New Prosperity Gold-Copper Mine Project
Federal Review Panel

Canadian Environmental Assessment Agency, 160 Elgin Street, 22nd Floor, Ottawa, ON K1A 0H3, Tel: 1-866-582-1884
NewProsperityReview@ceaa.gc.ca

March 28, 2013

Ms. Katherine Gizikoff
Director, Environment and Government Affairs
Taseko Mines Limited
15th Floor, 1040 West Georgia St.
Vancouver, BC
V6E 4H1

Sent by e-mail: <email address removed>

Subject: Second Deficiency Statement – Supplemental Information Requests – New Prosperity Gold-Copper Mine Project Environmental Impact Statement

Dear Ms. Gizikoff:

The Federal Review Panel (the Panel) responsible for reviewing the New Prosperity Gold-Copper Mine Project has completed its review of the responses to information requests received from Taseko Mines Ltd. (Taseko) on March 1, 2013. The Panel also reviewed and considered all comments and information received from the various participants as part of the 15-day public comment period.

Based on its own review of the responses and the comments received, the Panel has determined that additional information is required to supplement the information already provided in order to fulfill the requirements of the EIS Guidelines issued in March 2012. The list of supplemental information requests (SIRs) is attached to this letter. To assist with planning, the Panel requests that Taseko indicate when it expects to be able to submit its responses.

The additional information requested is necessary for the Panel to determine if the EIS is sufficient to proceed to the public hearing. Once all the requested information is submitted, the Panel will determine whether additional information is still needed or whether there is sufficient information for scheduling the public hearing.

The Panel notes a fundamental difference between NRCan and Taseko concerning the interpretation of the 1994 pump test well data, and requires supplemental information as outlined in SIR 10/11. The Panel has identified two ways for Taseko to resolve this difference: further aquifer pump tests and modeling or new modeling based on 1994 data. In order to act in a careful and precautionary manner, without any new pump tests, the Panel will accept as reliable, the 1994 data in its analysis and assessment of environmental effects.

The Panel strongly encourages Taseko to consult with NRCan and TNG if it decides to undertake a field program to address this deficiency. The Panel notes that the TNG stated, in its submission of March 16, 2013, that it has never objected to the Proponent carrying out site investigations of this nature.

Many of Taseko's IR responses involve adaptive management with details to be developed at the regulatory phase. For routine matters, the use of adaptive management with details to be worked out in the regulatory phase of projects is appropriate. However, when environmental effects may be serious, such as when they may result in significant adverse effects, it is essential that more detailed information be provided to the Panel. Under these conditions, deferring decisions to subsequent regulatory processes is not appropriate. It is first necessary to determine if a significant adverse effect is likely. For that purpose, more information is needed before the hearing. The Panel has adopted this approach of seeking more information now in several of its SIRs.

Please note that the time required by Taseko to respond to any information requested by the Panel is not included in the timeline remaining for the Panel to complete its review.

If you have any questions or concerns, please do not hesitate to contact Livain Michaud, Panel Manager at 613-948-1359 or at NewProsperityReview@ceaa-acee.gc.ca.

Sincerely,

<original signed by>

Bill Ross
Chair

cc: Mr. Brian Battison, Taseko Mines Limited

Attach.

Supplemental Information Requests

from the Federal Review Panel to Taseko Mines Ltd.

Regarding the Environmental Impact Statement

for the

New Prosperity Gold-Copper Mine Project, British Columbia

March 28, 2013

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Supplemental Information Requests

Supplemental Information Requests

SIR 1 – Cumulative Effects Assessment

References:

Response to IR 1 – Cumulative Effects Assessment

Related Comments:

CEAR # 460 (Tsilhqot'in National Government)
CEAR # 458 (Friends of the Nemaiah Valley)

Rationale:
The Panel requires further information concerning the cumulative effects of the Project. In the response received, Taseko provided the cumulative effects that are likely to result from the Project in combination with other physical activities (such as forest harvesting) that have been carried out since 2009 or will be carried out. The Panel believes there has been forest harvesting activities that took place before 2009 that act cumulatively with Project effects. In order to comply with the requirements of the *Canadian Environmental Assessment Act, 2012* (the Act), the effects of these activities that act in a cumulative manner with Project effects must be included in the cumulative effects assessment.

Additionally, the Act requires that the Panel determine the significance of the cumulative effects. In the response received, Taseko has most frequently provided the significance of the Project contribution to the cumulative effects, not the significance of the cumulative effects. The latter is required by the Act. The significance of the cumulative effects should be evaluated using the same criteria as the determination of significance for Project effects.

To be helpful, the Panel offers the following specific advice. As Taseko points out, "it is not clear whether Pine Beetle deforestation constitutes a physical activity as that term is used in [the] Act." The Panel agrees and would accept the treatment used by Taseko (in effect treating it as a physical activity) or the alternative treatment (regarding it as part of natural process). The Panel agrees with Taseko, in its determination of the VECs or key indicators that should be considered in these cumulative effects assessments: vegetation, wildlife, resource use and Aboriginal interests. The Panel accepts the reasons Taseko provided for excluding the other VECs.

Information Requested:

The Panel requests that Taseko:

a. Complete the cumulative effects assessment to include the effects of all past physical activities that act cumulatively with the Project effects, not just some recent ones, and in particular those related to forest harvesting activities that occurred prior to 2009.

b. Provide its determination of the significance of the cumulative effects.

SIR 5 – Assessment of Alternatives

References:

Response to IR 5 – Assessment of Alternative Mine Development Plans

Related Comments:

CEAR # 454 (Environment Canada)
CEAR # 459 (Cindy Ehrhart-English)

Rationale:

The Panel requested that Taseko revise the Multiple Accounts Analysis (MAA) so that the Mine Development Plans (MDPs) could be properly compared and the validity of the MAA outcomes established. All indicators used in the MAA should be applied to reflect a consistent consideration of the MDPs as a whole, not just the tailings storage facility (TSF). Alternatively, a justification should be provided for the approach used in the EIS.

