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Memorandum

Date: July 6, 2016

Project: 16026 – KGHM Ajax Mining Inc.

To: Todd Goodsell, KGHM Ajax Mining Inc.

From: Nicola Lower, Irene Mencke, Rick Palmer, Palmer Environmental Consulting Group Inc.

Subject: Ajax Project Application/EIS Response to DFO Information Request 052

Introduction

The Ajax Project Environmental Assessment Certificate Application / Environmental Impact Statement for a Comprehensive Study was issued in January 2016 (KAM 2016). Comments and Information Requirements (IRs) from the technical working group were provided to KGHM Ajax Mining Inc. (KAM) by the EAO on February 22, 2016 following a review of the Application and supporting documents. Fisheries and Oceans Canada (DFO) issued the following IR for KAM response:

- DFO-052: Population estimates of the existing spring rainbow trout fishery of Peterson Creek. Estimates of the economic contribution and social value provided by this Aboriginal Fishery. Rationale - The above information request is required to accurately quantify the existing rainbow trout population expected to make up the Aboriginal fishery. Since the Aboriginal fishery is reported to be lost by the mine development, it is important to establish the scale and magnitude of the fishery. Estimates of the economic contribution and social values of this fishery should also be assessed to further consider the significance of the impacts of the project to the fishery and what scale and types of offsets would be required to potentially address the impacts if possible.

Response

Information regarding the connection between Jacko Lake and Peterson Creek in support of the asserted Aboriginal Fishery on Upper Peterson Creek is presented in Section 6.7 of the Application/EIS and was completed by Knight Piesold consulting for KAM. KAM retained Palmer Environmental Consulting Group to conduct additional work to assess the economic and social contribution of the Aboriginal fishery asserted by the Stk'emlupsemc te Secwepemc Nation (SSN). All rainbow trout that are found in Peterson Creek, and are therefore available to be caught during the spring, originate from the stocked population in Jacko Lake. Jacko Lake was first stocked in the 1940's, and since 1954 the lake has been stocked annually with hatchery raised rainbow trout, with the exception of 1991, by the Ministry of Environment (The Freshwater Fisheries Society of B.C., 2016). Numbers of stocked fish (typically fingerlings and yearlings) range from 6,500 to 20,000 per year over the last 30 years. The stocked rainbow trout population in Jacko Lake are a mix of triploid (reproductively sterile) and diploid (reproductively viable)

strains. The number, age classes, and strains of stocked fish varies annually. There may therefore be some natural reproduction between these fish, but not at a level required to maintain a self-sustaining population. Rainbow trout are still stocked into the lake in order to maintain a recreational fishery, and there is a lack of suitable spawning habitat within the inlet and outlet of Jacko Lake.

The adult rainbow trout move downstream into Peterson Creek from Jacko Lake in spring and early summer via a spillway channel that circumvents an earthfill dam at the outlet of Jacko Lake ("Dam"). Water only flows through the spillway during high flows when the Jacko Lake levels rise and water can flow over the spillway crest. This typically occurs annually during freshet and/or autumn storms. At other times, when Jacko Lake water levels are below the invert elevation of the spillway, flows are released into Peterson Creek via an outlet pipe in the dam, and downstream migration of fish is prohibited.

The adults that move from Jacko Lake into Peterson Creek are driven by their genetic predisposition to spawn. Lake-resident rainbow trout spawn in spring and early summer, in the inlet or outlet streams of their resident lake (McPhail, 2007). Despite the limitations to successful reproduction in Jacko Lake, some spawning behaviours are still exhibited by the rainbow trout. Female triploids are hormonally and functionally sterile, and therefore do not exhibit spawning behavior, but male triploids (infertile) still produce hormones that trigger them to exhibit "false" spawning behavior. The adult rainbow trout that are found in Peterson Creek are therefore limited to those fish that exhibit spawning behaviours, and are able to navigate down the spillway during the limited period of high flow in the spring. These fish are then available to be caught in the spring fishery.

There is no definite population estimate of this fishery, and the availability of fish in the Peterson Creek is heavily dependent on seasonal high flows that are in excess of water allocations to licenced users downstream and temperature. Once the spillway ceases flowing, the rainbow trout in Peterson Creek downstream of the dam are stranded. Temperatures rise, dissolved oxygen decreases, and the channel is usually dry throughout most of the summer and over the winter. Furthermore, the section of Peterson Creek downstream of the dam has been channelized and lined with impervious till during previous mining activities, and offers marginal rainbow trout spawning and rearing habitat. Fish kills can occur when rainbow trout, stranded in the creek, are subject to these deteriorating habitat conditions, as was evidenced when several mature, dead and decomposing rainbow trout were observed in the channel in June 2014. The fish available to be caught in Peterson Creek are therefore largely limited to the first 100 m downstream from the outlet of the dam, for a period of approximately 2-4 weeks during the spring. Some years the lake water levels do not reach the spillway crest, as was observed in 2009 (BC Rivers Consulting Ltd.).
Based on field surveys and observations conducted on site in 2016, on May 3, 2016, the spillway still had flow, and approximately two fish were observed per metre in the first 80 m of the channel downstream of the lake. On May 18, 2016, the spillway was dry and only two adult rainbow trout were observed in the first 190 m downstream of the dam. These numbers are in line with visual observations over previous years, although high flows in the spillway and outlet channel could bias the estimate of the number of fish. Collecting more comprehensive data in the spillway and outlet channel is challenging as provincial and

