

APPENDIX A: MODELING INPUT DATA REVIEW

Table A-1. TSS data summary

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
01467470	USGS	5/5/1976	2/28/1977	26
01467500	USGS	7/18/1962	6/26/1973	41
01467950	USGS	7/18/1962	7/9/1973	43
01469710	USGS	7/18/1962	9/18/1973	43
01470500	USGS	2/26/1961	9/1/1999	93
01470640	USGS	6/1/2000	6/1/2000	1
01470726	USGS	7/31/1974	5/21/1975	6
01470727	USGS	7/31/1974	5/21/1975	6
01470729	USGS	7/31/1974	5/21/1975	6
01470730	USGS	7/30/1974	5/21/1975	6
01470732	USGS	7/31/1974	5/21/1975	6
01470734	USGS	7/30/1974	5/22/1975	6
01470736	USGS	7/30/1974	5/22/1975	6
01470738	USGS	7/30/1974	5/22/1975	6
01470739	USGS	7/30/1974	5/22/1975	6
01470740	USGS	7/30/1974	5/22/1975	5
01470744	USGS	6/1/2000	6/1/2000	1
01470759	USGS	9/6/1979	9/7/1979	3
01470779	USGS	10/26/1998	8/8/2001	58
01470800	USGS	1/23/1974	9/4/1974	2
01470818	USGS	6/1/2000	6/1/2000	1
01470825	USGS	1/23/1974	9/4/1974	2
01470960	USGS	1/23/1974	9/4/1974	3
01470982	USGS	4/12/1973	4/12/1973	1
01471000	USGS	7/18/1962	9/6/1979	44
01471510	USGS	4/19/1979	9/6/1979	3
01471519	USGS	8/12/1979	9/22/1979	4
01471520	USGS	6/1/2000	9/25/2000	2
01471530	USGS	7/18/1962	2/1/1972	39
01471540	USGS	8/12/1979	9/6/1979	2
01471667	USGS	5/17/2000	9/25/2000	2
01471980	USGS	9/6/1979	9/25/2000	3
01472000	USGS	10/9/1965	8/31/1999	50
01472054	USGS	9/29/1970	9/28/1971	3
01472065	USGS	5/5/1970	9/28/1971	4
01472080	USGS	2/19/1970	9/28/1971	5
01472100	USGS	5/16/2000	10/2/2000	2
01472109	USGS	5/6/1970	9/28/1971	4
01472110	USGS	2/19/1970	9/28/1971	5
01472129	USGS	5/7/1970	10/30/1972	5
01472138	USGS	5/20/1970	10/30/1972	5

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
01472140	USGS	5/7/1970	10/30/1972	5
01472154	USGS	5/20/1970	10/30/1972	5
01472157	USGS	7/29/1969	9/1/2004	78
01472161	USGS	9/6/1979	9/6/1979	1
014721612	USGS	10/5/1970	10/4/1971	3
01472170	USGS	5/4/1970	10/3/1972	5
01472174	USGS	10/20/1967	10/3/1972	24
01472175	USGS	12/12/1967	6/19/1968	20
01472182	USGS	3/13/1968	8/15/1968	17
01472183	USGS	10/19/1967	1/18/1968	3
014721854	USGS	5/5/1970	10/3/1972	5
014721884	USGS	5/3/1971	9/18/2000	5
01472190	USGS	10/20/1967	10/3/1972	16
01472820	USGS	1/22/1976	8/1/1977	8
01473000	USGS	7/27/1962	8/31/1999	60
01473120	USGS	12/30/1970	9/6/1979	57
01473140	USGS	1/12/1976	8/3/1977	8
01473170	USGS	7/14/1969	9/6/1979	16
01473193	USGS	9/6/1979	9/6/1979	1
01473470	USGS	9/6/1979	9/19/2000	3
01473800	USGS	12/16/1956	5/4/1985	96
01473895	USGS	8/17/1972	8/24/1976	11
01473900	USGS	10/23/1965	12/14/1968	47
01473950	USGS	10/4/1967	2/7/1973	37
01473980	USGS	10/5/1967	8/20/1968	10
01474000	USGS	7/27/1962	9/13/1999	89
01474010	USGS	2/25/1976	7/27/1976	4
01474500	USGS	9/17/1969	9/2/2004	112
410074	USEPA HQ	2/1/1960	6/29/1964	80
422107	DRBC	6/5/1968	9/14/1992	161
422110	DRBC	11/20/1968	9/17/1997	178
422111	DRBC	5/7/1996	9/17/1997	8
422111	DRBC	7/31/1975	4/7/1977	120
HOFU_BOYER_01	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_02	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_03	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_04	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_05	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_06	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_07	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_08	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_09	National Park Service	7/9/1991	7/9/1991	1
HOFU_BOYER_10	National Park Service	7/9/1991	7/9/1991	1
HOFU_PADEP_01SR	National Park Service	4/28/1995	4/28/1995	1
HOFU_PADEP_02FC	National Park Service	7/9/1991	4/28/1995	2

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
HOFU_PADEP_03PC	National Park Service	7/9/1991	5/16/1995	2
HOFU_PADEP_04PC	National Park Service	4/28/1995	4/28/1995	1
HOFU_PADEP_05FC	National Park Service	7/9/1991	4/28/1995	2
HOFU_PADEP_06UN	National Park Service	5/16/1995	5/16/1995	1
HOFU_PADEP_07RR	National Park Service	5/24/1995	5/24/1995	1
HOFU_PADEP_08FC	National Park Service	5/24/1995	5/24/1995	1
HOFU_PADEP_09SB	National Park Service	7/9/1991	5/25/1995	2
HOFU_PADEP_10SB	National Park Service	7/9/1991	5/25/1995	2
HOFU_PADEP_11SB	National Park Service	5/16/1995	5/16/1995	1
HOFU_PADEP_12FC	National Park Service	5/25/1995	5/25/1995	1
HOFU_PADEP_13BE	National Park Service	5/25/1995	5/25/1995	1
HOFU_PADEP_14FC	National Park Service	7/9/1991	5/25/1995	2
HOFU_PADEP_15BI	National Park Service	7/9/1991	5/26/1995	2
HOFU_PADEP_16FC	National Park Service	5/26/1995	5/26/1995	1
OWW04440-0498	EPA National Aquatic Resource Survey Data	8/17/2004	8/17/2004	1
OWW04440-0586	EPA National Aquatic Resource Survey Data	8/16/2004	8/16/2004	1
OWW04440-0626	EPA National Aquatic Resource Survey Data	8/21/2004	8/21/2004	1
OWW04440-PA01	EPA National Aquatic Resource Survey Data	8/19/2004	8/19/2004	1
OWW04440-ST06	EPA National Aquatic Resource Survey Data	8/19/2004	8/19/2004	1
TENS0001	PADEP	3/22/1977	8/29/1977	5
TENS0008	PADEP	3/22/1977	8/29/1977	4
TENS0012	PADEP	8/3/1977	8/3/1977	1
TENS0013	PADEP	3/22/1977	8/29/1977	7
TENS0016	PADEP	2/23/1977	8/29/1977	5
TENS0018	PADEP	8/3/1977	8/3/1977	1
TENS0022	PADEP	3/22/1977	8/29/1977	6
TENS0025	PADEP	2/23/1977	8/29/1977	6
TENS0026	PADEP	8/3/1977	8/3/1977	1
TENS0027	PADEP	3/22/1977	8/29/1977	6
TENS0032	PADEP	4/5/1977	8/29/1977	4
TENS0033	PADEP	4/5/1977	4/5/1977	1
TENS0034	PADEP	4/5/1977	4/5/1977	1
TENS0035	PADEP	4/5/1977	8/3/1977	2
TENS0036	PADEP	3/22/1977	3/22/1977	1
TENS0037	PADEP	8/3/1977	8/29/1977	2
TENS0039	PADEP	2/23/1977	8/29/1977	8
TENS0040	PADEP	8/3/1977	8/3/1977	1
TENS0041	PADEP	3/22/1977	8/3/1977	5
TENS0045	PADEP	8/3/1977	8/3/1977	1
TENS0046	PADEP	3/22/1977	7/8/1977	4
TENS0047	PADEP	2/23/1977	8/29/1977	4
VAFO_ABI_CC	National Park Service	4/29/1993	12/14/1994	16
VAFO_ABI_CS	National Park Service	5/25/1993	11/22/1993	3
VAFO_ABI_IT	National Park Service	4/29/1993	12/14/1994	11
VAFO_ABI_LS	National Park Service	4/29/1993	5/25/1993	2

