APPENDIX B

List of Point Sources

Table B.1. Permitted point source discharges to study area

Permit Number	Company	Facility Type	Outfall Number	Flowrate (MGD)	Receiving Waterbody	Impaired Receiving Reach	Parameter	Limit
							Zinc (total recoverable) avg (ug/L), max (ug/L)	115.62, 231.99
							Copper (total recoverable) avg (ug/L), max (ug/L)	12.2, 24.48
			001	1.87[A]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606	Nitrate Nitrogen (monthly avg, daily max)	26.3, 74.9
							Zinc (total recoverable) avg (ug/L), max (ug/L)	115.62, 231.99
							Copper (total recoverable) avg (ug/L), max (ug/L)	12.2, 24.48
			002	0.5[A]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606	Nitrate Nitrogen (monthly avg, daily max)	12,18
			003	0.06[A]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606		
			004	2.39[B]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606	Zinc (total recoverable) avg (ug/L), max (ug/L)	115.62, 231.99
			005	3.7[B]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606	Zinc (total recoverable) avg (ug/L), max (ug/L)	115.62, 231.99
			006	2.8[A]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606	Zinc (total recoverable) avg (ug/L), max (ug/L)	115.62, 231.99
			007	10.6[A]	TRIB,FLAT CK,HAYNES CK,OUACHITA RV	ELCC trib 606	Zinc (total recoverable) avg (ug/L), max (ug/L)	115.62, 231.99
AR0000752	EL DORADO CHEMICAL CO, INC	NITROGEN FERTILIZERS	010		OUACHITA RV	Ouachita-004		
			001	46.46				
			002					
			101					
			102		MOSSY LK,OUACHITA RV	Ouachita-002		
AR0001210	GEORGIA PACIFIC-CROSSETT PAPER	PAPER MILLS	103					
AR0021687	STRONG, CITY OF	SEWERAGE SYSTEMS		0.3	LAPILE CK,OUACHITA RV	Ouachita-002		
AR0022268	HUTTIG, CITY OF	SEWERAGE SYSTEMS		0.138	OUACHITA RV	Ouachita-002		
AR0033812	N CROSSETT UTILITIES	SEWERAGE SYSTEMS		0.45	LTL BRUSHY CK, BIG BRUSHY CK	Ouachita-002		
AR0039659	FELSENTHAL, TOWN OF	SEWERAGE SYSTEMS		0.049	WOLF SLOUGH, OUACHITA RV	Ouachita-002		
AR0042315	CROSSETT HARBOR PORT AUTHORITY	REC VEHICLE PARKS & CAMPSITES		0.013	OUACHITA RV	Ouachita-002		
			001	Int				
AR0046116	WEST FRASER (SOUTH), INC	SAWMILLS & PLANING MILLS, GEN	002	Int	DOLLAR SLU (1,2); BUCKHORN SLU (4)	Ouachita-002		
AR0047384	ANTHONY FOREST PRODUCTS COMPAN	SAWMILLS & PLANING MILLS, GEN		2.211	N LAPILE CK,LAPILE CK OUACHITA RV	Ouachita-002		
AR0048097	GEORGIA PACIFIC, LLC-N LOG YRD	LOGGING CAMPS/LOGGING CONTRACT		int	TRIB,LTL BRUSHY CK,BRUSHY CK	Ouachita-002		
ARG160026	WASTE CORP OF AR-UNION COUNTY	REFUSE SYSTEMS		0.065	TRIB,SMACKOVER CK	Ouachita-004		
ARG640109	BEARDEN, CITY OF	WATER SUPPLY		0.07	TRIB,MIZZEL CK	Ouachita-005		
			001					
			002					
			003					
AR0000591	CROSS OIL REFINING & MARKETING	PETROLEUM REFINING	004		SMACKOVER CK (1-3) & HOLMES CK (4)	Smackover-006		
			001					
AR0000663	BERRY PETROLEUM CO-STEPHENS	PETROLEUM REFINING	002		TRIB,SMACKOVER CK,OUACHITA RV	outfalls Smackover-0		
			001	69.2[A]			copper (avg, max) ug/L	12.5, 25.2
AR0000841	ARKANSAS ELECTRIC COOP-MCCLELL	ELECTRICAL SERVICES	002		QUACHITA RV	Ouachita-005		
AR0020168	STEPHENS, CITY OF	SEWERAGE SYSTEMS		0.2	SMACKOVER CK,OUACHITA RV	Smackover-007		
AR0021440	SMACKOVER, CITY OF	SEWERAGE SYSTEMS		0.5	SMACKOVER CK,OUACHITA RV	Smackover-006		
AR0021474	BEARDEN, CITY OF	SEWERAGE SYSTEMS		0.17	TWO BAYOU CK,OUACHITA RV	Ouachita-005		
AR0021873	HAMPTON, CITY OF	SEWERAGE SYSTEMS		0.3	CHAMPAGNOLLE CK	Ouachita-004		
AR0022365	CAMDEN, CITY OF	SEWERAGE SYSTEMS		3.5	OUACHITA RV	Ouachita-005		
AR0033715	CARTHAGE, CITY OF	SEWERAGE SYSTEMS		0.09	MORO CK TRIB,OUACHITA RV	Ouachita-004		
AR0033758	FORDYCE, CITY OF	SEWERAGE SYSTEMS		0.84	JUG CK,MORO CK,OUACHITA RV	Ouachita-004		
AR0033936	EL DORADO, CITY OF-NORTH WWTP	SEWERAGE SYSTEMS		5	MILL CK,FLAT CK,HAYNES CK,SMACKOVER	Smackover-006		
							Copper (total recoverable) avg (ug/L), max (ug/L)	13.26, 26.6
AR0034363	SHUMAKER PUBLIC SERVICE CORP	COMBINATION UTILITIES, NEC		1.5	TWO BU CK	Ouachita-005	zinc (total recoverable) avg (ug/L), max (ug/L)	120.56,241.9
AR0035653	NORPHLET, CITY OF	SEWERAGE SYSTEMS		0.18	TRIB/FLAT CK,HAYNES CK,SMACKOVER CK	ELCC trib 606		
AR0035661	THORNTON, CITY OF	SEWERAGE SYSTEMS		0.05	TURNERS CK,CHAMPAGNOLLE CK,OUACHITA	Ouachita-004		
			001					
AR0036064	GEORGIA PACIFIC WOOD PRODUCTS	SOFTWOOD VENEER AND PLYWOOD	002		DIT,JUG CK,MORO CK	Ouachita-004		
AR0037761	LIBERTY BAPT ASSN-DBA BEECH SP	SCHOOLS & EDUCATIONAL SERVICES		0.03	TRIB,OUACHITA RV	Ouachita-005		
AR0038211	CALION, CITY OF	SEWERAGE SYSTEMS		0.112	CHAPELLE SLU,OUACHITA RV	Ouachita-004		
AR0040517	LOUANN, CITY OF	SEWERAGE SYSTEMS		0.064	BRUSHY CK,SMACKOVER CK,OUACHITA RV	Smackover-007		
AR0042609	HARRELL, CITY OF	SEWERAGE SYSTEMS		0.072	SPRING BR,BLANN CK,LLOYD CK,MORO CK	Ouachita-004		
AR0044733	CEDARWOOD LEISURE PARK, LLC	OPER OF RES MOBILE HOME SITES		0.031	TRIB,FLAT CK,HAYNES CK,SMACKOVER CK	ELCC trib 606		
			001					
AR0047503	IDAHO TIMBER CORP OF CARTHAGE,	SAWMILLS & PLANING MILLS, GEN	002		TRIB,MORO CK,SALINE RV,OUCHITA RV	Ouachita-004		
AR0048046	ROGERS LUMBER COMPANY, INC	SAWMILLS & PLANING MILLS, GEN			TRIB,OLD LOWER RV,OUACHITA RV	Ouachita-005		
			001					
AR0048381	WATSON SAWMILL, INC.	SAWMILLS & PLANING MILLS, GEN	002		TRIB,BEECH CK,SMACKOVER CK,OUACHITA	Smackover-007		
AR0049123	MT HOLLY SCHOOL WASTEWATER SYS	ELEMENTARY & SECONDARY SCHOOLS		0.005	TRIB,DRY CK,BEECH CK,SMACKOVER CK	Smackover-007		
			001	2.56[C]			ZINC, TOTAL (AS ZN) (avg, max)	1,1
			002					
			003					
AR0049140	UNION POWER PARTNERS, LP-UNION	ELECTRICAL SERVICES	004		OUACHITA RV	Ouachita-004		
AR0049204	GEORGIA PACIFIC-FORDYCE OSB FA	RECONSTITUTED WOOD PRODUCTS		0.006	TRIB,MORO CK,OUACHITA RV	Ouachita-004		

Permit Number	Company	Facility Type	Outfall Number	Flowrate (MGD)	Receiving Waterbody	Impaired Receiving Reach	Parameter	Limit
AR0049646	STANDARD GRAVEL COMPANY, INC	CONSTRUCTION SAND AND GRAVEL		Int	MILL CK,FREECO BU,OUACHITA RV	Ouachita-005		
AR0049743	EL DORADO WATER UTILITIES	SEWERAGE SYSTEMS		12	OUACHITA RV	Ouachita-004		
			001					
AR0049891	ANTHONY TIMBERLANDS, INC.	LOGGING CAMPS/LOGGING CONTRACT	002		MIZZELL CK,OUACHITA RV	Ouachita-005		
AR0050482	GARLAND GASTON LUMBER COMPANY,	SAWMILLS & PLANING MILLS, GEN		0.2	TRIB,MILL CK,TWO BU,OUACHITA RV	Ouachita-005		
			001					
ARG340076	TEPPCO EL DORADO P5 TERMINAL	REFINED PETROLEUM PIPELINE	002		FLAT CK	smackover-006		
ARG340077	TEPPCO EL DORADO 1 TERMINAL	REFINED PETROLEUM PIPELINE		0.04	FLAT CK,OUACHITA RV	smackover-006		
ARG640027	FORDYCE WATER SYSTEM	WATER SUPPLY		0.093	ACRUMAN DITCH, MORE CREEK, OUACHITA	Ouachita-004		
ARG640052	SHUMAKER WATER TREATMENT FACIL	WATER SUPPLY		0.075	TWO BAYOU CREEK	Ouachita-005		
ARG750069	GET-RID-OF-IT OF AR	CAR WASHES		0.15	FLAT CK	ELCC trib		
AR0050105	HARMONY GROVE PUBLIC SCHOOL	ELEMENTARY & SECONDARY SCHOOLS		0.015	MIZZELL CK,PALMER BU,OUCHITA RV	Ouachita-005		
ARG500014	HANSON AGGREGATES-EAGLE MILLS	CONSTRUCTION SAND AND GRAVEL		Int	MIZZEL CK,OUACHITA RV	Ouachita-005		
AR0000876	BRADLEY LUMBER COMPANY	SAWMILLS & PLANING MILLS, GEN		1.49	TRIB,SALINE RV (1,2) & BRUSHY FK(3)	Ouachita-002		
AR0038989	HERMITAGE, CITY OF	SEWERAGE SYSTEMS		0.07	BIG TOWN CK,L'AIGLE CK,SALINE RV	Ouachita-002		
AR0042421	FOUNTAIN HILL, CITY OF	SEWERAGE SYSTEMS		0.055	FLAT CK TRIB,SALINE RV	Ouachita-002		
AR0047830	JOHNSVILLE COMPANY, LLC	MINE & EARTHS, GROUND OR TREAT		int	HUNT BR,SALINE RV,OUCHITA RV	Ouachita-002		
AR0050300	BRADLEY LUMBER COMPANY-HERMITA	SAWMILLS & PLANING MILLS, GEN		int	TRIB,L'AIGLE CK,SALINE RV,OUACHITA	Ouachita-002		
AR0050601	BANKS, CITY OF	SEWERAGE SYSTEMS		0.036	TRIN,L'AIGLE CK,SALINE RV,OUACHITA	Ouachita-002		
ARG500012	P & C CONSTRUCTION	CONSTRUCTION SAND AND GRAVEL		Int	TRIB,GRAY BR	Ouachita-002		
ARG640143	FOUNTAIN HILL WATERWORKS	WATER SUPPLY		0.055	TRIB,FLAT CK	Smackover-007		

Notes

A: Maximum value reported in permit renewal application 2006

B: Maximum value reported in DMRS 2002 - 2004 from PCS facility report

C: Value reported in permit

APPENDIX C

Water Quality Data

Table C.1. Historical water quality for Ouachita River at Felsenthal Lock and Dam (OUA0008B).

Date Collected	Copper µg/L	Zinc µg/L	Hardness mg/L
2/20/1996	< 0.5	12	32
3/12/1996	< 0.5	12.5	29
4/23/1996	< 0.5	8.8	23
5/21/1996	< 0.5	13.3	23
6/18/1996	< 0.5	12.8	27
7/16/1996	4.2	7.9	22
9/10/1996	5.7	17.6	28
11/19/1996	< 0.5	13.2	23
1/28/1997	2.5	13	20
3/11/1997	2.1	43.3	16
7/22/1998	1.08	27.2	16.3
9/1/1998	1.37	38.5	18
11/16/1998	1.14	18.4	28
1/26/1999	1.46	10.6	22
3/23/1999	1.4	22.9	13
5/25/1999	0.95	5.4	25
7/27/1999	1.32	23.5	23
9/21/1999	1	18.3	20
11/22/1999	0.99	20.5	125
1/25/2000	1.1	26.6	26
3/27/2000	1.38	9.1	21
5/30/2000	1.31	37.6	20
7/25/2000	1.34		21
9/18/2000	< 0.5	3.4	16
12/19/2000	0.97	13	20
1/30/2001	1.2	13.2	14
5/22/2001	2.5	17.9	18
7/24/2001	2.332	12	21
9/17/2001	2.41	21.5	21
11/19/2001	1.25	3.6	
3/26/2002	1.33		14
5/28/2002	2.1	20.7	18
7/23/2002	3.58	273	25
9/17/2002	1.17	24.8	21
11/5/2002	1.42	32.7	262
1/21/2003	4.78	72.5	20
3/25/2003	1.09	24	20
5/20/2003	1.64	27.4	23
7/15/2003	3.25	103	25
9/23/2003	2.08	95.9	30
11/11/2003	0.82	12.1	25
1/20/2004	< 0.5	33.5	26
3/16/2004	2.42	9.89	17
5/11/2004	1.49	29.1	25
7/20/2004	2.11	16.9	17
9/21/2004	2.02	12.6	26
11/30/2004	2.11	21.8	
3/28/2005	1.94	19.9	17

Date Collected	Copper µg/L	Zinc µg/L	Hardness mg/L
5/23/2005	1.43	34.4	26
7/25/2005	0.81	13.5	26
9/27/2005	1.19	33.4	17
11/29/2005	0.65	42.5	30
1/17/2006	< 0.5	12.3	36
5/16/2006	8.38	14	26
7/25/2006	3.3	13.4	22
9/26/2006	1.06	5.2	82
11/28/2006	1.53	8.38	31
1/2/2007	1.71	4.46	28
3/13/2007	1.56	15.2	26
No. of Values	59	57	57
Minimum	0.25	3.40	13.00
Average	1.70	26.74	29.69
Median	1.37	17.60	23.00
Maximum	8.38	273.00	262.00

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Table C1 WQ data for OUA0008B

Table C.2. Historical water quality for Ouachita River at Pigeon Hill Access (OUA0124B).

Date Collected	Copper µg/L	Zinc µg/L	Hardness mg/L
1/10/1995	< 0.5	6.44	20
2/14/1995	< 0.5	9.52	23.11
3/28/1995	< 0.5	11.3	22
4/25/1995	< 0.5	8.6	22.2
5/23/1995	< 0.5	14.9	22
6/20/1995	8.79	34.3	21
7/17/1995	< 0.5	14.4	21
8/8/1995	2.6	16.3	21
9/19/1995	< 0.5		24
10/17/1995	< 0.5	6.9	30
11/13/1995	3.7	7.8	28
12/18/1995	< 0.5	20.5	48
1/30/1996	< 0.5	25.9	49
2/20/1996	2.4	16.7	38
3/12/1996	< 0.5	18.3	32
4/23/1996	< 0.5	10.4	28
5/21/1996	< 0.5	9.5	22
6/18/1996	< 0.5	39.2	38
7/16/1996	< 0.5	9.8	31
9/10/1996	7.5	19.5	27
11/19/1996	< 0.5	23.9	20
1/28/1997	2.2	21.4	22
3/11/1997	< 0.5	19.4	17
7/22/1998	1.16	55.6	17.3
9/1/1998	6.06	55.3	19
11/16/1998	1.29	44.3	29
1/26/1999	1.48	14.2	21
3/23/1999	1.54	32.2	14
5/25/1999	1.48	59.4	19
7/27/1999	0.99	2.3	24
9/21/1999	2.06	11.7	19
11/22/1999	1.08	21.5	28
1/25/2000	3.62	26	27
3/27/2000	1.57	28.2	20
5/30/2000	1.02	5.8	22
7/25/2000	0.7		22
9/18/2000	1.09	4.7	20
12/19/2000	0.91	9.9	17
1/30/2001	1.27	8.6	13
5/22/2001	1.42	9.4	22
7/24/2001	0.6918	11.2	20
9/17/2001	1.94	9.1	23
11/19/2001	0.98	4.4	
5/28/2002	2.33	48.5	20
9/17/2002	1.4	16.5	22
11/5/2002	2.67	56	35
1/21/2003	0.87	40.4	19
3/25/2003	1.18	79.1	19

Date Collected	Copper µg/L	Zinc µg/L	Hardness mg/L
5/20/2003	3.57	66	30
7/15/2003	19	79.4	26
11/11/2003	1.8	54.9	31
5/11/2004	1.33	22.1	20
7/20/2004	2.73	30.8	24
9/21/2004	1	26.4	25
11/30/2004	2.12	49	
3/28/2005	< 0.5	14.9	21
5/23/2005	1.08	120	28
7/26/2005	2.68	11.9	25
9/27/2005	2.47	155	23
11/29/2005	< 0.5	90.1	25
1/17/2006	< 0.5	5.27	31
5/16/2006	3.38	43.7	24
7/25/2006	2.84	7.71	19
9/26/2006	0.92	2.71	24
11/28/2006	1.17	11.1	31
1/2/2007	1.55	2.95	22
No. of Values	66	64	64
Minimum	0.25	2.30	13.00
Average	1.83	28.33	24.48
Median	1.17	17.50	22.10
Maximum	19.00	155.00	49.00

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Table C.3. Historical water quality data for Ouachita River below Camden, Arkansas (OUA0037).

Date Collected	Copper µg/L	Zinc µg/L	Hardness mg/L
1/9/1995	< 0.5	11.1	21
2/13/1995	< 0.5	6.71	17.66
3/27/1995	2.42	17.2	19
4/24/1995	3.7	30.3	24.6
5/22/1995	2.33	10.1	23
6/19/1995	2.9	7.71	20
7/18/1995	< 0.5	13.7	20
8/7/1995	5.7	12.3	21
9/18/1995	< 0.5	23.6	22
10/16/1995	< 0.5	7.8	23
11/14/1995	2.9	6.3	22
12/6/1995			
12/18/1995	2.4	33.2	19
1/30/1996	< 0.5	12.6	22
2/20/1996	< 0.5	11	24
3/12/1996	< 0.5	15.5	19
4/23/1996	2.6	25.7	18
5/21/1996	< 0.5	24.5	22
6/18/1996	< 0.5	13.9	23
7/16/1996	4	9.8	19
9/10/1996	6.9	13.8	25
11/19/1996	< 0.5	17.9	17
1/28/1997	2.7	12.9	22
3/11/1997	2.2	39.9	19
7/21/1998	1.79	29.1	19.5
9/1/1998	1.84	3	18
11/16/1998	1.44	9.6	25
1/26/1999	1.4	27.9	21
3/23/1999	1.04	31.4	16
5/25/1999	1.3	13.2	20
7/27/1999	1.03	205.8	21
9/21/1999	1.43	12.4	21
11/22/1999	1.29	13.9	24
1/25/2000	0.97	6.8	24
3/27/2000	1.32	9.1	20
5/30/2000	1.47	8.5	23
7/25/2000	0.69		22
9/18/2000	1.55	7.2	21
12/19/2000	1.1	19.6	18
1/30/2001	1.03	43.5	16
3/27/2001	1.65	7.1	20
5/22/2001	1.77	30.9	15
7/24/2001	2.166	5.9	19
9/18/2001	1.43	4	23
11/19/2001	1.19	7.4	
5/28/2002	24.65	96	26
7/23/2002	3.27	< 0.1	21
9/17/2002	5.44	64	21

Date Collected	Copper µg/L	Zinc µg/L	Hardness mg/L
11/5/2002	1.78	39.2	24
1/21/2003	2.33	23.2	19
3/25/2003	1	33.6	20
5/20/2003	2.21	31.4	27
7/15/2003	8.6	44.1	26
9/23/2003	1.54	22.2	24
11/11/2003	2.47	273	30
1/20/2004	1.38	91.1	21
3/16/2004	2.49	12.3	25
5/11/2004	1.65	17.3	25
7/20/2004	3.42	13.3	23
9/21/2004	2.3	14	25
11/30/2004	2.5	153	
3/28/2005	< 0.5	24	23
4/4/2005	1.55	4.02	
5/2/2005	1.01	1.91	23
5/23/2005	2.01	53.8	25
6/27/2005	2.5	28.1	22
7/26/2005	2.65	11.9	24
9/27/2005	0.96	118	21
11/29/2005	< 0.5	28.9	25
1/17/2006	< 0.5	53.3	32
5/16/2006	5.78	26.7	26
7/25/2006	2.33	6.14	20
9/26/2006	0.99	2.84	21
11/28/2006	0.86	4.53	22
1/2/2007	1.95	3.43	22
3/13/2007	1.58	6.18	24
No. of Values	75	74	72
Minimum	0.25	0.50	15.00
Average	2.19	29.40	21.89
Median	1.55	13.90	22.00
Maximum	24.65	273.00	32.00

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Table C3 WQ data for OUA0037

Table C.4. Historical water quality data collected by ADEQ For Smackover Creek near Smackover (OUA0027

Date Collected	Copper µg/L	Zinc µg/L	Hardnes mg/L
1/9/1995	< 0.5	18.2	29
2/13/1995	< 0.5	10.6	30.18
3/27/1995	< 0.5	17.4	38
4/24/1995	3.1	16.2	18.8
5/22/1995	3.16	17.6	35
6/19/1995	1	11.9	36
7/18/1995	1	32.2	44
8/7/1995	4.4	18.1	38
9/18/1995	< 0.5	24.2	62
10/16/1995	4.2	29.8	58
11/14/1995	2.5	4.8	52
12/18/1995	2.9	36.3	85
1/30/1996	< 0.5	25.6	73
2/20/1996	< 0.5	22.9	73
3/12/1996	< 0.5	21	71
4/23/1996	3.8	55.3	26
5/21/1996	2.8	55.6	58
6/18/1996	60.2	29.3	39
7/16/1996	5	20.7	25
9/10/1996	8	30.9	45
11/19/1996	2.2	27.9	45
1/28/1997	2.4	13.7	17
3/11/1997	3.4	83.9	22
7/21/1998	1.02	32.7	47.9
9/1/1998	1.45	31.3	40
11/16/1998	1.86	26.9	57
1/26/1999	1.37	32.3	24
3/23/1999	1.01	19.1	25
5/25/1999	1.15	13.7	39
7/27/1999	1.85	40	57
9/21/1999	4.17	23.7	97
11/22/1999	1.06	7	45
1/25/2000	1.17	23.8	52
3/27/2000	1.68	19.8	41
5/30/2000	0.94	13.7	32
7/25/2000	0.99		40
12/19/2000	1.32	24.1	23
1/30/2001	1.23	23.5	22
3/27/2001	1.52	15.7	21
5/22/2001	2.99	113	23
7/24/2001	1.889	11	36
9/18/2001	1.66	11.6	23
11/19/2001	0.95	10.2	
3/26/2002	1.79		13
5/28/2002	4.95	43	35
7/23/2002	1.97	< 0.5	33
9/17/2002	1.56	25.4	59
11/5/2002	2.32	33.5	41

Date Collected	Copper µg/L	Zinc µg/L	Hardnes mg/L
1/21/2003	6.38	49.5	39
3/25/2003	2.4	32.7	21
5/20/2003	1.51	49.1	20
7/15/2003	5.46	51.5	30
9/23/2003	4.24	64.5	48
11/11/2003	0.84	65.7	63
1/20/2004	0.57	65.8	34
3/16/2004	2.55	10.9	31
5/11/2004	1.42	19.8	39
7/20/2004	1.77	31.8	31
9/21/2004	2.31	19.2	90
11/30/2004	2.34	50.8	
3/28/2005	0.74	123	26
5/23/2005	0.88	14.4	27
7/26/2005	1.75	14.5	32
9/27/2005	1.16	42.2	27
11/29/2005	0.93	78.7	37
7/25/2006	7.28	18.9	60
9/26/2006	0.69	8.66	27
11/28/2006	0.89	10.3	27
1/2/2007	2.14	14.2	26
3/13/2007	1.26	13.2	34
No. of Values	70	68	68
Minimum	0.25	0.25	13.00
Average	2.93	30.42	39.92
Median	1.67	23.75	36.00
Maximum	60.20	123.00	97.00

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Table C4 WQ data for OUA0027

Table C.5. Historical metals water Quality data collected on the ELCC tributary.

Station	Date	Copper (ug/L)	Zinc (ug/L)	Hardness (mg/L)
OUA0137A	4/4/95	5.1	25.30	
	2/8/00	5.93	41.10	38
	4/24/00	3.83	15.90	13
	6/20/00	7.32	67.20	91
	8/29/00	14.1	23.40	17
	9/19/00	9.38	133.80	143
	12/4/01	5.7	24.60	30
	No. of Values	7	7	6
	Min	3.83	15.9	13
	Average	7.34	47.33	55.33
	Median	5.93	25.3	34
	Max	14.1	133.8	143
OUA0137B	4/4/95	10	25.80	
	2/8/00	8.03	46.00	29
	4/24/00	7.42	22.00	16
	6/20/00	8.03	48.30	78
	8/29/00	9.99	6.30	43
	9/19/00	8.94	13.60	20
	No. of Values	6	6	5
	Min	7.42	6.3	16
	Average	8.74	27.00	37.20
	Median	8.485	23.9	29
	Max	10	48.3	78

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Table C.6. Historical water Quality data collected on the ELCC tributary.

Station	Date	Nitrate + Nitrite Nitrogen (mg/L)
OUA0137A	17-May-94	24.2
	21-Jun-94	7.35
	26-Jul-94	7.25
	26-Sep-94	4.89
	18-Oct-94	28.3
	24-Jan-95	24.6
	21-Mar-95	16.2
	04-Apr-95	37.8
	08-Jan-96	78.7
	06-Feb-96	40.8
	26-Mar-96	13.74
	30-Apr-96	16.9
	28-May-96	117
	18-Jun-96	99.2
	16-Jul-96	52.7
	08-Feb-00	18.4
	24-Apr-00	2.636
	20-Jun-00	88.13
	29-Aug-00	24.51
	19-Sep-00	211
	04-Dec-01	8.694
OUA0137B	17-May-94	13
	21-Jun-94	23.5
	26-Jul-94	16.2
	26-Sep-94	22.9
	18-Oct-94	16.9
	24-Jan-95	13.4
	21-Mar-95	13.9
	04-Apr-95	11.3
	08-Jan-96	69.3
	06-Feb-96	44.2
	26-Mar-96	7.29
	30-Apr-96	8.3
	28-May-96	96
	18-Jun-96	80.9
	16-Jul-96	26.1
	08-Feb-00	17.7
	24-Apr-00	7.761
	20-Jun-00	79.6
	29-Aug-00	27
	19-Sep-00	2.62

Station	Date	Nitrate + Nitrite Nitrogen (mg/L)
OUA0137C	17-May-94	.283
	21-Jun-94	.412
	26-Jul-94	.994
	26-Sep-94	.278
	18-Oct-94	1.76
	24-Jan-95	2.231
	21-Mar-95	1.872
	04-Apr-95	1.172
	08-Jan-96	2.014
	06-Feb-96	1.808
	26-Mar-96	1.560
	30-Apr-96	0.325
	28-May-96	0.436
	18-Jun-96	2.120
	16-Jul-96	1.082
	08-Feb-00	0.645
	24-Apr-00	0.175
	20-Jun-00	3.135
	29-Aug-00	0.330
	19-Sep-00	0.367
OUA0137D	17-May-94	.0360
	21-Jun-94	< 0.01
	26-Jul-94	.0780
	26-Sep-94	< 0.01
	18-Oct-94	.0690
	24-Jan-95	0.102
	21-Mar-95	0.031
	04-Apr-95	0.022
	08-Jan-96	0.417
	06-Feb-96	0.049
	26-Mar-96	0.067
	30-Apr-96	0.145
	28-May-96	0.204
	18-Jun-96	0.220
	16-Jul-96	0.172
	08-Feb-00	0.018
	24-Apr-00	< 0.01
	20-Jun-00	0.010
	29-Aug-00	0.126
	19-Sep-00	< 0.01

Station	Date	Nitrate + Nitrite Nitrogen (mg/L)
OUA0137E	10-Mar-97	0.078
	27-May-97	0.192
	22-Sep-97	0.214
	01-Dec-97	0.064
	04-Dec-01	0.037
OUA0137F	10-Mar-97	22.2
	27-May-97	73.4
	22-Sep-97	105
	01-Dec-97	55.5
OUA0137G	10-Mar-97	7.94
	27-May-97	13.6
	22-Sep-97	4.3
	01-Dec-97	40.8

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Figure C.1 Time Series Concentration of Zinc for Ouachita River at Felsenthal Lock and Dam (OUA0008B)

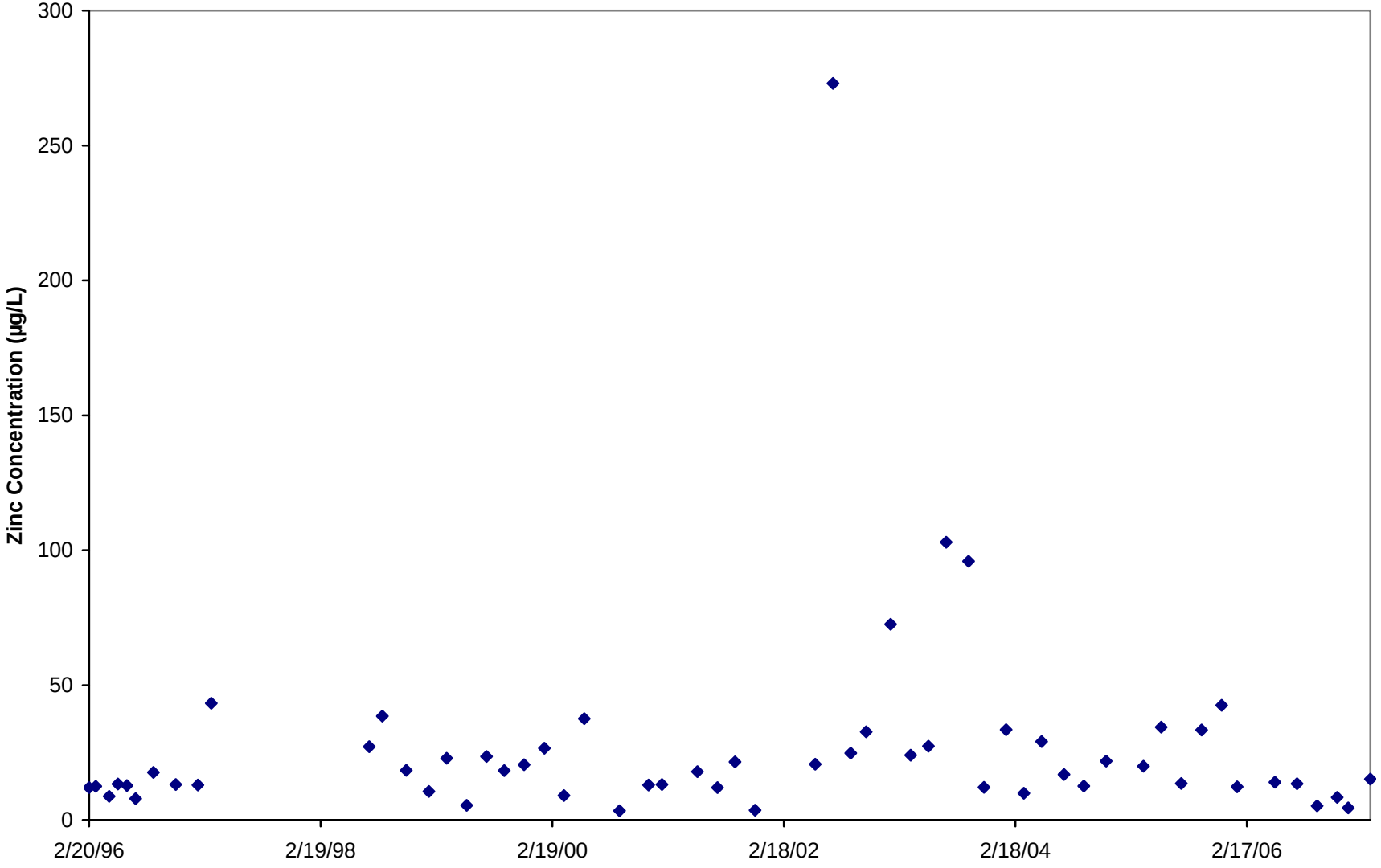


Figure C.2 Time Series Concentration of Zinc for Ouachita River below Game & Fish Pigeon Hill Access (OUA0124B)

