GEOSCIENCE

The First Name in Groundwater

February 2, 2024

Mr. Steve Johnson
Water Resource Manager
Indian Wells Valley Groundwater Authority
100 W California Ave.
Ridgecrest, CA. 93555

Re: Review of Draft Indian Wells Valley Groundwater Basin GSP Annual Report for Water Year 2023

Dear Steve:

Geoscience Support Services, Inc. (Geoscience), who is engaged on behalf of Searles Valley Minerals, Inc., has conducted a review of the draft Indian Wells Valley Groundwater Basin (IWV Basin) Groundwater Sustainability Plan (GSP) Annual Report for Water Year (WY) 2023[1]. We recognize that the main purpose of these annual GSP reports is largely to provide updates on basin management actions and projects as well as present data collected during the previous year. As such, the discussion provided within the document is fairly general, with limited technical detail. However, we have a couple of comments/suggestions regarding some of the technical reporting items, including presentation of groundwater elevation data and estimated change in groundwater elevation and groundwater storage, which we feel would be beneficial for the Indian Wells Valley Groundwater Authority (IWVGA) to consider. Our comments are summarized briefly below.

Groundwater Elevation Contours

The groundwater contour maps developed for the basin (provided as Figures 5-1 and 5-2) indicate groundwater mounding near the wastewater treatment plant on the U.S. Navy Naval Air Weapons Station (NAWS) China Lake. This mounding is the result of treated wastewater spreading, 40% of which (approximately 830 acre-ft in WY 2023) was estimated to percolate to the groundwater (i.e., become groundwater recharge; Table 6-3, footnote 4). The mounding and estimated percolation volume is an

[1] IWVGA, 2023. Indian Wells Valley Groundwater Basin GSP Annual Report Water Year 2023 (October 1, 2022 to September 30, 2023), Review Draft dated December 2023.

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example of a source of groundwater recharge not currently considered in the hydrogeologic conceptual model or groundwater budgets presented in the IWV Basin GSP[2] and annual reports. While the WY 2023 annual report states that the groundwater model is currently being updated, there is not enough information provided in the report to indicate whether or not modeled recharge volumes are being reevaluated, or just their geographic distribution. We recommend that additional sources of recharge other than mountain front recharge and underflow from Rose Valley be included in the model update, such as leakage from the Los Angeles (LA) Aqueduct, recharge from LA Aqueduct releases, irrigation return flows, water distribution system leakage, and percolation from wastewater spreading. These additional sources of recharge have important implications on the safe yield of the basin, which is likely higher than currently indicated in the GSP and annual reports.

Furthermore, as the groundwater elevation contours are currently presented, recharge from the wastewater percolation ponds would appear to potentially flow, at least in part, into the pumping depression mapped to the southwest, within the City of Ridgecrest. Some previous studies have indicated that the shallow aquifer system in this part of the basin is disconnected from the deeper, regional aquifer system due to the presence of clay layers. Various aquifer conditions (i.e., confined, semi-confined, unconfined) have also been observed in the basin, as evidenced by different water level signatures and/or offsets in water levels on hydrographs for nested wells with multiple completion depths (examples of which are provided in Attachment E of the annual report). However, this detail is not apparent in the groundwater elevation mapping. Additional clarifications are needed to fully interpret groundwater conditions, including a description of contour methodology and indication of what completion depths are used for each control point and why.

Changes in Groundwater Elevation and Groundwater Storage

The change in groundwater elevation map presented as Figure 5-6 in the annual report is biased towards declines in groundwater elevations; the map contains four color categories for different ranges of declines in groundwater elevation but lumps all “no change” and increases in groundwater elevation into one category. As noted in the change in groundwater storage worksheet provided as Attachment F, some of the increases in groundwater elevation are equal but opposite in magnitude to the higher levels of groundwater elevation decline. Therefore, it is not apparent from the figure where groundwater elevations are increasing, which is an important consideration for evaluating locations of groundwater recharge and response to changes in groundwater pumping. We recommend that increases in

[2] IWVGA, 2020. Groundwater Sustainability Plan for the Indian Wells Valley Groundwater Basin Bulletin 118 Basin No. 6-054. Dated January 2020.

groundwater elevation should be denoted separately to allow readers to visibly assess where recharge and/or recovery is occurring.

The annual report also notes that "The highest levels of groundwater elevation change observed (orange dots) appear to correlate with pumping and discharge areas" (Section 5.3.1, p 30). However, as noted on the next page of the annual report, pumping cannot explain the decreases in groundwater elevation observed in the El Paso area where few wells exist. These decreases in groundwater elevation are uncharacteristic of the El Paso area, which has shown increases in groundwater elevation and storage in previous annual reporting, particularly given the wet conditions experienced in 2023 and DWR discharges from the LA Aqueduct. We agree that further investigation into these water level trends is warranted.

The decrease in groundwater elevations observed in El Paso during WY 2023 also affects estimated change in groundwater storage for the IWV Basin. As shown on Figure 5-8, the change in groundwater storage estimate for El Paso in WY 2023 seems anomalous given: a) the opposite trend seen in storage change between El Paso (increased decline in storage) and the Main Basin (reduced decline in storage); b) the negative change in storage for El Paso, which has previously been positive, especially considering the lack of wells in the area, high amount of precipitation experienced that year, and 2023 DWR releases; and c) the magnitude of the change in the El Paso area, which has shown relatively minimal changes in storage every year prior. As noted above, an investigation of these data is necessary to determine whether these changes are real (representing a yet-unknown basin mechanism) or are in error.

We appreciate the opportunity to comment on the draft 2023 annual report. If you have any questions, please contact us at (909) 451-6650.

Sincerely,

Johnson Yeh, PhD, PG, CHG
Principal Modeler

Lauren Wicks, PG
Project Geohydrologist

CC: Alison Toivola, Jeffrey Dunn, and Eric Garner – Best Best & Krieger, LLP