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
VAFO_ABI_LT	National Park Service	4/29/1993	12/14/1994	11
VAFO_ABI_NS	National Park Service	4/29/1993	12/14/1994	10
VAFO_ABI_SS	National Park Service	4/29/1993	5/25/1993	2
VAFO_ABI_UT	National Park Service	4/29/1993	5/25/1993	2
VAFO_ABI_WR	National Park Service	5/25/1993	11/22/1993	5
VAFO_ABI69_01	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_02	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_03	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_04	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_05	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_06	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_07	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_08	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_09	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_10	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI69_11	National Park Service	6/25/1969	6/25/1969	1
VAFO_ABI74_1	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_2	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_3	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_4	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_5	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_6	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_7	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_8	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI74_9	National Park Service	8/19/1974	8/19/1974	1
VAFO_ABI75_1	National Park Service	6/19/1975	6/19/1975	1
VAFO_ABI75_2	National Park Service	6/19/1975	6/19/1975	1
VAFO_ABI75_3	National Park Service	6/19/1975	6/19/1975	1
VAFO_ABI75_4	National Park Service	6/19/1975	6/19/1975	1
VAFO_ABI75_5	National Park Service	6/19/1975	6/19/1975	1
VAFO_ABI76_1	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_2	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_3	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_4	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_5	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_6	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_7	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_8	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI76_9	National Park Service	3/1/1976	3/1/1976	1
VAFO_ABI78_1	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_2	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_3	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_4	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_4A	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_4B	National Park Service	7/11/1978	7/11/1978	1

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
VAFO_ABI78_4C	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_4D	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI78_5	National Park Service	7/11/1978	7/11/1978	1
VAFO_ABI85_1	National Park Service	9/19/1984	11/8/1984	2
VAFO_ABI85_2	National Park Service	9/19/1984	11/8/1984	2
VAFO_ABI85_3	National Park Service	11/8/1984	11/8/1984	1
VAFO_ABI85_4	National Park Service	9/19/1984	11/5/1994	3
VAFO_ABI85_5	National Park Service	9/19/1984	11/8/1984	2
VAFO_ABI85_6	National Park Service	11/8/1984	11/8/1984	1
VAFO_ABI91_0	National Park Service	3/21/1991	3/21/1991	1
VAFO_ABI91_1	National Park Service	3/21/1991	3/21/1991	1
VAFO_ABI91_2	National Park Service	3/21/1991	3/21/1991	1
VAFO_ABI94_01	National Park Service	6/14/1994	6/14/1994	1
VAFO_ABI94_02	National Park Service	6/14/1994	6/14/1994	1
VAFO_ABI94_03	National Park Service	6/14/1994	6/14/1994	1
VAFO_ABI94_20	National Park Service	1/12/1994	1/12/1994	1
VAFO_ABI94_32	National Park Service	1/12/1994	1/12/1994	1
VAFO_ABI95_02	National Park Service	1/31/1994	1/31/1994	1
VAFO_ABI95_03	National Park Service	1/31/1994	1/31/1994	1
VAFO_ABI95_04	National Park Service	1/12/1994	1/12/1994	1
VAFO_ABI95_05	National Park Service	1/12/1994	1/31/1994	2
VAFO_ABI95_07	National Park Service	1/31/1994	1/31/1994	1
VAFO_ABI95_09	National Park Service	1/12/1994	1/12/1994	1
VAFO_ABI96_1	National Park Service	3/1/1994	3/1/1994	1
VAFO_ABI96_2	National Park Service	3/1/1994	3/1/1994	1
VAFO_ABI96_3	National Park Service	3/1/1994	3/1/1994	1
VAFO_ABI98_1	National Park Service	4/14/1998	4/14/1998	1
VAFO_ABI98_1A	National Park Service	4/14/1998	4/14/1998	1
VAFO_ABI98_2	National Park Service	4/14/1998	4/14/1998	1
VAFO_ABI98_2A	National Park Service	4/14/1998	4/14/1998	1
VAFO_CCHD_378	National Park Service	1/27/1981	3/25/1997	33
VAFO_CCHD_393	National Park Service	6/23/1981	3/18/1997	33
VAFO_CCHD_396	National Park Service	6/23/1981	3/18/1997	32
VAFO_CCHD_402	National Park Service	6/23/1981	3/18/1997	34
VAFO_CCHD_409	National Park Service	6/23/1981	3/18/1997	32
VAFO_CCHD_420	National Park Service	6/18/1981	3/17/1997	33
VAFO_CCHD_431	National Park Service	6/18/1981	3/17/1997	36
VAFO_CCHD_434	National Park Service	6/18/1981	3/17/1997	37
VAFO_CCHD_437	National Park Service	6/18/1981	3/17/1997	35
VAFO_CCHD_440	National Park Service	6/18/1981	3/17/1997	38
VAFO_CCHD_446	National Park Service	6/9/1983	3/17/1997	27
VAFO_CCHD_5	National Park Service	3/26/1984	8/30/1984	3
VAFO_NPS_AH1	National Park Service	6/18/1981	10/31/1985	14
VAFO_NPS_AH2	National Park Service	6/18/1981	8/5/1985	13
VAFO_NPS_AH3	National Park Service	6/9/1983	8/5/1985	7