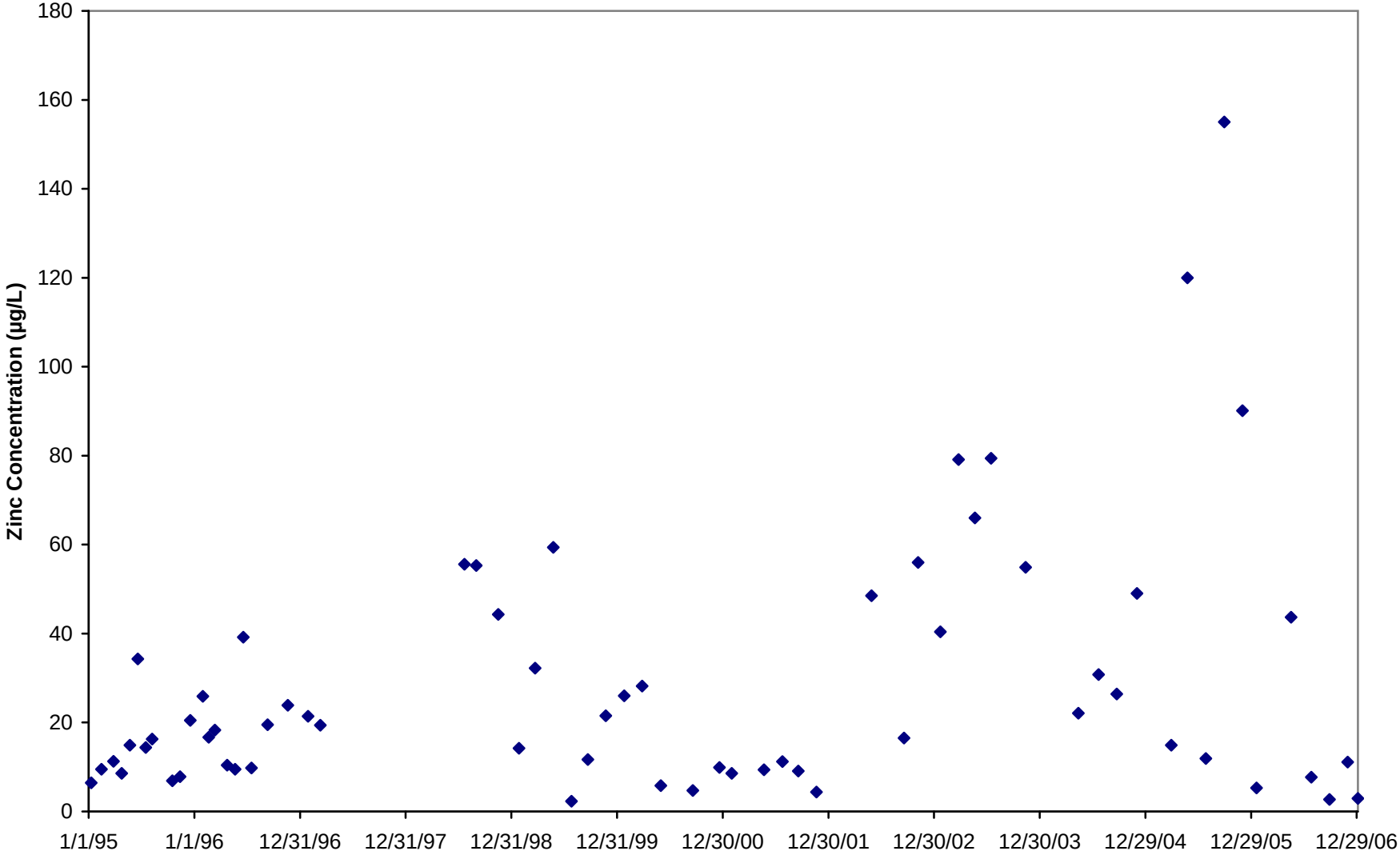


Figure C.3 Time Series Concentration of Zinc for for Ouachita River below Camden, Arkansas (OUA0037)

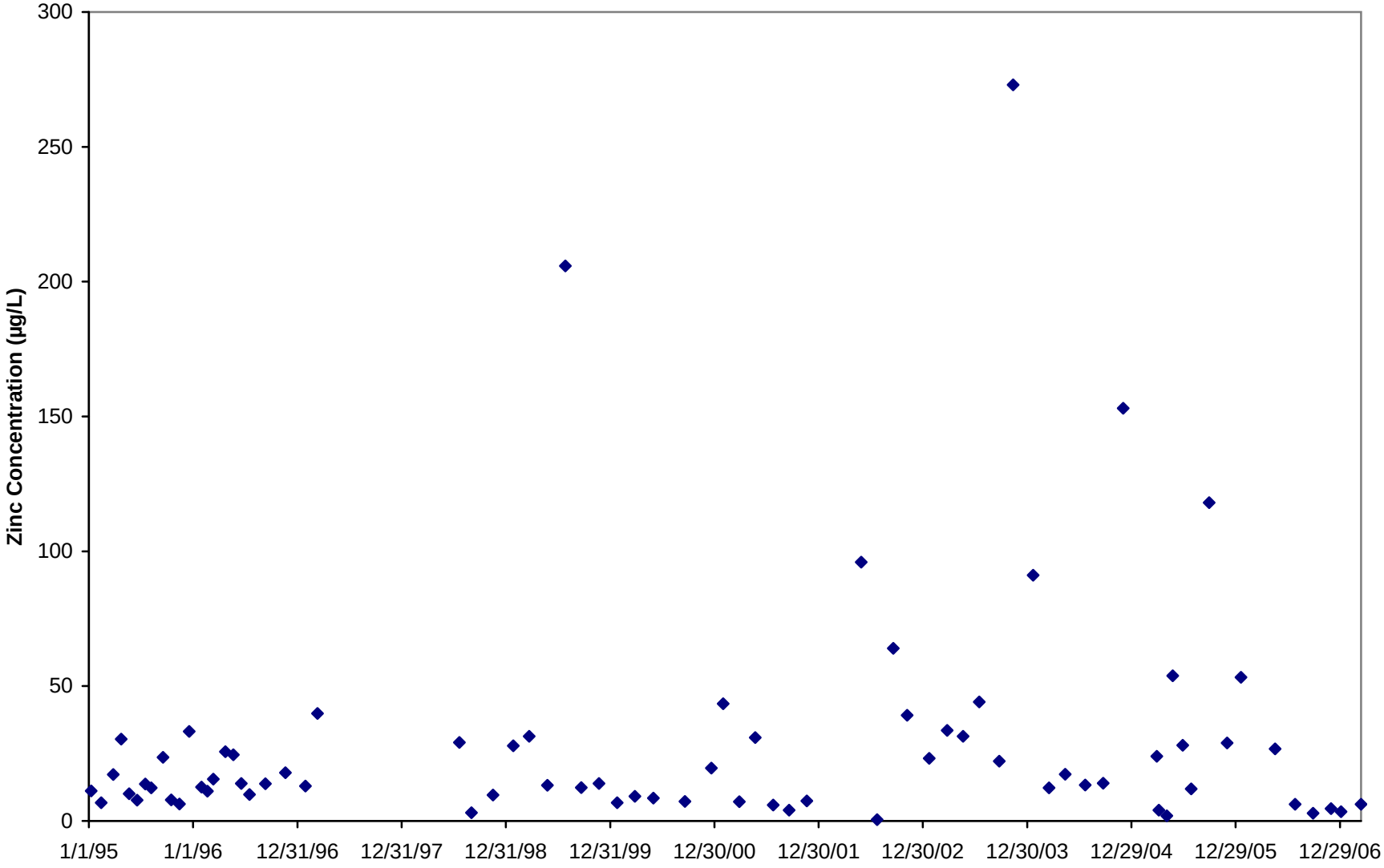


Figure C.4. Time Series Concentration of Zinc in Smackover Creek near Smackover (OUA0027)

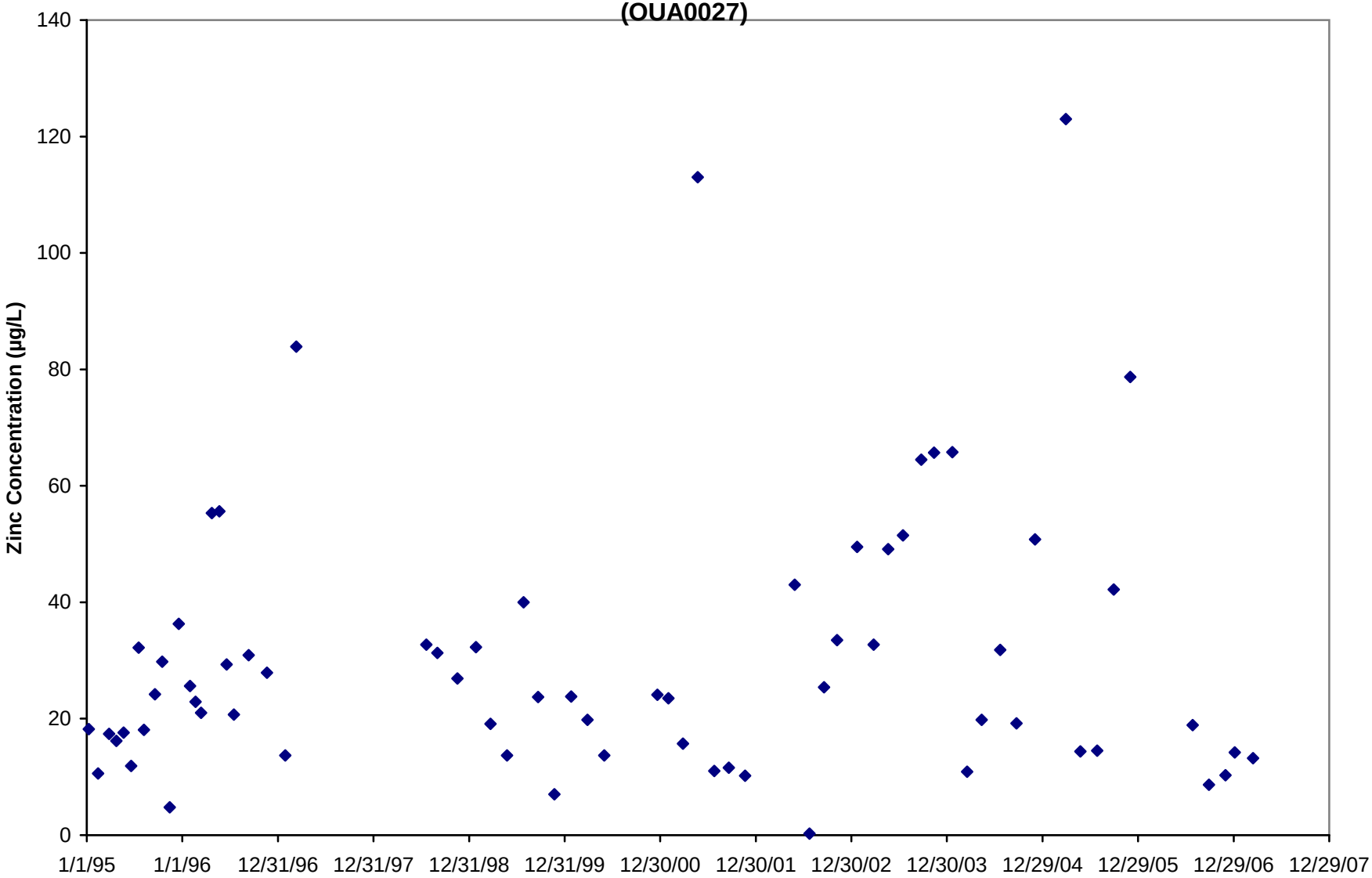


Figure C.5 Time Series Concentration of Zinc in the ELCC Tributary (OUA0137A and B)

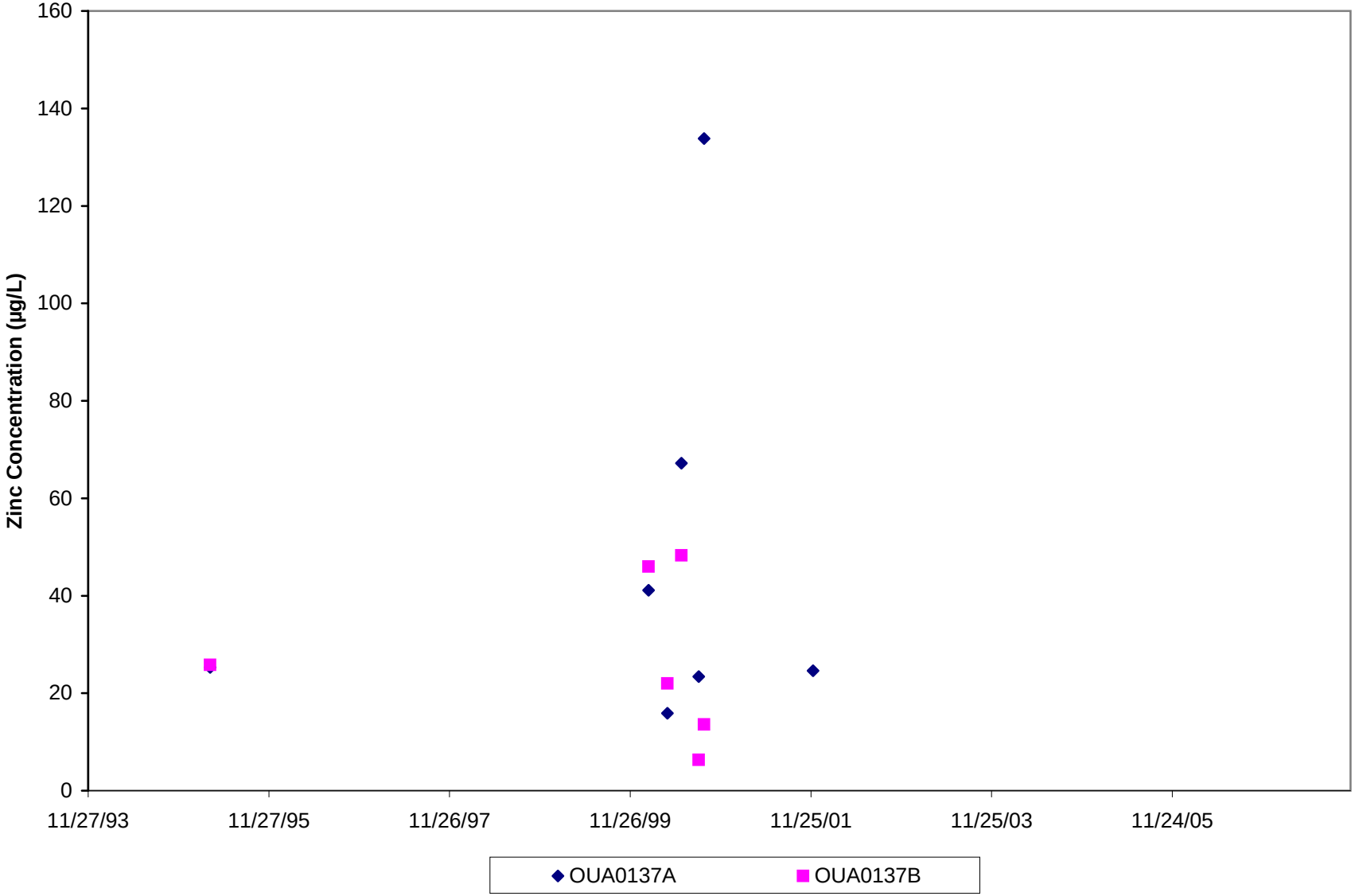


Figure C.6 Plot of Time Series Concentration of Copper for Ouachita River at Felsenthal Lock and Dam (OUA0008B)

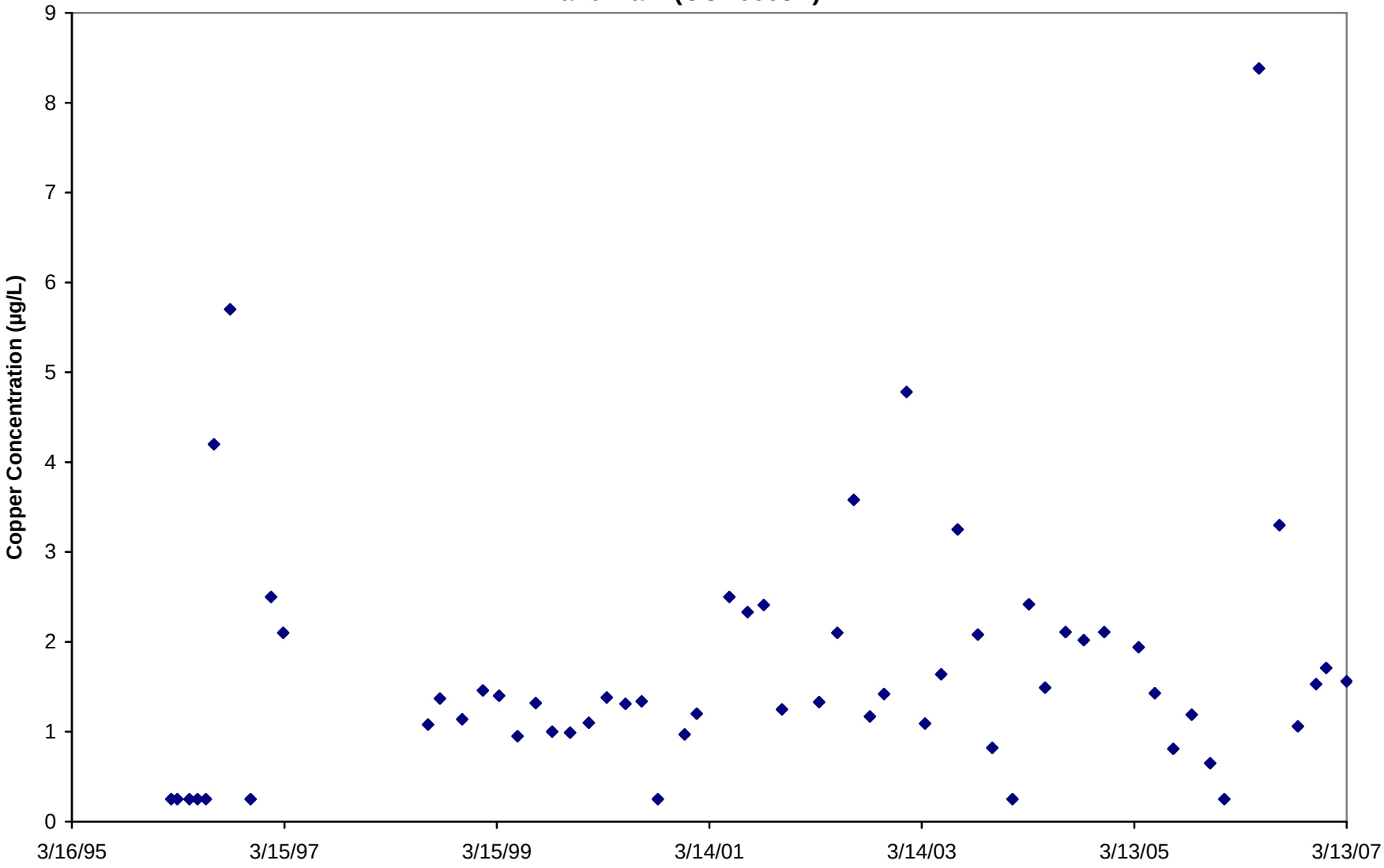


Figure C.7 Time Series Concentration of Copper for Ouachita River below Game & Fish Pigeon Hill Access (OUA0124B)

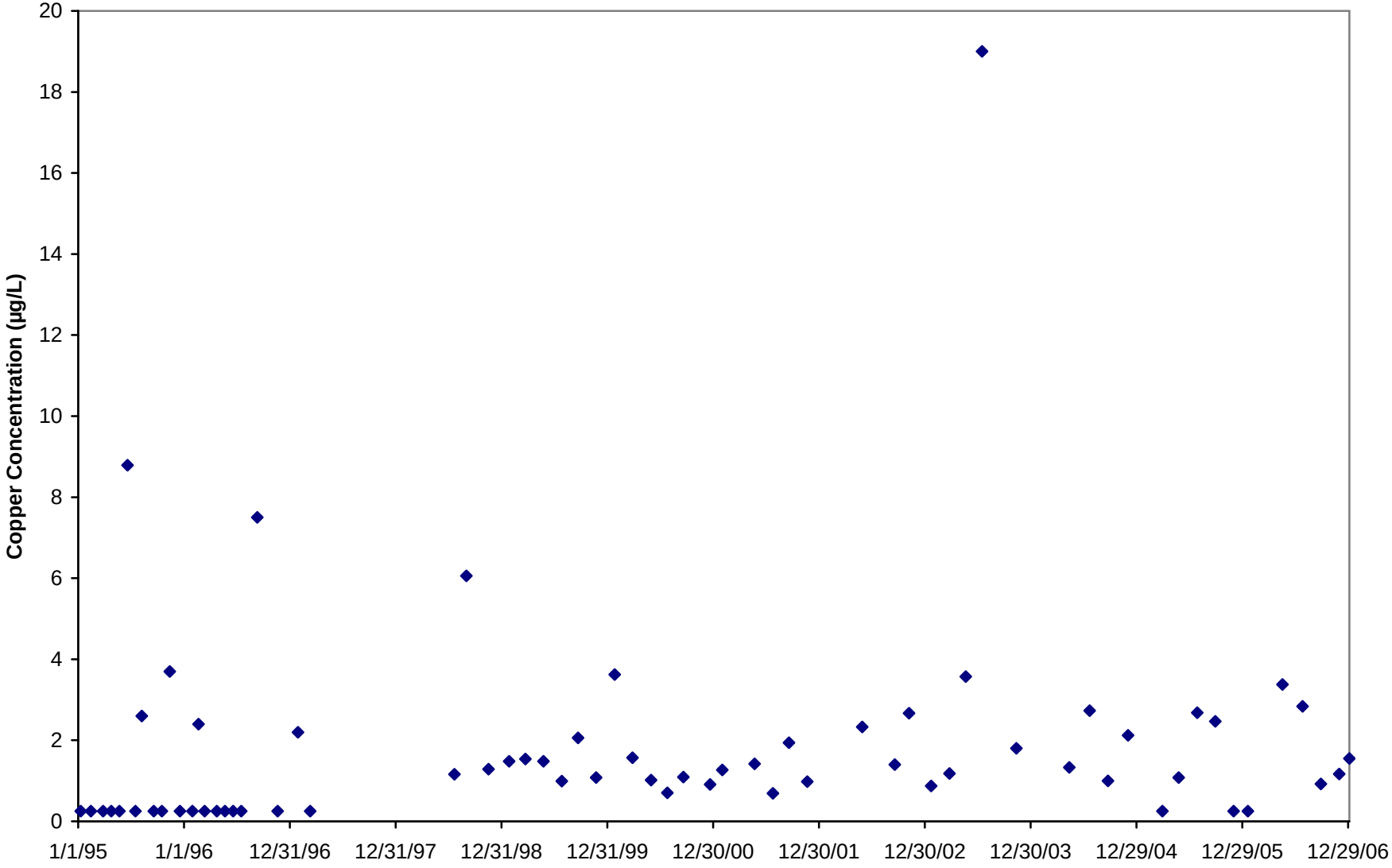


Figure C.8 Time Series Concentration of Copper for Ouachita River below Camden, Arkansas (OUA0037)

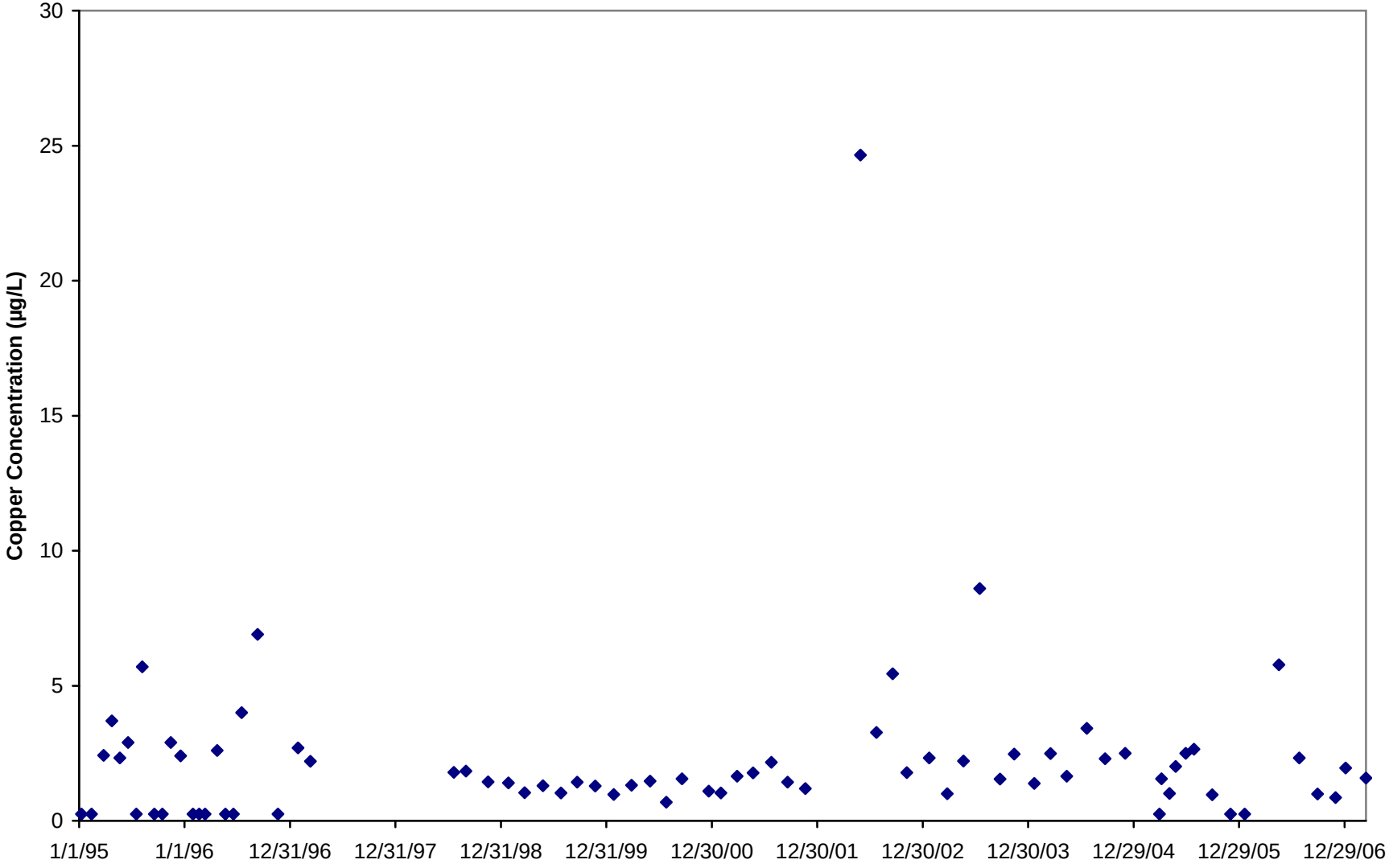


Figure C.9. Time Series Copper Concentration in Smackover Creek near Smackover (OUA0027)

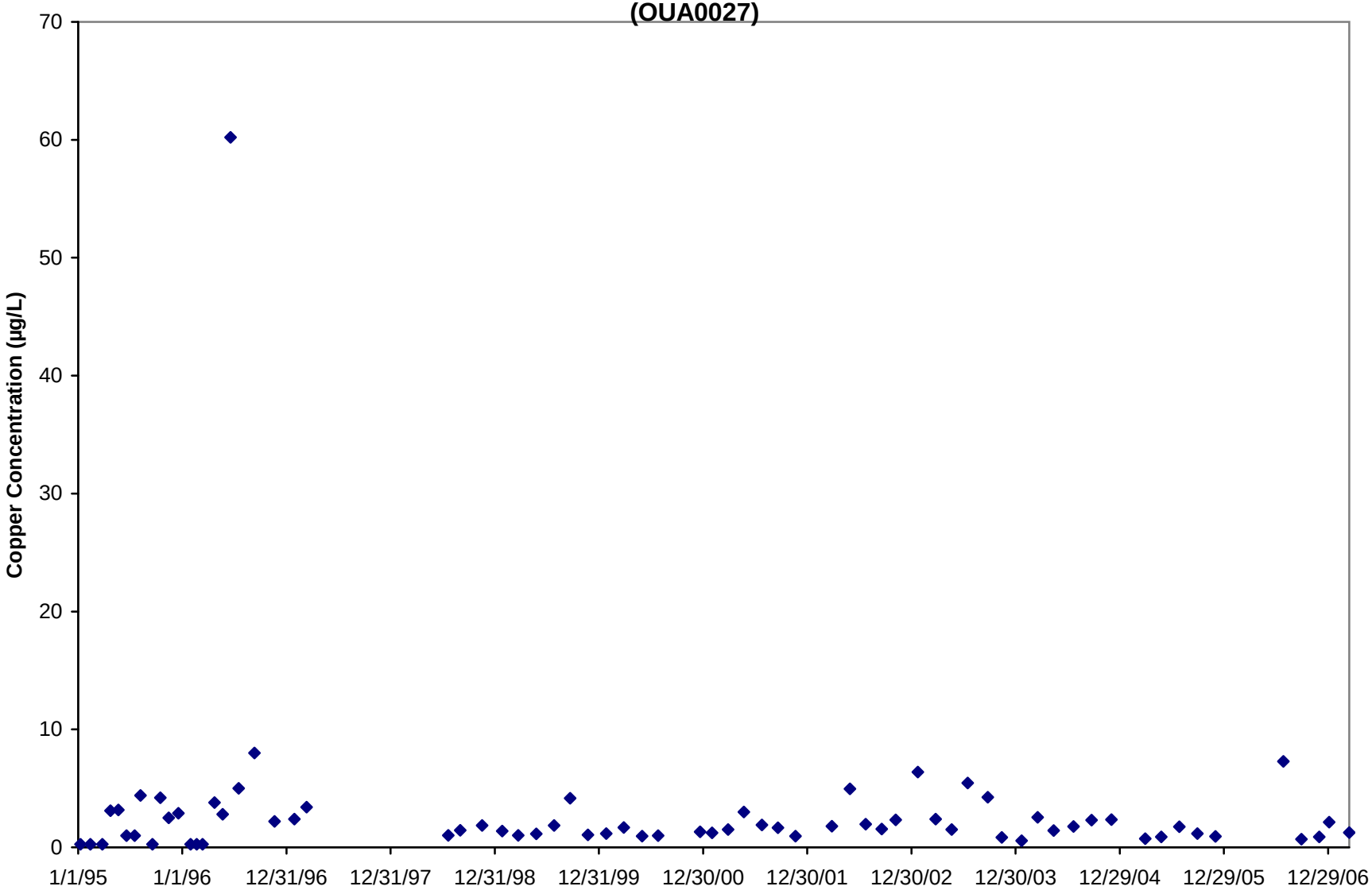


Figure C.10 Time Series Copper Concentration in ELCC Tributary (OUA0137A and B)

