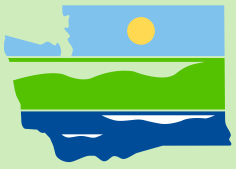
Appendix B. Data Tables

Roofing Materials Assessment: Investigation of Toxic Chemicals in Roof Runoff from Constructed Panels in 2013 and 2014



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Publication and Contact Information

This appendix is linked as a supplementary document to the report at:
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List of Tables

Table 1. Rain event data for events 1 – 10 in metric units. 5
Table 2. Rain event data for events 11 – 20 in metric units. 6
Table 3. pH of panel runoff at time of sampling from the 20 rain events. 7
Table 4. Temperature (in ^{o}C) of panel runoff from the 20 rain events. 8
Table 5. Specific conductance (uS/cm) of panel runoff from the 20 rain events. 9
Table 6. Volume of runoff collected (in liters) for each rain event and each panel. 10
Table 7. Total arsenic concentration (ug/L) by panel and rain event. 11
Table 8. Total cadmium concentration (ug/L) by panel and rain event. 12
Table 9. Total copper concentration (ug/L) by panel and rain event. 13
Table 10. Total lead concentration (ug/L) by panel and rain event. 14
Table 11. Total zinc concentration (ug/L) by panel and rain event. 15
Table 12. Concentrations of PAHs (in ug/L) in runoff from rain event 1. 16
Table 13. Concentrations of PAHs (in ug/L) in runoff from rain event 2. 17
Table 14. Concentrations of PAHs (in ug/L) in runoff from rain event 3. 18
Table 15. Concentrations of PAHs (in ug/L) in runoff from rain event 4. 19
Table 16. Concentrations of PAHs (in ug/L) in runoff from rain event 5. 20
Table 17. Concentrations of PAHs (in ug/L) in runoff from rain event 6. 21
Table 18. Concentrations of PAHs (in ug/L) in runoff from rain event 7. 22
Table 19. Concentrations of PAHs (in ug/L) in runoff from rain event 8. 23
Table 20. Concentrations of PAHs (in ug/L) in runoff from rain event 9. 24
Table 21. Concentrations of PAHs (in ug/L) in runoff from rain event 10. 25
Table 22. Concentrations of PAHs (in ug/L) in runoff from rain event 12. 26
Table 23. Concentrations of PAHs (in ug/L) in runoff from rain event 15. 27
Table 24. Concentrations of PAHs (in ug/L) in runoff from rain event 17. 28
Table 25. The sum of detected PAHs (in ug/L) by panel and event number. 29
Table 26. Concentrations of phthalates (in ug/L) in runoff from rain event 1. 29
Table 27. Concentrations of phthalates (in ug/L) in runoff from rain event 2. 30
Table 28. Concentrations of phthalates (in ug/L) in runoff from rain event 3. 30
Table 29. Concentrations of phthalates (in ug/L) in runoff from rain event 4. 31
Table 30. Concentrations of phthalates (in ug/L) in runoff from rain event 5. 31
Table 31. Concentrations of phthalates (in ug/L) in runoff from rain event 6. 32
Table 32. Concentrations of phthalates (in ug/L) in runoff from rain event 7. 32
Table 33. Concentrations of phthalates (in ug/L) in runoff from rain event 8. 32
Table 34. Concentrations of phthalates (in ug/L) in runoff from rain event 9. 33
Table 35. Concentrations of phthalates (in ug/L) in runoff from rain event 10. 33

Table 36. Concentrations of phthalates (in ug/L) in runoff from rain event 12. 34
Table 37. Concentrations of phthalates (in ug/L) in runoff from rain event 15. 34
Table 38. Concentrations of phthalates (in ug/L) in runoff from rain event 17. 35
Table 39. The sum of detected phthalates (in ug/L) by panel and event number..... 35
Table 40. Concentrations of PBDEs (in ug/L) in runoff from rain event 1..... 36
Table 41. Concentrations of PBDEs (in ug/L) in runoff from rain event 2..... 37
Table 42. Concentrations of PBDEs (in ug/L) in runoff from rain event 3..... 38
Table 43. Concentrations of PBDEs (in ug/L) in runoff from rain event 4..... 39
Table 44. Concentrations of PBDEs (in ug/L) in runoff from rain event 5..... 40
Table 45. Concentrations of PBDEs (in ug/L) in runoff from rain event 6..... 41
Table 46. Concentrations of PBDEs (in ug/L) in runoff from rain event 7..... 41
Table 47. Concentrations of PBDEs (in ug/L) in runoff from rain event 8..... 42
Table 48. Concentrations of PBDEs (in ug/L) in runoff from rain event 9..... 42
Table 49. Concentrations of PBDEs (in ug/L) in runoff from rain event 10..... 43
Table 50. Concentrations of PBDEs (in ug/L) in runoff from rain event 12..... 44
Table 51. Concentrations of PBDEs (in ug/L) in runoff from rain event 15..... 45
Table 52. Concentrations of PBDEs (in ug/L) in runoff from rain event 17..... 46
Table 53. Sum of the detected PBDE concentrations (in ug/L) by panel and storm event. 47

Table 1. Rain event data for events 1 – 10 in metric units.

Event Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Event Date(s)	2/21 - 2/22	2/24 - 2/25	2/27 - 2/28	3/5 - 3/6	3/11 - 3/12	3/12 - 3/13	3/19 - 3/20	4/4 - 4/5	4/10	4/18 - 4/19
Sampled Rain Event Duration (hrs)[a]	23.25	9.5	15.5	16.15	9.25	16.75	13.25	17.0	2.75	17.75
Precipitation in 6 Hours Preceding Event (mm)[b]	0.762	0.0	1.778	0.254	0.254	0.762	0.0	2.286	0.0	0.0
Hours Preceding Event with No Measurable Precipitation[b]	0.5	31.5	0.0	0.0	0.0	0.25	30	0.25	66.5	46.75
Total Precipitation (mm)[b]	16.51	7.61	13.46	4.57	4.31	5.08	18.03	18.8	10.16	7.61
Average Rain Intensity (mm./hr.)[b]	0.710	0.801	0.868	0.283	0.467	0.303	1.361	1.106	3.695	0.429
Average Rain Intensity when Rain Falling (mm/hr.)[b]	2.45	1.69	1.58	1.31	1.33	1.20	1.64	1.98	3.69	1.17
Peak Rain Intensity (mm/15 min.)[b]	1.52	0.76	0.76	0.51	0.51	0.51	1.02	1.27	1.52	0.51
Minimum Rain Intensity (mm/15 min.)[b]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.254	0.0
Average Wind Speed during Event (km/h)[c]	ND	6.2	0.2	0.2	2.2	1.5	0.5	2.5	6.2	3.5
Highest Wind Gusts (km/h)[c]	ND	26	5	6	5	17	14	24	24	21
Average Wind Direction during Event (^{o}C)[c]	ND	206	261	310	174	188	206	185	197	175
Average Wind Direction when Rain Falling[c]	ND	197	68	284	166	190	204	183	197	178
Average Temperature (^{o}C)[d]	5.3	4.6	6.8	5.2	8.8	9.8	6.9	11.4	10.6	9.7
Low Temperature (^{o}C)[d]	4.4	2.0	6.7	4.4	8.0	9.4	6.1	10.6	10.0	9.0
High Temperature (^{o}C)[d]	6.0	8.9	7.8	6.1	10.0	10.6	9.4	13.3	11.1	11.1

a Rain event duration = (event stop time and date) - (event start time and date)

b Data from tipping bucket rain gage co-located with roofing panels at the Department of Ecology Lacey, Washington

c Wind speed and direction data obtained from Weather Underground (www.wunderground.com) for station KWALACEY6.

d Temperature data from Olympia Airport (MesoWest http://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?state=WA&rawsflag=3)

ND No data

Table 2. Rain event data for events 11 – 20 in metric units.

Event Number	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Event Date(s)	10/30 -10/31/ 2013	11/6 - 11/7	11/15	11/30 - 12/1	12/12 - 12/13	12/23	1/2/ 2014	1/6 - 1/7	1/9 - 1/10	1/27 - 1/28
Sampled Rain Event Duration (hrs) [a]	6.5	15.75	1.25	15	13	6.5	4.5	11.75	17.5	23.5
Precipitation in 6 Hours Preceding Event (mm)[b]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hours Preceding Event with no Measureable Precipitation[b]	141.25	32.0	54.75	21.5	44.75	20.5	12.75	93.5	12.75	55.75
Total Precipitation (mm)[b]	2.03	19.3	1.27	11.18	5.08	3.81	4.32	9.14	12.95	6.60
Average Rain Intensity (mm./hr.)[b]	0.312	1.23	1.016	0.745	0.391	0.586	0.960	0.778	0.740	0.281
Average Rain Intensity when Rain Falling (mm/hr.)[b]	1.16	2.41	1.27	1.40	1.35	1.27	1.33	1.52	1.40	1.468
Peak Rain Intensity (mm/15 min.)[b]	0.51	4.57	0.51	0.76	0.76	0.51	0.76	0.76	1.02	0.76
Minimum Rain Intensity (mm/15 min.)[b]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Temperature (^{o}C)[c]	8.58	9.6	7.0	9.8	3.8	8.9	7.8	3.4	7.3	6.1
Low Temperature (^{o}C)[c]	8.0	8.3	6.7	7.8	0	8.9	7.2	2.8	2.8	3.3
High Temperature (^{o}C)[c]	10.0	11.7	7.2	11.1	5.0	9.0	8.9	5	8.9	8.3

[a] Rain event duration = (event stop time and date) - (event start time and date)

[b] Data from tipping bucket rain gage co-located with roofing panels at the Department of Ecology Lacey, Washington

[c] Temperature data from Olympia Airport (MesoWest http://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?state=WA&rawsflag=3), except event 11 which was from Fort Lewis

Table 3. pH of panel runoff at time of sampling from the 20 rain events.

Event #	Steep-Slope Panels									Low-Slope Panels						
	AAR	AS[A]	CPR	CTI	PAZ	TWO	WOS	GST	BUA	BUR	BUS	EPD	PVC	TPO	ZIN	GLO
1	6.6	6.9	5.9	9.1	5.4	5.1	5.6	5.3	6.7	6.9	7.1	5.0	5.0	6.1	5.2	5.2
2	7.7	6.7	6.4	8.1	6.2	5.0	3.8	5.0	6.1	6.7	7.4	4.9	5.2	7.0	5.1	4.6
3	7.0	6.8	6.6	8.1	4.8	4.4	3.7	4.7	6.5	7.2	7.3	5.1	5.2	6.0	5.9	5.2
4	6.2	7.3	6.2	7.2	5.3	4.8	4.3	4.8	5.7	6.1	7.3	4.5	5.0	5.6	5.1	5.0
5	6.5	6.5	5.0	8.0	4.3	4.6	3.6	4.7	6.2	6.6	6.2	4.4	4.7	6.7	5.2	5.6
6	7.2	7.1	6.4	7.8	4.6	4.7	3.5	4.5	6.3	6.8	7.3	4.2	4.6	5.8	5.6	4.9
7	5.9	6.5	5.8	7.2	5.1	4.3	3.7	4.7	5.4	6.4	5.8	4.6	4.6	5.8	5.7	5.0
8	6.2	6.5	4.9	7.2	4.8	4.5	4.0	5.8	5.8	5.8	6.0	4.7	4.8	5.8	4.8	4.7
9	8.1	4.8	7.1	8.6	4.5	4.6	5.4	6.3	7.1	6.1	5.3	4.4	4.9	7.2	5.0	6.8
10	7.0	6.9	5.6	7.0	4.9	4.9	4.3	6.0	5.3	6.2	6.5	4.4	5.0	5.8	4.1	4.7
11	6.8	6.9	5.7	7.2	4.6	4.3	3.7	4.6	5.2	6.6	NM	6.2	4.7	5.6	5.7	4.7
12	6.5	7.3	6.2	6.9	5.4	4.7	4.2	4.7	5.9	6.3	5.9	4.8	4.8	5.1	4.9	5.6
13	6.9	7.2	6.2	6.9	6.5	4.3	3.8	5.3	5.7	6.7	6.1	4.6	4.8	6.0	5.8	5.9
14	6.7	7.3	6.1	7.3	6.1	4.6	4.1	4.8	5.3	6.7	6.2	5.0	5.2	4.8	6.0	5.0
15	6.7	6.9	6.9	7.6	5.2	4.8	3.9	4.7	6.5	7.1	6.0	4.8	4.6	5.3	4.2	4.9
16	6.7	7.2	6.3	7.3	5.9	4.6	3.9	5.2	6.2	6.8	6.3	5.0	4.5	5.9	4.9	6.4
17	NM	7.2	5.9	7.3	5.8	4.5	3.8	5.0	6.0	6.6	6.3	4.9	4.9	5.3	5.2	5.3
18	6.7	7.2	6.3	7.4	5.8	4.8	4.0	4.9	5.9	7.1	6.3	5.1	5.2	5.3	5.2	5.5
19	6.9	7.2	6.3	7.1	5.6	4.5	4.0	5.7	5.8	6.7	6.5	5.6	5.0	4.8	5.8	5.3
20	7.1	7.2	6.3	7.3	5.9	4.5	3.8	4.8	6.1	7.5	6.7	5.3	5.3	4.8	5.7	5.6

a During rain event 9, pH meter drifted, Data were not included in median values.
A Average of three replicate asphalt shingle panels

Table 4. Temperature (in ^{o}C) of panel runoff from the 20 rain events.

