

# 2016 ANNUAL REPORT

Report 2016  
 North Troy Quarry  
 Mill Creek, OK  
 Vulcan Materials Company

## VMC North Troy 2016 Monitoring Report

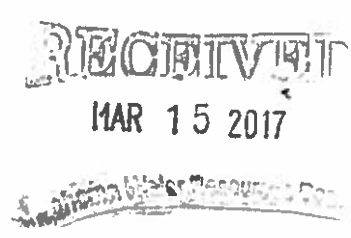
All volumes are in acre-feet.

	Total Groundwater Entering Pit	Total Stormwater Entering Pit	Total Pit Stormwater Diverted	Total Pit Water Diverted	Pit Water Sent To Holding Basin	Groundwater Augmentation	Streamwater Augmentation	Consumptive Use of Pit Water	Streamwater Pumped From Mill Creek	Groundwater Pumped From Wells	Total Annual Groundwater Allocation, Ac-ft
January-16	339.02	1.28	1.28	330.36	53.06	241.05	39.79	4.10	0.00	0.00	219.50
February-16	303.78	16.79	16.79	314.86	51.53	263.69	65.67	6.65	0.00	0.00	219.50
March-16	270.82	27.14	27.14	267.20	5.80	348.12	122.45	8.71	0.00	0.00	219.50
1st QTR Totals	913.62	45.19	45.19	912.42	110.39	853.05	227.91	19.46	0.00	0.00	N/A
April-16	264.37	50.12	50.12	263.45	43.18	277.63	108.45	8.72	0.00	0.00	219.50
May-16	818.50	12.58	12.58	816.39	32.53	292.60	65.89	8.44	0.00	0.00	219.50
June-16	378.30	2.20	2.20	377.85	43.24	341.80	0.00	7.77	0.00	0.00	219.50
2nd QTR Totals	1461.16	64.90	64.90	1457.69	118.95	912.03	174.34	24.93	0.00	0.00	N/A
July-16	314.22	6.58	6.58	316.39	28.85	55.11	242.75	11.88	0.00	0.00	219.50
August-16	288.15	12.84	12.84	290.57	50.18	258.08	0.00	11.50	0.00	0.00	219.50
September-16	358.09	23.98	23.98	356.69	30.26	351.59	0.00	9.84	0.00	0.00	219.50
3rd QTR Totals	960.48	43.51	43.51	962.65	107.29	664.78	242.75	33.02	0.00	0.00	N/A
October-16	322.42	20.24	20.24	322.19	0.00	251.36	86.06	10.91	0.00	0.00	219.50
November-16	273.51	5.75	5.75	280.15	32.78	220.28	35.14	5.58	0.00	0.00	219.50
December-16	298.11	3.77	3.77	293.82	29.55	270.50	1.78	5.02	0.00	0.00	219.50
4th QTR Totals	894.04	28.76	28.76	896.16	62.33	742.12	132.98	21.51	0.00	0.00	N/A
2016 Totals	4229.29	183.36	183.36	4228.92	398.96	3171.98	777.98	98.92	0.00	2.92	219.50

1st Qtr Notes

2nd Qtr Notes Pit Meter replaced Mar 19th

3rd Qtr notes Onsite Rain Gauge damaged by hail Replaced



# 2016 4th QUARTER REPORT

Report 2016  
North Troy Quarry  
Mill Creek, OK  
Vulcan Materials Company

## VMC North Troy 2016 Monitoring Report

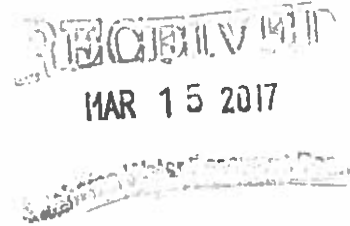
All volumes are in acre-feet.

