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Project Memorandum				
То:	KGHM Ajax Mining Inc.	Doc. No.:	BGC-011	
Attention:	Nettie Ore	Project No	Project No.: 1125011	
From:	Hamish Weatherly	Date:	April 13, 2016	
Subject:	Ajax Project Environmental Assessment Certificate Application / Environmental Impact Statement for a Comprehensive Study - Responses to Information Requests from COK, DFO and FLNRO			

# 1.0 INTRODUCTION

The Ajax Project Environmental Assessment Certificate Application / Environmental Impact Statement for a Comprehensive Study was issued in September 2015 (KAM, 2015). Comments, *Mines Act* and *Environmental Management Act* (MA and EMA) Application Permit Conditions, and Permit Information Requirements (IRs) were provided to KAM on February 22, 2016 by the City of Kamloops (COK), Department of Fisheries and Oceans Canada (DFO) and British Columbia Ministry of Forests, Lands and Natural Resource Operations (FLNRO) following a review of the Application and supporting documents.

This memorandum documents responses for the following IRs:

- COK-SLR621 and COK-SLR175
- DFO-016, DFO-018 and DFO-021
- FLNRO-189, FLNRO-213, FLNRO-216, FLNRO-218, FLNRO-232 and FLNRO-233

# 2.0 INFORMATION REQUIREMENT RESPONSES

#### 2.1. Information Requirement Issue ID # COK-SLR621

Alteration of Baseline Landforms – Note on mine site new features will include a 237 ha lake with max depth of 545m and volume of 1470 Mm<sup>3</sup> in the mined out pit – Indicates will take several hundred years for the pit to reach its [inferred by Golder] full elevation. Have all sources of pit filling been considered: incident precipitation, groundwater seepage and possibly most importantly groundwater outbreaks from saturated MRSF's into the pit? Have the extremes of climate change been considered?

#### Response:

The pit lake filling water balance developed for the Project considers all inflows to the Open Pit including direct precipitation, groundwater seepage, surface and seepage runoff from disturbed areas such as the pit wall, MRSFs and TSF along with runoff from natural,

undisturbed areas. Groundwater flux into the pit from above and below the lake surface was considered. Climate change was not considered in the pit filling model. As indicated in IR #COK-SLR640, water balance results show that runoff volumes in the year 2085 are projected to decrease on the order of 15% compared to 1981 to 2010 climate conditions with an earlier onset of snowmelt. As a result, reduced inflows to the pit during the post closure period are expected.

# 2.2. Information Requirement Issue ID # COK-SLR175

*City of Kamloops Sec. 4.6, Question 81. How will mine operations and construction affect water reservoirs in the area? This has not been addressed.* 

#### Response:

The Project and associated mine plan necessitates the need to drain a portion of the northeast arm of Jacko Lake. This will result in the loss of approximately 33,000 m<sup>3</sup> of storage capacity within the Jacko Lake reservoir. The mine plan includes engineered dams on Jacko Lake (JLD1 to JLD4), a diversion system (Peterson Creek Diversion System) and the construction of the Peterson Creek Diversion Pond (PCDP), a new pond in Peterson Creek (Refer to Figure 2.2-1, Section 2). The PCDP has been designed to supplement the storage capacity lost within the Jacko Lake reservoir and also takes into consideration the quantity of water needed by downstream licensees, such that the PCDS will not need to operate continually to meet the licensed water demands.

Also predicted lake levels in Jacko Lake under existing conditions and at the end of operations are addressed in IR# MOE-012 (BGC 2016).

# 2.3. Information Requirement Issue ID # DFO-016

KAM indicates that typically Upper Peterson Creek has no surface flows late summer through March due to the groundwater table being located below the ground surface. As mentioned earlier in this section, an approximate annual surface water allocation of 530,396 m<sup>3</sup> is licensed for Upper Peterson Creek predominantly for irrigation of hay crops. To what degree is the scarcity of water in Upper Peterson Creek related to ground water table as opposed to the surface water availability and the current water licence allocation? What steps have been taken to acquire any of these water licences?