Event #	Steep-Slope Panels									Low-Slope Panels						
	AAR	AS[A]	CPR	CTI	PAZ	TWO	WOS	GST	BUA	BUR	BUS	EPD	PVC	TPO	ZIN	GLO
1	3.4	3.7	3.5	3.5	3.7	3.7	4.2	4.0	4.3	4.2	3.7	4.8	4.6	4.7	4.5	5.2
2	4.2	3.9	4.7	3.6	3.1	4.5	2.7	4.4	4.9	3.7	3.1	4.2	3.3	2.8	2.7	5.3
3	5.4	4.6	5.9	5.1	4.8	4.8	5.0	5.5	5.2	4.8	5.2	5.8	6.4	5.9	7.4	5.0
4	3.2	3.5	2.5	1.8	2.9	3.2	3.5	1.6	1.0	2.4	2.8	1.9	2.0	1.4	2.6	1.7
5	6.1	7.0	7.3	4.6	9.6	6.4	6.1	6.0	3.7	5.1	4.2	4.5	7.2	5.1	6.5	4.6
6	8.6	7.9	8.6	9.0	8.6	8.5	8.1	9.0	6.9	8.6	7.6	9.0	8.5	7.2	9.4	7.4
7	6.9	7.0	7.2	6.6	7.8	7.4	7.0	6.4	5.3	8.1	5.5	6.6	6.3	10.9	6.3	6.7
8	10.3	10.7	10.7	10.9	10.7	10.6	10.8	10.5	9.4	9.4	9.2	10.2	9.5	10.3	9.4	10.2
9	5.9	7.9	6.4	6.6	6.6	5.9	7.4	6.4	6.6	7.6	8.7	8.1	8.8	6.7	9.8	10.5
10	10.9	11.3	11.0	11.4	11.2	11.4	11.5	11.0	10.2	10.6	10.9	11.3	11.7	11.2	10.9	11.5
11	3.6	2.2	2.7	2.14	1.9	2.4	2,7	2.8	2.1	2.3	NM	3.4	2.8	2.8	4.2	4.2
12	7	6.66	6.7	6.5	6.9	7.1	6.4	5.6	7.5	7.3	6.7	6.1	6.9	7.5	6.9	7.9
13	2.2	2.5	1.8	1.7	2	1.5	1.3	5.27	1.6	1.9	1.5	1.8	1.7	1.4	1.6	2.4
14	7.5	8.2	8.6	8.2	8.4	8.5	8.8	8.9	7.9	7.9	7.9	8.7	9.1	8.5	8.5	8.4
15	1.0	1.6	1.0	2.4	1.2	1.5	1.4	1.1	2.0	1.4	1.2	1.5	1.0	1.2	1.5	1.2
16	3.6	3.4	3.2	3.8	3.6	3.1	2.9	4.6	3.3	3.3	2.2	4.0	3.4	2.8	3.1	2.5
17	NM	1.1	0.9	1.1	0.5	0.9	1.3	0.9	1.1	0.5	0.7	1.0	0.6	0.6	1.5	0.8
18	3.8	3.7	3.7	3.8	3.5	3.6	3.7	3.5	3.8	4.0	4.0	4.0	4.1	3.8	4.0	3.7
19	5.4	5.2	6.2	7.3	7.7	6.7	6.5	6.1	6.1	6.3	5.4	6.7	6.5	6.3	6.3	6.6
20	2.6	2.2	2.0	1.7	1.9	2.6	3.2	1.8	3.2	2.1	1.0	2.4	2.6	1.9	2.1	2.5

[A] Average of three replicate asphalt shingle panels
NM Not measured

Table 5. Specific conductance (uS/cm) of panel runoff from the 20 rain events.

Event #	Steep-Slope Panels									Low-Slope Panels						
	AAR	AS[A]	CPR	CTI	PAZ	TWO	WOS	GST	BUA	BUR	BUS	EPD	PVC	TPO	ZIN	GLO
1	15	14	11	63	6	15	108	6	6	20	6	13	13	6	4	6
2	13	15	6	64	16	24	117	10	11	25	9	10	7	16	15	13
3	3	4	2	28	3	7	38	4	0	2	11	1	1	0	2	0
4	9	9	8	82	2	18	84	0	5	5	6	7	4	4	41	3
5	21	23	4	116	6	21	175	5	9	17	16	25	8	9	8	2
6	13	13	4	61	6	9	83	4	10	21	14	17	13	5	5	17
7	6	13	8	44	0	3	76	0	0	1	0	4	0	0	2	0
8	4	3	1	18	10	2	32	0	1	5	5	1	0	0	0	0
9	4	7	0	28	1	4	51	0	0	3	1	5	0	0	0	0
10	14	19	0	72	0	14	74	0	3	13	9	14	0	1	0	0
11	32	48	32	128	4	27	95	12	7	46	NM	15	9	8	19	8
12	8	10	0	39	0	12	31	0	1	3	0	1	3	0	1	0
13	35	34	3	81	0	19	50	0	2	19	3	3	2	2	4	2
14	12	16	1	50	0	11	26	5	0	9	0	0	0	5	0	0
15	12	16	13	67	0	9	56	0	4	7	0	0	2	2	14	0
16	13	18	0	63	0	6	56	0	0	16	0	2	2	0	0	0
17	NM	14	0	57	0	7	73	0	0	17	0	0	0	0	0	0
18	9	11	0	54	0	2	31	0	0	4	0	0	0	2	0	0
19	43	38	23	62	18	25	52	21	16	28	17	20	16	21	18	18
20	20	24	2	80	7	18	85	0	2	11	2	0	4	14	0	0

[A] Average of three replicate asphalt shingle panels
NM Not measured

Table 6. Volume of runoff collected (in liters) for each rain event and each panel.

Event #	Total Precipitation (mm)	Steep-Slope Panels								Low-Slope Panels							
		AAR	AS[A]	CPR	CTI	PAZ	TWO	WOS	GST	BUA	BUR	BUS	EPD	PVC	TPO	ZIN	GLO
1	16.51	54.6	55.0	52.6	52.6	58.6	57.6	54.6	58.6	58.6	58.6	51.6	61.6	65.5	53.6	54.1	58.6
2	7.61	26.8	26.8	25.8	23.8	26.3	24.8	25.8	24.8	22.8	22.8	20.9	25.8	24.8	23.8	24.8	24.8
3	13.46	39.7	39.7	38.7	37.7	38.7	40.7	39.7	38.7	38.7	37.7	33.3	41.7	42.7	41.2	38.7	42.7
4	4.57	11.9	12.9	13.4	7.0	12.9	10.9	10.9	13.4	12.9	12.9	9.9	13.9	12.9	12.9	13.9	13.4
5	4.31	15.4	16.7	16.4	15.9	15.9	14.9	14.9	16.9	17.4	15.9	12.4	17.4	18.4	17.9	17.9	18.9
6	5.08	15.9	17.0	15.9	15.9	16.9	15.9	17.4	16.4	14.9	13.9	10.9	16.9	16.9	17.9	17.4	17.9
7	18.03	44.7	45.5	42.7	42.7	45.7	44.7	41.7	42.2	42.2	39.7	33.8	45.7	48.7	45.2	48.7	47.7
8	18.8	56.6	57.4	55.6	54.6	57.1	57.6	56.6	54.6	47.7	47.7	43.7	57.6	58.6	58.1	59.6	58.4
9	10.16	28.8	29.5	28.8	27.8	29.8	29.3	27.8	27.3	26.3	25.8	25.3	27.8	28.8	27.8	29.3	27.8
10	7.61	22.8	23.0	22.8	22.8	22.8	21.8	21.8	22.8	20.9	19.9	18.9	22.8	24.8	22.8	24.3	25.8
11	2.03	7.0	7.0	7.4	6.0	7.0	4.5	5.0	7.9	7.0	5.0	5.0	7.0	7.0	6.0	7.0	7.4
12	19.30	51.6	52.0	50.7	50.7	51.6	51.6	49.7	49.7	45.7	44.7	44.7	30.8	52.1	45.7	56.1	51.6
13	1.27	5.0	5.5	5.5	5.5	5.5	4.0	4.0	5.5	5.0	5.0	5.0	5.0	5.0	6.0	6.0	5.5
14	11.18	38.7	38.7	38.2	37.2	38.7	37.7	36.7	37.7	30.8	28.8	28.8	37.7	37.7	36.7	38.7	37.7
15	5.08	16.4	16.9	15.9	15.9	16.9	14.9	14.9	15.9	14.9	12.9	14.9	16.9	16.9	16.9	17.9	16.9
16	3.81	12.9	13.2	12.9	12.9	13.9	12.9	12.4	12.9	11.4	10.4	9.4	12.9	12.9	12.9	13.9	12.9
17	4.32	NS	12.9	12.9	12.4	12.9	11.9	11.9	11.9	5.0	9.9	9.9	12.9	12.9	12.9	12.9	12.9
18	9.14	23.8	23.8	23.3	22.8	23.8	22.8	22.8	22.8	21.4	20.9	20.9	25.8	25.8	24.3	26.8	25.8
19	12.95	45.7	45.7	45.2	43.7	46.7	46.7	46.7	44.7	35.8	34.3	33.8	44.7	45.7	44.2	45.7	45.7
20	6.60	14.9	15.5	15.9	14.9	14.9	12.9	12.9	15.9	13.9	11.9	11.9	16.9	16.9	16.9	17.4	16.9

NS No Sample obtained

Table 7. Total arsenic concentration (ug/L) by panel and rain event.

Event #	Total Precip. (mm)	Average Rain Intensity (mm/hr)	Steep-Slope Panels																Low-Slope Panels																	
			AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	16.5	0.028	**0.40**		**0.21**	J, a	**0.05**	J, a	**0.36**		**0.14**		**1,520**		**0.23**		**0.16**		**0.10**	a	**0.09**	J	**0.14**		0.02	U	**36**		**0.08**	J	**0.81**		**0.09**	J
2	7.6	0.034	**0.27**		**0.10**	J	**0.05**	J	**0.33**		**0.05**	J, a	**1,510**		**0.57**		**0.05**	J,a	**0.07**	J	**0.11**		**0.22**		**0.07**	J,a	**41**		**0.06**	J	0.02	U	**0.10**	
3	13.5	0.035	**0.40**	a	**0.10**	J	0.02	U	**0.34**		**0.12**		**1,260**	J,a	**0.36**		**0.16**		0.02	U	**0.07**	J	**0.09**	J	0.02	U	**20**		**0.06**	J,a	0.02	U	**0.12**	
4	4.6	0.011	**0.41**		**0.17**	J	0.02	U	**0.65**		0.02	U	**3,270**	J	**0.29**	J	**0.18**	J,a	**0.06**	J	**0.26**		**0.40**		0.02	U,a	**86**		**0.25**	J	**0.20**		**0.08**	J,a
5	4.3	0.018	**3.0**		**0.35**	J	**0.21**	J	**0.90**		**0.28**	J	**3,400**		**0.50**	**J**	**0.26**	J,a	**0.18**	J	**0.38**	J	**0.49**	J	**0.24**	J	**117**		**0.21**	J,a	**0.55**	J	**0.34**	J
6	5.1	0.012	**0.41**	J	**0.17**	J	**1.4**		**1.19**		**0.07**	J	**4,690**		**1.00**		**0.70**		**0.21**	J	**0.19**	J	**0.33**	J	**0.10**	J,a	**90**		**0.19**	J	**0.25**	J	**0.34**	J,a
7	18.0	0.054	**0.13**		**0.07**	J	**0.04**	J	**0.23**		**0.04**	J	**1,080**		**0.10**	J,a	**0.06**	J	**0.04**	J	**0.07**	J	**0.11**		0.02	U	**22**		**0.04**	J	**0.07**	J	**0.06**	J
8	18.8	0.044	**0.41**		**0.05**	J,a*	0.02	U	**0.22**	J	**0.08**	J	**1,700**		**0.06**	J	0.02	U	0.02	U	**0.07**	J	**0.04**	J,a	0.02	U	**24**		0.02	U	0.02	U	0.02	U
9	10.2	0.145	**0.19**	J,a	**0.10**	J	**0.08**	J,a	**0.22**	J,a	**0.09**	J	**692**	J	**0.16**	J	**0.07**	J	**0.04**	J	0.02	U	**0.06**	J	0.02	U	**30**		**0.07**	J	**0.10**	J	**0.09**	J
10	7.6	0.017	**0.20**		**0.07**	J,a	**0.08**	J	**0.45**		**0.12**	J,a	**2,405**	J,a	**0.10**	J	0.02	U	**0.15**	J	**0.17**	J	**0.25**		**0.08**	J	**54**	J,a	**0.10**	J	**0.11**	J	**0.10**	J
11	2.0	0.312	**1.1**	J,a	**0.31**	J	**0.13**	J	**0.89**		**0.22**	J	**4,040**	J,a	**0.49**	J	**0.165**	J,a	**0.2**	J	**0.18**	J	**0.3**	J	**0.15**	J	**25**		**0.17**	J	**0.15**	J	**0.22**	J
12	19.3	1.226	**0.06**	J	**0.02**	J,*	**0.12**	J,a	**0.23**		0.02	U	**660**		0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U,a	**2.3**		0.02	U,a	0.02	U	0.02	U
13	1.3	1.016	**0.18**	J	**0.08**	J,a	**0.13**	J	**0.43**		**0.05**	J	**1,090**		**0.13**	J	0.02	U	**0.1**	J	**0.13**	J	**0.15**	J	**0.07**	J	**18**		**0.08**	J	**0.09**	J,a	**0.08**	J
14	11.2	0.745	**0.32**		**0.04**	J,*	**0.04**	J	**0.46**		**0.09**	J	**723**		**0.08**	J,a	**0.08**	J	**0.05**	J,a*	0.02	U	**0.06**	J,a	**0.08**	J	**2.7**		**0.07**	J	**0.07**	J	**0.05**	J
15	5.1	0.391	**0.04**	J	**0.06**	J,*	0.02	U	**0.34**	a	**0.03**	J,a*	**774**		**0.11**		**0.07**	J	**0.07**	J	**0.09**	J	0.02	U	0.02	U	**3.7**		**0.06**	J	0.02	U	**0.08**	J,a*
16	3.8	0.586	**0.13**		**0.06**	J,a	0.02	U	**0.29**		**0.07**	J	**1,510**		**0.07**	J	0.02	U	**0.03**	J	**0.03**	J,a*	0.02	U	**0.06**	J	**3.6**		**0.03**	J	0.02	U	**0.04**	J
17	4.3	0.960	NS		**0.08**	J	**0.06**	J	**0.41**	a	0.02	U	**1,120**		**0.11**	J	0.02	U	**0.05**	J	**0.05**	J	**0.04**	J	**0.09**	J	**3.7**	a	0.02	U	**0.08**	J	0.02	U
18	9.1	0.778	**0.07**	J	**0.04**	J,*	**0.04**	J	**0.28**		**0.03**	J,a*	**560**		**0.05**	J	0.02	U	**0.03**	J,a*	**0.043**	J,a*	**0.07**	J	**0.07**	J	**1.8**		0.02	U	0.02	U	0.02	U
19	13.0	0.740	**0.15**		0.02	U.a	0.02	U	**0.18**		0.02	U	**72**		0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	**1.0**	a	0.02	U,a	0.02	U	0.02	U
20	6.60	0.281	**0.21**		**0.15**	a	**0.04**	J,a	**0.52**		**0.15**		**1,530**		**0.24**		**0.09**	J,a	**0.15**		**0.16**		**0.17**		**0.09**	J	**5.7**		0.02	U	**0.12**		**0.11**	

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
*: Where a value is less than the MDL, averages were calculated using 1/2 of the MDL.
NS: No sample collected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 8. Total cadmium concentration (ug/L) by panel and rain event.