	Total Groundwater Entering Pit	Total Stormwater Entering Pit	Total Pit Stormwater Diverted	Total Pit Water Diverted	Pit Water Sent To Holding Basin	Groundwater Augmentation	Streamwater Augmentation	Consumptive Use of Pit Water	Streamwater Pumped From Mill Creek	Groundwater Pumped From Wells	Total Annual Groundwater Allocation, Ac-ft
January-16	303.78	16.78	1.28	330.36	53.06	241.05	38.78	4.10	0.00	0.00	219.50
February-16	270.82	27.14	27.14	314.86	51.53	263.88	65.67	6.65	0.00	0.00	219.50
March-16	913.62	45.19	45.19	912.42	110.39	853.05	227.91	19.46	0.00	1.48	N/A
1st QTR Totals	264.37	50.12	50.12	263.45	43.18	277.63	108.45	6.72	0.00	0.00	219.50
April-16	818.50	12.58	12.58	816.39	32.53	292.60	65.89	8.44	0.00	0.00	219.50
May-16	378.30	2.20	2.20	377.85	43.24	341.80	0.00	7.77	0.00	0.00	219.50
2nd QTR Totals	1461.16	64.90	64.90	1457.68	118.95	912.03	174.34	24.93	0.00	0.00	N/A
June-16	314.22	6.58	6.58	316.39	26.85	242.75	11.68	11.68	0.00	1.44	219.50
July-16	288.15	12.94	12.94	290.57	50.18	258.08	0.00	11.50	0.00	0.00	219.50
August-16	358.09	23.89	23.89	355.69	30.28	351.59	0.00	9.84	0.00	0.00	219.50
3rd QTR Totals	980.46	43.51	43.51	982.65	107.29	884.78	242.75	33.02	0.00	0.00	N/A
September-16	322.42	20.24	20.24	322.19	0.00	251.38	98.06	10.91	0.00	0.00	219.50
October-16	273.51	5.75	5.75	280.15	32.78	220.28	35.14	5.58	0.00	0.00	219.50
November-16	298.11	3.77	3.77	293.82	29.55	270.50	1.78	5.02	0.00	0.00	219.50
December-16	894.04	28.76	28.76	896.16	62.31	742.12	132.98	21.51	0.00	0.00	N/A
4th QTR Totals	4229.29	183.36	183.36	4229.92	398.96	3171.99	777.96	98.92	0.00	2.92	219.50
2016 Totals											

1st Qtr Notes

2nd Qtr Notes Pit Meter replaced Mar 19th

3rd Qtr Notes Onsite Rain Gauge damaged by hail Replaced



MILL CREEK 2016 AUGMENTATION and GAUGE DATA

Start Date	Start Time	Stop Date	Stop Time	Begin Reading	End Reading	Ac - Ft pumped	USGS	Mill Creek Stream gauge Reading	Time Read	Stream height	Stream flow
1/24/2016	9:30 AM	1/25/2016	5:30 PM				4.19	7331200	9:00 AM	7	28
1/28/2016	4:30 PM	2/1/2016	9:00 AM	1484749704	1496350000		35.60	7331200	4:00 PM	6.97	25
2/4/2016	6:20 AM	2/6/2016	2:50 PM	1509970000	1515980000		18.44	7331200	6:00 AM	6.89	19
2/11/2016	10:15 AM	2/12/2016	5:00 PM	1538940000	1542940000		12.28	7331200	9:30 AM	6.86	18
2/18/2016	2:45 PM	2/22/2016	6:10 AM	1570130000	1581520000		34.95	7331200	2:00 PM	6.79	12
3/2/2016	7:00 AM	3/5/2016	11:00 AM	1618660000	1658560000		122.45	7331200	6:30 AM	7.02	30
4/5/2016	3:55 PM	4/15/2016	2:00 PM	74760000	110100000		108.45	7331200	3:30 PM	6.74	15
5/10/2016	5:40 PM	5/17/2016	5:45 PM	224290000	245760000		65.89	7331200	5:00 PM	7.13	51
6/30/2016	1:00 PM	7/13/2016	5:31 PM	447260000	489160000		128.59	7331200	12:30 PM	6.53	4.9
7/20/2016	9:15 AM	8/1/2016	6:30 AM	515300000	552500000		114.16	7331200	8:30 AM	6.4	3.6
August 2016	No augmentation this month										
September 2016	No augmentation this month										
10/11/2016	10:14 AM	10/13/2016	3:39 PM	815710000	825080000		28.76	7331200	10:00 AM	6.36	4.07
10/13/2016	4:15 PM	10/20/2016	7:30 AM	825080000	847010000		67.30	7331200	4:00 PM	6.28	2.36
11/17/2016	11:40 AM	11/20/2016	7:40 AM	940850000	946490000		17.31	7331200	11:00 AM	6.14	0.83
11/21/2017	6:00 AM	11/23/2016	7:45 AM	946490000	952300000		17.83	7331200	5:30 AM	6.16	0.97
12/1/2016	8:20 AM	12/1/2016	1:05 PM	979860000	980440000		1.78	7331200	7:30 AM	6.16	0.97

