

BaySaver® Separation System Total Suspended Solids Removal Data

University of Maryland Test Data

BaySaver® 3K with two 60" manholes located at a vehicle maintenance and storage facility in Rockville, MD.

- Impervious acreage - 3.67 acres.
- Parking for 128 buses on 3.51 acres of asphalt.
- 7,000 sq. ft. of green space.
- 24" RCP inlet pipe.
- Automatic sampler - 2 minute intervals.

University of Maryland was the third party test administrator at this commercial installation.
(Tables 1 - 3)

<u>Storm Date</u>	<u>Average In (mg/L)</u>	<u>Average Out (mg/L)</u>	<u>Peak Flow Rate (cfs)</u>	<u>Peak Flow Rate (gpm)</u>	<u>Average Removal %</u>	
4-1-99	503	41	.47	211	91%	LowFlow Treatment
5-22-99	2019	59	6.31	2,833	97%	Maximum Treatment
6-14-99	524	122	24.33	10,910	76%	Flood Treatment
Average:			10.37	4,651		

Average Removal: 88%

BaySaver Technologies™ / University of Maryland TSS Removal Study Review

The University of Maryland at College Park conducted a field study of a 3K BaySaver® Separation System which is located at a Montgomery county school bus depot in Rockville, Maryland. The unit was installed in the winter of 1998 when some stormwater renovations were being done at the site. The unit is being utilized as a hydrodynamic pretreatment for a detention pond. Samples from the installed BaySaver® system were taken during storm events over a period from June 30, 1998 until June 14, 1999. The bus depot houses approximately 128 buses and has a drainage area of 3.67 acres. This area is composed of approximately 3.51 acres of impervious cover (asphalt) and 0.16 acres of grass, which drains into an inlet and is located just upstream from the BaySaver® system.

Input samples were taken just upstream of the primary manhole for the 3K BaySaver® system. The output samples were taken just past the outlet of the separator system. These samples were collected using two ISCO® 6700 Compact Portable samplers that contained twenty-four 500-ml propylene bottles each and stored in one-liter HDPE or Nalgene LDPE bottles. At the beginning of each storm, samples were taken at two-minute intervals. After the first eight samples, the sampling interval was increased.

Standard Method 209C was followed to measure the Total Suspended Solids in each sample. Gelman® Supor® 1.0 µm pore diameter A/E glass type filters were rinsed, dried and weighed before they were used to capture the suspended solids from 100 ml influent and effluent samples. The filters were then dried at -104°C for at least one hour until consecutive weightings were within 0.5 mg (Table 1 through 3).

Rainfall and flowrate data were recorded and printed automatically by an ISCO® Model 4250 flow meter. Flowrate was computed using depth and velocity data obtained by a flowmeter probe mounted just inside the inlet to the primary manhole. The rainfall intensity was measured using a tip bucket.

A particle distribution sieve analysis from another 3K BaySaver® Separation System is on Page 4

BaySaver® Separation System TSS Removal Data - Summary

BaySaver® 3K System Suspended Solids Data			
University of Maryland Data			
Storm Date	Average-In (mg/L)	Average-Out (mg/L)	Average Removal (%)
4/01/99	503	41	91.28
5/22/99	2171	59	97.29
6/14/99	524	122	75.56
Average Removal:			88.04%

BaySaver Technologies 3K TSS System Removal Data - Detail

Peak Flow Rate: .47 cfs (211 gpm)

Table 1. TSS Data for 4/1/1999

Sample	Time (min)	TSS In (mg/L)	Sample	Time (min)	TSS Out (mg/L)
1	0	7600	1	0	160
2	2	570	2	2	28
3	6	75	4	6	16
4	8	87	5	8	22
5	10	380	6	10	27
6	12	130	7	12	87
7	14	13	8	14	16
8	16	13	9	16	28
9	24	200	11	24	66
10	25	340	12	28	54
11	32	190	13	32	92
12	36	190	14	36	48
13	40	270	15	40	81
14	44	75	16	44	12
15	48	240	17	48	74
16	54	110	18	54	16
17	100	340	19	100	39
18	106	41	20	106	20
19	112	86	21	112	25
20	118	29	22	118	8
21	124	41	23	124	17
22	130	33	24	130	9
23	142	26	25	142	21
Avg. In		503	Avg. Out		41

Collection Efficiency: 91.28%

BaySaver Technologies 3K TSS System Removal Data – Detail (Continued)

Peak Flow Rate: 6.31 cfs (2,833 gpm)

Table 2. TSS Data for 5/22/1999

Sample	Time (min)	TSS In (mg/L)	Sample	Time (min)	TSS Out (mg/L)
1	1	53000	1	3	35
2	2	470	2	4	50
3	4	350	3	6	54
4	6	490	4	8	200
5	8	320	5	10	190
6	10	360	6	12	140
7	11	140	7	14	120
8	14	380	8	16	110
9	16	200	9	18	83
10	18	180	10	21	89
11	22	97	11	24	79
12	23	78	12	28	56
13	26	91	13	29	41
14	27	53	14	32	28
15	30	31	15	34	34
16	34	48	16	36	35
17	35	23	17	40	20
18	38	12	18	41	20
19	42	23	19	44	34
20	43	17	20	48	5
21	46	10	21	49	12
22	48	14	22	52	26
23	50	14	23	58	23
24	56	8	24	59	12
25	58	11	25	104	22
26	102	18	26	110	14
	Ave. In	2171		Avg. Out	59

Collection Efficiency: 97.29%

Peak Flow Rate: 24.33 cfs (10,910 gpm)

