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RE: Application #QZ04-065 – Yukon Zinc Corporation, Wolverine Mine Project

Please accept this document as an intervention of Ross River Dena Council and Liard First Nation in the Water Licence application of Yukon Zinc Corporation (YZC) in respect of the proposed Wolverine Mine.

Our opinions of the environmental effects of hard rock mining have been heavily influenced by past projects such as the Faro Mine which has been so damaging to the environment, will probably cost hundreds of millions of dollars to properly remediate, and even then, will require long-term maintenance in the order of hundreds of years. We realize that mine planning has advanced tremendously since the late 1960s when the Faro Mine was developed, and that today's mine plans are closely scrutinized in an attempt to minimize adverse environmental effects. Nonetheless, the predictive tools used in developing environmentally sound mine plans, particularly those that need to deal with acid rock drainage (ARD), are imprecise, and our members need to be convinced that proper safeguards are in place to deal with unanticipated problems such as worse water quality than was originally predicted in the mine planning.

We should note here, however, that we support in principle, and do not oppose the proposed Wolverine Mine project. In fact, YZC and Ross River Dena Council, on behalf of the Kaska Nation, have entered into a Socio-economic Participation Agreement (SEPA) regarding the Wolverine Mine project. Rather, our intervention is intended to highlight the most serious water-related concerns of the Kaska Nation about this project with the objective of augmenting or improving the mitigation and monitoring suggested by the proponent or by government regulators.

In keeping our intervention comments within the mandate of the Yukon Water Board, our intervention covers the following general subject areas:

1. Impacts on Wolverine Creek
2. Impacts on Go Creek
3. Impacts on Fish
4. Impacts on Wildlife
5. Hazardous Materials
6. Access Road
7. Monitoring
8. Follow-Up

9. Decommissioning and Reclamation

Each of these topics is discussed in the following sections, and recommendations to the Water Board are provided where appropriate.

1. Impacts on Wolverine Creek

We are concerned about the impacts of the mining operation on the water quality of Wolverine Creek.

The Wolverine Mine will process ore from a massive sulphide deposit, with the potential environmental impact of acid rock drainage and metal leaching. It is our understanding that YZC has chosen to consider all mined material as potentially acid generating (PAG) and will therefore dispose of all waste materials, including waste rock and tailings, either underwater in a tailings management facility (TMF) in the Go Creek watershed or by backfilling the underground workings using a cement paste backfill technique, and flooding the mine workings after mine closure.

From the hydrogeological and water quality modeling information, it appears that underground mine flood water in contact with the mine tunnel walls or the cement paste backfill, may be of poor quality and may discharge, via groundwater movement, to Wolverine Creek. As a contingency mitigation measure, YZC has proposed the construction of a passive bio-treatment channel along a 300-400 m section of Wolverine Creek that would intercept and passively remove metals, including selenium, from contaminated groundwater.

We have several concerns about the proposed bio-treatment channel:

1. Because ARD and metal leaching from the underground mine workings may not manifest themselves in the groundwater for many years, we recommend that groundwater monitoring in the flow path to Wolverine Creek, on at least an annual basis, be part of the long-term monitoring plan to determine when the bio-treatment channel is required;
2. We are concerned that the proposed bio-treatment channel technology has not been sufficiently proven, particularly in respect of selenium removal. In this, we support the recommendation of the EA Screening Report for a field test of the bio-pass system early in the mine production period.
3. What are the long-term maintenance requirements of such a bio-treatment system? High metal levels in the groundwater from the underground mine workings, if they develop, are likely to last many years (hundreds? thousands?). We recommend that the costs associated with the long-term maintenance of such a system be considered in the determination of the amount of any financial security.
4. What is the contingency plan if the by-pass system does not prove to be effective? Is the primary alternative long-term groundwater collection and treatment in a water treatment plant (WTP)? If so, we recommend that the cost of long-term

groundwater collection and treatment in a water treatment plant be considered in the calculation of financial security if the bio-treatment bypass system is found to be ineffective or unreliable.

2. Impacts on Go-Creek

We are concerned about impacts of the mine on the water quality of Go Creek, Money Creek, and ultimately, Francis Lake.

