

Lahontan Regional Water Quality Control Board

M E M O R A N D U M

TO: Lahontan Water Board Advisory Team and Desert View Dairy CAO
Responsible Parties



FROM: Lauri Kemper, Assistant Executive Officer
LAHONTAN WATER BOARD

DATE: July 19, 2016

SUBJECT: PROSECUTION TEAM RESPONSE TO COMMENTS AND PROPOSED REVISIONS TO AMENDED DESERT VIEW DAIRY CLEANUP AND ABATEMENT ORDER (CAO) R6V-2008-0034A4

The Regional Water Quality Control Board's Prosecution Team (Prosecution Team) has prepared this memo to provide responses to stakeholder comments and recommendations to the Advisory Team for revisions to the proposed subject line CAO, which was circulated for public review on March 2, 2016.

Comments were received from:

- 1) Pacific Gas & Electric Company (PG&E);
- 2) GHD Services on behalf of Paul Ryken; and
- 3) Project Navigator, the Hinkley Community Independent Review Panel (IRP) Manager.

Stakeholder comments are summarized in ***bold italics*** below, followed by the Prosecution Team's responses. Where appropriate, proposed revisions to the CAO are noted in this document (and shown in ~~strikeout~~/underline text in the enclosed proposed revised CAO).

The major proposed revision is to acknowledge that constituents of concern for dairy waste are elevated in groundwater upgradient of the Desert View Dairy (DVD), unrelated to DVD discharges, and that it is appropriate to account for the effects of these upgradient discharges in this Order. Therefore, the Prosecution Team proposes to revise the replacement water thresholds that are based on secondary maximum contaminant levels (for total dissolved solids, chloride and sulfate) upwards by 40 percent. The technical basis for this proposed 40 percent revision is provided in response to comment PGE-2.

Several additional edits are proposed to improve clarity. These edits are summarized in section IV of this document, *Additional Editorial Changes*. Comment letters enumerated above and previous enforcement orders issued to the dischargers may be viewed at http://www.waterboards.ca.gov/lahontan/water_issues/programs/enforcement/desert_view_dairy.shtml.

I. PG&E Comments

PGE-1. Background concentrations of TDS (e.g., cited in CAO findings 17 for total dissolved solids [TDS] and findings 20 and 21 for chloride and sulfate) are not representative of groundwater quality in the area between background well locations and the DVD.

Prosecution Team Response: The background concentrations cited in findings 17, 20 and 21 (findings 20 and 21 are now re-numbered 26 and 24 in the revised proposed CAO) are not intended to represent groundwater quality *immediately* upgradient of the Desert View Dairy (DVD), but rather to establish that water quality for TDS, chloride and sulfate is generally good (i.e., better than secondary Maximum Contaminant Levels, SMCLs) until groundwater travels through the area of Hinkley where historic and current farming and dairies are located. These findings establish that if unauthorized waste discharges from dairies and farming operations had not adversely affected groundwater quality in the Hinkley Valley, domestic wells users could expect good quality water in their wells. It also supports that the recommended secondary MCLs (the lowest, most stringent levels of the three-tiered SMCLs for TDS, chloride and sulfate) are appropriate starting points from which to base replacement water thresholds for drinking and cooking purposes. Findings 17, 20 and 21 of the CAO cite water quality data from wells not affected by farming and dairy operations to illustrate this point; therefore, the wells are not located near the DVD or immediately upgradient, because those areas have been affected by dairies or farming. Additional discussion on groundwater quality immediately upgradient of the DVD is provided in response to comment PGE-2.

The Prosecution Team has proposed revisions to the CAO to emphasize that the background concentrations cited in findings 17, 20 and 21 represent groundwater quality in the Hinkley area not affected by waste discharges.

- **See revisions to findings 17, 18, and 19 in the attached revised proposed CAO.**

PGE-2. Elevated concentrations of nitrate, TDS, chloride and sulfate exist from non-DVD sources such as historical agriculture, septic systems, and naturally occurring salts due to arid desert environments. In general, PG&E asserts that TDS is present upgradient of the DVD in concentrations greater than the thresholds set in the CAO for replacement water.

Prosecution Team Response: We acknowledge that concentrations of TDS and nitrate greater than drinking water standards (i.e., primary or secondary Maximum Contaminant Levels [MCLs or SMCLs]) exist in groundwater in locations immediately upgradient of DVD, and that groundwater beneath the DVD has been affected by upgradient current or previous farming and dairy operations. This fact will be clarified in the revised proposed CAO, and the Prosecution Team is recommending adjusting the replacement water thresholds upwards to account for such upgradient pollution.

However, the Prosecution Team contends that the discharges from the DVD are responsible for the majority of water quality degradation in downgradient domestic wells, and as such must provide replacement water to those well users when (adjusted) threshold levels are reached. Data from various PG&E monitoring reports supports that the contribution of TDS from the DVD is greater in comparison to upgradient sources. For example, figure B3 (TDS concentrations in the shallow zone of the upper aquifer, 2011-2014) of PGE's June 30, 2015 *Agricultural Treatment Unit Byproduct Investigation Report*¹ provides a comprehensive view of groundwater quality in the Hinkley Valley. This figure shows the upgradient dairies or heifer ranches (former Leyerly, former Nelson/Diaz, and Harmsen dairies, and Ryken Heifer ranch) that are located south of the DVD between Frontier Road and Santa Fe Avenue. This area (upgradient of the DVD) is where TDS levels show a strong pattern of degradation from generally less (better quality) than drinking water standards between the Mojave River and the compressor station to above (worse quality) than drinking water standards. Concentrations in this area reflect the above dairy and farming operations and range from 1,170 to 2,180 milligrams per liter (mg/L) TDS as shown in figure B3. But when groundwater passes beneath the DVD north of Santa Fe Avenue, the most striking and significant degradation is observed: concentrations are now commonly in the 4,000 mg/L range as shown in figure B3 of the 2015 PG&E report cited above, and up to 12,000 mg/L in MW-206 located on Thompson Road². Figure 1 (TDS Concentrations for Selected Monitoring and Domestic Wells) contained in PG&E's April 4, 2016 *Desert View Dairy Amended CAO Comments*³ also shows this pattern. The average of TDS concentrations directly upgradient of the DVD (near Santa Fe Avenue, reflecting waste discharges from the upgradient dairy, heifer or farming operations) is 1,459 mg/L. The average of TDS concentrations directly downgradient of the DVD is 3,679 mg/L, indicating that the DVD contributes about 2.5 times as much TDS to groundwater as upgradient sources.

We acknowledge that the Ryken Heifer Ranch and the Harmsen Dairy also affect domestic wells in their downgradient directions, and are required in Water Board Orders⁴ to provide replacement water if TDS concentrations reach 500 mg/L in

¹ http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/6337839484/SL0607111288.PDF

² MW-206 data reported in PG&E's 4th Quarter 2015 Groundwater Monitoring Report for Agricultural Treatment Units.

³ Available at

http://www.waterboards.ca.gov/lahtontan/water_issues/programs/enforcement/docs/desert_view_cao/pge.pdf.

⁴ Cleanup and Abatement Order Nos. R6V-2011-0057, R6V-2011-0058, R6V-2011-0059

domestic wells, or if nitrate levels reach 6 to 7 mg/L. Currently, those dischargers are not required to provide whole house water, but are required to provide bottled water. The Water Board in the future may also amend those CAOs to include whole house water requirements. The current DVD CAO requires whole house water for domestic wells over drinking water standards for nitrate, but does not contain TDS, chloride or sulfate replacement water thresholds (see Order no. 1 in DVD CAO amendment 2 and Order no. A.1 in DVD CAO amendment 3).

Given the significant degradation of groundwater quality for TDS and other salts as well as nitrate at the DVD, downgradient domestic wells users must be provided bottled water or equivalent, or whole house water where TDS levels are elevated above SMCLs set to protect water supplies for taste, odor, corrosion and staining impacts. However, because the DVD is not the only source of TDS or other salts contributing to water quality degradation, the Prosecution Team proposes to adjust the replacement water thresholds to account for these upgradient waste contributions. We analyzed data presented in PG&E's April 4, 2016 *Desert View Dairy Amended CAO Comments*, figure 1. Data from worst-case upgradient wells were compared to wells reflecting worst-case discharges from the DVD. This analysis shows that upgradient sources contribute an average of 40 percent of the TDS concentrations in groundwater downgradient of the DVD (see analysis in Table 2 of revised proposed CAO at page 7). Chloride and sulfate concentrations indicate a similar pattern, as shown in figures 2 and 3 submitted with PG&E's April 4, 2016 letter, *Desert View Dairy Amended CAO Comments*, and as shown in Table 3 at page 9 of the revised proposed CAO). Therefore, replacement water threshold based on SMCLs are proposed to be adjusted upwards 40 percent to account for the pre-existing upgradient degradation of TDS in groundwater. This 40 percent adjustment is proposed for the chloride and sulfate thresholds as well, as described below. A discussion of SMCL ranges and their applicability is also provided here for context and to support that the proposed increases are still protective of the domestic water supply beneficial use.