The Proponent responded that the fundamental difference between the two MDPs is the location of the TSFs within the two plans. All other components are either identical (e.g open pit) or virtually the same (e.g. MDP 6 has identical plant site and ore stockpile and similar waste stockpile shifted to the north relative to MDP 2) so it would be reasonable to expect that although indicators have been selected to consider the MDPs as a whole, the differentiating aspects of most indicators are going to be related to the TSFs themselves or activities associated with them.

The Proponent revised the MAA (Appendix 2.4.3.1- A) to provide clarity and explanation with respect to how each indicator considers the MDPs as a whole.

Environment Canada noted that Section 6.1.2 – MDP 6 – Tête Angela Creek of Appendix 2.4.3.1-A had been substantially revised in relation to the August 30, 2012 version of document. In particular, this subsection now states that: “The flows in the Fish Creek catchment must be managed in such a manner as to be contained upstream of the open pit (i.e. in Fish Lake), and safely directed around the open pit and released to lower Fish Creek.” This subsection further states that: “there would be excess flows annually in the Fish Creek system that would be pumped around the open pit to lower Fish Creek”.

However, for MDP T2, Environment Canada noted that no excess flows from the Fish Creek system would be directed into lower Fish Creek. Rather, section 6.1.1 – MDP T2 – Fish Creek South, states that: “Excess Fish Lake water that is not required for the design inflows to the lake is directed to the TSF supernatant pond.”

Environment Canada also noted that the assessment of alternatives stated that: “MDP T2 cuts off 75% of Fish Creek flows downstream of the pit until the post closure period”.

Cindy Ehrhart-English indicated in her letter of March 16, 2013 that there is information that Taseko has “overlooked regarding the usage of Little Fish Lake by Tsilhqot’in”.

Information requested:

The Panel requests that Taseko:

a. Provide :
    i. An explanation as to why excess water from MDP T2 could not be directed into lower Fish Creek to help maintain flows in lower Fish Creek, as it would be if MDP T6 was to be implemented.
    ii. Estimates of flow reductions in Tête Angela Creek that would be expected downstream of the tailings storage facility if MDP T6 was implemented.

b. Provide the following information for each of the following indicators and sub-accounts:
    i. Sub-Account: Aquatic Habitat – provide estimates on flow reductions in Tête Angela Creek that would be expected downstream of the tailings storage facility if MDP T6 was implemented. As currently measured, the indicator treats all flow reductions to be of equal impact, regardless of the magnitude of the reduction. This indicator should consider both:
        I. the total length of stream reaches that are anticipated to receive flow reductions downstream of the tailings storage facility as a result of the MDP; and
        II. the magnitude of anticipated flow reductions.
    ii. Indicator: Number of Watersheds Affected – it is noted that two indicators are used to distinguish between directly and indirectly impacted watersheds. The indicator “Total Watersheds Directly and Indirectly Affected” duplicates “Number of Watersheds Directly Affected” while also incorporating watersheds indirectly affected. As a consequence, watersheds directly are counted twice, creating a bias in favour of the MDP with direct effects on the smallest number of watersheds. Redefine the second indicator so it only accounts for indirectly affected watersheds, making the two indicators mutually exclusive.
    iii. Indicator: Wetlands - the range of impact for the wetland indicator descriptor is <100 ha to >500 ha, but a rationale for this range is not provided. The full range of wetland losses arising from each of the alternatives assessed should be identified to facilitate an understanding of impacts.
    iv. Indicator: Number of Users - the source reference for these data is Cindy Ehrhart-English April 1994 Heritage Significance of the Fish Lake Study Area Ethnography (2009 EIS Appendix 8-2-B). Provide clarification on whether information more recent than 1994 is available; and whether efforts have been made to assess the current validity of the 1994 data.
    v. Sub-Account: Recreational and Commercial Use - clarify how the visual sensory and noise impacts associated with the locations of the tailings storage facility, non-potentially acid generating waste rock stockpile and low grade ore stockpile were considered for of MDP T2 and T6 on the Fish Lake recreational experience were evaluated.

c. Provide a response to the criticism raised by Cindy Ehrhart-English regarding traditional use of Little Fish Lake and Upper Fish Creek area.

SIR 10/11 – Groundwater Interactions between Fish Lake and Open Pit

References:

Response to IR 10 – Groundwater Interactions between Fish Lake and Open Pit
Response to IR 11 – Pit Dewatering Rates

Related Comments:

CEAR # 444 (Natural Resources Canada)
CEAR # 460 (Tsilhqot'in National Government)
CEAR # 454 (Environment Canada)

Rationale:

Part A - Hydraulic Conductivity Modeling

In IR 10a the Panel requested "that Taseko undertake additional sensitivity analysis for modeling the hydraulic conductivity between the proposed pit and Fish Lake to assess the predicted effects of hydraulic conductivity on the water quality (sic) of Fish Lake. *[Note: "water quality" reference was made in error and should have been "water level"].* This work should incorporate existing data, including data obtained from the 1994 pump tests (discounted high flow results), and any new data collected. Specifically, Taseko should run a model based on the highest hydraulic conductivity values measured in the area."

Taseko responded by stating that several sensitivity scenarios were documented in Appendix 2.7.2.4 A-C of the 2012 EIS, including a case where the hydraulic conductivity of all hydrogeologic units is increased by a factor of 5. Taseko noted that model calibration for the base case was good, but poor model calibration results for the high conductivity scenario indicated that this high conductivity was unlikely to be encountered at the project (km) scale and that it would be of little value to carry these results forward to water balance modelling or water quality predictions.

In its commentary on Taseko's response, NRCan stated what it considers to be shortfalls in Taseko's approach of simply increasing the hydraulic conductivity of all units by a factor of 5, and goes on to state that it would be necessary to make adjustments to other model parameters such as conductance of the MODFLOW "River Boundary" cells used to represent Fish Lake. NRCan also reiterated earlier concerns that the scale (25 km) of the regional groundwater flow model is not appropriate for assessing critical groundwater interactions between the proposed pit and Fish Lake which are separated by less than 400 m.

