BCnature
FEDERATION OF BC NATURALISTS

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Dear Ms Bakelaar,

Re: Galore Creek Copper-Gold-Silver Project

BC Nature (Federation of British Columbia Naturalists) represents over 4,000 members in 50 member clubs, in communities throughout British Columbia. Our motto is "*To know nature and to keep it worth knowing.*" Naturalists strive to understand the inter-connectedness of life on earth, including, in particular, the rich diversity of ecosystems in British Columbia and the growing challenges these face.

For reasons of capacity and timing, BC Nature was unable to send comments on the Galore Creek Project during previous windows for public comment during the environmental assessment conducted by the BC Environmental Assessment. We therefore appreciate this opportunity to comment on CEAA's Comprehensive Study Report. Our comments and conclusions are **highlighted in *bold italics*** throughout this submission.

SUMMARY

The interests of BC Nature in the Galore Creek Project relate to potential adverse impacts of the mine and access corridor on water quality and fish, and on vulnerable terrestrial wildlife and their supporting ecosystems. We welcome the proponent's selection of the access route, which avoids the Stikine River corridor, and appreciate the comprehensive nature of the environmental assessment, but are troubled by the conclusions that the proponent's promised precautionary measures and mitigation will result in minimal likelihood of adverse effects. We do not doubt the proponent's sincere commitment to develop and operate the mine responsibly. However, most accidents occur as a result of human error. Add the potential of human error to the potential for random earthquakes and

extreme weather events in this seismically active area where severe weather is the norm, it is unlikely that, over the projected mine life of twenty years or more, there will not be some serious, potentially long-lasting environmental damage from the Project. Furthermore, regardless of present intentions to decommission the road following mine closure, pressure to keep the road open from other industrial interests is inevitable in this mineral rich region of the province. The provincial government does not have a good track record in decommissioning mining roads. In other words, the Galore Creek Project will most likely lead to on-going incremental degradation of currently intact natural ecosystems in this region of British Columbia.

WATER QUALITY ISSUES

Of relevance to water quality are: Acid Rock Drainage (ARD), drainage from the mine pits, the quality of the drainage impoundment water, the dam, pipeline ruptures and increased sedimentation. The Proponent has committed to long-term monitoring of surface water, sediment, benthic invertebrates and fish.

About 500 million tonnes of potentially acid generating (PAG) tailings and most of a predicted billion tonnes of waste rock, both PAG and non-PAG, will be stored under water in the tailings impoundment in Galore Creek Valley in the course of a 20 year mine life. The waste rock will contain substantial concentrations of other metals which may leach into the impoundment water. The impoundment will also store drainage from the open pits.

We support disposing of all of the mine's potentially acid-generating waste subaqueously in the tailings impoundment as the most efficient way to deal with this material, but it is not without risks.

One such risk is that water toxins present in the tailings/waste rock impoundment could very well pose considerable risks to any wildlife that had access to them, in particular migrating waterfowl and shorebirds. This needs to be addressed.

Tailings decant water

The Report states (p.126):

> "During operation of the mine, tailings decant water will be discharged into Galore Creek each year during freshet. These discharges are expected to increase the concentrations of a selection of metals and nutrients in Galore Creek and the Scud River, and are therefore planned for high-flow periods when dilution from snow melt and rainwater *will assist in mitigating the potential impacts of metal and nutrient toxicity*". (italics ours)

We do not derive a great deal of comfort from those words "assist in mitigating", as they imply that impacts will occur, but will be less than they would be. The question is, how much is too much? The official conclusion, however, is that there are no expected adverse impacts on downstream organisms, which are adapted to naturally occurring existing high baseline levels of dissolved metals. There appears to be no information on what the tolerance levels of organisms is for metals in this area. For mitigation measures to be identified the tolerance levels of key organisms needs to be determined.