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
VAFO_NPS_AH4	National Park Service	6/18/1981	10/31/1985	14
VAFO_NPS_AH5	National Park Service	6/18/1981	10/31/1985	14
VAFO_PADEP_VC1	National Park Service	5/14/1996	5/14/1996	1
VAFO_PADEP_VC4	National Park Service	5/14/1996	5/14/1996	1
VAFO_VC1_01	National Park Service	11/7/1996	11/7/1996	1
VAFO_VC1_02	National Park Service	11/7/1996	11/7/1996	1
VAFO_VC1_03	National Park Service	11/7/1996	11/7/1996	1
VAFO_VC1_04	National Park Service	10/30/1996	10/30/1996	0
VAFO_VC1_04A	National Park Service	11/4/1998	12/30/1998	2
VAFO_VC1_05	National Park Service	5/9/1995	1/7/1998	6
VAFO_VC1_06	National Park Service	10/30/1996	10/30/1996	0
VAFO_VC1_07	National Park Service	11/7/1996	11/7/1996	1
VAFO_VC1_08	National Park Service	7/18/1996	9/3/1996	2
VAFO_VC1_09	National Park Service	7/18/1996	9/3/1996	2
VAFO_VC1_10	National Park Service	5/14/1996	1/7/1998	2
VAFO_VC1_11	National Park Service	7/18/1996	9/3/1996	1
VAFO_VC1_12	National Park Service	5/14/1996	9/3/1996	0
VAFO_VC1_13	National Park Service	7/18/1996	12/30/1998	1
VAFO_VC1_14	National Park Service	7/18/1996	9/3/1996	0
VAFO_VC1_15	National Park Service	7/18/1996	1/7/1998	2
VAFO_VC1_16	National Park Service	8/23/1995	9/3/1996	2
VAFO_VC1_17	National Park Service	5/9/1995	9/3/1996	4
VAFO_VC1_18	National Park Service	5/9/1995	1/7/1998	5
VAFO_VC1_19	National Park Service	5/14/1996	12/30/1998	3
VAFO_VC1_20	National Park Service	11/7/1996	11/7/1996	0
VAFO_VC1_21	National Park Service	5/9/1995	5/9/1995	1
VAFO_VC1_ML	National Park Service	1/7/1998	12/30/1998	2
VAFO_VC1_RT	National Park Service	12/30/1998	12/30/1998	1
WQN0110	PADEP	7/27/1962	6/15/2004	278
WQN0111	PADEP	7/27/1962	6/16/2004	279
WQN0112	PADEP	7/18/1962	1/7/1988	44
WQN0113	PADEP	7/18/1962	6/22/2004	291
WQN0114	PADEP	7/18/1962	9/20/1984	104
WQN0115	PADEP	7/27/1962	6/15/2004	226
WQN0116	PADEP	7/27/1962	6/24/2004	200
WQN0117	PADEP	7/18/1962	6/22/2004	181
WQN0118	PADEP	7/18/1962	2/1/1995	78
WQN0119	PADEP	7/18/1962	5/30/1985	107
WQN0120	PADEP	7/18/1962	9/20/1984	47
WQN0143	PADEP	9/28/1972	2/3/1976	5
WQN0144	PADEP	11/15/1977	8/3/1983	2
WQN0154	PADEP	10/15/1975	6/14/2004	102
WQN0155	PADEP	1/22/1976	12/10/1979	20
WQN0156	PADEP	2/22/2000	6/16/2004	53
WQN0160	PADEP	11/6/1975	12/6/1979	42

Primary Station ID	Agency	Begin Date	End Date	Total TSS Samples
WQN0162	PADEP	1/22/1976	11/25/1986	16
WQN0163	PADEP	1/12/1976	11/25/1986	17
WQN0175	PADEP	11/15/1977	8/3/1983	2
WQN0177	PADEP	1/28/1988	7/7/1998	103
WQN0178	PADEP	2/29/1988	7/6/1998	122
WQN0193	PADEP	2/7/2002	6/28/2004	15
WQNL101	PADEP	8/19/1993	9/13/1995	6
WQNL102	PADEP	9/5/1995	9/5/1995	2
WQNL106	PADEP	7/11/1996	7/11/1996	2
WQNL109	PADEP	8/8/1996	8/8/1996	2

Table A-2. USGS continuous flow data summary

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
01467470	2/14/1949	6/30/1978	7	858	62	19
01467500	10/1/1943	9/30/1969	13	3350	99	100
01467950	10/4/1963	9/30/1965	10	690	55	80
01468500	10/1/1947	8/17/2006	21	9650	283	69
01469000	10/14/1947	9/10/1964	42	5380	333	16
01469500	10/1/1919	8/17/2006	3	3600	86	100
01469700	4/1/1950	9/10/1964	39	5630	234	21
01470000	10/1/1947	9/30/1965	32	5450	226	32
01470500	8/1/1947	8/17/2006	40	31900	725	100
01470720	10/1/1965	4/10/1981	0	740	12	100
01470729	10/1/1974	9/30/1977	1	197	11	100
01470736	10/1/1974	9/30/1976	2	293	28	100
01470756	1/19/1973	9/30/1995	11	7010	265	100
01470779	11/22/1974	8/17/2006	15	4240	111	100
01470853	10/1/1982	9/30/2005	0	139	7	100
01470960	5/1/1965	8/17/2006	23	11000	278	100
01471000	10/1/1950	8/17/2006	27	12000	321	100
01471500	10/1/1914	9/30/1930	98	26800	1489	75
01471510	10/1/1914	8/17/2006	98	46900	1600	45
01471700	10/1/1981	9/30/1982	1	210	9	100
01471710	10/1/1981	9/30/1982	1	13	2	100
01471800	10/1/1981	9/30/1982	1	167	13	100
01471835	10/1/1981	9/30/1982	1	425	14	100
01471845	10/1/1981	9/30/1982	2	130	13	100
01471875	10/1/1993	8/17/2006	9	2220	94	100
01471900	10/1/1981	9/30/1982	7	847	74	100
01471980	8/1/1974	8/17/2006	11	4190	133	100
01472000	10/1/1927	8/17/2006	175	71200	1935	100
01472157	10/1/1968	8/17/2006	7	4530	91	100

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
01472174	1/1/1967	10/17/1983	1	500	10	100
01472186	3/1/1974	9/30/1978	0	31	2	100
01472198	8/24/1981	8/17/2006	4	3000	63	100
01472199	10/1/1981	8/17/2006	3	1770	40	100
01472500		12/31/1913	4	8770	251	209
01472620	10/1/1983	8/17/2006	0	528	31	100
01472810	1/18/1991	8/17/2006	4	6020	127	100
01473000	10/1/1914	8/17/2006	4	18600	409	100
01473120	5/1/1966	9/30/1994	0	6600	79	100
01473169	10/1/1982	8/16/2006	7	2020	33	100
01473500	10/1/1927	8/17/2006	179	59300	2861	14
01473870	10/1/1973	9/30/1978	0	85	2	100
01473900	9/1/1961	8/17/2006	5	2490	60	31
01473950	10/1/1965	9/30/1981	8	2390	83	100
01473980	10/1/1965	11/3/1970	9	2060	68	100
01474000	10/1/1965	8/17/2006	9	5560	106	100
01474500	10/1/1931	8/17/2006	1	93400	2786	100

Table A-3. USGS continuous depth data summary

Station ID	Start Date	End Date	Min Depth (ft)	Max Depth (ft)	Avg Depth (ft)	% Complete
01470500	8/1/1947	8/17/2006	4.54	16.69	5.46	12
01470960	5/1/1965	8/17/2006	2.09	8.86	3.10	17
01474500	10/1/1931	8/17/2006	5.53	11.34	6.44	9

Table A-4. USGS instantaneous flow data summary

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
0146742494	4/3/2002	3/15/2005	0	8	3	2.4
0146742496	10/16/1997	2/15/2000	1	1	1	0.6
0146742498	10/16/1997	3/15/2005	1	5	2	1.0
0146742500	4/3/2002	3/15/2005	1	10	5	2.4
01467448	9/24/2002	9/30/2004	6	102	46	0.4
01467455	10/16/1997	10/16/1997	2	2	2	100.0
01467456	10/16/1997	2/15/2000	1	3	2	0.6
01467470	5/5/1976	2/28/1977	41	350	169	8.7
01467471	8/23/2005	8/23/2005	10	10	10	100.0
0146748710	3/14/2005	9/29/2005	0	3	2	1.0
0146748720	11/18/2002	11/18/2002	0	0	0	100.0
01467492	8/23/2005	8/23/2005	12	12	12	100.0
01467500	7/18/1962	11/5/1969	5	510	77	1.2

