NEVADA DIVISION OF
ENVIRONMENTAL PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administrator

July 17, 2015

Michael Rojo
Environmental Services, Supervisor
NV Energy
6226 W Sahara Ave M/S 30
Las Vegas, NV 89146

Re: **NV Energy (NVE)**
Reid Gardner Station (RGS)
NDEP Facility ID #H-000530
Nevada Division of Environmental Protection (NDEP) Comments to the:
Preliminary Geochemical Conceptual Site Model, Draft March 2015

Dear Mr. Rojo:

The NDEP has received and reviewed NVE's submittal of the DRAFT report titled *Preliminary Geochemical Conceptual Site Model* (Geochemical CSM). The Geochemical CSM was received by the NDEP on March 6, 2015 and describes a preliminary geochemical conceptual site model for indicator constituents of concern in groundwater at RGS. The Geochemical CSM is thorough, well organized, and well written. Overall, the NDEP is very pleased with the effort put forth and the quality of the Preliminary Geochemical Conceptual Site Model. The Geochemical CSM helps advance the overall project CSM and ultimately helps advance the investigation and remediation of the Site. NDEP is appreciative of the effort and thanks NV Energy for putting this document forward. Comments to the Geochemical CSM from NDEP are included in Attachment A.

Please contact me with any questions or comments about this letter at (775) 687-9396 or aoakley@ndep.nv.gov

Sincerely,

Alison Oakley, CEM
Environmental Scientist III
Bureau of Corrective Actions
NDEP-Carson City Office

Attachments (1)
Attachment A – NDEP Comments

ec: Jeff Collins, Nevada Division of Environmental Protection (NDEP)
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Darren Daboda, Moapa Band of Paiutes, Environmental Director, P.O. Box 340, Moapa, NV 89025
Clark County Emergency Management, 500 S. Grand Central Parkway 6th Floor, P.O. Box 551713, Las Vegas, NV 89155-1713
Anitha Rednam, Department of Water Resources, 1416 9th Street, Room 1140, Sacramento CA 95814

Attachment A

Comments on the Preliminary Geochemical Conceptual Site Model

1. Executive Summary, Page I ES – Please include sodium and chloride in the list of indicator constituents of concern (COCs).

2. Executive Summary, Page II, first partial paragraph – This paragraph states "…there has been relatively little migration of groundwater with high total dissolved solids (TDS) concentrations over time." Please amend this statement to indicate that this statement is relevant to shallow groundwater and is based on data collected to date.

3. Section 3.3, Page 11, first partial paragraph – This paragraph states that Piper diagrams "were constructed by grouping data according to Table 3-1, removing groundwater samples with a charge-balance error greater than 10%, and finally, entering uncensored data into Geochemist's Workbench." Please provide information on the total number of samples for which charge balance was calculated, the number of samples rejected due to charge-balance error greater than 10%, the range of TDS concentrations of rejected samples, and rationale for using a charge-balance error threshold of 10%.

4. Section 3.7, Pages 14 and 15, and Footnote 31 – Footnote 31 states, "samples with >20% difference between dilution values were excluded" from attenuation calculations. Dilution calculations using SO_4 were not described in Methods section of the text. Please provide a description of SO_4 dilution calculations in Section 3.7. Please indicate total number of samples evaluated and the number of samples excluded because of Cl dilution and SO_4 dilution difference > 20%. Please provide the rationale for using the 20% difference between SO_4 and Cl dilution as a significant exclusion threshold.

5. Section 4, Page 16, Second bullet – Please include a list of COCs with concentrations above applicable surface water quality criteria in un-impacted Muddy River surface water, i.e., TDS, As, B, P, and Se, as stated on Page 17 in the section titled Water Quality.

6. Section 4.1, Page 17, second full paragraph – this paragraph suggests that the South Gate Spring (SGSPR) has a chemical signature similar to groundwater from the Muddy Creek Formation (MCF). To further support this discussion, please provide a reference, figure citation, or new figure showing that the South Gate Spring (SGSPR) has a chemical signature similar to groundwater from the Muddy Creek Formation (MCF).

7. Section 4.1, Page 17, Water Quality – This paragraph states "COC concentrations are generally below applicable surface water quality criteria. The primary exception is fluoride, with a median concentration of 2.4 mg/L in MR-UP (compared to criteria of 1 to 2 mg/L for irrigation and livestock watering, respectively, and a criterion of 2.6 mg/L specific to

the Muddy River) (Table 4-1)." Please provide a summary table with the following information for each Muddy River monitoring location:

a. Total number of samples,
b. Applicable surface water quality criteria value(s) for each COC,
c. Number of samples with COC concentrations above their respective surface water quality criteria, and
d. Range of concentrations (minimum and maximum concentration).

