

Central Valley Regional Water Quality Control Board

23 July 2013

NOTICE OF VIOLATION

Alan E. White
Vintage Production California LLC
9600 Ming Avenue, Suite 300
Bakersfield, CA 93311

CERTIFIED MAIL
7012 2920 0000 1430 1127

REVIEW OF VINTAGE PRODUCTION CALIFORNIA LLC RESPONSE TO SECTION 13267 ORDER, SILL 2-14H WELL DRILLING SUMP

On 8 March 2013, Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff (Staff) viewed a video on the internet at <http://www.youtube.com/watch?v=mx671gbmkY> showing fluid discharging to an unlined oilfield surface impoundment (sump) near Shafter in Kern County. Next to the sump is a well drilled and operated by Vintage Production California, LLC (Vintage) and identified as the Sill 2-14H well (Well). The video shows that the Well had been completed as evidenced by the "Christmas Tree" on the Well head. Vintage subsequently confirmed in a telephone conversation with Staff that the fluids discharged to the sump in the video were from the Well.

On 4 April 2013, the Executive Officer of the Central Valley Water Board issued an order, pursuant to section 13267 of the California Water Code (Order), to Vintage. The Order required Vintage to submit technical information by 6 May 2013.

On 6 May 2013, Staff received a technical report entitled *Response to CVRWQCB Section 13267 Directive Vintage Sill 2-14H Well Drilling Sump Shafter, California* (Response). On 19 June 2013, Vintage submitted a second technical report entitled *Supplemental Report Response to CVRWQCB Section 13267 Directive Vintage Sill 2-14H Well Drilling Sump Shafter, California* (Supplemental Report).

Staff's comments on the Response and Supplemental Report are presented in the enclosed memorandum. Staff has identified the following information:

1. Assuming previously discharged fluids were present in the Sill 2-14H sump from 1 October through 5 October 2012, discharged fluids (fresh water, three to four percent potassium chloride (KCl) water, formation fluids, and linear fluid) would have been present in the sump for at least 12 days during the period from 30 September until 11 October 2012.
2. The volume of KCl water, formation fluids, and linear fluid discharged to the Sill 2-14H sump on 30 September 2012 and from 6 October through 8 October 2012 ranges from 89 to 175 barrels (3,738 to 7,350 gallons).

3. Staff became aware of the video of the Sill 2-14H sump about 20 weeks after the sump was closed by Vintage. Therefore, Staff inspected and sampled a similar Vintage drilling sump, the Betty Boop 32H sump, in the Rose Oil Field. The analytical results of selected constituents in the fluid from the Betty Boop 32H sump are in Table 1 of the memorandum. The analytical results indicate: (a) specific conductance, chloride, and boron levels significantly exceed their respective numerical limits in the *Water Quality Control Plan for the Tulare Lake Basin*, Second Edition, revised January 2004 (Basin Plan); and, (b) benzene, total petroleum hydrocarbons (TPH) in the gasoline range, and TPH in the diesel range exceed their respective maximum contaminant level in drinking water. Staff believes the analytical results of fluid in the Betty Boop 32H sump are representative of the fluid that was in the Sill 2-14H sump. This conclusion is consistent with information provided by Vintage in its Response and Supplemental Report.

Vintage discharged KCl water, formation fluids, and linear fluid to an unlined sump in violation of the Waiver Resolution condition that the discharge consists of only "drilling muds/boring wastes." This discharge is a violation of California Water Code Article 5 section 13350 which states: *Any person who... (2) in violation of any waste discharge requirement, waiver condition, certification, or other order or prohibition issued, reissued, or amended by a regional board or the state board, discharges waste, or causes or permits waste to be deposited where it is discharged, into the waters of the state, or (3) causes or permits any oil or any residuary product of petroleum to be deposited in or on any of the waters of the state, except in accordance with waste discharge requirements or other actions or provisions of this division, shall be liable civilly, and remedies may be proposed, in accordance with subdivision (d) or (e).*

If you have any questions, please contact Douglas Wachtell at (559) 445-5114 or by e-mail at dwachtell@waterboards.ca.gov.