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
01467688	7/26/2005	9/29/2005	0	7	3	3.1
01467689	7/26/2005	9/29/2005	9	22	16	3.1
01467691	7/26/2005	9/29/2005	4	6	5	3.1
01467692	7/26/2005	9/29/2005	14	34	24	3.1
01467752	8/23/2005	8/23/2005	22	22	22	100.0
0146784338	3/4/2003	9/12/2005	0	7	2	1.6
0146784348	10/16/1997	9/12/2005	2	3	2	0.1
0146784350	10/16/1997	9/12/2005	1	13	4	0.7
0146784354	10/2/2002	9/12/2005	3	14	7	1.6
0146784358	10/2/2002	8/10/2005	4	22	9	1.2
01469270	11/18/2002	11/18/2002	0	0	0	100.0
01469500	10/22/1959	9/27/1978	25	284	108	0.1
01469640	12/28/1977	9/27/1978	3	36	12	1.8
01469645	12/28/1977	9/27/1978	3	68	19	1.8
01469710	7/18/1962	9/27/1978	5	516	74	0.7
01470500	9/11/1947	8/10/2004	0	16000	1255	2.9
01470600	10/25/1967	10/25/1967	1	1	1	100.0
01470620	10/25/1967	10/25/1967	1	1	1	100.0
01470640	10/25/1967	6/1/2000	6	38	22	0.0
01470660	10/25/1967	10/25/1967	1	1	1	100.0
01470726	7/31/1974	5/21/1975	2	25	7	2.4
01470727	7/31/1974	5/21/1975	1	7	3	2.4
01470729	7/31/1974	5/21/1975	3	18	10	2.4
01470730	10/25/1967	5/21/1975	1	14	8	0.3
01470732	7/31/1974	5/21/1975	0	4	2	2.4
01470734	7/30/1974	5/22/1975	4	17	11	2.4
01470736	7/30/1974	5/22/1975	8	34	22	2.4
01470738	7/30/1974	5/22/1975	10	36	23	2.4
01470739	7/30/1974	5/22/1975	12	46	27	2.4
01470740	7/30/1974	5/22/1975	13	44	28	2.4
01470744	6/1/2000	6/1/2000	19	19	19	100.0
01470750	5/20/1968	9/24/1969	9	34	20	0.6
01470758	5/14/1970	10/6/1975	18	32	22	0.3
01470759	9/6/1979	9/7/1979	790	1780	1210	300.0
01470779	8/25/1998	8/24/2004	20	1740	112	3.1
01470780	5/20/1968	9/24/1969	4	8	6	0.6
01470800	6/14/1972	9/21/1977	50	600	185	3.1
0147080755	10/16/2003	10/16/2003	4	4	4	100.0
0147080760	10/16/2003	10/16/2003	5	5	5	100.0
0147080769	10/15/2003	10/15/2003	3	3	3	100.0
0147080781	10/15/2003	10/15/2003	2	2	2	100.0
0147080786	10/15/2003	10/15/2003	7	7	7	100.0
0147080787	10/15/2003	10/15/2003	10	10	10	100.0
0147080789	10/15/2003	10/15/2003	16	16	16	100.0

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
0147080799	10/15/2003	10/15/2003	6	6	6	100.0
01470808	10/15/2003	10/15/2003	22	22	22	100.0
01470809	10/15/2003	10/15/2003	34	34	34	100.0
01470810	10/15/2003	10/15/2003	50	50	50	100.0
01470812	10/15/2003	10/15/2003	2	2	2	100.0
0147081710	10/15/2003	10/15/2003	2	2	2	100.0
0147081719	10/15/2003	10/15/2003	8	8	8	100.0
0147081725	10/15/2003	10/15/2003	3	3	3	100.0
0147081727	10/15/2003	10/15/2003	4	4	4	100.0
0147081729	10/15/2003	10/15/2003	5	5	5	100.0
0147081739	10/15/2003	10/15/2003	18	18	18	100.0
0147081749	10/15/2003	10/15/2003	3	3	3	100.0
0147081759	10/15/2003	10/15/2003	27	27	27	100.0
0147081769	10/15/2003	10/15/2003	10	10	10	100.0
0147081776	10/15/2003	10/15/2003	3	3	3	100.0
01470818	6/1/2000	10/15/2003	56	99	78	0.2
01470825	6/14/1972	10/15/2003	1	630	109	0.5
01470850	6/14/1972	5/22/1973	3	29	7	4.1
01470853	10/11/1984	10/11/1984	1	1	1	100.0
01470860	6/14/1972	6/12/1973	11	326	88	4.1
01470870	3/23/1994	3/23/1994	730	730	730	100.0
01470960	6/14/1972	8/24/2004	48	2610	433	1.0
01470982	2/16/1973	9/21/1973	1	77	22	2.3
01471000	10/22/1959	8/10/2004	1	1070	241	0.5
01471510	4/19/1979	6/26/1980	468	8850	3817	2.8
01471519	8/12/1979	9/22/1979	41	137	90	9.8
01471520	6/1/2000	9/25/2000	12	20	16	1.7
01471540	8/12/1979	9/6/1979	26	48	37	8.0
01471667	5/17/2000	9/25/2000	6	19	12	1.5
01471668	8/25/1998	8/25/1998	5	5	5	100.0
01471700	8/30/1982	8/30/1982	0	0	0	100.0
01471710	8/30/1982	8/30/1982	1	1	1	100.0
01471800	5/14/1970	8/30/1982	5	18	11	0.1
01471835	8/30/1982	8/30/1982	3	3	3	100.0
01471845	8/30/1982	8/30/1982	3	3	3	100.0
01471900	8/30/1982	8/30/1982	18	18	18	100.0
01471980	9/6/1979	9/25/2000	45	1740	496	0.1
01472000	10/1/1944	8/12/2004	233	14500	2056	1.7
01472054	11/14/1969	10/29/1982	1	6	3	0.1
01472065	11/14/1969	10/29/1982	2	12	7	0.2
01472080	11/14/1969	10/7/2004	3	29	10	0.3
01472100	5/16/2000	10/2/2000	8	14	11	1.4
01472109	11/12/1969	11/6/1996	0	7	2	0.3
01472110	11/13/1969	10/19/1982	1	9	5	0.2