8. Section 4.1, Page 17, Note 33 – This footnote states, "A cluster of upward spikes in 2005-2007 was accompanied by an overall increase in TDS at all monitoring points. To incorporate this, an adjustment was made to the model to distinguish the monitoring event data before September 1, 2004, from those after. This variable is significant and the estimated effect is an increase of 42 mg/L in the average levels of all subsequent data. This means that the sudden 42 mg/L increase in 2005 has persisted over time (relative to the ongoing 4.6 mg/L annual decrease)." Please provide additional language to this footnote stating that evaluating the cause of the spikes in concentration during the 2005 to 2007 timeframe was beyond the scope of the geochemistry conceptual site model assessment. Please also provide additional language to this footnote stating that monitoring of Muddy River water quality is ongoing.

9. Section 5.2, Page 21, second paragraph and Footnote 41 – This section states, "Although pond water primarily consists of sodium and sulfate (Table 5-2), there is variability in the relative ratio of sulfate to chloride[41]." Footnote 41 states "The Piper diagram in Figure 5-2 shows relatively few data points because of the requirement of charge balance, which is less frequently achieved in high TDS samples. Although chloride is the dominant ion in some of the pond samples in the figure, it has an overall lower median concentration relative to sulfate (Table 5-2)". Please provide information regarding the total number of pond water samples evaluated for charge balance, the range of charge-balance error, the number of samples rejected from plotting in Figure 5-2, and the range of chloride and sulfate concentrations of rejected samples. Also, please describe what charge-balance error threshold was used for screening pond water data and provide rationale for threshold used.

10. Page 22, Footnote 44 – This footnote states: "The presence of reduced sulfur species is important because these constituents represent a significant chemical oxygen demand that causes the redox state of pond water, pore water, and interstitial water to be highly-reducing." However, Figure ES-2 and Figure 10-1 show Fe/Mn-Reduction in shallow pond solids to be primary terminal electron accepting process (TEAP). Please revise Figure ES-2 and Figure 10-1 to indicate sulfate reducing conditions are likely present in shallow and deep pond solids.

11. Section 6, Page 23, Fourth bullet – This bullet states, "The extent of the TDS plume (a surrogate for infiltrated pond water) has not changed significantly over the past twenty years, i.e., the plume is stable." Please revise this statement to indicate this description of plume stability is limited to shallow groundwater only, and that the stability of the TDS plume is the subject of on-going investigation.

12. Section 6.4, Page 25 – This section provides a discussion of TDS concentration trends in groundwater. The text of this section states that "Time-trend analysis on TDS concentrations in individual wells confirms that there is no systematic increase in TDS concentrations across the groundwater monitoring network (Figure 6-7)." This is a rather strong statement considering that there are 18 shallow zone wells and 7 deeper wells exhibiting increasing trends. Further, the wells exhibiting the increasing trends are generally located downgradient of or adjacent to the pond areas. Please revise this sentence to indicate that trend analysis indicates TDS trends are increasing in some areas of the site and stable to decreasing in other areas. Please provide a summary table that includes the following information for each groundwater monitoring location included in the TDS concentration trend evaluation:
    a. Historical range of TDS concentrations,
    b. Most recent TDS concentration,
    c. Time period of monitoring, and
    d. Direction of TDS concentration trend with time.

13. Section 6.4, Page 25, Fifth bullet – This bullet states "Also, TDS concentrations in P-18B are significantly less than concentrations prior to 2002 (Figure 6-8f)". As shown on Figure 6-8f, there are some TDS concentrations prior to 2002 that are within the range of the more recent TDS concentration. Please revise this sentence to read "Also, TDS concentrations in P-18B are significantly less than some concentrations measured prior to 2002 (Figure 6-8f)".

14. Section 6.4 Page 25, (editorial comment) – First sentence after bullets states, "One possible explanation for the lack of systematic increases in TDS concentrations in shallow wells is that density differences between pond infiltration and native groundwater has primarily resulted in vertical transport of TDS." Please revise this sentence to read "One possible explanation for the lack of **site-wide** systematic increases in TDS concentrations in shallow wells is that density differences between pond infiltration and native groundwater has primarily resulted in **downward** vertical transport of TDS."