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October Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS	
Hydrologic Soil Group	D
Land Use	gravel road
AMC Condition	II (ave)
CN (pit fringe)	88
CN (pit)	100
S (pit fringe)	1.063636
S (pit)	0
Pit - Direct Interception (>85 ft deep)	53.91
Pit fringe (area drains to pit)	122.04
Drainage to Pit (total area)	175.95
	area draining into pit
	area with direct interception
	subject to refinement
	subject to refinement

Date	Quarry area		Daily
	Precip, in.	Runoff, in.	
1-Oct	0.00	0.00	0.13
2-Oct	0.00	0.00	0.17
3-Oct	0.00	0.00	0.21
4-Oct	0.00	0.00	0.23
5-Oct	0.00	0.00	0.26
6-Oct	0.00	0.00	0.2
7-Oct	1.73	0.75	0.1
8-Oct	0.00	0.00	0.16
9-Oct	0.00	0.00	0.14
10-Oct	0.00	0.00	0.18
11-Oct	0.00	0.00	0.25
12-Oct	0.00	0.00	0.21
13-Oct	0.14	0.00	0.08
14-Oct	0.00	0.00	0.12
15-Oct	0.00	0.00	0.21
16-Oct	0.00	0.00	0.25
17-Oct	0.00	0.00	0.3
18-Oct	0.00	0.00	0.17
19-Oct	0.36	0.00	0.16
20-Oct	0.21	0.00	0.15
21-Oct	0.00	0.00	0.11
22-Oct	0.00	0.00	0.17
23-Oct	0.00	0.00	0.17
24-Oct	0.00	0.00	0.15
25-Oct	0.00	0.00	0.15
26-Oct	0.36	0.00	0.15
27-Oct	0.00	0.00	0.12
28-Oct	0.00	0.00	0.2
29-Oct	0.00	0.00	0.22
30-Oct	0.00	0.00	0.13
31-Oct	2.80	2.80	0.76
Sum			5.45
Volume, ac-ft	12.58		7.66
Total Vol, ac-ft	20.24		

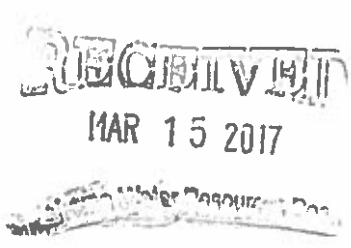
Runoff formula  
 $Pe = (P-0.2S)^2 / (P+0.8S)$   
 $S = (1000/CN)-10$

Blue cells contain formulas

Oct, Precip  
 N. Troy Rain gauge

Pan Evaporation from Sulphur Mesonet

\* Used Mesonet Pan Evaporation - Sulphur



November Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS	
Hydrologic Soil Group	D
Land Use	Gravel road
AMC Condition	II (ave)
CN (pit fringe)	88
CN (pit)	100
S (pit fringe)	1.363636
S (pit)	0
Pit - Direct Interception (>95 ft deep)	53.91
Pit fringe (area drains to pit)	122.04
Drainage to Pit (total area)	175.95
	subject to refinement
	subject to refinement