Seepage

In addition to planned discharges of excess water from the tailings and waste rock impoundment, the proponent anticipates that seepage to groundwater will occur from the dam impoundment, but that impacts will be negligible because the dam is to be constructed with a till core and bituminous liner, as well as a grout curtain beneath the till core of the dam. In addition, the proponent has committed to installing a seepage collection and pump back system below the dam. ***Despite these precautions, we are concerned that there will be on-going risk of seepage. These concerns are reinforced by comments by the Ministry of Environment on the proponent's Application submitted last Fall.*** These comments point out that:

> "Due to the fractured nature of the bedrock....and the location of 3 major faults within and at the toe of the main tailings dam the potential for substantial, difficult to control seepage is a concern."

We interpret this to mean that seepage could get into the groundwater, and would escape the collection and pump back system below the dam. If this is the case, then further mitigation measures need to be identified.

Dam failure

The most serious impacts would come from a breach of the dam as the result of a catastrophic flood or earthquake. The predicted consequences are contamination not only to Galore Creek and the Scud River into which it flows, but the Stikine River itself with potentially long-lasting severe impacts on fish and wildlife, as well as on humans who depend on the Stikine for their livelihood. To guard against such an eventuality the dam will be built to withstand a 1:10,000 year earthquake. Other potential causes of dam failure are: karst collapse beneath the dam, and a sliding block on weak plane of soil or linear interface. The dam will be built to "last indefinitely and become a permanent feature of the landscape" and dam failure from any cause is rated as "not likely".

There is also the potential for ARD/Metal Leaching from high rock walls along the access road corridor. The Proponent does not know what the probability of this occurring is, but it is assumed the effects would be reversible in the long run.

Increased sedimentation from the Project is most likely to occur from landslides along the access corridor. It is intended to manage the risk of landslides through road design, with appropriate water management and slope stabilization measures.

The access corridor will include two pipelines, one to transport concentrate from the mine to a filtration plant off Highway 37, near the Iskut River, and the other to transport diesel fuel to the mine . We appreciate the fact that the proponent has chosen to transport these materials by pipeline, which will reduce truck traffic on the road and the likelihood of accidents and spills. However, there is still the potential for pipeline ruptures which could contaminate nearby streams and wetlands.

All these issues have the potential for negative ecological effects, and are therefore of concern to BC Nature. We concur that with due diligence they can be managed to prevent long term damage, with the exception of dam failure, which would occur as a random event over which there is no control and which, as the Report states, "is beyond any best engineering practices for earth-filled hydroelectric reservoirs". We are deeply concerned about the possibility of dam failure, however unlikely it may be. Extreme weather events are predicted to increase globally as a result of climate change, which suggests that the likelihood of an extreme flood will be greater and landslides will become more frequent. Unlike some other components of the mine, the tailings and waste rock impoundment will need to be maintained for an indeterminate length of time post-closure. A 1:10,000 earthquake can occur at any time, as likely today as it is in 10,000 years. The issue is not so much about assessing the possibility of dam failure as of assessing the consequences and developing contingency plans to deal with these. We are glad to see that the proponent will be working with the Tahltan and relevant Canadian and US government agencies to development conceptual contingency plans to remediate the effects of dam failure. Those who live in the area and use the Stikine, especially the people of Telegraph Creek and Wrangell need to be asked whether the risks are worth the consequences that they would bear; and their wishes need to be respected.

FISH

Our concerns regarding fish relate to degradation of habitat and overfishing. The Report acknowledges that the Project "has the potential to adversely affect local populations of several species of fish and their habitats, within what is currently a relatively pristine environment". Galore Creek itself is not considered

to be a fish-bearing stream due to the poor quality of fish habitat and the fact that a barrier close to its confluence with the Scud River is thought to prevent upstream migration. Contaminated effluent from the mine could, however, impact adversely on the Scud River, where eight different species of fish captured included coho and sockeye salmon, Dolly Varden and bull trout (a blue-listed species). It is thought possible that low numbers of bull trout may occur in Galore Creek. The location of the proposed aerodrome is in the floodplain of the Porcupine River which with its side channels, provides habitat for Dolly Varden and coho and sockeye salmon.