15. Section 8.3, Page 33, Footnote 57, last sentence (editorial comment) – Please revise "explained by is its adsorption" to read: "explained by its adsorption."

16. Section 8.3, Page 35, Footnote 63 (editorial comment) – The sentence states, "This implies that, if present, fluorite can potentially be released from pond solids and/or shallow aquifer soils with an influx of fresh groundwater." Please revise the sentence to read "This implies that, if present, fluoride can potentially be released from pond solids and/or shallow aquifer soils with an influx of fresh groundwater due to dissolution of fluorite."

17. Section 8.3, Page 36, Thallium (editorial comment) – Please delete "only" from the last two sentences. The revised sentences should read, "At this location, thallium was reported at 0.016 mg/L, despite the fact that TDS was high (136,800 mg/L). Incidentally, 0.016 mg/L is slightly above the applicable water quality criterion (0.013 mg/L; Table 4-1).

18. Section 9.1, Page 41, Interpretation of Redox Parameters, 2nd paragraph (editorial comment) – Please delete the word "generation" from the second to last sentence, and revise the sentence to read "Although sulfide is known to be generated in the ponds (Ainsworth et al. 1995), there are no indications from redox data that sulfate reducing conditions have significantly migrated into the aquifer."

19. Section 9.1, Page 42, Top bullet – To further clarify this discussion of conditions driving TEAPs (i.e. presence of organic carbon), please provide a site map with posted groundwater DOC concentrations.

20. Section 9.2, Page 43, Second Full Paragraph (editorial comment) – The first sentence of the second paragraph reads, "The fraction of each COC not specifically explained by pond water dilution was calculated using equation 3-2 (Section 3.7)." Please revise this sentence to read, "The fraction of **attenuation for** each COC not specifically explained by pond water dilution was calculated using equation 3-2 (Section 3.7)".

21. Figure ES-2 and Figure 10-1 (editorial comment) – Please subscript the "2" in "CdS2"

22. Figure 4-7 (editorial comment) – This figure title reads, "Eh-pH diagrams showing pond water and groundwater relative to the stability fields of minerals and aqueous species…" Pond water sample data are not included on the plots in Figure 4-7. Please revise Figure 4-7 title to read, "Eh-pH diagrams showing groundwater relative to the stability fields of minerals and aqueous species."

23. Figures 6-1a through 6-1f – These figures shows well locations with colored dots representing ranges of TDS concentrations. In figure 6-1 a, the two-order of magnitude range 500-50,000 is too large for a single color. The use of ½ order of magnitude ranges would better show variability in TDS. Please revise concentration ranges to provide more detailed resolution of TDS concentrations in the 500 to 50,000 mg/L range. Please revise Figures 6-1b through 6-1f in a similar manner.

24. Figure 6-5 – are we still removing K values for BG wells?

25. Figure 6-7 (editorial comment) – The boxes for deep groundwater trend directions are difficult to read. Please revise figures to make these data displays more legible with higher contrast against the background aerial photo. The legend includes the acronym "NSD". Please define "NSD" in the legend or in the notes.

26. Figure 9-1 (editorial comment) – Please specify form of Iron and Manganese depicted on this figure, e.g., Dissolved Iron.

27. Figure 9-2a through 9-2d – The data ranges of Mn concentrations listed in the legend of Figure 9-2a are discontinuous. Please revise the concentration ranges to be more

continuous, such as ≤0.05, >0.05 to ≤0.2, >0.2 to ≤1, etc. Please revise concentration ranges in a similar fashion for Figures 9-2b through 9-2d.

28. Table ES-1 (editorial comment) – Report Section 4 bullets delete "relatively". Delete "relatively" from summary bullet in Section 4, Major Finding 3 summary text as well. Split this out

29. Table 5-4 (editorial comment) – Fix line height for S^{-2} row, check "A1" in † footnote

30. Table 9-1a (editorial comment) – The Iron (II) concentration for MW-13 is listed as "0." Please verify Iron (II) concentration for MW-13 and revise Table 9-1a accordingly. The Manganese (II) concentration for MW-16S is listed as "0." Please verify Manganese (II) concentration for MW-16S and revise Table 9-1a accordingly.

31. Table 9-1b (editorial comment) – The Iron (II) concentration for IMW-2.5S is listed as "0." Please verify Iron (II) concentration for IMW-2.5S and revise Table 9-1b accordingly.