DANE S. JOHNSON
Senior Engineering Geologist
PG No. 4239

Enclosure: Memorandum

cc: Julie Macedo, Office of Enforcement, State Water Resources Control Board, Sacramento
Burton Ellison, California Division of Oil, Gas, and Geothermal Resources, Bakersfield
Kern County Environmental Health Services Department, Bakersfield

Central Valley Regional Water Quality Control Board

TO: Douglas K. Patteson *DKP*
Supervising Engineer

Dane S. Johnson *DSJ*
Senior Engineering Geologist

FROM: Douglas L. Wachtell *Douglas L. Wachtell*
Engineering Geologist
PG No. 6689

DATE: 23 July 2013

SUBJECT: REVIEW OF VINTAGE PRODUCTION CALIFORNIA LLC RESPONSE TO SECTION 13267 ORDER, SILL 2-14H WELL DRILLING SUMP, KERN COUNTY

On 4 April 2013, the Executive Officer of the Central Valley Regional Water Quality Control Board (Central Valley Water Board) issued a Section 13267 Order to Vintage Production California LLC (Vintage). The Order required Vintage to submit by 6 May 2013 technical information for the discharge of liquid wastes to a sump at an oil well drilled near Shafter in Kern County.

The Order names the well as the "Sill 2H-14". However, the permitted name with the California Division of Oil, Gas, and Geothermal Resources is the Sill 2-14H well (Well) which is in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 14, T28S, R25E, MDB&M.

On 6 May 2013, Central Valley Water Board staff (Staff) received a technical report entitled *Response to CVRWQCB Section 13267 Directive Vintage Sill 2-14H Well Drilling Sump Shafter, California* (Response). On 19 June 2013, Vintage submitted a second technical report entitled *Supplemental Report Response to CVRWQCB Section 13267 Directive Vintage Sill 2-14H Well Drilling Sump Shafter, California* (Supplemental Report). Both technical reports were prepared by BSK Associates on behalf of Vintage.

The Response states the sump was constructed on 21 July 2012. Drilling of the Well began on 12 August 2012. A total drilled depth of 11,685 feet (true vertical depth of 8,036 feet) was reached on 15 September 2012. On 9 October 2012, the Well was placed on production.

Drilling Fluid

The initial discharge of drilling fluid to the sump occurred on 12 August 2012. The drilling fluid consisted of a mixture of water, drilled solids, added minerals, formation connate water, and formation hydrocarbons. Beginning at a depth of 5,600 feet, the drilling fluid contained between 6 and 10 percent (%) crude oil. Excluding formation fluids entering the borehole, the total volume of drilling fluid discharged to the sump was 27,757 barrels. This included 1,783 barrels of drill cuttings; 2,714 barrels of additives; and, 23,250 barrels (976,500 gallons at 42 gallons per barrel) of fresh water.

There were 25 different additives in the drilling fluid that combined were 9.81% of the total volume discharged to the sump. The two largest additives, barite and gel (bentonite clay) were 8.57% of the total volume. Five drilling fluid additives, constituting about 0.20% of the total volume, have unidentified chemical ingredients or proprietary ingredients protected by trade secret.

KARL E. LONGLEY ScD, P.E., CHAIR | PAMELA C. CREEDON P.E., BCCE, EXECUTIVE OFFICER

On 18 September 2012, 175 barrels of potassium chloride (KCl) water was pumped into the Well to displace drilling fluid into the sump. This is considered by Staff to be the last day that drilling fluid was discharged to the sump.

The discharge of "drilling muds/boring wastes" (drilling fluid) to an unlined sump during the drilling phase is conditionally waived by General Waiver Resolution R5-2008-0182 (Waiver Resolution).

Discharges from Pressure Testing

On 29 September and 30 September 2012, surface lines were pressure tested. After the tests, the pressure in the lines was slowly released and fluid discharged to the sump. The Supplemental Report states that the fluid discharged each day to the sump was less than 10 barrels of fresh water from the City of Shafter.

On 6 October 2012, the well head and surface lines were depressurized after a pressure test and formation fluid flowed into the sump, as depicted in the video. Later in the video, KCl water was released from lines after another pressure test and discharged into the sump. The Supplemental Report states that one barrel of formation fluid and one barrel of KCl water were discharged to the sump.

Discharges of "Linear Fluid"

The Supplemental Report states "linear fluid" is a mixture of fresh water, 4% KCl water, and four additives. The additives with their chemical ingredients are: (1) a gelling agent with guar gum, 1-butoxy-2-propanol, ethoxylated isotridecanol, paraffinic petroleum distillate, and petroleum distillates; (2) a biocide with glutaraldehyde; (3) a surfactant with methanol, a mixture of surfactants protected by trade secret, and water; and, (4) a 'breaker' with hemicellulase enzyme concentrate. The additives are four of the nine fluid components listed in the Hydraulic Fracturing Fluid Product Component Information Disclosure at fracfocus.org.

