEMNG can ensure that TCM or their successor owners will fulfill this obligation. GGWG and other watershed users will be again be forced to fill the resulting gap. We reject this option.



Figure 2: Garbage cans containing garbage at lower barrier 26 March 2010.



Figure 3: Gate removed. Upper barrier 30 June 2012.



Figure 4: Block removed. Upper barrier 27 June 2009.

34) GGWG's experience has been that to control and reduce inappropriate activity in our neighbourhood in general all inappropriate activity must be reacted to immediately (a few days). We have found it necessary to firmly establish the presence of a vigilant, concerned citizenry. This logic applies to the mine road and TCM. TCM is aware of our experience but has yet, in our opinion to establish an adequate presence for itself. Nor does its proposed inspection plans address this reality.

35) Domestic water is high in MOE's hierarchy of values.

36) The proposed method of closing the adit access road is essentially the same as the last NOW road closure method and the road's current status. As the record shows (comment 31) this method failed to protect the watershed from inappropriate activities which could and have affected water. How could MEMNG justify approving a closure plan known to be inadequate?

37) It is GGWG's contention, based on experience that if the adit access road is left as TCM proposes (essentially in its current state) for long term closure then the barriers will eventually be removed or permanently bypassed to access the road beyond. With time the activities inappropriate for a watershed will migrate up the road into the watershed. TCM or future owners cannot be relied upon to prevent this eventuality. Therefore the road and infrastructure needs to be decommissioned to a degree that makes circumventing/removing the barriers undesirable and impractical. This is the only way that the integrity of the watershed can be protected and GGWG and other users of the community watershed relieved of their adit access road related watershed concerns and monitoring activities.

38) GGWG requests that the SUP be decommissioned and reclaimed. The details depend on the eventual plans for decommissioning the rest of the adit access road. We understand that MEMNG and

MOE are in the process of determining the necessary procedures for dealing with the SUP. GGWG would like to be kept informed of progress on this item. GGWG wishes to comment on the SUP decommissioning plan before a final decision about its future status is decided.

39) GGWG requests that during road reclamation indigenous seed be used and no fertilizer be applied (see comment 6)).

40) Will the geotechnical engineer retained to check for unstable ground and design remedial work for them and the slope failures be informed that the work will take place in a domestic watershed? Will they be informed of our access concerns?

41) There are collapsed silt fences immediately downstream from the road in a number of creeks. What is TCM's plan to deal with them?

42) Currently water from the road is directed into or near a creek in two locations, at bend 1 and near bend 3. We request that the ditching/diversion be changed to redirect the water away from the creeks and into the forest.

Missing

43) In the 2006 Closure plan, Section 3, "Implementation" a list of closure activities in time sequence is provided. We expect that such an implementation sequence will be develop in the revised DPCMPCRUCU to ensure that all items are appropriately dealt with.

44) In the 2006 Closure plan, Section 4, "Inspection and Monitoring" outlines some of the procedure to be followed during closure activities. There are no procedures for closure referenced in the DPCMPCRUCU.

- We expect that such a section will be included in the revised DPCMPCRUCU.
- We expect that the Trigger Table will be finalized and the necessary personal to monitor closure activities will be in place prior to undertaking closure activities.

45) In the 2006 Closure plan, Section 6, "Reporting", the reporting of closure activities are outlined. No such section appears in the DPCMPCRUCU. We expect the nature and timing of reports on closure activities to be outlined in the revised DPCMPCRUCU.

3. Care and Maintenance Monitoring

3.1 Proposed Care and Maintenance Monitoring Plan

46) It is unclear whether the proposed care and maintenance aspects of the DPCMPCRUCU are directed at the period before or after the Closure plan is implemented. The care and maintenance proposal is the same as that previously referred to as an interim management plan, i.e. for prior to closure (Draft, Thompson Creek Metals Company Inc. 2013. Davidson Property, Interim Management Plan, 9 May). GGWG is therefore commenting on the care and maintenance aspects as if they were intended for pre closure.

47) GGWG requests to comment on the post closure care and maintenance plan when it becomes available.