A tailings management facility (TMF) will be constructed behind a 37.5 m high dam in a natural depression perched on the NE valley slope of Go Creek. The TMF will be used for the permanent underwater storage of PAG materials, including tailings and waste rock that will not be backfilled into the underground mine. The permanent underwater storage will prevent acidification and subsequent metal leaching of PAG materials. The TMF will be lined with an impermeable synthetic geo-membrane to prevent contamination of groundwater. PAG materials will be placed underwater on top of the membrane and ultimately covered with 1 m of dense media separation gravels, plus 0.5 m of water. The dam will be designed to withstand 1 in 10,000 year seismic events, and its spillway will be designed to handle 1 in 10,000 year flood events.

During mine operations, water from the TMF will be recycled to the mill. All effluent will report to the tailings facility, including tailings and process water from the mill, water from the underground workings, sludge from the Water Treatment Plant, and effluent from the sewage treatment plant used to treat sewage from the mine camp. Seepage will be collected behind a seepage collection dam downstream of the TMF dam, and will be pumped back to the TMF. Excess water from the TMF will be treated in a high density sludge plant before being sent to polishing ponds for storage prior to annual (summer) discharge at a point in Go Creek downstream of the seepage dam. YZC has committed to additional treatment (carbon columns and a patented biological selenium reduction) to supplement water treatment in the High Density Sludge Plant.

It is anticipated that water treatment will be required for three years after closure before the water from the TMF is of high enough quality for direct discharge to Go Creek. At this point, the diversion channels around the TMF will be removed, allowing runoff from the immediate catchment to flow into the TMF.

Although we believe this to be a viable plan to mitigate the impacts of the mine on the water quality of Go Creek and downstream waterbodies, we do have a number of concerns and recommendations:

1. We are concerned that the bioreactor process addition to the High Density Sludge Plant is unproven technology, and may not be successful in reliably reducing selenium concentrations. We therefore support the recommendation of the EA Screening Report to conduct bench scale test-work to validate this selenium removal method.

2. What is the contingency plan if the selenium removal process does not prove to be effective, and what are the implications of the need for alternate selenium removal methods on the calculation of the financial security for the Mine?
3. We recommend that YZC maintain a water treatment plant on site and maintain the polishing ponds, and associated pumps and pipelines, for a period of at least 10 years after water from the TMF has initially met compliance, to ensure rapid remedial response in the event that variability in flow conditions or other factors results in a reduction in water quality to the point that direct discharge is no longer possible.
4. To provide comfort to the Kaska who consider Francis Lake to be one of their most important traditional use areas, we recommend that baseline water and sediment chemistry monitoring, and subsequent operational and post-closure monitoring, of a station in Francis Lake near the discharge of Money Creek be conducted in an attempt to identify any changes in water and sediment chemistry over time.
5. The long-term monitoring plan must include: 1) regular monitoring of water quality in the TMF discharge, probably of greater frequency in the first years of closure and less frequently as time goes on; 2) regular monitoring of water quality at the compliance point; 2) annual monitoring (and maintenance) of TMF dam to ensure its continued stability; and 3) regular monitoring of seepage from the dam for some number of years after closure.

3. Impacts on Fish

Our greatest concern in respect of fish is that fish in watercourses affected by the mine remain safe to eat. It appears that very little has been done on establishing baseline metal concentrations (including selenium) in fish in watercourses that will be affected by the Wolverine Mine project. We recommend that a comprehensive fish tissue monitoring program be designed to determine whether the Wolverine Mine causes increased metal burden in fish tissues, and whether or not that increase in metal burden results in an unacceptable risk to humans or wildlife. The statistically rigorous establishment of baseline levels must be a first step.

Although there appears to be some dispute about whether or not fish occur in the immediate mine area, this area would not appear to be prime fish habitat. High value fish habitat is likely to occur further downstream in the Go and Wolverine Creek watersheds. The most likely and common impact on fish habitat from such projects is either the physical destruction of habitat from in-stream placement of mine facilities such as tailings management facilities, or the degradation of fish habitat from sedimentation caused by erosion of soils that have been denuded of vegetation. In the case of the Wolverine Mine, the TMF is not located in-stream, and is possibly above any fish use areas in any case. Our concerns about erosion and sedimentation are normally addressed by a mine proponent in a Sediment and Erosion Control Plan and can be satisfactorily mitigated by the implementation of standard best management practices.