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
01472126	10/26/1982	10/25/2000	1	4	3	0.0
01472129	12/9/1969	10/26/1982	6	18	13	0.2
014721369	2/9/2005	9/26/2005	0	8	3	3.5
01472138	12/9/1969	10/23/2002	5	32	15	0.2
01472140	12/9/1969	10/23/2002	4	19	9	0.2
01472150	5/15/1968	1/26/2005	4	109	49	0.3
01472154	12/10/1969	10/8/1997	9	61	30	0.2
01472157	2/12/1969	10/7/2004	7	9370	168	1.1
01472161	9/6/1979	9/6/1979	1100	1100	1100	100.0
014721612	10/5/1970	10/2/1997	22	123	47	0.2
01472170	10/22/1969	10/18/2004	1	5	2	0.2
01472174	10/20/1967	10/12/1995	1	207	30	0.5
01472175	12/12/1967	6/19/1968	4	62	36	10.5
01472180	5/15/1968	9/20/1968	5	10	7	1.6
01472182	3/13/1968	8/15/1968	3	100	16	11.0
01472183	10/19/1967	1/18/1968	3	6	4	3.3
014721854	11/10/1969	10/18/2004	6	30	15	0.2
014721884	11/11/1969	9/18/2000	8	49	20	0.2
01472190	10/20/1967	12/17/2004	7	1160	101	0.3
014721986	2/2/2005	9/26/2005	5	55	18	3.4
01472400	5/14/1968	10/2/1968	2	11	7	1.4
01472800	5/14/1968	10/3/1968	1	120	61	1.4
01473000	9/23/1958	8/31/1999	10	13800	1064	1.1
01473030	4/9/2002	9/9/2003	118	1290	318	1.9
01473120	3/11/1969	6/25/1980	2	5820	512	2.4
01473140	9/25/1970	2/17/1976	36	501	269	0.1
01473153	10/11/1984	9/9/1998	1	1	1	0.0
01473154	3/20/1984	10/16/2000	1	12	5	0.2
01473155	10/12/1984	10/19/2000	1	3	2	0.1
01473156	9/9/1998	9/9/1998	2	2	2	100.0
01473157	9/9/1998	9/9/1998	0	0	0	100.0
01473158	9/9/1998	9/9/1998	2	2	2	100.0
01473159	9/9/1998	9/9/1998	3	3	3	100.0
01473160	9/9/1998	10/24/2000	3	4	3	0.3
01473161	10/10/1984	9/9/1998	3	5	4	0.0
01473163	10/24/2000	10/24/2000	9	9	9	100.0
01473167	10/15/1982	10/16/2000	3	19	8	0.4
01473168	10/15/1982	10/16/2000	3	27	13	0.2
01473169	8/22/1984	11/3/2004	6	32	18	0.1
01473170	6/8/1973	8/19/2004	20	14000	728	0.2
01473180	10/23/2000	10/23/2000	21	21	21	100.0
01473193	9/6/1979	9/6/1979	15400	15400	15400	100.0
01473197	11/6/2000	11/6/2000	1	1	1	100.0
01473470	9/6/1979	9/19/2000	8	220	79	0.0

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
01473695	10/10/1979	10/10/1979	69	69	69	100.0
01473800	12/16/1956	5/4/1985	222	73600	17786	1.1
01473900	10/23/1965	8/23/2004	9	2640	236	0.5
01473950	10/4/1967	2/7/1973	4	1350	106	2.3
01473980	10/5/1967	2/19/1970	23	109	56	2.1
01474000	7/27/1962	8/10/2005	6	1650	142	0.8
01474010	2/25/1976	9/3/2003	73	5520	2789	0.1
01474500	10/1/1945	9/2/2004	46	53700	3017	4.4
395908075121500	6/27/1989	9/28/1989	634	5100	2221	4.3
400130075344501	10/11/1984	10/11/1984	0	0	0	100.0
400233075334701	10/11/1984	10/11/1984	1	1	1	100.0
400235075343001	8/22/1984	10/11/1984	0	1	0	4.0
400300075333101	10/11/1984	10/11/1984	1	1	1	100.0
400301075333001	9/2/1987	9/2/1987	0	0	0	100.0
400303075332201	9/2/1987	9/2/1987	1	1	1	100.0
400303075332701	9/2/1987	9/2/1987	1	1	1	100.0
400304075333301	9/2/1987	9/2/1987	0	0	0	100.0
400307075335301	3/13/1985	3/13/1985	0	0	0	100.0
400332075315001	10/12/1984	10/12/1984	5	5	5	100.0
401948076294501	11/10/1971	11/10/1971	1	1	1	100.0
402035076005601	11/10/1971	11/10/1971	1	1	1	100.0
402055076070001	11/10/1971	11/10/1971	6	6	6	100.0
402101076105501	11/10/1971	11/10/1971	0	0	0	100.0
402258075563901	11/9/1971	11/9/1971	2	2	2	100.0
403058075454501	11/8/1971	11/8/1971	2	2	2	100.0
403958076191401	3/22/1965	12/16/2004	1	10	4	0.2
404143076091001	4/23/1975	11/6/1991	0	2	1	0.0
404212076151601	3/22/1965	10/31/1991	5	9	7	0.0
404217076082201	3/22/1965	11/7/1991	0	3	1	0.0
404224076150601	7/28/1964	10/31/1991	6	65	24	0.1
404251076122101	3/22/1965	11/6/1991	1	11	4	0.0
404258076090101	7/28/1964	11/6/1991	0	2	1	0.1
404320076103201	7/28/1964	9/29/2005	2	14	4	0.1
404321076043001	4/22/1975	4/22/1975	0	0	0	100.0
404403076072401	3/22/1965	1/13/2003	0	6	2	0.1
404406076120201	2/17/1965	10/31/1991	0	7	3	0.1
404425076115201	4/23/1975	10/31/1991	0	1	1	0.0
404443076035101	4/22/1975	4/22/1975	0	0	0	100.0
404511076025811	4/15/2004	3/15/2005	0	0	0	4.2
404511076025812	4/15/2004	3/15/2005	0	2	1	3.9
404511076025818	8/16/2004	8/16/2004	0	0	0	100.0
404511076025872	8/16/2004	8/16/2004	0	0	0	100.0
404512076025501	3/22/1965	3/15/2005	0	5	2	0.3
404513076025811	4/15/2004	3/15/2005	0	1	1	4.2

Station ID	Start Date	End Date	Min Flow (cfs)	Max Flow (cfs)	Avg Flow (cfs)	% Complete
404513076025812	4/15/2004	3/15/2005	0	2	1	3.6
404513076025818	8/16/2004	8/16/2004	0	0	0	100.0
404513076025872	8/16/2004	8/16/2004	0	0	0	100.0
404531076025701	4/21/1975	11/1/1991	0	3	1	0.0
404538076063701	3/22/1965	11/6/1991	0	1	1	0.0
404538076063901	4/21/1975	4/21/1975	2	2	2	100.0
404612076015601	3/22/1965	11/1/1991	0	2	1	0.0
404657076105501	3/22/1965	11/6/1991	1	15	7	0.0
404705076003201	3/22/1965	9/29/2005	0	2	1	0.1
404728075590901	7/28/1964	6/4/2003	0	4	1	0.1
404728075590906	11/6/2002	6/11/2003	0	0	0	2.3
404728075590907	6/4/2003	6/4/2003	0	0	0	100.0
404909075560001	4/23/1975	11/1/1991	8	27	17	0.0
405224076001701	4/18/1975	11/26/2002	1	9	6	0.1