Event #	Total Precip. (mm)	Average Rain Intensity (mm/hr)	Steep-Slope Panels																Low-Slope Panels																	
			AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	16.5	0.028	0.005	U	0.005	U,a	**0.008**	J,a	0.005	U	**0.010**	J	**0.130**		0.005	U	0.005	U	0.005	U,a	0.005	U	**0.020**	J	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
2	7.6	0.034	0.005	U	0.005	U	0.005	U	0.005	U	**0.018**	J,a	**0.160**		0.005	U	0.005	U,a	0.005	U	0.005	U	**0.010**	J	**0.038**	J,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
3	13.5	0.035	**0.020**	J,a	0.005	U	**0.030**	J	0.005	U	0.005	U	**0.095**	J,a	0.005	U	0.005	U	0.005	U	0.005	U	**0.090**	J	0.005	U	0.005	U	0.005	U,a	**0.010**	J	0.005	U		
4	4.6	0.011	**0.020**	J,a	**0.010**	J	**0.010**	J	0.005	U	**0.010**	J	**0.310**		**0.020**	J	**0.010**	J,a	0.005	U	0.005	U	**0.010**	J	**0.015**	J,a	**0.020**	J	0.005	U	**0.020**	J	**0.010**	J,a		
5	4.3	0.018	**0.010**	J	0.005	U	**0.060**	J	**0.010**	J	**0.020**	J	**0.310**		**0.020**	J	**0.020**	J,a	0.005	U	0.005	U	0.005	U	**0.010**	J	**0.010**	J	0.005	U,a	**0.020**	J	**0.030**	J		
6	5.1	0.012	0.005	U	0.005	U	**0.020**	J	0.005	U	0.005	U	**0.260**		**0.020**	J	0.005	U	**0.020**	J	0.005	U	0.005	U	**0.030**	J,a	**0.010**	J	**0.010**	J	0.005	U	**0.010**	J,a		
7	18.0	0.054	0.005	U	**0.016**	J,a	**0.020**	J	0.005	U	0.005	U	**0.090**	J	0.005	U,a	0.005	U	0.005	U	**0.013**	J,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U		
8	18.8	0.044	0.005	U	**0.009**	J,a	**0.020**	J	0.005	U	0.005	U	**0.120**		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U		
9	10.2	0.145	**0.010**	J,a	**0.020**	J	**0.020**	J,a	**0.025**	J,a	**0.020**	J	**0.070**	J	0.005	U	**0.010**	J	0.005	U	0.005	U	0.005	U	0.005	U	**0.020**	J	**0.020**	J	**0.020**	J	**0.020**	J		
10	7.6	0.017	0.005	U	**0.012**	J	**0.020**	J	**0.020**	J	**0.020**	J,a	**0.140**	a	0.005	U	0.005	U	0.005	U	**0.010**	J	**0.010**	J	0.005	U	0.005	U,a	0.005	U	**0.020**	J	0.005	U		
11	2.0	0.312	0.005	U,a	**0.007**	J,*	**0.020**	J	0.005	U	**0.030**	J	**0.240**	a	**0.020**	J	**0.030**	J,*	0.005	U	**0.020**	J	**0.020**	J	**0.020**	J	**0.030**	J	**0.040**	J	**0.030**	J	**0.030**	J		
12	19.3	1.226	0.005	U	0.005	U	**0.008**	J,a*	**0.010**	J	0.005	U	**0.050**	J	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	**0.015**	J,a	**0.010**	J	**0.010**	J		
13	1.3	1.016	**0.010**	J	0.005	U,a	0.005	U	0.005	U	0.005	U	**0.100**	J	**0.010**	J	0.005	U	0.005	U	0.005	U	**0.020**	J	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U		
14	11.2	0.745	0.005	U	0.005	U	0.005	U	**0.020**	J	0.005	U	**0.050**	J	0.005	U,a	0.005	U	0.005	U,a	0.005	U	**0.008**	J,a*	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U		
15	5.1	0.391	0.005	U	0.005	U	0.005	U	**0.040**	J,a	0.005	U	**0.100**	J	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.020**	J	0.005	U	0.005	U	0.005	U,a		
16	3.8	0.586	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	**0.070**	J	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U		
17	4.3	0.960	NS		**0.007**	J,*	**0.020**	J	**0.015**	J,a	0.005	U	**0.090**	J,a	**0.020**	J	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U		
18	9.1	0.778	0.005	U	**0.007**	J,*	**0.010**	J	**0.010**	J	0.005	U,a	**0.060**	J	0.005	U	0.005	U	0.005	U,a	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.010**	J		
19	13.0	0.740	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	**0.110**		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.010**	J	0.005	U,a	0.005	U,a	0.005	U	0.005	U		
20	6.60	0.281	0.005	U	0.005	U,a	**0.030**	J,a	**0.020**	J	**0.030**	J	**0.160**	J	**0.010**	J	**0.020**	J,a	0.005	U	0.005	U	**0.010**	J	0.005	U	**0.020**	J	**0.020**	J	**0.020**	J	**0.020**	J		

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
* Where a value is less than the MDL, averages were calculated using 1/2 of the MDL.
NS: No sample collected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 9. Total copper concentration (ug/L) by panel and rain event.

Event #	Total Precip. (mm)	Average Rain Intensity (mm/hr)	Steep-Slope Panels																Low-Slope Panels																	
			AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	16.5	0.028	**12**		**1.7**	a	**1,035**	J	**0.50**	J	**0.32**	J	**1,480**	J	**0.49**	J	**0.18**	J	**0.35**	J,a	**0.07**	J	**0.34**	J	**0.16**	J	**0.17**	J	**0.40**	J	**0.37**	J	**0.23**	J
2	7.6	0.034	**14**		**2.1**		**1,200**	J	**0.46**	J	**0.37**	J	**1,840**		**1.5**		**0.28**	J,a	**0.23**	J	**0.18**	J	**0.32**	J	**0.71**	J,a	**0.36**	J	**0.25**	J	**0.32**	J	**0.25**	J
3	13.5	0.035	**8.4**	a	**0.9**	J	**1,410**	J	**0.35**	J	**0.36**	J	**918**	J,a	**0.61**	J	**0.40**	J	**0.26**	J	**0.27**	J	**0.33**	J	**0.32**	J	**0.39**	J	**0.41**	J,a	**0.50**	J	**0.38**	J
4	4.6	0.011	**79**		**11**		**2,390**	J	**0.56**		**0.80**		**3,190**	J	**1.2**		**0.85**	a	**1.6**		**0.84**		**1.1**		**0.57**	a	**0.49**		**0.56**		**0.72**		**0.80**	a
5	4.3	0.018	**88**		**7.2**		**3,310**		**0.93**		**1.1**		**2,610**		**0.85**		**1.2**	a	**0.83**		**0.82**		**1.3**		**0.61**		**0.62**	a	**0.54**	a	**1.0**		**0.95**	
6	5.1	0.012	**30**		**2.2**		**3,380**		**0.66**		**0.33**		**1,760**		**0.65**		**0.27**		**0.33**		**0.26**		**0.32**		**0.35**	a	**0.47**		**0.33**		**0.39**		**0.41**	a
7	18.0	0.054	**34**		**4.4**	a	**1,610**	J	**0.36**	J	**0.31**	J	**732**		**0.47**	J	**0.22**	J	**0.49**	J	**0.31**	J,a	**0.39**	J	**0.27**	J	**0.28**	J	**0.28**	J	**0.25**	J	**0.27**	J
8	18.8	0.044	**26**		**2.9**	a	**1,160**	J	**0.40**	J	**0.58**		**936**		**2.4**		**0.30**	J	**0.36**	J	**0.24**	J	**0.36**	J,a	**0.34**	J	**0.39**	J	**0.33**	J	**0.23**	J	**0.33**	J
9	10.2	0.145	**46**	a	**5.0**		**1,805**	J,a	**1.1**	a	**1.3**		**601**		**0.82**		**0.63**		**0.74**		**0.74**		**1.0**		**0.54**	J	**1.2**		**0.76**		**1.03**		**0.57**	J
10	7.6	0.017	**86**		**7.0**		**2,270**	J	**1.1**		**0.91**	a	**1,045**	J,a	**0.73**	J	**0.43**	J	**1.1**		**1.1**		**1.4**		**0.94**		**0.71**	J,a	**0.60**	J	**0.67**	J	**0.42**	J
11	2.0	0.312	**114**	a	**4.2**		**4,220**	J	**1.2**	J	**2.5**	J	**1,450**	J,a	**1.2**	J	**4.1**	a	**2.7**	J	**1.4**	J	**1.9**	J	**1.2**	J	**1.8**	J	**1.8**	J	**2.5**	J	**2.5**	J
12	19.3	1.226	**18**	J	**0.9**	J	**1,630**	a	**0.88**	J	**0.58**	J	**262**		**0.39**	J	**0.78**	J	**0.39**	J	**0.4**	J	**0.35**	J	**0.42**	J,a	**0.52**	J	**0.76**	J,a	**0.52**	J	**0.57**	J
13	1.3	1.016	**193**		**2.3**	a	**2,480**		**0.59**	J	**0.57**	J	**625**		**1.0**		**0.33**	J	**1.1**		**0.75**	J	**0.67**	J	**0.71**	J	**0.56**	J	**0.49**	J	**0.50**	J,a	**0.49**	J
14	11.2	0.745	**28**		**0.7**	J	**1,900**		**1.2**		**0.41**	J	**276**		**0.76**	J,a	**0.45**	J	**0.35**	J,a	**0.25**	J	**0.23**	J,a	**0.26**	J	**0.36**	J	**0.38**	J	**0.47**	J	**0.49**	J
15	5.1	0.391	**45**		**1.7**	J	**2,320**		**2.4**	J,a	**1.0**	J	**534**		**1.1**	J	**1.2**	J	**1.1**	J	**0.57**	J	**0.51**	J	**0.51**	J	**1.0**	J	**0.95**	J	**0.89**	J	**1.3**	J,a
16	3.8	0.586	**30**		**1.1**	J,a	**1,910**		**0.44**		**0.20**	J	**435**		**0.43**	J	**0.21**	J	**0.52**	J	**0.53**	J,a	**0.53**	J	**0.20**	J	**0.25**	J	**0.28**	J	**0.42**	J	**0.39**	J
17	4.3	0.960	**NS**		**1.3**	J	**2,060**		**0.78**	J,a	**0.55**	J	**550**	a	**0.66**	J	**0.33**	J	**0.53**	J	**1.3**	J	**0.31**	J	**0.17**	J	**0.27**	J,a	**0.46**	J	**0.39**	J	**0.42**	J
18	9.1	0.778	**13**		**0.6**	J	**1,640**		**0.54**	J	**0.41**	J,a	**365**		**0.33**	J	**0.40**	J	**0.31**	J,a	**0.26**	J,a	**0.28**	J	**0.18**	J	**0.34**	J	**0.53**	J	**0.69**	J	**0.55**	J
19	13.0	0.740	**8.8**		**0.4**	J,a	**1,250**		**0.25**	J	**0.21**	J	**506**		**0.72**	J	**0.15**	J	**0.15**	J	**0.2**	J	**0.12**	J	**0.21**	J	**0.16**	J,a	**0.27**	J,a	**0.16**	J	**0.16**	J
20	6.60	0.281	**38**		**2.1**	J,a	**2,800**	J,a	**1.2**		**1.8**		**980**		**0.81**		**1.5**	J	**1.0**		**0.85**		**0.81**		**0.52**	J	**0.94**		**0.85**		**1.1**		**1.4**	

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
NS: No sample collected
Bold: Analyte detected above the MDL.

Table 10. Total lead concentration (ug/L) by panel and rain event.

