Response to Final EIS with regards to addressing Semmens, 2022 comments.

Semmens (2022) provided comments that the MODPRO2 numerical groundwater model (the Stibnite Hydrologic Site Model (SHSM)) did not correlate what the SHSM results mean in terms of potential impacts to sensitive ecosystems. Specifically, that the SHSM did not estimate the volumes of impacted groundwater nor rates of impacted groundwater movement to understand the magnitude and timing of potential impacts to sensitive downstream ecosystems. Additionally, the SHSM report did not show drawdown of the water table below ten (10) feet, citing that the average absolute model calibration error is nine (9) feet and that predicted drawdown less than ten (10) feet is highly uncertain. Drawdown of the water table by up to ten (10) feet may impact sensitive ecosystems that rely on spring discharges and/or baseflow and that may be significantly reduced by drawdown less than ten (10) feet.

The US Forest Service responded to this comment as follows (Appendix B, Comment number 78):

a) natural fluctuations in water levels, particularly in fractured rock aquifers, commonly exceed 10 feet,

b) the 10-foot drawdown cone has been used as the threshold for defining the potential drawdown effect in numerous mining EIS documents for over 25 years,

c) they acknowledge that numerical models could be used to provide predictions of drawdown of less than 10 feet and that drawdown of less than 10 feet could significantly impact flow in some perennial seeps, springs, and streams, and

d) the extent of the model domain and the lack of detailed hydrogeologic data outside the mine exploration areas make smaller scale drawdown predictions in these areas unreasonable.

The US Forest Services response is inadequate for the following reasons:

1. persistent drawdown of the water table up to 10-feet superimposed onto natural fluctuations of the water table would change the natural cycles of water level fluctuations to which ecosystems may be currently adapted. The SHSM was conducted as a no-mine model scenario which forward-ran the model without the simulation of mining activities to get a baseline from which to subtract the mining impacts. The SHSM has monthly stress periods and included components to simulate the streams, including baseflow discharge. The calibration of the SHSM should reasonably represent current natural fluctuations of the water table, and the no-mine forward model scenarios should include reasonable future natural fluctuations of the water table, from which to subtract the impacts of mining.

2. Use of a 10-foot drawdown cone to quantify drawdown effects in numerous mining EIS documents is an arbitrary measure of protection of ecosystems at this mining location.

3. It is unreasonable to extend the SHSM domain into areas without proper hydrogeologic characterization to allow for meaningful impact analysis, however, the 10-foot drawdown

contour shown in the SHSM does not extend to the model domain in many areas, including areas of mapped springs and seeps. In other words, without extending the model domain, lower levels of drawdown could be shown with the existing SHSM. Additionally, the downgradient bound of the SHSM is too close to the Yellow Pine pit, as indicated by the 10-foot drawdown contour reaching the boundary, a comment raised by Semmens (2022).

Semmens (2022) provided additional, specific comments on the SHSM that were not addressed by the US Forest Service. These comments are listed below and details were provided in Semmens (2022):

1. The domain of the SHSM is too close to the Yellow Pine pit which can interfere with drawdown predictions,
2. Justification was not provided to indicate that the model grid represents the pit geometries, which is important for proper estimation of dewatering rates, and rate and ultimate level of pit lake formation,
3. The SHSM report inadequately confirmed the reasonableness of modeled vertical hydraulic gradients and the appropriateness of the model layer thicknesses,
4. The sensitivity analysis of modeled values of hydraulic conductivity was inadequate, especially in the area of Midnight Basin, near the West End pit which is shown in the SHSM to be a flow-through pit, and
5. There is bias in the model calibration including at low streamflows, in bedrock monitoring wells, and a spatial bias near the Yellow Pine pit.