Table A-5. USGS instantaneous depth data summary

Station ID	Start Date	End Date	Min Depth (ft)	Max Depth (ft)	Avg Depth (ft)	% Complete
01467470	5/5/1976	5/5/1976	1.2	1.2	1.2	100
01470500	9/10/1974	9/1/1999	4.5	9.6	5.7	1
01470755	12/18/1978	12/18/1978	3.8	3.8	3.8	100
01470759	9/6/1979	6/26/1980	1.9	5.7	3.8	4
01470779	8/25/1998	8/8/2001	1.1	6.2	1.9	6
01470853	10/11/1984	10/11/1984	3.0	3.0	3.0	100
01470870	3/23/1994	3/23/1994	4.2	4.2	4.2	100
01470960	10/17/1972	9/18/1979	1.6	6.1	2.9	1
01471000	12/19/1978	4/28/1980	1.4	3.0	2.2	1
01471510	4/19/1979	6/26/1980	2.7	7.5	4.9	3
01471519	8/12/1979	6/26/1980	0.5	4.2	1.8	4
01471540	8/12/1979	3/25/1980	0.2	0.7	0.5	2
01471625	9/26/1979	9/26/1979	4.1	4.1	4.1	100
01471980	9/6/1979	9/25/2000	2.0	5.4	3.1	0
01472000	12/19/1978	8/31/1999	0.9	7.7	4.2	0
01472080	10/20/1981	10/11/1985	1.2	1.3	1.3	0
01472105	3/21/1980	5/14/1980	5.3	7.4	6.8	24
01472110	10/20/1981	10/20/1981	3.2	3.2	3.2	100
01472157	5/27/1971	10/7/2004	4.0	12.9	4.8	1
01472161	9/6/1979	6/25/1980	2.6	7.9	5.3	4
01472174	10/16/1981	10/12/1995	2.3	2.5	2.3	0
01472190	10/15/1981	12/17/2004	1.4	2.1	1.7	0
01473000	8/18/1971	8/31/1999	1.2	10.4	3.7	0
01473120	9/6/1979	6/25/1980	1.1	8.3	3.9	4

Station ID	Start Date	End Date	Min Depth (ft)	Max Depth (ft)	Avg Depth (ft)	% Complete
01473167	11/7/1994	10/30/1995	0.8	0.9	0.8	1
01473168	10/21/1983	10/30/1995	0.6	3.4	1.6	0
01473169	11/2/1998	11/3/2004	3.1	3.5	3.4	0
01473170	9/6/1979	6/26/1980	1.7	3.2	2.4	2
01473193	9/6/1979	6/25/1980	58.9	67.2	61.6	8
01473470	9/6/1979	6/25/1980	1.1	3.8	2.4	3
01473695	10/10/1979	10/10/1979	6.4	6.4	6.4	100
01473800	12/18/1978	6/26/1980	6.7	20.3	11.5	5
01473900	12/18/1978	12/18/1978	2.2	2.2	2.2	100
01473950	12/18/1978	12/18/1978	3.2	3.2	3.2	100
01474000	8/18/1971	8/10/2005	2.2	4.0	3.0	0
01474010	1/16/2003	3/13/2003	6.5	6.9	6.7	4
01474500	4/26/1973	9/2/2004	5.6	11.8	6.5	1

APPENDIX B: SOURCE INFORMATION

Table B-1. PCS point sources located in tributary watersheds

Seg- ment	Sub- segment	NPDES ID	Facility Name	Facility Type ^a	Flow (MGD)	Permit Limit Avg (ng/L) ^b
A	2	PA0043877	GREATER POTTSVILLE SEWER AUTHORITY STP	POWTP	0.50	DELMON
A	2	PA0043885	GREATER POTTSVILLE SEWER AUTHORITY STP	POWTP	6.96	DELMON
C	9	PA0021601	HAMBURG BORO STP	POWTP	1.55	DELMON
C	12	PA0026549	READING CITY - FRITZ ISLAND WWTP	POWTP	66.14	DELMON
D	15	PA0026972	EXETER TOWNSHIP WWTP	POWTP	1.20	DELMON
D	17	PA0026786	POTTSTOWN BORO STP	POWTP	12.85	ADDMON
D	18	PA0025437	NORTH COVENTRY STP	POWTP	2.01	
D	19	PA0051926	LIMERICK GENERATING STATION	INDUSTRIAL WASTE- ESTIMATED STORM WATER	0.49	
E	20	PA0051934	KING ROAD STP	POWTP	1.70	
E	21	PA0054526	UNITECH SERVICES GROUP INC	INDUSTRIAL WASTE	0.08	
E	22	PA0021512	ROYERSFORD STP	POWTP	0.54	
E	22	PA0028614	SPRING CITY BORO STP	POWTP	0.35	
E	22	PAR200018	SPRING CITY ELEC MFG PLT	STORM WATER- INDUSTRIAL	0.002	
E	25	PA0011631	CROMBY GENERATING STATION IWTP	INDUSTRIAL WASTE- ESTIMATED STORM WATER	0.25	
F	26	PA0027154	PHOENIXVILLE BORO STP	POWTP	4.00	
G	28	PA0026964	OAKS WWTP	POWTP	14.25	2.90
G	29	PA0043974	VALLEY FORGE STP	POWTP	9.20	40.00
G	30	PA0026131	TROUT RUN STP	POWTP	6.00	DELMON
H	33	PA0027421	NORRISTOWN BORO STP	POWTP	9.75	DELMON

Segment	Sub-segment	NPDES ID	Facility Name	Facility Type ^a	Flow (MGD)	Permit Limit Avg (ng/L) ^b
H	33	PAR800121	NORFOLK SOUTHERN ABRAMS YARD	STORM WATER-INDUSTRIAL	0.002	
H	34	PA0026816	EAST NORRITON PLYMOUTH WHITPAIN STP	POWTP	8.10	DELMON
H	35	PA0020397	BRIDGEPORT BORO STP	POWTP	0.90	
H	36	PA0026085	MATSUNK STP	POWTP	6.88	DELMON
H	37	PA0050326	ISG PLATE CONSHOHOCKEN PLANT	INDUSTRIAL WASTE	1.20	
H	38	PA0050377	RIVERSIDE FACTORY	INDUSTRIAL WASTE	0.08	
I	39	PA0011681	PECO W CONSHOHOCKEN GAS PLT	INDUSTRIAL WASTE	0.00	
I	40	PA0026794	CONSHOHOCKEN BORO STP	POWTP	2.30	DELMON
I	41	PA0026298	WHITEMARSH STP	POWTP	2.00	
K	46	PA0050202	AMTRAK RACE ST PENN COACH YARD	INDUSTRIAL WASTE-ESTIMATED STORM WATER	NA	
K	47	PA0012629	SUNOCO INC. - POINT BREEZE	INDUSTRIAL WASTE	6.40	
K	48	PA0011533	SUNOCO INC. - GIRARD POINT	INDUSTRIAL WASTE	6.40	
K	49	PA0057690	KVAERNER SHIPYARD, INC.	INDUSTRIAL WASTE	0.00	
C	Trib	PA0021075	MYERSTOWN BORO STP	POWTP	1.6	DELMON
C	Trib	PA0021636	FLEETWOOD BORO AUTHORITY STP	POWTP	0.61	DELMON
C	Trib	PA0031062	ROBESONIA-WERNERSVILLE M/A OF	POWTP	1.4	DELMON
C	Trib	PA0070271	MAIDENCREEK TOWNSHIP AUTHORITY STP	POWTP	0.8	DELMON
D	Trib	PA0023540	BERKS-MONTGOMERY MA/MORYSVILLE WWTP	POWTP	0.32	DELMON
G	Trib	PA0020460	PENN RIDGE WWTP	POWTP	4.325	1.00

Segment	Sub-segment	NPDES ID	Facility Name	Facility Type ^a	Flow (MGD)	Permit Limit Avg (ng/L) ^b
G	Trib	PA0024180	BERKS MONTGOMERY MUNICIPAL AUTHORITY STP	POWTP	1.9	DELMON
G	Trib	PA0039004	UPPER GWYNEDD-TOWAMENCIN MUNIPIAL AUTHORITY STP	POWTP	6.5	0.00
J	Trib	PA0026603	AMBLER WWTP	POWTP	6.5	DELMON

^a Facility type Industrial Waste-Estimated Storm Water identifies facilities that are not specifically permitted for storm water discharges, but are thought to be generating PCB contaminated storm water runoff. Flows for all storm water sites are estimated based on the facility site land area.