Discussion of SMCLs and Consumer Acceptance Ranges

SMCLs for TDS, chloride and sulfate are set using a using a three-tiered approach to account for ranges in consumer acceptance of water containing those constituents. SMCLs are therefore referred to in California Code of Regulations, title 22⁵, chapter 15, article 16, section 64449, Table 64449-B⁶ as "Consumer Acceptance Contaminant Level Ranges" and it is noted in title 22, section 64449 that "no fixed consumer acceptance level has been established" for those constituents. The table below shows the ranges of SMCLs for TDS, chloride and sulfate set in title 22, section 64449.

⁵ All references to title 22 in this document are to California Code of Regulations title 22.

⁶ http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/recentlyadoptedregulations/R-21-03-finalregtext.pdf

SMCLs from title 22, section 64449, Table 64449-B, in Milligrams per Liter (mg/L).

Constituent	Recommended SMCL	Upper SMCL	Short term SMCL
TDS	500	1,000	1,500
Sulfate	250	500	600
Chloride	250	500	600

Guidance provided in title 22, section 64449 states that constituent concentrations lower than the recommended SMCL (the lowest tier SMCL) are desirable for a "higher degree of consumer acceptance." Constituent concentrations ranging to the upper SMCL (the mid-level tier) are acceptable if it is "neither reasonable nor feasible to provide water at lower levels." Concentrations up to the short-term SMCL (the highest level) are acceptable only for "existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources" (title 22, section 64449). This guidance indicates that while the recommended SMCLs for Table 64449-B constituents are the most desirable, levels up to the upper SMCLs are acceptable if, as here, it is not reasonable to require providing water at lower levels (due to upgradient sources of pollution). However, because background levels of TDS, chloride and sulfate (unaffected by waste discharges, as described in response to comment PGE-1), are generally better (lower) than recommended SMCLs, Water Board staff contend that it is appropriate to use the recommended SMCL as the "starting point" or basis for calculating replacement water thresholds, with consideration given as to whether technical literature supports impacts to taste and odor (requiring bottled water) or scaling and staining (requiring whole house replacement water) at that lowest SMCL.

Revised TDS Replacement Water Threshold

For TDS, there is technical literature⁷ supporting that both taste and odor impacts and nuisance effects such as appliance scaling and laundry staining are observed at the recommended SMCL; therefore, this level will be used as the basis for calculating threshold replacement water levels for both drinking and cooking supply, and whole house water. The replacement water threshold for TDS pollution is proposed to be increased 40 percent to account for upgradient sources, from 500 mg/L to 700 mg/L. This level is 200 mg/L greater than the recommended SMCL for TDS, but 300 mg/L less than the upper SMCL. As such, the 700 mg/L TDS replacement water threshold is well within the range of reasonable levels for consumer acceptance based on guidance found in title 22, section 64449.

Revised Chloride and Sulfate Replacement Water Thresholds

For chloride and sulfate, technical literature⁸ supports that taste and odor impacts are noticeable at levels greater than the recommended SMCLs of 250 mg/L;

⁷ See references in finding 16 at page 5 of the revised proposed CAO.

⁸ See revised finding 22, and references.

therefore, this level will be used as the basis for calculating threshold replacement water levels for drinking and cooking supply. Drinking and cooking supply replacement water thresholds for chloride and sulfate are proposed to be increased 40 percent, from 250 mg/L to 350 mg/L. This level is 100 mg/L greater than the recommended SMCLs, but 150 mg/L less than the upper SMCLs. As such, the 350 mg/L replacement water threshold is well within the range of reasonable levels for consumer acceptance based on guidance found in title 22, section 64449.

For nuisance impacts such as appliance scaling and laundry staining, technical literature is not available to support at what specific levels such impacts may be observed (see revised CAO finding 23). To account for this uncertainty, the Prosecution Team proposes to use the mid-point value between the recommended and upper level SMCLs as the basis for calculating whole house replacement water supply thresholds for chloride and sulfate. Therefore, whole house replacement water supply is required when chloride or sulfate concentrations reach or exceed 525 mg/L (40 percent greater than 375 mg/L, the mid-point between the recommended and upper SMCL for those constituents). This value exceeds the upper limit SMCL by five percent, but due to lack of information on a specific level where nuisance impacts are observed, this value is reasonably close to the upper limit SMCL for consumer acceptance based on guidance found in title 22.

- See revisions to findings 17, 18, 19, 20, 21, 22, 23, 24, and 25 (as renumbered in the revised proposed CAO). See new Table 2 in revised finding 20.
- See revisions to Orders section II and revised Table 4 in that section.

PGE-3. The expansion of the affected area is not justified. TDS north of Thompson Road is not related to discharges from the DVD. Groundwater affected by discharges from the DVD should contain elevated concentration of both nitrate and TDS, as indicated by data collected at the DVD. However, nitrate greater than the MCL of 10 mg/L extends only to near Thompson Road, while TDS greater than 500 mg/L extends further north, to north of Salinas Road and up to Mount General Road. This suggests that elevated TDS north of Thompson Road is unlikely to have originated from the DVD.

Prosecution Team Response: Water Board staff disagrees with this conclusion. Groundwater in the DVD area has much higher concentrations of TDS compared to nitrate concentrations. For example, maximum TDS concentrations are two to three orders of magnitude higher than maximum nitrate concentrations (maximum nitrate at 77 mg/L; maximum TDS at 6,000 mg/L⁹, and up to 12,000 mg/L in MW-206). This indicates that TDS in groundwater originating from the DVD would travel further before being diluted out or dispersed than nitrate originating from the DVD. Monitoring well data cross gradient to groundwater flow from the DVD (e.g., east of Summerset Road and north of the former Hinkley School) showing TDS

⁹ Table 4-2, Annual maximums for DVD monitoring wells, June 30, 2015 Agricultural Treatment Unit Byproduct Investigation Report.

contributions from other sources do not reflect the high concentrations (>2,000 mg/L) that are seen in monitoring wells at and immediately north of the DVD. Therefore, the expansion of the affected area is justified in the amended CAO.

PGE-4. Groundwater affected by the DVD has not likely travelled as far north as the TDS affected groundwater greater than 500 mg/L. To support its assertion that the TDS in groundwater in the expanded affected area is from non-DVD sources, PG&E cites flow modeling, past and current agricultural pumping that limits northward groundwater flow, and the fact that elevated nitrate is not present north of Thompson Road.

Prosecution Team Response: Water Board staff disagrees that pollutants in groundwater from the DVD have not likely travelled as far north as the expanded affected area. The northern (downgradient) boundary of the proposed expanded affected area at Sonoma Road is approximately 8,000 feet downgradient of the DVD. Dairy operations at the DVD have occurred since the 1970s and the responsible parties named in this proposed Amended CAO have operated the dairy since 1981. Based on estimates of vadose zone travel time estimates provided by PG&E¹⁰, the average time for water to percolate down to the aquifer from the ground surface at the DVD is 6.5 years. This means waste discharges have potentially been in the groundwater for approximately 28.5 years. Based on previous estimates of groundwater velocities provided by PG&E and supported by data from the USGS and the Mojave Water Agency¹¹, a reasonable estimate of groundwater flow velocity is 2 feet per day. PG&E asserts in its comments on this proposed amended CAO and previous comments¹² on CAO R6V-2015-0068 that groundwater moves more slowly in the area due to groundwater extraction for remediation pumping in the area, historic groundwater pumping for agricultural fields, and slower velocities due to finer-grained aquifer sediments in the northern Hinkley Valley. Water Board staff does not dispute PG&E's claim that groundwater velocity should decrease in the north Hinkley Valley and the Harper Dry Lake Valley because of finer-grained sediments composing the aquifers. However, the slower velocity is counteracted when faster groundwater flow is factored in where the aquifer narrows near the DVD due to bedrock outcrops in the west at Mountain View Road and east at Summerset Road. Principles of fluid mechanics state that flow is faster in a reduced area. Thus, natural groundwater is expected to flow faster between Acacia Road and Thompson Road in this narrow area. North of Thompson Road to Sonoma Street, TDS would continue to migrate with natural groundwater flow, since limited, if any, agriculture occurred in this area (as seen in aerial photos from the 1950s to present submitted with PG&E's April 4, 2016 *Desert View Dairy Amended CAO Comments*). Lastly, PG&E's remediation pumping targeting the upper aquifer zone where the highest TDS and nitrate are present did not begin until 2004 at the DVD, and did not result in

¹⁰ June 30, 2015 *Agricultural Treatment Unit Byproduct Investigation Report - at*, http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/6337839484/SL0607111288.PDF

¹¹ See finding 10 of CAO R6V-2015-0068.