Table 3. TSS Data for 6/14/1999

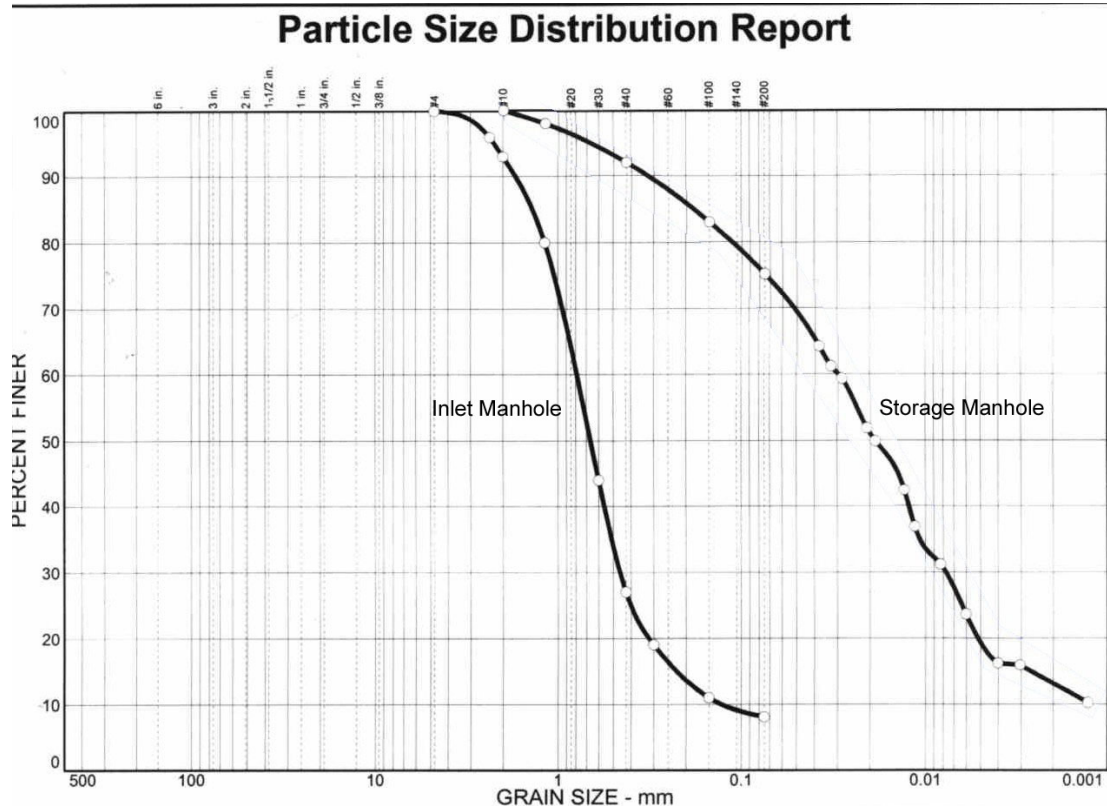
Sample	Time (min)	TSS In (mg/L)	Sample	Time (min)	TSS Out (mg/L)
1	0	1700	1	1	1000
2	2	7100	2	3	910
3	4	690	3	5	310
4	6	150	4	7	290
5	7	100	5	8	88
6	10	120	6	11	79
7	11	56	7	12	60
8	14	61	8	15	73
9	15	31	9	16	46
10	18	32	10	19	49
11	22	20	11	22	36
12	26	19	12	27	45
13	28	19	13	28	44
14	30	9	14	31	20
15	34	9	15	35	14
16	36	16	16	36	39
17	38	22	17	39	35
18	40	690	18	40	160
19	42	3400	19	43	130
20	46	300	20	47	42
21	50	29	21	51	7
22	54	22	22	55	23
23	58	10	23	59	10
24	104	10	24	105	13
25	110	20	25	111	16
26	116	13	26	117	14
27	122	11	27	123	12
28	128	10	28	129	21
	Avg. In	524		Avg. Out	128

Collection Efficiency: 75.56%

BaySaver® Particle Distribution Sieve Analysis

The results below summarize the particle size distribution of collected sediments that were sampled and tested from each of the manholes in a 3K BaySaver® Separation System in Sparks, Nevada. The percentages reported are for particular particle size distributions of actual sediments separated and retained by the BaySaver® system.

As you can see by the graph, the BaySaver® removed fine sediments as small as one micron. In fact 64% of the sediments collected in the storage manhole were smaller than 38 microns. Testing was completed by a third party using ASTM D422 methodology.



Inlet

Manhole Sediments

Sand thru:

# 4 sieve	4.750 mm	100.0%
# 8 sieve	2.360 mm	96.0%
# 10 sieve	2.000 mm	93.0%
# 16 sieve	1.180 mm	80.0%
# 30 sieve	0.600 mm	44.0%
# 40 sieve	0.425 mm	27.0%
# 50 sieve	0.300 mm	19.0%
# 100 sieve	0.150 mm	11.0%
# 200 sieve	0.075 mm	8.1%

Storage Manhole Sediments

Sand thru:

# 10 sieve	2.000 mm	100.0%
# 16 sieve	1.180 mm	98.0%
# 40 sieve	0.425 mm	92.0%
# 100 sieve	0.150 mm	83.0%
# 200 sieve	0.075 mm	75.1%
# 400 sieve	0.038 mm	64.1%

Testing Agency – Stantec Consulting, Inc. Date of Test – April 15, 2002.

For a copy of the full sediment capture data report please contact BaySaver Technologies, Inc.