^b Permit limits presented represent PCB concentration limits given in PCS for pretreatment facilities discharging to an associated WWTP/STP. A PCB concentration limit equal to the state water column criteria (0.044 ug/L) was assigned to all other facilities.

Table B-3. PCB CERCLA sites in Schuylkill River watershed

EPA ID	Site Name	Address	City	Zip Code	Description	Date of Discovery	NPL Status
PAD987349123	AMTRAK 30TH STREET	30TH & MARKET STREET STATION	PHILADELPHIA	19104	UNDERGROUND CONDUITS, STANDING POOLS OF POLYCHLORINATED BIPHENYL (PCB) CONTAMINATED WATER.	4/26/1990	NOT ON NPL
PA0000093385	ELLSWORTH STREET PCB SITE	2901-37 ELLSWORTH STREET	PHILADELPHIA	19146	ABANDONED TRANSFORMERS	12/2/1993	NOT ON NPL
PAD987277175	OLD BARRETT BUILDING	36TH AND WHARTON STREETS	PHILADELPHIA	19146	ABANDONED FACTORY; TRANSFORMER OIL CONTAINING PCB'S LEAKING	10/2/1989	NOT ON NPL

Table B-4. PCB spill sites in Schuylkill River watershed

Name	County	Municipality	Closure Date
LIPPINCOTTS GARAGE	BERKS	SINKING SPRING BORO	9/26/1995
U HAUL SHILLINGTON	BERKS	CUMRU TWP.	
MRS PAULS KITCHEN	BUCKS	TELFORD BORO	7/16/1997
VILLAGE WOOD SHOP	BUCKS	RICHLAND TWP.	
ALLEN ENVELOPE	CHESTER	TREDYFFRIN TWP.	
ALLEN RESIDENCE	CHESTER	SOUTH COVENTRY TWP.	
FRIENDLY CHEVROLET FORMERLY TIM SMITH CHEVROLET	LEBANON	JACKSON TWP.	3/5/1996

Name	County	Municipality	Closure Date
EXXON RS 2 6374	LEHIGH	WEISENBERG TWP.	3/28/1995
ELM TERRACE GARDENS APTS	MONTGOMERY	LANSDALE BORO	10/29/1993
EXXON RS 2 8251	MONTGOMERY	HATFIELD TWP.	8/1/1994
GUY M COOPER INC.	MONTGOMERY	UPPER MORELAND TWP.	
INDIAN CREST MID SCH	MONTGOMERY	FRANCONIA TWP.	
NELSONS ICE CREAM	MONTGOMERY	ROYERSFORD BORO	5/5/1994
NEW AGE IND	MONTGOMERY	UPPER MORELAND TWP.	
TROOPER MOBILE HOME PARK	MONTGOMERY	LOWER PROVIDENCE TWP	
VAGNONI RESIDENCE	MONTGOMERY	EAST NORRITON TWP.	
WEST SIDE LAWNMOWER	MONTGOMERY	HATFIELD TWP.	10/27/1992
BELL FUELS INC	PHILADELPHIA	PHILADELPHIA	10/10/1991
CONTINENTAL BANKING CO	PHILADELPHIA	PHILADELPHIA	
FAULKNER INTL SITE	PHILADELPHIA	PHILADELPHIA	12/6/1994
FIRESTONE MASTERCARE CTR	PHILADELPHIA	PHILADELPHIA	11/8/1993
FLEET MGMT SITE 015	PHILADELPHIA	PHILADELPHIA	
PENN FISHING TACKLE MFG CO	PHILADELPHIA	PHILADELPHIA	
PENNYPACK AQUATIC & FITNESS CTR	PHILADELPHIA	PHILADELPHIA	7/9/1993
SUDBURY INC	PHILADELPHIA	PHILADELPHIA	
SUNOCO 0363 1322	PHILADELPHIA	PHILADELPHIA	

APPENDIX C: PLUG FLOW REACTOR MODEL

Water Balance for Critical Condition

Because of the direct discharges of PCBs are continuous, a long-term balance and a harmonic flow condition (Q), was represented as follows:

$$Q = Q_{PCB} + Q_{NPS} + Q_{PS} \quad (C-1)$$

where Q_{NPS} = flow due to any non point sources [L^3/T]

Q_{PS} = flow due to any point sources [L^3/T]

Q_{PCB} = flow due to PCB discharge [L^3/T]

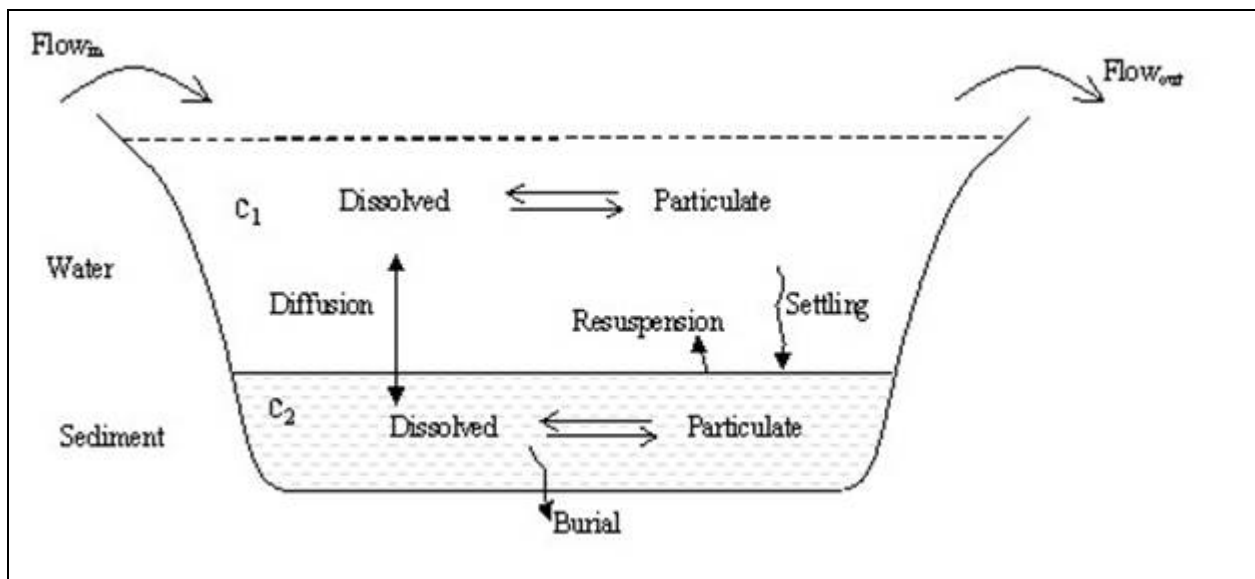


Figure C-1. Processes and Interactions represented in the Plug Flow Reactor Model

Contaminant Budget

A mass balance of PCBs can be developed for the stream-segments assuming that the PCBs partition into the dissolved and particulate forms and considering the various interactions between the sediment layer and the water column (Figure C-1). (Note: subscript 1 refers to the water column and subscript 2 refers to the sediment layer).