Event #	Total Precip. (mm)	Average Rain Intensity (mm/hr)	Steep-Slope Panels																																			
			AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	16.5	0.028	**0.04**	J	**1.1**	a	**0.67**	a	**1.7**		**0.18**		0.002	U	**0.03**	J	**0.18**		**0.03**	J,a	**0.04**	J	**0.05**	J	**0.07**	J	**0.18**		**0.16**		**0.41**		**0.22**	
2	7.6	0.034	**0.01**	J	**0.03**	J	**0.56**		**0.55**		**0.07**	a	**0.03**	J	**0.02**	J	**0.10**	J,a	0.002	U	0.002	U	**0.04**	J	**0.12**	a	**0.09**	J	**0.04**	J	**0.15**		**0.08**	J
3	13.5	0.035	**0.01**	J	**0.04**	J	**0.19**		**0.20**		**0.13**	J	**0.08**	J,a	**0.04**	J	**0.12**	J,a	**0.03**	J	**0.03**	J	**0.07**	J	**0.54**		**0.14**	J	**0.11**	J,a	**0.18**		**0.68**	
4	4.6	0.011	**0.06**	J	**0.07**	J	**0.30**		**0.33**		**0.30**		**0.26**		**0.06**		**0.27**	a	**0.04**	J	**0.04**	J	**0.04**	J	**0.16**	a	**0.19**		**0.08**	J	**0.18**		**0.24**	a
5	4.3	0.018	**0.05**	J,a	**0.05**	J	**0.49**		**0.31**		**0.46**		**0.05**	J	**0.12**		**0.44**	a	**0.04**	J	**0.03**	J	**0.03**	J	**0.20**		**0.37**	a	**0.05**	J,a	**0.37**		**0.47**	
6	5.1	0.012	**0.05**	J	**0.06**	J	**0.20**		**0.25**		**0.30**		**0.03**	J	**0.08**	J	**0.28**		**0.04**	J	**0.03**	J	**0.04**	J	**0.11**	J,a	**0.33**		**0.13**		**0.30**		**0.36**	a
7	18.0	0.054	**0.05**	J	**0.06**	J,a	**0.25**		**0.17**		**0.17**		**0.03**	J	**0.04**	J,a	**0.14**		**0.05**	J	**0.04**	J,a	**0.04**	J	**0.09**	J	**0.16**		**0.15**		**0.18**		**0.16**	
8	18.8	0.044	**0.03**	J	**0.07**	J,a	**0.21**		**0.13**		**0.07**	J	**0.04**	J	**0.05**	J	**0.07**	J	**0.03**	J	**0.02**	J	**0.02**	J,a	**0.15**		**0.12**		**0.16**		**0.11**		**0.11**	
9	10.2	0.145	**0.06**	J,a	**0.07**	J	**0.23**	a	**0.21**	a	**0.17**		**0.05**	J	**0.04**	J	**0.11**		**0.07**	J	**0.03**	J	**0.03**	J	**0.17**		**0.22**		**0.12**		**0.16**		**0.15**	
10	7.6	0.017	**0.05**	J	**0.06**	J	**0.33**		**0.48**		**0.18**	a	**0.04**	J,a	**0.04**	J	**0.13**		**0.11**		**0.07**	J	**0.07**	J	**0.25**		**0.19**	a	**0.16**		**0.18**		**0.13**	
11	2.0	0.312	**0.06**	J,a	**0.06**	J	**0.64**		**0.24**		**0.43**		**0.03**	J,a	**0.08**	J	**1.3**	a	**0.08**	J	**0.22**		**0.08**	J	**0.30**		**0.18**		**0.18**		**0.4**		**0.35**	
12	19.3	1.226	**0.11**		**0.12**		**0.35**	a	**0.71**		**0.19**		**0.05**	J	**0.02**	J	**0.18**		**0.02**	J	**0.13**		**0.05**	J	**0.15**	a	**0.13**		**0.22**	a	**0.20**		**0.23**	
13	1.3	1.016	**0.05**	J	**0.06**	J,a	**0.20**		**0.11**		**0.06**	J	**0.01**	J	**0.04**	J	**0.04**	J	**0.02**	J	**0.04**	J	**0.03**		**0.07**	J	**0.20**		**0.05**	J	**0.08**	J,a	**0.08**	J
14	11.2	0.745	**0.04**	J	**0.04**	J	**0.19**		**1.0**		**0.09**	J	**0.03**	J	**0.03**	J,a	**0.08**	J	**0.02**	J,a	**0.02**	J	**0.02**	J,a	**0.04**	J	**0.11**		**0.08**	J	**0.11**		**0.11**	
15	5.1	0.391	**0.16**		**0.16**		**0.21**		**2.4**	a	**0.27**	a	**0.13**		**0.08**	J	**0.34**		**0.06**	J	**0.1**	J	**0.06**	J	**0.17**		**0.34**		**0.39**		**0.29**		**0.43**	a
16	3.8	0.586	**0.06**	J	**0.07**	J,a	**0.18**		**0.14**		**0.04**	J	**0.03**	J	**0.05**	J	**0.05**	J	**0.03**	J	**0.05**	J,a	**0.05**	J	**0.03**	J	**0.05**	J	**0.04**	J	**0.08**	J	**0.07**	J
17	4.3	0.960	NS		**0.95**	J	**0.17**		**0.44**	a	**0.09**	J	**0.06**	J,a	**0.04**	J	**0.05**	J	**0.02**	J	**0.05**	J	**0.02**	J	**0.03**	J	**0.05**	J,a	**0.09**	J	**0.06**	J	**0.06**	J
18	9.1	0.778	**0.03**	J	**0.05**	J	**0.16**		**0.35**		**0.22**	a	**0.03**	J	**0.04**	J	**0.19**		**0.03**	J,a	**0.04**	J,a	**0.04**	J	**0.03**	J	**0.10**		**0.12**		**0.21**		**0.17**	
19	13.0	0.740	0.002	U	**0.01**	J,a	**0.10**		**0.16**		**0.05**	J	**0.01**	J	**0.01**	J	**0.04**	J	0.002	U	**0.01**	J	0.002	U	0.002	U	**0.04**	J,a	**0.07**	J,a	**0.05**	J	**0.05**	J
20	6.60	0.281	**0.09**	J	**0.18**	a	**0.38**	a	**0.58**		**0.29**		**0.08**	J	**0.13**		**0.30**	a	**0.08**	J	**0.14**		**0.08**	J	**0.13**		**0.23**		**0.19**		**0.18**		**0.27**	

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
* Where a value is less than the MDL, averages were calculated using 1/2 of the MDL.
NS: No sample collected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 11. Total zinc concentration (ug/L) by panel and rain event.

Event #	Total Precip. (mm)	Average Rain Intensity (mm/hr)	Steep-Slope Panels																															
			AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		Low-Slope Panels																	
																			BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	16.5	0.028	**8.7**		**1.9**	J,a	**5.8**	a	**4.4**	J	**18**		**11**		**5.7**		**3.5**	J	**1.1**	J,a	**1.6**	J	**1.9**	J	**99**		**4.7**	J	**3.7**	J	**121**		**2.2**	J
2	7.6	0.034	**10**	J	**3.7**	J	**2.8**	J	**2.9**	J	**21**	a	**13**	J	**6.2**	J	**5.1**	J,a	**1.3**	J	**1.3**	J	**4.2**	J	**130**	a	**5.1**	J	**2.6**	J	**117**		**3.4**	J
3	13.5	0.035	**7.4**	J,a	**1.7**	J	**2.1**	J	**3.6**	J	**23**		**8.1**	J	**3.8**	J	**1.9**	J	**3.0**	J	**3.4**	J	**1.8**	J	**49**		**3.7**	J	**2.9**	J,a	**69**		**1.6**	J
4	4.6	0.011	**18**	J	**5.0**	J	**5.6**	J	**6.2**	J	**58**		**20**		**9.7**	J	**3.2**	J,a	**2.4**	J	**2.2**	J	**4.5**	J	**313**	a	**11**	J	**3.1**	J	**192**		**6.1**	J,a
5	4.3	0.018	**19**	J	**5.1**	J	**6.4**	J	**8.1**	J	**73**		**26**		**10**	J	**6.4**	J,a	**3.7**	J	**4.0**	J	**3.4**	J	**276**		**11**	J,a	**3.4**	J,a	**322**		**7.5**	J
6	5.1	0.012	**14**	J	**6.4**	J	**3.4**	J	**3.2**	J	**83**		**16**	J	**17**	J	**3.0**	J	**9.0**	J	**2.5**	J	**4.9**	J	**200**	J,a	**8**	J	**3.2**	J	**578**		**2.3**	J,a
7	18.0	0.054	**14**	J	**3.2**	J,a	**6.0**	J	**3.9**	J	**24**	J	**7.4**	J	**5.2**	J,a	**4.4**	J	**2.9**	J	**4.3**	J,a	**6.1**	J	**65**	J	**5**	J	**3.6**	J	**45**	J	**3.6**	J
8	18.8	0.044	**6.4**	J	**3.7**	J.a	**3.9**	J	**3.2**	J	**18**		**8.0**	J	**4.7**	J	**3.4**	J	**2.1**	J	**4.9**	J	**2.7**	J,a	**44**		**5**	J	**6.0**	J	**38**		**4.2**	J
9	10.2	0.145	**11**	J,a	**6.9**		**6.1**	J,a	**9.5**	J,a	**30**		**7.8**		**5.0**	J	**4.3**	J	**3.0**	J	**2.8**	J	**2.4**	J	**99**		**12**	J	**7.6**		**131**		**5.9**	
10	7.6	0.017	**12**		**5.1**	J	**12**		**11**		**48**	a	**10**	J,a	**6.4**	J	**5.8**	J	**5.1**	J	**6.3**	J	**4.2**	J	**108**		**11**	a	**7.5**	J	**103**		**5.1**	J
11	2.0	0.312	**5.9**	J,a	**1.9**	J	**7.6**	J	**2.4**	J	**194**		**10**	J,a	**4.5**	J	**13**	J,a	**2.4**	J	**2.7**	J	**2.2**	J	**154**		**12**		**15**		**496**		**9.8**	J
12	19.3	1.226	**3.4**	J	**1.9**	J	**2.0**	J,a	**4.1**	J	**47**		**5.1**		**1.8**	J	**2.0**	J	**3.0**	J	**1.9**	J	**1.4**	J	**22**	a	**2.1**	J	**3.25**	J,a	**111**		**2.6**	J
13	1.3	1.016	**5.7**		**2.0**	J	**5.0**	J	**2.9**	J	**113**		**11**		**6.1**		**3.4**	J	**2.8**	J	**1.6**	J	**2.8**	J	**110**		**4.3**	J	**2.0**	J	**328**	a	**3.9**	J
14	11.2	0.745	**1.7**	J	**0.9**	J	**1.7**	J	**5.6**		**56**		**3.6**	J	**1.2**	J,a	**2.3**	J	**2.4**	J,a	**0.9**		**1.2**	J,a	**17**		**2.3**	J	**2.7**	J	**93**		**4.4**	J
15	5.1	0.391	**3.9**	J	**2.3**	J	**2.4**	J	**12**	a	**106**	a	**7.1**	J	**3.4**	J	**3.8**	J	**4.0**	J	**5.2**	J	**1.5**	J	**30**		**8.6**		**6.3**	J	**255**		**5.1**	J,a
16	3.8	0.586	**2.0**	J	**1.2**	J,a	**1.1**	J	**1.1**	J	**59**		**3.8**	J	**4.4**	J	**1.0**	J	**2.5**	J	**2.5**	J,a	**1.0**	J	**15**		**1.4**	J	**2.4**	J	**109**		**1.2**	J
17	4.3	0.960	NS		**3.9**	J	**4.0**	J	**5.6**	a	**66**		**9.5**	a	**6.3**		**1.4**	J	**3.4**	J	**2.3**	J	**3.2**	J	**21**		**2.2**	J,a	**4.3**	J	**95**		**4.2**	J
18	9.1	0.778	**2.1**	J	**2.3**	J	**2.4**	J	**3.5**	J	**48**	J,a	**2.9**	J	**6.1**		**4.5**	J	**1.0**	J,a	**0.9**	J,a	**0.5**	J	**23**		**5.2**		**2.6**	J	**63**		**2.2**	J
19	13.0	0.740	**4.0**	J	**2.6**	J,a	**1.1**	J	**6.6**	J	**42**		**7.1**		**5.7**	J	**4.2**	J	**3.7**	J	**4.4**	J	**2.7**	J	**49**		**4.1**	J,a	**6.0**	J,a	**91**		**3.5**	J
20	6.60	0.281	**4.8**	J	**2.8**	J,a	**7.8**	J,a	**5.7**	J	**125**		**10**		**5.4**	J	**6.5**	J,a	**0.8**	J	**2.3**	J	**1.0**	J	**43**		**6.2**	J	**6.9**		**253**		**7.4**	

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
NS: No sample collected
Bold: Analyte detected above the MDL

Table 12. Concentrations of PAHs (in ug/L) in runoff from rain event 1.