Some quotes from the Report's section on potential effects on fish will serve to illustrate our concerns.

On page 126 the report states:

> "At the mouth of Galore Creek, sulphate is predicted to the [sic] have the highest hazard quotient with average concentrations up to 2.4 times higher than baseline conditions."

And then goes on to say:

> "……little is known about the toxicity of sulphate to aquatic life."

On page 127:

> "While some metals are not predicted to have effects on their own, some metals have an additive, or synergistic, effect when combined in aqueous solution. The Application notes that waterborne solutions of zinc-cadmium mixtures have been found to be additive in toxicity to aquatic organisms, including freshwater fish, amphipods, marine fish, and copepods. Similarly, mixtures of copper and zinc are generally acknowledged to be more-than-additive in toxicity to a wide variety of aquatic organisms. There is a slight probability that combinations of these metals, even though they are not predicted to have significant impacts on the productive capacity of aquatic habitat on their own, may combine to affect productivity downstream of the mine; however these effects have not been modeled."

On p.129 it is concluded that:

> "Any potential effects [of the release of surface water decants from the tailings and waste rock impoundment] on fish mortality would be most evident near the mouth of Galore Creek……Sulphate and molybdenum emerged as contaminants of concern from [hazard

> quotient] calculations; however concentrations are predicted to have negligible effect on fisheries."

And more on dam failure [p.127]:

> "During mine operation and post-closure, the integrity of the tailings dam will be of importance. A tailings dam failure would result in a very large pulse of water traveling downstream. The force of the water may result in the destruction of alteration of habitat for kilometers downstream of the mine, possibly as far as the Stikine River. At the mouth of the Stikine River, the pulse of water would not be as much as a yearly flood; however, when added to an ongoing flood event (such as a 5-year event), the pulse would resemble a 1-in-50 year flood. Contaminated sediment from the tailings pond would settle in the Scud River and potentially cause mortality among primary and secondary producers. However, an event such as this is classified as catastrophic."

In the case of a dam failure, the potential effects on the Stikine River are described thus (p.141):

> "Tailings water and sediment would likely travel as far as the Stikine. This may have catastrophic effects on the productivity of the river, affecting not only fish species, but also wildlife and humans. Productive capacity would likely be altered for years as newly-exposed potentially acid-generating rock begins to leach acid, and contaminated sediment settles onto the substrate of the river."

To mitigate against the potentially disastrous consequences of dam failure the proponent has agreed to work with the Tahltan Central Council and relevant Canadian, B.C. and Alaskan government agencies to assess conceptually the potential effects and develop a program for remediation of these.

In regard to the Porcupine aerodrome [p.129]:

> ".....sub-lethal concentrations of chemical compounds used for de-icing aircraft have also been found in fish and invertebrates living downstream of major airports. Major spills could make their way into active fish habitat relatively quickly via groundwater flows through the porous gravel substrate. Accidental discharge of these substances could potentially cause a decrease in the productive capacity of habitat for all fisheries' valued ecosystem components."

Along the access corridor Dolly Varden was the most common fish found in both streams and in 10 out of 21 wetlands surveyed. Fish habitat along the access

corridor may be adversely affected by pipeline ruptures, landslides and erosion at stream crossings.
While it is intended to restrict use of the road to mine personnel and those with permits, without enforcement and over the long term if the road remains open after mine closure, the fish populations along the access corridor may experience overfishing.

The Report states (p.129):

> "Contamination of habitat leading to decreased productive capacity for valued ecosystem component species may occur if the proposed slurry or fuel pipelines leak or burst near fish habitat. The most likely place for this to happen would be at any road crossings where the pipeline is not buried, but rather attached to the crossing structures.....In the event of a pipeline breakage, automatic switches would shut off the pumps driving the materials through the pipelines. Thus, the likelihood of a breach or breakage occurring is very low and the net effect, should it occur, would not be significant."

