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Oklahoma Water Resources Board

June 27, 2018

Matt Cogburn
Oklahoma Water Resources Board
3800 North Classen Blvd.
Oklahoma City, OK 73118

Subject: Vulcan North Troy Annual Water Report Revisions

Mr. Cogburn,

Attached please find the revised annual water reports for the Vulcan North Troy mine site for 2015, 2016 and 2017. The revision are being submitted to update the actual precipitation watershed area for the mine. In addition the revisions account for stormwater storage from one calendar year to the next, the evaporation associated and clarify water augmented to the creek.

If you have further questions please feel free to contact us.

Sincerely,

Eddie Saucedo

Eddie Saucedo
Environmental Services Manager
Vulcan Materials Company

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Report 2017
 North Troy Quarry
 Mill Creek, OK
 Vulcan Materials Company

Oklahoma Water Resources Board

2017 ANNUAL REPORT

VMC North Troy 2017 Monitoring Report

All volumes are in acre-feet.

	Total Stormwater Entering Pit note(a)	Total Groundwater Diverted	Pit Water Sent To Holding Basin	Groundwater Augmentation	Streamwater Augmentation	Defined Elements of Consumptive Use of Pit Water	Streamwater Pumped From Mill Creek	Groundwater Pumped From Wells	Total Annual Groundwater Allocation, Ac-R
January-17	277.09	28.74	247.35	18.29	260.75	0.00	0.00	0.00	219.50
February-17	304.86	29.46	275.40	33.48	276.37	0.00	0.00	0.00	219.50
March-17	292.89	9.57	283.11	44.56	220.27	30.35	0.00	0.00	219.50
1st QTR Totals	874.83	68.77	805.06	96.33	757.39	30.35	0.00	0.00	N/A
April-17	309.30	23.36	284.94	9.02	304.77	0.00	0.00	0.00	219.50
May-17	363.93	137.23	216.70	46.74	263.71	45.88	0.00	0.00	219.50
June-17	383.12	18.36	364.76	49.96	341.65	0.00	0.00	0.00	219.50
2nd QTR Totals	1046.36	178.95	866.40	105.72	910.12	45.88	0.00	0.00	N/A
July-17	387.42	64.68	322.74	0.00	389.70	0.00	0.00	0.00	219.50
August-17	397.02	61.98	335.04	40.17	362.59	0.00	0.00	0.07	219.50
September-17	379.87	32.38	347.49	32.16	313.45	36.43	0.00	0.00	219.50
3rd QTR Totals	1164.31	159.05	1005.26	72.33	1095.74	36.43	0.00	0.07	N/A
October-17	384.79	12.24	372.55	34.59	356.69	0.00	0.00	0.00	219.50
November-17	340.88	0.00	340.88	45.51	224.88	72.46	0.00	1.40	219.50
December-17	333.86	13.10	320.76	30.01	307.84	0.00	0.00	0.00	219.50
4th QTR Totals	1069.33	25.35	1033.98	110.11	889.41	72.46	0.00	1.10	219.50
2017 Totals	4143.62	432.11	3711.51	384.49	3622.66	185.12	0.00	2.57	219.50
2017 Total (adj)	4143.62	432.11	3711.51	384.49	3622.66	185.12	0.00	2.57	219.50

1st Qtr notes
 2nd Qtr notes
 3rd Qtr notes
 4th Qtr notes

(a) Total Stormwater = Volume of precipitation that falls into producing mine pit and volume of precipitation that falls onto producing mine and flows over the land surface into the mine pit.
 (adj) Annual total adjustment for stormwater carried over to next calendar year

Water Balance = -480.76 Total Net Reported Consumptive Use

Revisions:

06-2018
 Stormwater watershed area revised based on actual pit area
 (adj) adjustment based on stored water
 streamwater augmentation totals revised to show actual augmentation credits
 added notes for definitions

September Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS			
Hydrologic Soil Group	D	Level	Runoff
Land Use	Forest	100	100
AMC Condition	100		
CH (in)	100		
S (in)	100		
P4 Direct Interception (95% E deep)	100.45		
P4 Infiltration (area of area to pit)	100.45		
Damage to P4 (total area)	100.45		

Date	Precip. (in)	Runoff (in)	Quantity and Temp. (in)	Daily
1-Sep	0.00	0.00	0.00	0.00
2-Sep	0.00	0.00	0.00	0.00
3-Sep	0.00	0.00	0.00	0.00
4-Sep	0.00	0.00	0.00	0.00
5-Sep	0.00	0.00	0.00	0.00
6-Sep	0.00	0.00	0.00	0.00
7-Sep	0.00	0.00	0.00	0.00
8-Sep	0.00	0.00	0.00	0.00
9-Sep	0.00	0.00	0.00	0.00
10-Sep	0.00	0.00	0.00	0.00
11-Sep	0.00	0.00	0.00	0.00
12-Sep	0.00	0.00	0.00	0.00
13-Sep	0.00	0.00	0.00	0.00
14-Sep	0.00	0.00	0.00	0.00
15-Sep	0.00	0.00	0.00	0.00
16-Sep	0.00	0.00	0.00	0.00
17-Sep	0.00	0.00	0.00	0.00
18-Sep	0.00	0.00	0.00	0.00
19-Sep	0.00	0.00	0.00	0.00
20-Sep	0.00	0.00	0.00	0.00
21-Sep	0.00	0.00	0.00	0.00
22-Sep	0.00	0.00	0.00	0.00
23-Sep	0.00	0.00	0.00	0.00
24-Sep	0.00	0.00	0.00	0.00
25-Sep	0.00	0.00	0.00	0.00
26-Sep	0.00	0.00	0.00	0.00
27-Sep	0.00	0.00	0.00	0.00
28-Sep	0.00	0.00	0.00	0.00
29-Sep	0.00	0.00	0.00	0.00
30-Sep	0.00	0.00	0.00	0.00
31-Sep	0.00	0.00	0.00	0.00
Sum	0.00	0.00	0.00	0.00

Runoff formula: $P_o = (P-0.25)/2(P+0.85)$
 $S = (1000/CH) \cdot 10$
 Blue cells contain formulae
 Gap data from Sulphur Mesonet

Volume, ac-ft: 0.00

Total Vol, ac-ft: 0.00

Pan Evaporation from Sulphur Mesonet

Pan Evaporation from Sulphur Mesonet

October Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS			
Hydrologic Soil Group	D	Level	Runoff
Land Use	Forest	100	100
AMC Condition	100		
CH (in)	100		
S (in)	100		
P4 Direct Interception (95% E deep)	100.45		
P4 Infiltration (area of area to pit)	100.45		
Damage to P4 (total area)	100.45		

Date	Precip. (in)	Runoff (in)	Quantity and Temp. (in)	Daily
1-Oct	0.00	0.00	0.00	0.00
2-Oct	0.00	0.00	0.00	0.00
3-Oct	0.00	0.00	0.00	0.00
4-Oct	0.00	0.00	0.00	0.00
5-Oct	0.00	0.00	0.00	0.00
6-Oct	0.00	0.00	0.00	0.00
7-Oct	0.00	0.00	0.00	0.00
8-Oct	0.00	0.00	0.00	0.00
9-Oct	0.00	0.00	0.00	0.00
10-Oct	0.00	0.00	0.00	0.00
11-Oct	0.00	0.00	0.00	0.00
12-Oct	0.00	0.00	0.00	0.00
13-Oct	0.00	0.00	0.00	0.00
14-Oct	0.00	0.00	0.00	0.00
15-Oct	0.00	0.00	0.00	0.00
16-Oct	0.00	0.00	0.00	0.00
17-Oct	0.00	0.00	0.00	0.00
18-Oct	0.00	0.00	0.00	0.00
19-Oct	0.00	0.00	0.00	0.00
20-Oct	0.00	0.00	0.00	0.00
21-Oct	0.00	0.00	0.00	0.00
22-Oct	0.00	0.00	0.00	0.00
23-Oct	0.00	0.00	0.00	0.00
24-Oct	0.00	0.00	0.00	0.00
25-Oct	0.00	0.00	0.00	0.00
26-Oct	0.00	0.00	0.00	0.00
27-Oct	0.00	0.00	0.00	0.00
28-Oct	0.00	0.00	0.00	0.00
29-Oct	0.00	0.00	0.00	0.00
30-Oct	0.00	0.00	0.00	0.00
31-Oct	0.00	0.00	0.00	0.00
Sum	0.00	0.00	0.00	0.00