4. Impacts on Wildlife

The Environmental Screening Report referred to the following mitigative measures in relation to water use and wildlife:

1. Appropriate water licence and discharge standards, including monitoring of the tailings facility during the life of the mine plus 3 years post-closure;
2. Monitoring of wildlife use within the Tailings Pond Facilities, particularly waterfowl and shorebirds during the migration period, for the period of mine operation and temporary closure. Construct fencing around the facilities if deemed necessary by the Mining Inspector;
3. The implementation of a Wildlife Protection Plan. In addition to the priorities listed, this could allow for further mitigation and/or monitoring opportunities in relation to health risks related to ingestion of contaminants;
4. Adaptive management measures, as deemed appropriate to respond to changes in climate that may influence predictions about flow rates, seasonal discharges, etc.

The potential effect of the tailings pond on wildlife should be emphasized. Moose in particular are considered at high risk due to their attraction to water for thermal relief, predator avoidance, aquatic forage, and attraction to salts and other water-borne minerals. Concerns have been elevated based on observations in the Faro area where moose are now frequently seen in association with the Faro tailings ponds. The Faro project also drew attention to the risk of contamination due to the ingestion of pollutants that were spread by air currents and have accumulated in plants and organisms that feed on these plants, most notably lichens, ptarmigan and caribou.

Our comments in respect of the water use application apply in large part to the concern of wildlife contamination. Most of these concerns can be addressed within a Wildlife Protection Plan, required under the Environmental Screening Report.

1. Design and construction of the tailings pond should be done in consultation with wildlife experts (e.g. Kaska elders) to discourage the use of the facility by wildlife;
2. Consideration should be given to using bear bangers or other repellents to deter wildlife from using the tailings facilities;
3. Ongoing monitoring, and recording of wildlife use of the tailings facility, through periodic visits, and possibly time lapse cameras, or track surveys;
4. Testing of wildlife in the vicinity of the tailings facility to determine background levels and trends in heavy metal accumulation. Consideration should be given to sampling insects, birds, aquatic mammals (such as mink) and riparian microtines, as well as moose and waterbirds. Testing should be extended downstream to allay concerns of downstream contamination;
5. Monitoring and testing should extend to the life of the “problem” not simply the operational life of the project;
6. Thresholds should be established that indicate the level of wildlife use that would trigger the construction of fencing around the tailings facility;
7. Fencing should be maintained for the life of the “problem”;

8. Attention should be given to the possible dispersal of airborne pollutants, and appropriate testing if this is a legitimate concern, designed based on preliminary results in the Faro area;
9. Kaska should be directly involved in the development and implementation of the Wildlife Protection Plan.

5. Hazardous Materials

In its documentation for an application for a Water Licence, in a section entitled “Hazardous Materials and Spill Contingency”, YZC has listed the chemicals and other potentially hazardous materials it will be using during the mining project. In general, we are satisfied with the handling procedures and spill contingency measures described for hazardous materials, including fuels and petroleum products.

However, we do have concerns regarding the use of sodium cyanide. The EA Report indicates that this chemical will be used in the flotation and regrind phase of the mill processing, that there will be no free cyanide in solution, and that any cyanide complex remaining in final tailings will be insignificant. We also note that a discharge limit (0.05 mg/L) and a Water Quality Objective (0.005 mg/L) at the compliance point in Go Creek are proposed. We recommend that YZC provide further information on:

- the likelihood of free cyanide being released under some ore processing upset conditions;
- the fate of free cyanide or cyanide in the tailings pond, and the effect of cold climate conditions on natural breakdown of cyanide;
- potential impacts of cyanide in the tailings management facility on wildlife that drink or are otherwise exposed to TMF water; and
- justification for the discharge limit and Water Quality Objective being proposed for total cyanide.

As contemplated by YZC, we expect that all significant spills of hazardous materials will be reported immediately to the Kaska.

6. Access Road

In respect of the Access Road, we have two primary concerns in relation to potential impacts on water:

1. Rock removed to allow construction of the road, and rock cut walls, must be tested for their acid rock drainage potential. If such potential exists, then appropriate mitigation actions must be implemented; and

2. Erosion of soils and transport of sediment into nearby water bodies must be minimized by the use of standard best management practices (see also Section 3, above).