The question we must ask is, what if the automatic switches fail? How long would it be before the leak was discovered and action taken?

With the regard to the possibility of slope failures along the access corridor, the Report states [p.129]:

> "Productive capacity of aquatic habitat may also be impacted by ~~catastrophic slope failures, debris torrents, and avalanches~~ associated with the proposed access corridor and its stream crossings. Road building has been associated with increased rates of slope failure and large-scale erosion, particularly in steep, coastal watersheds. Debris torrents in streams can affect productivity in streams for hundreds of years.....The significance of this potential secondary effect could be very high. To mitigate this risk, a geohazard assessment was completed in 2005. Appropriate protective measures.....and erosion control will be implemented along the access road to manage water and maintain slope stability. The likelihood of a major slope failure will therefore be low....."

We appreciate the fact that these dangers we have touched on have been recognized. If good luck and exemplary management practices prevail, no harm will occur. However, this "best case scenario" cannot be guaranteed. No risk analysis seems to have been carried out: instead, the conclusions reached by the proponent and reviewing agencies are that impacts will be insignificant. It appears to us that even if the probability

of any one failure (other than dam failure) having a significant longterm impact is low, collectively the consequences of multiple failures with low to moderate impacts (and failures/accidents or one kind or another will occur) could be very significant.

WETLANDS

The proponent has committed to avoiding wetlands wherever possible. However, a total of 12.3 ha of wetlands will be destroyed, and a number of others will be affected. The proponent's consideration of the effects of the project on wetlands is limited to a focus on fish, grizzly bear, western toad and moose. These include:

- Bisection of two large wetland areas in the access corridor that could affect the movements of grizzly bears and western toads;
- Loss of fish habitat in one wetland bisected by access corridor;
- Reduction of wildlife habitat function of wetlands near the proposed Porcupine aerodrome site that have been identified as having high grizzly bear and moose forage value;
- Reduction of fish habitat values of wetlands downstream of the aerodrome;
- Loss of western toad reproduction habitat in wetlands occurring in area of the mine;
- Exposure of wetlands down-slope of the access corridor to different flow patterns, that may result in the loss of some wetland areas and creation of new ones (with, consequently, presumed negligible net effects);

The proponent will compensate for degradation of fish habitat with the creation of new fish habitat (where, is not stated), and has committed to monitoring to ensure that no significant loss of wetlands function will occur. The proponent also assumes that any impacts on western toads and grizzly bears will be reversed after mine closure when the road will be deactivated. Despite the likelihood that the road will not be deactivated, the reviewing bodies have concluded that significant adverse environmental effects are "not likely".

The federal government has a policy of no net loss of wetland function. We believe that this should be required of the project proponent. The proponent's stated goal is to minimize the effects of development on wetland functions, but this does not address the predicted direct loss of 12.3 ha of wetland habitat. This may not seem significant, since it is only 4% of the total wetland habitat in the project area. However, if this mine is followed by other industrial development in the area, as may well be the case, and each developer is allowed simply to minimize effects on wetlands, the result will be the incremental degradation and loss of

wetlands in what is now as close to pristine as can be found anywhere on the planet.

TERRESTRIAL ECOSYSTEMS

Ecosystem mapping and field surveys identified six blue-listed ecological communities in the CWHwm zone in the study area. One blue-listed plant species, Jordal's locoweed (*Oxytropis jordallii* ssp. *jordalli*), was identified along the access corridor in the ESSFwvp zone, as well as one previously blue-listed species, sheathed cotton-grass (*Eriophorum vaginatum* ssp. *vaginatum*), which was down-graded to "yellow-listed" in 2006.

Three invasive plant species were documented in the access corridor area: water hemlock (*Cicuta douglasii*), sheep sorrel (*Rumex acetosella*) and common horsetail (*Equisetum arvense*). The construction and use of the access corridor may lead to the introduction of other invasive species.