Date	Quarry area		Fringe area		Daily
	Precip, in.	Runoff, in.	Runoff, in.	Evaporation, in.	
1-Nov	0.00	0.00	0.17	Runoff formula	
2-Nov	0.00	0.00	0.13	Runoff formula	
3-Nov	0.44	0.00	0.07	Pe = (P-0.25)*2/(P+0.85)	
4-Nov	0.00	0.00	0.06	S = (1000/CN)-10	
5-Nov	0.00	0.00	0.11		Blue cells contain formulas
6-Nov	0.00	0.00	0.14		
7-Nov	0.16	0.16	0.00	0.05	
8-Nov	0.00	0.00	0.00	0.04	
9-Nov	0.00	0.00	0.00	0.1	
10-Nov	0.00	0.00	0.00	0.07	
11-Nov	0.00	0.00	0.00	0.1	
12-Nov	0.00	0.00	0.00	0.11	
13-Nov	0.00	0.00	0.00	0.1	
14-Nov	0.00	0.00	0.00	0.1	
15-Nov	0.00	0.00	0.00	0.09	
16-Nov	0.00	0.00	0.00	0.16	
17-Nov	0.00	0.00	0.00	0.12	
18-Nov	0.00	0.00	0.00	0.23	
19-Nov	0.00	0.00	0.00	0.07	
20-Nov	0.00	0.00	0.00	0.14	
21-Nov	0.00	0.00	0.00	0.17	
22-Nov	0.16	0.16	0.00	0.09	
23-Nov	0.00	0.00	0.00	0.09	
24-Nov	0.00	0.00	0.00	0.08	
25-Nov	0.00	0.00	0.00	0.08	
26-Nov	0.00	0.00	0.00	0.08	
27-Nov	0.00	0.00	0.00	0.08	
28-Nov	0.52	0.52	0.00	0.14	
29-Nov	0.00	0.00	0.00	0.14	
30-Nov	0.00	0.00	0.00	0.11	
sum	1.28	1.28	0.00	3.18	
Volume, ac-ft		5.75	0.00		
Total Vol, ac-ft		6.75			

Nov. Precip  
N. Troy Rain gauge

Pan Evaporation from Sulphur Mesonet

\* Used Mesonet Pan Evaporation - Sulphur

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December Precipitation/Evaporation Data

PIT RUNOFF ASSUMPTIONS	
Hydrologic Soil Group	D
Land Use	Gravel road
AMC Condition	II (ave)
CN (pit fringe)	88
CN (pit)	100
S (pit fringe)	1.363636
S (pit)	0
Pit - Direct Interception (>95 ft deep)	53.91
Pit fringe (area drains to pit)	122.04
Drainage to Pit (total area)	175.95

Date	Quarry area		Daily
	Precip, in.	Runoff, in.	
1-Dec	0.00	0.00	0.12
2-Dec	0.00	0.00	0.06
3-Dec	0.56	0.56	0.03
4-Dec	0.08	0.08	0.03
5-Dec	0.00	0.00	0.03
6-Dec	0.00	0.00	0.05
7-Dec	0.00	0.00	0.07
8-Dec	0.00	0.00	0.09
9-Dec	0.00	0.00	0.05
10-Dec	0.00	0.00	0.11
11-Dec	0.00	0.00	0.15
12-Dec	0.00	0.00	0.07
13-Dec	0.00	0.00	0.05
14-Dec	0.00	0.00	0.06
15-Dec	0.00	0.00	0.06
16-Dec	0.00	0.00	0.08
17-Dec	0.00	0.00	0.13
18-Dec	0.00	0.00	0.04
19-Dec	0.00	0.00	0.05
20-Dec	0.00	0.00	0.12
21-Dec	0.00	0.00	0.16
22-Dec	0.00	0.00	0.08
23-Dec	0.08	0.08	0.03
24-Dec	0.00	0.00	0.03
25-Dec	0.12	0.12	0.12
26-Dec	0.00	0.00	0.14
27-Dec	0.00	0.00	0.11
28-Dec	0.00	0.00	0.19
29-Dec	0.00	0.00	0.16
30-Dec	0.00	0.00	0.15
31-Dec	0.00	0.00	0.14
sum	0.84	0.84	2.78
Volume, ac-ft	3.77	0.00	
Total Vol, ac-ft	3.77		Pan Evaporation from Sulphur Mesonet