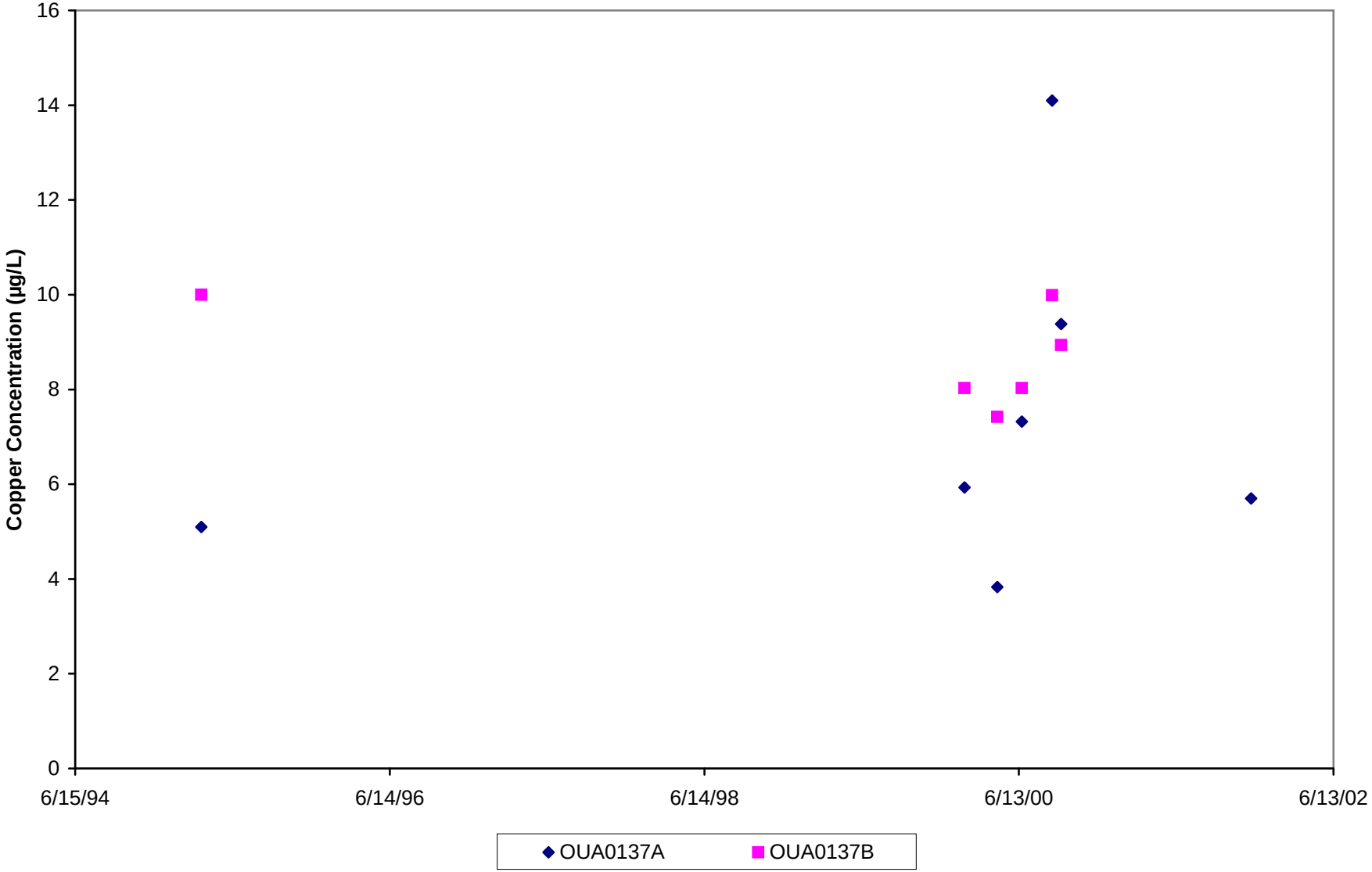


Figure C.11 Time Series Nitrate Concentrations in ELCC Tributary

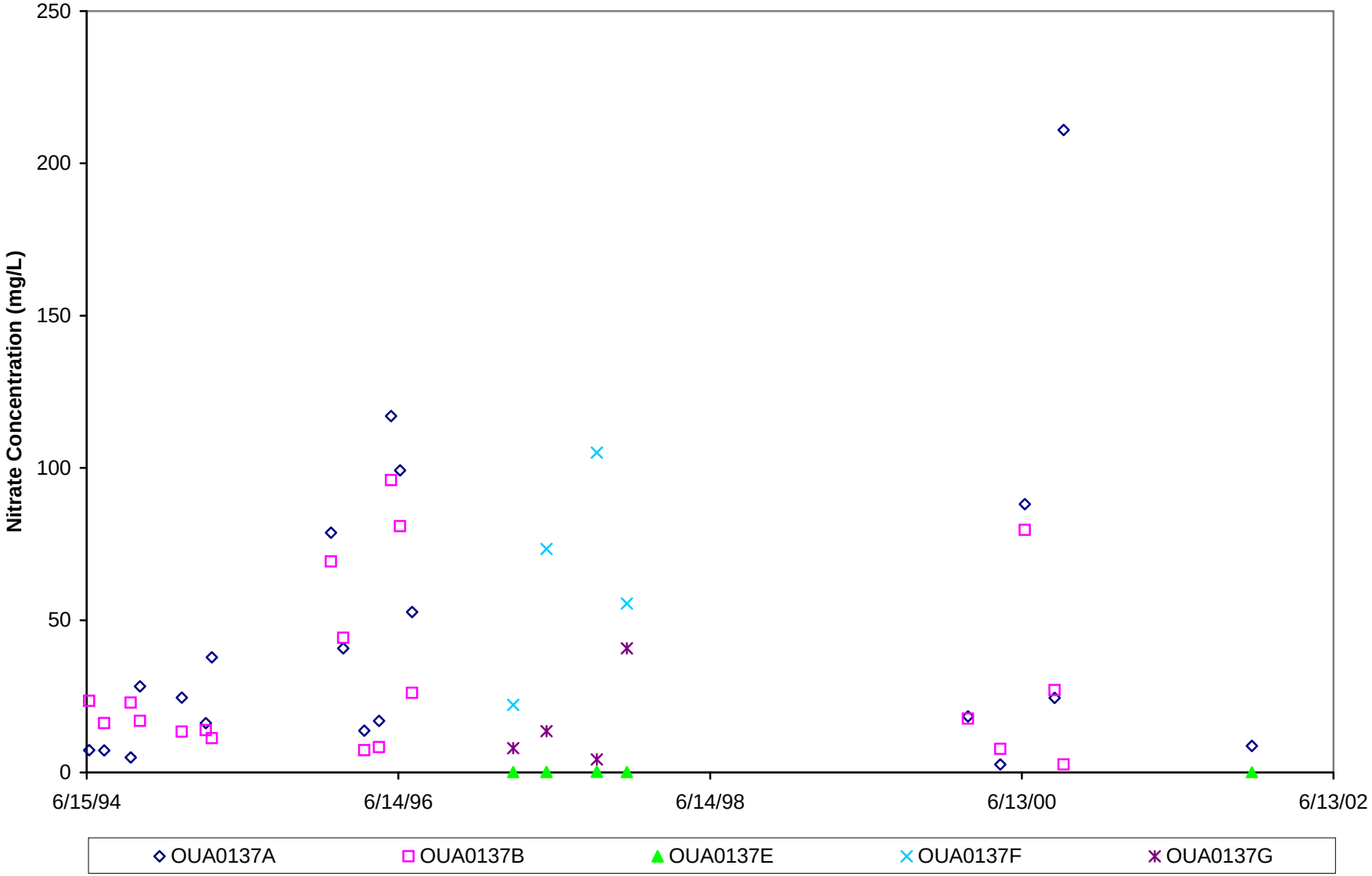


Figure C.12 Seasonal Concentration of Zinc for Ouachita River at Felsenthal Lock and Dam (OUA0008B)

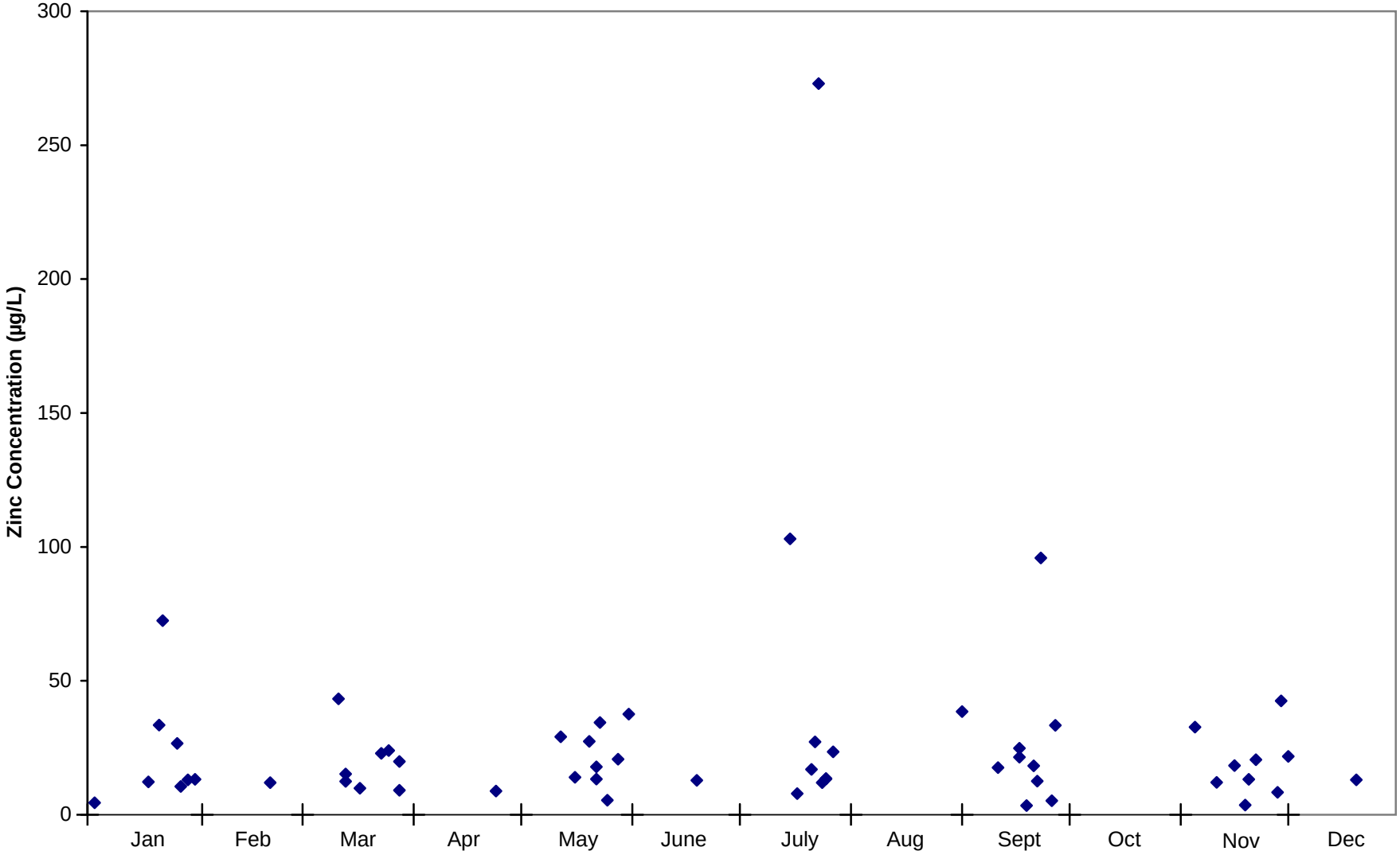


Figure C.13 Seasonal Concentration of Zinc for Ouachita River below Game & Fish Pigeon Hill Access (OUA0124B)

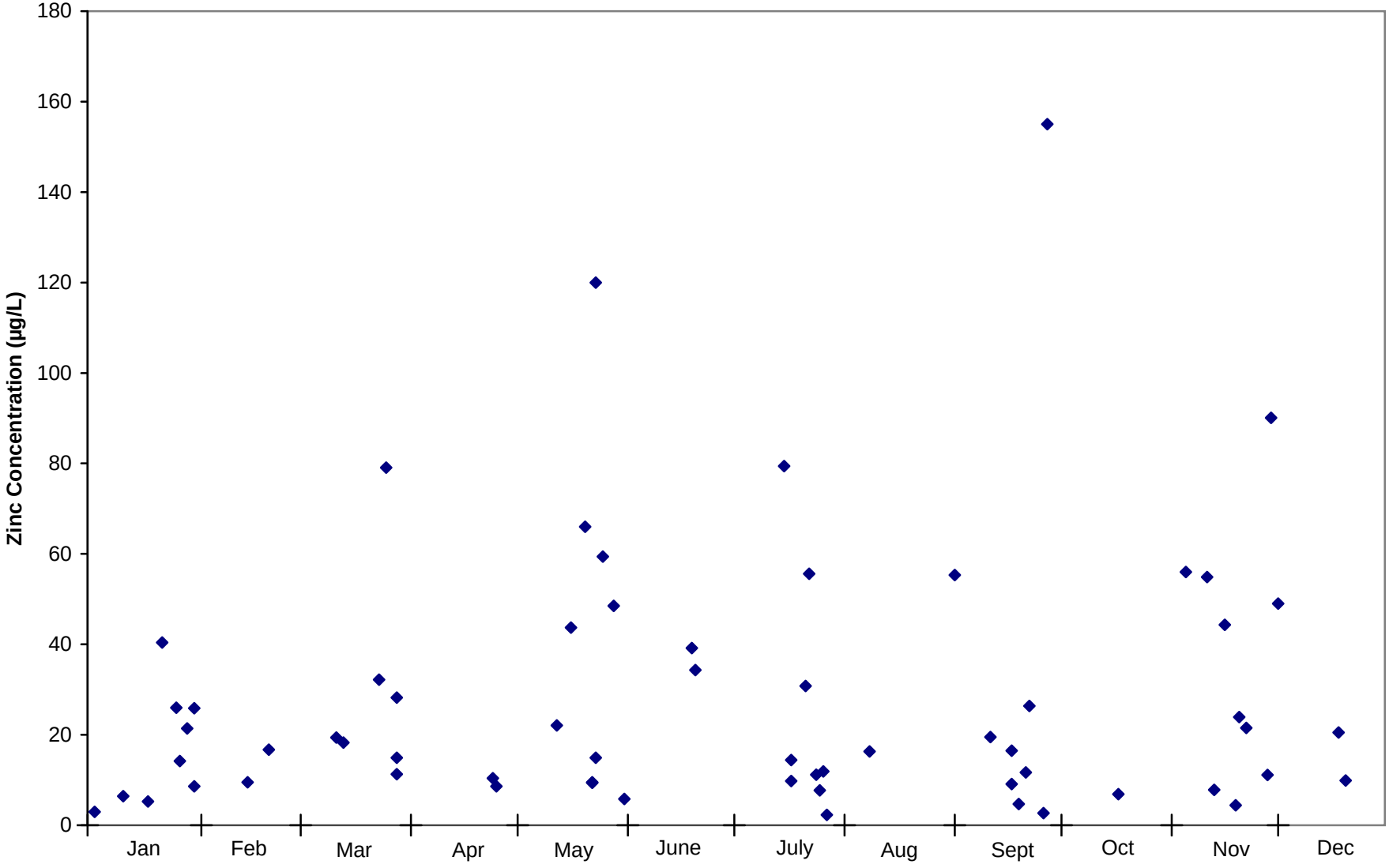


Figure C.14 Seasonal Concentration of Zinc for for Ouachita River below Camden, Arkansas (OUA0037)

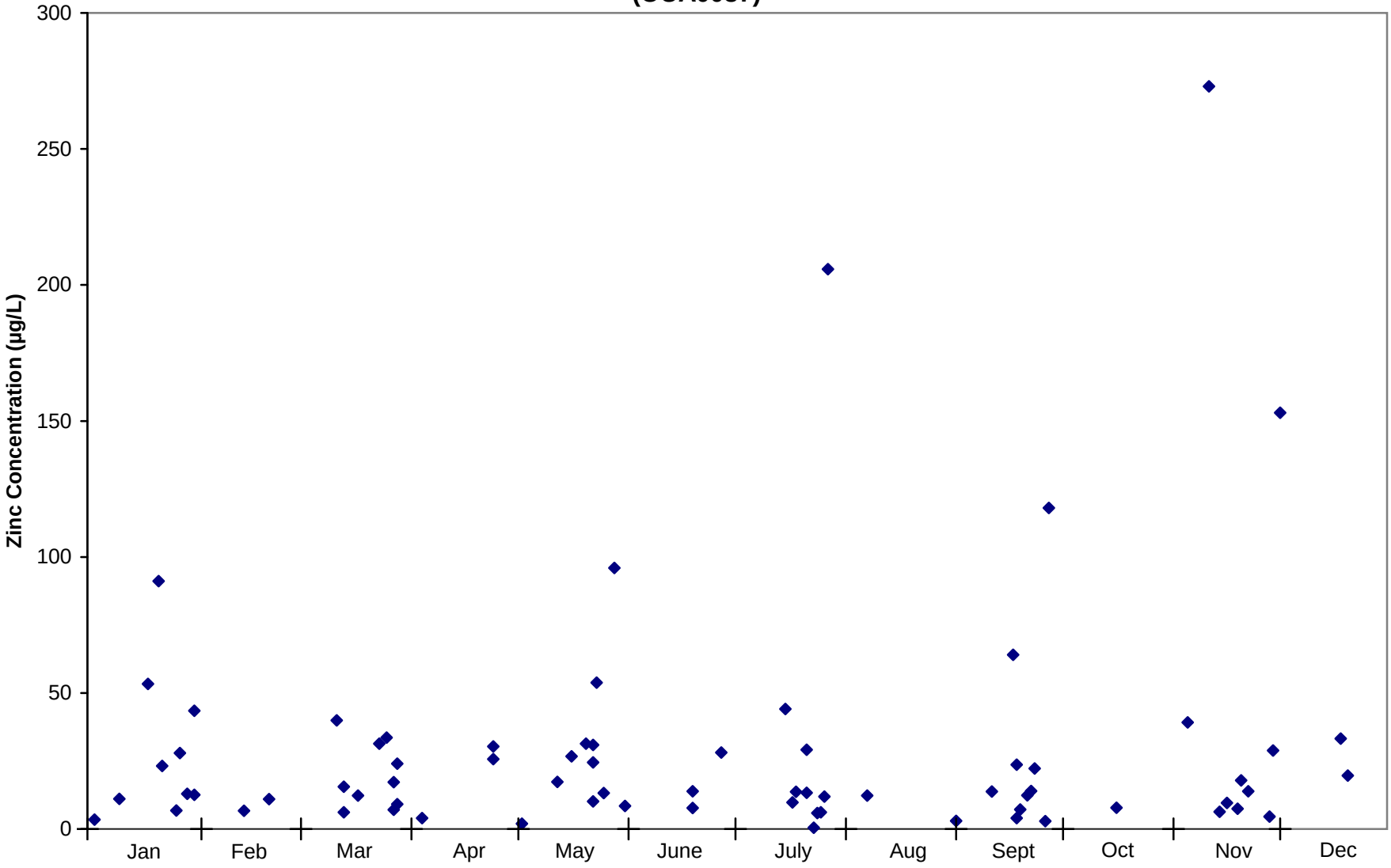


Figure C.15. Seasonal Concentration of Zinc for Smackover Creek near Smackover(OUA0027)

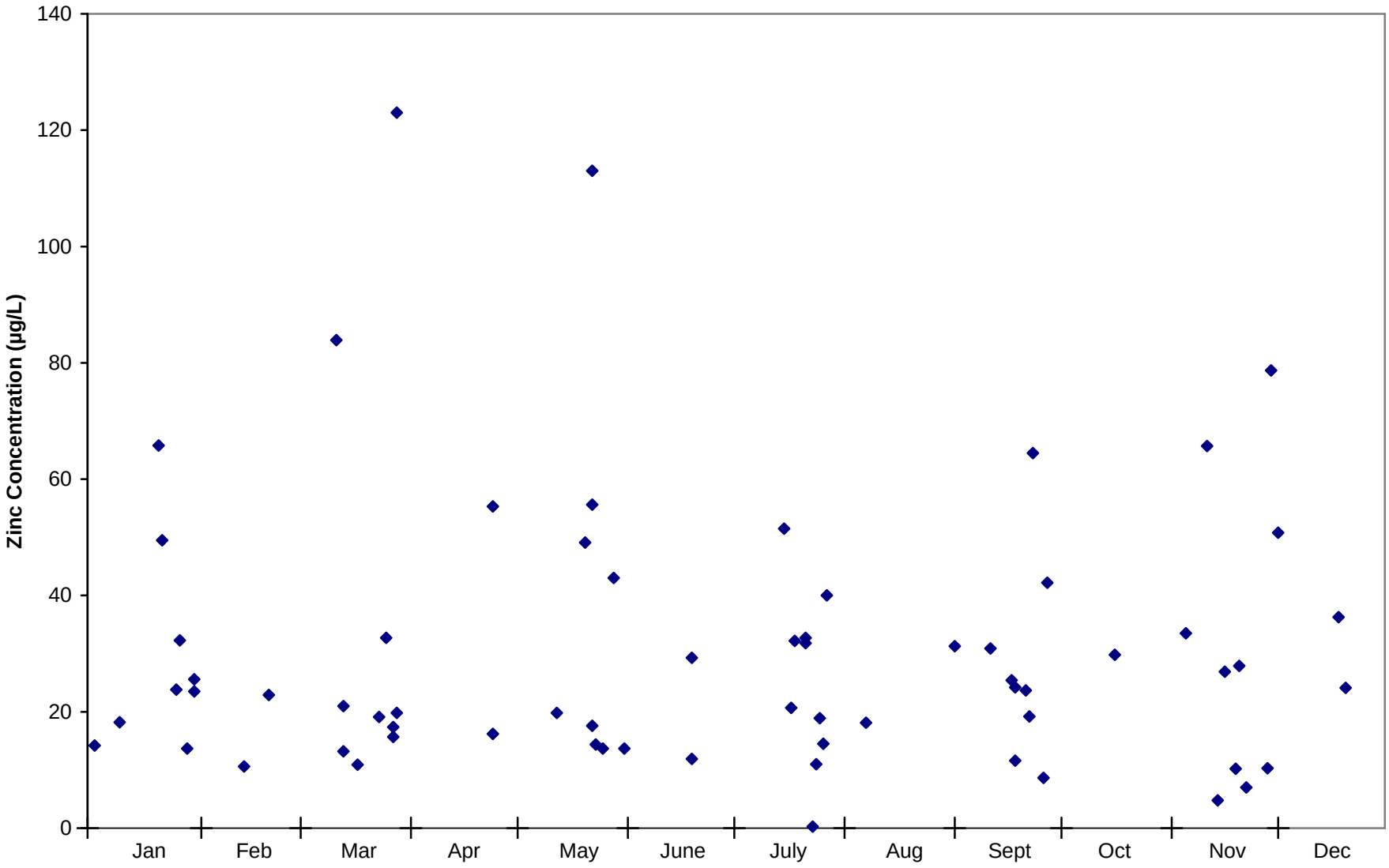


Figure C.16 Seasonal Concentration of Zinc in the ELCC Tributary (OUA0137A and B)

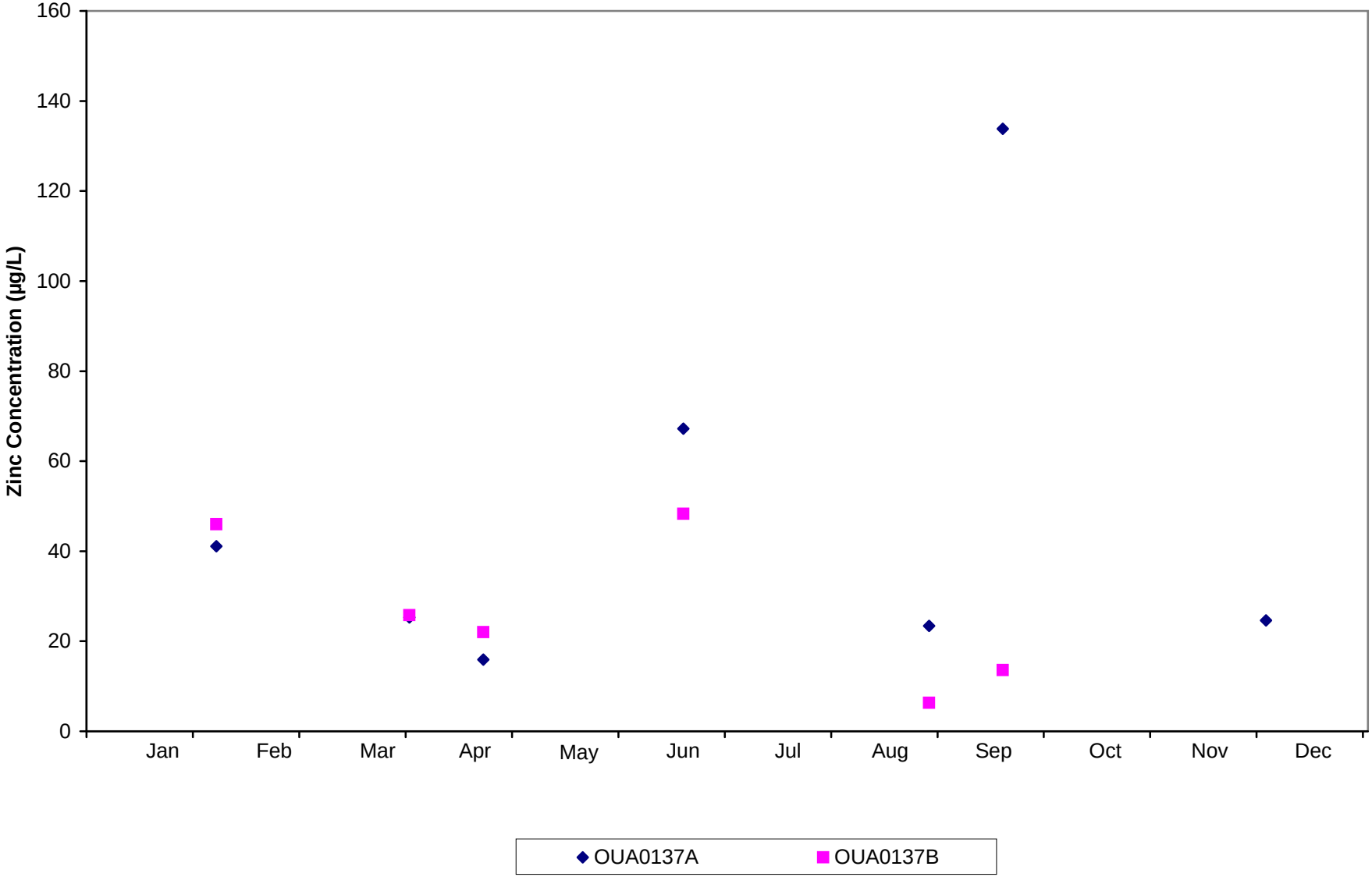


Figure C.17 Seasonal Concentration of Copper for Ouachita River at Felsenthal Lock and Dam (OUA0008B)

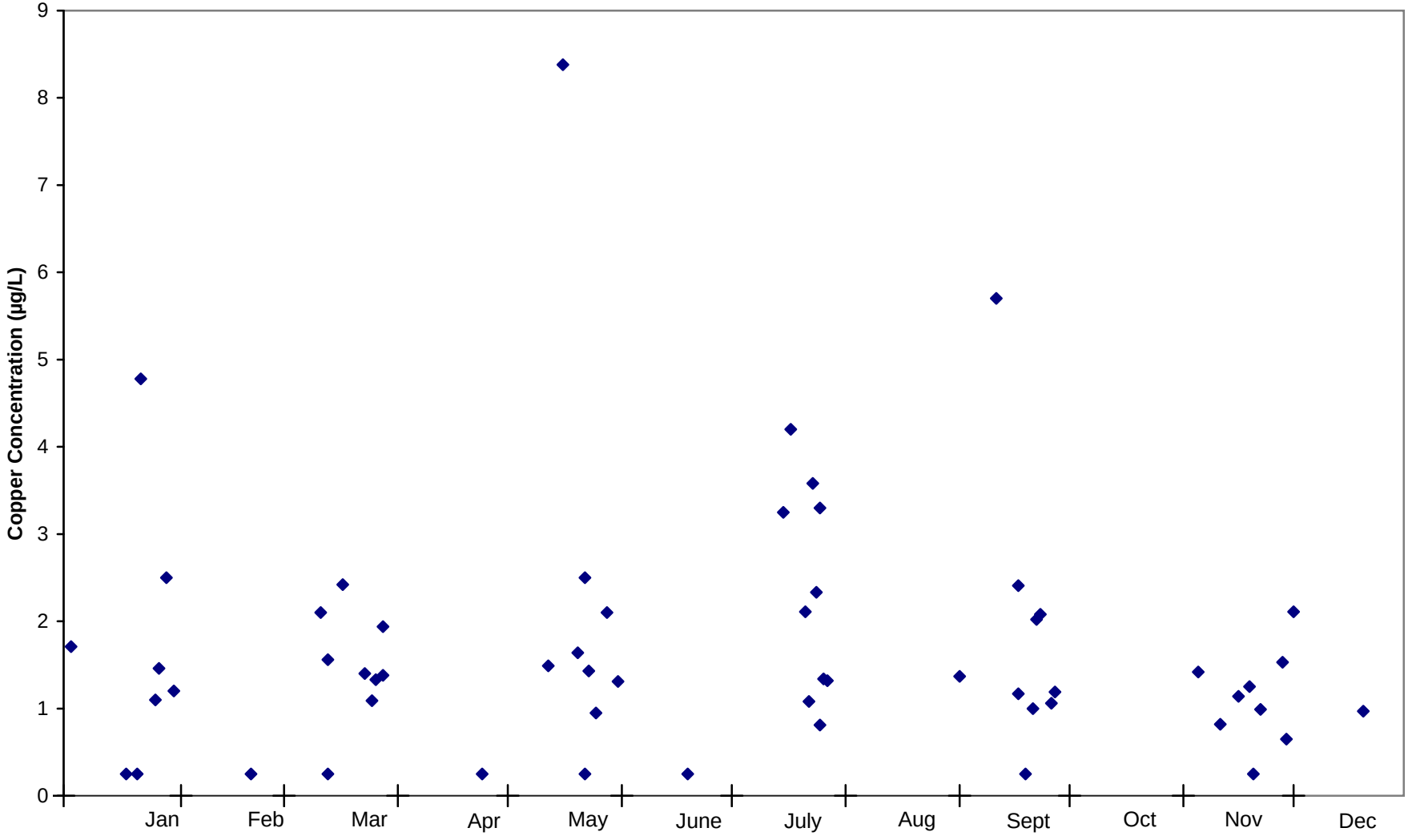


Figure C.18 Seasonal Concentration of Copper for Ouachita River below Game & Fish Pigeon Hill Access (OUA0124B)

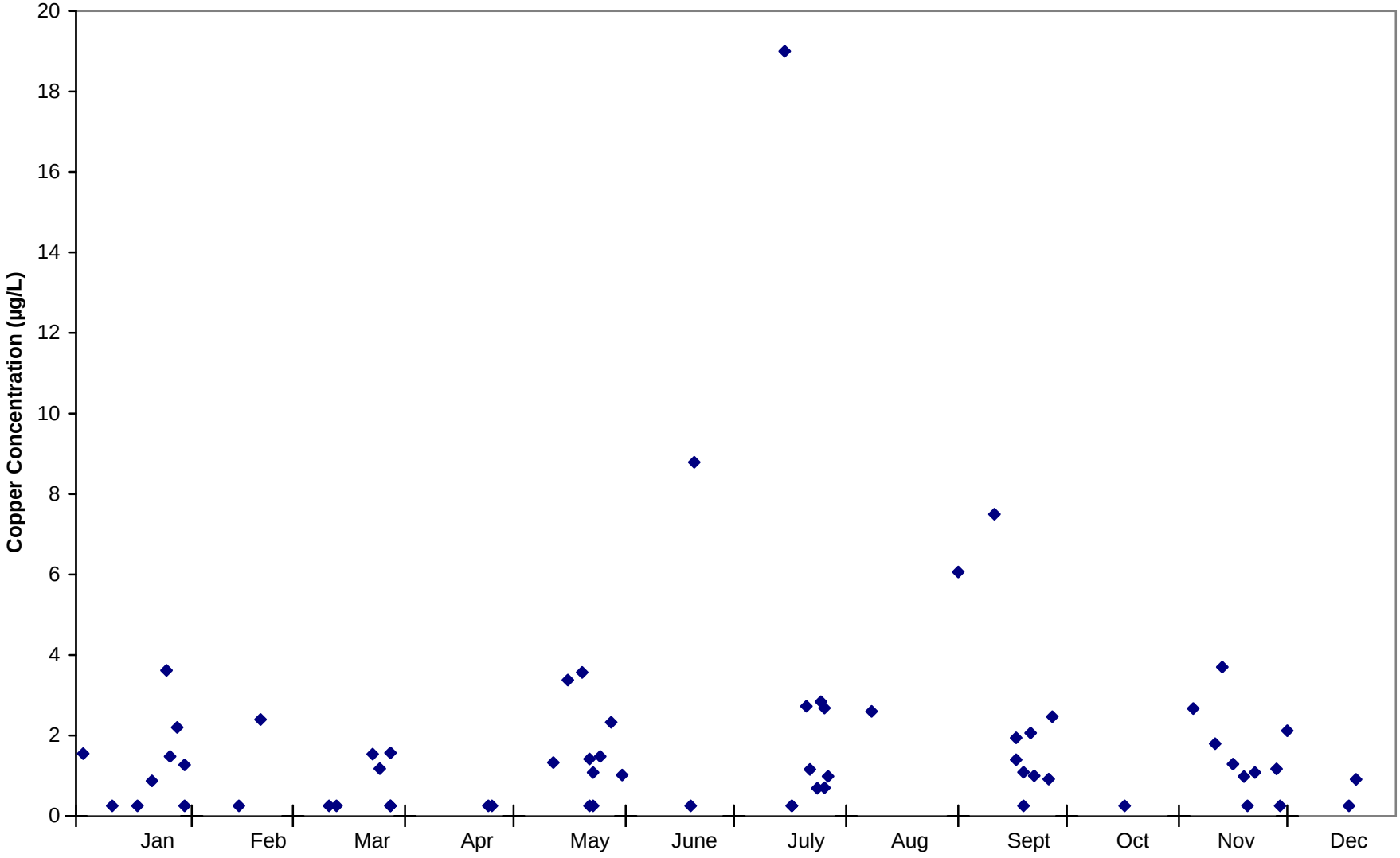


Figure C.19 Seasonal Concentration of Copper for for Ouachita River below Camden, Arkansas (OUA0037)