¹² March 12, 2015 Comments on Proposed Cleanup and Abatement Order No. R6V-2015-PROP, available at http://www.waterboards.ca.gov/lahontan/water_issues/projects/pge/cao/.

a year-round capture zone until 2012 at the earliest. This means that remediation pumping between 2004 and 2012 was not sufficient to limit TDS and nitrate migration in groundwater during that period. These factors make the 2 feet per day groundwater velocity estimate reasonable, and justify the DVD expanded affected area. Based on this estimate, waste discharges in groundwater from the DVD could have traveled up to 20,805 feet¹³, indicating that the 8,000-foot downgradient affected area is justified and reasonable.

Regarding TDS travelling further than nitrate in groundwater, please see response to comment GHD-4.

PGE-5. There are technical challenges to providing whole house water for TDS above SMCLs. Reverse osmosis (RO) is the only practical alternative to remove TDS concentrations, and to provide RO for whole house use would require a large footprint, be energy intensive, require more operation and maintenance and would result in greater discharges to septic systems.

Prosecution Team Response: We understand these challenges and propose to modify the CAO requirements to be clear that the Dischargers may submit a replacement water plan that proposes treatment such as providing reverse osmosis or bottled water dispensers at each sink in the household for drinking water, and installing point-of-use pre-filters for major appliances such as dishwashers and clothes washers. Monitoring requirements for drinking water versus appliance filters may also be tiered; in other words, monitoring for water quality for drinking and cooking should focus on meeting MCLs or SMCLs, whereas monitoring for appliance supply water should focus on user acceptance or satisfaction.

- See revisions to Order section IV.A, IV.A.4, IV.A.5, IV.A.8, and V.A.1.h.

PGE-6. Salt impairment in this aquifer is best addressed on a regional basis through cooperation and collaboration among all contributing stakeholders. To that end, we believe this CAO should be crafted in the context of an overall program for the Hinkley area and the Mojave River watershed. PG&E is committed to being a good partner in finding workable, long term solutions for the salts and other regional groundwater issues in the area. As an example, the Mojave Salt and Nutrient Management Plan provides a roadmap for a possible regional and collaborative solution.

Prosecution Team Response: Water Board staff agrees that salt impairment is widespread in the Hinkley Valley, and has contributed to commingled plumes of salts, including nitrate, resulting from various dairy and farming discharges over the years. We are amenable to a Valley-wide solution to address this salt impairment. A coordinated approach in the future may be an option, such as through a

¹³ Assuming waste discharges subject to the CAO began in 1981, minus 6.5 years of travel time from ground surface to the aquifer, equals 28.5 years of potential groundwater contamination. 28.5 years x 365 days per year x 2 feet per day equals 20,805 feet of potential contaminant migration.

consolidated Board Order or stipulated agreement. Water Board staff are interested to work with Hinkley Valley dischargers to explore such options.

However, affected residents cannot wait for a new process to be put in place; they are entitled to good quality, palatable water now. So in the meantime, the current process, including this amended CAO, is the best approach to ensure timely protection for domestic well users affected by discharges of waste from the DVD..

II. GHD Services (on behalf of Paul Ryken) Comments

GHD-1. The proposed CAO states that background total dissolved solids concentrations south of the compressor station range from 228-266 mg/L and these are unaffected by dairy or farming operations. While this statement is correct, it does not accurately represent true background TDS concentrations immediately upgradient of DVD.

Prosecution Team Response: Water Board staff acknowledge that more information on TDS concentrations immediately upgradient to the DVD is needed in the CAO, and have proposed revisions to the CAO to incorporate such information. Please see response to comments PGE-1 and PGE-2.

GHD-2. DVD believes that TDS by itself does not constitute an impact related to their operations and believes that unless other compounds, such as nitrates, are also found with elevated TDS, then DVD should not be held responsible for their poor water quality.

Prosecution Team Response: Water Board staff disagrees that unless nitrate is found with TDS, impacts cannot be linked to the DVD. Please see response to GHD-4 below regarding nitrate and TDS migration and dilution in groundwater.

Also, as stated in Amended CAO finding 14, TDS concentrations in groundwater beneath and downgradient from the DVD during 2015 adversely affects water quality at concentrations greater than 500 mg/L. And as stated in finding 16, the USEPA and State of California have set a range of secondary MCLs for TDS with the recommended limit of 500 mg/L set to control for "hardness, deposits, colored water, staining, and salty taste." TDS levels above 500 mg/L result in excessive scaling in water pipes, water heaters, boilers, and household appliances such as kettles and steam irons, shortening the service life of these appliances. Thus, TDS by itself constitutes a constituent of concern justifying the replacement water orders in the Proposed CAO.

GHD-3. GHD has not seen sulfate in dairy waste at other Dairy operations in California or across the United States, and ask what data was used to make this conclusion.

Prosecution Team Response: Sulfate, along with TDS, chloride and nitrate, has been noted as constituent of concern in DVD waste discharges since the original CAO was issued in 2008. Elevated sulfate concentrations are observed beneath and downgradient of DVD (see for example, figure 3 of PG&E's April 4, 2016 *Desert View Dairy Amended CAO Comments* and Table 3 of this document, which summarizes sulfate data from that figure). The original CAO for the DVD in finding 9 cited water sample results from a domestic well located on Alcurdia Road approximately 200 feet north of the DVD property. As described in that finding, six constituents in the sample exceeded drinking water standards, including chloride and sulfate. Sulfate is also noted as a constituent of concern related to waste discharges from the DVD and present in domestic wells sampled in 2009 (see finding 4 in amendment 2).

Lastly, the Central Valley Regional Water Board re-issued General Waste Discharge Requirements for Existing Milk Cow Dairies in 2013 (Board Order R5-2013-0122, available at http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0122.pdf). In that Order, constituents of concern (COCs) are defined¹⁴:

The COCs due to discharges of waste from dairies with respect to groundwater are: nitrogen in its various forms (ammonia and un-ionized ammonia, nitrate, nitrite, and total Kjeldahl nitrogen), salts, and general minerals (calcium, magnesium, sodium, potassium, bicarbonate, carbonate, **sulfate** [emphasis added], and chloride).

In summary, several sources of monitoring data document that dairy waste discharges from the DVD contribute elevated levels of sulfate (and other salts) to groundwater. Sulfate is a component of TDS, which is also a well-documented constituent in dairy waste. The Central Valley Regional Board defines dairy waste COCs to include sulfate.

GHD-4. The TDS concentrations referenced in item 13 of the proposed order were between 550 mg/l to 1,600 mg/l which is said to be caused by DVD operations. This conclusion is incorrect because background concentrations up-gradient of DVD are already above the SMCL for TDS as discussed in the previous item. Again, if DVD was the only source of TDS, chloride or sulfates, which it isn't, there would be elevated levels of nitrate since both TDS and nitrate migrate at the same relative rate (nitrate, sulfate, chloride, sodium and other ions make up the measured TDS). In fact, nitrate concentrations decrease quickly and there is no nitrate above the MCL north of Thompson Rd. but TDS concentrations remain above the SMCL.

¹⁴ See Information Sheet for Order R5-2013-0122, page IS-17.

Prosecution Team Response: Please see responses to comments PG&E-1, -2, -3, and -4 (and proposed CAO revisions) regarding upgradient sources and their contributions to groundwater at and downgradient of the DVD.

Nitrate and TDS migrate at the same rate with groundwater flow; however, they would not dilute or attenuate with distance at the same rate, as explained in response to comment PG&E-3, due in part to the much higher concentrations of TDS compared to nitrate. Also, TDS is a conservative solute (meaning it does not undergo microbial degradation or chemical transformation which would reduce concentrations in groundwater). Nitrate is a non-conservative solute, and undergoes transformation (denitrification) in the subsurface from nitrate to nitrogen gas, most readily under anaerobic geochemical conditions. While groundwater in desert environments does not typically exhibit high rates of denitrification, some amount of reduction in nitrate concentrations in groundwater due to geochemical conditions is possible, while for TDS it is not. This additional factor, besides the highly elevated TDS levels compared to nitrate levels, provides reasonable support for why TDS has affected groundwater further from the source of pollution at the DVD than has nitrate.

GHD-5. Whole house water replacement is unprecedented and should not be required unless it is uniformly applied.

Prosecution Team Response: Water Board staff disagree that whole house water is unprecedented. Whole house water is required in the current DVD CAO, amended in 2010. Water Board staff is contemplating actions to amend existing CAOs in the Hinkley area (issued to Harmsen Dairy and Ryken Heifer Ranch) to include similar requirements (which may incorporate similar revised requirements as discussed in this document). For example, please see our response to comment PG&E-2 at page 3, second paragraph.

III. IRP Manager Comments

IRP-1. The IRP Manager is in agreement with the requirements outlined in Section III and IV of the proposed CAO.

