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18 January 2018
18-ED-009

Mr. Matt Cogburn
Planning and Management Division
Oklahoma Water Resources Board
3800 North Classen Boulevard
Oklahoma City, OK 73118

Oklahoma Water Resources Board

CONCRETE
SAND & GRAVEL
STONE
BLOCK
MASONRY

RE: Water Monitoring Plan Report, 4th Quarter 2017 and 2017 Annual Summary, for Dolese Bros. Co. Davis Quarry, Murray County, Oklahoma

Dear Mr. Cogburn:

According to the Oklahoma Water Resources Board's Title 785, Chapter 30, Subchapter 15, Part 4, *Mines with Preexisting Exemptions*, Dolese Bros. Co. Davis Quarry qualifies as a mine with a preexisting exemption. As part of maintaining this exemption status, the regulations require us to do the following:

1. Adopt and implement a plan to monitor and report to the Board the accumulation and disposition of pit water during the previous calendar year;
 - The Davis Quarry has adopted and implemented such a plan, and the tables below serve to report to the Board the accumulation and disposition of pit water during the 4th Quarter 2017 and for Year 2017.
2. Make quarterly and annual reports of the measured or reasonably estimated groundwater and surface water volumes, separately stated, entering the pit, of the water that is diverted from the pit, of the disposition of the water from the pit, and of the consumptive use of the water from the pit on or before the deadlines provided by Title 82 of Oklahoma Statutes, § 1020.2(E)(1);
 - The Davis Quarry has continued to fulfill this obligation by compiling and submitting this 4th Quarter 2017 Report and 2017 Annual Summary. The specific information requested in this section is outlined in the tables shown below
3. At any time after March 31, 2015, demonstrate to the satisfaction of the Board within the pertinent report or reports that the mine has not consumptively used during the previous twelve-month period, from the mining site, an amount of groundwater which combined with any amounts used from permitted groundwater wells exceeds the MEPS¹. Such demonstration may require providing to the Board a copy of the mine's monitoring plan and all of the data collected and procedures used to support the calculations and results reported.
 - After 31 March 2015, the Davis Quarry will be willing to demonstrate to the Board that the mine site has not consumptively used during the previous twelve-month period from the mining site, an amount of groundwater which combined with any amounts used from permitted groundwater wells exceeds the MEPS. Example calculations used in the First Quarterly Monitoring Report for 2013 have already been submitted to the OWRB for review and analysis.

¹ Mine's Equal Proportionate Share

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Below, in Tables 1, 2, and 3, is shown the 4th Quarter 2017 summary data collected at the Davis Quarry.

Table 1

Accumulation & Disposition of Pit Water during 4th Quarter 2017

	<u>Groundwater</u> Acre-Feet	<u>Surface Water</u> Acre-Feet	<u>Total</u> Acre-Feet
Water Entering The Mine Pit	170.20	15.95	186.15
Water Diverted From The Mine Pit Into Fresh Water Lake	170.20	15.95	186.15
Water Removed From Fresh Water Lake	663.86	103.17	767.03
Water Returned To Fresh Water Lake	608.67	94.59	703.26
Water Returned To Land Surface Overlying ASA² Basin	178.79	27.79	206.58
Water Consumptively Used	23.90	(See Table 3 for Calculations)	

Table 2

Water Fluctuations of Fresh Water Lake during 4th Quarter 2017

Average Size of Lake	31.79 acres
Loss in Water Elevation	1.05 feet
Loss in Lake Volume	33.38 acre-feet

Table 3

Consumptive Use Summary for 4th Quarter 2017

	<u>Amount of Pit Water Used,</u> Acre-Feet	<u>Percent Groundwater Content</u>	<u>Groundwater Component,</u> Acre-Feet
1 North Water Well	0.00	All	0.45
2 South Water Well	0.00	All	1.69
3 Material Moisture Hauled from Site	4.71	86.55%	4.08
4 Land Application for Roadway Dust Suppression	20.38	86.55%	17.64
5 Evaporation from Mine Pit	0.04	91.43%	0.04
6 Offsite Dewatering	0.00	86.55%	0.00

For 4th Quarter 2017,
Total Groundwater Consumption from ASA at Davis Quarry = 23.90 Acre-Feet

² Arbuckle Simpson Aquifer

Below, in Tables 4, 5, and 6, please find the 2017 Annual Summary data collected at the Davis Quarry.