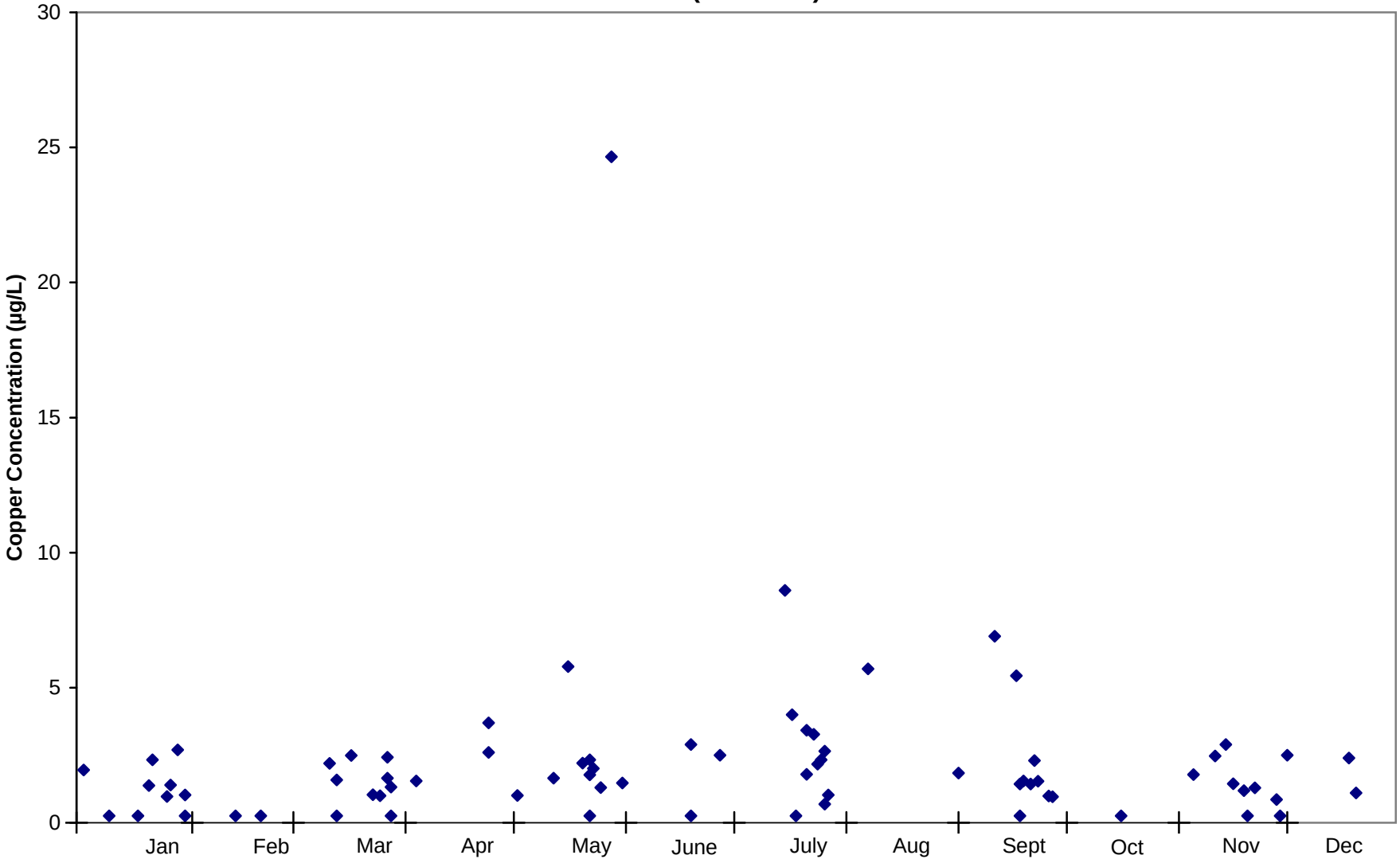


Figure C.20. Seasonal Concentration of Copper in Smackover Creek near Smackover (OUA0027)

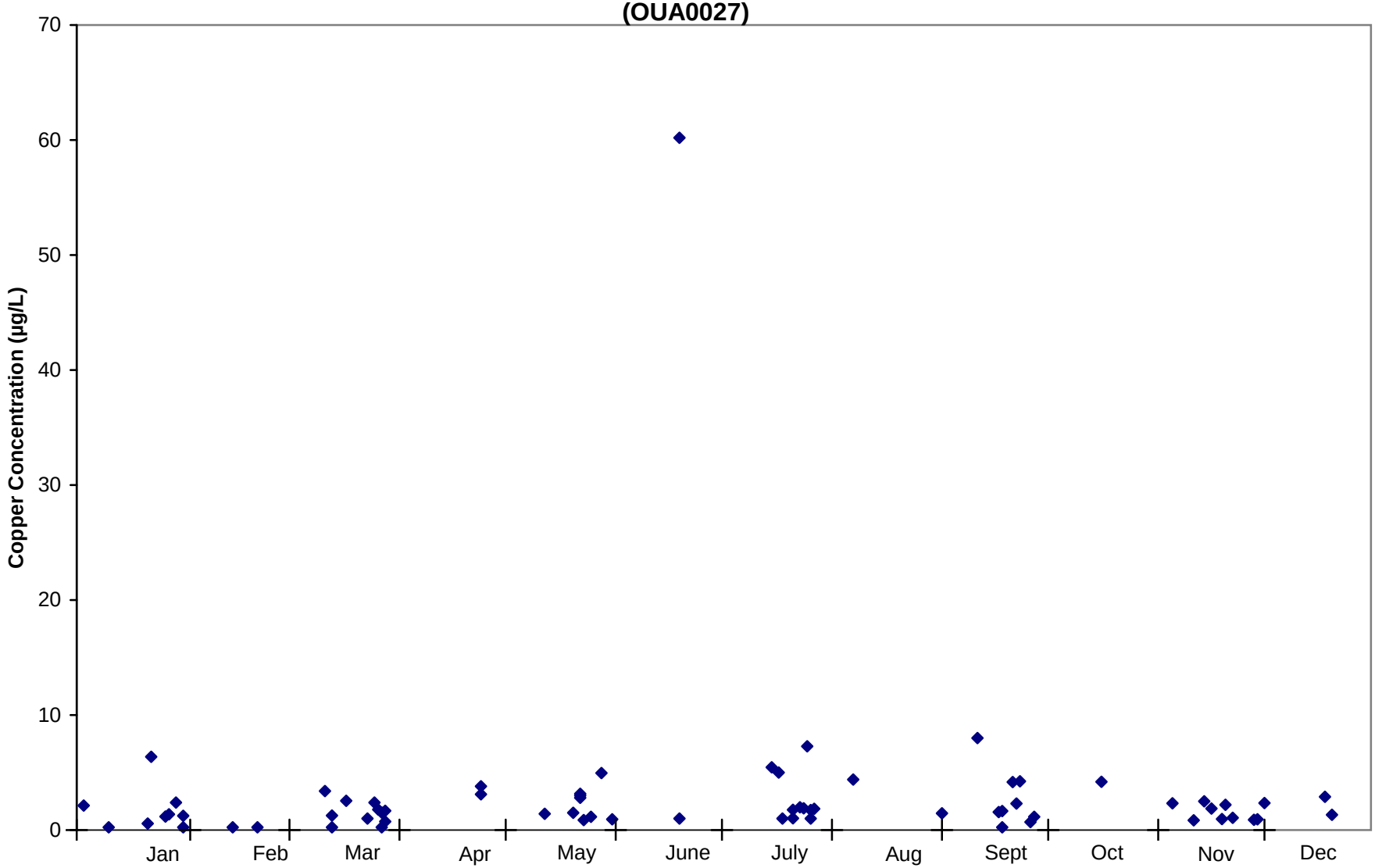


Figure C.21 Seasonal Concentration of Copper in the ELCC Tributary (OUA0137A and B)

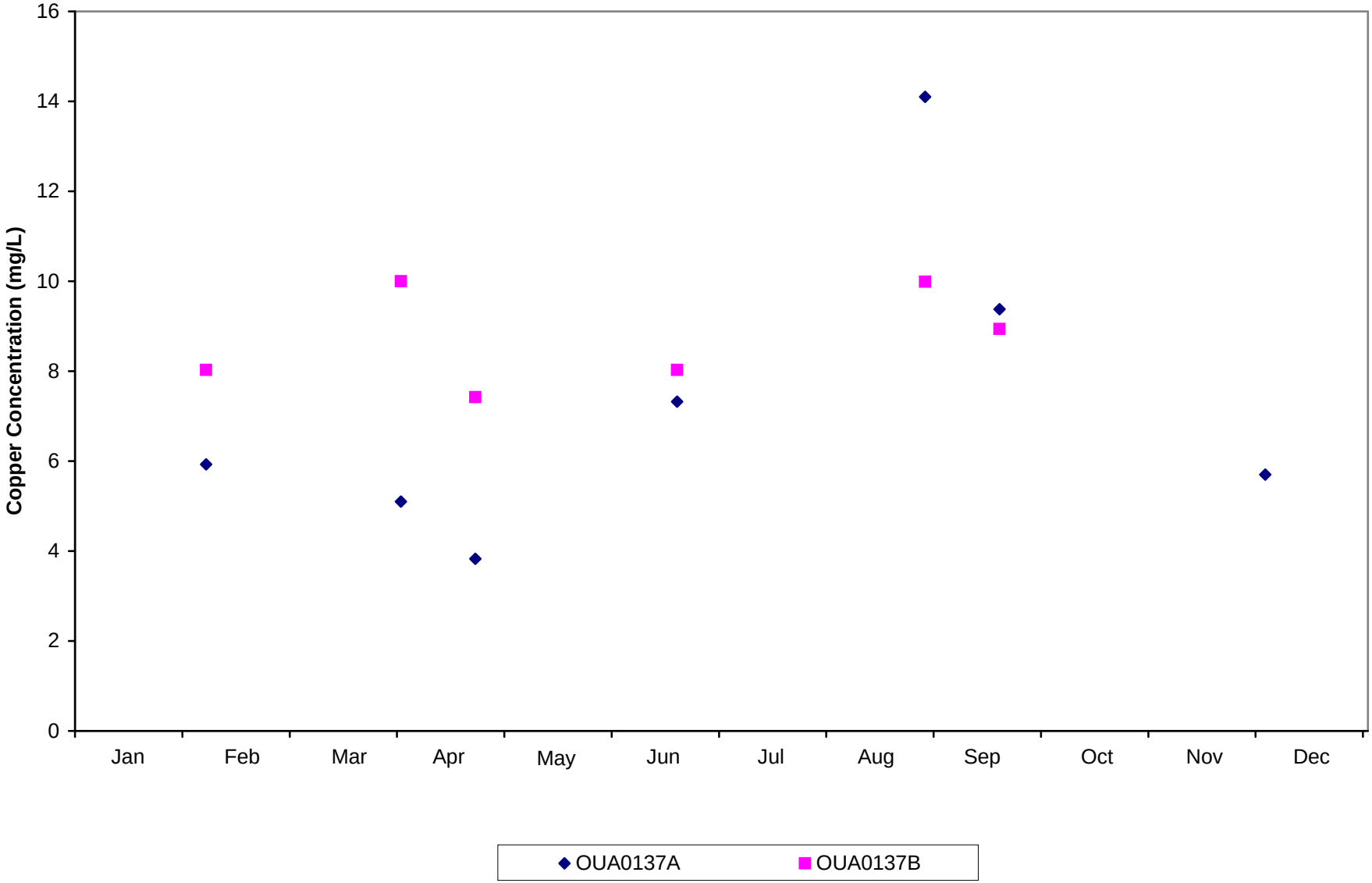


Figure C.22 Seasonal Concentration of Nitrate in the ELCC Tributary (OUA0137A and B)

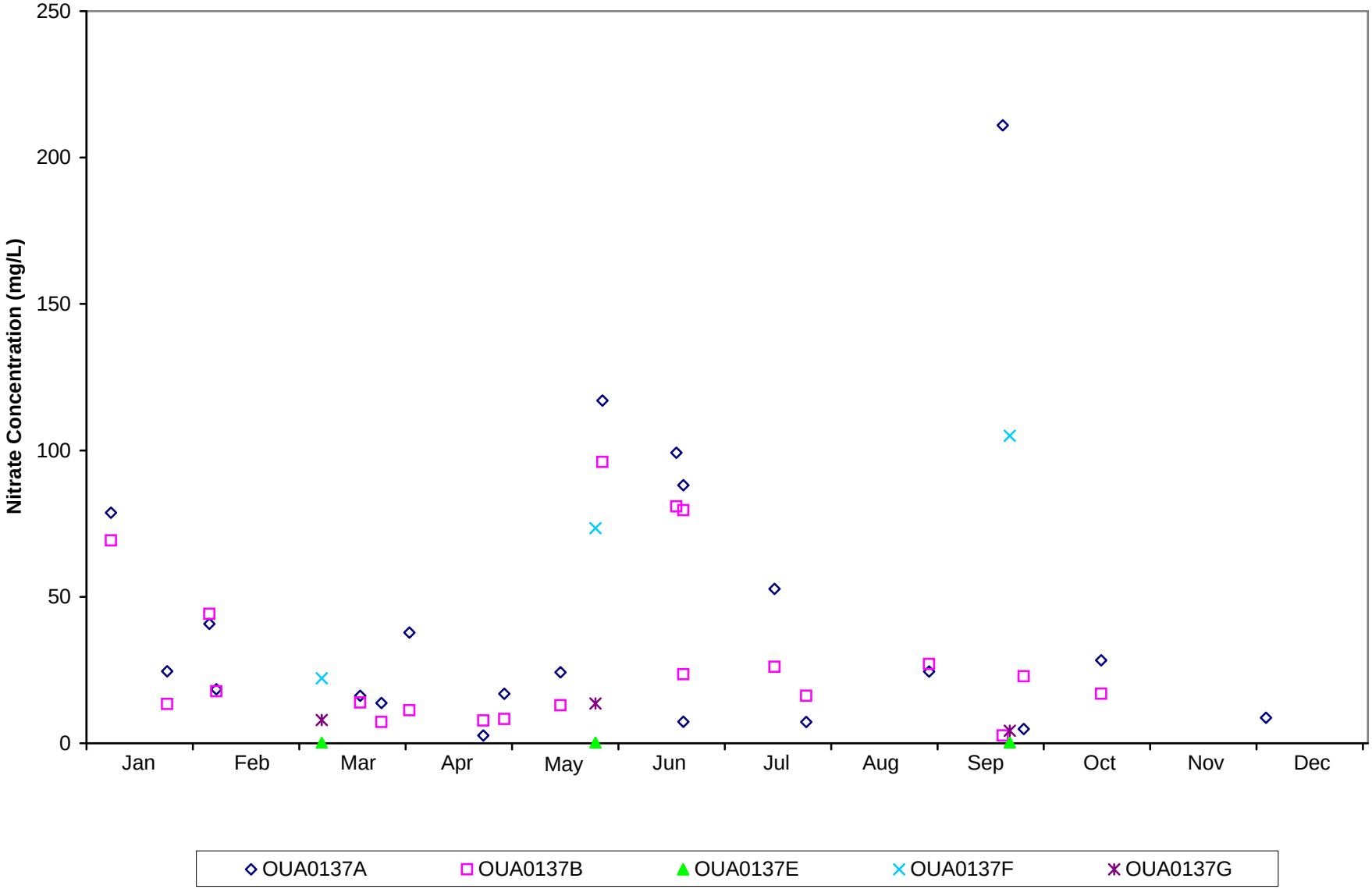


Figure C.23. Zinc concentration versus flow for Ouachita River at Felsenthal Lock and Dam (OUA0008B)

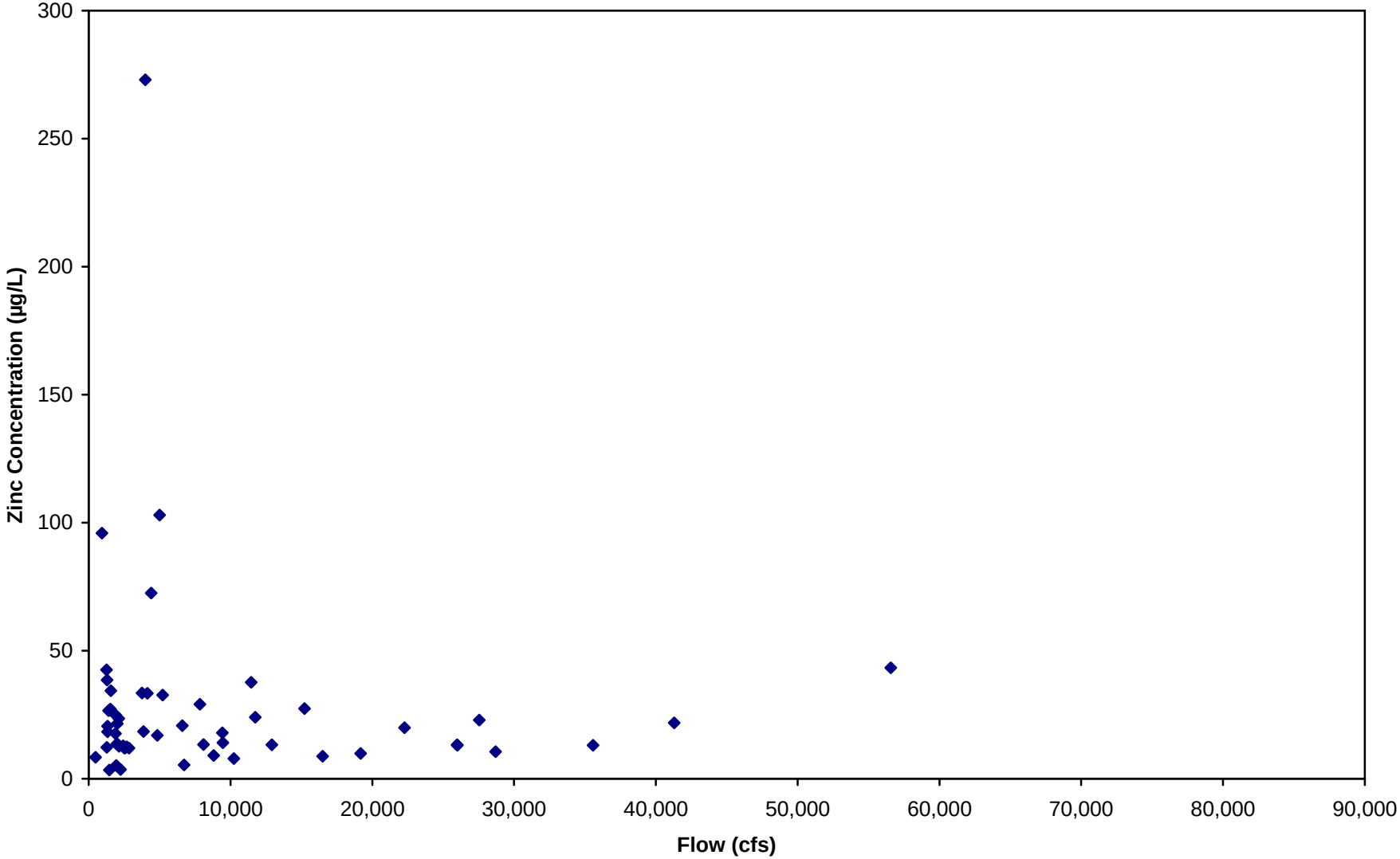


Figure C.24. Concentration of Zinc versus Streamflow for Ouachita River below Game & Fish Pigeon Hill Access (OUA0124B)

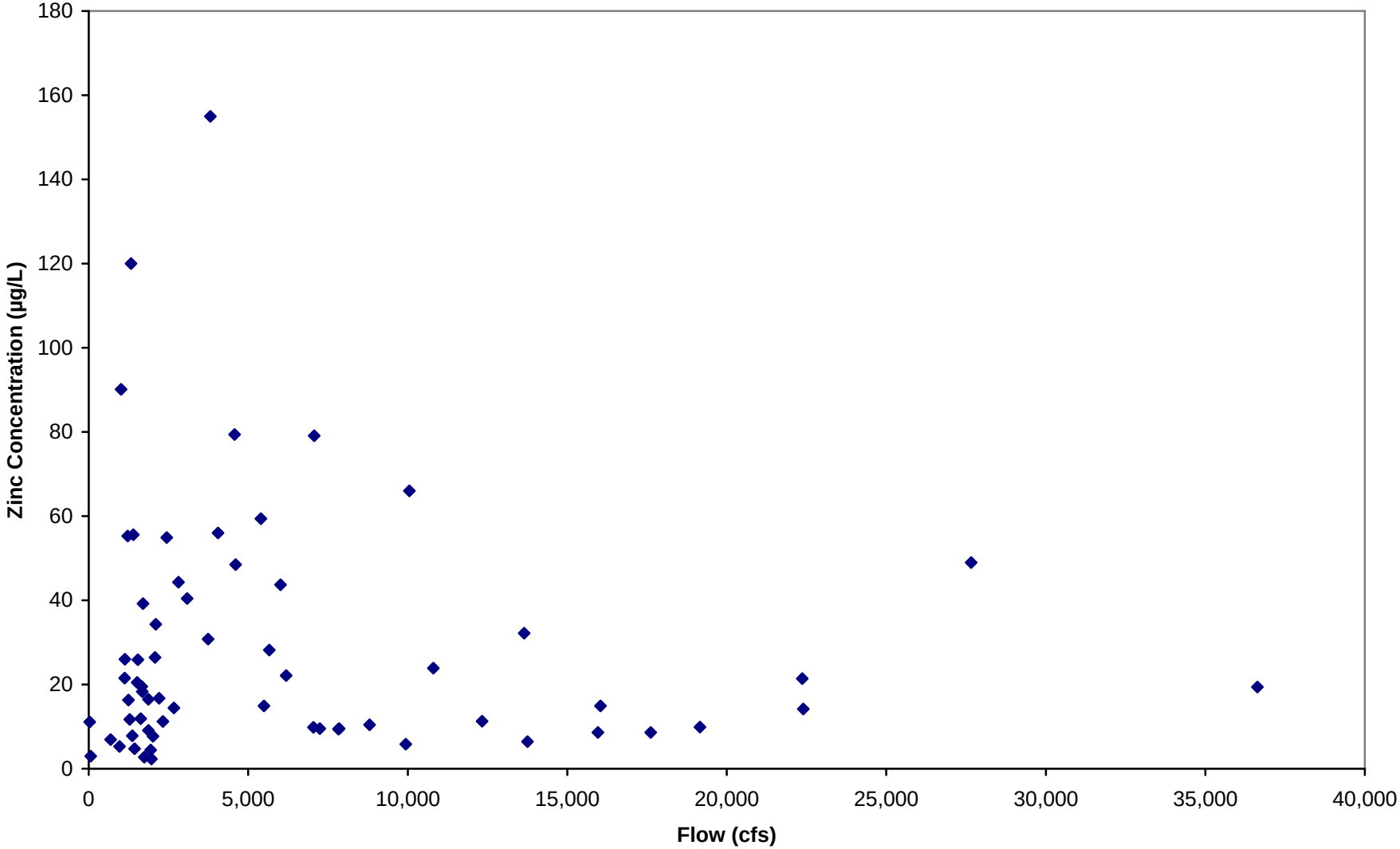


Figure C.25. Zinc Concentration versus flow for for Ouachita River below Camden, Arkansas (OUA0037)

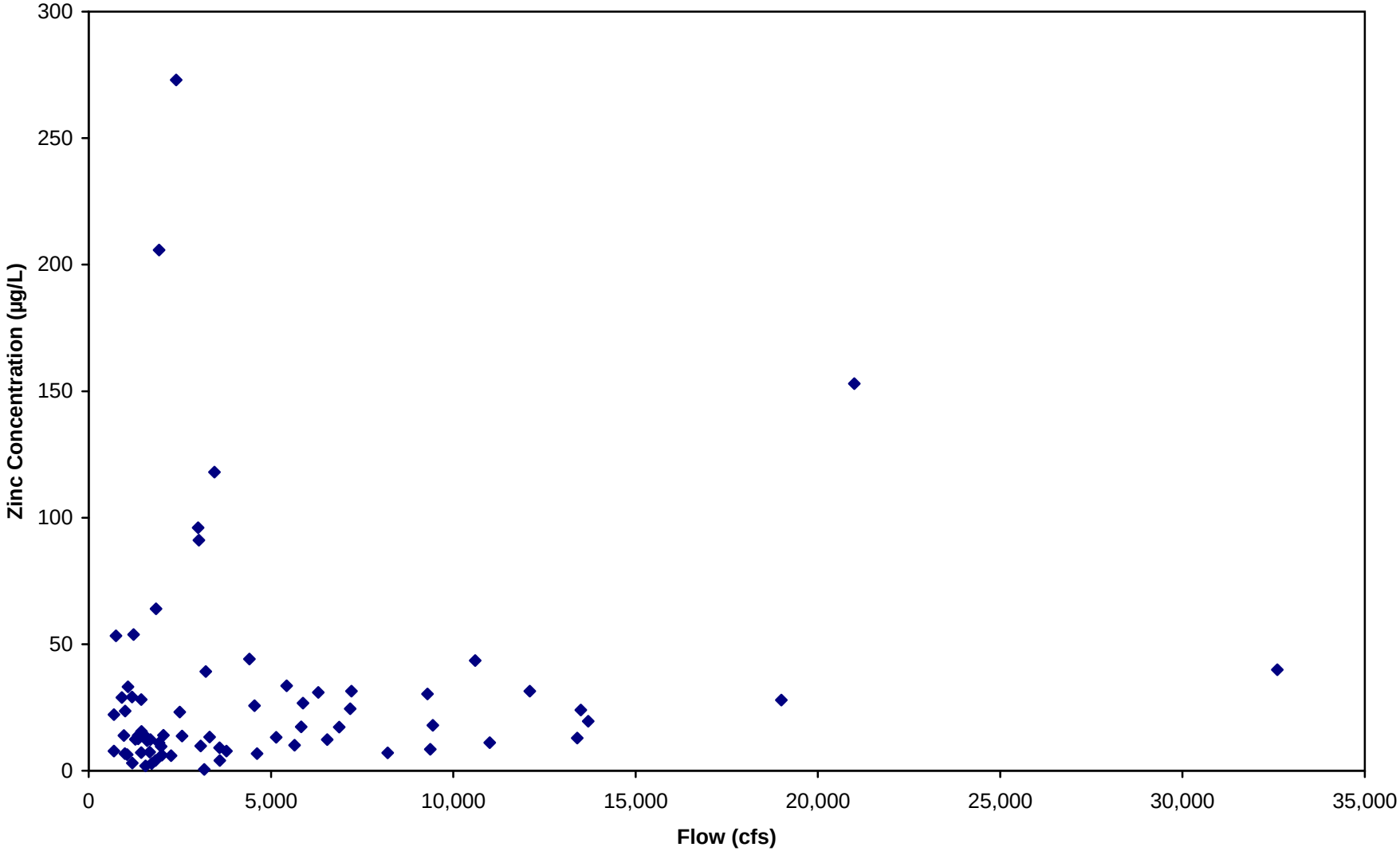


Figure C.26. Copper concentration versus flow for Ouachita River at Felsenthal Lock and Dam (OUA0008B)

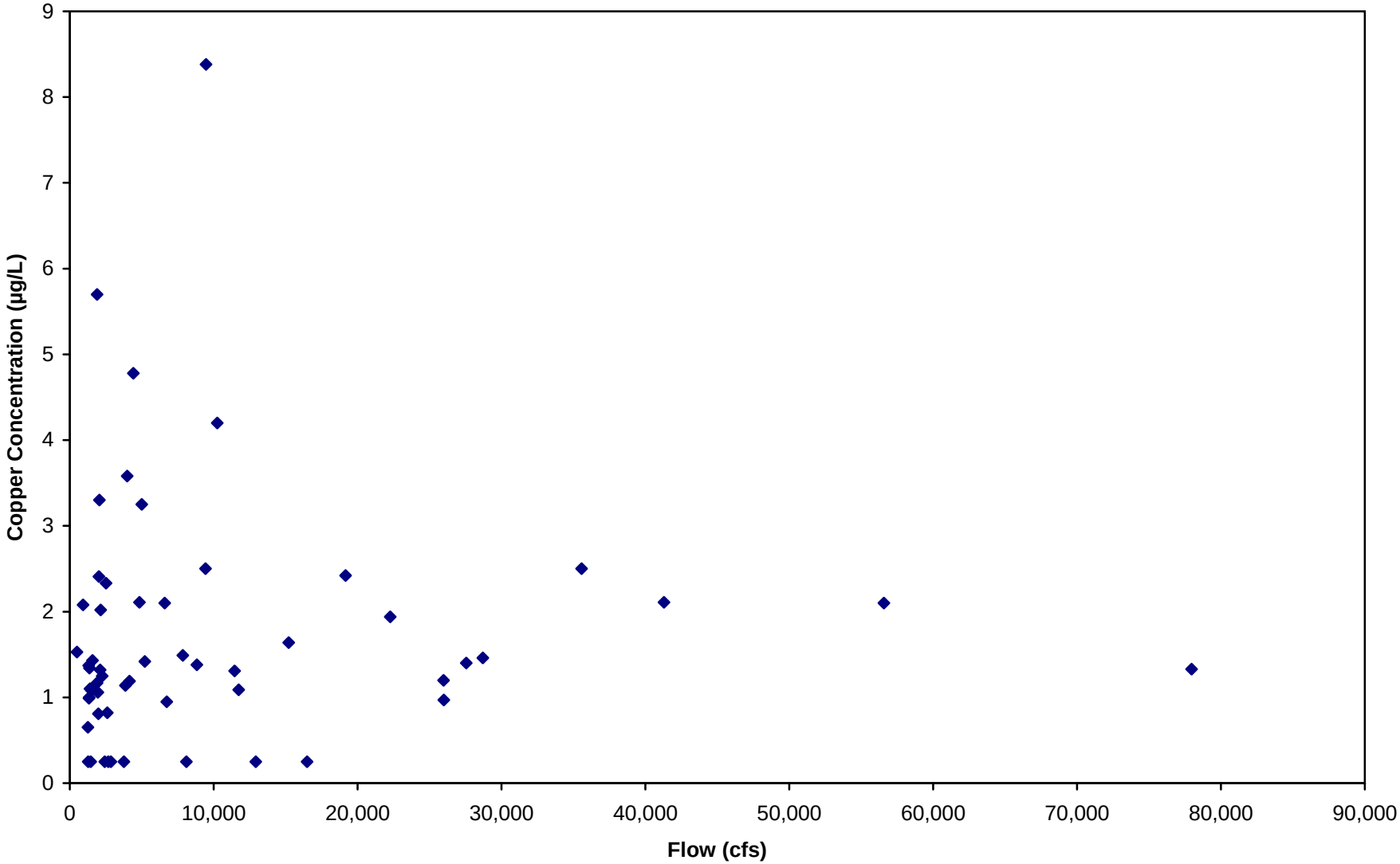


Figure C.27. Concentration of Copper versus Streamflow for Ouachita River below Game & Fish Pigeon Hill Access (OUA0124B)