Prosecution Team Response: Comment noted. Please see our response to comment PG&E-2, providing justification for proposing revisions to the CAO to adjust the thresholds levels for replacement water for TDS, chloride and sulfate upwards 40 percent to account for upgradient sources of pollution.

IRP-2. Is there a minimum timeframe that the dischargers are required to maintain and operate the [whole house replacement water] systems?

Prosecution Team Response: Dischargers are required to maintain and operate the systems as long as a domestic supply well is "affected" as described in Section II of the CAO, and as clarified further in response to comment IRP-4.

IRP-3. If the water quality at a specific domestic well improves (concentrations decrease below thresholds limits) will the discharger be permitted to stop monitoring and maintenance of that specific system?

Prosecution Team Response: Yes. See response to comment IRP-4 below for additional details.

IRP-4. Are there any criteria for the discharger to terminate supplying replacement water to eligible residents?

Prosecution Team Response: Yes. The Discharger may terminate supplying replacement water, including terminating monitoring, maintenance and operation of the system, for a domestic well that was previously deemed affected if analytical results from four (4) consecutive sampling events are below the levels shown in Table 3, section II of the draft CAO. The Discharger may also provide evidence that concentrations of constituents of concern in a domestic well within the affected area is not due to its discharge and may be relieved of the requirement to provide replacement water service. This information will be added to the draft CAO.

- See revisions in Orders section II.

IRP-5. What happens to a system once a domestic well is not defined as an affected domestic well? Does the homeowner keep the replacement water system or does the discharger remove the system from the homeowner's property?

Prosecution Team Response: Once a domestic well is no longer affected, the Discharger will work with homeowners to remove the system and restore the property back to its original condition if needed, unless other agreements between the Discharger and the homeowner are made. This will be clarified in the proposed CAO.

- See revisions in Orders section IV.

IRP-6. On Attachment 1, the location of the DVD is shown along Serra Road and it should be located on Mountain View Road on the enclosed map.

Prosecution Team Response: The comment is correct. The map will be revised and replaced.

- Recommended revision to CAO: Replace existing attachment 1 with new attachment 1.

IRP-7. The IRP Manager is in agreement with the reporting requirements outlined in Section V of the Proposed CAO.

Prosecution Team Response: Comment noted.

IRP-8. Will each discharger provide a separate semi-annual report or will they all accumulatively submit one semi-annual report to the Water Board?

Prosecution Team Response: The primary responsible parties typically submit one report. However, each discharger may submit separate reports to comply with CAO directives. If none of the responsible parties comply with these directives, all parties may be subject to enforcement action by the Water Board.

IRP-9. Suggest that a map is included showing parcel ownership to illustrate the number of possible replacement water recipients and properties owned by the dischargers.

Prosecution Team Response: A revised Attachment 1 will be included in the final CAO, showing the suggested information.

IRP-10. Suggest that the report compares information from wells down and up-gradient of the affected area.

Prosecution Team Response: Dischargers are not required to sample outside the affected area; therefore, data up- or downgradient of the affected area will not be reported.

IV. Additional Editorial Changes to revised Proposed CAO

CAO Section and Page(s)	Change
Title Block, Headers, Watermark	Add text - REVISED
Findings 1b, c and d, page 1	Add clarifying language regarding need for amending CAO.
Finding 15, page 5	Removed text "either recommended or upper" to reflect that the whole house replacement water threshold for chloride and sulfate is based on the mid-point between the two SMCLs. Changed references to findings.
Finding 6, page 3	Add language to clarify there are no primary MCLs set for TDS, chloride or sulfate.
Finding 7, page 3	Add language clarifying the three tiered approach for secondary maximum contaminant level ranges, guidance in CCR title 22 regarding application of the three tiers, and reference for such.
Finding 15, page 5	Add <u>40 percent above</u> to reflect updated thresholds for replacement water.
Findings 18 and onward (starting on page 7)	Re-numbered findings to reflect new inserted findings 18, 19 and 20.

Enclosure: Amended Cleanup and Abatement Order No. R6V-2008-0034A4-(Revised Proposed)

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**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION**

**AMENDED CLEANUP AND ABATEMENT ORDER NO. R6V-2008-0034A4-(REVISED
PROPOSED)**

**REQUIRING PAUL RYKEN, THE ESTATE OF NICK VAN VLIET, FLAMELING DAIRY, INC.,
K&H VAN VLIET CHILDREN LLC, AND
THE PACIFIC GAS AND ELECTRIC COMPANY
TO CLEAN UP OR ABATE THE EFFECTS OF
CONTAMINANTS TO GROUNDWATERS OF
THE MOJAVE RIVER HYDROLOGIC UNIT,
DESERT VIEW DAIRY, HINKLEY,
WDID NO. 6B360409002**

San Bernardino County_____

FINDINGS

The California Regional Water Quality Control Board, Lahontan Region (Water Board), finds:

Reason for Action

1. This is an amendment to previous Cleanup and Abatement Orders issued to the Dischargers for dairy waste pollution in groundwater originating at the Desert View Dairy. This amended Order (CAO No. R6V-2008-0034A4; hereafter, Amended Order 4) is needed to:
 - a) Expand the affected area for the purposes of domestic well sampling and replacement water requirements;
 - b) Add sampling for additional constituents of concern related to dairy wastes (i.e., total dissolved solids, chloride and sulfate);
 - c) Add ~~Require~~ replacement drinking and cooking water supply thresholds (i.e., bottled water or equivalent) for all domestic wells in the revised affected area with concentrations above threshold levels ~~primary or secondary Maximum Contaminant Levels~~ for these additional constituents of concern;
 - d) Require a plan and schedule to provide whole house replacement water for all domestic wells in the revised affected area with constituents of concern above threshold levels, ~~primary or secondary MCLs~~, and
 - e) Provide more specific reporting requirements for domestic wells.

Legal and Regulatory Authority

2. This Amended Order 4 conforms to and implements policies and requirements of the Porter-Cologne Water Quality Control Act (Division 7, commencing with Water Code section 13000) including (1) sections 13267 and 13304; (2) applicable state and federal regulations; (3) all applicable provisions of statewide Water Quality Control Plans adopted by the State Water Resources Control Board (State Water Board) and the Water Quality Control Plan for

the Lahontan Region (Basin Plan) adopted by the Water Board including beneficial uses, water quality objectives, and implementation plans; (4) State Water Board policies and regulations, including State Water Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California; Resolution No. 88-63, Sources of Drinking Water; Resolution No. 92-49, Policies and Procedures for Investigation, and Cleanup and Abatement of Discharges under Water Code Section 13304; California Code of Regulations (CCR) Title 23, Chapter 16, Article 11; CCR Title 23, section 3890 et. seq.; and (5) relevant standards, criteria, and advisories adopted by other state and federal agencies.

Order History

3. On November 10, 2008, the Water Board issued CAO No. R6V-2008-0034 (Original Order) to Paul Ryken, the Estate of Nick Van Vliet, Flameling Dairy, Inc., K&H Van Vliet Children LLC, and the Pacific Gas and Electric Company (hereinafter referred to as the Dischargers). In the Original Order, findings 21 and 22 designate primary and secondary responsible parties for the purposes of compliance with the Order. Mr. Paul Ryken, the Estate of Nick Van Vliet and Flameling Dairy Inc. were designated as primary responsible parties, because as the past dairy owners and/or operators they initiated and contributed to the discharge of waste. The current owner/operator Pacific Gas and Electric Company and the past owner, the K&H Van Vliet Children LLC, were designated secondary responsible parties for complying with the Order. The primary and secondary responsible party designations remain in this Amended Order 4.
4. The Original Order required the Dischargers to supply interim water supply (i.e., bottled water) and long-term alternate replacement water supply to residences and businesses in which nitrate was detected at concentrations above Maximum Contaminant Levels (MCLs, also called drinking water standards) of 45 milligrams per liter (mg/L) (nitrate as nitrate [NO₃]) or 10 mg/L (nitrate as nitrogen [N]). Findings 6 through 17 of the Original Order describe how groundwater sampling indicated that the nitrate and other salts (total dissolved solids, chloride, sulfate and sodium) above MCLs, secondary MCLs or a United States Environmental Protection Agency (USEPA) health advisory level in nearby domestic wells originated from dairy waste disposal practices and irrigated agriculture at the DVD. Monitoring requirements for domestic wells in the vicinity of the DVD were described, as well as a deadline to submit a long-term alternate replacement water supply plan.
5. First Amended Order No. R6V-2008-0034A1 (Amended Order 1), issued on June 16, 2009, modified the domestic well sampling requirements of the Original Order. The Water Board's Executive Officer accepted the Dischargers' proposal to implement long-term replacement water supply by continuing the bottled water program that was already in place as required by the Original Order.
6. Second Amended Order No. R6V-2008-0034A2 (Amended Order 2) was issued on March 9, 2010, modifying the replacement water requirements in the Original Order. Amended Order 2 required the Dischargers to submit an *Alternative Water Supply Evaluation* to identify a new, long-term uninterrupted replacement water plan for all domestic uses (i.e., whole house replacement water), while continuing to implement an interim replacement water plan. Finding 4 (note there are two findings numbered 4) of Amended Order 2 describes that residents on Thompson Road complained of foul odors and tastes, residues on clothing and dishes, skin rashes, and adverse effects to their appliances. The majority of these effects could not be mitigated by bottled water, but required whole house replacement water to

supply bathing and washing facilities and appliances. Results from residential well sampling for four domestic wells on Thompson Road (downgradient of the DVD) show that concentrations of chloride, sulfate, and total dissolved solids (TDS) were anywhere from three to 12 times higher (above) their respective secondary MCLs (there are no primary MCLs set for these constituents), as presented in the table in Amended Order 2, finding 4. Locations referred to in this and subsequent findings are shown in attachment 1, Location Map and Affected Area.