On 30 September 2012, the surface equipment and lines were filled with linear fluid in anticipation of subsequently aborted hydraulic fracturing treatment of the Well. The Supplemental Report states that one barrel of linear fluid discharged to the sump.

On 30 September 2012, Vintage pre-mixed linear fluid in a 120 barrel hydration tank to use for hydraulic fracturing treatment of the Well. Later that day it was determined that the wellhead would have to be repaired causing hydraulic fracturing treatment to be aborted. The linear fluid in the tank could not be used later because of degradation and was discharged to the sump. The Supplemental Report states that, on 30 September 2012, at least 40 barrels and possibly up to 120 barrels of linear fluid was discharged to the sump followed by 40 barrels of fresh water.

Discharges during Hydraulic Fracturing Operations

Hydraulic fracturing treatment of the Well occurred in four stages beginning on 7 October and ending on 8 October 2012. The Response states that 335,958 gallons of fresh water from the City of Shafter was used for hydraulic fracturing treatment and about 98.2% of the hydraulic fracturing fluid and proppant components were either water or sand. The remaining 1.8% consisted of nine chemical components.

At the start of the first of four hydraulic fracturing stages, up to one barrel of KCl water was bled from surface lines and discharged to the sump as the pumps were primed and lines pressurized with linear fluid.

After submission of the Response, Vintage investigated whether small quantities of fracturing fluids were discharged to the sump from surface lines after each fracturing stage. On 24 May 2013, Vintage submitted additional information stating that, on 7 October and again on 8 October 2012, fracturing fluids were discharged to the sump as the pressure was released from the surface lines. The volume discharged to the sump was initially reported at "five barrels or less each day." The Supplemental Report states that a total of

up to nine barrels of linear fluid was discharged to the sump with one barrel discharged four separate times on 7 October 2012 and one barrel discharged five separate times on 8 October 2012.

After the fourth hydraulic fracturing stage ended on 8 October 2012, the surface lines were flushed with up to two barrels of KCl water that was discharged to the sump.

On 9 October 2012, hydraulic fracturing flowback fluid (water, formation fluids, and some of the proppant and additives in the fracturing fluid) from the Well was discharged for one hour into portable tanks. The flowback fluid in the tanks was transported to oil field production processing facilities.

Use of the word "linear fluid" by Vintage first occurs in the Supplemental Report. Linear fluid appears to be similar to and could be nearly identical to hydraulic fracturing fluid. Excluding water and KCl water, the Supplemental Report only identifies four components in linear fluid that are also reported as components of hydraulic fracturing fluid to fracfocus.org. The other five of the nine (excluding water and the proppants) components reported to fracfocus.org are in hydraulic fracturing fluid but not in the linear fluid.

Sump Closure

Sump closure began on 4 October 2012 and was completed on 18 October 2012. Appendix B of the Response is a sump closure report prepared by Soli-Bond Inc. A photograph in the sump closure report shows fluid visible in the sump on 10 October 2012. The cuttings and fluids in the sump were solidified and chemically stabilized using the Soli-Bond process. Another photograph in the closure report shows on 16 October 2012 that the sump appears to be dry. A third photograph shows that on 18 October 2012, the sump is backfilled to the existing grade with a reported three to four feet of compacted native soil.

Appendix B of the Response includes an indoor lysimeter study of the effect of percolating water on the movement of chloride through bentonite material treated using undisclosed concentrations of the proprietary Soli-Bond chemical agent. The results demonstrated a 50% reduction in the amount of chloride leached.

STAFF COMMENTS

The Order required submission of technical information by 6 May 2013. Vintage submitted the technical information on 6 May 2013. All information required was submitted. Additional information regarding the volume and chemical characteristics of all materials discharged to the sump was submitted in the Supplemental Report received on 19 June 2013.

Fresh water, KCl water, formation fluids, and linear fluid were discharged to the sump on four days: 30 September, 6 October, 7 October, and 8 October 2012. A photograph in the sump closure report shows a significant amount of fluid visible in the sump mid-day on 10 October 2012 and, therefore, fluid would likely have been present in the sump early on 11 October 2012. Assuming previously discharged fluids were present in the sump from 1 October through 5 October 2012, discharged fluids (fresh water, KCl water, formation fluids, and linear fluid) would have been present in the sump for at least 12 days during the period from 30 September until 11 October 2012.