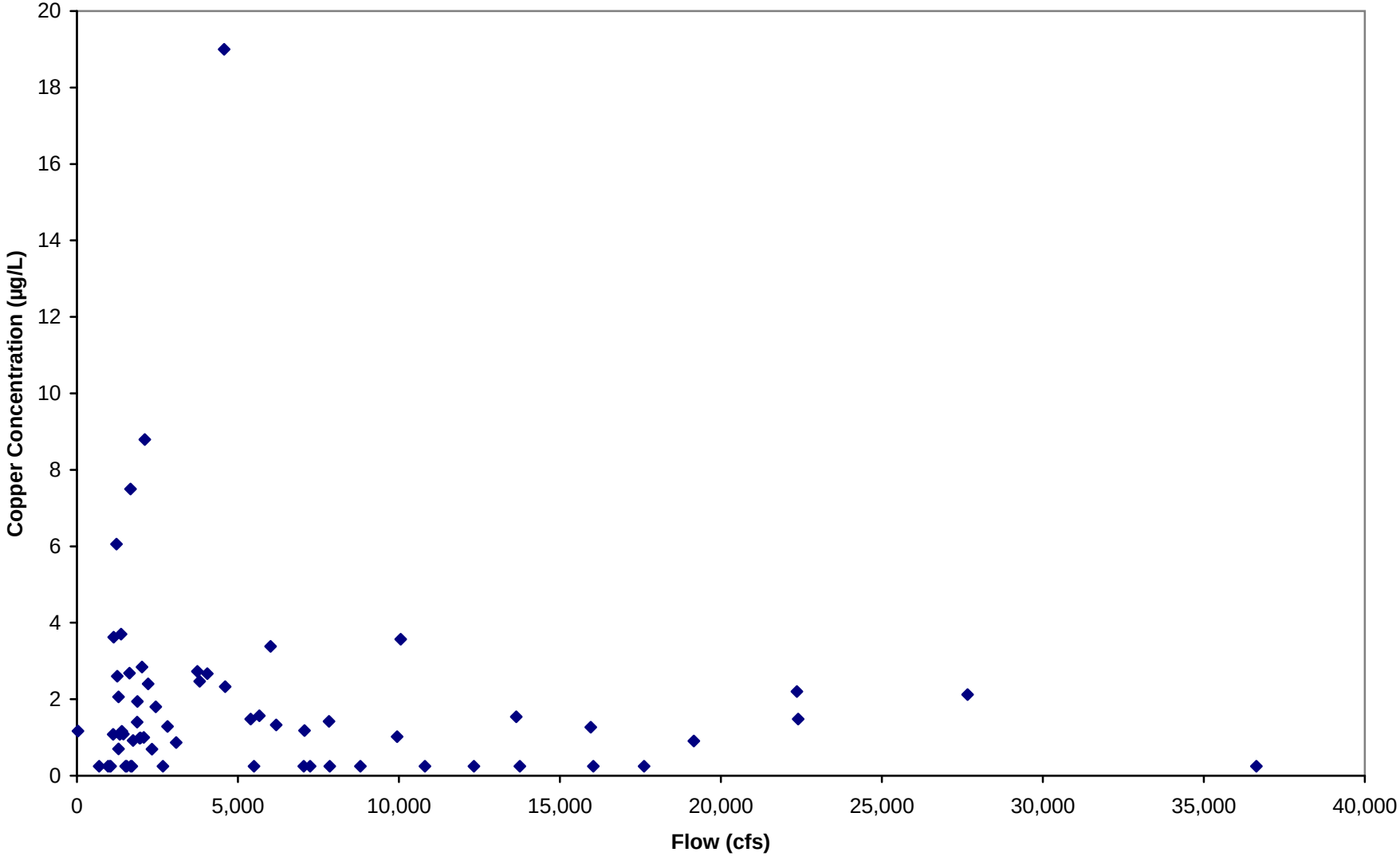


Figure C.28. Copper Concentration versus flow for for Ouachita River below Camden, Arkansas (OUA0037)

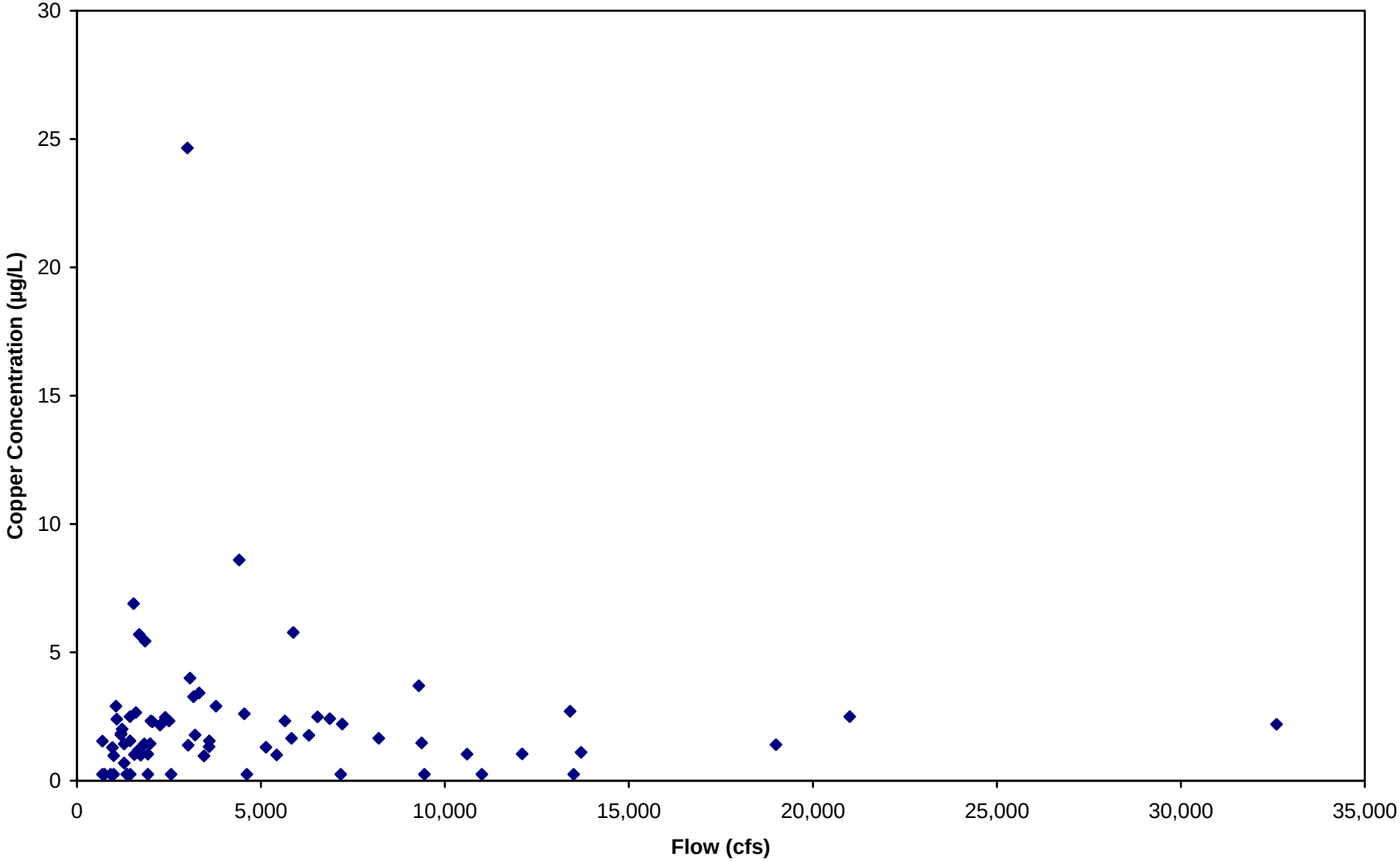


Figure C.29. Zinc concentration versus flow for Smackover Creek near Smackover (OUA0027)

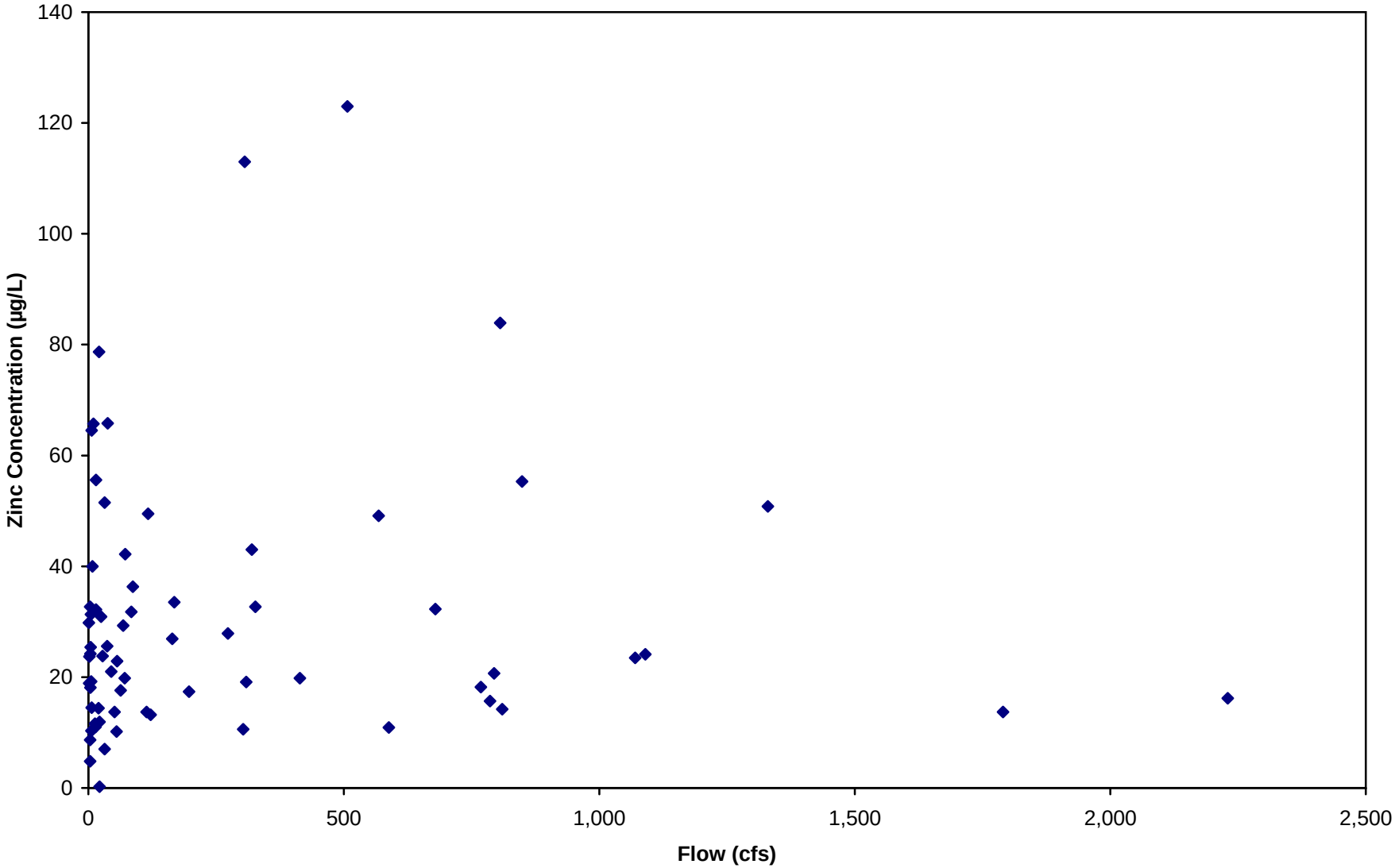


Figure C.30. Copper concentration versus flow for Smackover Creek near Smackover (OUA0027)

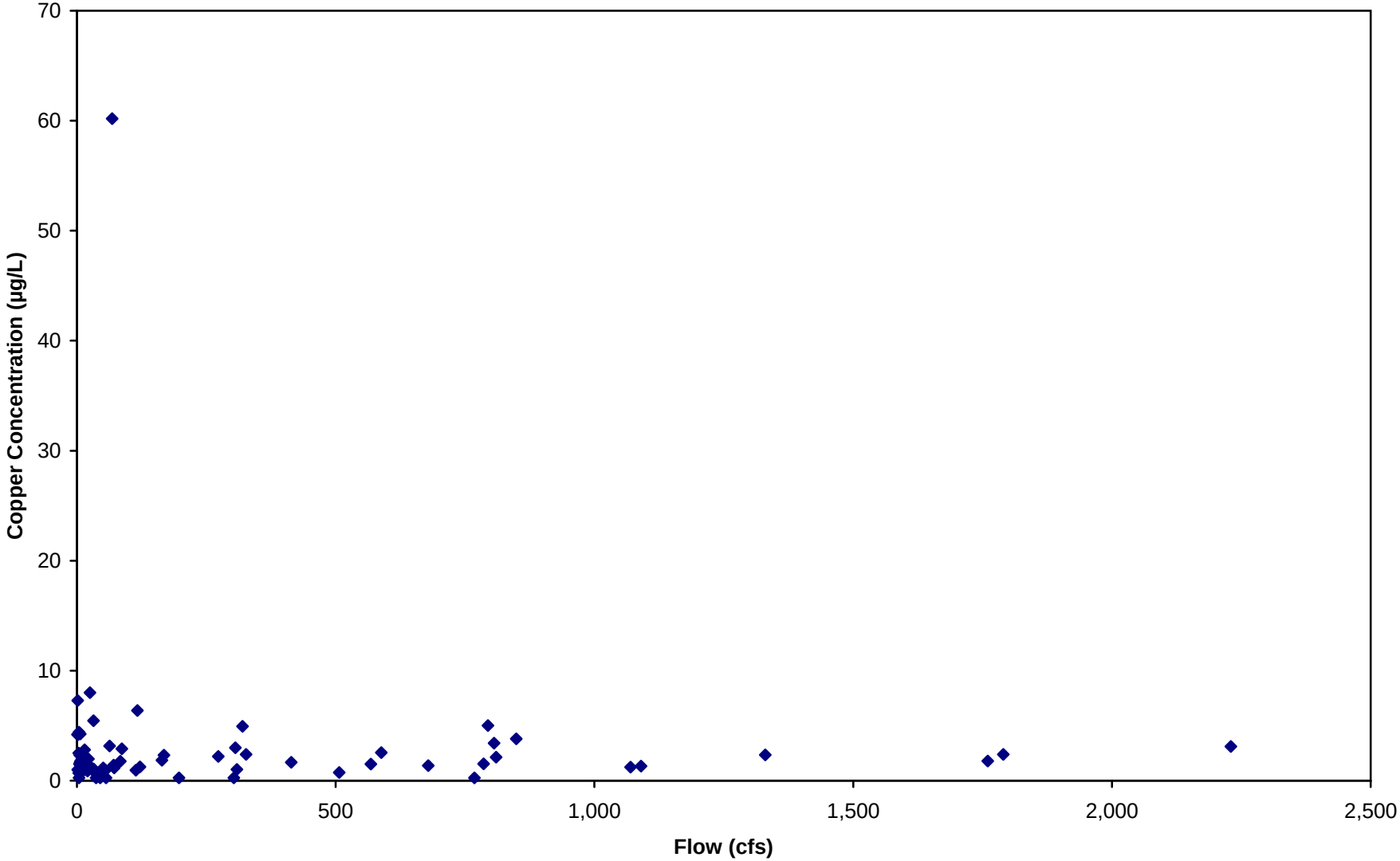


Figure C.31 Flow vs Concentration of Zinc in the ELCC Tributary (OUA0137A and B)

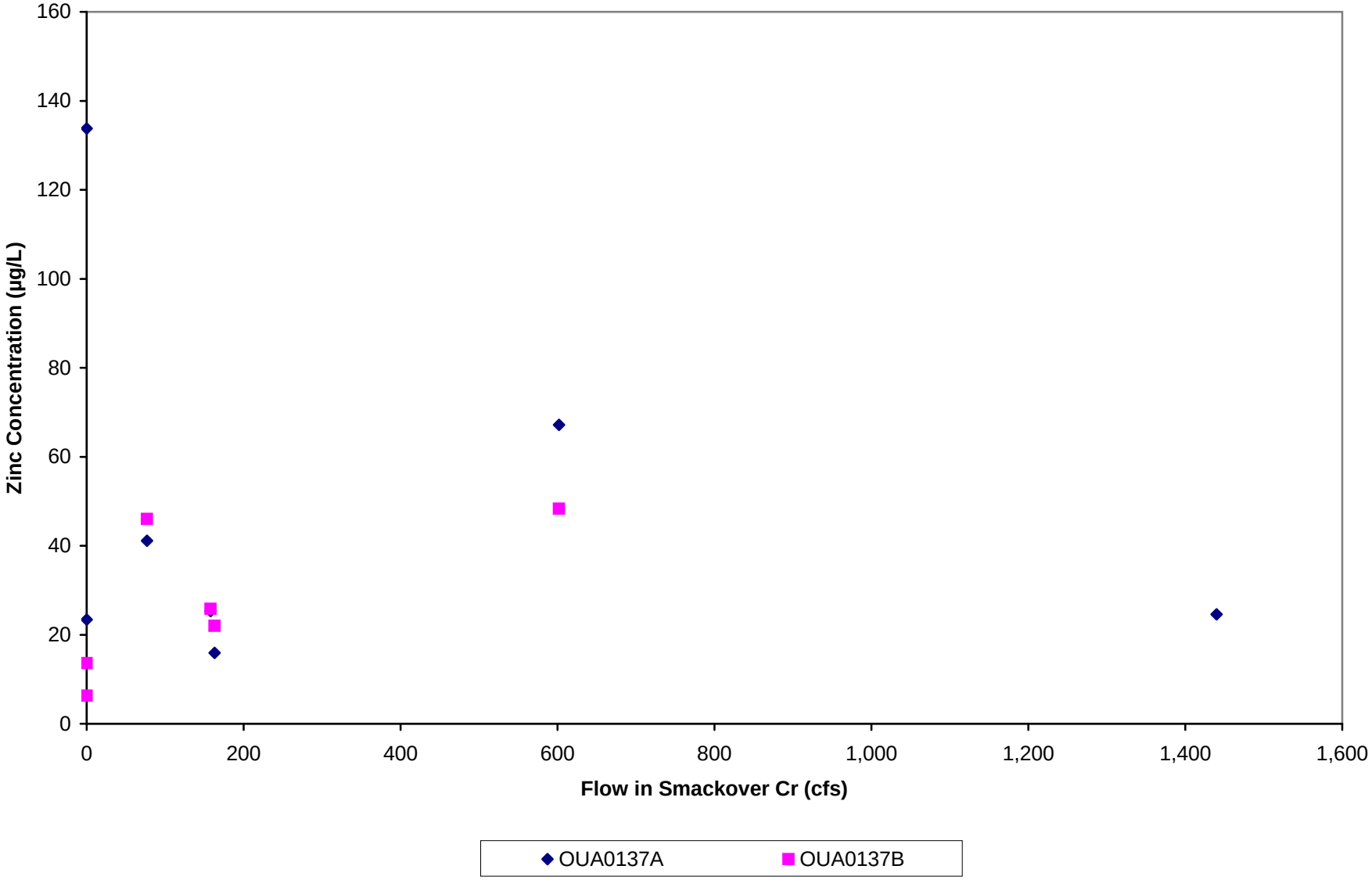


Figure C.32. Flow vs Concentration of Copper in the ELCC Tributary (OUA0137A and B)

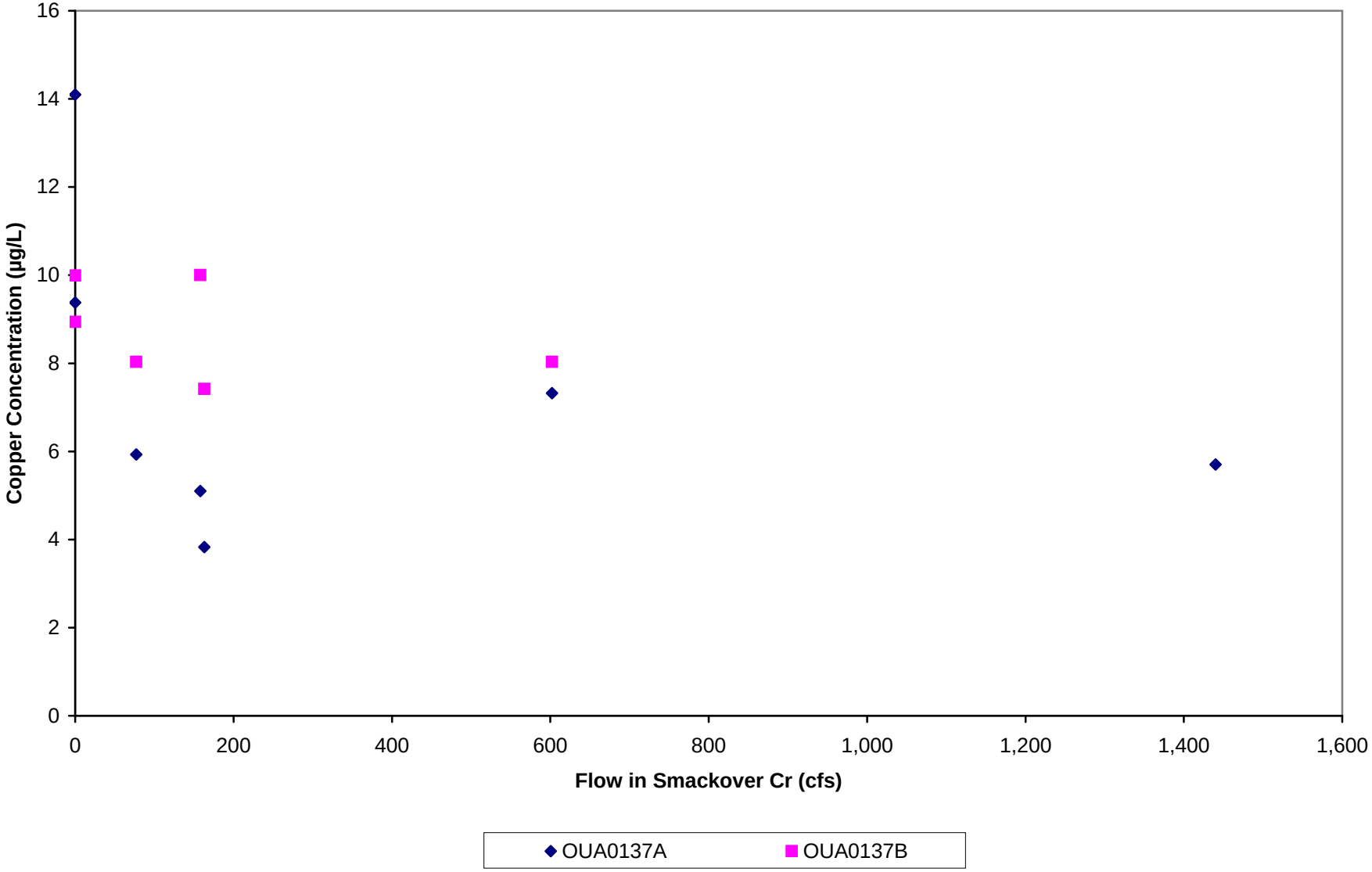
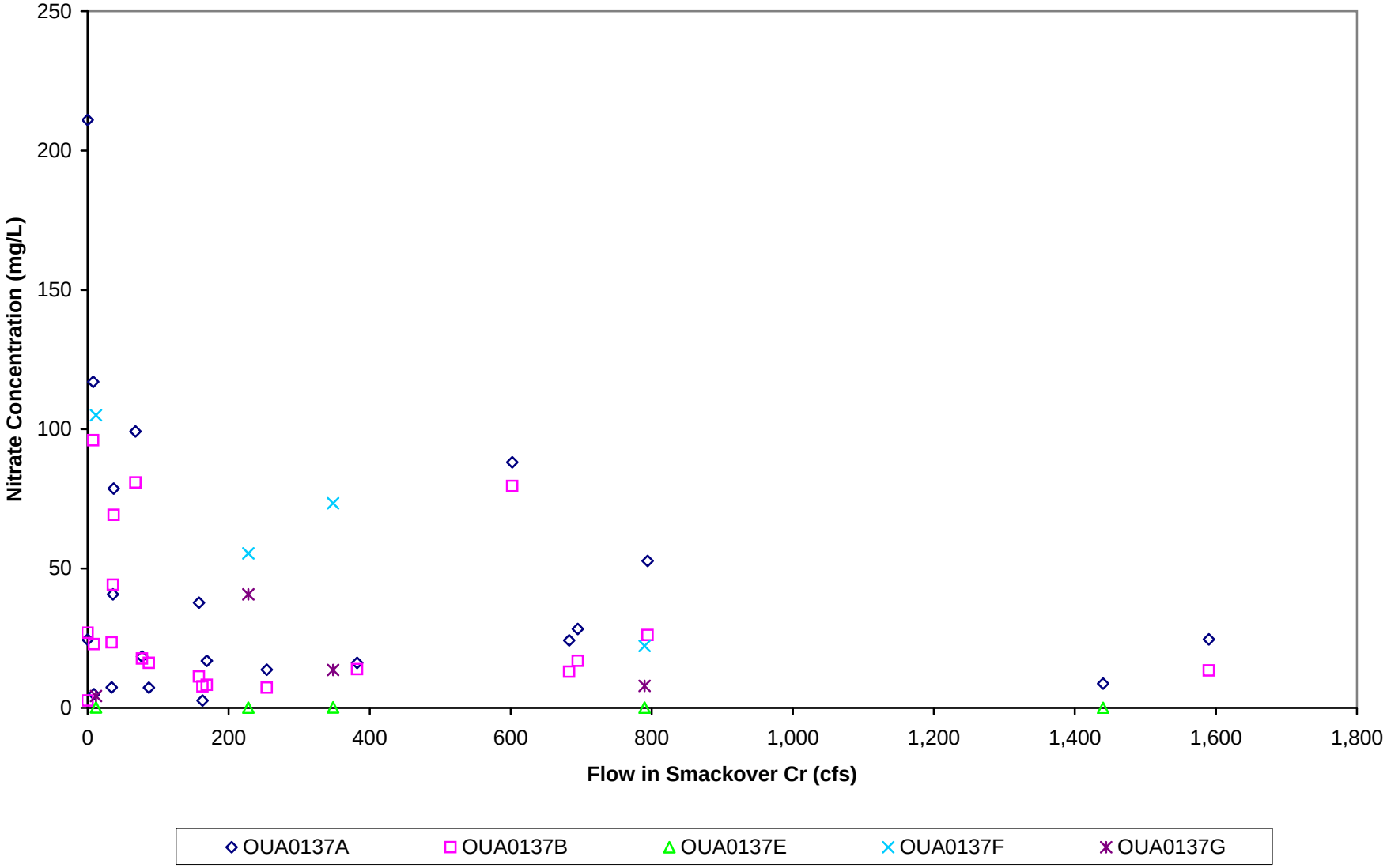


Figure C.33 Flow vs Concentration of Nitrate in the ELCC Tributary (OUA0137A and B)



APPENDIX D

TMDL Calculations for 08040201-005

Figure D.1. Flow Duration Curve for Ouachita River (08040201-005)

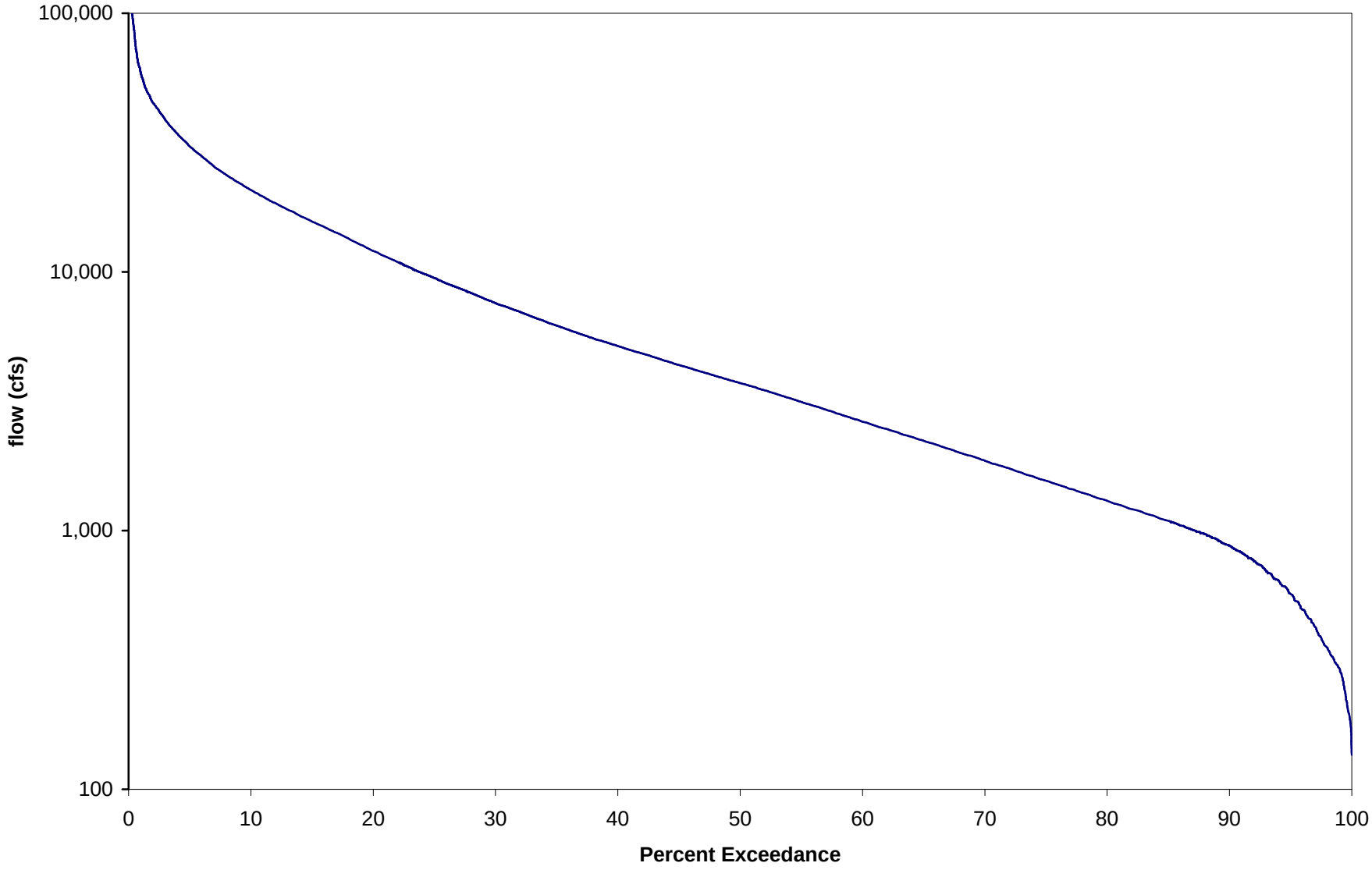


Figure D.2. Zn Load Duration Curve for Ouachita River (08040201-005)

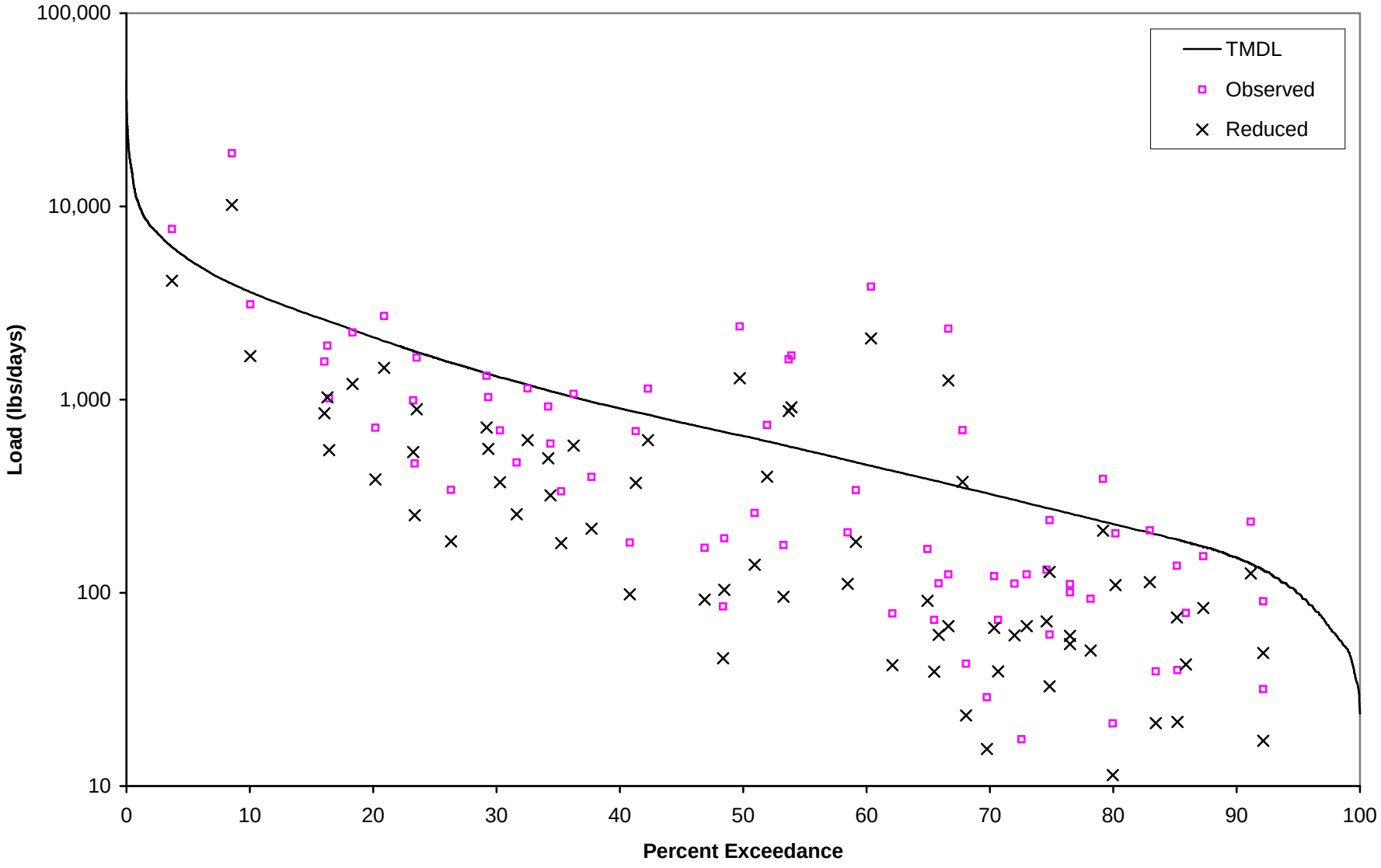


Figure D.3. Cu Load Duration Curve for Ouachita River (08040201-005)

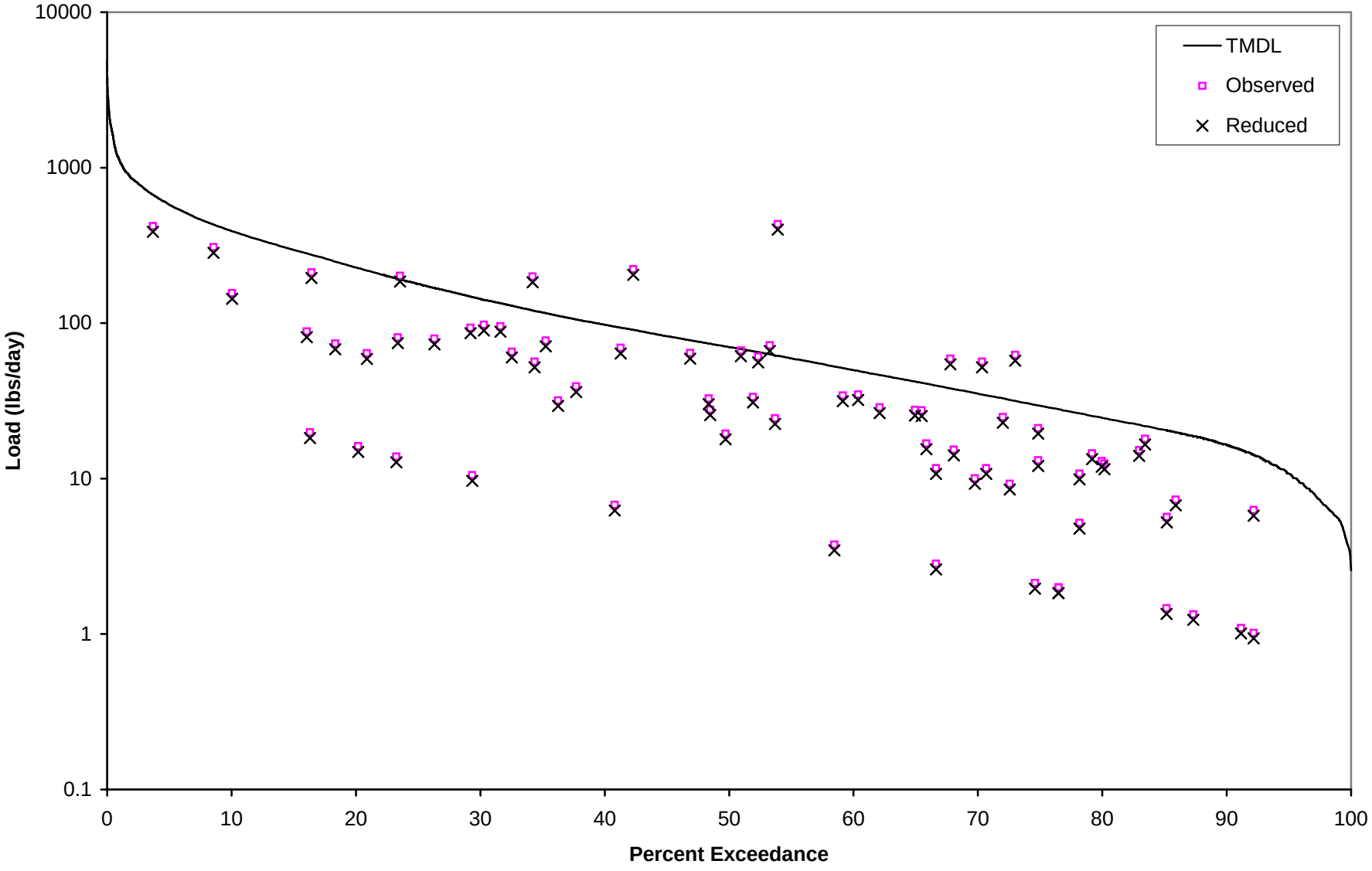


TABLE D.1. ALLOWABLE LOADS FOR OUACHITA RIVER (08040201-005).