In its commentary the TNG noted that the Proponent's response to IR 10a failed to deliver the information requested by the Panel, specifically:

- No new data were obtained and utilized in the analyses;
- The 1994 testing program data were not included in the analyses, despite the Panel's direct request;

- While measured hydraulic conductivities for all water-bearing units on the site range considerably, *over several orders of magnitude*, the sensitivity analysis increased the mean conductivities by only [a multiple of 5]; and,
- No sensitivity analyses were run using the maximum measured conductivities.

The Panel concurs with NRCan's and TNG's conclusion that better data and a more credible modeling exercise at the project scale is required to make predictions about the dewatering impacts to Fish Lake and water inflows to the pit.

The TNG has also noted that in 2009 BGC conducted a review of bedrock above and below the gypsum line and concluded that there was no significant difference in hydraulic properties between the two units. However the TNG also pointed out that Knight Piesold, [in Appendix 3-6-H, 1995 and in Appendix 2.2.4.A, 2012], characterized the rocks above and below the gypsum line with different hydraulic characteristics. The Panel agrees with the TNG that this discrepancy needs to be resolved.

Part B – Pump test Data – Wells 94-154, 94-157 and 94-159

IR 10b requested Taseko to provide further rationale why the pump test data from wells 94-154, 94-157 and 94-159 were not relied on by BGC Engineering and were not used for the purposes of the Baseline Groundwater Hydrology Assessment (Appendix 2.6.1 4D-A).

Taseko responded by stating that Pump test data from wells 94-154, 94-157 and 94-159 were not relied on because the pumping and observation wells were screened across multiple hydrogeological units, the pumping rate was not recorded throughout the test duration, (p.28 Appendix 3-6-H states "a steady-state pumping rate of approximately 80 gpm was used for each test) and the observed pumping water levels suggested that a steady state pumping condition was not achieved (However, p.30 of Appendix 3-6-H states: "The final portion of the curve is therefore assumed to be representative of flow from the confined aquifer in bedrock"). As evidence, Taseko produced a graph (Table 10B-1 taken from Appendix 3-6-H) depicting, among other things, drawdown fluctuations observed during testing, which it claims are likely due to fluctuations in the pumping rate. Taseko noted that this can often happen in lower producing wells if the test pump is not constantly adjusted for the declining water level in the pumping well. For this and other reasons cited, Taseko and BGC believe that it would be inappropriate to place emphasis on the original 1994 results for the 3D numerical analysis given the uncertainty in the interpretation. However, the Panel notes that no other hydrogeological pump test data have been made available to understand the groundwater interactions between Fish Lake and the open pit.

In NRCan's review of the Taseko response and in its review of the literature on this subject (Domenico and Schwartz, 1990), NRCan provided its opinion that, for reasons cited within its commentary to the Panel, the time-drawdown data for the 1994 pump test (Table 10 B-1) is characteristic of a "leaky aquifer". Moreover, the pump test results show that at the end of pump testing (2.1 days), steady state conditions were reached whereby groundwater withdrawal at the pumping well was balanced by inflows from the aquifer which are from sources that likely include Fish Lake, given its proximity to the pumping well. NRCan concludes by stating that "far from demonstrating that the hydraulic connection between the pit dewatering well and Fish Lake is insignificant, the

pump test results submitted by *[Taseko]* suggest quite the opposite and confirm NRCan's misgivings."

Part C – Pit Dewatering Rates

Contained within IR 11b was a Panel request that Taseko revise the 3D numerical groundwater flow model to incorporate a more refined representation of hydrostratigraphic units between the proposed pit and Fish Lake, including the more permeable bedrock above the 'gypsum line' and the overlying thick inter-stratified overburden deposits between Fish Lake and the proposed pit.

Taseko responded by stating that as part of the 2009 E for the Prosperity project, BGC (BGC 2009b – CEAR # 1269 from the 2009/10 EIS) conducted a careful review of the pit outline and the hydrogeological data above and below the 'gypsum line'. Taseko went on to state that following this review, BGC determined that gypsum dissolution did not have a marked effect on bulk hydraulic conductivity of the fractured rock mass when compared to the parameter assignment used in the regional (25 km) 3D model over the depth range potentially affected by gypsum dissolution. In Taseko's opinion, neither of these data reviews supported a refined representation of the hydrogeology between Fish Lake and the Open Pit. Consequently, Taseko claimed that a refined modeling effort was neither warranted, nor would it significantly change results pertaining to the interaction between the Open Pit and Fish Lake.

In its review of Taseko's response, NRCan noted that Taseko has not provided any evidence to support its claim; therefore NRCan stated that it was unable to assess its merits. However, NRCan noted that a relatively refined representation of hydrostratigraphy of the pit-Fish Lake area was used by Taseko in the 2D model SEEP/W (Appendix 2.2.4-A) for the purpose of predicting pit wall stability and assessing the effectiveness of the proposed dewatering system.

The scale of this particular analysis (2D modeling) was said to be limited to the interaction between the open pit and Fish Lake. NRCan strongly advises that this is precisely the scale at which estimates of pit dewatering and induced seepage from Fish Lake should be assessed (i.e. through 3D modeling), rather than using a regional 3D (25 km) model.

NRCan's concern stems from the fact that the gypsum that sealed bedrock fractures has been leached away by groundwater flow over time, resulting in enhanced hydraulic conductivity. NRCan noted that this leaching is evidence of a fairly active groundwater flow regime in the past and possibly to this day.

NRCan is also of the opinion that Taseko's claim that induced lakebed seepage due to pit dewatering (53 m^3 per day) is likely highly underestimated. Furthermore, NRCan has analysed TML data for the pit dewatering rates at Year 17 and has concluded that the results are unrealistic and are an artefact of the assumed very low lake bed conductivity and the hydraulic conductivity data used in the regional groundwater study.

In this regard NRCan provided its assessment, supported by the literature (Bredehoeft et al., 1982; Bredehoeft, 2002), that induced lakebed seepage may be as high as Taseko's proposed pit dewatering rate of 2900 m^3 per day (Year 17). NRCan is concerned that the most likely source of recharge is Fish Lake for reasons cited.