A steady-state contaminant budget can be written for a plug-flow system with constant hydro-geometric characteristics with respect to the water column as (Thomman and Mueller 1987, EPA, 1984 and Chapra, 1997):

$$U \frac{dC_1}{dx} = k_1 C_1 - \frac{v_v}{H_1} F_{d1} C_1 - \frac{v_s}{H_1} F_{p1} C_1 + \frac{v_d}{H_1} (F_{d2} C_2 - F_{d1} C_1) + \frac{v_r}{H_1} C_2 \quad (C-2)$$

where:

k_1 = first order decomposition rate [$1/T$] (assumed to be negligible i.e. zero)

v_v = volatilization rate [L/T] (assumed to be negligible i.e. zero)

U = stream velocity [L/T]

H_1 = depth of water column [L]

C_1 = PCB concentration in the water column [M/L³]

C_2 = PCB concentration in the sediment layer [M/L³]

K_{d1} = PCB partitioning coefficient in water column [L³/M]

K_{d2} = PCB partitioning coefficient in sediment layer [L³/M]

The water column partition coefficient (K_{d1}) for PCBs range from 10⁵ to 10⁶ L/kg (Thomman and Mueller 1987) and suggest that the sediment partition coefficient (K_{d2}) may be lower than the water column partition coefficient. For this study the partition coefficient was taken as the mean of this range i.e. 5.5x10⁵ L/Kg.

m_1 = suspended solids in the water column [M/L³]

F_{p1} = fraction of the total PCB that is in water

$$F_{p1} = \frac{K_{d1} m_1}{1 + K_{d1} m_1} \quad (C-3)$$

F_{d1} = fraction of total PCBs dissolved in water

$$F_{d1} = \frac{1}{1 + K_{d1} m_1} \text{ or } (1 - F_{p1}) \quad (C-4)$$

F_{d2} = fraction of total PCBs dissolved in sediment

$$F_{d2} = \frac{1}{\phi + K_{d2}(1 - \phi)\rho} \quad (C-5)$$

v_d = diffusive mixing velocity [L/T].

$$v_d = 69.35\phi M^{-2/3} \text{ (Di Toro et al., 1981)} \quad (C-6)$$

ϕ = sediment porosity (taken as 0.8)

ρ = sediment density [M/L³]

M = mean PCB molecular weight velocity [L/T] (taken as 305.6 gmole for high molecular weight PCBs)

v_s = settling velocity [L/T] (from literature Fox River, WDNR, 2000, suggests a typical value of 0.05-2.5 m/day)

v_r = re-suspension velocity

$$v_r = v_s \frac{m_1}{(1 - \phi)\rho} - v_b \quad (C-7)$$

v_b refers to the burial velocity [L/T] (assumed to be negligible or zero for free flowing streams)

The mass balance given in equation [C-2] can be further rearranged to give:

$$U \frac{dC_1}{dx} = -C_1 \left(\frac{v_s}{H_1} F_{p1} + \frac{v_d}{H_1} F_{d1} \right) + C_2 \left(\frac{v_d}{H_1} F_{d2} + \frac{v_r}{H_1} \right) \quad (C-8)$$

Or

$$U \frac{dC_1}{dx} = -C_1 L_1 + C_2 L_2 \quad (C-8a)$$

where:

$$L_1 = \left(\frac{v_s}{H_1} F_{p1} + \frac{v_d}{H_1} F_{d1} \right) \quad (\text{C-9})$$

and

$$L_2 = \left(\frac{v_d}{H_1} F_{d2} + \frac{v_r}{H_1} \right) \quad (\text{C-10})$$

Then for spatially constant sediment layer, equations C-8 or C-8a have the following solution:

$$C_1 = C_1(0) \cdot \exp\left(-\frac{L_1}{U}x\right) + C_2 \frac{L_2}{L_1} \left(1 - \exp\left(-\frac{L_1}{U}x\right)\right) \quad (\text{C-11})$$

It can be seen that for the riverine portion the water column concentration C_1 is a function of the travel time downstream (x/U), the settling velocity (v_s), the net diffusion and the amount of re-suspension (v_r). Also, note that the stream segment takes into account observed sediment data (C_2) as source to compute the water column concentrations.

The contributions due to MS4s along the length of the Schuylkill River were included in as a distributed source at the top of the segment ($x=0$) and added then added to the resulting predicted concentration from equation C-11. The water quality response due to the distributed source is as follows ((Thomman and Mueller 1987):

$$s = s_d \cdot \left(1 - \exp\left(-\frac{L_1}{U}x\right)\right) \quad (\text{C-12})$$

s = predicted concentration due to the distributed source [M/L^3]

s_d = concentration of the distributed source [M/L^3]

C-3: Baseline Condition Computation – Stream Segments

The Schuylkill River was segmented into a series of plug-flow reactors defined within the entire length of the impaired segment to simulate the steady-state distribution of PCBs. This was necessary to accurately account for the water balance between each segment and the impact of point sources, and tributaries in the main stem of the Schuylkill River. Each of the plug-flow reactor, defines a mass balance for PCBs for the sediment-water system.

PCBs are man-made compounds and there are no natural sources, however a background concentration of 2 ng/L was attributed at the headwaters of the Schuylkill River. This upstream boundary condition at the headwaters was set based on the water column concentration estimated from the post 90s fish tissue data and a bio-concentration factor (BCF). This PCBs concentration incorporates historical spills, atmospheric deposition, and unknown contributing sources of PCBs from surrounding minor tributaries. Using this upstream boundary condition of $C_1 = C_1(0)$ the water column concentration of PCBs was calculated using equation [C-11]. At each confluence where there is a point source or tributary, a mass balance of the load just upstream and the load from the point source or tributary was performed to determine the change in concentration (equation [C-13]). The concentration calculated using equation [C-13] was then used as the initial concentration in equation [C-11] for the next segment.

$$C_1(0) = \frac{Q_r C_{1r} + Q_w C_{1w}}{Q_r + Q_w} \quad (\text{C-13})$$

where Q_r and C_{1r} refer to the flow and concentration of the receiving river and Q_w and C_{1w} refers to the flow and concentration from the point source or tributary.

C-4 Existing Condition Computation – Reservoir Segments behind dam

The reservoir portions behind the dam required taking into account the burial process and was handled differently. For a constant daily load coming in to the reservoir (based on the computed stream segment concentration (C_{in}) just upstream of the reservoir segment) a time variable (daily) concentration was calculated, taking into account settling, diffusion, re-suspension, burial and sediment data as a source. With time, the concentration in the reservoir achieves equilibrium and this equilibrium concentration was used as $C_1(0)$ for the segment downstream of the dam.

The following mass balance equations with respect to the water column (C-14) and the sediment layer (C-15) were used for the analysis:

$$V_1 \frac{dC_1}{dt} = QC_{in} - QC_1 - v_s AF_{p1} C_1 + v_d A(F_{d2} C_2 - F_{d1} C_1) + v_r AC_2 \quad (\text{C-14})$$

$$V_2 \frac{dC_2}{dt} = v_s AF_{p1} C_1 + v_d A(F_{d2} C_2 - F_{d1} C_1) - v_r AC_2 - v_b AC_2 \quad (\text{C-15})$$

Where A and V refer to the surface area and volume of the reservoir portion behind the dam.

The burial rate v_b was estimated using the following formula:

$$v_b = \frac{Q}{A} \cdot \frac{m_1}{(1 - \phi)\rho} \quad (\text{C-16})$$

All other terms have been defined previously in this section.