Table 4
Accumulation & Disposition of Pit Water during 2017

	<u>Groundwater</u> Acre-Feet	<u>Surface Water</u> Acre-Feet	<u>Total</u> Acre-Feet
Water Entering The Mine Pit	496.23	479.29	975.52
Water Diverted From The Mine Pit Into Fresh Water Lake	496.23	479.29	975.52
Water Removed From Fresh Water Lake	1589.95	2056.23	3646.18
Water Returned To Fresh Water Lake	1498.89	1976.89	3475.78
Water Returned To Land Surface Overlying ASA Basin	319.22	320.10	639.32
Water Consumptively Used	188.83	(See Consumptive Use Summary in Table 6)	

Table 5
Water Fluctuations in Fresh Water Lake during 2017

Average Size of Lake	32.04 acres
Gain in Water Elevation	0.61 feet
Gain in Lake Volume	19.54 acre-feet

Table 6
Consumptive Use Summary for 2017

Activity or Location	Groundwater Component, Acre-Feet
1 North Water Well	2.01
2 South Water Well	4.83
3 Material Moisture Hauled from Site	8.75
4 Land Application for Roadway Dust Suppression	40.50
5 Evaporation from Mine Pit	2.58
6 Offsite Dewatering	130.17
For Calendar Year 2017,	
Total Groundwater Consumption from ASA at Davis Quarry = 188.83 Acre-Feet	

Below, in Table 7, please find the Groundwater Rights Summary for the Davis Quarry.

Table 7

Summary of Groundwater Rights for Davis Quarry

From Acreage on the Arbuckle-Simpson Aquifer And Included in the ASA Groundwater Rights (1,196 acres on ASA)*(0.2 ac-ft/acre) = 239.2 acre-feet on the ASA
From Acreage off the Arbuckle-Simpson Aquifer And Excluded from the ASA Groundwater Rights (812 acres off ASA)*(2.0 ac-ft/acre) = 1,624 acre-feet off the ASA

Based on the plan that we have adopted and implemented to monitor and report the accumulation and disposition of pit water, based on our actual consumptive use of groundwater quantities, and based on the timely submittal of all reports including this 4th Quarter Report for 2017, we believe that the Davis Quarry is in full compliance with all of the regulations that allow us to maintain its preexisting exemption.

General Information

Our calculations show that Davis Quarry's total estimated groundwater consumption for 2017 was 188.83 acre-feet. Annually, the Davis Quarry site has 239.2 acre-feet of groundwater rights available over the ASA, but our total available water rights for this site could also include other unused groundwater rights of significant quantity that we have at another site that overlies the ASA in Murray County.

Below are listed the groundwater consumptive use figures reported for the last few years—

- 2013: Used 36.25 acre-feet of groundwater, or 16.7% of Davis Quarry's EPS.
- 2014: Used 61.66 acre-feet of groundwater, or 28.4% of Davis Quarry's EPS.
- 2015: Used 180.33 acre-feet of groundwater, or 83% of Davis Quarry's EPS.
- 2016: Used 183.81 acre-feet of groundwater, or 84.9% of Davis Quarry's EPS.
- 2017: Used 188.83 acre-feet of groundwater, or *78.94% of Davis Quarry's EPS.

**The EPS increased during 2017 because of the purchase of additional land at the facility.*

The amount of groundwater shown that we consumed during 2017 equates to approximately 79% of our Equal Proportionate Share (EPS) at this facility. In order to better understand the activities pertaining to this amount of groundwater consumption, it is important to note that nearly 69% of the water consumed was due to offsite dewatering because of high-water conditions at the site during the first three quarters, caused by rainfall. The remaining amount that we consumed throughout the year (31% of the total consumption) pertains to all other consumptive use activities which include usage from two (2) small water wells, material moisture hauled from site, dust suppression waters, and evaporation of Mine Pit water.

The amount of rainfall that we received during each quarter of 2017 varied significantly from quarter to quarter. We received 8.90 inches of rain during the First Quarter, 15.30 inches during the Second Quarter, 17.30 inches during Third Quarter, and 2.0 inches during the Fourth Quarter. Overall, we logged 43.50 inches of rainfall in our rain gauge throughout the year. The estimated quarterly "runoff" estimated to have reached our Mine Pit from these storms was 4.17 inches, 8.57 inches, 8.90 inches, and 0.75 inches; totaling 22.39 inches of storm water runoff for the year.