Runoff formula: $P_o = (P-0.25)/2(P+0.85)$
 $S = (1000/CH) \cdot 10$
 Blue cells contain formulae
 OCL Precip
 N. Troy Rain gauge

Volume, ac-ft: 0.00

Total Vol, ac-ft: 0.00

Pan Evaporation from Sulphur Mesonet

Pan Evaporation from Sulphur Mesonet

November Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS			
Hydrologic Soil Group	D	Level	Runoff
Land Use	Forest	100	100
AMC Condition	100		
CH (in)	100		
S (in)	100		
P4 Direct Interception (95% E deep)	100.45		
P4 Infiltration (area of area to pit)	100.45		
Damage to P4 (total area)	100.45		

Date	Precip. (in)	Runoff (in)	Quantity and Temp. (in)	Daily
1-Nov	0.00	0.00	0.00	0.00
2-Nov	0.00	0.00	0.00	0.00
3-Nov	0.00	0.00	0.00	0.00
4-Nov	0.00	0.00	0.00	0.00
5-Nov	0.00	0.00	0.00	0.00
6-Nov	0.00	0.00	0.00	0.00
7-Nov	0.00	0.00	0.00	0.00
8-Nov	0.00	0.00	0.00	0.00
9-Nov	0.00	0.00	0.00	0.00
10-Nov	0.00	0.00	0.00	0.00
11-Nov	0.00	0.00	0.00	0.00
12-Nov	0.00	0.00	0.00	0.00
13-Nov	0.00	0.00	0.00	0.00
14-Nov	0.00	0.00	0.00	0.00
15-Nov	0.00	0.00	0.00	0.00
16-Nov	0.00	0.00	0.00	0.00
17-Nov	0.00	0.00	0.00	0.00
18-Nov	0.00	0.00	0.00	0.00
19-Nov	0.00	0.00	0.00	0.00
20-Nov	0.00	0.00	0.00	0.00
21-Nov	0.00	0.00	0.00	0.00
22-Nov	0.00	0.00	0.00	0.00
23-Nov	0.00	0.00	0.00	0.00
24-Nov	0.00	0.00	0.00	0.00
25-Nov	0.00	0.00	0.00	0.00
26-Nov	0.00	0.00	0.00	0.00
27-Nov	0.00	0.00	0.00	0.00
28-Nov	0.00	0.00	0.00	0.00
29-Nov	0.00	0.00	0.00	0.00
30-Nov	0.00	0.00	0.00	0.00
31-Nov	0.00	0.00	0.00	0.00
Sum	0.00	0.00	0.00	0.00

Runoff formula: $P_o = (P-0.25)/2(P+0.85)$
 $S = (1000/CH) \cdot 10$
 Blue cells contain formulae
 New Precip
 N. Troy Rain gauge

Volume, ac-ft: 0.00

Total Vol, ac-ft: 0.00

Pan Evaporation from Sulphur Mesonet

Pan Evaporation from Sulphur Mesonet

December Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS			
Hydrologic Soil Group	D	Level	Runoff
Land Use	Forest	100	100
AMC Condition	100		
CH (in)	100		
S (in)	100		
P4 Direct Interception (95% E deep)	100.45		
P4 Infiltration (area of area to pit)	100.45		
Damage to P4 (total area)	100.45		