5,357 mi^2, of gage 07362000, Ouachita River at Camden
5,826 mi^2, drainage area at downstream end of Reach 08040201-005

				3.5 ug/L = diss. Cu crit.			32.3 ug/L = diss. Zn crit.		
Ouachita River flow at Camden (cfs)	Est flow at DS end of 08040201-005 (cfs)	Percent exceed-ance	Width on plot between data points (unitless)	Cu TMDL load (lbs/day)	Cu TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)	Zn TMDL load (lbs/day)	Zn TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)
125	135.9	99.99	0.02	2.57	2.31	4.2717E-04	23.68	21.32	3.9422E-03
133	144.6	99.97	0.02	2.73	2.46	4.5451E-04	25.20	22.68	4.1945E-03
141	153.3	99.96	0.01	2.89	2.61	3.5505E-04	26.72	24.04	3.2766E-03
150	163.1	99.95	0.01	3.08	2.77	3.2375E-04	28.42	25.58	2.9878E-03
155	168.6	99.94	0.01	3.18	2.86	3.0667E-04	29.37	26.43	2.8301E-03
158	171.8	99.93	0.01	3.24	2.92	3.9786E-04	29.94	26.94	3.6716E-03
160	174.0	99.91	0.02	3.28	2.96	5.1801E-04	30.32	27.28	4.7804E-03
165	179.4	99.90	0.02	3.39	3.05	5.3419E-04	31.26	28.14	4.9298E-03
The rows between percent exceedances 99.90% and 0.03% are not shown for the sake of brevity.									
168,000	182,708.2	0.03	0.00	3,449	3,104	1.2087E-01	31,831	28,648	1.1154E+00
172,000	187,058.4	0.03	0.00	3,531	3,178	1.2375E-01	32,589	29,330	1.1420E+00
174,000	189,233.5	0.02	0.00	3,572	3,215	1.2518E-01	32,968	29,671	1.1553E+00
178,000	193,583.7	0.02	0.00	3,655	3,289	1.2806E-01	33,726	30,353	1.1818E+00
181,000	196,846.4	0.02	0.00	3,716	3,344	1.6278E-01	34,294	30,865	1.5022E+00
182,000	197,933.9	0.01	0.01	3,737	3,363	1.9641E-01	34,484	31,035	1.8126E+00
204,000	221,860.0	0.01	0.00	4,188	3,769	1.8346E-01	38,652	34,787	1.6931E+00
238,000	258,836.7	0.00	0.00	4,886	4,398	1.7123E-01	45,094	40,585	1.5802E+00
				Total area under TMDL curve for copper (lbs/day) =		155.7	Total area under TMDL curve for zinc (lbs/day) =		1,436.9
Explicit MOS (lbs/day) = TMDL × 10% =						15.6			143.7
WLA for point sources (lbs/day) (from Appendix J) =						4.0			0.5
LA for nonpoint sources (lbs/day) = TMDL - MOS - WLA =						136.1			1,292.7

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TABLE D.2. EXISITNG LOAD AND PERCENT REDUCTION FOR ZINC FOR OUACHITA RIVER 08040201-005

Zn Target = 32.3 ug/L
Explicit MOS (% of TMDL) = 10%

Percent reduction = 46%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed Zn at OUA0037 (ug/L)	Ouachita River flow (cfs)	Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Znrrent Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
		Flow on Sampling Day							
1/9/1995	11.1	11,000	11,963	20.18	716.24	386.77	1,916.41	1,875.77	Yes
2/13/1995	6.71	4,620	5,024	40.80	181.85	98.20	804.89	787.82	Yes
3/27/1995	17.2	6,870	7,471	30.29	693.15	374.30	1,196.88	1,171.50	Yes
4/24/1995	30.3	9,290	10,103	23.54	1,651.20	891.65	1,618.49	1,584.17	Yes
5/22/1995	10.1	5,650	6,145	35.25	334.74	180.76	984.34	963.46	Yes
6/19/1995	7.71	3,780	4,111	46.87	170.96	92.32	658.55	644.58	Yes
7/18/1995	13.7	2,560	2,784	58.46	205.73	111.10	446.00	436.54	Yes
8/7/1995	12.3	1,690	1,838	70.34	121.94	65.85	294.43	288.19	Yes
9/18/1995	23.6	999	1,086	85.17	138.30	74.68	174.04	170.35	Yes
10/16/1995	7.8	694	755	92.16	31.75	17.15	120.91	118.34	Yes
11/14/1995	6.3	1,060	1,153	83.44	39.17	21.15	184.67	180.76	Yes
12/18/1995	33.2	1,080	1,175	82.96	210.33	113.58	188.16	184.17	Yes
1/30/1996	12.6	1,360	1,479	76.48	100.52	54.28	236.94	231.91	Yes
2/20/1996	11	1,930	2,099	66.64	124.54	67.25	336.24	329.11	Yes
3/12/1996	15.5	1,450	1,577	74.59	131.84	71.19	252.62	247.26	Yes
4/23/1996	25.7	4,550	4,948	41.29	685.94	370.41	792.70	775.89	Yes
5/21/1996	24.5	7,170	7,798	29.34	1,030.45	556.44	1,249.15	1,222.66	Yes
6/18/1996	13.9	1,360	1,479	76.48	110.89	59.88	236.94	231.91	Yes
7/16/1996	9.8	3,070	3,339	53.27	176.48	95.30	534.85	523.51	Yes
9/10/1996	13.8	1,540	1,675	72.99	124.66	67.32	268.30	262.61	Yes
11/19/1996	17.9	9,440	10,266	23.24	991.21	535.25	1,644.63	1,609.75	Yes
1/28/1997	12.9	13,400	14,573	16.43	1,014.00	547.56	2,334.53	2,285.03	Yes
3/11/1997	39.9	32,600	35,454	3.69	7,630.14	4,120.27	5,679.54	5,559.10	Yes
7/21/1998	29.1	1,190	1,294	80.18	203.13	109.69	207.32	202.92	Yes
9/1/1998	3	1,200	1,305	79.96	21.12	11.40	209.06	204.63	Yes

Date	Observed Zn at OUA0037 (ug/L)	Flow on Sampling Day: Ouachita River flow (cfs)	Flow on Sampling Day: Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Znrrent Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
11/16/1998	9.6	1,990	2,164	65.85	112.06	60.51	346.70	339.34	Yes
1/26/1999	27.9	19,000	20,663	10.04	3,109.57	1,679.17	3,310.16	3,239.97	Yes
3/23/1999	31.4	12,100	13,159	18.33	2,228.73	1,203.51	2,108.05	2,063.35	Yes
5/25/1999	13.2	5,140	5,590	37.70	398.00	214.92	895.49	876.50	Yes
7/27/1999	205.8	1,930	2,099	66.64	2,329.94	1,258.17	336.24	329.11	No
9/21/1999	12.4	1,280	1,392	78.16	93.11	50.28	223.00	218.27	Yes
11/22/1999	13.9	966	1,051	85.89	78.77	42.53	168.30	164.73	Yes
1/25/2000	6.8	997	1,084	85.19	39.77	21.48	173.70	170.01	Yes
3/27/2000	9.1	3,590	3,904	48.47	191.64	103.48	625.45	612.18	Yes
5/30/2000	8.5	9,370	10,190	23.37	467.20	252.29	1,632.43	1,597.81	Yes
9/18/2000	7.2	1,440	1,566	74.84	60.82	32.84	250.88	245.56	Yes
12/19/2000	19.6	13,700	14,899	16.05	1,575.14	850.57	2,386.80	2,336.19	Yes
1/30/2001	43.5	10,600	11,528	20.88	2,704.81	1,460.60	1,846.72	1,807.56	Yes
3/27/2001	7.1	8,200	8,918	26.32	341.52	184.42	1,428.60	1,398.30	Yes
5/22/2001	30.9	6,300	6,852	32.53	1,141.93	616.64	1,097.58	1,074.30	Yes
7/24/2001	5.9	2,260	2,458	62.10	78.22	42.24	393.73	385.39	Yes
9/18/2001	4	1,830	1,990	68.07	42.94	23.19	318.82	312.06	Yes
11/19/2001	7.4	1,670	1,816	70.66	72.49	39.15	290.95	284.78	Yes
5/28/2002	96	3,000	3,263	53.91	1,689.41	912.28	522.66	511.57	No
7/23/2002	0.5	3,170	3,448	52.33	9.30	5.02	552.27	540.56	Yes
9/17/2002	64	1,850	2,012	67.79	694.53	375.05	322.31	315.47	No
11/5/2002	39.2	3,210	3,491	51.93	738.13	398.59	559.24	547.38	Yes
1/21/2003	23.2	2,500	2,719	59.13	340.23	183.72	435.55	426.31	Yes
3/25/2003	33.6	5,430	5,905	36.25	1,070.24	577.93	946.01	925.95	Yes
5/20/2003	31.4	7,210	7,841	29.20	1,328.03	717.13	1,256.12	1,229.48	Yes
7/15/2003	44.1	4,410	4,796	42.29	1,140.82	616.05	768.31	752.01	Yes
9/23/2003	22.2	694	755	92.16	90.38	48.80	120.91	118.34	Yes
11/11/2003	273	2,400	2,610	60.36	3,843.40	2,075.44	418.13	409.26	No
1/20/2004	91.1	3,020	3,284	53.69	1,613.86	871.49	526.14	514.98	No
3/16/2004	12.3	6,540	7,113	31.63	471.87	254.81	1,139.39	1,115.23	Yes
5/11/2004	17.3	5,830	6,340	34.37	591.64	319.48	1,015.70	994.16	Yes
7/20/2004	13.3	3,320	3,611	50.94	259.02	139.87	578.41	566.14	Yes

Table D2
Percent Reductions

Date	Observed Zn at OUA0037 (ug/L)	Flow on Sampling Day: Ouachita River flow (cfs)	Flow on Sampling Day: Est flow at DS end of 08040201-005 (cfs)	Flow on Sampling Day: Percent exceedance for flow on sampling day	Znrrent Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
9/21/2004	14	2,050	2,229	64.95	168.35	90.91	357.15	349.58	Yes
11/30/2004	153	21,000	22,839	8.55	18,847.45	10,177.62	3,658.60	3,581.02	No
3/28/2005	24	13,500	14,682	16.30	1,900.58	1,026.31	2,351.96	2,302.08	Yes
4/4/2005	4.02	3,600	3,915	48.37	84.89	45.84	627.19	613.89	Yes
5/2/2005	1.91	1,560	1,697	72.56	17.48	9.44	271.78	266.02	Yes
5/23/2005	53.8	1,230	1,338	79.18	388.18	209.62	214.29	209.75	Yes
6/27/2005	28.1	1,440	1,566	74.84	237.36	128.18	250.88	245.56	Yes
7/26/2005	11.9	1,600	1,740	72.00	111.69	60.31	278.75	272.84	Yes
9/27/2005	118	3,450	3,752	49.71	2,388.05	1,289.55	601.06	588.31	No
11/29/2005	28.9	913	993	87.30	154.78	83.58	159.06	155.69	Yes
1/17/2006	53.3	747	812	91.15	233.56	126.12	130.14	127.38	Yes
5/16/2006	26.7	5,880	6,395	34.19	920.94	497.31	1,024.41	1,002.68	Yes
7/25/2006	6.14	2,010	2,186	65.47	72.39	39.09	350.18	342.75	Yes
9/26/2006	2.84	1,730	1,881	69.75	28.82	15.56	301.40	295.01	Yes

Total number of values of loads =	71
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	8
No. of exceedances before reductions of loads =	20
No. of exceedances after reductions of loads =	7

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Table D2
Percent Reductions

TABLE D.3. EXISITNG LOAD AND PERCENT REDUCTION FOR COPPER FOR OUACHITA RIVER 08040201-005

Cu Target = 3.5 ug/L
Explicit MOS (% of TMDL) = 10%

Percent reduction = 8%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed Cu at OUA0037 (ug/L)	Ouachita River flow (cfs)	Flow on Sampling Day: Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/9/1995	0.25	11,000	11,963	20.18	16.13	14.84	225.84	203.26	Yes
2/13/1995	0.25	4,620	5,024	40.80	6.78	6.23	94.85	85.37	Yes
3/27/1995	2.42	6,870	7,471	30.29	97.52	89.72	141.05	126.94	Yes
4/24/1995	3.7	9,290	10,103	23.54	201.63	185.50	190.73	171.66	No
5/22/1995	2.33	5,650	6,145	35.25	77.22	71.05	116.00	104.40	Yes
6/19/1995	2.9	3,780	4,111	46.87	64.30	59.16	77.61	69.85	Yes
7/18/1995	0.25	2,560	2,784	58.46	3.75	3.45	52.56	47.30	Yes
8/7/1995	5.7	1,690	1,838	70.34	56.51	51.99	34.70	31.23	No
9/18/1995	0.25	999	1,086	85.17	1.47	1.35	20.51	18.46	Yes
10/16/1995	0.25	694	755	92.16	1.02	0.94	14.25	12.82	Yes
11/14/1995	2.9	1,060	1,153	83.44	18.03	16.59	21.76	19.59	Yes
12/18/1995	2.4	1,080	1,175	82.96	15.20	13.99	22.17	19.96	Yes
1/30/1996	0.25	1,360	1,479	76.48	1.99	1.83	27.92	25.13	Yes
2/20/1996	0.25	1,930	2,099	66.64	2.83	2.60	39.62	35.66	Yes
3/12/1996	0.25	1,450	1,577	74.59	2.13	1.96	29.77	26.79	Yes
4/23/1996	2.6	4,550	4,948	41.29	69.39	63.84	93.42	84.07	Yes
5/21/1996	0.25	7,170	7,798	29.34	10.51	9.67	147.21	132.49	Yes
6/18/1996	0.25	1,360	1,479	76.48	1.99	1.83	27.92	25.13	Yes
7/16/1996	4	3,070	3,339	53.27	72.03	66.27	63.03	56.73	No
9/10/1996	6.9	1,540	1,675	72.99	62.33	57.35	31.62	28.46	No
11/19/1996	0.25	9,440	10,266	23.24	13.84	12.74	193.81	174.43	Yes
1/28/1997	2.7	13,400	14,573	16.43	212.23	195.25	275.12	247.60	Yes
3/11/1997	2.2	32,600	35,454	3.69	420.71	387.05	669.31	602.38	Yes
7/21/1998	1.79	1,190	1,294	80.18	12.50	11.50	24.43	21.99	Yes
9/1/1998	1.84	1,200	1,305	79.96	12.95	11.92	24.64	22.17	Yes

Date	Observed Cu at OUA0037 (ug/L)	Flow on Sampling Day: Ouachita River flow (cfs)	Flow on Sampling Day: Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
11/16/1998	1.44	1,990	2,164	65.85	16.81	15.46	40.86	36.77	Yes
1/26/1999	1.4	19,000	20,663	10.04	156.04	143.55	390.09	351.08	Yes
3/23/1999	1.04	12,100	13,159	18.33	73.82	67.91	248.42	223.58	Yes
5/25/1999	1.3	5,140	5,590	37.70	39.20	36.06	105.53	94.98	Yes
7/27/1999	1.03	1,930	2,099	66.64	11.66	10.73	39.62	35.66	Yes
9/21/1999	1.43	1,280	1,392	78.16	10.74	9.88	26.28	23.65	Yes
11/22/1999	1.29	966	1,051	85.89	7.31	6.73	19.83	17.85	Yes
1/25/2000	0.97	997	1,084	85.19	5.67	5.22	20.47	18.42	Yes
3/27/2000	1.32	3,590	3,904	48.47	27.80	25.57	73.71	66.34	Yes
5/30/2000	1.47	9,370	10,190	23.37	80.80	74.33	192.38	173.14	Yes
7/25/2000	0.69	1,280	1,392	78.16	5.18	4.77	26.28	23.65	Yes
9/18/2000	1.55	1,440	1,566	74.84	13.09	12.05	29.56	26.61	Yes
12/19/2000	1.1	13,700	14,899	16.05	88.40	81.33	281.27	253.15	Yes
1/30/2001	1.03	10,600	11,528	20.88	64.04	58.92	217.63	195.87	Yes
3/27/2001	1.65	8,200	8,918	26.32	79.37	73.02	168.35	151.52	Yes
5/22/2001	1.77	6,300	6,852	32.53	65.41	60.18	129.35	116.41	Yes
7/24/2001	2.166	2,260	2,458	62.10	28.71	26.42	46.40	41.76	Yes
9/18/2001	1.43	1,830	1,990	68.07	15.35	14.12	37.57	33.81	Yes
11/19/2001	1.19	1,670	1,816	70.66	11.66	10.72	34.29	30.86	Yes
5/28/2002	24.65	3,000	3,263	53.91	433.79	399.09	61.59	55.43	No
7/23/2002	3.27	3,170	3,448	52.33	60.81	55.94	65.08	58.57	Yes
9/17/2002	5.44	1,850	2,012	67.79	59.04	54.31	37.98	34.18	No
11/5/2002	1.78	3,210	3,491	51.93	33.52	30.84	65.90	59.31	Yes
1/21/2003	2.33	2,500	2,719	59.13	34.17	31.44	51.33	46.19	Yes
3/25/2003	1	5,430	5,905	36.25	31.85	29.30	111.48	100.33	Yes
5/20/2003	2.21	7,210	7,841	29.20	93.47	85.99	148.03	133.23	Yes
7/15/2003	8.6	4,410	4,796	42.29	222.47	204.68	90.54	81.49	No
9/23/2003	1.54	694	755	92.16	6.27	5.77	14.25	12.82	Yes
11/11/2003	2.47	2,400	2,610	60.36	34.77	31.99	49.27	44.35	Yes
1/20/2004	1.38	3,020	3,284	53.69	24.45	22.49	62.00	55.80	Yes
3/16/2004	2.49	6,540	7,113	31.63	95.53	87.88	134.27	120.85	Yes
5/11/2004	1.65	5,830	6,340	34.37	56.43	51.91	119.70	107.73	Yes

Table D3
Percent Reductions

Date	Observed Cu at OUA0037 (ug/L)	Flow on Sampling Day: Ouachita River flow (cfs)	Flow on Sampling Day: Est flow at DS end of 08040201-005 (cfs)	Flow on Sampling Day: Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
7/20/2004	3.42	3,320	3,611	50.94	66.60	61.28	68.16	61.35	Yes
9/21/2004	2.3	2,050	2,229	64.95	27.66	25.45	42.09	37.88	Yes
11/30/2004	2.5	21,000	22,839	8.55	307.96	283.33	431.15	388.04	Yes
3/28/2005	0.25	13,500	14,682	16.30	19.80	18.21	277.17	249.45	Yes
4/4/2005	1.55	3,600	3,915	48.37	32.73	30.11	73.91	66.52	Yes
5/2/2005	1.01	1,560	1,697	72.56	9.24	8.50	32.03	28.83	Yes
5/23/2005	2.01	1,230	1,338	79.18	14.50	13.34	25.25	22.73	Yes
6/27/2005	2.5	1,440	1,566	74.84	21.12	19.43	29.56	26.61	Yes
7/26/2005	2.65	1,600	1,740	72.00	24.87	22.88	32.85	29.56	Yes
9/27/2005	0.96	3,450	3,752	49.71	19.43	17.87	70.83	63.75	Yes
11/29/2005	0.25	913	993	87.30	1.34	1.23	18.74	16.87	Yes
1/17/2006	0.25	747	812	91.15	1.10	1.01	15.34	13.80	Yes
5/16/2006	5.78	5,880	6,395	34.19	199.36	183.41	120.72	108.65	No
7/25/2006	2.33	2,010	2,186	65.47	27.47	25.27	41.27	37.14	Yes
9/26/2006	0.99	1,730	1,881	69.75	10.05	9.24	35.52	31.97	Yes

Total number of values of loads =	72
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	8
No. of exceedances before reductions of loads =	10
No. of exceedances after reductions of loads =	8

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Table D3
Percent Reductions

APPENDIX E

TMDL Calculations for 08040201-006

Figure E.1. Flow Duration Curve for Smackover Creek 08040201-006

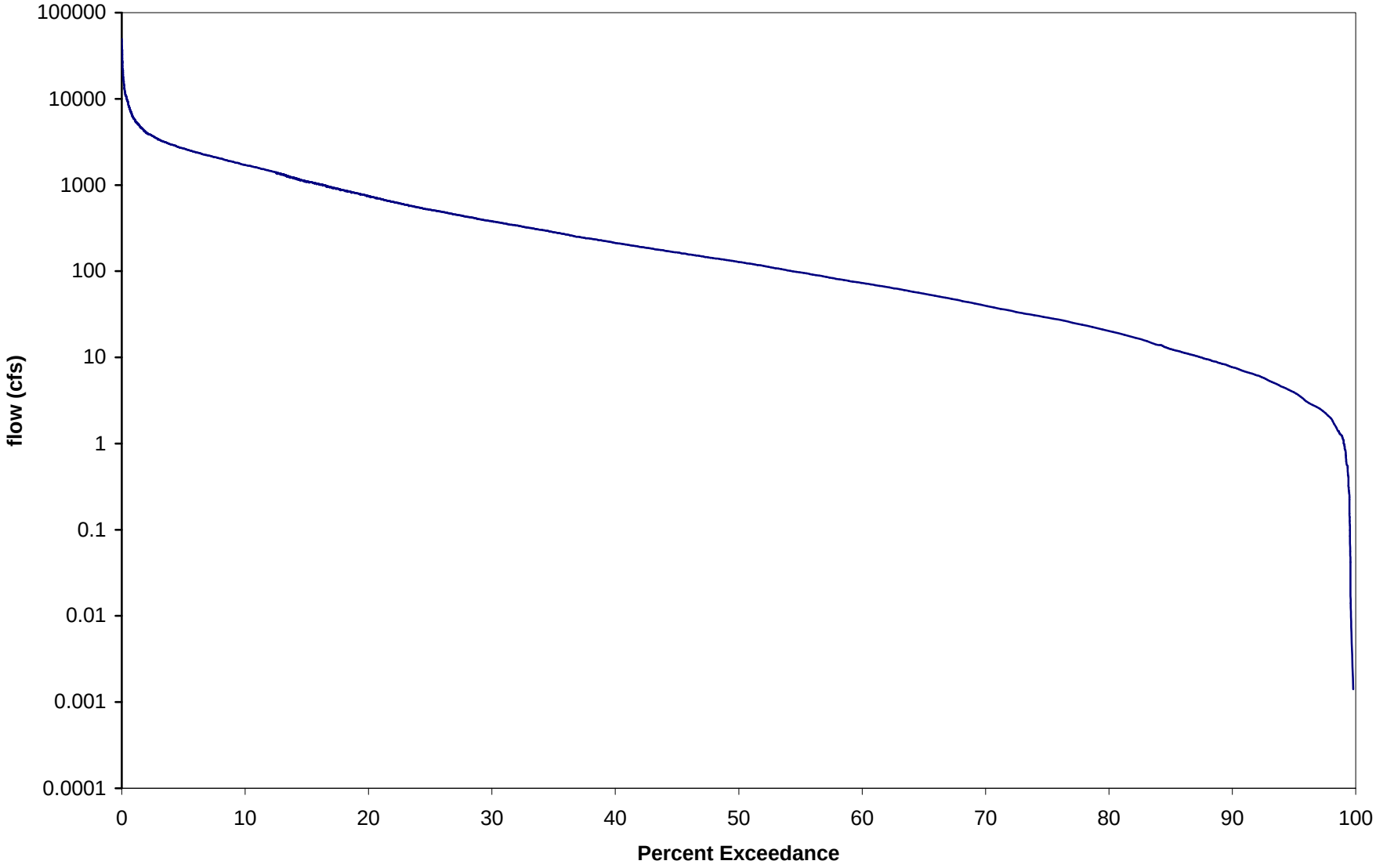

Figure E.2. Zinc Load Duration Curve for Smackover Creek (08040201-006)

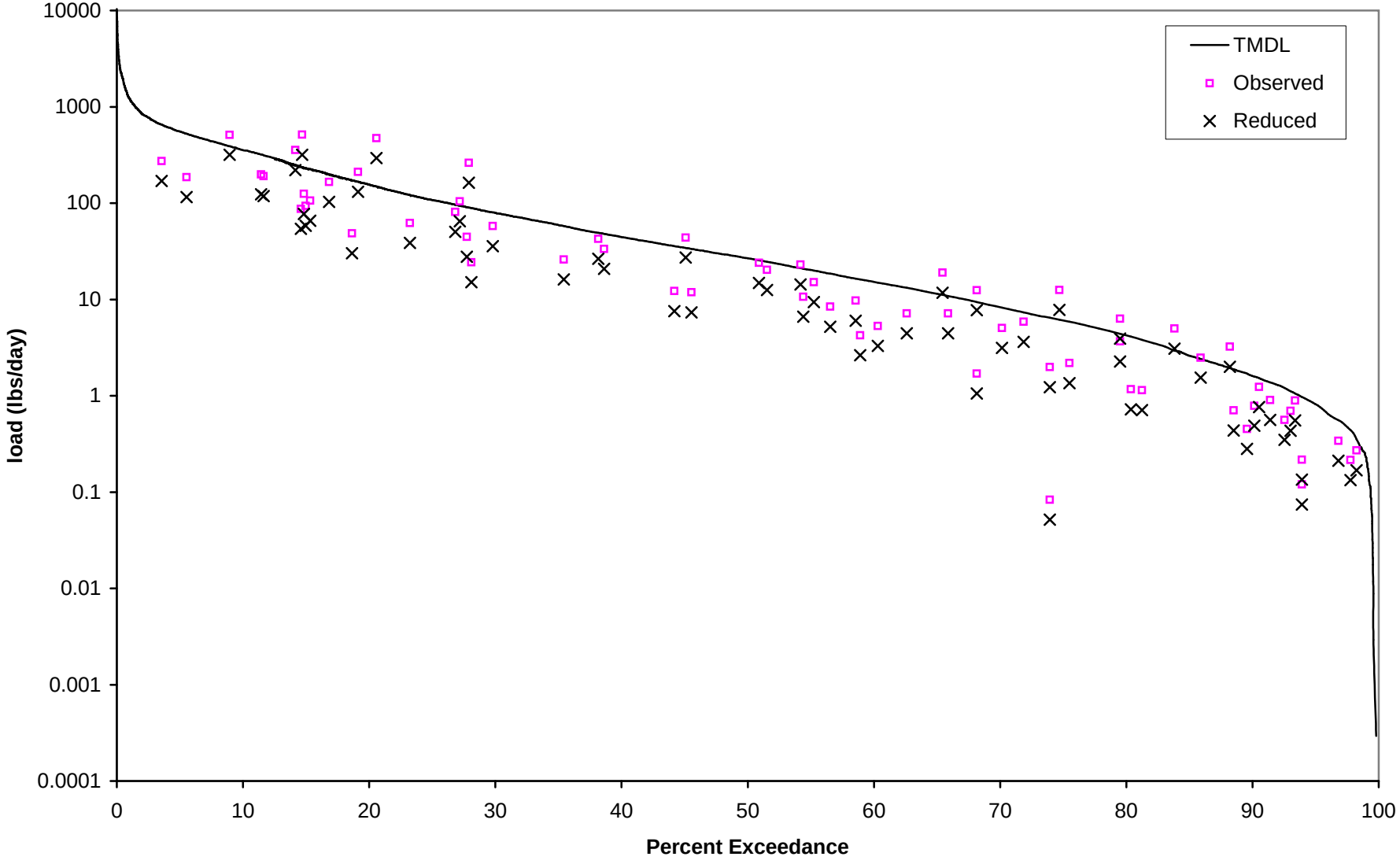

Figure E.3. Copper Load Duration Curve for Smackover Creek (08040201-006)

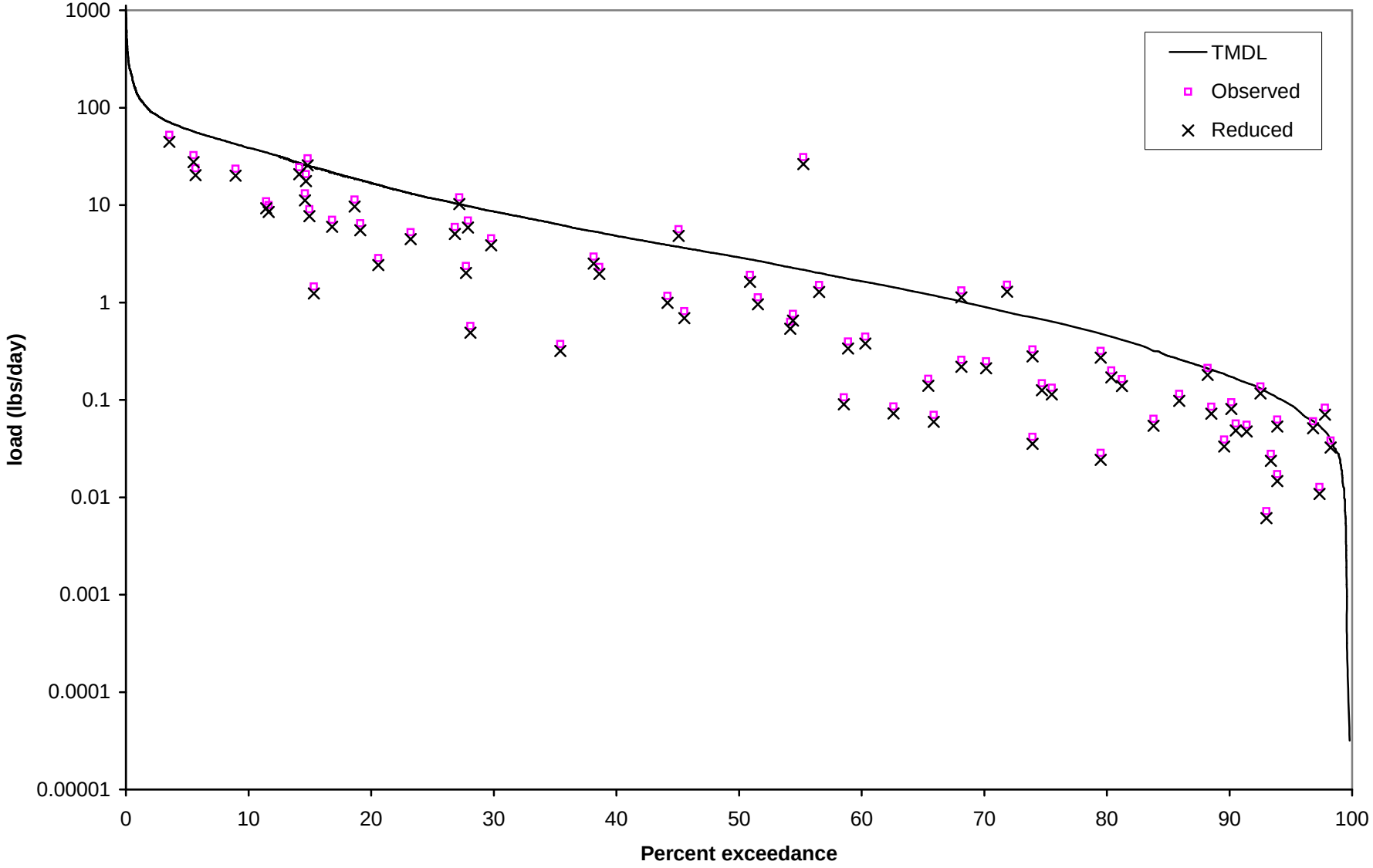

TABLE E.1. ALLOWABLE LOAD FOR SMACKOVER CREEK 08040201-006.