The TNG's expert concurred with NRCan's assessment, stating that there is significant uncertainty from not completing the new local scale modeling requested in IR 11a/b and from Taseko's assumptions about the hydrogeological character of the sediments and rock units beneath the lake. TNG went on to express its opinion that, for reasons cited, induced seepage effects and drawdown of lake water levels could be substantially greater than estimates put forward by Taseko, placing the viability of Fish Lake as a sustainable aquatic ecosystem in jeopardy.

The Panel notes the profound fundamental difference between Taseko and NRCan / TNG as to what scale of modeling analysis is most appropriate for estimating key groundwater fluxes, including pit dewatering rates and induced lake bed seepage, and concludes that more information is required to inform this highly important issue.

Information Requested:

Part A:
The Panel requests that Taseko:

a. Complete sensitivity analyses of groundwater flows and effects on Fish Lake using the observed minimum and maximum conductivity values for each hydrostratigraphic unit (using all existing and new data, including the 1994 test values) to provide a possible range in flows and effects on Fish Lake and the open pit.

b. As originally requested in IR 10a, undertake additional sensitivity analysis for modeling the hydraulic conductivity between the proposed pit and Fish Lake to assess the predicted effects of hydraulic conductivity on water level in Fish Lake. This work should incorporate existing data, including data obtained from the 1994 pump tests (discounted high flow results), and any new data collected.

c. Develop a local scale groundwater model based on the highest hydraulic conductivity values measured in the area.

d. Provide a detailed cross section between the Pit and the lake that shows all the litho-stratigraphic units between the surface and the rocks below the gypsum line, the location and dates of the boreholes, and the measured hydraulic conductivity value(s) of each unit and the date when the data were obtained.

Part B:
The Panel requests that Taseko:

a. Comment on NRCan's conclusion that the deep (~160 m) aquifer between the pit and the lake "clearly corresponds to [a] 'leaky aquifer'".

b. Model this possible leaky aquifer and provide an analysis on the effect such leakage would have on:
    i. The ability to maintain the water level of Fish Lake;
    ii. The predicted pit dewatering rates;
    iii. The risks to the open pit slope stability at the various stages of open pit development.

c. Provide the year in the mine life in which the boundary between the overburden and the rocks above the gypsum line would be exposed.

Part C:
The Panel requests that Taseko:

a. Develop a more refined 3D groundwater flow model at a scale that distinguishes between the various hydro stratigraphic units that will be encountered in the pit slopes.

b. Provide an analysis of NRCan's conclusions, particularly as they pertain to:
   i. The pit dewatering rate of 2900 m^3/day at year 17;
   ii. The hydraulic connection between the lake and the groundwater flow system.

The Panel notes a fundamental difference between NRCan and Taseko concerning the interpretation of the 1994 pump test well data. This difference could be resolved by conducting additional pump tests. Alternatively, in order to act in a careful and precautionary manner, without any new pump tests, the Panel accepts as reliable, the 1994 data in its analysis and assessment of environmental effects, and directs Taseko to use the hydraulic conductivities from the 1994 pump tests in the new model requested in "e" above.

The Panel strongly encourages Taseko to consult with NRCan and TNG if it decides to undertake a field program to address this deficiency. In this regard, the Panel notes that the TNG, in its submission of March 16, 2013, stated that it has never objected to the Proponent carrying out site investigations of this nature.

The Panel notes that the deepest well in the 1994 Pump Test Investigations was terminated at 193.5 m due to high water inflows and trapped drill cuttings. If additional field work is undertaken, the Panel recommends that the aquifer beyond the 193.5 m level be tested in order to evaluate the full extent of the aquifer in this area.

SIR 12/14 – Tailings Storage Facility

References:

Response to IR 10b – Groundwater Interactions between Fish Lake and Open Pit
Response to IR 12 – Tailings Hydraulic Conductivity
Response to IR 14 – Tailings Storage Facility Seepage - Mitigation

Related Comments:

CEAR # 444 (Natural Resources Canada)
CEAR # 460 (Tsilhqot'in National Government)

Rationale:

Part A: Tailings Seepage Estimates
As part of IR 12 the Panel requested Taseko to develop and report on a 3D numerical groundwater flow model for the purpose of estimating seepage through the embankments and base of the TSF. The Panel requested that the model feature the TSF as an explicit part of the model domain rather than as a boundary condition. Materials within the TSF include PAG waste rock and tailings of varying degrees of compaction and textural coarseness should be used in the modeling and be assigned realistic values for their different hydraulic properties.

Taseko responded by stating that the 2D seepage model and 3D numerical groundwater flow model that was used to estimate seepage for the New Prosperity TSF achieved the same result as a 3D model that includes the TSF as an explicit part of the model domain, and that a reasonable estimate of seepage from the TSF was calculated already to assess potential impacts to the receiving environment. Taseko went on to state that the development of a 3D numerical model with the attributes requested will not provide any improved refinement in the estimates of seepage to those already completed.

Taseko claimed that its 2D seepage model and the 3D numerical groundwater model both incorporate tailings and PAG waste rock units with different realistic hydraulic conductivities. The 3D numerical model was specifically developed at a regional scale, and Taseko asserted that this representation is deemed appropriate. Moreover, reducing the model scale to that of the project (i.e. inclusion of specific layers within the TSF) is not expected to produce substantially different results than existing simulation predictions.

Taseko further claimed that the current model provides a single base case for the pre-development groundwater conditions allowing for direct comparison between the pre-development and post-development scenarios. Taseko concluded by stating that modeling of the TSF at the embankment scale would require artificial boundary conditions that would allow water to enter and leave the model domain introducing error into the results. For these reasons, Taseko did not comply with the information request.

In NRCan's review of Taseko's response and its assertion that 2D and 3D groundwater modeling conducted to date achieves the same result as the model specifically

requested by the Panel, NRCan stated that in the absence of any supporting evidence, it is unable to judge the merits of these claims.

NRCan disagreed with Taseko's claim that the existing groundwater models incorporated a realistic hydraulic conductivity for tailings. NRCan stated that the tailings conductivity value Taseko assumed was at the low end of values reported in the literature and could not be considered conservative for the purpose of estimating seepage fluxes from the TSF.