PAHs	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1-Methylnaphthalene	0.001	U	**0.001**	J,a*	0.001	U,a	0.001	U	0.001	U	**0.016**	J	0.005	U	**0.002**	J	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
2-Methylnaphthalene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.130**	J	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
Acenaphthene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.007	U		Rej	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
Acenaphthylene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U		Rej		Rej	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
Anthracene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.007**	J		
Benz[a]anthracene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
Benzo(a)pyrene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	**0.008**	J	0.001	U	0.001	U		
Benzo(b)fluoranthene	0.001	U	**0.002**	J,a*	**0.003**	J,a*	**0.009**	J	**0.006**	J	0.001	U	0.001	U	0.001	U	**0.002**	J,a*	0.001	U	0.001	U	**0.009**	J	0.001	U	**0.011**		0.001	U	**0.008**	J		
Benzo(ghi)perylene	0.001	U	**0.001**	J,a*	0.001	U,a	**0.005**	J	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.007**	J	0.001	U	**0.007**	J	**0.005**	J	0.001	U		
Benzo(k)fluoranthene	0.001	U	**0.002**	J,a*	0.001	U,a	**0.009**	J	0.006	J	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.006**	J	0.001	U	**0.007**	J	0.001	U	**0.008**	J		
Chrysene	0.001	U	0.001	U,a	0.001	U,a	**0.003**	J	**0.001**	J	0.001	U	0.001	U	0.001	U	**0.002**	J,a*	0.001	U	0.001	U	0.001	U	0.001	U	**0.003**	J	0.001	U	0.001	U		
Dibenzo(a,h)anthracene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
Fluoranthene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.003**	J,a*	0.001	U	**0.005**	J	**0.011**		**0.005**	J	**0.007**	J	**0.006**	J	0.001	U		
Fluorene	0.001	U	0.000	U,a	0.000	U,a	0.000	U	**0.002**	J	0.000	U	0.000	U	0.001	U	0.000	U,a	**0.003**	J	**0.003**	J	0.001	U	0.001	U	0.001	U	0.001	U	0.000	U		
Indeno(1,2,3-cd)pyrene	0.001	U	**0.002**	J,a*	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.006**	J	0.001	U	**0.007**	J	**0.006**	J	0.001	U		
Naphthalene	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.006	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U		
Phenanthrene	**0.012**		**0.011**	J,a	**0.003**	J,a*	**0.007**	J	**0.007**	J	0.001	U	0.001	U	**0.009**	J	**0.004**	J,a*	**0.007**	J	**0.016**		**0.010**	J	0.001	U	**0.005**	J	**0.005**	J	0.001	U		
Pyrene	0.001	U	**0.003**	J,a*	**0.003**	J,a*	**0.006**	J	**0.006**	J	0.001	U	0.001	U	**0.006**	J	**0.002**	J,a*	0.001	U	**0.004**	J	**0.026**		**0.005**	J	**0.006**	J	**0.005**	J	**0.006**	J		

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
L: Sample lost
Rej: Data rejected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL

Table 13. Concentrations of PAHs (in ug/L) in runoff from rain event 2.

PAHs	Steep-Slope Panels																Low-Slope Panels																			
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1-Methylnaphthalene	0.001	U	**0.003**	J,*	0.001	U	0.001	U	0.001	U,a	**0.027**	J	0.001	U	0.001	U,a	0.001	U	**0.002**	J	**0.007**	J	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
2-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.012**	J	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Acenaphthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U		Rej	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Acenaphthylene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U		Rej	0.001	U,a	0.001	U	0.001	U	0.002	U	0.001	U,a	0.002	U	0.001	U	0.001	U	0.001	U
Anthracene	0.001	U	**0.009**	J,*	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.004**	J,a*	0.001	U	0.001	U	0.002	U	0.001	U,a	0.002	U	0.001	U	0.001	U	0.001	U
Benz[a]anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(a)pyrene	0.001	U	0.001	U	**0.009**	J	**0.007**	J	0.001	U,a	0.001	U	0.009	U	**0.005**	J,a*	0.001	U	0.001	U	0.002	U	0.001	U,a	0.002	U	0.001	U	0.001	U	**0.010**	J
Benzo(b)fluoranthene	0.001	U	**0.003**	J,*	**0.012**		0.009	J	**0.013**	a	0.001	U	0.006	U	**0.014**		0.001	U	0.001	U	0.001	U	**0.014**		**0.013**	J	**0.009**	J	**0.012**		**0.015**	
Benzo(ghi)perylene	0.001	U	**0.002**	J,*	**0.007**	J	0.001	U	**0.007**	J,a	0.001	U	0.009	U	**0.008**	J,a	0.001	U	0.001	U	0.002	U	**0.009**	J,a	**0.005**	J	0.001	U	**0.006**	J	**0.009**	J
Benzo(k)fluoranthene	0.001	U	**0.003**	J,*	**0.008**	J	**0.007**	J	0.007	J,a	0.001	U	0.006	U	**0.011**		0.001	U	0.001	U	0.001	U	**0.008**	J,a	0.001	U	0.001	U	**0.007**	J	**0.009**	J
Chrysene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Dibenzo(a,h)anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.008	U	0.001	U,a	0.001	U	0.001	U	0.002	U	0.001	U,a	0.002	U	0.001	U	0.001	U	0.001	U
Fluoranthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.012**		0.001	U	0.001	U	**0.005**	J	0.001	U
Fluorene	0.001	U	**0.004**	J,*	0.001	U	0.001	U	0.000	U,a	0.000	U	0.001	U	0.000	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.000	U
Indeno(1,2,3-cd)pyrene	0.001	U	0.001	U	**0.009**	J	0.001	U	**0.009**	J,a	0.001	U	**0.011**	J	**0.010**		0.001	U	0.001	U	0.002	U	**0.009**	J,a	**0.008**	J	**0.007**	J	**0.008**	J	**0.011**	
Naphthalene	0.001	U	**0.004**	J,*	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.003**	J,a*	0.001	U	**0.006**	J	**0.011**	J	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Phenanthrene	**0.010**	J	**0.010**	J	0.001	U	**0.005**	J	**0.003**	J,a*	0.001	U	0.001	U	**0.005**	J,a	**0.005**	J	**0.009**	J	**0.018**	J	**0.007**	J,a*	0.002	U	0.001	U	**0.005**	J	**0.005**	J
Pyrene	0.001	U	0.001	U	**0.006**	J	**0.005**	J	**0.006**	J,a	0.001	U	0.001	U	**0.006**	J,a	0.001	U	0.001	U	**0.010**	J	**0.029**		**0.010**	J	0.001	U	**0.005**	J	**0.006**	J

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
Rej: Data rejected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL

Table 14. Concentrations of PAHs (in ug/L) in runoff from rain event 3.

PAHs	Steep-Slope Panels														Low-Slope Panels															
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1-Methylnaphthalene	0.001	U,a	**0.004**	J,*	0.001	U	0.001	U	0.001	U	**0.046**	J,a*	0.005	U	0.001	U	0.001	U	0.001	U	**0.019**	J	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
2-Methylnaphthalene	**0.008**	J,a	**0.006**	J,*	**0.007**	J	**0.008**	J	0.001	U	0.001	U,a	0.006	U	0.001	U	0.001	U	**0.007**	J	**0.032**		0.001	U	0.001	U	0.001	U,a	**0.006**	J	**0.006**	J
Acenaphthene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.002	U,a		Rej	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Acenaphthylene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.003	U,a		Rej	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Anthracene	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.014**		0.001	U,a	**0.048**		0.001	U	**0.011**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Benz[a]anthracene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.005	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Benzo(a)pyrene	0.001	U,a	**0.003**	J,*	**0.008**	J	0.001	U	0.001	U	0.001	U,a	0.009	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Benzo(b)fluoranthene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.006	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Benzo(ghi)perylene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.009	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Benzo(k)fluoranthene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.006	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Chrysene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.007	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Dibenzo(a,h)anthracene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.008	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Fluoranthene	0.001	U,a	0.001	U	**0.007**	J	0.001	U	**0.006**	J	**0.005**	J,a	0.001	U	**0.007**	J	0.001	U	0.001	U	0.001	U	**0.010**		0.001	U	0.001	U,a	0.001	U	**0.007**	J
Fluorene	0.006	J,a	**0.005**	J,*	0.001	U	0.001	U	0.001	U	0.000	U,a	0.000	U	0.000	U	0.000	U	**0.005**	J	**0.006**	J	0.001	U	0.000	U	0.000	U,a	0.000	U	0.000	U
Indeno(1,2,3-cd)pyrene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.010	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
Naphthalene	**0.015**		**0.012**	J,*	**0.017**		**0.017**		**0.018**		**0.008**	J,a*	0.006	U	**0.015**		**0.017**		**0.014**		**0.034**		**0.016**		0.001	U	**0.017**		**0.016**		**0.017**	
Phenanthrene	**0.010**	J,a	**0.011**	J	**0.011**		**0.008**	J	**0.010**		0.001	U,a	0.001	U	**0.010**		**0.008**	J	**0.011**		**0.025**		**0.012**		0.001	U	**0.006**	J,a	**0.007**	J	**0.011**	
Pyrene	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.010	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.031**		0.001	U	0.001	U,a	0.001	U	0.001	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
Rej: Data rejected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL

Table 15. Concentrations of PAHs (in ug/L) in runoff from rain event 4.

PAHs	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.014**	J	**0.003**	J,a*	**0.017**	J	0.001	U	0.001	U,a
2-Methylnaphthalene	0.001	U	0.001	U	**0.003**	J,a*	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.005**	J,a*
Acenaphthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Acenaphthylene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Anthracene	0.001	U	0.001	U	**0.009**	J,a*	0.001	U	0.001	U	**0.056**		0.029	U,a	**0.007**	J	0.001	U	**0.009**	J,a*
Benz[a]anthracene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Benzo(a)pyrene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.004**	J,a*
Benzo(b)fluoranthene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Benzo(ghi)perylene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U,a
Benzo(k)fluoranthene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Chrysene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Dibenzo(a,h)anthracene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Fluoranthene	0.001	U	0.001	U	**0.012**		0.001	U	0.001	U	0.001	U	**0.016**	a	0.001	U	0.001	U	**0.011**	
Fluorene	0.000	U	0.001	U	**0.004**	J,a*	0.000	U	0.000	U	0.000	U	0.000	U,a	0.001	U	0.000	U	0.000	U
Indeno(1,2,3-cd)pyrene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Naphthalene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.021**		0.011	U,a	0.001	U	0.001	U	0.001	U
Phenanthrene	**0.018**		**0.015**		**0.012**	J,a	**0.010**	J	0.001	U	**0.041**	J	0.021	U,a	**0.006**	J	**0.007**	J	**0.013**	J,a
Pyrene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.001**		0.001	U	0.001	U	0.001	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 16. Concentrations of PAHs (in ug/L) in runoff from rain event 5.

PAHs	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	**0.019**		0.001	U	0.001	U,a	0.001	U,a	0.001	U
2-Methylnaphthalene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	**0.031**		0.001	U	0.001	U,a	0.001	U,a	0.001	U
Acenaphthene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Acenaphthylene	0.002	U	0.002	U	0.001	U,a	L		0.002	U	0.001	U	0.002	U	0.001	U,a	0.001	U,a	0.001	U
Anthracene	0.002	U	0.002	U	0.002	U,a	L		0.002	U	0.001	U	0.002	U	0.001	U,a	**0.005**	J,a*	0.001	U
Benz[a]anthracene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benzo(a)pyrene	0.002	U	0.002	U	**0.014**	J,a	L		0.002	U	0.001	U	0.002	U	0.001	U,a	0.001	U,a	**0.010**	J
Benzo(b)fluoranthene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benzo(ghi)perylene	0.002	U	0.002	U	**0.010**	J,a*	L		0.002	U	0.001	U	**0.020**		0.001	U,a	0.001	U,a	0.001	U
Benzo(k)fluoranthene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Chrysene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Dibenzo(a,h)anthracene	0.002	U	0.001	U	0.001	U,a	L		0.002	U	0.001	U	0.002	U	0.001	U,a	0.001	U,a	0.001	U
Fluoranthene	0.001	U	0.001	U	**0.019**		L		0.001	U	0.001	U	**0.027**		0.001	U,a	0.001	U,a	**0.014**	J
Fluorene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Indeno(1,2,3-cd)pyrene	0.002	U	0.002	U	**0.010**	J,a*	L		0.002	U	0.001	U	0.002	U	0.001	U,a	0.002	U,a	0.001	U
Naphthalene	0.001	U	0.001	U	0.001	U,a	L		0.001	U	**0.026**		0.001	U	0.001	U,a	**0.006**	J,a*	**0.012**	J
Phenanthrene	**0.020**		**0.020**	J	**0.014**	J,a	L		**0.019**	J	**0.050**		0.002	U	0.001	U,a	0.002	U,a	0.001	U
Pyrene	0.002	U	0.002	U	0.002	U,a	L		0.002	U	0.001	U	**0.056**		0.001	U,a	0.002	U,a	0.001	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
L: Sample lost
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 17. Concentrations of PAHs (in ug/L) in runoff from rain event 6.

PAHs	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.016**		0.001	U,a	0.001	U	0.001	U	0.001	U,a
2-Methylnaphthalene	0.001	U	**0.003**	J,*	0.001	U	0.001	U	0.001	U	**0.026**		0.001	U,a	0.001	U	0.001	U	0.001	U,a
Acenaphthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Acenaphthylene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Benz[a]anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Benzo(a)pyrene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Benzo(b)fluoranthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Benzo(ghi)perylene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.007**	J,a	0.001	U	0.001	U	0.001	U,a
Benzo(k)fluoranthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Chrysene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Dibenzo(a,h)anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Fluoranthene	0.001	U	0.001	U	**0.006**	J	0.001	U	0.001	U	0.001	U	**0.017**	J,a	0.001	U	0.001	U	**0.006**	J,a
Fluorene	0.001	U	**0.008**	J,*	0.001	U	0.001	U	0.001	U	**0.008**	J	0.000	U,a	0.000	U	0.000	U	0.001	U,a
Indeno(1,2,3-cd)pyrene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Naphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
Phenanthrene	**0.014**	J	**0.013**	J	**0.008**	J	**0.009**	J	**0.014**	J	**0.033**	J	**0.011**	J,a*	**0.005**	J	**0.008**	J	**0.008**	J,a
Pyrene	**0.007**	J	0.001	U	**0.008**	J	0.001	U	0.001	U	0.001	U	**0.050**	J,a	0.001	U	0.001	U	**0.008**	J,a

[A] Average of three replicate asphalt shingle panels
[A] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 18. Concentrations of PAHs (in ug/L) in runoff from rain event 7.