federal collection permits do not allow electrofishing near fish in the spawning period. Based on the observations, a conservative estimate of the numbers of fish in the fishery can be calculated to be 2 fish per m^2, multiplied by 100 m, for four weeks, which equals 800 fish.

The SSN has asserted that the spring fishery is of great social and economic importance to the SSN. The rainbow trout harvested as part of the aboriginal fishery are captured using traditional methods. The rainbow trout are funneled into the outflow channel, which is narrow (<1.5 m wide) and shallow (0.5 m deep approximately). This facilitates quick and easy capture of fish. Fishing at the outlet is considered a community food gathering activity, and the fish captured are distributed within the community. The rainbow trout are an important protein source for the aboriginal community (SSN, 2016). The SSN have asserted that before it was stocked, Secwepemc people utilized traditional fishing methods at the inflow and outflow of Jacko Lake for a naturally reproducing food fishery (SSN, 2016). Those fishers would take 'literally hundreds of pounds' of trout in an important food fishery (Ignace, 2015, quoted in Fortems, 2015). The SSN did fish for traditional purposes in 2015 at the outflow of Jacko Lake into Peterson Creek and successfully caught 6 fish. The SSN also fished at the inlet from Jacko Creek to Jacko Lake and were unable to locate any fish. KAM has no record of SSN fishing for traditional purposes in the area in 2016.

Taking into consideration the importance of the spring fishery, KAM has changed the project design so impacts to the spring fishery are mitigated and Peterson Creek is preserved over a 150 m section immediately downstream of Jacko Lake (Supplementary Memo 0706_KAM_Peterson Creek Diversion System Update). The dam at the outlet of the lake will be rebuilt immediately downstream of its current location, and below the 200 m of open channel, the creek will flow through a culvert for 2.7 km. While this proposed design would result in some alteration of the fishery, the 200 m section of open channel will still be accessible for fishing, and where practicable, the habitat will be enhanced so that no loss in the total numbers of fish are anticipated. Improvements to spawning habitat around Jacko Lake are further aimed at enhancing the rainbow trout population downstream of Jacko Lake in Peterson Creek.

To help estimate the economic value of the fishery, the price of rainbow trout sold in Kamloops (at the time of writing, June 2016) were considered:

- Fisherman's Market: $16/lb. The rainbow trout come from Little Fort (a small community on the west bank of North Thompson River), and are flash frozen. This store sells vacuum packed fillets, not whole fish.
- Real Canadian Superstore: $7 to $10 per whole rainbow trout (price per lb varies). The trout are farmed, in Surrey, BC.
- Safeway: $1.99/100 g ($9/lb). The trout are farmed (winter) or wild (summer), depending on the season.

In Peterson Creek, within the reach downstream of the dam, there were no fish captured during baseline sampling from 2007 to 2011 (though visual observations of large bodied mature rainbow trout were made). In 2014, five rainbow trout were captured with a fork length range of 465-520 mm. Using a length-weight regression from the Kootenay Lake rainbow trout sport fishery, this would give a mean weight of 1.5kg (or 3.3 lbs) (Andrusak and Andrusak, 2006). Multiplying this mean weight by 800 fish gives 2,640

lbs of fish per spring season. Applying a market price of $16 per lb, the market value of the fishery could be conservatively estimated at $42,240.

This valuation represents a monetary estimate of the direct use value (or market value) of the spring fishery, which is the value of consuming the fish; other non-market values, such as indirect use value (e.g., cultural or ceremonial use), option value (e.g., ability to fish in the future) and non-use values (e.g., intactness, stewardship), are not included. Indirect use, option and non-use values are less tangible values and more difficult to estimate because markets do not exists for those values. As described earlier, the SSN has asserted that the spring fishery is of great social and economic importance to them. The SSN has identified other non-market values associated with the rainbow trout fishery, including but not limited to stewardship, ceremonial, intergenerational transfer of traditional knowledge and family cohesion values. Primary data from SSN will be required in order to monetize such non-market values and develop broadly supported valuations.

As outlined, the mine plan has been modified to protect this fishery, and monitoring plans with contingency measures will be put into place as described in section 6.7.4.3 and 6.7.6.4 to ensure that the scale and magnitude of the fishery are maintained from mine pre-development conditions.

References

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