#### Response:

Because of the many water licenses on Peterson Creek, procedures are in place to fairly distribute the available water in any year to all licensees in order of priority. This allocation of water is administered by a province-appointed water bailiff. The scarcity of water in Peterson Creek (Upper) in late summer is related to surface water availability, as Peterson Creek flows are snowmelt dominated. During the late summer, potential evapotranspiration is in excess of rainfall, so minimal runoff occurs during this period.

Currently, KAM and its consultants are working with regulators on a mitigation strategy that addresses potential impacts to existing water licenses on Peterson Creek. One of the strategies being considered is acquiring existing water licenses.

# 2.4. Information Requirement Issue ID # DFO-018

During reclamation will the central pond be connected with the re-established Peterson Creek channel? If so, what implications to aquatic health parameters may result?

#### Response:

The Central Collection Pond will be decommissioned at mine closure to allow for reestablishment of Peterson Creek. If necessary, a smaller pond will be constructed in the vicinity to capture water until water quality objectives have been met.

# 2.5. Information Requirement Issue ID # DFO-021

It appears that during mine construction and mine operations, the monthly peak flows during freshet periods will be greatest impacted. How will this reduction in peak flows translate in downstream habitats receiving flushing flows?

#### Response:

Flushing flows for Peterson Creek (Lower) are currently impacted by the operation of Jacko Lake. During July and August, water levels in Jacko Lake are lowered below the spillway invert to meet downstream water license requirements. The subsequent spring this lost storage is replenished by snowmelt runoff, but surface flows do not discharge from Jacko Lake until water levels reach the spillway invert. Figure DFO.021-1 illustrates the offset of peak flows into Jacko Lake in 2014 (as monitored at station JACINF) versus flows out of the lake (as monitored at station JACLAKE).



Figure DFO.021-1. Jacko Lake peak inflow (JACINF) and outflow (JACLAKE) offset

During Construction and Operations, the magnitude, duration and timing of peak flows in Peterson Creek will be impacted by: (1) a reduction in the total contributing watershed area, (2) collection and recycling of contact water from disturbed areas being managed on site and, (3) management of Jacko Lake water levels. Jacko Lake inflows will be pumped around a majority of the mine infrastructure once the Peterson Creek Diversion System (PCDS) is established. As a result, the Project may reduce peak flows on Peterson Creek during all phases of the Project due to active management of Jacko Lake inflows.

This reduction in peak flows will be a function of the magnitude of lake inflows. As part of the MA and EMA permitting process, an updated analysis has been conducted for the Peterson Creek Diversion System (PCDS) pumping system. There will be a single pump station with two independent pump sets inside. Both will utilize the same dedicated pipeline. Each pump set will have a separate duty, specifically:

Pump Set 1 (252 m<sup>3</sup>/h x 2) (0.070 m<sup>3</sup>/s x 2) will handle normal operation flows. These are seasonally variable flows maintaining downstream water license holders during operations, drawing only from water above the conservation level; and,

Pump Set 2 (1440 m<sup>3</sup>/h x 2) (0.40 m<sup>3</sup>/s x 2) will handle the 200-year, 24-hour storm event volume pumped out over a three-day period. The pump station will prevent overflow of Jacko Lake that could potentially cause flooding of downstream mine infrastructure.

The reduction in flows is expected to result in an indirect habitat loss in Peterson Creek downstream from the Project. The effects assessment for the Project characterized the magnitude of the indirect loss of habitat in Peterson Creek on the productivity of the rainbow trout population downstream of the Project area as Minor for the Construction and Operation phases and Negligible during the Post Closure phase as detailed in Section 6.7.