PAHs	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene		Rej	0.001	U,a		Rej	0.001	U	0.001	U,a	**0.012**	J	0.001	U	0.001	U	0.001	U		Rej
2-Methylnaphthalene	0.001	U	0.001	U,a		Rej	0.001	U	0.001	U,a	**0.023**	J	0.001	U	0.001	U	0.001	U		Rej
Acenaphthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Acenaphthylene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Anthracene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Benz[a]anthracene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(a)pyrene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(b)fluoranthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(ghi)perylene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(k)fluoranthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Chrysene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Dibenzo(a,h)anthracene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Fluoranthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	**0.014**	J	0.001	U	0.001	U	0.001	U
Fluorene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.000	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Indeno(1,2,3-cd)pyrene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Naphthalene	0.001	U	**0.006**	J,a*	0.001	U	0.001	U	0.001	U,a	**0.022**	J	0.001	U	0.001	U	0.001	U	0.001	U
Phenanthrene	**0.013**	J	**0.014**	J,a	**0.010**	J	0.001	U	**0.013**	J,a	**0.036**	J	0.001	U	0.001	U	0.001	U	**0.011**	J
Pyrene	0.001	U	0.001	U,a	**0.008**	J	0.001	U	0.001	U,a	0.001	U	**0.027**	J	0.001	U	0.001	U	**0.009**	J

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
Rej: Data rejected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 19. Concentrations of PAHs (in ug/L) in runoff from rain event 8.

PAHs	Steep-Slope Panels						Low-Slope Panels															
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.009**	J,a	0.001	U	0.001	U	0.001	U	0.001	U
2-Methylnaphthalene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.016**		**0.031**	J	0.001	U	0.001	U	0.001	U
Acenaphthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Acenaphthylene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Anthracene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Benz[a]anthracene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(a)pyrene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(b)fluoranthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(ghi)perylene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Benzo(k)fluoranthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Chrysene	0.001	U	**0.002**	J,a*	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Dibenzo(a,h)anthracene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Fluoranthene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Fluorene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.003**	J,a*	0.001	U	0.001	U	0.001	U	0.001	U
Indeno(1,2,3-cd)pyrene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
Naphthalene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	**0.007**	J,a*	0.001	U	0.001	U	0.001	U	0.001	U
Phenanthrene	**0.011**		**0.008**	J,a*	0.001	U	0.001	U	**0.011**		**0.027**		0.001	U	0.001	U	0.001	U	0.001	U
Pyrene	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U,a	**0.038**		0.001	U	0.001	U	0.001	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 20. Concentrations of PAHs (in ug/L) in runoff from rain event 9.

PAHs	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
2-Methylnaphthalene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	**0.011**		0.001	U	0.001	U	0.001	U	0.001	U
Acenaphthene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Acenaphthylene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Anthracene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Benz[a]anthracene	0.010	U,a	0.010	U,a	0.010	U	0.010	U,a	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Benzo(a)pyrene	0.010	U,a	0.010	U,a	**0.010**	J	0.010	U,a	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	**0.010**	J
Benzo(b)fluoranthene	0.010	U,a	0.010	U,a	**0.015**	J	0.010	U,a	0.010	U	0.010	U	**0.012**	J	**0.014**	J	**0.008**	J	**0.016**	J
Benzo(ghi)perylene	0.010	U,a	0.010	U,a	**0.012**		0.010	U,a	0.010	U	0.010	U	**0.011**		0.010	U	0.010	U	**0.012**	
Benzo(k)fluoranthene	0.001	U,a	0.001	U,a	**0.012**		0.001	U,a	0.001	U	0.001	U	**0.011**		**0.014**	J	0.001	U	**0.012**	
Chrysene	**0.005**	J,a*	**0.011**	J,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Dibenzo(a,h)anthracene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Fluoranthene	0.001	U,a	0.001	U,a	**0.010**	J	0.001	U,a	0.001	U	0.001	U	**0.016**		**0.011**		0.001	U	**0.010**	J
Fluorene	0.010	U,a	0.010	U,a	0.010	U	0.010	U,a	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Indeno(1,2,3-cd)pyrene	0.001	U,a	0.001	U,a	**0.009**	J	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.009**	J
Naphthalene	0.010	U,a	0.010	U,a	0.010	U	0.010	U,a	0.010	U	0.011	U	0.010	U	0.010	U	0.010	U	0.010	U
Phenanthrene	0.010	U,a	**0.011**	J,a,*	0.010	U	0.010	U,a	**0.011**		**0.021**		0.010	U	0.010	U	0.010	U	0.010	U
Pyrene	0.001	U,a	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.033**		0.001	U	0.001	U	0.001	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 21. Concentrations of PAHs (in ug/L) in runoff from rain event 10.

PAHs	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
1-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
2-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Acenaphthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Acenaphthylene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benz[a]anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benzo(a)pyrene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benzo(b)fluoranthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benzo(ghi)perylene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Benzo(k)fluoranthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Chrysene	**0.010**	J	**0.010**	J	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Dibenzo(a,h)anthracene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Fluoranthene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Fluorene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Indeno(1,2,3-cd)pyrene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Naphthalene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U
Phenanthrene	**0.014**		**0.013**		0.001	U	**0.008**	J	**0.013**	a	**0.029**		0.001	U	0.001	U,a	0.001	U,a	0.001	U
Pyrene	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	**0.051**		0.001	U,a	0.001	U,a	0.001	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 22. Concentrations of PAHs (in ug/L) in runoff from rain event 12.

PAH	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1-Methylnaphthalene	0.0005	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.004**	J	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
2-Methylnaphthalene	0.0007	U	**0.004**	J,*	0.001	U,a	0.001	U	**0.006**	J	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.008**	J	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
Acenaphthene	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
Acenaphthylene	**0.012**	J	**0.007**	J,*	**0.014**	J,a	**0.014**	J	0.001	U	0.001	U	**0.100**	J	**0.014**	J	**0.018**	J	**0.013**	J	**0.013**	J	**0.009**	J,a*	**0.013**	J	**0.009**	J,a*	0.001	U	**0.015**	J
Anthracene	0.0012	U	**0.013**	J,*	0.012	U,a	0.001	U	**0.023**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
Benz[a]anthracene	0.0006	U	**0.024**		**0.009**	J,a	0.001	U	**0.017**		0.001	U	**0.022**	J	**0.008**	J	**0.009**	J	0.001	U	**0.008**	J	0.001	U,a	0.001	U	**0.005**	J,a*	0.001	U	0.001	U
Benzo(a)pyrene	0.0010	U	0.004	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.005	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
Benzo(b)fluoranthene	**0.019**	J	**0.020**	J,*	**0.022**	J,a	**0.022**	J	**0.026**	J	**0.030**	J	**0.025**	J	**0.021**	J	**0.019**	J	**0.020**	J	0.001	U	**0.020**	J,a	**0.017**	J	**0.021**	J,a	**0.020**	J	**0.019**	J
Benzo(ghi)perylene	**0.003**	J	**0.004**	J	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.003**	J	0.045	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
Benzo(k)fluoranthene	**0.011**		0.004	U	**0.010**	J,a	**0.011**		0.001	U	0.001	U	**0.015**		**0.011**		**0.010**	J	**0.011**		0.001	U	**0.010**	J,a	**0.008**	J	**0.011**	J,a	**0.009**	J	**0.012**	
Chrysene	**0.011**		**0.014**		**0.005**	J,a*	0.001	U	0.001	U	0.001	U	**0.011**	J	**0.009**	J	0.001	U	**0.012**		**0.009**	J	**0.004**	J,a*	0.001	U	0.001	U,a	0.001	U	0.001	U
Dibenzo(a,h)anthracene	**0.006**	J	**0.003**	J,*	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.005**	J	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	**0.005**	J
Fluoranthene	0.0007	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
Fluorene	0.0006	U	0.002	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.007**	J	0.001	U	**0.008**	J	0.001	U,a	0.001	U	0.005	U,a	0.001	U	0.010	U
Indeno(1,2,3-cd)pyrene	**0.009**	J	**0.009**	J	**0.008**	J,a	**0.009**	J	**0.007**	J	**0.009**	J	**0.012**		**0.008**	J	**0.008**	J	**0.009**	J	**0.008**	J	**0.005**	J,a*	0.001	U	**0.008**	J,a	**0.007**	J	**0.008**	J
Naphthalene	**0.010**	J	**0.012**		**0.015**	a	**0.013**		**0.013**		0.001	U	**0.017**	J	**0.013**		**0.014**		**0.013**		**0.014**		**0.013**	J,a	**0.011**		**0.012**	a	**0.013**		0.001	U
Phenanthrene	**0.010**		**0.011**		**0.014**	a	**0.013**		**0.014**		0.001	U	0.001	U	**0.013**		**0.013**		**0.013**		**0.018**		0.001	U,a	**0.006**	J	**0.004**	J,a*	**0.014**		**0.013**	
Pyrene	**0.005**	J	**0.004**	J,*	**0.007**	J,a	**0.006**	J	**0.006**	J	0.001	U	0.001	U	0.001	U	0.001	U	**0.006**	J	**0.005**	J	**0.011**	J,a*	0.001	U	0.001	U,a	0.001	U	**0.006**	J

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 23. Concentrations of PAHs (in ug/L) in runoff from rain event 15.

PAH	Steep-Slope Panels																Low-Slope Panels																			
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	**0.038**	J	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.002**	J,a*
2-Methylnaphthalene	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	**0.011**	J	0.001	U	0.001	U	0.001	U	**0.003**	J,a*
Acenaphthene	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
Acenaphthylene	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
Anthracene	0.001	U	**0.011**	J,*	0.001	U	**0.022**	J,a*	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
Benz[a]anthracene	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	**0.049**	J	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.006	U,a
Benzo(a)pyrene	0.001	U	**0.008**	J,*	**0.012**		**0.015**	a	**0.007**	J,a*	**0.013**		0.001	U	**0.014**	J	0.001	U	0.001	U	0.001	U	**0.014**		0.001	U	**0.015**		**0.014**		**0.015**	a
Benzo(b)fluoranthene	**0.019**	J	**0.019**	J	**0.024**	J	**0.025**	J,a	**0.024**	J,a	**0.019**	J	0.001	U	**0.027**	J	**0.015**	J	**0.017**	J	**0.015**	J	**0.022**	J	**0.025**	J	**0.027**	J	**0.020**	J	**0.027**	J,a
Benzo(ghi)perylene	0.001	U	**0.003**	J,*	**0.006**	J	**0.014**	J,a	**0.007**	J,a	**0.005**	J	0.001	U	**0.009**	J	0.001	U	0.001	U	0.010	U	**0.011**	J	**0.011**	J	**0.016**	J	**0.007**	J	**0.010**	J,a
Benzo(k)fluoranthene	**0.011**		**0.012**	J	**0.012**		**0.024**	a	**0.014**	a	**0.011**		0.001	U	**0.016**		**0.006**	J	**0.008**	J	**0.006**	J	**0.017**		**0.015**		**0.025**		**0.013**		**0.016**	a
Chrysene	**0.014**		**0.017**		**0.012**		**0.014**	a	**0.011**	a	0.001	U	**0.011**	J	**0.014**		0.001	U	**0.010**		0.001	U	**0.010**		0.001	U	**0.016**		0.001	U	**0.015**	a
Dibenzo(a,h)anthracene	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
Fluoranthene	0.001	U	0.001	U	**0.025**		**0.023**	a	**0.023**	a	0.001	U	0.001	U	**0.023**	J	**0.012**		**0.013**		**0.013**		**0.016**		**0.013**		**0.019**		**0.019**		**0.025**	a
Fluorene	0.001	U	0.001	U	0.001	U	**0.004**	J,a*	0.001	U,a	0.001	U	0.001	U	0.001	U	0.010	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
Indeno(1,2,3-cd)pyrene	**0.008**	J	**0.008**	J	**0.009**	J	**0.014**	a	**0.010**	a	**0.008**	J	**0.009**	J	**0.011**		**0.005**	J	**0.006**	J	**0.005**	J	**0.012**		0.001	U	**0.014**		**0.010**	J	**0.012**	a
Naphthalene	**0.018**		**0.016**		**0.016**		**0.018**	a	**0.017**	a	**0.021**		**0.019**		**0.014**		**0.020**		**0.019**		**0.017**		**0.022**		**0.023**		**0.020**		**0.018**		**0.015**	a
Phenanthrene	**0.020**		**0.019**		**0.024**		**0.029**	a	**0.024**	a	0.001	U	0.001	U	**0.023**		**0.019**		**0.021**		**0.027**		0.001	U	**0.011**		**0.017**		**0.025**		**0.026**	a
Pyrene	**0.008**	J	**0.009**	J	**0.018**	J	**0.018**	J,a	**0.017**	J,a	0.001	U	0.001	U	**0.018**	J	**0.007**	J	**0.008**	J	**0.007**	J	**0.020**	J	**0.008**	J	**0.017**	J	**0.011**	J	**0.018**	J,a

[A] Average of three replicate asphalt shingle panels

[a] Average of split samples

J: Value is an estimate

U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.

Bold: Analyte detected above the MDL.

Table 24. Concentrations of PAHs (in ug/L) in runoff from rain event 17.

PAH	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1-Methylnaphthalene	NS		**0.001**	J,*	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
2-Methylnaphthalene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Acenaphthene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Acenaphthylene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Anthracene	NS		**0.007**	J,*	0.001	U	0.001	U,a	0.001	U	0.001	U,a	**0.220**		0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Benz[a]anthracene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	**0.042**	J,a*	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Benzo(a)pyrene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Benzo(b)fluoranthene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Benzo(ghi)perylene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Benzo(k)fluoranthene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Chrysene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Dibenzo(a,h)anthracene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Fluoranthene	NS		**0.006**	J,*	**0.012**		**0.010**	J,a	**0.010**	J	**0.009**	J,a	0.001	U	**0.011**		**0.008**	J	**0.008**	J	**0.009**	J	**0.008**	J	**0.004**	J,a*	**0.006**	J	**0.009**	J	**0.010**	J
Fluorene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Indeno(1,2,3-cd)pyrene	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
Naphthalene	NS		**0.010**	J,*	**0.009**	J	**0.009**	J,a	**0.009**	J	**0.012**	J,a	**0.015**	J	**0.008**	J	**0.010**	J	**0.009**	J	**0.009**	J	**0.009**	J	**0.011**	a	**0.009**	J	**0.009**	J	0.001	U
Phenanthrene	NS		**0.012**		**0.014**		**0.015**		**0.013**		0.001	U,a	**0.081**	J	**0.012**		**0.014**		**0.013**		**0.019**		0.001	U	**0.006**	J,a	**0.009**	J	**0.012**		**0.011**	
Pyrene	NS		0.001	U	**0.005**	J	**0.004**	J,a	**0.003**	J	**0.004**	J,a	0.001	U	**0.004**	J	**0.002**	J	**0.002**	J	**0.003**	J	**0.008**	J	0.001	U,a	0.001	U	**0.002**	J	**0.003**	J

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
NS: No sample collected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 25. The sum of detected PAHs (in ug/L) by panel and event number.