For reasons cited in its commentary, NRCan did not accept the argument put forward by Taseko that a refinement of its present modeling to meet the Panel's request would require an "addition of model complexity, which while appearing to provide greater precision, would be inconsistent with the accuracy of inputs and results." NRCan stated that it does not consider making the TSF an integral part of the model domain to be an unjustified addition of complexity.

NRCan also commented on Taseko's concern that reducing the model area to smaller than the watershed scale would require establishment of artificial boundary conditions which for reasons cited would introduce sources of error. In its comments, NRCan claimed that this is a dilemma frequently encountered in groundwater flow modeling: the region of interest for model predictions may be far removed from natural boundaries such as rivers or drainage divides. In this respect, NRCan put forward options commonly employed in modeling to work around this dilemma.

NRCan concluded its commentary with a summary of the pros and cons of Taseko's modeling approach and the approach advocated by NRCan and the Panel. In sum, Taseko's regional-scale model faithfully represents the major hydraulic boundaries of the Fish Creek groundwater flow system but lacks the resolution required for prediction of key seepage fluxes of interest, namely those from Fish Lake to the pit and those from the TSF towards Fish Lake. On the other hand, the model requested by NRCan and the Panel would be well suited to making predictions of seepage flux from the TSF while compromising on the representation of boundary conditions.

In this regard, the Panel agrees with NRCan's conclusion that it is preferable to err with respect to boundary conditions rather than with seepage flux predictions which are critical to the assessment of environmental effects on Fish Lake.

Part B: Tailing Storage Facility Seepage Mitigation

Given the heterogeneous nature of overburden units beneath the TSF and the potential for contaminant transport along preferential groundwater flow paths that bypass interception wells, the Panel requested in IR 14a that Taseko provide the basis for estimates presented for the effectiveness of measures that would be implemented to control and collect seepage from the TSF.

In response, Taseko stated that it considers the estimates utilized for the effectiveness to control and collect seepage from the TSF to be reasonable for this level of design of the TSF. Taseko goes on to state that as the Project progresses, additional studies will be completed to refine the location, size and aspect of the various mitigation measures that have been proposed. Beyond those measures identified, Taseko stated that additional mitigation measures may be implemented, if required, such as additional seepage interception wells. Furthermore, Taseko makes the claim that the potential for

preferential groundwater pathways is a risk that can be managed, and in this regard Taseko included a reference for a peer reviewed survey method for identifying such groundwater pathways.

Taseko stated that the control of seepage water from the TSF occurs through many aspects of the design, including the glacial till basin liner, the embankment core/filter zones, the tailings mass, the depressurization wells, the seepage collection ponds and the groundwater pump back wells. Moreover, the optimization of each of these measures occurs during detailed design, as well as throughout the project life based on information collected in the monitoring program.

Taseko noted that the basis of estimates for seepage control and collection measures is discussed in greater detail in its responses to IR12a, IR12b and IR14b.

In separate commentaries on Taseko's response, NRCan and the TNG both noted that Taseko's estimates of TSF seepage recovery efficiencies are based on the 2D Seepage and 3D project-scale numerical groundwater flow models, in which the heterogeneous units beneath the impoundment (glacial till, weathered and fractured basalt, fluvial sands and gravels, and glacial lacustrine sediments) are represented by an idealized layer-cake hydrogeological stratigraphy. NRCan stated that with such a homogenized representation of the subsurface, the models cannot account for the preferential seepage flow paths that are bound to develop and thus make any predictions of seepage recovery efficiency unreliable. Similarly, in its comments on Taseko's IR response, the TNG claimed that "insufficient information has been presented to document the lateral extent, thickness and characteristics of the underlying till sediments".

In response to Taseko's claim that methods for detecting such flow paths now exist, NRCan stated that in its opinion, "these methods have yet to be demonstrated at a very large scale similar to that of the New Prosperity mine project".

NRCan claimed that Taseko's "estimate of overall seepage recovery efficiency (93%) is unrealistically high and not reasonable for the current level of design of the TSF when a more conservative estimate would be expected".

The Panel concurs with the opinion of the TNG that the very close proximity of Fish Lake to the operations, and the overarching goal of preserving Fish Lake as a functioning ecosystem impose significant constraints on the allowable levels of confidence in the assessments and should be factored conservatively into the conceptual design of the TSF.

Information Requested:

Part A:

a. Consistent with IR 10b, the Panel requests once more that Taseko develop and report on a more refined 3-D numerical groundwater flow model at the project scale using realistic and conservative hydraulic conductivity values to estimate TSF seepage.

Part B:
The Panel requests Taseko to:

a. Comment on NRCan claims that Taseko's estimate of overall seepage recovery efficiency (93%) is unrealistically high and not reasonable for the current level of design of the TSF when a more conservative estimate would be expected.

b. Provide additional evidence regarding an overall seepage recovery efficiency of 93%, supported by new modeling requested above and by comparative examples from other large tailings storage facilities constructed on a glacial till cover.

c. Provide additional information regarding the lateral extent, thickness and characteristics of the underlying till sediments and intercalated basalts. Provide the basis for why a non-conservative till thickness of 5-15 m was used for glacial units that blanket the TSF when it is known that a significant area of the TSF is underlain by till of less than 5 m.

SIR 18 – Effects of Climate Change on the Lake Productivity

References:

Response to IR 18 – Lake Productivity – Climate Change

Related Comments:

CEAR # 454 (Environment Canada)
CEAR # 456 (BC Ministry of Environment)

Rationale:

The Panel requested that Taseko provide additional information on the current and future impacts of climate change and increased seasonal variability on the hydrology and hydrochemistry of the Fish Lake watershed to fully assess the adequacy of the habitat and fish productivity and water quality and quantity models. The Panel also requested that Taseko provide a rationale for why climate data from a closer meteorological station (e.g. Nemaiah Station) was not used.

In its response, Taseko described how precipitation and temperature records from the Barkerville meteorological station have been used to support an analysis of regional climate and hydroclimatic trends. Taseko responded that data from the regional climate station at Barkerville was used to assess climatic trends because this station has the longest historical climate record available for the general project region, with over 100 years of complete record. Taseko concluded that the review of historical climate data for the past 100 years would indicate that there is no basis for assuming any material climate change in the region within the time frame of project development and closure.