# 2.6. Information Requirement Issue ID # FLNRO-189

A new bathymetric survey of Jacko Lake will be required to determine new elevation of lake representing storage quantities of water after construction of dams. This new elevation will need to be incorporated into a new release schedule for pumping storage from Jacko to PCDP, and releasing water from PCDP to downstream irrigators. Elevation of 892 masl represents the current elevation of storage in Jacko Lake. Installation of dams may cause changes to the elevation representing storage. New release schedule will need to include inflows from Edith Lake (baseflow, and releases from storage) as well as Humphrey Creek flows.

#### Response:

A bathymetric survey of Jacko Lake will be conducted post-construction. As noted, the installation of dams may cause changes to the elevation-storage curve, such that elevation 892 masl no longer represents the existing storage capacity of the lake. The updated elevation will be incorporated into a new release schedule for pumping storage from Jacko Lake to the PCDP. The new release schedule will also include potential releases of storage from Edith Lake, as there have been recent changes in the operation of this system.

# 2.7. Information Requirement Issue ID # FLNRO-213

Will the central pond be decommissioned or reconfigured at closure? If reconfigured, is the pond intended to be on Peterson Creek? This will impact flow regime of the stream and may increase losses to ground water and evaporation.

#### Response:

Please refer to IR# DFO-018.

# 2.8. Information Requirement Issue ID # FLNRO-216

Water will be pumped from Kamloops Lake to the New Gold – New Afton storage pond and then pumped through the new pipeline. Will the New Gold – New Afton storage pond be able to accommodate this quantity or will it require enlargement?

# Response:

Water destined for the Ajax Mine will not be pumped to the New Afton fresh water tank. The system has been designed for the two pumping systems to operate independently with a shared pipeline. There will be a take-off from the shared pipeline, with up to 300 m<sup>3</sup>/h going to the New Afton fresh water tank.

#### 2.9. Information Requirement Issue ID # FLNRO-218

Upon decommissioning the intention is to re-establish the Jacko Lake dam spillway to 892 m. This is the elevation of the current spillway; however, the spillway level will require re-establishment due to the removal of the northeast arm of the lake.

#### Response:

Please refer to IR# FLNRO-189.

#### 2.10. Information Requirement Issue ID # FLNRO-232

Neither Howard Pond, nor Anderson Creek, are licensed for diversion, into Davidson Brook watershed.

#### Response:

Available scanned licenses for C115106 and C115107 indicate that Anderson Creek flows are licensed for diversion into the Davidson Brook watershed via a diversion channel (see Figure FLNRO.232-1 below).



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The boundaries of the land to which this licence is appurtenant are shown thus:

Figure FLNRO.232-1. Point of diversion for water license C115106.

#### 2.11. Information Requirement Issue ID # FLNRO-233

Separation Lake and areas to the east and north east are not tributary to Peterson Creek.

#### Response:

Thank you for your comment. As discussed in Section 7.9.6, Chapter 6-4, the water balance model (WBM) assumes no surface runoff contribution from Separation Lake watershed as a tributary to Peterson Creek. However, it is assumed that recharge (3 mm) bypasses the surface drainages and lakes, and instead discharges to Peterson Creek (Lower).

Review of Google Earth imagery and LiDAR data indicates that there is a potential during wet years for surface water to discharge from Separation Lake and flow toward Davidson Brook and Peterson Creek. Figure FLNRO.233-1 shows this potential flow path, as delineated by the blue arrows. An approximate 600 mm diameter culvert is located where this flow path crosses Highway 5A. However, this potential flow path has not been verified in the field and the LiDAR data are inconclusive.



Figure FLNRO.233-1. Potential flow path (blue arrow) for Separation Lake outflows.

# 3.0 CLOSURE

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Yours sincerely,

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# REFERENCES

BGC Engineering Inc. 2016. Ajax Project Environmental Assessment Certificate Application / Environmental Impact Statement for a Comprehensive Study – Responses to Information Requests from COK, MOE and SSN. Memorandum (Document No. BGC-010) submitted to KGHM Ajax Mining Inc., April 12, 2016.

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