7. Secondary MCLs (SMCLs) are set by the State Water Resources Control Board's Division of Drinking Water and the USEPA for domestic water supplies (including drinking, cooking, and washing) to control for non-health related effects such as undesirable taste, odor, corrosion, staining, discoloration, foaming, scaling and sedimentation. For TDS, chloride and sulfate, SMCLs are adopted using a three-tiered approach to account for ranges in consumer acceptance of water containing those constituents. SMCLs for these constituents are therefore referred to in California Code of Regulations, title 22, chapter 15, article 16, section 64449, Table 64449-B¹ as "Consumer Acceptance Contaminant Level Ranges" and it is noted in title 22, section 64449 that "no fixed consumer acceptance level has been established" for those constituents. Guidance provided in title 22, section 64449 states that constituent concentrations lower than the recommended SMCL (lowest tier SMCL) are desirable for a higher degree of consumer acceptance. Constituent concentrations ranging to the upper SMCL (mid-level tier) are acceptable if it is neither reasonable nor feasible to provide water at lower levels. Concentrations up to the short-term SMCL (highest level) are acceptable only for existing community water systems on a temporary basis pending construction of treatment facilities or development of acceptable new water sources. These SMCL ranges are set by the State Water Resources Control Board's Division of Drinking Water and the USEPA, are shown in Table 1 for the constituents of concern for this Amended Order 4.

Table 1. Ranges of State and Federal Secondary MCLs, in Milligrams per Liter (mg/L).

Constituent	Recommended SMCL	Upper SMCL	Short term SMCL
TDS	500	1,000	1,500
Sulfate	250	500	600
Chloride	250	500	600

8. On January 26, 2011 the Water Board's Assistant Executive Officer issued a Notice of Violation of CAO R6V-2008-0034A2, and an Investigative Order R6V-2010-0028 (January 2011 NOV) based on the Dischargers' failure to deliver interim replacement water by the July 30, 2010 and October 11, 2010 deadlines in accordance with the Amended Order 2 and a 2010 Investigative Order. This Amended Order 4 in no way absolves the Dischargers from any future potential civil monetary liability indicated in the January 2011 NOV based on violations of previous Orders.

¹ http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/recentlyadoptedregulations/R-21-03-finalregtext.pdf

9. Third Amended Order R6V-2008-0034A3 (Amended Order 3), issued on February 24, 2011, required the Discharger to implement new plans to provide long-term whole house replacement water service to affected properties, and conduct a groundwater investigation to determine the extent of dairy and agricultural waste constituents, including nitrate, TDS and other salts. In response to the first requirement, Mr. Ryken provided storage tanks and trucked water to four properties on Thompson Road (after the owners' acceptance of this long-term replacement water approach). The Dischargers submitted two groundwater investigation reports on June 30, 2011.
10. On March 20, 2015 the Water Board's Assistant Executive Officer issued a second Notice of Violation of CAO Nos. R6V-2008-0034 and R6V-2008-0034A1 to the Dischargers for failing to describe nitrate and other constituents above drinking water standards in a newly affected domestic well in the CAO affected area; not providing alternate water supply to the residence affected by nitrate pollution of groundwater resulting from the DVD; and failing to provide a written report that alternate water supply was being provided to affected residents. This Amended Order 4 in no way absolves the Dischargers from any future potential civil monetary liability indicated in the March 2015 NOV based on violations of previous Orders.

Basis of and Need for Amendment

11. At the time of issuance of the Original Order in 2008, groundwater sampling indicated that nitrate and salts pollution originating from the DVD had migrated downgradient (generally northward) to at least Thompson Road, about 2,500 feet north of the DVD (see findings 11 and 16 of the Original Order). Therefore, Order No. 1 of the Original Order defined an "affected area" subject to sampling and replacement water requirements in the Original Order as bounded by Serra Road to the west, Santa Fe Road to the south, Summerset Road to the east, and Salinas Road to the north (Salinas Road is about 2,500 north of Thompson Road in the downgradient groundwater flow direction from the DVD). See attachment 1, Location Map and Affected Area, showing these locations.
12. Since late 2008, as directed by the Original Order, Mr. Ryken's consultant Conestoga-Rover Associates (now GHD Services, Inc.) has collected water samples from active domestic wells in the affected area. Data² from 2015 sampling of accessible domestic wells in the affected area shows that six active domestic wells show concentrations of two or more constituents of concern (TDS, chloride, nitrate, and sulfate) above the primary or secondary MCLs.
13. Additional groundwater monitoring near and downgradient of the DVD is required pursuant to Board Order No. R6V-2014-0023, *Agricultural Treatment Unit Waste Discharge Requirements* (ATU WDRs), issued to PG&E to regulate discharges from its irrigated alfalfa fields. These fields, called Agricultural Treatment Units (ATUs), are used to contain and treat PG&E's chromium plume in groundwater originating from the Hinkley Compressor Station. Data³ collected in 2012 through 2015 from domestic well sampling required by the ATU WDRs indicate that TDS concentrations in domestic wells *north* of Salinas Road in the downgradient flow direction from the DVD are greater than the secondary TDS MCL of 500 mg/L. Maximum TDS concentrations in those domestic wells range from 550 to 1,600 mg/L.

² Data from 2015 collected by Conestoga Rover/GHD is available at http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0607171020.

³ See Table H-3 in the Third Quarter 2015 Agricultural Treatment Units Monitoring Report, available at http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0607111288.

14. In June 2015, PG&E submitted the *Agricultural Treatment Byproducts Investigation Report for Environmental Impact Report Mitigation Measure WTR-MM-5*⁴. This report provides data from monitoring wells, including several located north of Salinas Road in the downgradient flow direction from the DVD. Data from those wells indicate that TDS concentrations are greater than the secondary MCL of 500 mg/L in these wells, ranging up to 904 mg/L.
15. This Amended Order 4 does not change the existing requirement for the Dischargers to provide interim and whole house replacement water to domestic wells with nitrate at or above its MCL. This Amended Order 4 does require the Dischargers to provide alternate water supply for drinking and cooking uses and whole house replacement water for additional constituents that reach 40 percent above ~~either recommended or upper~~ SMCLs, as described in findings 16 through 227 below.

Basis for Replacement Water Requirements for TDS Pollution

16. The USEPA and State of California have set a range of SMCLs for TDS (see Table 1 in finding 7). The recommended limit of 500 mg/L is set to control for "hardness, deposits, colored water, staining, and salty taste." These effects are described as "noticeable above the secondary [recommended] MCL" of 500 mg/L⁵. According to the World Health Organization⁶, TDS levels above 500 mg/L result in excessive scaling in water pipes, water heaters, boilers, and household appliances such as kettles and steam irons, shortening the service life of these appliances.
17. Data⁷ reported in the 2013 Final Environmental Impact Report certified by the Water Board for PG&E's chromium cleanup shows that groundwater in the southern Hinkley Valley upgradient of ~~the DVD (and other dairy or farming operations)~~ generally contains constituents below the recommended SMCL for TDS. Data⁸ from PG&E's freshwater supply wells located to the south and east of the Compressor Station and upgradient of dairy or farming operations indicate that Hinkley Valley background groundwater quality for TDS is below the recommended SMCL (TDS concentrations range from 228 to 266 mg/L). Therefore, background water quality for TDS in the Hinkley Valley, not affected by dairy or farming operations, is better (lower) than the recommended SMCL of 500 mg/L. Also, references cited in finding 16 above support that taste, odor and nuisance impacts such as appliance scaling and laundry staining are observed at levels greater than recommended SMCL. This indicates that the recommended SMCL of 500 mg/L is an appropriate starting point to determine replacement water thresholds for TDS pollution.

⁴ Available at http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0607111288.

⁵ <http://www.epa.gov/dwstandardsregulations/secondary-drinking-water-regulations-guidance-nuisance-chemicals#table-of-secondary>.