Event #	Steep-Slope Panels																Low-Slope Panels																	
	AAR		ASA		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	**0.012**		**0.023**	J,a	**0.015**	J,a*	**0.040**	J	**0.022**	J	**0.016**	J	**0.179**	J	**0.016**	J	**0.013**	J,a	**0.010**	J	**0.051**	J	**0.073**	J	**0.010**	J	**0.064**	J	**0.0272**	J	**0.0291**	J
2	**0.010**	J	**0.039**	J,*	**0.051**	J	**0.025**	J	**0.037**	J,a*	**0.027**	J	**0.011**	J	**0.065**	J,a*	**0.005**	J	**0.017**	J	**0.057**	J	**0.088**	J,a*	**0.036**	J	**0.016**	J	**0.0489**	J	**0.0651**	J
3	**0.032**	J,a	**0.040**	J,*	**0.051**	J	**0.033**	J	**0.048**	J	**0.060**	J,a*	**0.048**		**0.032**	J	**0.036**	J	**0.037**	J	**0.116**	J	**0.069**		ND		**0.022**	J,a*	**0.0289**	J	**0.0412**	J
4	**0.018**		**0.015**		-		-		-		-		-		**0.039**	J,a*	**0.010**	J	ND		**0.132**	J	**0.086**	J,a*	**0.030**	J	**0.007**	J	-		**0.0410**	J,a*
5	**0.020**		**0.020**	J	-		-		-		-		-		**0.066**	J,a	L		**0.019**	J	**0.126**		**0.103**		ND	a	**0.011**	J,a*	-		**0.0357**	J
6	**0.021**	J	**0.024**	J,a*	-		-		-		-		-		**0.022**	J	**0.009**	J	**0.014**	J	**0.083**	J	**0.084**	J,a*	**0.005**	J	**0.008**	J	-		**0.0226**	J,a
7	**0.013**	J	**0.019**	J,a*	-		-		-		-		-		**0.018**	J	ND		**0.013**	J,a	**0.093**	J	**0.041**	J	ND		ND		-		**0.0196**	J
8	**0.011**		**0.011**	J,a*	-		-		-		-		-		ND		ND		**0.011**		**0.054**	J,a*	**0.069**	J	ND		ND		-		ND	
9	**0.005**	J,a*	**0.021**	J,a*	-		-		-		-		-		**0.087**	J	ND	a	**0.011**		**0.032**	J	**0.083**		**0.039**	J	**0.008**	J	-		**0.069**	J
10	**0.024**	J	**0.023**	J	-		-		-		-		-		ND		**0.008**	J	**0.013**	J,a	**0.029**		**0.051**	J	ND		ND	a	-		ND	
12	**0.096**	J	**0.125**	J,*	**0.102**	J,a*	**0.088**	J	**0.112**	J	**0.039**	J	**0.202**	J	**0.097**	J	**0.103**	J	**0.096**	J	**0.098**	J	**0.071**	J,a*	**0.055**	J	**0.068**	J,a*	**0.064**	J	**0.079**	J
15	**0.098**	J	**0.122**	J,*	**0.158**	J	**0.217**	J,a*	**0.153**		**0.115**	J	**0.088**	J	**0.169**	J	**0.085**	J	**0.102**	J	**0.091**	J	**0.155**	J	**0.106**	J	**0.186**	J	**0.136**	J	**0.181**	J,a*
17	NS		**0.0279**	J,*	**0.0396**	J	**0.0373**	J,a	**0.0228**	J	**0.0144**	J,a*	**0.0977**	J	**0.0347**	J	**0.0346**	J	**0.0317**	J	**0.0201**	J	**0.0184**	J	**0.0207**	J,a*	**0.0246**	J	**0.023**	J	**0.0238**	J

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
L: Sample lost
ND: Analyte not detected at the method detection limit (MDL).
NS – No sample obtained
* In summing, values detected above MDL in one replicate were averaged with values at one-half the MDL in replicate for the same compounds in replicate that were not detected.
Bold: analyte detected above the MDL.
Shading indicates glass control panels.

Table 26. Concentrations of phthalates (in ug/L) in runoff from rain event 1.

Phthalates	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	**0.25**	J,a*	**0.33**	J,a	0.050	U,a	0.050	U	**2.6**	J	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U
Butyl benzyl phthalate	0.009	U	**0.070**	J,a*	0.009	U,a	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Diethyl phthalate	0.009	U	0.009	U,a	0.009	U,a	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Dimethyl phthalate	0.007	U	0.007	U,a	0.007	U,a	0.007	U,a	0.007	U	**2.0**	J	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	**0.20**	J
Di-N-butyl phthalate	0.005	U	0.005	U,a	0.005	U,a	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Di-N-octyl phthalate	0.005	U	**0.39**	J,a*	**0.24**	J,a	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	**0.44**	J	0.005	U	0.005	U	0.005	U	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Where a value is less than the MDL, averages were calculated using 1/2 of the MDL.
Bold: Analyte detected above the MDL.

Table 27. Concentrations of phthalates (in ug/L) in runoff from rain event 2.

Phthalates	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U,a	**4.2**	J	**0.85**	J	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U
Butyl benzyl phthalate	0.009	U	**0.12**	J	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U
Diethyl phthalate	0.009	U	0.009	U	0.009	U	0.009	U	**0.02**	J,a*	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U
Dimethyl phthalate	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U
Di-N-butyl phthalate	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U
Di-N-octyl phthalate	0.005	U	**0.095**	J	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 28. Concentrations of phthalates (in ug/L) in runoff from rain event 3.

Phthalates	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U	**1.70**	J,a	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U
Butyl benzyl phthalate	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Diethyl phthalate	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Dimethyl phthalate	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
Di-N-butyl phthalate	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Di-N-octyl phthalate	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	**0.12**	J,a*	0.005	U	0.005	U	**0.25**	J	0.005	U	0.005	U	**0.32**	J	0.005	U	0.005	U	0.005	U	**0.53**	J

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 29. Concentrations of phthalates (in ug/L) in runoff from rain event 4.

Phthalates	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U,a
Butyl benzyl phthalate	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a
Diethyl phthalate	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	**0.33**	J,a*
Dimethyl phthalate	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	**0.12**	J,a	0.007	U	0.007	U	0.007	U,a
Di-N-butyl phthalate	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a
Di-N-octyl phthalate	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	**0.10**	J,a*

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 30. Concentrations of phthalates (in ug/L) in runoff from rain event 5.

Phthalates	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U	0.050	U,a	L		0.050	U	0.050	U	0.050	U	0.050	U,a	0.050	U,a	0.050	U
Butyl benzyl phthalate	0.009	U	0.009	U	0.009	U,a	L		0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U,a	0.009	U
Diethyl phthalate	0.009	U	0.009	U	0.009	U,a	L		0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U,a	**0.13**	J
Dimethyl phthalate	0.007	U	0.007	U	0.007	U,a	L		0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U,a	0.007	U
Di-N-butyl phthalate	0.005	U	0.005	U	0.005	U,a	L		0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U,a	0.005	U
Di-N-octyl phthalate	0.005	U	0.005	U	0.005	U,a	L		0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U,a	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
L: Sample lost
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 31. Concentrations of phthalates (in ug/L) in runoff from rain event 6.

Phthalates	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U,a
Butyl benzyl phthalate	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a
Diethyl phthalate	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a
Dimethyl phthalate	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U,a
Di-N-butyl phthalate	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a
Di-N-octyl phthalate	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 32. Concentrations of phthalates (in ug/L) in runoff from rain event 7.

Phthalates	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U
Butyl benzyl phthalate	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Diethyl phthalate	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Dimethyl phthalate	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
Di-N-butyl phthalate	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Di-N-octyl phthalate	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 33. Concentrations of phthalates (in ug/L) in runoff from rain event 8.

Phthalates	Steep-Slope Panels						Low-Slope Panels													
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U
Butyl benzyl phthalate	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U
Diethyl phthalate	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U
Dimethyl phthalate	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U
Di-N-butyl phthalate	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U
Di-N-octyl phthalate	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 34. Concentrations of phthalates (in ug/L) in runoff from rain event 9.

Phthalates	Steep-Slope Panels						Low-Slope Panels											
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U,a	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U
Butyl benzyl phthalate	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Diethyl phthalate	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Dimethyl phthalate	0.007	U,a	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
Di-N-butyl phthalate	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Di-N-octyl phthalate	0.005	U,a	0.005	U	0.005	U	0.005	U,a	**0.20**	J	**0.20**	J	0.005	U	0.005	U	0.005	U	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 35. Concentrations of phthalates (in ug/L) in runoff from rain event 10.

Phthalates	Steep-Slope Panels						Low-Slope Panels											
	AAR		AS[A]		GST		BUA		BUR		BUS		EPD		PVC		TPO		GLO	
Bis(2-ethylhexyl) phthalate	0.050	U	0.050	U	0.050	U	0.050	U	0.050	U,a	0.050	U	0.050	U	0.050	U,a	0.050	U,a	0.050	U
Butyl benzyl phthalate	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U,a	0.009	U
Diethyl phthalate	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U,a	0.009	U,a	0.009	U
Dimethyl phthalate	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U,a	0.007	U,a	0.007	U
Di-N-butyl phthalate	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U,a	0.005	U
Di-N-octyl phthalate	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U,a	0.005	U,a	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 36. Concentrations of phthalates (in ug/L) in runoff from rain event 12.

Phthalate	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
Bis(2-ethylhexyl) phthalate	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U,a	0.005	U	0.050	U
Butyl benzyl phthalate	0.01	U	0.01	U	0.01	U,a	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U,a	0.01	U	0.01	U,a	0.01	U	0.01	U
Diethyl phthalate	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U	0.009	U,a	0.009	U	0.009	U
Dimethyl phthalate	0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	**0.10**	J,a*	0.007	U	**0.10**	J,a*	0.007	U	0.007	U
Di-N-butylphthalate	0.006	U	0.006	U	0.006	U,a	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U,a	0.006	U	0.006	U,a	0.006	U	0.005	U
Di-N-octyl Phthalate	0.006	U	0.006	U	0.006	U,a	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U,a	0.006	U	0.006	U,a	0.006	U	0.005	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 37. Concentrations of phthalates (in ug/L) in runoff from rain event 15.

Phthalate	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
Bis(2-ethylhexyl) phthalate	0.005	U	0.005	U	0.005	U	0.005	U,a	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.050	U,a
Butyl benzyl phthalate	0.01	U	0.01	U	0.01	U	0.01	U,a	0.01	U,a	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U,a
Diethyl phthalate	0.009	U	0.009	U	0.009	U	0.009	U,a	0.009	U,a	**0.17**	J	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a
Dimethyl phthalate	0.007	U	0.007	U	0.007	U	0.007	U,a	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U,a
Di-N-butylphthalate	0.006	U	0.006	U	0.006	U	0.006	U,a	0.006	U,a	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U,a
Di-N-octyl Phthalate	0.006	U	0.006	U	0.006	U	0.006	U,a	0.006	U,a	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 38. Concentrations of phthalates (in ug/L) in runoff from rain event 17.

Phthalate	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
Bis(2-ethylhexyl) phthalate	NS		0.005	U	0.005	U	0.005	U,a	0.005	U	0.005	U,a	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.050	U,a
Butyl benzyl phthalate	NS		0.01	U	0.01	U	0.01	U,a	0.01	U	0.01	U,a	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	**0.13**	J	0.01	U	0.01	U,a
Diethyl phthalate	NS		0.009	U	0.009	U	0.009	U,a	0.009	U	**0.090**	J,a*	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U,a
Dimethyl phthalate	NS		0.007	U	0.007	U	0.007	U,a	0.007	U	0.007	U,a	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U,a
Di-N-butylphthalate	NS		0.006	U	0.006	U	0.006	U,a	0.006	U	0.006	U,a	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U,a
Di-N-octyl Phthalate	NS		0.006	U	0.006	U	0.006	U,a	0.006	U	0.006	U,a	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.005	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
NS: No sample collected.
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 39. The sum of detected phthalates (in ug/L) by panel and event number.