We assume that spills of fuel and other hydrocarbons will be minimized through the implementation of a Hazardous Materials Management Plan including appropriate spill response provisions (see also Section 5, above).

7. Monitoring

Given the uncertainty of the predictions used to plan this mine, and given the fact that unforeseen circumstances are bound to occur during construction, operations, and closure, an adaptive management approach will be required. This approach depends on obtaining comprehensive monitoring information that quickly identifies problems.

While we find the monitoring plan for the operational and closure periods to be generally acceptable (with some additions as described in other sections of this intervention), we do have some concerns in relation to post-closure monitoring:

1. while YZC is aiming to achieve a “passive” closure condition, we do not believe that it will be totally achievable (if “passive” is meant to indicate a “walk-away” situation), and that some long-term monitoring and maintenance will be required;
2. although monitoring plans are described for the closure period (which we interpret to mean the 3 or so years in which decommissioning or reclamation activities will take place), they are not described well for the long-term post-closure condition;
3. for example, we believe that some long-term post closure monitoring will be required for:
 - the quality of groundwater that flows from the underground workings to Wolverine Creek;
 - the effectiveness of the bio-treatment bypass channel along Wolverine Creek, should it be necessary;
 - the stability of the dam for the TMF;
 - the condition of the spillway over the dam for the TMF;
 - water quality of the TMF discharge for some number of years after closure to ensure that the water chemistry of the TMF had reached an acceptable steady-state condition, and to ensure that there is an acceptably low risk to wildlife when they drink or are otherwise exposed to the water of the TMF; and
 - water levels in the TMF for some number of years after closure to ensure that extreme climatic variations do not reduce the water level to a point where tailings are exposed to higher oxygen conditions.

These are examples of potential long-term post-closure monitoring needs that must be better described.

As contemplated in SEPA, the Kaska must be provided with copies of all environmental monitoring reports prepared for government agencies. We also request that YZC annually provide the Kaska with a reader-friendly summary of the past year's environmental monitoring, including surprise results, the identification of those problems or situations that resulted in those surprises, and the mitigative actions taken to remedy problems.

8. Follow-Up

As pointed out by in the paper entitled "Predicting Water Quality Problems at Hardrock Mines" submitted by the Yukon Conservation Society as part of their intervention for this licence application (Exhibit 5.2.1), there have been very few retrospective comparisons of what was predicted in terms of water quality at the time of hard rock mine planning with what actually occurred as a result of mining. In their studies, Maest and Kuipers found that predicted water quality impacts did not match reality in most situations. Three quarters of the mines studied in detail actually exceeded water quality standards whereas all were predicted to meet water quality standards in the planning predictions.

We believe that a Follow-Up program is necessary to determine if the mine planning predictions of geochemistry and water quality for the Wolverine Mine are actually borne out by operational and post-closure monitoring. This follow-up program should be properly designed with the input of regulatory agencies and the Kaska, and its implementation should be a condition of the Water Licence. It should probably be funded by YZC but conducted by an independent contractor agreed to by the regulators and the Kaska.

It is only by rigorously conducting such follow-up investigations, that we can improve the predictions used in mine planning, and effectively design mitigation actions. We believe that this should be a requirement for all hard rock mines with the potential for acid rock generation and metal leaching.

9. Decommissioning and Reclamation

As contemplated in SEPA, we expect to participate in the preparation or amendment of any detailed reclamation and abandonment plans. We support the concept of progressive reclamation, doing what can be done in terms or reclamation while the mine is still operating.

Please feel free to contact Norm Barichello (867-667-2639) or Malcolm Foy (250-656-0127) if you have any questions about this submission.

Yours truly,

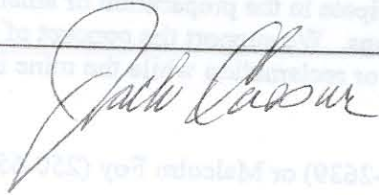
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cc. Pamela Ladyman, Yukon Zinc Corporation

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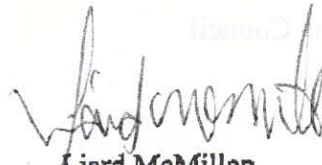
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