⁶ Total Dissolved Solids in Drinking Water: Background Document for Development of WHO Guidelines for Drinking-water Quality. WHO 2003

⁷ See EIR Figure 3.1-7 "Existing TDS Concentrations within Project Area" and accompanying TDS discussion at pp. 3.1-33 through 3.1-35, available at http://www.waterboards.ca.gov/lahtontan/water_issues/projects/pge/docs/feir/ch3_1.pdf.

⁸ See Appendix B, FW-01, FW-02, FW-03, and FW-04 Water Quality Data contained in PG&E's "Hinkley School Supplemental Environmental Project Final Report and Satisfaction of Order Request" dated July 15, 2015 available at http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/2518251538/SL0607111288.PDF.

18. Concentrations of TDS greater than SMCLs exist in groundwater at locations immediately upgradient of the DVD, and groundwater beneath the DVD has been affected by upgradient current or previous farming and dairy operations. For example, figure B3 (TDS concentrations in the Shallow Zone of the Upper Aquifer, 2011-2014) of PGE's June 30, 2015 *Agricultural Treatment Unit Byproduct Investigation Report*⁹ provides a comprehensive view of groundwater quality in the Hinkley Valley. This figure shows the upgradient dairies or heifer ranches (Leyerly, Nelson/Diaz and Harmsen dairies, and Ryken Heifer ranch) which are located south or southeast of the DVD between Frontier Road and Santa Fe Avenue. This area is where TDS levels show a strong pattern of degradation from generally less (better quality) than SMCLs between the Mojave River and the compressor station (described in finding 17 above) to above (worse quality) than SMCLs. Concentrations in this area reflect the above dairy and farm operations and range from 1,170 to 2,180 mg/L TDS as shown in figure B3 of the above-referenced report.
19. As described in finding 18 above, upgradient sources have contributed to water quality degradation measured at the DVD such that it is not reasonable to require the Discharger to provide replacement water for TDS pollution at the recommended SMCL level of 500 mg/L. Rather, an allowance for this upgradient pollution is appropriate to incorporate into the replacement water threshold.
20. Water Board staff analyzed data presented in PG&E's April 4, 2016 *Desert View Dairy Amended CAO Comments*¹⁰, figure 1. This figure shows the most recent data for TDS from monitoring and domestic wells immediately upgradient, beneath, and downgradient of the DVD. Data from upgradient wells directly upgradient of the DVD (reflecting legacy waste discharges from dairies and irrigated agriculture) were compared to wells reflecting discharges from the DVD. This analysis shows that upgradient sources contribute an average of 40 percent of the TDS concentrations in groundwater downgradient of the DVD (see Table 2, below).

⁹ http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/6337839484/SL0607111288.PDF.

¹⁰ http://www.waterboards.ca.gov/lahtontan/water_issues/programs/enforcement/docs/desert_view_cao/pge.pdf.

Table 2. Selected Data from PG&E's April 4, 2016 Figure 1, TDS Concentrations in Monitoring and Domestic Wells (Milligrams per liter [mg/L]).

<u>Upgradient of DVD Data</u>	<u>TDS (mg/L)</u>	<u>Downgradient of DVD Data</u>	<u>TDS (mg/L)</u>
MW 109	1,090	MW 29	2,830
MW 23A	1,670	DW 01	2,530
MW 26	2,070	DW 02	3,100
MW 22A1	2,480	MW 21A	3,600
MW 25 A2	1,170	MW 68S	3,500
MW 24 A1	2,090	MW 69S	3,809
MW 28 A	1,100	MW 83D	3,300
MW 108S	1,135	MW 70S	6,900
MW14S	1,210	MW 89S	3,900
MW 27A	1,160	MW 85S	4,300
MW 49S	1,170	23-24	3,900
MW 95S	1,240	MW 84S	4,100
25-04	1,386	MW 127S1	3,700
		MW 63	2,800
		MW 43	2,920
Average Upgradient	1,459	Average Downgradient	3,679
Average Percent Contribution of Upgradient Sources →		40 percent [(1,459/3,679) x 100]	

21. Data in Table 2 show that discharges from the DVD contribute the majority (60 percent) of water quality degradation in downgradient domestic wells, and as such the Dischargers must provide replacement water to those well users when threshold levels, adjusted to account for upgradient pollution yet still below the upper (second-tier) SMCL, are reached.
22. ~~18.~~ Therefore, whole house replacement water is required when a domestic well reaches 700 mg/L TDS. This level is 40 percent above the recommended SMCL for TDS of 500 mg/L to account for upgradient water quality, but remains within the range of reasonable levels for consumer acceptance based on guidance found in title 22 of the California Code of Regulations as described in finding 7. Replacement water is required due to the potential for taste, odor, corrosion and staining impacts at levels greater than the recommended SMCL. In the interim period before whole house water is implemented, well users affected by such TDS pollution shall receive bottled water or equivalent as specified by this Amended Order 4 (see Orders section III.A and III.B).

Basis for Replacement Water Requirements for Chloride and Sulfate Pollution

23. ~~19.~~ Chloride and sulfate are salts in dairy waste which are constituents of concern for this Amended Order 4. The USEPA and the State of California have set a range of SMCLs for sulfate and chloride (see Table 1 in finding 7) to address corrosion and staining, as well as taste and odor. However, the "noticeable effect above secondary [recommended] MCL" of 250 mg/L for chloride and sulfate is noted as "salty taste", but not corrosion and staining (see reference in footnote 4). This suggests that appliance and laundry staining impacts may not be observed at the recommended SMCL of 250 mg/L for these constituents, but at an uncertain higher concentration.

24. ~~24.~~ Data¹¹ from PG&E's freshwater supply wells located to the south and east of the Compressor Station, and upgradient of dairy or farming operations indicate that water quality for chloride and sulfate is less (better) than the recommended SMCLs (chloride concentrations range from 29.4 to 42.3 mg/L; sulfate ranges from 33.8 to 42.3 mg/L). Data in Table 2 and this finding 24-These data support that background water quality for chloride and sulfate in the Hinkley Valley, not affected by dairy or farming operations, is better (lower) than the recommended SMCL of 250 mg/L. References cited in finding 23 above support that taste and odor of drinking water can be impacted at levels greater than the recommended SMCLs for chloride and sulfate. Therefore, the recommended SMCL of 250 mg/L is an appropriate starting point to determine the replacement water threshold for requiring bottled water or equivalent.
25. For whole house replacement water to mitigate effects such as appliance scaling and laundry staining, technical literature is not available to support *specific levels* of chloride or sulfate which may cause such effects to be noticeable (see finding 23). However, technical literature does support that SMCLs are intended to protect against corrosion and staining effects (see reference in footnote 4). To account for this uncertainty, the mid-point value between the recommended and upper level SMCLs is used for these constituents as the basis for calculating whole house replacement water supply thresholds. The mid-point value between the recommended and upper limit SMCLs for chloride and sulfate is 375 mg/L.
26. ~~20.~~ On June 30, 2011, The April 4, 2016 PG&E submitted the document *Desert View Dairy Amended CAO Comments*¹², submitted by PG&E includes figures 2 and 3, showing water quality results for chloride and sulfate from monitoring and domestic wells upgradient, beneath, and downgradient of the DVD. These data are summarized in Table 3 below. *Groundwater Investigation and Characterization Report*¹³ pursuant to Amended Order 3. Table 4-2 of that report contains the water quality results from monitoring and extraction wells at, south of, and north of the DVD. These locations represent the source of pollution, the upgradient, and downgradient groundwater flow direction from the DVD. Table 2 below summarizes concentrations of chloride and sulfate in groundwater upgradient and downgradient of the dairy waste source. Note that upgradient concentrations are less (better) than the SMCLs for chloride and sulfate shown in finding 7, Table 1. Downgradient water quality shows a marked increase in these salts, all above the respective SMCLs. Data analysis shows that, similar to TDS, upgradient chloride and sulfate sources contribute up to 39 percent of the downgradient concentrations.

¹¹ See reference in footnote 7.

¹² Available at

http://www.waterboards.ca.gov/lahtontan/water_issues/programs/enforcement/docs/desert_view_cao/pge.pdf.

¹³ Available at http://geotracker.waterboards.ca.gov/esi/uploads/geo_report/9745538294/SL0607111288.PDF.

Table 32. Upgradient and Downgradient of DVD¹⁴, Chloride and Sulfate Results, in Milligrams per Liter (mg/L).