385 mi^2, of gage, 07362100, Smackover Creek nr Smackover, AR
541 mi^2, of drainage area at downstream end of reach 08040201-006

				4.2 ug/L = diss. Cu crit.			38.7 ug/L = diss. Zn crit.		
Smackover Creek flow (cfs)	Est Flow at DS end of 08040201-006 (cfs)	Percent exceed-ance	Width on plot between data points (unitless)	Cu TMDL load (lbs/day)	Cu TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)	Zn TMDL load (lbs/day)	Zn TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)
0.00	1.405E-03	99.80	0.31001	3.18E-05	2.87E-05	9.87E-08	2.93E-04	2.64E-04	9.09E-07
0.01	1.405E-02	99.58	0.11232	3.18E-04	2.87E-04	3.58E-07	2.93E-03	2.64E-03	3.30E-06
0.03	4.216E-02	99.57	0.01348	9.55E-04	8.60E-04	1.29E-07	8.80E-03	7.92E-03	1.19E-06
0.04	5.622E-02	99.56	0.01498	1.27E-03	1.15E-03	1.91E-07	1.17E-02	1.06E-02	1.76E-06
0.06	8.433E-02	99.54	0.01198	1.91E-03	1.72E-03	2.29E-07	1.76E-02	1.58E-02	2.11E-06
0.07	9.838E-02	99.53	0.00899	2.23E-03	2.01E-03	2.00E-07	2.05E-02	1.85E-02	1.85E-06
0.08	1.124E-01	99.52	0.00749	2.55E-03	2.29E-03	1.91E-07	2.35E-02	2.11E-02	1.76E-06
0.09	1.265E-01	99.52	0.00599	2.87E-03	2.58E-03	1.72E-07	2.64E-02	2.38E-02	1.58E-06
The rows between 99.52 and 0.04 percent exceedances are not shown for the sake of brevity.									
21,000	29,515	0.04	0.00599	669	602	4.01E-02	6,161	5,545	3.69E-01
23,300	32,747	0.04	0.00599	742	668	4.44E-02	6,836	6,152	4.09E-01
26,300	36,963	0.03	0.00599	837	754	5.02E-02	7,716	6,944	4.62E-01
26,600	37,385	0.03	0.00599	847	762	5.07E-02	7,804	7,023	4.67E-01
27,800	39,072	0.02	0.00599	885	797	5.30E-02	8,156	7,340	4.89E-01
28,100	39,493	0.01	0.00599	895	805	5.36E-02	8,244	7,419	4.94E-01
33,100	46,521	0.01	0.00599	1,054	948	6.31E-02	9,711	8,740	5.82E-01
35,300	49,613	0.00	0.00449	1,124	1,012	5.05E-02	10,356	9,320	4.65E-01
				Total area under TMDL curve for copper (lbs/day) =		13.6	Total area under TMDL curve for zinc (lbs/day) =		125.3
Explicit MOS (lbs/day) = TMDL × 10% =						1.4			12.5
WLA for point sources (lbs/day) (from Appendix J) =						0.0			0.0
LA for nonpoint sources (lbs/day) = TMDL - MOS - WLA =						12.2			112.8

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TABLE E.2. PERCENT REDUCTION FOR ZINC FOR SMACKOVER CREEK 08040201-006

Zn Target = 38.7 ug/L

Explicit MOS (percent of TMDL) = 10%

Percent reduction = 38%

Error check for reduction is / is not needed: ok

Error check for less or more reduction needed: ok

Date	Observed Zn at OUA0027 (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Flow on Sampling Day: Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load before MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/9/1995	18.2	768.0	1,079.4	15.3	105.96	65.70	225.31	202.78	Yes
2/13/1995	10.6	303.0	425.9	28.1	24.35	15.10	88.89	80.00	Yes
3/27/1995	17.4	197.0	276.9	35.4	25.99	16.11	57.79	52.02	Yes
4/24/1995	16.2	2,230.0	3,134.2	3.5	273.86	169.79	654.22	588.80	Yes
5/22/1995	17.6	63.0	88.5	56.5	8.41	5.21	18.48	16.63	Yes
6/19/1995	11.9	22.0	30.9	73.9	1.98	1.23	6.45	5.81	Yes
7/18/1995	32.2	15.0	21.1	79.5	3.66	2.27	4.40	3.96	Yes
8/7/1995	18.1	4.1	5.8	92.5	0.56	0.35	1.20	1.08	Yes
9/18/1995	24.2	3.8	5.3	93.0	0.70	0.43	1.11	1.00	Yes
10/16/1995	29.8	1.2	1.7	98.3	0.27	0.17	0.35	0.32	Yes
11/14/1995	4.8	3.3	4.6	93.9	0.12	0.07	0.97	0.87	Yes
12/18/1995	36.3	87.0	122.3	50.9	23.94	14.84	25.52	22.97	Yes
1/30/1996	25.6	37.0	52.0	65.9	7.18	4.45	10.85	9.77	Yes
2/20/1996	22.9	56.0	78.7	58.6	9.72	6.03	16.43	14.79	Yes
3/12/1996	21.0	45.0	63.2	62.6	7.16	4.44	13.20	11.88	Yes
4/23/1996	55.3	849.0	1,193.2	14.1	355.91	220.67	249.07	224.17	Yes
5/21/1996	55.6	15.0	21.1	79.5	6.32	3.92	4.40	3.96	Yes
6/18/1996	29.3	68.0	95.6	55.2	15.10	9.36	19.95	17.95	Yes
7/16/1996	20.7	794.0	1,115.9	14.8	124.59	77.25	232.94	209.64	Yes
9/10/1996	30.9	25.0	35.1	71.9	5.86	3.63	7.33	6.60	Yes
11/19/1996	27.9	273.0	383.7	29.8	57.74	35.80	80.09	72.08	Yes
1/28/1997	13.7	1,790.0	2,515.8	5.5	185.90	115.26	525.14	472.62	Yes
3/11/1997	83.9	806.0	1,132.8	14.7	512.63	317.83	236.46	212.81	No
7/21/1998	32.7	3.6	5.1	93.4	0.89	0.55	1.06	0.95	Yes
9/1/1998	31.3	5.2	7.3	90.5	1.23	0.76	1.53	1.37	Yes
11/16/1998	26.9	164.0	230.5	38.6	33.44	20.73	48.11	43.30	Yes

Date	Observed Zn at OUA0027 (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load before MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/26/1999	32.3	679.0	954.3	16.8	166.26	103.08	199.20	179.28	Yes
3/23/1999	19.1	309.0	434.3	27.7	44.74	27.74	90.65	81.59	Yes
5/25/1999	13.7	51.0	71.7	60.3	5.30	3.28	14.96	13.47	Yes
7/27/1999	40.0	8.2	11.5	85.9	2.49	1.54	2.41	2.17	Yes
9/21/1999	23.7	1.9	2.7	96.8	0.34	0.21	0.56	0.50	Yes
11/22/1999	7.0	32.0	45.0	68.1	1.70	1.05	9.39	8.45	Yes
1/25/2000	23.8	28.0	39.4	70.1	5.05	3.13	8.21	7.39	Yes
3/27/2000	19.8	414.0	581.9	23.2	62.14	38.53	121.46	109.31	Yes
5/30/2000	13.7	114.0	160.2	45.5	11.84	7.34	33.44	30.10	Yes
12/19/2000	24.1	1,090.0	1,531.9	11.4	199.14	123.47	319.78	287.80	Yes
1/30/2001	23.5	1,070.0	1,503.8	11.6	190.62	118.18	313.91	282.52	Yes
3/27/2001	15.7	786.0	1,104.7	15.0	93.55	58.00	230.59	207.53	Yes
5/22/2001	113.0	306.0	430.1	27.9	262.13	162.52	89.77	80.79	No
7/24/2001	11.0	14.0	19.7	80.4	1.17	0.72	4.11	3.70	Yes
9/18/2001	11.6	13.0	18.3	81.2	1.14	0.71	3.81	3.43	Yes
11/19/2001	10.2	55.0	77.3	58.9	4.25	2.64	16.14	14.52	Yes
5/28/2002	43.0	320.0	449.7	27.2	104.31	64.67	93.88	84.49	Yes
7/23/2002	0.5	22.0	30.9	73.9	0.08	0.05	6.45	5.81	Yes
9/17/2002	25.4	4.7	6.6	91.4	0.90	0.56	1.38	1.24	Yes
11/5/2002	33.5	168.0	236.1	38.2	42.66	26.45	49.29	44.36	Yes
1/21/2003	49.5	117.0	164.4	45.1	43.90	27.22	34.32	30.89	Yes
3/25/2003	32.7	327.0	459.6	26.8	81.06	50.26	95.93	86.34	Yes
5/20/2003	49.1	568.0	798.3	19.1	211.42	131.08	166.64	149.97	Yes
7/15/2003	51.5	32.0	45.0	68.1	12.49	7.75	9.39	8.45	Yes
9/23/2003	64.5	6.6	9.3	88.2	3.23	2.00	1.94	1.74	No
11/11/2003	65.7	10.0	14.1	83.8	4.98	3.09	2.93	2.64	No
1/20/2004	65.8	38.0	53.4	65.4	18.95	11.75	11.15	10.03	No
3/16/2004	10.9	588.0	826.4	18.6	48.59	30.12	172.50	155.25	Yes
5/11/2004	19.8	71.0	99.8	54.4	10.66	6.61	20.83	18.75	Yes
7/20/2004	31.8	84.0	118.1	51.5	20.25	12.55	24.64	22.18	Yes
9/21/2004	19.2	5.4	7.6	90.1	0.79	0.49	1.58	1.43	Yes
11/30/2004	50.8	1,330.0	1,869.3	8.9	512.18	317.55	390.19	351.17	Yes
3/28/2005	123.0	507.0	712.6	20.6	472.74	293.10	148.74	133.87	No

Table E2
Percent Reductions

Date	Observed Zn at OUA0027 (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Flow on Sampling Day: Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load before MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
5/23/2005	14.4	20.0	28.1	75.5	2.18	1.35	5.87	5.28	Yes
7/26/2005	14.5	6.4	9.0	88.5	0.70	0.44	1.88	1.69	Yes
9/27/2005	42.2	72.0	101.2	54.2	23.03	14.28	21.12	19.01	Yes
11/29/2005	78.7	21.0	29.5	74.7	12.53	7.77	6.16	5.54	No
7/25/2006	18.9	1.5	2.1	97.8	0.21	0.13	0.44	0.40	Yes
9/26/2006	8.7	3.3	4.6	93.9	0.22	0.13	0.97	0.87	Yes
11/28/2006	10.3	5.8	8.2	89.6	0.45	0.28	1.70	1.53	Yes
1/2/2007	14.2	810.0	1,138.4	14.6	87.19	54.06	237.63	213.87	Yes
3/13/2007	13.2	122.0	171.5	44.2	12.21	7.57	35.79	32.21	Yes

Total number of values of loads =	68
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	7
No. of exceedances before reductions of loads =	17
No. of exceedances after reductions of loads =	7

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Table E2
Percent Reductions

TABLE E.3. PERCENT REDUCTION FOR COPPER FOR SMACKOVER 08040201-006

Cu Target = 4.2 ug/L
Explicit MOS (percent of TMDL) = 10%

Percent reduction = 15%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed Cu at OUA0027 (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load before MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/9/1995	0.25	768.0	1,079.4	15.33	1.4555	1.2372	24.4523	22.0071	Yes
2/13/1995	0.25	303.0	425.9	28.10	0.5742	0.4881	9.6472	8.6825	Yes
3/27/1995	0.25	197.0	276.9	35.43	0.3733	0.3173	6.2723	5.6450	Yes
4/24/1995	3.1	2,230.0	3,134.2	3.55	52.4054	44.5446	71.0009	63.9008	Yes
5/22/1995	3.16	63.0	88.5	56.54	1.5092	1.2828	2.0059	1.8053	Yes
6/19/1995	0.25	22.0	30.9	73.94	0.0417	0.0354	0.7005	0.6304	Yes
7/18/1995	0.25	15.0	21.1	79.50	0.0284	0.0242	0.4776	0.4298	Yes
8/7/1995	4.4	4.1	5.8	92.54	0.1368	0.1162	0.1305	0.1175	Yes
9/18/1995	0.25	3.8	5.3	93.02	0.0072	0.0061	0.1210	0.1089	Yes
10/16/1995	4.2	1.2	1.7	98.25	0.0382	0.0325	0.0382	0.0344	Yes
11/14/1995	2.5	3.3	4.6	93.90	0.0625	0.0532	0.1051	0.0946	Yes
12/18/1995	2.9	87.0	122.3	50.89	1.9126	1.6257	2.7700	2.4930	Yes
1/30/1996	0.25	37.0	52.0	65.88	0.0701	0.0596	1.1780	1.0602	Yes
2/20/1996	0.25	56.0	78.7	58.55	0.1061	0.0902	1.7830	1.6047	Yes
3/12/1996	0.25	45.0	63.2	62.60	0.0853	0.0725	1.4328	1.2895	Yes
4/23/1996	3.8	849.0	1,193.2	14.14	24.4569	20.7883	27.0313	24.3281	Yes
5/21/1996	2.8	15.0	21.1	79.50	0.3184	0.2706	0.4776	0.4298	Yes
6/18/1996	60.2	68.0	95.6	55.24	31.0324	26.3775	2.1650	1.9485	No
7/16/1996	5	794.0	1,115.9	14.83	30.0954	25.5811	25.2801	22.7521	No
9/10/1996	8	25.0	35.1	71.86	1.5161	1.2887	0.7960	0.7164	No
11/19/1996	2.2	273.0	383.7	29.79	4.5530	3.8700	8.6920	7.8228	Yes
1/28/1997	2.4	1,790.0	2,515.8	5.52	32.5667	27.6817	56.9917	51.2926	Yes
3/11/1997	3.4	806.0	1,132.8	14.68	20.7742	17.6580	25.6622	23.0960	Yes
7/21/1998	1.02	3.6	5.1	93.38	0.0278	0.0237	0.1146	0.1032	Yes
9/1/1998	1.45	5.2	7.3	90.52	0.0572	0.0486	0.1656	0.1490	Yes

Date	Observed Cu at OUA0027 (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load before MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
11/16/1998	1.86	164.0	230.5	38.61	2.3124	1.9656	5.2216	4.6994	Yes
1/26/1999	1.37	679.0	954.3	16.82	7.0518	5.9940	21.6187	19.4568	Yes
3/23/1999	1.01	309.0	434.3	27.74	2.3659	2.0110	9.8382	8.8544	Yes
5/25/1999	1.15	51.0	71.7	60.30	0.4446	0.3779	1.6238	1.4614	Yes
7/27/1999	1.85	8.2	11.5	85.89	0.1150	0.0977	0.2611	0.2350	Yes
9/21/1999	4.17	1.9	2.7	96.82	0.0601	0.0511	0.0605	0.0544	Yes
11/22/1999	1.06	32.0	45.0	68.15	0.2571	0.2186	1.0188	0.9170	Yes
1/25/2000	1.17	28.0	39.4	70.15	0.2483	0.2111	0.8915	0.8023	Yes
3/27/2000	1.68	414.0	581.9	23.22	5.2725	4.4817	13.1813	11.8632	Yes
5/30/2000	0.94	114.0	160.2	45.53	0.8123	0.6905	3.6296	3.2667	Yes
7/25/2000	0.99	1.7	2.4	97.33	0.0128	0.0108	0.0541	0.0487	Yes
12/19/2000	1.32	1,090.0	1,531.9	11.43	10.9071	9.2710	34.7045	31.2340	Yes
1/30/2001	1.23	1,070.0	1,503.8	11.64	9.9770	8.4804	34.0677	30.6609	Yes
3/27/2001	1.52	786.0	1,104.7	14.97	9.0568	7.6983	25.0254	22.5229	Yes
5/22/2001	2.99	306.0	430.1	27.90	6.9359	5.8955	9.7427	8.7684	Yes
7/24/2001	1.889	14.0	19.7	80.35	0.2005	0.1704	0.4457	0.4012	Yes
9/18/2001	1.66	13.0	18.3	81.23	0.1636	0.1391	0.4139	0.3725	Yes
11/19/2001	0.95	55.0	77.3	58.90	0.3961	0.3367	1.7511	1.5760	Yes
3/26/2002	1.79	1,760.0	2,473.6	5.67	23.8823	20.2999	56.0366	50.4329	Yes
5/28/2002	4.95	320.0	449.7	27.18	12.0078	10.2067	10.1885	9.1696	No
7/23/2002	1.97	22.0	30.9	73.94	0.3285	0.2793	0.7005	0.6304	Yes
9/17/2002	1.56	4.7	6.6	91.39	0.0556	0.0472	0.1496	0.1347	Yes
11/5/2002	2.32	168.0	236.1	38.16	2.9547	2.5115	5.3489	4.8141	Yes
1/21/2003	6.38	117.0	164.4	45.07	5.6587	4.8099	3.7252	3.3526	No
3/25/2003	2.4	327.0	459.6	26.83	5.9493	5.0569	10.4113	9.3702	Yes
5/20/2003	1.51	568.0	798.3	19.11	6.5018	5.5265	18.0845	16.2761	Yes
7/15/2003	5.46	32.0	45.0	68.15	1.3245	1.1258	1.0188	0.9170	No
9/23/2003	4.24	6.6	9.3	88.21	0.2121	0.1803	0.2101	0.1891	Yes
11/11/2003	0.84	10.0	14.1	83.81	0.0637	0.0541	0.3184	0.2866	Yes
1/20/2004	0.57	38.0	53.4	65.44	0.1642	0.1396	1.2099	1.0889	Yes
3/16/2004	2.55	588.0	826.4	18.64	11.3665	9.6615	18.7213	16.8492	Yes
5/11/2004	1.42	71.0	99.8	54.41	0.7643	0.6496	2.2606	2.0345	Yes

Table E3
Percent Reductions

Date	Observed Cu at OUA0027 (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load before MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
7/20/2004	1.77	84.0	118.1	51.54	1.1271	0.9580	2.6745	2.4070	Yes
9/21/2004	2.31	5.4	7.6	90.15	0.0946	0.0804	0.1719	0.1547	Yes
11/30/2004	2.34	1,330.0	1,869.3	8.95	23.5927	20.0538	42.3458	38.1112	Yes
3/28/2005	0.74	507.0	712.6	20.57	2.8441	2.4175	16.1424	14.5281	Yes
5/23/2005	0.88	20.0	28.1	75.50	0.1334	0.1134	0.6368	0.5731	Yes
7/26/2005	1.75	6.4	9.0	88.51	0.0849	0.0722	0.2038	0.1834	Yes
9/27/2005	1.16	72.0	101.2	54.18	0.6331	0.5382	2.2924	2.0632	Yes
11/29/2005	0.93	21.0	29.5	74.70	0.1481	0.1258	0.6686	0.6018	Yes
7/25/2006	7.28	1.5	2.1	97.77	0.0828	0.0704	0.0478	0.0430	No
9/26/2006	0.69	3.3	4.6	93.90	0.0173	0.0147	0.1051	0.0946	Yes
11/28/2006	0.89	5.8	8.2	89.56	0.0391	0.0333	0.1847	0.1662	Yes
1/2/2007	2.14	810.0	1,138.4	14.59	13.1404	11.1693	25.7896	23.2106	Yes
3/13/2007	1.26	122.0	171.5	44.18	1.1653	0.9905	3.8844	3.4959	Yes

Total number of values of loads =	70
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	7
No. of exceedances before reductions of loads =	12
No. of exceedances after reductions of loads =	7

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Table E3
Percent Reductions

APPENDIX F

TMDL Calculations for 08040201-007

Figure F.1. Flow Duration Curve for Smackover Creek 08040201-007

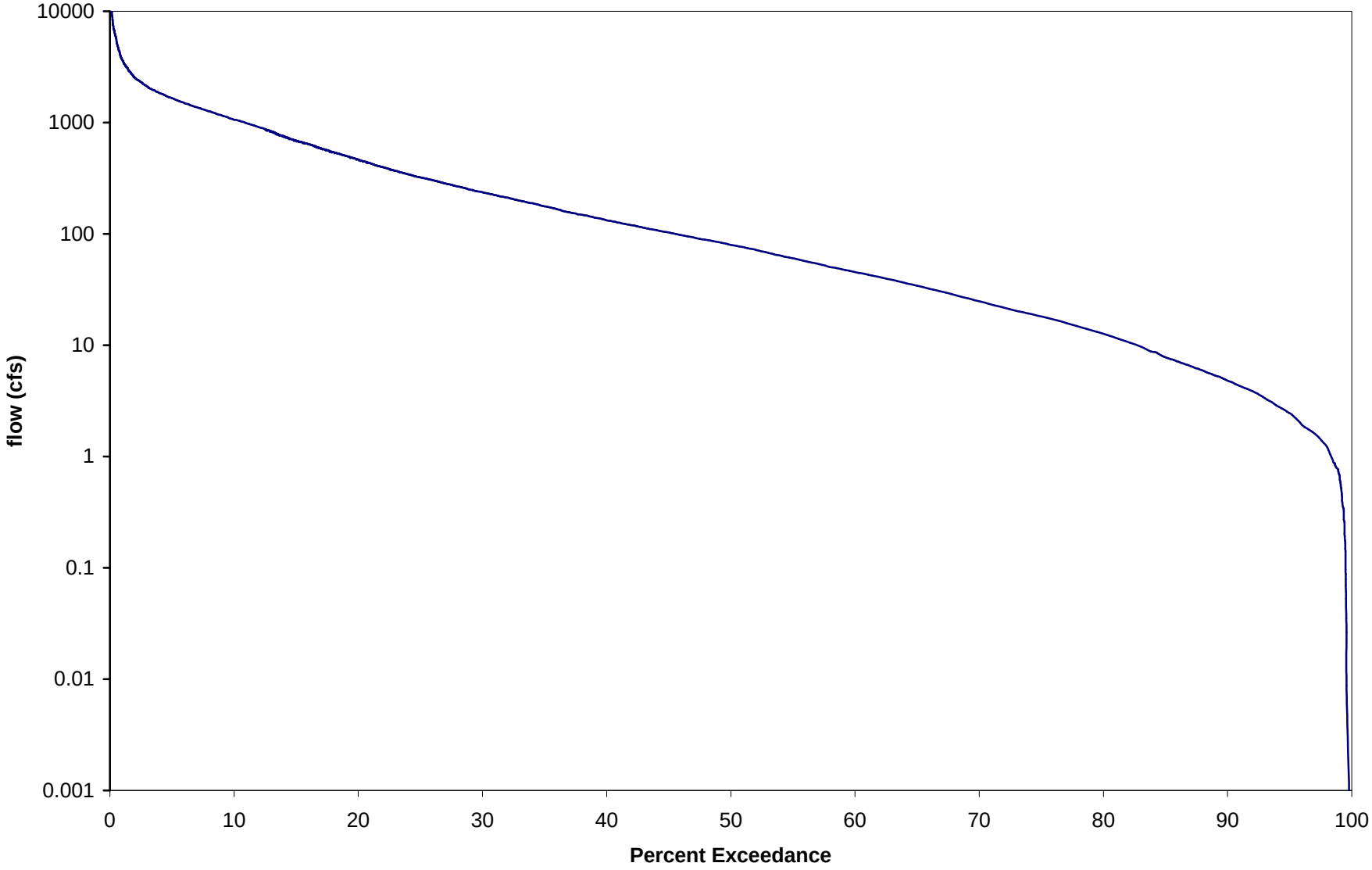

Figure F.2. Zinc Load Duration Curve for Smackover Creek 08040201-007

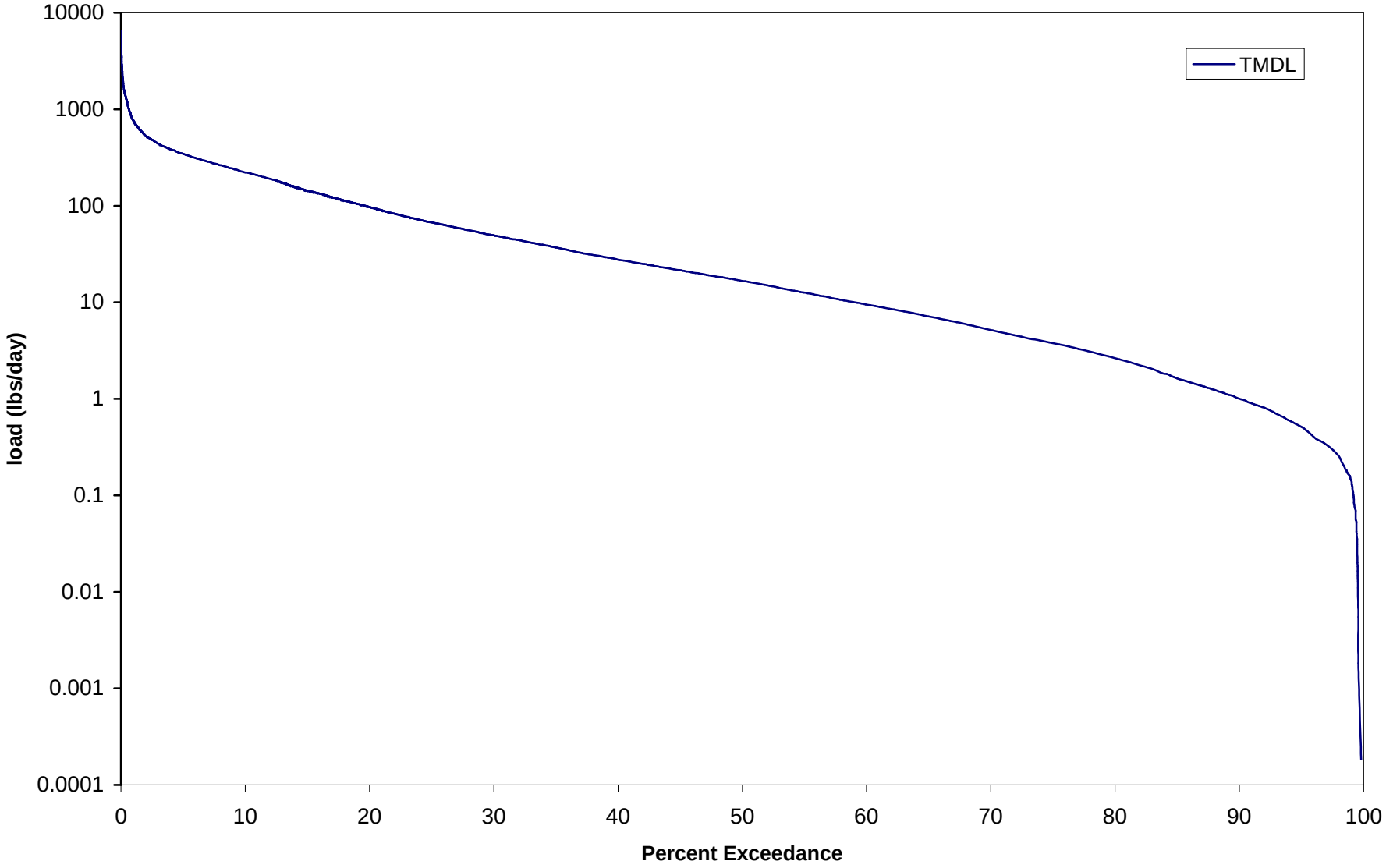

Figure F.3. Copper Load Duration Curve for Smackover Creek 08040201-007

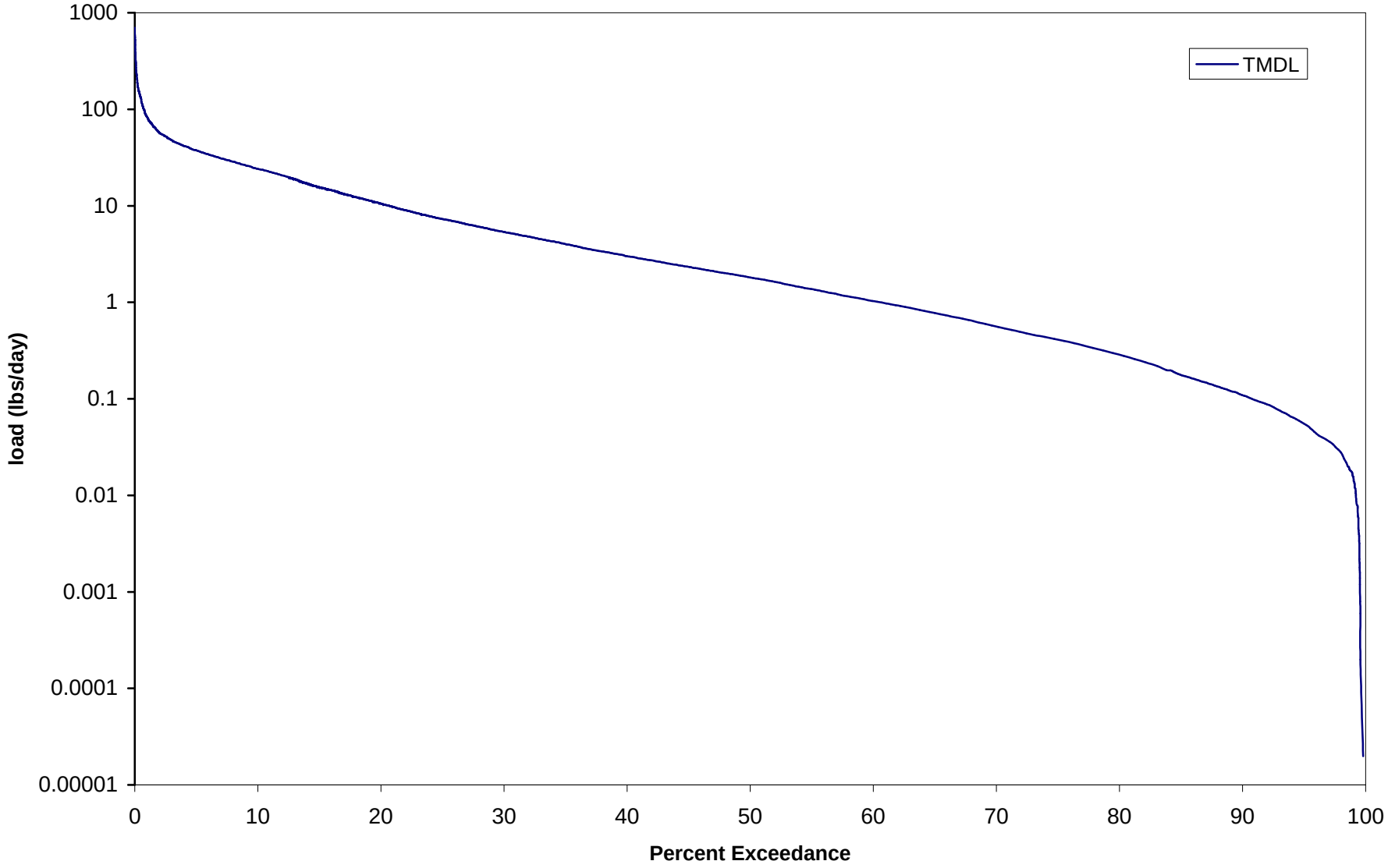

TABLE F.1. ALLOWABLE LOAD FOR SMACKOVER CREEK 08040201-007.