The calculated percentages of groundwater content in the Fresh Water Lake during each of the quarters are as follows:

- First Quarter, 39.89%
- Second Quarter, 28.05%
- Third Quarter, 29.96%
- Fourth Quarter, 86.55%

The effects of the quarterly rainfall totals on the calculated groundwater percentages of the Fresh Water Lake, shown above, are very apparent. Notice that significant quarterly rainfall amounts, like those during the Second and Third Quarters, cause the groundwater percentages to appear to decrease, and minimal amounts of quarterly rainfall cause the groundwater percentages to appear to increase. It is important to mention that during quarters in which the storm water inflow to the Mine Pit is minimal, like the Fourth Quarter when we only received 2.0 inches of rain and only 0.75 inches of runoff, the calculated percentage of groundwater in the Mine Pit is proportionally exaggerated because we count all of the Fresh Water Lake seepage that returns to the Mine Pit as groundwater - even though it is not. During periods when the quarterly rainfall is substantial, like the Second and Third Quarters, the Fresh Water Lake seepage amount is proportionally less significant—thereby not affecting the groundwater percentage as much.

For a review, here is a recap of the recent annual rainfall amounts at Davis Quarry.

- 2013: Received 34.17 inches
- 2014: Received 36.20 inches
- 2015: Received 77.15 inches
- 2016: Received 40.50 inches
- 2017: Received 43.50 inches

The annual rainfall at Davis Quarry during 2017 was only slightly above the average annual rainfall for Murray County, but it is important to note that over 75% of 2017's rainfall (32.6 inches) was received during the Second and Third Quarters. During these quarters of significant precipitation (including some excess water stored in the First Quarter), we were required to discharge about 130.17 acre-feet of groundwater because our Fresh Water Lake, which serves as our water storage lake, became too full.

We continue to use the least controversial methods (very conservative approach) of calculating groundwater concentrations in the Mine Pit and the Fresh Water Lake, even though it causes our calculated groundwater consumption figures to be much higher than we believe they are. We are able to use these conservative assumptions only because we own a significant amount of land in the region, we acquired some additional land during 2017, and we have the necessary water rights available. The primary drawback to using these very conservative assumptions and calculation methods is that we "appear" to be consuming more groundwater than is actually being consumed at our water-efficient operation. However, we hope that our frequent documentation of our assumptions used in these calculations clarify our reported water usage and explain why our reported consumptive groundwater use is so high.

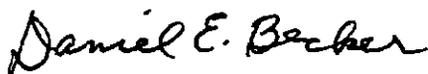
Here are some conservative assumptions that we have always used in our calculations:

- In trying to keep the lower elevations of the Mine Pit (located in the eastern part of the Quarry Area) relatively dry so that our employees can work in this area, we pump most of the rainfall (and any minimal "true" groundwater seepage) from the Mine Pit into our adjacent Fresh Water Lake (FWL) for storage and reuse. If this FWL were water-tight, our water balance calculations would be rather simple and more accurate. However, this lake continually leaks back into the same Mine Pit that we just pumped it from, causing us to pump considerably more water than if the FWL didn't leak. The worst part about this leakage of the FWL is that every gallon that leaks into the mine pit, and that has to be pumped again and again back into the FWL, is all reported as newly infiltrating groundwater—causing our groundwater concentration figures in the FWL to appear to increase significantly above actual levels. Therefore, every gallon that we draw from this lake to use in our operations, or every gallon that we discharge offsite, reflects the higher groundwater concentration and causes our reported groundwater consumption to be artificially higher than actual.
- In the past, we have never claimed any augmentation credits for the discharge of any water to adjacent streams—even though we know this water benefitted downstream users and fish/wildlife during many of the dry times. We simply counted the calculated groundwater portion of the water being discharged as groundwater consumption. The reason that we are not seeking augmentation credits at this time is that the regulations became too complex for us to ensure compliance (e.g., stationing a stream gauge at outfalls, installing monitoring wells near outfalls, and monitoring the daily levels of the receiving streams during each discharge). If we would have accepted augmentation credits, our reported groundwater consumption figures for the last few years would have dropped significantly.

We conclude this report as we did last year by stating the following: Dolese Bros. Co. will continue to manage the waters of the Arbuckle Simpson Aquifer in compliance with all rules and regulations that apply to us. We will continue to analyze our water management techniques to make sure we are utilizing any waters we encounter at our operation as efficiently and appropriately as possible—both during drought periods, and during periods of flooding. We recognize that these water are as important to us as they are to the neighbors in our community.

Please contact me if you have any questions or comments concerning this submittal. Thank you.

Sincerely,
DOLESE BROS. CO



Daniel E. Becker, P.E.
Environmental Engineer

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cc: Mr. Kent Wilkins, Oklahoma Water Resources Board, 3800 North Classen Boulevard,
Oklahoma City, OK 73118