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15 January 2015

Mr. Dane Johnson
Senior Engineering Geologist
Central Valley Regional Water Quality Control Board
1685 E Street
Fresno, California 93706

Subject: Interim Report on Phase 2 Subsurface Investigations at the Valley Water Management Company Edison Oil Field Fee 34 Facility and Race Track Hill
K/J 1365027*00

Dear Mr. Johnson:

This interim report on the Phase 2 Subsurface Investigations: Valley Water Management Company Edison Oil Field, Fee 34 Facility and Race Track Hill is submitted in compliance with the 13267 Order issued to Valley Water Management Company (VWMC) on 1 July 2014. A Work Plan describing the proposed investigations was submitted for Central Valley Regional Water Quality Control Board (Regional Board) approval on 14 November 2014 and reviewed with the Regional Board during a meeting on 2 October 2014. During that meeting, the Regional Board gave conceptual approval to the Phase 2 investigations plan.

Background. VWMC received the 13267 Order on 7 July 2014, and responded to the Regional Board on 29 July 2014 (Letter from Larry Bright, VWMC, to Clay Rodgers, Regional Board, dated 29 July 2014). The purpose of the letter was to once again reiterate the impossibility VWMC faces in complying with the requirement to complete all the work described in the 13267 Order by the final completion date of 15 January 2015 established in the Order.

The basis for our concerns with the schedule contained in the 13267 Order is summarized as follows. The work required to be performed by VWMC in the Order consists of three basic tasks:

1. Conduct investigations and studies necessary to determine whether potential adverse impacts on soil and groundwater quality have occurred.

2. Characterize the nature and extent of release, if any, from the subject facilities.

3. Once the characterization is complete, conduct studies to evaluate what corrective measures, if any, need to be taken to protect existing and potential future uses of impacted soils and groundwater.

PT Exhibit 6

samples will be discussed here. Monitoring wells RTH#1 and RTH#6 are located directly adjacent to produced water percolation-evaporation ponds on Racetrack Hill. Water quality of these wells is expected to be related to the chemistry of produced water. RTH#3 and RTH#4 are at the base of Racetrack Hill and may have water quality affected by more than one water source. The same is true for RTH#5 but this well is much further from Racetrack Hill.

Electrical conductivity (EC) and boron (B) are highest at well RTH#1 and slightly lower at RTH#4 and RTH#6. These parameters are lowest at wells RTH#3 and RTH#5. RTH#5 is much lower in EC and B than all other wells, likely because it is furthest from Racetrack Hill and may not have been influenced by water from the Racetrack Hill ponds. This comparative trend among wells is consistent for a number of constituents including sodium (Na) and chloride (Cl) which are characteristically high in produced water. Calcium and total dissolved solids (TDS) also follow this trend. Nitrate nitrogen, sulfate (SO_4), magnesium (Mg), potassium (K), and alkalinity (HCO_3) all have different trends for the wells completed in first encountered groundwater. SO_4, Mg, K, and HCO_3 all have concentrations equal to or greater than those at RTH#1. This suggests that there are other sources of groundwater that contribute salt ions, particularly at RTH#4.

The relationships among salt ions can be evaluated using a trilinear geochemical analysis (Figure 4). This figure shows that the wells on Racetrack Hill, RTH#1 and RTH#6, consistently plot near each other, because they are chemically similar. Wells RTH#3 and RTH#5 consistently plot at one end of the group of five wells because their geochemistry is markedly different. In addition, RTH#3 and RTH#5 are different from each other because RTH#5 has a geochemical make-up that is distinctly different from all other wells. EC, B, and Cl are much lower than the other wells and indicates that groundwater at this well location comes primarily from sources other than produced water discharge at Racetrack Hill. Well RTH#4 generally falls between the geochemistry of RTH#1/RTH#6 and RTH#3/RTH#5. This well also has higher Mg and SO_4 concentrations than are present in the produced water or at RTH#1.

The sampling plan for the December 2014 sampling event also included TPHc and isotopes of oxygen and hydrogen. TPHc was not detected in any sample above the method reporting limit, 500 µg/l (Table 4).

The preliminary analysis of wells at the Racetrack Hill site indicate that wells located on Racetrack Hill (RTH#1, RTH#6) have characteristics similar to produced water but generally at somewhat lower concentrations. The other wells have chemical differences from produced water that suggest that other groundwater sources are present at these wells. RTH#4 may have another source with elevated K, Mg, and SO_4. RTH#3 may have similar effects but the concentrations of B, Cl, and EC are lower than at RTH#4. This may be due to the distance of RTH#3 from the nearest percolation-evaporation ponds. As mentioned above, RTH#5 has very different water quality than that of the other four wells at Racetrack Hill.

Isotope analyses have not yet been completed by the specialty laboratory. Since isotopic analysis is a key part of evaluating potential component sources of groundwater, any further

Table 3: Summary of Monitoring Well Sample Data - Inorganic Analytes

Monitoring Well	Sample Date	Sample Name	pH	Electrical Conductivity @ 25°C	Total Dissolved Solids @ 180°C	Calcium	Magnesium	Sodium	Potassium	Boron	Bicarbonate Alkalinity as $CaCO_3$	Carbonate Alkalinity as $CaCO_3$	Chloride	Nitrate as N	Sulfate
			pH Units	µmhos/cm[a]	mg/L[b]	mg/L	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L
Produced Water	10/24/2014	RTH Discharge Water	7.49	5700	3000	100	10	1300	12	13	290	<10[c]	1500	-	18
RTH #1	4/30/2014	RTH-1-140430	7.31	8,690	6,600	560	44	1,100	8.9	16	240	<8.2[c]	2,900	7.1	42
RTH #1	12/22/2014	RTH #1 - 122214	7.26	8,650	7,000	550	45	1,300	9.0	16	220	<8.2	2,900	14	42
RTH #1	12/22/2014	QCFD-01-141222	7.24	8,700	7,000	560	45	1,300	9.0	16	220	<8.2	2,900	11	40
RTH #3	4/29/2014	RTH-3-140429	6.86	2,810	1,900	200	93	280	25	4.1	120	<8.2	510	0.7	680
RTH #3	12/23/2014	RTH#3-122314	6.91	1,920	1,500	170	81	180	22	0.65	100	<8.2	130	0.16	800
RTH #4	4/29/2014	RTH-4-010429	7.52	5,900	4,400	450	170	580	22	6.9	210	<8.2	1,700	8.3	510
RTH #4	4/29/2014	QCFD-01-140429	7.53	5,900	4,100	430	160	560	22	6.8	220	<8.2	1,700	8.4	510
RTH #4	12/22/2014	RTH #4 - 122214	7.38	6,540	5,100	490	180	680	23	5.4	210	<8.2	2,000	3.4	370
RTH #5	12/21/2014	RTH #5 - 122114	7.69	624	450	64	23	51	6.4	0.066	220	<4.1	26	0.57	92
RTH #6	12/23/2014	RTH #6 - 122314	7.34	4,680	3,500	400	48	570	22	3.0	190	<8.2	1,300	23	290

Notes:
(a) µmhos/cm = micromhos per centimeter
(b) mg/l = milligrams per liter
(c) "<10", "<8.2" = not detected above the practical quantitation limit