Environment Canada noted that there is substantial variability in climate in mountainous environments, particularly precipitation, and therefore, a regional trend analysis should be based on more than one or two records. Environment Canada further noted that the records for the region document considerable warming over the past 100 years and the published literature indicates that significant changes in hydrology have occurred in this region and further changes are projected for the future.

Environment Canada and BC MOE suggested that climate change predictions reflect a broader consideration of regional models and that Taseko should use the extensive climate information and pertinent publications available.

Information Requested:

The Panel requests that Taseko:

a. Use the information suggested by EC and MOE to prepare a more comprehensive analysis of climate change effects on the lake productivity of Fish Lake.

SIR 38 – Mitigation for Effects on Grizzly Bear

References:

Response to IR 38 – Mitigation for Effects on Grizzly Bear

Related comments:

CEAR # 458 (Friends of the Nemaiah Valley)

Rationale:

In IR 38, the Panel requested the Proponent to "describe to what extent the proposed mitigation measure for grizzly bear will minimize the cumulative effects on the South Chilcotin Ranges Grizzly Bear Population Unit". Taseko responded with a list of ten mitigation measures and determined the effectiveness of each in a qualitative manner. Each measure was scored with an effectiveness rating of high, moderate or low.

Friends of the Nemaiah Valley noted that no evidence was provided to support the effectiveness ratings of the mitigation measures proposed and requested data and case history studies used by Taseko in its effectiveness determinations. Friends of the Nemaiah Valley also expressed concerns that no evidence was provided to support the prediction that no significant adverse residual effects to grizzly bears will result after the application of mitigation measures.

The Panel would benefit from additional information on how the proposed mitigation measures will address previously identified cumulative effects to grizzly bear.

Information Requested:

The Panel requests that Taseko provide:

a. A discussion on how the effectiveness of each mitigation measure in the response to IR 38 was determined (*i.e.*, what led Taseko to classify the effectiveness of mitigation measures as high, medium or low?).

b. A discussion on how much each mitigation measure will offset the cumulative effects predicted.

SIR 42/45 – Health Effects in the Local Study Area

References:

Response to IR 42 – Health Effects in the Local Study Area
Response to IR 45 – Soil Metal Concentrations Modelling

Related Comments:

CEAR # 449 (Health Canada)

Rationale:

In IR 42b, the Panel requested that Taseko, with regards to the conduct of a human health and ecological risk assessment, "assess the health effects of the Project on workers who would reside in the project area; on residents of Taseko Lake Lodge; on transient people visiting the project area for recreational purposes (short term and longer term); and on Aboriginal people who would relate to a subsistence lifestyle or who are conducting cultural and spiritual activities at Fish Lake."

The Proponent indicated in its response, that the dust modeling carried out as part of the 2009 EIS, using a "Total Suspended Solids" (TSP) model, produced particulate matter results that exceeded the 24 hour regulatory guideline limits at the Employee Camp, Fish Lake and Taseko Lake Lodge. The Proponent stated that the method used was "extremely conservative", as most TSP emissions were from road surfaces, not the ore body and that subsequent dust emission mitigation resulted in 75% less dust. Furthermore, the Proponent stated that subsequent dust emission modeling carried out in 2012 using a "2.5 micron" ($PM_{2.5}$) model indicated that the 2009 TSP emissions were overstated by more than 400%.

Health Canada indicated that the inclusion of road dust in the assessment was necessary and that the Proponent did not provide any data to support the above-mentioned statements. Health Canada also stated that the change in the atmospheric modeling approach, introduces the possibility that the predicted risks of adverse human health impacts could be underestimated.

Additionally, Health Canada suggested that the Proponent "provide additional information on the likely nature and frequency of usage by First Nations people of the areas that are predicted to experience the highest metal deposition into environmental media since this information is important to determine potential exposures to metal contaminants by human receptors."

In IR 45, the Panel requested Taseko to provide a discussion on the applicability of the 2.5 micron model in the current assessment versus the TSP model used in the previous assessment, including a discussion of the model's limitations.

Health Canada has expressed concern regarding the atmospheric dispersion model used in the 2012 EIS (2.5 micron). Health Canada is of the opinion that using the 2.5 micron model is substantially less conservative than the approach used in the 2009 EIS (TSP) and has produced substantially different levels of metal deposition to soil. For example, the TSP model used in the 2009 EIS predicted a 567% increase in copper

concentrations in the soil after 19 years of operation, while the 2.5 micron model used in the 2012 EIS predicted a relatively insignificant increase of 0.65%.

Health Canada expressed concerns because the predicted atmospheric deposition of metals to soils, and ultimately to other media, *e.g.* water and country foods, has considerable influence on the assessment of human health risks due to consumption of country foods, inhalation of dust and ingestion of soils containing metals, *etc.* The change in atmospheric modelling approaches reduces the Panel's confidence in the results of the human health risk assessments based on modeled concentrations of dust and metals in soil and air.

Information Requested:

a. With regards to the dust modeling that was used in the EIS, as per comments received from Health Canada, the Panel requests that Taseko:
    i. Provide additional justification regarding Health Canada's concern that road dust can be a significant source of deposition, yet was partially excluded from the 2012 model.
    ii. Provide additional information and data to support the statement that mitigation of dust emissions resulted in 75% less dust.
    iii. Include specifics on the mitigation measures that will be implemented to attain these dust level reductions.

b. Provide additional information on the likely nature and frequency of usage by Aboriginal people of the area that are predicted to experience the highest metal deposition into environmental media.

SIR 43/44 – Country Foods

References:

Responses to IR 43 a and b – Country Foods
Response to IR 44 – Assumptions of the Human Health Risk Assessment

Related Comments:

CEAR # 449 (Health Canada)
CEAR # 460 (Tsilhqot'in National Government)

Rationale:

In IR 43, the Panel requested that Taseko "reassess the potential risks to human health from the consumption of country foods using hazard quotients that are calculated based on total dietary exposure to contaminants of potential concern," and "reassess country foods contaminant exposure using chemical-specific toxicity reference values".