The proponent has committed to a number of mitigation measures, including:

- adaptive management approaches, including advances in reclamation research, in final closure planning;
- reclamation using plants that will allow for natural succession and the establishment of plant communities reflecting the ecology of the area;
- development of plans to control and manage invasive plant species;
- monitoring, with assistance of Tahltans, of surface water, soil and vegetation concentrations of selected metals throughout mine development and operation.

The reviewing bodies are satisfied that there will be no significant adverse environmental effects from the Project on terrestrial ecosystems.

We support conceptually the proponent's proposed mitigation measures, on the assumption that detailed plans for addressing these will be developed during the permitting stage.

WILDLIFE AND WILDLIFE HABITAT

The mammal species most at risk from the Project are grizzly bear and mountain goat. The identified amphibian of greatest concern is the western toad (listed on Schedule 1 of the Species at Risk Act). In addition, a number of nesting and migrating waterfowl may be affected, especially those using wetlands in the area of the Project, including blue-listed trumpeter swans. Surf scoters, another blue-listed species, assumed to be transient, were observed. Harlequin ducks (identified as focal species by Canadian Wildlife Service) were observed on Scottsimpson Creek in the access corridor area. We discuss only those most likely to be impacted.

The Proponent has committed to long-term monitoring of moose, grizzly bear, western toad and mountain goat.

Grizzly Bear

The report identifies the following potential impacts to grizzly bears:

- Collisions with vehicles along the access road, as well as with trucks carrying concentrate to Stewart along Highway 37;
- Hunting mortality arising from increased access;
- Disturbance due to noise in the mine area;
- Disturbance to feeding at salmon-spawning areas in the vicinity of the aerodrome, with unknown effects on breeding success;
- Avoidance of suitable denning areas above the mine in Galore Creek Valley;
- Ingestion of chemical contaminants in Galore Creek Valley

The proponent dismisses the likelihood of significant residual impacts on grizzly bears because of the availability of alternative habitat, and their commitment to restrict use of the access road during the life of the mine and to prohibit mine personnel from carrying firearms, and to monitoring the bear population.

We remain unconvinced that residual impacts on grizzly bears will be insignificant in view of the fact that this is a highly vulnerable species with a low reproductive rate, and the likelihood that the road will never be decommissioned. Ongoing monitoring of the coastal and interior populations will be critical.

Mountain Goat

Mountain Goat are at even greater risk than Grizzly Bears. As the Report points out, goats are very susceptible to disturbance and may be forced to abandon their home range, which in turn may increase mortality as goats do not disperse widely. The Report states that despite proposed mitigation measures,

> "potential disturbance of mountain goat natal habitats as a result of access road construction blasting and helicopter traffic is deemed considerable.....[and].....The potential for considerable adverse effects on mountain goat natal habitat and mountain goat feeding habitat and/or behaviour within the Galore Creek valley is deemed considerable." (p.173)

And

> "Disturbance to goat natal habitats in the Galore Creek valley and along the access corridor during project operations were assessed as being considerable. The effects of this disturbance on mountain goats may extend beyond the lifetime of the Project; mountain

goats do not disperse widely and may not re-colonise suitable habitats for several decades." (p.174)

The proponent is committed to developing mitigation strategies to minimize impacts on mountain goats, using baseline estimates of abundance, kid production and range to identify a monitoring plan that will allow for adaptive management

It is hard for us to conceive how impacts on mountain goats can be avoided if this project goes ahead. We find this very disturbing. Every effort needs to be made to avoid disturbing mountain goats even if this increases costs to the proponent. The Cassiar Iskut-Stikine Land and Resource Management Plan (LRMP) recognized the particular vulnerability of mountain goat natal areas to disturbance and recommended the avoidance of overflights and the construction and use of roads close to natal areas between April 15 and June 15. It is therefore incumbent on the proponent to abide by the direction of the LRMP as one strategy to reduce impacts.