Date	Precip. (in)	Runoff (in)	Quantity and Temp. (in)	Daily
1-Dec	0.00	0.00	0.00	0.00
2-Dec	0.00	0.00	0.00	0.00
3-Dec	0.00	0.00	0.00	0.00
4-Dec	0.00	0.00	0.00	0.00
5-Dec	0.00	0.00	0.00	0.00
6-Dec	0.00	0.00	0.00	0.00
7-Dec	0.00	0.00	0.00	0.00
8-Dec	0.00	0.00	0.00	0.00
9-Dec	0.00	0.00	0.00	0.00
10-Dec	0.00	0.00	0.00	0.00
11-Dec	0.00	0.00	0.00	0.00
12-Dec	0.00	0.00	0.00	0.00
13-Dec	0.00	0.00	0.00	0.00
14-Dec	0.00	0.00	0.00	0.00
15-Dec	0.00	0.00	0.00	0.00
16-Dec	0.00	0.00	0.00	0.00
17-Dec	0.00	0.00	0.00	0.00
18-Dec	0.00	0.00	0.00	0.00
19-Dec	0.00	0.00	0.00	0.00
20-Dec	0.00	0.00	0.00	0.00
21-Dec	0.00	0.00	0.00	0.00
22-Dec	0.00	0.00	0.00	0.00
23-Dec	0.00	0.00	0.00	0.00
24-Dec	0.00	0.00	0.00	0.00
25-Dec	0.00	0.00	0.00	0.00
26-Dec	0.00	0.00	0.00	0.00
27-Dec	0.00	0.00	0.00	0.00
28-Dec	0.00	0.00	0.00	0.00
29-Dec	0.00	0.00	0.00	0.00
30-Dec	0.00	0.00	0.00	0.00
31-Dec	0.00	0.00	0.00	0.00
Sum	0.00	0.00	0.00	0.00

Runoff formula: $P_o = (P-0.25)/2(P+0.85)$
 $S = (1000/CH) \cdot 10$
 Blue cells contain formulae
 Dec. Precip
 N. Troy Rain gauge

Volume, ac-ft: 0.00

Total Vol, ac-ft: 0.00

Pan Evaporation from Sulphur Mesonet

Pan Evaporation from Sulphur Mesonet

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Monthly Water Data, ac-ft

	Water Diverted From Pit	Storm Water Entering Pit	Net Sump Volume Change	Groundwater Sent To Holding Basin	Groundwater Sent To Infiltration Areas	Groundwater Used For Stream Augmentation	Evaporation	Moisture Content of Product Shipped	Water Truck Usage	Misc Pit Water Use On Site	Misc Pit Water Use Off Site	Production Well Permit 2002-502	North Well Permit 20060801A
January-17	277.06	29.74	3.76	18.24	234.80	0.00	0.43	2.50	3.61	0.00	0.00	0.00	0.00
February-17	304.36	29.46	2.07	33.44	271.38	0.00	0.61	3.11	0.86	0.00	0.00	0.00	0.00
March-17	282.86	9.57	2.16	44.56	217.37	30.35	0.92	2.56	0.88	0.00	0.00	0.00	0.00
April-17	304.35	23.36	6.31	6.00	299.35	0.00	1.36	2.84	1.19	0.00	0.00	0.00	0.00
May-17	333.69	137.23	1.77	46.07	291.32	46.06	1.76	3.79	1.23	0.00	0.00	0.00	0.00
June-17	383.72	18.36	-0.65	49.96	336.16	0.00	1.80	3.64	3.78	0.00	0.00	0.00	0.00
July-17	387.42	64.66	1.97	0.00	387.42	0.00	1.94	3.78	5.53	0.00	0.00	0.00	0.00
August-17	307.02	61.98	-2.53	40.37	346.65	0.00	1.50	3.35	7.35	0.00	0.00	0.00	0.00
September-17	319.87	32.38	-1.33	32.16	311.28	34.43	1.38	2.72	4.45	0.00	0.00	0.07	0.00
October-17	354.79	12.24	2.09	34.54	351.30	0.00	1.22	3.98	3.19	0.00	0.00	1.40	0.00
November-17	340.83	0.00	-0.78	45.51	222.31	72.48	0.82	3.19	4.31	0.00	0.00	0.00	0.00
December-17	333.26	13.10	-0.81	30.01	303.83	0.00	0.56	2.80	4.78	0.00	0.00	1.10	0.00