The Proponent had used CCME Guidelines and based daily food intake levels on a 2006 Galore Creek Country Foods Baseline Assessment done on the Tahltan Nation.

The Tsilhqot'in National Government suggested that the CCME guidelines were inappropriate and not necessarily protective of the local Tsilhqot'in communities.

Health Canada suggested that there was insufficient information to justify the use of Tahltan food intake values as relevant for the Tsilhqot'in people. Health Canada also noted that a recent dietary study of BC First Nations demonstrated that the dietary consumption patterns of BC First Nations can differ substantially.

Health Canada was of the opinion that uncertainties in country food consumption levels and the levels of contaminants in soil that are taken-up into country foods act cumulatively and increase the uncertainty in human health risk estimates for country food consumption.

In IR 44, the Panel requested that Taseko "identify the assumptions made in the risk assessment calculations including food consumption rates, soil ingestion rates, transport of contaminants, soil particle size and pathways of exposure to sensitive receptors and discuss how these assumptions represent conservatism"

The Proponent, in its response to IR 44, stated that the country food consumption rates used in the assessment have a neutral effect.

Health Canada stated that food consumption rates can make a substantial difference when assessing the potential human health risks from consuming country foods. Health Canada also noted that health effects result from total exposures, not just incremental changes in exposures to contaminants. The Tsilhqot'in National Government also suggested that the ratio of contaminants before and after the Project would be meaningless as the total body burden would determine the risk and potential adverse effects. Health Canada stated that total exposures would be particularly important given that some metal concentrations are already high in the soils.

Information Requested:

With regards to the risk assessment, the Panel requests that Taseko re-assess the human health risks by:

a. Refining the predicted metal accumulation in all country foods (including moose, muskrat, ptarmigan, Labrador tea, and fish) to include total exposure, not just incremental changes in exposures to contaminants.

b. Considering the total body burden, as determined by country food contaminant exposure.

SIR 48 – Accidents and Malfunctions

References:

Response to IR 48 – Accidents and Malfunctions

Related Comments:

CEAR # 456 (British Columbia Ministry of Energy, Mines and Natural Gas)

Rationale:

In IR 48, the Panel requested that Taseko provide a risk assessment of a series of specific potential failure modes. The Panel notes that in the 2009 EIS, Taseko conducted the risk assessment and evaluated the consequences of failures on human life, water quality, fish, wildlife and operations. The Proponent, in its response to IR 48, did not consider risks to water quality and human safety.

The British Columbia Ministry of Energy, Mines and Natural Gas (BC EMNG) noted that water quality and human safety are important receptors that should be fully considered in the risk assessment's consequence ratings. BC EMNG suggested that a rupture of the reclaim water pipeline or a rupture of tailings pipeline could fall in the high risk category if water quality were considered. Risks should also be considered during different phases of the project including temporary closure.

The BC EMNG also noted that the response to IR 48 incorrectly stated that the Provincial Ministry of Mines would maintain a reclamation and closure bond for continuing the responsibilities of monitoring and maintenance in the event of a temporary or permanent closure. BC EMNG stated that "the Proponent is solely responsible for implementing their approved plans" and for "managing all short and long-term environmental, reclamation and closure liabilities". BC EMG pointed out that "the financial security is not used to assist the Proponent with prevention of failure modes or with the implementation of their management strategies during temporary or permanent closure. Financial security is only used by the Province in the event that a company defaults on its obligations".

Information Requested:

With regards to accidents and malfunctions, the Panel requests that Taseko:

a. Re-assess risks including water quality and human safety as receptors.

b. Clarify its commitment and capability to deal with various failure modes in the absence of financial security of the reclamation and closure bond.

SIR 15/19/25/49 – Lake Productivity, Mitigation and Adaptive Management

References:

Response to IR 15 – Water Quality
Response to IR 19 – Lake Productivity – Eutrophication
Response to IR 25 – Lake Productivity – Mitigation Measures
Response to IR 49 – Adaptive Management

Related Comments:

CEAR # 460 (Tsilhqot'in National Government)
CEAR # 456 (BC Ministry of Environment)
CEAR # 456 (BC Ministry of Energy, Mines and Natural Gas)
CEAR # 456 (BC Ministry of Forests, Lands and Natural Resource Operations)

Rationale:

In its rationale for IR 49, the Panel noted that an adaptive management approach should include the identification of thresholds and then the implementation of corresponding actions. The Panel also stated that in order for adaptive management to be an effective tool, thresholds, such as metal concentrations in soil, water seepage rates, etc., should be determined in advance.

In IR 25, the Panel had requested that Taseko provide details of its adaptive management goal for Fish Lake along with the adaptive management options available that would ensure Fish Lake and its tributaries remain a biologically functioning ecosystem. Taseko was also requested to consider Fish Lake at the ecosystem level and not simply provide the details for each VEC separately. Specifically, Taseko was asked to discuss which elements of the Fish Lake ecosystem would be monitored and potentially require mitigation in the long-term. The Panel also requested that Taseko describe the thresholds that had been established for adaptive management of Fish Lake and to provide a rationale for how those thresholds were determined.

Taseko, in its response to IR 25, stated that the overarching goal of the adaptive management program would be to maintain a habitat capable of supporting a viable population of Rainbow Trout. Taseko suggested it would apply appropriate technology to adjust the trophic state of Fish Lake when monitoring results indicated that the threshold levels in the adaptive management plans were being approached.

In its response to IR 19, Taseko stated that while Fish Lake productivity is predicted to increase with mine development, the change would be gradual and measurable so that monitoring, coupled with the use of the adaptive management program, would afford the Proponent adequate time to monitor and, if needed, implement appropriate mitigation or contingency measures to maintain the water quality required to support and sustain a viable population of monoculture Rainbow Trout.

In IR 25, the Panel requested that Taseko describe the thresholds that had been established for the adaptive management of Fish Lake and provide a rationale on how these thresholds were determined. In response to IR 25, Taseko noted that the threshold

levels for determining when mitigation measures would need to be implemented had not been established.

Taseko stated that the development of adaptive management plans would take place during the permitting process. Adaptive management plans would specify what indicators would be monitored, how often monitoring would take place, how monitoring and measurement would happen and where measurements would be taken. Indication, warning and action levels would be designated for all of the variables being monitored.

