

From: [Harry O"Keefe](#)
To: [Anneli Jokela](#)
Cc: [Laura Pacholski](#); [Giovanna Diaz](#); [Rhiana Bams](#); [Meaghan MacIntyre-Newell](#)
Subject: RE: Follow-up on Arctic's Responses Re Two Rock Outfall Report
Date: September 29, 2021 10:43:46 PM
Attachments: [image002.png](#)

Hello Anneli,

Please find below responses to your questions:

IR# 1 Response

Generating a calibrated model requires many iterations with small adjustments during the testing and quality control stages to arrive a model that is judged to have the best overall fit, while balancing the need to produce defensible, conservative and accurate simulations. The Old Base Case and Revised Base Case show two iterations of model simulations, with marginally different results that both produced a reasonable calibration. The Revised Base Case corresponds to the Base Case in the outfall design report, which was selected based on water balance considerations. The Old Base Case is the GoldSim model predictions from the 2020 model update, which were not presented in the outfall design report; the "Revised Base Case" corresponds to the base case model results presented in the report. The difference between the two base case results are lower flow rates for WRSA runoff and seepage, which were selected from existing based on feedback from Arctic regarding minimal observed flows from the WRSAs. The two scenarios were indeed iterations that made minimal difference to the calibration for the 2019-2020 period.

Normally only the latest simulation would be shown; however in this case, the graphs were produced from the original calibration files in short order to the meet the previous deadline to answer the Board's questions as quickly as possible.

The "Max truck out" corresponds to the future "Reduced Discharge Trucking Out" scenario – however, this time series is identical to the Revised Base Case for the period plotted, as all scenarios have the same Discharge assumptions for this period (i.e., actual Discharge in 2019 and no Discharge in 2020). The Revised Base Case time series plot line is not visible as it underneath "Max truck out" time series plot line.

TRSP Plots

Arctic confirms that the TRSP predictions provided in response to IR#1 are from the TRSP Water Quality Model (Section 3.2.2 of the Report).

Horseshoe Lake

The Horseshoe Lake plots in the response were generated by the GoldSim model that was presented in Section 3.2.2 of the report, as these plots deal specifically with the question of calibration. All Horseshoe Lake plots in the report were from the GEMSS model presented in Section 3.2.4. Details of the similarities and differences are as follows:

The plots provided on 17 September 2021 were originally generated as part of the model calibration exercise to confirm that the model was being calibrated correctly, even though the GoldSim model

was not used to predict future concentrations in downstream waterbodies. The downstream waterbodies were modelled in GoldSim to verify that the calibration was not leading to unreasonable concentrations when the results of the calibration were carried downstream. The “observed” values on the plot are measurements from within Horseshoe Lake collected from the AEMP sampling location during open-water 2018 and 2020, and under-ice 2020. The downstream model in GoldSim also acted as a quality control check on the far-field results of the GEMSS model that was presented in the Report Section 3.2.4. Both models used identical water balances with the only differences being that GEMSS has mechanistic features such as internal water circulation and spatially realistic ice cover. Because the GoldSim model cannot simulate a near-field or mid-field mixing result nor seasonal stratification, the GEMSS model was used to predict all future concentrations in Horseshoe Lake (near-field and far-field). In other words, the Horseshoe Lake plots are only meant to illustrate the effects of the calibration factors (as per Question 1 of the Information Request) and are not intended to illustrate future predictions, which are represented by the Report figures that are all generated by GEMSS (Section 3.2.4).

Even though these results are generated by the GoldSim model, they are similar to the GEMSS results during the period of 2018 to 2020 because there is no Discharge that would affect the near-field zone. Under 2018 to 2020 conditions presented in these plots, there is no measurable vertical or horizontal gradient in Horseshoe Lake, so both models predict the same results and both models agree with the observed data to the extent shown in these figures.

The “No Discharge” scenario was used to establish baseline concentrations for Horseshoe Lake for modelling purposes in the GEMSS model (Section 3.2.4 of the Report) and is not provided in the response to IR#1 (i.e., the predictions are from the GoldSim model and not the GEMSS model). This scenario was modelled for baseline purposes only; to provide a baseline to build predictions for the operational scenarios, and does not represent an operational situation where Discharge would not occur from TRSP.

Regards
Harry

Harry O’Keefe

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HSE RCD ENV-1586

From: Anneli Jokela <ajokela@wlwb.ca>
Sent: Wednesday, September 29, 2021 7:54 PM
To: Harry O'Keefe <Harry.O'Keefe@arcticcanadian.ca>
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Subject: Follow-up on Arctic's Responses Re Two Rock Outfall Report

Importance: High

Evening Harry,

As discussed – here our Board staff’s follow-up questions on [Arctic’s September 17 response to the WLWB’s IR](#). As mentioned, timing is super tight on this and we need a response as quick as possible.

IR# 1 Response

Arctic has provided plots for modelled predictions and observed values in the Two Rock Sedimentation Pond (TRSP) and Horseshoe Lake. In the legend for each plot, it is unclear what “Old Base Case,” “Revised Base Case,” and “Max Truck Out” correspond to in the Report. Additionally, the “Revised Base Case” does not appear to be plotted. Please clarify, for both TRSP and Horseshoe Lake plots, what model predictions these scenarios correspond to in the Report.

TRSP Plots

Board staff understand that the TRSP predictions are for final Discharge concentrations and they come from the TRSP Water Quality Model (Section 3.2.2 of the Report). Please confirm this is true. If not, please explain where the predicted values are from.

Horseshoe Lake

Board staff understand that the Horseshoe Lake plots should correspond to predicted values from the GEMSS Model (Section 3.2.4 of the Report). It is unclear where the data included in the Horseshoe Lake plots comes from and if the modelled data represents the “No Discharge” scenario. Additionally, it is unclear what the “Observed” data points represent. Please clarify if any of the data presented in the Horseshoe Lake plots correspond to the “No Discharge” scenario outlined in Section 3.2.4 of the Report and what data the “Observed” data points correspond to. If the “No Discharge” scenario is not represented in the plots, it would be helpful if Arctic provided a discussion of how the “No Discharge” scenario compares to observed conditions in Horseshoe Lake and provided supporting figures, if possible.

Masi

Anneli Jokela, PhD (she/her/hers)

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