Pit Sump Volumes

	West Sump				505 Sump				New Freshwater Pond								
	Month End Depth-to-Water, Ft	Width, Ft	Length, Ft	Sump Volume Change, Ac-ft	Evaporation, ac-ft	Month End Depth-to-Water, Ft	Width, Ft	Length, Ft	Sump Volume Change, Ac-ft	Evaporation, ac-ft	Month End Depth-to-Water, Ft	Width, Ft	Length, Ft	Pond Volume Change, Ac-ft	Evaporation, ac-ft	Total Evaporation, ac-ft	Evaporation, ac-ft
January-17	14.83	125	325	3.16	0.24	4	50	50	50	0.00	4.28	4.28	750	0.00	0.24	0.24	0.43
February-17	13.64	125	325	2.07	0.24	4	50	50	50	0.00	4.00	4.00	750	0.00	0.30	0.30	0.61
March-17	11.30	125	325	2.18	0.31	4	50	50	50	0.00	2.88	2.88	750	0.00	0.54	0.54	0.92
April-17	17.00	125	325	-6.31	0.41	4	50	50	50	0.00	4.60	4.60	750	0.00	0.50	0.50	0.86
May-17	10.82	125	325	6.77	0.61	4	50	50	50	0.00	5.14	5.14	750	0.00	0.65	0.65	1.11
June-17	17.48	125	325	-0.62	0.63	4	50	50	50	0.00	4.07	4.07	750	0.00	0.68	0.68	1.13
July-17	8.26	125	325	1.87	0.61	4	50	50	50	0.00	3.40	3.40	750	0.00	0.72	0.72	1.23
August-17	12.08	125	325	-2.63	0.43	4	50	50	50	0.00	4.01	4.01	750	0.00	0.53	0.53	0.94
September-17	11.80	125	325	3.33	0.41	4	50	50	50	0.00	3.50	3.50	750	0.00	0.50	0.50	0.86
October-17	11.54	125	325	2.09	0.43	4	50	50	50	0.00	4.33	4.33	750	0.00	0.45	0.45	0.77
November-17	12.08	125	325	-0.74	0.36	4	50	50	50	0.00	3.71	3.71	750	0.00	0.30	0.30	0.52
December-17	12.84	125	325	-0.81	0.26	4	50	50	50	0.00	3.60	3.60	750	0.00	0.21	0.21	0.34

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May Shipments	June Shipments		July Shipments		August Shipments			
	Tons Shipped	Ac-ft of water shipped	Tons Shipped	Ac-ft of water shipped	Tons Shipped	Ac-ft of water shipped		
Base Products	534	0.073	Base Products	681	0.021	Base Products	2,016	0.049
Coarse Aggregates	254,259	3.154	Coarse Aggregates	219,476	2.638	Coarse Aggregates	246,479	2.962
Fine Aggregates	22,569	0.777	Fine Aggregates	30,967	0.984	Fine Aggregates	10,765	0.342
	277,362	3.766		251,304	3.643		259,260	3.354

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September Shipments		October Shipments		November Shipments		December Shipments		
	Tons Shipped	Ac-ft of water shipped	Tons Shipped	Ac-ft of water shipped	Tons Shipped	Ac-ft of water shipped	Tons Shipped	Ac-ft of water shipped
Base Products	1,430	0.006	844	0.021	860	0.021	934	0.023
Coarse Aggregates	190,947	2,205	206,103	3,558	249,940	3,004	217,393	2,613
Fine Aggregates	12,310	0.391	12,758	0.405	5,078	0.161	5,163	0.164
	204,687	2,721	309,705	3,965	255,068	3,186	223,490	2,800

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