In its comments on IR response 15, the BC Ministry of Energy, Mines and Natural Gas (BC EMNG) noted that an adaptive management approach with monitoring and triggers is important. BC EMNG stated that additional mitigation would be needed and should be considered by the Panel as an integral part of the Project design. BC EMNG referred to the conceptual plan for the liner beneath the ore/low grade ore stockpile, among others, and suggested that conceptual level design information should be provided for water treatment, along with supporting information, to demonstrate the effectiveness of the concept. A conceptual plan of similar detail to that of the conceptual plan for the liner beneath the ore stockpile would help the Panel better understand how Taseko plans to manage the water quality mitigation of Fish Lake.

The Tsilhqot'in National Government (TNG) was of the opinion that the Proponent's responses to information requests related to the ecological integrity of Fish Lake were inadequate. The TNG strongly disagreed with Taseko's assessments and did not believe Taseko had adequately studied the system to understand or address the complexities of how it would change as a result of alterations in nutrient loading, lake water levels, and tailings seepage. Specifically, the TNG disagreed with the Proponent's assessment that it was unable to give specifics regarding mitigation measures.

The BC Ministry of Environment was of the opinion that the list in Taseko's response to IR 25 provided no details as to what each of the treatment options involved and how the treatment option would work in Fish Lake to maintain an ecologically functioning system. More explanation of the actual treatment options and how they work and examples of their application are needed for items such as phosphorus and nitrogen addition or removal, periphyton treatment, pH adjustment water treatment systems, and the adjustment of ecosystem components causing changes in fish health.

The Proponent stated that water quality modeling indicated that several variables may increase in concentration, which could affect the water quality in Fish Lake, Fish Lake tributaries and adjacent lakes and streams. Water quality guideline exceedences were noted for a variety of predicted average and maximum concentrations, in particular: aluminum, cadmium, iron, sulphate, selenium and silver. In addition, the Proponent stated that a more productive Fish Lake in the course of the different Project phases is expected. However, measures to mitigate potential environmental effects and the effectiveness of those measures have not been fully discussed. The Panel is of the opinion that mitigation measures would be required where exceedences are predicted given the importance of water quality to support and sustain a viable population of Rainbow Trout.

Information Requested:

The Panel recognizes that adaptive management would be essential to manage changes to the ecosystem. However, to maintain a precautionary approach, it is necessary to first identify specific mitigation measures that are technically and economically feasible that would avoid or reduce potential significant adverse environmental effects on Fish Lake. Because of the unique nature of the Project, this information is necessary for the Panel (and should not wait until the regulatory phase to be developed) and would give it an increased level of confidence in Taseko's ability to preserve Fish Lake.

The Panel requests that Taseko:

a. Provide additional details of the adaptive management plan for the preservation of Fish Lake. This should contain technical information, including key indicators, pre-determined action thresholds, trophic level objectives, and other objectives that would help manage Fish Lake and achieve Taseko's overarching goal;

b. Provide a discussion on the proposed mitigation measures that would be applied for Fish Lake, evaluate the effectiveness of those mitigation measures, and determine the significance of the residual effects taking into account the applied mitigation measures.

c. Define what is meant by maintaining Fish Lake. What are the threshold levels and parameters required to maintain a viable trout population in Fish Lake?

d. Provide examples of any wilderness lakes that have been subjected to a recirculation process that is similar to that which is being proposed by Taseko for Fish Lake. Discuss how mitigation measures were successful in maintaining the ecological integrity of the lakes.

e. Provide mitigation measures that would be suitable to meet applicable guidelines where Taseko has predicted water quality exceedences.

SIR 51 – Navigable Waters

References:

EIS Guidelines, Section 2.7.3.2, page 53
EIS, Section 2.6.2.2, page 365
EIS, Section 2.7.3.2, pages 1172-1183

Related comments:

CEAR # 266 (Transport Canada)
CEAR # 453 (Transport Canada)

Rationale:

In section 2.7.3.2, the EIS Guidelines require the proponent to complete an assessment of the potential effects of the Project on navigable waters. The EIS will identify any Project components that will affect waterways and water bodies, including a description of any activities that may affect waterways and water bodies and describe any ancillary or temporary works, including, where available, approximate dimensions.

In the EIS Section 2.7.3.2, on page 1173, the proponent states that Fish Lake and Little Fish Lake are water bodies and portions of Fish Creek is a waterway at the proposed mine site that will be directly affected the project.

According to Transport Canada, details essential to understanding the impacts of the project on navigable waters are absent in section 2.7.3.2. “For example, there is no indication of the length of Fish Creek that will be directly affected, or exactly where the impacted sections are in relation to project components or other natural features. The EIS should provide specific details and portions (e.g. lengths) on how the project, project components or associated works will impact waterways and water bodies”.

Transport Canada has indicated that there is a gap in information relating to environmental effects the project may have on navigation. The Panel erred in not requesting this information previously.

In section 2.7.3.2 of the EIS, pages 1172-1183, the proponent indicates that several mine infrastructure components, including the TSF, will obstruct or adversely affect navigable water in the Upper Fish Creek watershed and Little Fish Lake. The proponent articulates that these mine infrastructure components are not subject to the *Navigable Waters Protection Act* (NWPA) as they are located in ‘Reach 8’ which is considered a minor navigable water.

According to Transport Canada, the proponent referenced the use of the Minor Works and Waters Order (MWWO) to determine that the cofferdams and the TSF main embankment planned for ‘Reach 8” fit within the order. Transport Canada indicated that Taseko’s determination did not provide sufficient evidence. Transport Canada states that although the MWWO is intended to be used as a self-assessment tool, all criteria must be met for the tool to be applicable.

Information Requested:

The Panel requests that Taseko:

a. Provide information and assess the impacts on the waterways and water bodies as described in Transport Canada's submission (CEAR # 266) in relation to:
    i. interference to navigation, including specific lengths and sections affected;
    ii. current use by Aboriginal groups and the public.

b. Fully describe how 'Reach 8' fits into the MWWO criteria.