Event #	Total Precip. (mm)	Steep-Slope Panels																Low-Slope Panels																	
		AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
1	16.5	ND		**0.64**	J,a*	**0.57**	J,a	ND	a	ND		**4.60**	J	ND		ND		ND	a	ND		ND		ND		**0.44**	J	ND		ND		**0.20**	J
2	7.6	ND		**0.22**	J	ND		ND		**0.02**	J,a*	**4.20**	J	**0.85**	J	ND	a	ND		ND		ND		ND	a	ND		ND		ND		ND	
3	13.5	ND	a	ND		ND		ND		ND		**1.82**	J.a*	ND		ND		**0.25**	J	ND		ND		**0.32**	J	ND		ND	a	ND		**0.53**	J
4	4.6	ND		ND		-		-		-		-		-		ND	a	ND		ND		ND		**0.12**	J,a	ND		ND		-		**0.43**	J,a*
5	4.3	ND		ND		-		-		-		-		-		ND	a	L		ND		ND		ND		ND	a	ND	a	-		**0.130**	
6	5.1	ND		ND		-		-		-		-		-		ND		ND		ND		ND		ND	a	ND		ND		-		ND	a
7	18.0	ND		ND	a	-		-		-		-		-		ND		ND		ND	a	ND		ND		ND		ND		-		ND	
8	18.8	ND		ND	a	-		-		-		-		-		ND		ND		ND		ND	a	ND		ND		ND		-		ND	
9	10.2	ND	a	ND	a	-		-		-		-		-		ND		ND	a	**0.20**	J	**0.20**	J	ND		ND		ND		-		ND	
10	7.60	ND		ND		-		-		-		-		-		ND		ND		ND	a	ND		ND		ND	a	ND	a	-		ND	
12	19.3	ND		ND		ND	a	ND		ND		ND		ND		ND		ND		ND		ND		**0.10**	J,a	ND		**0.10**	J,a	ND		ND	
15	5.1	ND		ND		ND		ND	a	ND		**0.17**	J	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	a
17	4.3	NS		ND		ND		ND	a	ND		**0.1**	J,a*	ND		ND		ND		ND		ND		ND		ND	a	**0.13**		ND		ND	

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
L: Sample lost
ND: Analyte not detected at MDL
NS: No sample obtained
* In summing, values detected above MDL in one replicate were averaged with values at one-half the MDL in replicate for the same compounds in replicate that were not detected.
Bold: analyte detected above the MDL.
Shading indicates glass control panels.

Table 40. Concentrations of PBDEs (in ug/L) in runoff from rain event 1.

PBDEs	Steep-Slope Panels																													
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
PBDE-047	0.0004	U	0.0004	U,a	0.0004	U,a	0.0004	U	0.0004	U	0.001	U	0.001	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U
PBDE-049	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.001	U	0.001	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-066	0.0002	U	0.0002	U,a	0.0002	U,a	0.0002	U	0.0002	U	0.00035	U	0.0004	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U
PBDE-071	0.00045	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.001	U	0.001	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0045	U
PBDE-099	0.0005	U	0.0005	U,a	**0.0018**	J,a*	0.0005	U	0.0005	U	0.001	U	**0.004**		0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	**0.0003**	J	0.0005	U	0.0005	U
PBDE-100	0.0005	U	0.0005	U,a	**0.0005**	J,a*	0.0005	U	0.0005	U	0.001	U	**0.0009**	J	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-138	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.002	U	0.0025	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
PBDE-153	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.001	U	0.001	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-154	0.0005	U	0.0005	U,a	**0.0013**	J,a*	0.0005	U	0.0005	U	0.001	U	0.001	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-183	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.0015	U	0.0015	U	0.001	U	0.001	U,a	0.001	U	0.001	U	**0.002**	J	0.001	U	0.001	U	0.001	U	0.001	U
PBDE-184	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.001	U	0.001	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-191	0.001	U	0.001	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0015	U	0.0015	U	0.001	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.001	U
PBDE-209	0.0015	U	0.0015	U,a	0.0015	U,a	0.0015	U	0.0015	U	0.003	U	0.0035	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U	0.0015	U	**0.005**	J	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 41. Concentrations of PBDEs (in ug/L) in runoff from rain event 2.

PBDEs	Steep-Slope Panels																													
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
PBDE-047	0.0004	U	0.0004	U,a	0.00035	U	0.0004	U	0.0005	U,a	0.0004	U	0.0004	U	0.00035	U,a	0.00035	U	0.00035	U	0.00035	U	0.0004	U,a	0.0004	U	0.0004	U	0.00035	U	0.00035	U
PBDE-049	0.0005	U	0.0005	U,a	0.00045	U	0.0005	U	0.001	U,a	0.0005	U	0.0005	U	0.00045	U,a	0.00045	U,a	0.00045	U	0.00045	U	0.0005	U,a	0.0005	U	0.0005	U	0.00045	U	0.00045	U
PBDE-066	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0003	U,a	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U
PBDE-071	0.00045	U	0.0005	U,a	0.00045	U	0.00045	U	0.001	U,a	0.00045	U	0.00045	U	0.00045	U,a	0.00045	U,a	0.00045	U	0.00045	U	0.00045	U,a	0.00045	U	0.00045	U	0.00045	U	0.00045	U
PBDE-099	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.001	U,a	0.0005	U	0.002	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	**0.0005**	J	0.0005	U	0.0005	U
PBDE-100	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.001	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-138	0.001	U	0.001	U,a	0.001	U	0.001	U	0.002	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
PBDE-153	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.001	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-154	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.001	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-183	0.001	U	0.001	U,a	0.001	U	0.001	U	0.0015	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U
PBDE-184	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.001	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-191	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.001	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-209	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U	0.002	U,a	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	**0.0015**	J	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 42. Concentrations of PBDEs (in ug/L) in runoff from rain event 3.

PBDEs	Steep-Slope Panels																Low-Slope Panels																			
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
PBDE-047	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U
PBDE-049	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	**0.0010**	J,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-066	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U
PBDE-071	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-099	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	**0.0010**	J	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-100	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-138	0.0010	U,a	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U,a	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U,a	0.0010	U	0.0010	U
PBDE-153	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-154	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	**0.0013**	J,a*	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-183	0.0010	U,a	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U,a	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U	**0.0020**	J	0.0010	U	0.0010	U,a	0.0010	U	0.0010	U
PBDE-184	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-191	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	**0.0020**	J,a	**0.0030**	J	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-209	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 43. Concentrations of PBDEs (in ug/L) in runoff from rain event 4.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U,a	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U,a
PBDE-049	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-066	0.0002	U,a	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U,a
PBDE-071	0.00045	U,a	0.00045	U,a	0.00045	U	0.00045	U	0.00045	U,a
PBDE-099	**0.0006**	J,a	**0.0006**	J,a	0.0005	U	**0.0005**	J	**0.0007**	J,a*
PBDE-100	**0.0004**	J,a*	0.0005	U,a	0.0005	U	0.0005	U	**0.0001**	J,a*
PBDE-138	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U,a
PBDE-153	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-154	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-183	0.001	U,a	0.001	U,a	0.001	U	0.001	U	**0.001**	J,a*
PBDE-184	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-191	0.001	U,a	0.0005	U,a	0.001	U	0.0005	U	0.0005	U,a
PBDE-209	0.0015	U,a	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 44. Concentrations of PBDEs (in ug/L) in runoff from rain event 5.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U,a	0.0004	U	0.0004	U,a	0.0004	U,a	0.0004	U
PBDE-049	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U,a	0.0004	U
PBDE-066	0.0002	U,a	0.0002	U	0.0002	U,a	0.0002	U,a	0.0002	U
PBDE-071	0.0005	U,a	0.0005	U	0.0004	U,a	0.0005	U,a	0.0004	U
PBDE-099	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U
PBDE-100	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U
PBDE-138	0.0010	U,a	0.0010	U	0.0010	U,a	0.0010	U,a	0.0010	U
PBDE-153	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U
PBDE-154	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U
PBDE-183	0.0010	U,a	0.0010	U	0.0005	U,a	0.0010	U,a	0.0005	U
PBDE-184	0.0005	U,a	0.0005	U	**0.0023**	J,a*	0.0005	U,a	0.0005	U
PBDE-191	0.0010	U,a	0.0005	U	0.0005	U,a	0.0010	U,a	0.0005	U
PBDE-209	0.0015	U,a	0.0015	U	0.0015	U,a	0.0015	U,a	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.

Table 45. Concentrations of PBDEs (in ug/L) in runoff from rain event 6.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U,a
PBDE-049	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-066	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U,a
PBDE-071	0.00045	U	0.00045	U,a	0.00045	U	0.00045	U	0.00045	U,a
PBDE-099	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-100	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-138	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
PBDE-153	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-154	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-183	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U,a
PBDE-184	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-191	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U,a
PBDE-209	0.0015	U	0.0015	U,a	0.0015	U	**0.0015**	J	0.0015	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J: Value is an estimate
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.
Bold: Analyte detected above the MDL.

Table 46. Concentrations of PBDEs (in ug/L) in runoff from rain event 7.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U
PBDE-049	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-066	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U
PBDE-071	0.00045	U	0.00045	U	0.00045	U,a	0.00045	U	0.00045	U
PBDE-099	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-100	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-138	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
PBDE-153	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-154	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-183	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U
PBDE-184	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-191	0.0005	U	0.0005	U	0.0005	U,a	0.001	U	0.0005	U
PBDE-209	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 47. Concentrations of PBDEs (in ug/L) in runoff from rain event 8.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U
PBDE-049	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-066	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U
PBDE-071	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-099	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-100	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-138	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
PBDE-153	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-154	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-183	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
PBDE-184	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-191	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
PBDE-209	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 48. Concentrations of PBDEs (in ug/L) in runoff from rain event 9.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a
PBDE-049	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-066	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a
PBDE-071	0.00045	U	0.00045	U	0.00045	U	0.00045	U	0.00045	U,a
PBDE-099	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-100	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-138	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
PBDE-153	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-154	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-183	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
PBDE-184	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-191	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-209	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 49. Concentrations of PBDEs (in ug/L) in runoff from rain event 10.

PBDEs	Steep-Slope Panel		Low-Slope Panels							
	GST		EPD		PVC		TPO		GLO	
PBDE-047	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U
PBDE-049	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-066	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U
PBDE-071	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-099	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-100	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-138	0.0010	U	0.0010	U	0.0010	U,a	0.0010	U	0.0010	U
PBDE-153	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-154	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-183	0.0010	U	0.0010	U	0.0010	U,a	0.0010	U	0.0010	U
PBDE-184	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-191	0.0010	U	0.0005	U	0.0005	U,a	0.0010	U	0.0010	U
PBDE-209	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 50. Concentrations of PBDEs (in ug/L) in runoff from rain event 12.

	Steep-Slope Panels																															
PBDE	**AAR**		**AS[A]**		**CPR**		**CTI**		**PAZ**		**TWO**		**WOS**		**GST**		**BUA**		**BUR**		**BUS**		**EPD**		**PVC**		**TPO**		**ZIN**		**GLO**	
PBDE-047	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U
PBDE-049	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-066	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U
PBDE-071	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-099	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-100	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-138	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
PBDE-153	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-154	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-183	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U
PBDE-184	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-191	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U
PBDE-209	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels

[a] Average of split samples

U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 51. Concentrations of PBDEs (in ug/L) in runoff from rain event 15.

	Steep-Slope Panels																Low-Slope Panels																			
PBDE	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
PBDE-047	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a
PBDE-049	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-066	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a
PBDE-071	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-099	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-100	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-138	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
PBDE-153	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-154	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-183	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a
PBDE-184	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-191	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a
PBDE-209	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 52. Concentrations of PBDEs (in ug/L) in runoff from rain event 17.

	Steep-Slope Panels																Low-Slope Panels																			
PBDE	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR		BUS		EPD		PVC		TPO		ZIN		GLO	
PBDE-047	NS		0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U	0.0004	U,a	0.0004	U	0.0004	U	0.0004	U
PBDE-049	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-066	NS		0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U,a	0.0002	U	0.0002	U	0.0002	U
PBDE-071	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-099	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-100	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-138	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
PBDE-153	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-154	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-183	NS		0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U,a	0.001	U	0.001	U	0.001	U
PBDE-184	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-191	NS		0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U,a	0.0005	U	0.0005	U	0.0005	U
PBDE-209	NS		0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U,a	0.0015	U	0.0015	U	0.0015	U

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
NS: No sample collected
U: Analyte not detected at MDL. Value in table equals 1/2 the MDL.

Table 53. Sum of the detected PBDE concentrations (in ug/L) by panel and storm event.

Event #	Steep-Slope Panels																Low-Slope Panels																	
	AAR		AS[A]		CPR		CTI		PAZ		TWO		WOS		GST		BUA		BUR	BUS	EPD		PVC		TPO		ZIN	GLO						
1	ND		ND	a	**0.004**	J,a*	ND		ND		ND		**0.005**	J,a	ND		ND	a	ND	ND	**0.002**	J	ND		**0.005**	J	ND	ND						
2	ND		ND		ND		ND		ND	a	ND		**0.003**	J	ND	a	ND		ND	ND	ND	a	ND		**0.002**		ND	ND						
3	ND	a	ND		ND		ND		ND		**0.003**	J,a*	**0.004**	J	ND		ND		ND	ND	**0.002**	J	ND		ND	a	ND	ND						
4	--		--		--		--		--		--		--		**0.001**	J,a*	--		--	--	**0.006**	J,a	ND		**0.005**	J	--	**0.002**	J,a					
5	--		--		--		--		--		--		--		ND	a	--		--	--	ND		**0.002**	J,a*	ND	a	--	ND						
6	--		--		--		--		--		--		--		ND		--		--	--	ND	a	ND		ND		--	ND	a					
7	--		--		--		--		--		--		--		ND		--		--	--	ND		ND	a	ND		--	ND	a					
8	--		--		--		--		--		--		--		ND		--		--	--	ND		ND		ND		--	ND						
9	--		--		--		--		--		--		--		ND		--		--	--	ND		ND		ND		--	ND	a					
10	--		--		--		--		--		--		--		ND		--		--	--	ND		ND	a	ND		--	ND						
12	ND		ND		ND	a	ND		ND		ND		ND		ND		ND		ND	ND	ND	a	ND		ND	a	ND	ND						
15	ND		ND		ND		ND	a	ND	a	ND		ND		ND		ND		ND	ND	ND		ND	a	ND		ND	ND	a					
17	NS		ND		ND	a	ND	a	ND		ND		ND		ND		ND		ND	ND	ND	a	ND		ND	a	ND	ND						

[A] Average of three replicate asphalt shingle panels
[a] Average of split samples
J; estimated value
ND: Not detected
NS: No sample collected
* Values detected above the MDL in one replicate (or split) were averaged with a value of 1/2 the MDL in the replicate (or split) where the parameter was not detected.
Bold: Analyte detected above the MDL.