\* Used Mesonet Pan Evaporation - Sulphur

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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 2002-602	North Well Permit 20060601A
January-16	331.62	1.26	0.66	53.06	238.77	39.79	1.79	1.43	0.00	0.00	0.00	0.00	0.00
February-16	331.65	16.79	-1.06	51.53	268.15	65.67	3.40	2.36	0.00	0.00	0.00	0.00	0.00
March-16	294.34	27.74	1.02	5.80	343.62	122.45	4.11	3.55	1.04	0.00	0.00	1.48	0.00
April-16	313.57	50.12	0.83	43.18	272.64	108.45	4.93	3.09	0.00	0.00	0.00	0.00	0.00
May-16	828.97	12.58	2.10	32.53	290.32	65.89	4.71	3.37	0.00	0.00	0.00	0.00	0.00
June-16	360.05	2.20	0.45	43.24	336.81	0.00	6.04	0.95	0.00	0.00	0.00	0.00	0.00
July-16	322.97	6.58	-2.18	26.85	53.37	242.75	7.76	2.70	1.22	0.00	0.00	1.44	0.00
August-16	303.51	12.94	3.42	50.18	253.34	0.00	6.75	3.91	0.00	0.00	0.00	0.00	0.00
September-16	378.68	23.99	2.40	30.26	348.42	5.20	3.74	0.90	0.00	0.00	0.00	0.00	0.00
October-16	342.43	20.24	0.23	0.00	248.37	96.06	4.16	2.96	0.00	0.00	0.00	0.00	0.00
November-16	265.90	5.75	-0.64	32.78	217.98	35.14	2.43	1.62	1.53	0.00	0.00	0.00	0.00
December-16	297.59	3.77	4.00	29.55	268.26	1.78	2.11	2.10	0.81	0.00	0.00	0.00	0.00

Pit Sump Volumes

	West Sump				805 Sump				New Freshwater Pond				Total 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.	Sump Volume Change, Ac-ft	Evaporation, ac-ft	Month End Depth-to-Water, Ft.	Width, Ft.		Length, Ft.	Pond Volume Change, Ac-ft
January-16	5.535	125	325	18.66	0.23	4	50	50	0.00	0.00	5.406	475	750	-10.03	1.79
February-16	17.412	125	325	-11.06	0.36	4	50	50	0.00	0.00	5.018	475	750	3.17	3.40
March-16	13.53	125	325	3.62	0.47	4	50	50	0.00	0.00	5.819	475	750	-6.54	1.48
April-16	12.537	125	325	0.83	0.50	4	50	50	0.00	0.00	4.454	475	750	11.16	0.00
May-16	10.26	125	325	2.17	0.41	4	50	50	0.00	0.00	4.452	475	750	0.02	0.00
June-16	9.8	125	325	0.45	0.61	4	50	50	0.00	0.00	2.566	475	750	15.51	0.00
July-16	12.12	125	325	-2.16	0.78	4	50	50	0.00	0.00	4.097	475	750	-12.52	0.00
August-16	14.719	125	325	2.42	0.69	4	50	50	0.00	0.00	3.812	475	750	2.25	0.00
September-16	12.15	125	325	2.40	0.53	4	50	50	0.00	0.00	4.14	475	750	-2.68	0.00
October-16	11.908	125	325	0.23	0.42	4	50	50	0.00	0.00	2.335	475	750	-3.69	0.00
November-16	19.028	123	323	-6.64	0.25	4	50	50	0.00	0.00	3.721	475	750	5.71	0.00
December-16	14.42	125	325	4.30	0.21	4	50	50	0.00	0.00	3.66	475	750	0.50	0.00

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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
Base Products	2,505	0.081	1,339	0.033	5,671	0.139
Coarse Aggregates	195,535	2,350	114,021	1,370	120,520	1,449
Fine Aggregates	17,338	0.551	6,848	0,218	16,151	0,513
	215,378	2,982	122,208	1,621	142,342	2,101

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