Well #	Chloride	Sulfate
Upgradient of DVD		
EX-10 MW 28A	262 141 -- 498	269 74.6 -- 85.5
EX-17 MW 23A	292 40.6 -- 44.9	250 26.7 -- 28.7
MW-41A MW 26	360 89.7 -- 90.3	698 123 - 124
MW-76S MW 22A1	484 103	684 166
MW 24A1	360	627
Average	352	506
Downgradient of DVD		
MW-29	8980	1,500
MW-62A	686	820
MW-83S	1,050 962	1,330 1,220
DW-03	852 1,120	1,430 1,510
DW 01	526	1310
DW 02	559	1,280
MW 21A	559	1,280
MW 63	814	952
MW 69S	1,160	1,260
MW 68S	983	1,300
MW 55S	1,000	1,330
Average	1,048	1,305
Average Percent Contribution of Upgradient Sources →	34 percent [(352/1048) x 100]	39 percent [(506/1305) x 100]

27. Therefore, whole house water is required when a domestic well reaches 525 mg/L for chloride or sulfate. This level is 40 percent above the midpoint (i.e., 375 mg/L) between the recommended and upper SMCL for sulfate and chloride to account for upgradient sources. Whole house water is required due to the potential for corrosion and staining at levels greater than the recommended or upper secondary MCL. Replacement water supply for drinking and cooking (i.e., bottled water or equivalent) is required for domestic wells with water quality at or above 350 mg/L. This level is 40 percent above the recommended SMCL of 250 mg/L for sulfate and chloride to account for upgradient sources. Replacement water for drinking and cooking is required due to the potential for taste and odor effects at levels greater than the recommended SMCL.

¹⁴ Data from figures 2 and 3 of PG&E's April 4, 2016 *Desert View Dairy Amended CAO Comments*.

Consideration of California Water Code Section 106.3

28. Water Code section 106.3 establishes a state policy that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes, and directs state agencies to consider this policy when adopting regulations pertinent to water uses described in the section, including the use of water for domestic purposes.
29. This Amended Order 4 implements Water Code section 106.3 by requiring the Dischargers to sample domestic wells in an expanded area and to provide bottled and whole house replacement water supply at no cost to affected well users. Bottled water shall be provided from commercial vendors and meet all primary and secondary state drinking water standards, and be of sufficient water quantity to fulfill drinking and cooking needs. Whole house replacement water must meet state primary and secondary standards, and be of sufficient quantity to provide for all indoor domestic uses, including drinking, cooking, bathing, washing, and appliance supply. Therefore, the consideration of access to safe, clean and affordable water has been met in this Amended Order 4.

IT IS HEREBY ORDERED, pursuant to Water Code sections 13267 and 13304, that Mr. Paul Ryken, the estate of Nick Van Vliet, Flaming Dairy, Inc., the K&H Van Vliet Children LLC and PG&E are responsible for the discharge of waste that has caused or threatens to cause a condition of pollution or nuisance, and shall abate the effects of waste discharges at, near, and downgradient of the DVD as directed in Cleanup and Abatement Order Nos. R6V-2008-0034, R6V-2008-0034A1, R6V-2008-0034A2, R6V-2008-0034A3, and as amended below.

I. REVISED AFFECTED AREA, SAMPLING TIMEFRAME, AND SAMPLING CONSTITUENTS

- A.** The affected area for this Amended Order 4 is revised as follows: All active domestic and community supply wells in the area bounded by Serra Road to the west, Santa Fe Road to the south, Summerset Road to the east, and expanded to Sonoma Road to the north, including all parcels containing active domestic wells adjacent to Sonoma Road on the north side (see attachment 1, Location Map and Affected Area).
- B.** Sampling frequency for active domestic wells in the revised affected area shall remain semi-annual (twice-yearly). Sampling for all domestic wells in the affected area shall occur during the months of **April and October** of each year.
- C.** The Dischargers shall sample nitrate, reported as nitrate as nitrogen; total dissolved solids; chloride; and sulfate, using the following methods and reporting limits:
1. TDS by SM 2540C, reporting limit 10 mg/L
 2. Chloride and sulfate by USEPA 300.0, reporting limit 25 mg/L
 3. Nitrate as nitrogen-N by USEPA 300.0, reporting limit 0.5 mg/L

II. AFFECTED WELL DEFINITION

- A. Affected wells are any private active domestic or community water supply wells in the revised affected area containing constituents **at or above** the ~~primary or secondary~~ Maximum Contaminant Levels (MCLs or SMCLs) levels listed in Table 3 4.
- B. After written agreement from the Water Board's Executive Officer, the Discharger may remove a well from affected status if analytical results from four (4) consecutive sampling events are below the levels specified in Table 4.
- C. If the Discharger provides sufficient evidence that the constituents of concern concentration(s) in a domestic well in the affected area are not caused by its discharge, and the Water Board's Executive Officer agrees in writing, then the Discharger is no longer required to provide replacement water service.

Table 43. Levels* for Defining Affected Domestic Wells, in Milligrams per Liter (mg/L).

Replacement Water Type	Nitrate as N	Chloride	Sulfate	TDS
1. Drinking and Cooking Supply (Bottled Water or Equivalent)	10 mg/L (primary MCL)	2350 mg/L (recommended SMCL)	2350 mg/L (recommended SMCL)	5700 mg/L (recommended SMCL)
2. Whole House Replacement Water Supply	10 mg/L (primary MCL)	52500 mg/L (upper SMCL)	52500 mg/L (upper SMCL)	5700 mg/L (recommended SMCL)

*Levels for defining affected wells for TDS are based on the recommended SMCL of 500 mg/L plus a 40 percent increase to account for upgradient sources, as described in findings 18 through 22. Levels for defining affected wells for chloride and sulfate for drinking and cooking supply are based on the recommended SMCLs plus a 40 percent increase to account for upgradient sources of those constituents as described in findings 24, 25 and 27. For whole house replacement water for chloride and sulfate, levels are based on the mid-point between the recommended and upper limit SMCL (i.e., 375 mg/L), plus a 40 percent increase, as described in findings 25, 26 and 27.

III. DRINKING AND COOKING REPLACEMENT WATER SUPPLY AND NOTIFICATIONS

- A. Within **14 days** of this Amended Order 4 being issued, the Dischargers shall supply uninterrupted replacement water for drinking and cooking purposes (defined as commercially available bottled water or equivalent) to users of affected wells where the most recent available data¹⁵ shows concentrations for constituents of concern **at or above** the limits in Table 3, row 1. Pursuant to California Water Code section 13304(f), replacement water "shall meet all applicable federal, state, and local drinking water standards, and shall have comparable water quality to that pumped by the public water system or private well owner before the discharge of waste."

¹⁵ For the purposes of this Amended Order 4, such data may include analytical results from sampling conducted by the Dischargers pursuant to this Order, other Water Board Orders or voluntary sampling efforts; or data collected by local, state, or federal agencies that have been made available to the Dischargers.

- B.** Within **5 business days** of receiving a future laboratory report identifying newly affected well(s) defined by Order II, above, and according to the limits in Table 3, row 1, the Dischargers shall supply uninterrupted replacement water for drinking and cooking purposes to users of such affected wells.
- C.** Within **2 business days** of providing replacement water to affected well users as required in III. A and III. B above, the Dischargers shall provide Water Board staff via email the following information:
1. The well number and location of any identified affected wells. Domestic well numbers shall be the same as those used by PG&E in its monitoring reports submitted in compliance with ATU WDRs;
 2. The date bottled water was first supplied;
 3. The bottled water supplier name; and
 4. A copy of the laboratory report indicating concentrations of constituents in the domestic well(s) at or above the limits shown in Table 3.

IV. WHOLE HOUSE REPLACEMENT WATER SUPPLY PLAN AND IMPLEMENTATION SCHEDULE

A. Within **30 days of this Amended Order 4 being issued**, the Dischargers must submit a workplan to provide whole house replacement water supply for all indoor domestic uses¹⁶ for all currently affected domestic wells, based on most recent data, and for future affected domestic wells. Whole house replacement water may be met by providing household point-of-entry systems, or point-of-use systems such as filters, reverse osmosis units, or other effective means to ensure that non-health-based nuisance effects¹⁷ are abated to the satisfaction of the user. Affected domestic wells eligible for whole house replacement water are those with water quality concentrations **at or above** the limits shown in Table 43, row 2. Pursuant to California Water Code section 13304(f), replacement water provided for drinking and cooking purposes "shall meet all applicable federal, state, and local drinking water standards, and shall have comparable water quality to that pumped by the public water system or private well owner before the discharge of waste." The workplan shall include the following:

1. An evaluation of at least three different methods to provide whole house replacement water supply;
2. A discussion on the feasibility and timing to implement each method including the needs for permits, approvals, and environmental analysis;
3. An evaluation of the quantity of water (gallons per minute) that can be provided by each method compared with typical individual household supply needs for all indoor uses;
4. An evaluation of the quality of water for drinking and cooking purposes that can be provided by each method in comparison to California primary and secondary drinking water standards (MCLs and SMCLs);
5. For any proposed point-of-use filters, reverse osmosis systems, or other methods to abate nuisance non-health-based effects, provide documentation that the proposed method is designed to be effective for such use;

¹⁶ Indoor domestic uses include drinking, food preparation and cooking, bathing, washing, toilet flushing, laundry, dishwashing, and garbage disposal.

¹⁷ Such effects include appliance corrosion, scaling, sedimentation, and laundry staining.