Trumpeter Swan

The Report concludes that aircraft noise could impact on nesting trumpeter swans in the Porcupine River Valley and at the confluence of the Porcupine and Stikine Rivers, but concludes that since the Pacific flyway population of swans is believed to be increasing, effects are likely to be restricted to the local population and that the effects of disturbance are therefore likely to be negligible.

We are troubled by this dismissal of potential effects on trumpeter swans, a blue-listed species, especially since the Cassiar Iskut-Stikine LRMP specifically called for resource development activities to minimize disturbance of trumpeter swan nesting and wintering areas.

Western toad

Western toads are the most commonly observed and widely distributed amphibian in the study area. Though they are considered not to be at risk in B.C., they have experienced precipitous declines in some areas and are listed as a species of special concern on Schedule 1 of the Species at Risk Act. The Study Report concludes that western toads will experience local impacts through the loss of about 1,876 ha of habitat, but that overall effects on western toads will be negligible.

We believe this conclusion may be optimistic, in view of the Conservation Data Centre Status Report that significant declines of

these toads have occurred in BC and the US for unknown reasons. It seems logical to conclude therefore that disturbance to western toads that will occur from the Galore Creek Project may not necessarily be followed by recovery. On-going monitoring and adaptive management will be essential.

MONITORING AND MITIGATION

The proponent has committed to undertake a follow-up program to verify the accuracy of predicted environmental effects of the project and the effectiveness of proposed mitigation measures; and has also committed to a comprehensive environmental management system that would form the basis for a more detailed management system to be developed during project permitting.

There are numerous references in the Report to the proponent's intention to carry out monitoring. We support the proponent's proposal to develop and implement a Wildlife Mitigation and Monitoring Plan and recommend that this be done with the participation of the Tahltan.

We consider it important that monitoring be undertaken in a credible and transparent manner, in which the public and Tahltan Elders can have confidence. Monitoring needs to be carried out at all stages of the project, from construction, operation, closure to post-closure.

BC NATURE'S CONCLUSIONS

We are deeply concerned about the potential for long-term adverse ecological impacts from the Project because, despite precautionary measures, accidents and malfunctions are bound to occur, and the risk of extreme weather events and earthquakes will be ever-present. If the proposed mine is to proceed, then clearly, in our view, more needs to be done to minimize the potential for adverse effects, including:

- ***Determining the tolerance levels to dissolved metals of key organisms subject to exposure to releases of water from the tailings and waste rock impoundment;***
- ***Assessment of potential impacts on waterfowl, shorebirds and other wildlife from toxins in the tailings/waste rock impoundment water, and development of mitigation measures to deal with these impacts;***

- ***Development of mitigation measures to deal with potential contamination of groundwater from uncontrolled seepage from the impoundment;***
- ***Adoption of goal of no net loss of wetland function;***
- ***Development of further strategies to minimize impacts on mountain goats, including avoiding disturbance of kidding areas between April 15 and June 15, in accordance with the Cassiar Iskut-Stikine LRMP;***
- ***Development of strategies to avoid disturbance of trumpeter swans in accordance with the Cassiar Iskut-Stikine LRMP;***
- ***Inclusion of the Tahltan in the development and implementation of the proposed Wildlife Mitigation and Monitoring Plan;***
- ***Seeking the opinions of those who live in the area and use the Stikine, especially the people of Telegraph Creek and Wrangell, on whether they consider the risks of dam failure are worth the consequences that they would bear; and respecting their views.***
- ***Ongoing monitoring at all stages of the project from development to post-closure, undertaken in a credible and transparent manner that will have the confidence of the public and Tahltan Elders.***
- ***Ensuring that the bond posted by the proponent is at all times adequate to deal with all contingencies that may arise.***

Sincerely,

Bev Ramey
President

Rosemary Fox
Vice-President