On 30 September 2012, one barrel of linear fluid was discharged from surface lines to the sump. On 30 September 2012, from 40 to as many as 120 barrels of linear fluid were discharged from a tank to the sump, followed by 40 barrels of fresh water used to rinse the tank. One barrel of formation fluids and one barrel of KCl water were discharged to the sump on 6 October 2012. From ½ to one barrel of KCl water and from two to four barrels of linear fluid were discharged to the sump on 7 October 2012. From 2½ to five barrels of linear fluid and one to two barrels of KCl water were discharged to the sump on 8 October 2012. The volume of KCl water, formation fluids, and linear fluid discharged to the sump ranges from 89 (3,738 gallons) to 175 barrels (7,350 gallons).

Betty Boop 32H Sump

Staff became aware of the video of the Sill 2-14H sump about 20 weeks after the sump was closed by Vintage; and, as a result, Staff was unable to inspect and sample the sump. Therefore, on 14 March 2013, Staff asked Vintage to identify where the company was currently drilling a well or wells and using a sump similar to the Sill 2-14H sump. Vintage replied that the Betty Boop 32H well had just been drilled in the Rose Oil Field. On 21 March 2013, the day after Vintage completed hydraulic fracturing treatment of the Betty Boop 32H well, Staff inspected and collected samples of the fluid in the sump. The analytical results for selected constituents in the fluid are in Table 1:

TABLE 1
ANALYTICAL RESULTS FOR SELECTED CONSTITUENTS IN THE BETTY BOOP 32H SUMP

Constituent	Analytical Result (mg/L)	Basin Plan Numerical Limit (mg/L)	Analytical Result (µg/L)	MCL ¹ (µg/L)
Specific Conductance (EC)	20,000 ²	1,000 ²		900 ²
Total Dissolved Solids (TDS)	14,000			500,000 ⁴
Chloride	5,100	200		250,000 ⁴
Boron	23	1		1,000 ⁵
Benzene			32	1
Toluene			61	150
Ethylbenzene			23	300
Xylenes, Total			68	1,750
TPH ³ , gasoline range (TPHg)			4,800	100 ⁴
TPH ³ , diesel range (TPHd)			3,000	100 ⁴

¹ Maximum Contaminant Level (MCL)
² Units for EC are micromhos per centimeter (µmhos/cm)
³ Total Petroleum Hydrocarbons (TPH)
⁴ Secondary taste and odor MCL in µg/L for TDS, chloride, TPHg, and TPHd in drinking water
⁵ California Department of Public Health Notification Level in µg/L for boron in drinking water

The numerical limits in Table 1 are from the *Water Quality Control Plan for the Tulare Lake Basin, Second Edition*, revised January 2004 (Basin Plan) and are the maximum concentration limits for EC, chloride, and boron in oilfield wastewater discharges to unlined impoundments. The Maximum Contaminant Level (MCL) in drinking water for EC, TDS, chloride, boron, and the BTEX constituents are also in Table 1.

The analytical results of fluid collected by Staff from the Betty Boop 32H sump indicates: (1) EC, chloride, and boron levels significantly exceed their respective numerical limits in the Basin Plan; and, (2) benzene, TPHg, and TPHd exceed their respective MCL in drinking water. Staff believes the analytical results of fluid in the Betty Boop 32H sump are representative of the fluid that was in the Sill 2-14H sump. This conclusion is consistent with information provided by Vintage in its Response and Supplemental Report.

CONCLUSION

Vintage discharged KCl water, formation fluids, and linear fluid to the sump in violation of the Waiver Resolution condition that the discharge consists of only "drilling muds/boring wastes." The discharge is a violation of California Water Code (CWC) Article 5 section 13350 which states: *Any person who... (2) in violation of any waste discharge requirement, waiver condition, certification, or other order or prohibition issued, reissued, or amended by a regional board or the state board, discharges waste, or causes or permits waste to be deposited where it is discharged, into the waters of the state, or (3) causes or permits any oil or any residuary product of petroleum to be deposited in or on any of the waters of the state, except in accordance with waste discharge requirements or other actions or provisions of this division, shall be liable civilly, and remedies may be proposed, in accordance with subdivision (d) or (e).*