6. An analysis of wastes that may be generated by each method, disposal options, costs, and an analysis of potential byproducts in groundwater created by each method. For example, reverse osmosis generates salts and potentially other compounds that may further impact groundwater quality;
7. An operation, maintenance, and, replacement plan, such as for filters, equipment, etc., of each evaluated method;
8. A water quality monitoring and reporting plan to verify quality and performance of each evaluated method. The monitoring plan should be designed to verify that replacement water for drinking and cooking purposes meets all applicable federal, state, and local drinking water standards, and that any point-of-use systems proposed to abate nuisance non-health-based effects are functioning to the user's satisfaction;
9. A complete cost analysis including construction, operations, maintenance, and replacement plan of each evaluated method;
10. A contingency plan to ensure uninterrupted replacement water supply in case of problems occurring with the selected method, and
11. A description of how the workplan and recommended method will be presented to the owner(s) and users of the affected well(s).

B. Within 60 days of the Water Board Executive Officer approving in writing the replacement water plan required in Order IV.A, the Dischargers shall provide whole house replacement water supply for all indoor domestic uses for eligible affected well(s). The Dischargers shall report the date that the whole house water system became operable and system monitoring results in its semi-annual reports. If monitoring results indicate the whole house water system component(s) supplying drinking and cooking water are ~~is~~ failing to meet primary and secondary MCLs, the Discharger shall immediately provide bottled water (or its equivalency). The Discharger shall notify the Water Board via email within 5 days of such failure.

C. Within 21 days of identifying a newly affected well eligible for whole house replacement water according to the limits in Table 3, row 2, the Dischargers shall consult with the affected well owner and users regarding which method for whole house replacement water would best fit the individual circumstances of the well owner and users. The Dischargers shall obtain written authorization from the well owner to install the preferred whole house replacement water method.

D. Within 10 days of receiving written authorization from the well owner, the Dischargers shall submit the following information to the Water Board's Executive Officer for acceptance:

1. The written authorization from the well owner for installation of the preferred whole house replacement water supply method, and
2. A schedule for installation and start-up of whole house replacement water at the location of the newly affected well.

E. The Dischargers shall implement the preferred whole house replacement water supply method according to the accepted schedule.

- F. If a domestic well has been removed from affected status based on the requirements in section II.B or II.C, the Discharger shall remove the whole house replacement water system components and restore the property to its original condition, unless the Discharger and homeowner make other arrangements.

V. REPORTING REQUIREMENTS

A. Reports

1. **On ~~June~~ December 15, 2016 and every six months thereafter (~~December~~ June 15 and ~~June~~ December 15 of each year)**, submit a report to Water Board staff containing the following information:
 - a) A transmittal letter summarizing the essential points in each report, including discussions of:
 - i. any violations of this Order found since the last report was submitted, and actions taken or planned for correcting those violations;
 - ii. any newly identified affected wells, and
 - iii. any wells in the affected area that have become inactive since the last reporting period;
 - b) A table showing results for all domestic wells that have been sampled under this Order, with current data from the reporting period added to previously tabulated historic data. The table shall include a column showing percentage change (increase or decrease) from the previous reporting period. Data shall be tabulated by well numbers that correspond to those used by PG&E in its domestic well sampling under the ATU WDRs. The table shall include sampling results for all constituents for each well sampled, and be compared to levels for all constituents shown in Table 3;
 - c) A table of all properties that have been provided replacement water supply, including well numbers and type of replacement water supplied (i.e., whole house supply or for drinking and cooking);
 - d) Any newly identified affected well including its number and location, the method used to provide replacement water supply if for whole house use, the date replacement water was first provided, and evidence that water supply meets state primary and secondary drinking water standards (or MCLs);
 - e) For all domestic wells sampled, wells owners shall be provided with letters notifying them of the sampling results. The letters shall compare current sampling results to state and federal MCLs or SMCLs, and criteria to determine affected wells for replacement water shown in Table 3. Notification letters must include a clear tabulation of analytical results of current and historical data. The Dischargers shall include copies of all notification letters in the report;
 - f) Describe and provide evidence if a well owner did not permit the Dischargers to sample their well or accept replacement water supply. Include the date, time, and manner of communication, and number of attempts to contact the well owner, or to seek permission to sample their well, or to provide whole house replacement water or bottled water;

- g) Describe all actions completed during the reporting period, including monitoring and maintenance of whole house replacement water systems;
- h) Describe any problems that have occurred and how and when they were corrected or remedied. For instance, if sampling monitoring indicates that alternate water supply does not meet federal and state drinking water standards or consumer acceptance for non-health based nuisance impacts, describe what corrective actions were implemented to fix the problem;
- i) An appendix of laboratory data sheets, including quality assurance and quality control results, chain of custody sheets, laboratory certification, method summaries, and sample results;
- j) Should the Dischargers sample any well or analyze any result more frequently than required by this Order, include the results for the parameters and locations specified in this Order, and
- k) All reports shall include the signature and stamp of a California licensed professional geologist or civil engineer verifying statements in the report, laboratory and other sampling results, and work conducted.

B. Required Maps

1. All maps shall have a font size of no less than 9 points and show the following information: scale, legend, street names, affected area boundaries and all sampling locations. The following maps shall be included in each report:
 - a) A map showing sampling results from domestic wells for each constituent analyzed, and;
 - b) Map(s) symbolizing the status of each domestic well in the revised affected area. Separate symbols shall be used to indicate the status of each well for the reporting period:
 - i. not sampled;
 - ii. sampled, and not affected for any constituent of concern under this Order;
 - iii. newly identified as affected for reporting period;
 - iv. previously identified as affected and receiving bottled water, or
 - v. previously identified as affected and receiving whole house water.

C. Geotracker and Hardcopy Submittals

1. Reports, workplans, maps and other documents submitted pursuant to this Order shall be uploaded to the State Water Resources Control Board's Geotracker database, within **one** business day of the report due date, so that reports can be viewed by the public at the link:
https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL0607171020.
If report appendices are uploaded as separate files, the appendix number or letter shall be included in the file name.
2. Any report, workplan, map, or other documents submitted pursuant to this Order containing maps, figures or tables larger than 11" X 17" must be submitted in hardcopy to the South Lake Tahoe and Victorville offices of the Lahontan Regional Water Quality Control Board:

Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150

Lahontan Regional Water Quality Control Board
14440 Civic Drive, Suite 200
Victorville, CA 92392

VI. GENERAL PROVISIONS

- A. Laboratory Qualifications.** All samples must be analyzed by California Environmental Laboratory Accreditation Program-certified laboratories using methods approved by the USEPA for the type of analysis to be performed. All water sample analyses shall utilize the most recent testing methods.
- B. Reporting of Changed Owner or Operator.** The Dischargers must notify the Water Board of any changes in occupancy or ownership associated with the property described in this Order.
- C. Certifications for all Plans and Reports.** All technical and monitoring plans and reports required in conjunction with this Order are required pursuant to Water Code section 13267 and shall include a statement by the Dischargers, or an authorized representative of the Dischargers, certifying under penalty of perjury in conformance with the laws of the State of California that the workplan and/or report is true, complete, and accurate. Maps, hydrogeologic reports and engineered plans shall be prepared or directly supervised by, and signed and stamped by a Professional Geologist or Civil Engineer, respectively, registered in California. It is expected that all interpretations and conclusions of data in these **documents** will be truthful, supported with evidence, and there will be no attempts to mislead by false statements, exaggerations, deceptive presentation, or failure to include essential information.
- D. Duty to Submit Other Information.** When the Dischargers becomes aware that it has failed to submit any relevant facts in any report required under this Order, or submitted incorrect information in any such report, the Discharger shall promptly submit such facts or information to the Water Board.
- E. No Limitation of Water Board Authority.** This Order in no way limits the authority of this Water Board to institute additional enforcement actions or to require additional investigation and cleanup of the site consistent with the Water Code. This Order may be revised by the Water Board's Executive Officer as additional information becomes available.
- F. Enforcement.** Failure to comply with the requirements, terms, or conditions of this Order will result in additional enforcement action that may include the imposition of administrative civil liability pursuant to California Water Code sections 13268 and 13350, or referral to the **Attorney** General of the State of California for civil liability or injunctive relief. The Water Board reserves its rights to take any enforcement action authorized by law. Findings and requirements that are in Cleanup and Abatement Order Nos. R6V-2008-0034, R6V-2008-0034A1, R6V-2008-0034A2 and R6V-2008-0034A3 that are not revised by this Amended Order 4 remain in effect.

G. Right to Petition. Any person aggrieved by this action of the Lahontan Water Board may petition the State Water Resources Control Board (State Water Board) to review the action in **accordance** with Water Code section 13320 and California Code of Regulations, title 23, section 2050 and following. The State Water Board shall receive the petition by 5:00 p.m., 30 days after the date this Order is issued, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition shall be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

Patty Z. Kouyoumdjian
Executive Officer

Date

Attachment 1: Location Map and Affected Area