48) We seek reassurance from MEMNG that TCM undertaking interim Care and Maintenance activities will be unacceptable as an excuse for not implementing a full closure plan in a timely manner, as required by the Health, Safety and Reclamation Code for Mines in British Columbia (2008). In making the comments below on the pre closure Care and Maintenance plan we assume that TCM is still intending to implement their closure plan by Dec 2014 (Draft ,Thompson Creek Metals Company Inc. 2013. Davidson Property, Interim Management Plan, 9 May).

3.1.1.1 Access to the Site

49) This section describes TCM acceptance of vehicles bypassing the barriers and implying that these activities require no response unless the barriers are moved. See comments 33) to 34) for GGWGs views on access to the site.

3.1.1.2 Monthly Site Visits

50) GGWG has yet to receive the site visit reports TCM promised to deliver to the PLC. See action item 10 (#96 in table) from 23 June 2011 PLC meeting. We reiterate that GGWG wishes to receive these reports shortly after they are completed and sooner if water quality of quantity is or could have been compromised.

51) Change bullet 4 to include the upper barrier as implied in the 3.1.1.1 statement (see figures 3 and 4).

52) Comments relevant to the frequency of site inspections needed to deal with inappropriate activities are provided in comments 31) to 34)).

3.1.2 Water Quality Monitoring and Reporting

53) GGWG understands that the frequency and details of site visits, water sampling and flow monitoring will shortly be re-evaluated by MEMNG and MOE. We also understand that the reporting process will be revised. GGWG asks to comment on the revised DPCMPCRUC sampling and reporting plan. See also section 3.1.1.2 above.

54) GGWG wishes to continue receiving the monitoring results and reports.

55) GGWG has already commented on the TCMs Davidson Project 2012 Freshwater Baseline Report. Those comments are included here for completeness. The outcome of discussion at the 9 May PLC meeting about GGWGs comments have been added in *italics*.

GGWG comments on “Davidson project 2012 freshwater baseline report”

J. Knight 1 April 2013

The report lacks some information.

The presentation methods needed to be augmented in order to comprehensively monitor the site and interpret anomalous results.

Flow Data

The data presented in figure 3.8-1 is incomplete. Much of the continuous flow data is missing.

See TCM file 6.13.11 Davidson discharge graph.pdf. *Wade says will add.*

Will continuous monitoring be started in 2013? *MOE and MEMPR and TCM will discuss this and current one a month proposal as part of site/closure monitoring.*

Will notes on the flow conditions be taken at time of measurements and be included in future reports? For example rain on snow event for June 2011. *TCM indicates being done and will be added.*

Composition Data

Time series data is missing. See interpretation. *Wade says will add.*

Will notes on the water conditions be taken at time of measurements and be included in future reports? *TCM indicates being done and will be added.*

Interpretation

In order to interpret the data and thus monitor the site both time series and statistical presentation are needed.

For example, one of the objectives is to monitor changes in the dump's ability to trap arsenic from the adit water. This is most clearly seen and monitored in time series data. See TCM 6.13.11 Davidson WQ graphs.pdf. Graph A1-A5 for Arsenic.

The same conclusion holds for the relationship between flow and composition for some sites and elements. Compare TCM 6.13.11 Davidson discharge graph.pdf and TCM 6.6.11 Davidson WQ graphs.pdf.

General

The emphasis in the report on sealing the drill holes as a cause for declines in the adit A1 and A5 samples' metal content neglects the following. The lack of change in A1 flow. The presence of significant amounts of metal rich sediment/precipitate on the adit and drift floors. Disturbance of this material contribute to changes in water composition. *The possibility that the drill holes making water were not sealed for their full length should be considered.*

Continuation of comments on draft Closure

3.1.3 Care and Maintenance Administration

3.1.3.1 Request to Discontinue the Care and Maintenance Plan or the Monitoring Program

56) It is GGWG's understanding that termination of care and maintenance or monitoring is determined by regulation and results. See section 10.7.31 of the Health, Safety and Reclamation Code for Mines in British Columbia (2008). However we would appreciate the opportunity to comment on any changes or cessation to a Care and Maintenance Plan or a Monitoring Program.