385 mi^2, of gage, 07362100, Smackover Creek nr Smackover, AR
338 mi^2, of drainage area at downstream end of reach 08040201-007

				4.2 ug/L = diss. Cu crit.			38.7 ug/L = diss. Zn crit.		
Smackover Creek flow (cfs)	Est Flow at DS end of 08040201-007 (cfs)	Percent exceed-ance	Width on plot between data points (unitless)	Cu TMDL load (lbs/day)	Cu TMDL - FG load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)	Zn TMDL load (lbs/day)	Zn TMDL - FG load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)
0.001	8.768E-04	99.80	0.31001	1.99E-05	1.79E-05	6.16E-08	1.83E-04	1.65E-04	5.67E-07
0.01	8.768E-03	99.58	0.11232	1.99E-04	1.79E-04	2.23E-07	1.83E-03	1.65E-03	2.06E-06
0.03	2.630E-02	99.57	0.01348	5.96E-04	5.36E-04	8.03E-08	5.49E-03	4.94E-03	7.40E-07
0.04	3.507E-02	99.56	0.01498	7.94E-04	7.15E-04	1.19E-07	7.32E-03	6.59E-03	1.10E-06
0.06	5.261E-02	99.54	0.01198	1.19E-03	1.07E-03	1.43E-07	1.10E-02	9.88E-03	1.32E-06
0.07	6.137E-02	99.53	0.00899	1.39E-03	1.25E-03	1.25E-07	1.28E-02	1.15E-02	1.15E-06
0.08	7.014E-02	99.52	0.00749	1.59E-03	1.43E-03	1.19E-07	1.46E-02	1.32E-02	1.10E-06
0.09	7.891E-02	99.52	0.00599	1.79E-03	1.61E-03	1.07E-07	1.65E-02	1.48E-02	9.87E-07
The rows between 99.52 and 0.04 percent exceedances are not shown for the sake of brevity.									
21,000	1.841E+04	0.04	0.00599	4.17E+02	3.75E+02	2.50E-02	3.84E+03	3.46E+03	2.30E-01
23,300	2.043E+04	0.04	0.00599	4.63E+02	4.17E+02	2.77E-02	4.26E+03	3.84E+03	2.55E-01
26,300	2.306E+04	0.03	0.00599	5.22E+02	4.70E+02	3.13E-02	4.81E+03	4.33E+03	2.88E-01
26,600	2.332E+04	0.03	0.00599	5.28E+02	4.76E+02	3.17E-02	4.87E+03	4.38E+03	2.92E-01
27,800	2.437E+04	0.02	0.00599	5.52E+02	4.97E+02	3.31E-02	5.09E+03	4.58E+03	3.05E-01
28,100	2.464E+04	0.01	0.00599	5.58E+02	5.02E+02	3.34E-02	5.14E+03	4.63E+03	3.08E-01
33,100	2.902E+04	0.01	0.00599	6.57E+02	5.92E+02	3.94E-02	6.06E+03	5.45E+03	3.63E-01
35,300	3.095E+04	0.00	0.00599	7.01E+02	6.31E+02	4.20E-02	6.46E+03	5.81E+03	3.87E-01
				Total area under TMDL curve for copper (lbs/day) =		8.5	Total area under TMDL curve for zinc (lbs/day) =		78.2
Explicit MOS (lbs/day) = TMDL × 10% =						0.9			7.8
WLA for point sources (lbs/day) (from Appendix J) =						0			0
LA for nonpoint sources (lbs/day) = TMDL - MOS - WLA =						7.6			70.4

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APPENDIX G

TMDL Calculations for 08040201-606

Figure G.1. Flow Duration Curve for ELCC Tributary 08040201-606

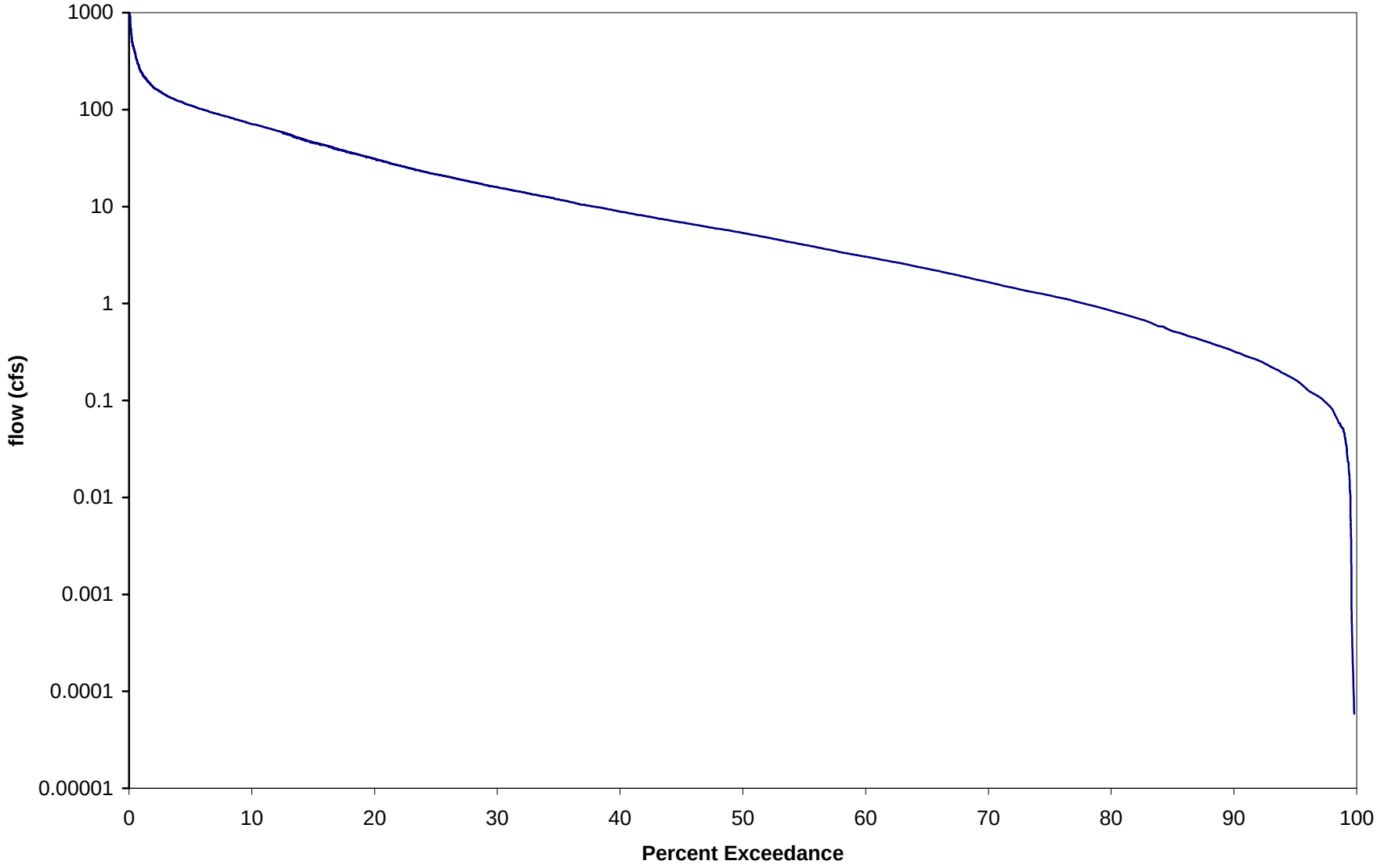

Figure G.2. Zinc Load Duration Curve for ELCC Tributary (08040201-606)

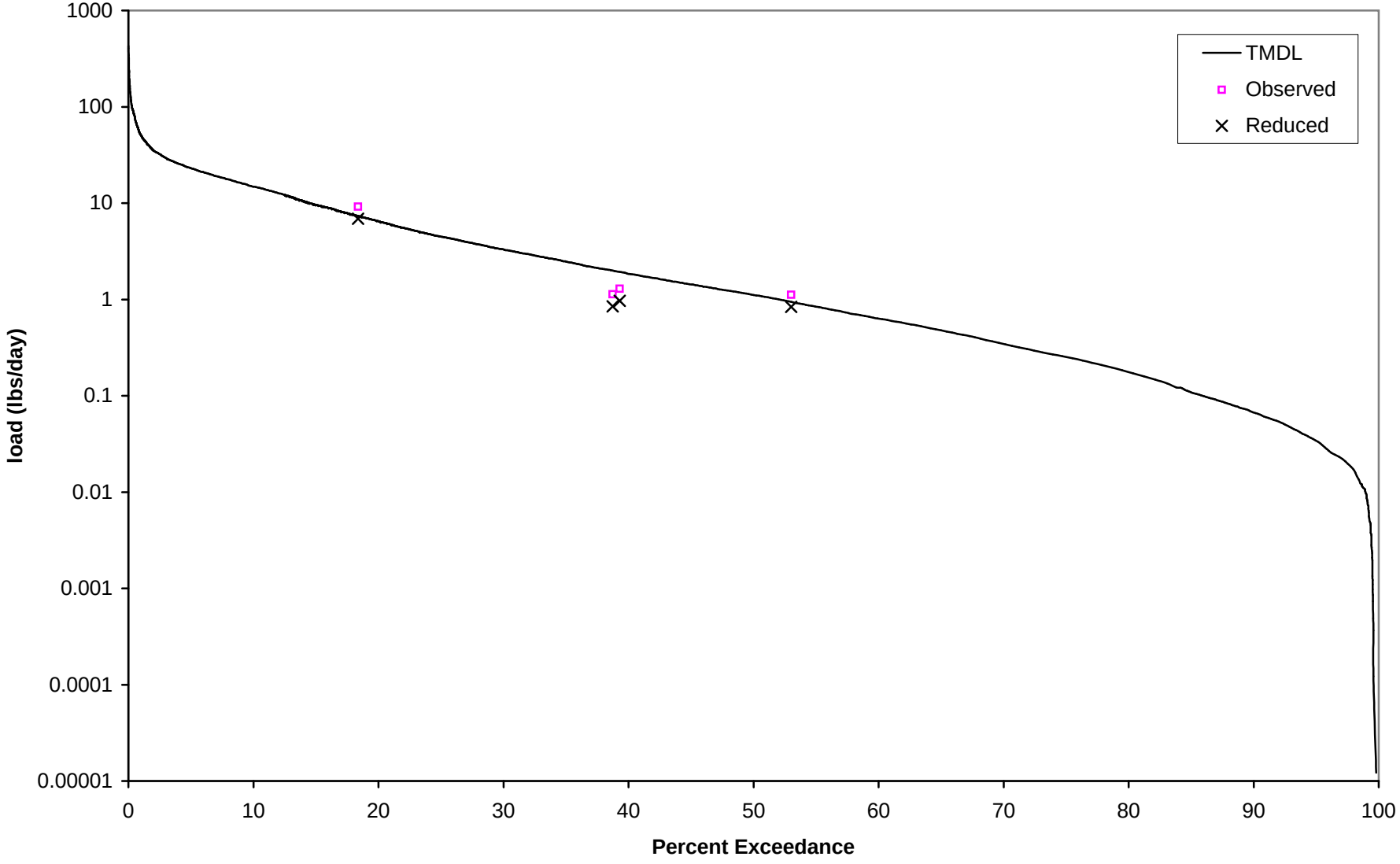

Figure G.3. Copper Load Duration Curve for ELCC Tributary (08040201-606)

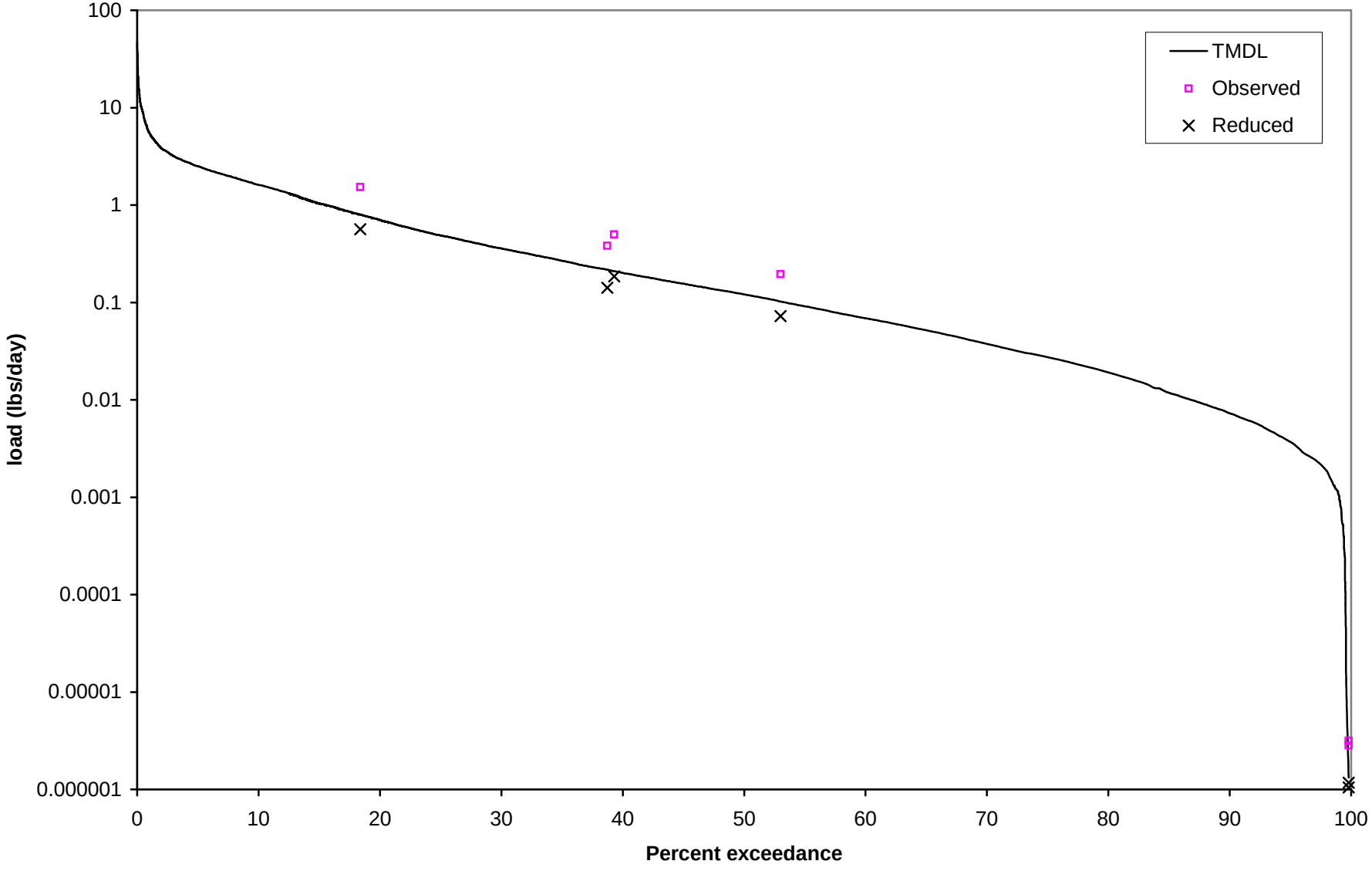

Figure G.4. Nitrate Load Duration Curve for ELCC Tributary (08040201-606)

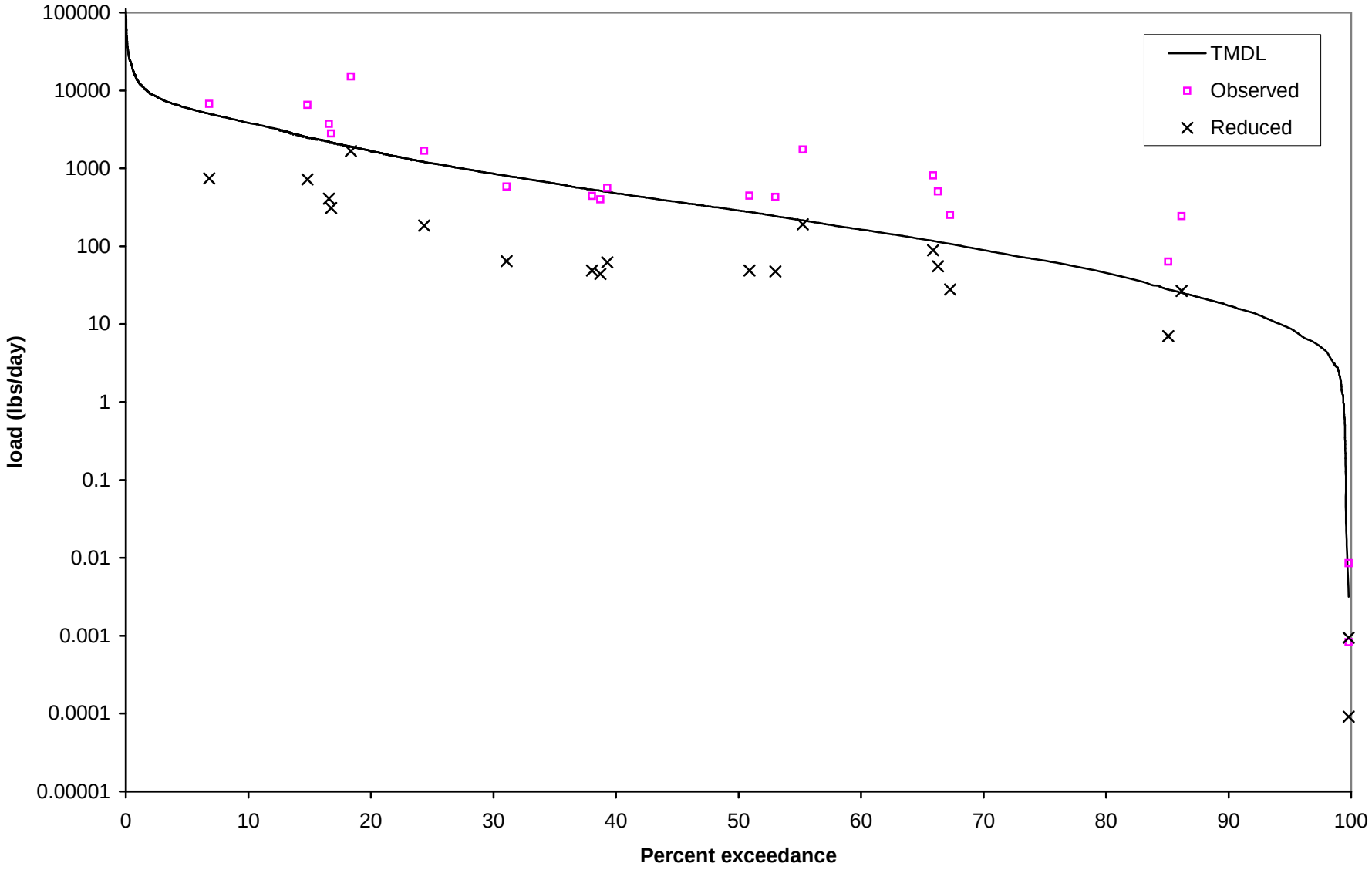

TABLE G.1. ALLOWABLE LOAD FOR ELCC TRIBUTARY 08040201-606.

385 mi^2, of gage, 07362100, Smackover Creek nr Smackover, AR
22.6 mi^2, of drainage area at downstream end of reach 08040201-606

				4.2 ug/L = diss. Cu crit.			38.7 ug/L = diss. Zn crit.			10 mg/L = NO_3 target		
Smackover Creek flow (cfs)	Est Flow at DS end of 08040201-606 (cfs)	Percent exceed-ance	Width on plot between data points (unitless)	Cu TMDL load (lbs/day)	Cu TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)	Zn TMDL load (lbs/day)	Zn TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)	NO_3 TMDL load (lbs/day)	NO_3 TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)
0.00	5.858E-05	99.80	0.31001	1.33E-06	1.19E-06	4.11E-09	1.22E-05	1.10E-05	3.79E-08	3.16E-03	2.84E-03	9.80E-06
0.01	5.858E-04	99.58	0.11232	1.33E-05	1.19E-05	1.49E-08	1.22E-04	1.10E-04	1.37E-07	3.16E-02	2.84E-02	3.55E-05
0.03	1.758E-03	99.57	0.01348	3.98E-05	3.58E-05	5.37E-09	3.67E-04	3.30E-04	4.94E-08	9.48E-02	8.53E-02	1.28E-05
0.04	2.343E-03	99.56	0.01498	5.31E-05	4.78E-05	7.95E-09	4.89E-04	4.40E-04	7.33E-08	0.13	0.11	1.89E-05
0.06	3.515E-03	99.54	0.01198	7.96E-05	7.17E-05	9.54E-09	7.34E-04	6.60E-04	8.79E-08	0.19	0.17	2.27E-05
0.07	4.101E-03	99.53	0.00899	9.29E-05	8.36E-05	8.35E-09	8.56E-04	7.70E-04	7.69E-08	0.22	0.20	1.99E-05
0.08	4.687E-03	99.52	0.00749	1.06E-04	9.56E-05	7.95E-09	9.78E-04	8.80E-04	7.33E-08	0.25	0.23	1.89E-05
0.09	5.273E-03	99.52	0.00599	1.19E-04	1.08E-04	7.16E-09	1.10E-03	9.91E-04	6.59E-08	0.28	0.26	1.70E-05
The rows between 99.52 and 0.04 percent exceedances are not shown for the sake of brevity.												
21,000	1,230	0.04	0.00599	27.87	25.08	1.67E-03	256.81	231.13	1.54E-02	66,359	59,723	3.98E+00
23,300	1,365	0.04	0.00599	30.92	27.83	1.85E-03	284.93	256.44	1.71E-02	73,626	66,264	4.41E+00
26,300	1,541	0.03	0.00599	34.90	31.41	2.09E-03	321.62	289.46	1.93E-02	83,106	74,796	4.98E+00
26,600	1,558	0.03	0.00599	35.30	31.77	2.11E-03	325.29	292.76	1.95E-02	84,054	75,649	5.04E+00
27,800	1,629	0.02	0.00599	36.90	33.21	2.21E-03	339.96	305.97	2.04E-02	87,846	79,061	5.26E+00
28,100	1,646	0.01	0.00599	37.29	33.56	2.23E-03	343.63	309.27	2.06E-02	88,794	79,915	5.32E+00
33,100	1,939	0.01	0.00599	43.93	39.54	2.63E-03	404.78	364.30	2.42E-02	104,594	94,134	6.27E+00
35,300	2,068	0.00	0.00599	46.85	42.16	2.81E-03	431.68	388.51	2.59E-02	111,546	100,391	6.68E+00
				Total area under TMDL curve for copper (lbs/day) =		0.57	Total area under TMDL curve for zinc (lbs/day) =		5.23	Total area under TMDL curve for nitrate (lbs/day) =		1,351
Explicit MOS (lbs/day) = TMDL × 10% =						0.06			0.52			135
WLA for point sources (lbs/day) (from Appendix J) =						0.09			0.76			221
LA for nonpoint sources (lbs/day) = TMDL - MOS - WLA =						0.42			3.95			995

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TABLE G.2. PERCENT REDUCTION FOR ZINC FOR ELCC TRIBUTARY 08040201-606

Zn Target = 38.7 ug/L

Explicit MOS (percent of TMDL) = 10%

Percent reduction = 25%

Error check for reduction is / is not needed: ok

Error check for less or more reduction needed: ok

Date	Observed Cu at OUA0137B (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-606 (cfs)	Flow on Sampling Day: Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load before MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
4/4/95	25.80	158.0	9.3	39.3	1.29	0.97	1.93	1.74	Yes
2/8/00	46.00	77.0	4.5	53.0	1.12	0.84	0.94	0.85	Yes
4/24/00	22.00	163.0	9.5	38.7	1.13	0.85	1.99	1.79	Yes
6/20/00	48.30	602.0	35.3	18.4	9.19	6.89	7.36	6.63	No
8/29/00	6.30	0.0	0.0	99.8	0.00	0.00	0.00	0.00	Yes
9/19/00	13.60	0.0	0.0	99.8	0.00	0.00	0.00	0.00	Yes

Total number of values of loads =	6
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	1
No. of exceedances before reductions of loads =	2
No. of exceedances after reductions of loads =	1

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TABLE G.3. PERCENT REDUCTION FOR COPPER FOR ELCC TRIBUTARY 08040201-606

Cu Target = 4.2 ug/L
Explicit MOS (percent of TMDL) = 10%

Percent reduction = 63%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed Cu at OUA0137B (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-006 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load before MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
4/4/95	10	158.0	9.3	39.29	0.4993	0.1847	0.2097	0.1887	Yes
2/8/00	8.03	77.0	4.5	53.00	0.1954	0.0723	0.1022	0.0920	Yes
4/24/00	7.42	163.0	9.5	38.72	0.3822	0.1414	0.2163	0.1947	Yes
6/20/00	8.03	602.0	35.3	18.37	1.5275	0.5652	0.7990	0.7191	Yes
8/29/00	9.99	0.0	0.0	99.80	0.0000	0.0000	0.0000	0.0000	Yes
9/19/00	8.94	0.0	0.0	99.80	0.0000	0.0000	0.0000	0.0000	Yes

Total number of values of loads =	6
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	1
No. of exceedances before reductions of loads =	6
No. of exceedances after reductions of loads =	0

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TABLE G.4. PERCENT REDUCTION FOR NITRATE FOR ELCC TRIBUTARY 08040201-606

NO3 Target = 10 mg/L
Explicit MOS (percent of TMDL) = 10%

Percent reduction = 89%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed NO3 at OUA0137B (ug/L)	Flow on Sampling Day: Smackover Creek flow (cfs)	Flow on Sampling Day: Est Flow at DS end of 08040201-606 (cfs)	Flow on Sampling Day: Percent exceedance for flow on sampling day	current NO3 load (lbs/day)	Reduced NO3 load (lbs/day)	Allowable NO3 load before MOS incorporated (lbs/day)	Allowable NO3 load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
5/17/94	13	683.0	40.0	16.75	2,805.70	308.63	2,158.23	1,942.41	Yes
6/21/94	23.5	34.0	2.0	67.26	252.48	27.77	107.44	96.69	Yes
7/26/94	16.2	87.0	5.1	50.89	445.36	48.99	274.91	247.42	Yes
9/26/94	22.9	8.8	0.5	85.08	63.68	7.00	27.81	25.03	Yes
10/18/94	16.9	695.0	40.7	16.58	3,711.50	408.26	2,196.15	1,976.54	Yes
1/24/95	13.4	1,590.0	93.1	6.81	6,732.55	740.58	5,024.29	4,521.86	Yes
3/21/95	13.9	382.0	22.4	24.35	1,677.86	184.56	1,207.09	1,086.38	Yes
4/4/95	11.3	158.0	9.3	39.29	564.17	62.06	499.27	449.34	Yes
1/8/96	69.3	37.0	2.2	65.88	810.24	89.13	116.92	105.23	Yes
2/6/96	44.2	36.0	2.1	66.29	502.81	55.31	113.76	102.38	Yes
3/26/96	7.29	254.0	14.9	31.07	585.11	64.36	802.62	722.36	Yes
4/30/96	8.3	169.0	9.9	38.04	443.24	48.76	534.03	480.63	Yes
5/28/96	96	8.0	0.5	86.16	242.68	26.70	25.28	22.75	No
6/18/96	80.9	68.0	4.0	55.24	1,738.34	191.22	214.88	193.39	Yes
7/16/96	26.1	794.0	46.5	14.83	6,548.45	720.33	2,508.99	2,258.09	Yes
2/8/00	17.7	77.0	4.5	53.00	430.67	47.37	243.31	218.98	Yes
4/24/00	7.761	163.0	9.5	38.72	399.74	43.97	515.07	463.56	Yes
6/20/00	79.6	602.0	35.3	18.37	15,142.14	1,665.64	1,902.28	1,712.05	Yes
8/29/00	27	0.0	0.0	99.80	0.01	0.00	0.00	0.00	Yes
9/19/00	2.62	0.0	0.0	99.80	0.00	0.00	0.00	0.00	Yes

Total number of values of loads = 20
Allowable % of exceedances of loads = 10%
Allowable no. of exceedances of loads = 2
No. of exceedances before reductions of loads = 16
No. of exceedances after reductions of loads = 1

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APPENDIX H

TMDL Calculations for 08040201-002

Figure H.1. Flow duration curve for Ouachita River (08040201-002)

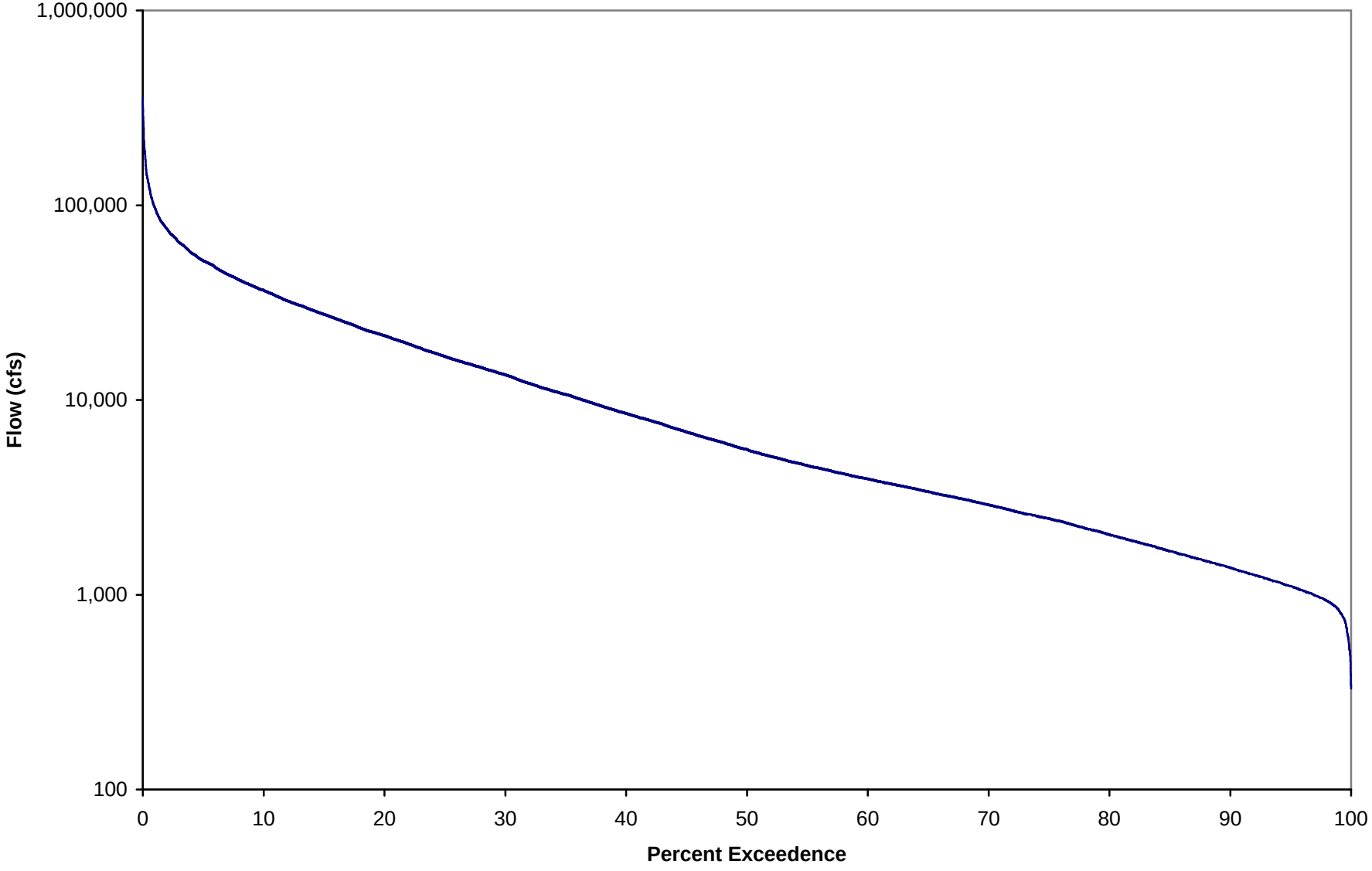

Figure H.2. Zinc Load Duration Curve for Ouachita River (OUA0008B)

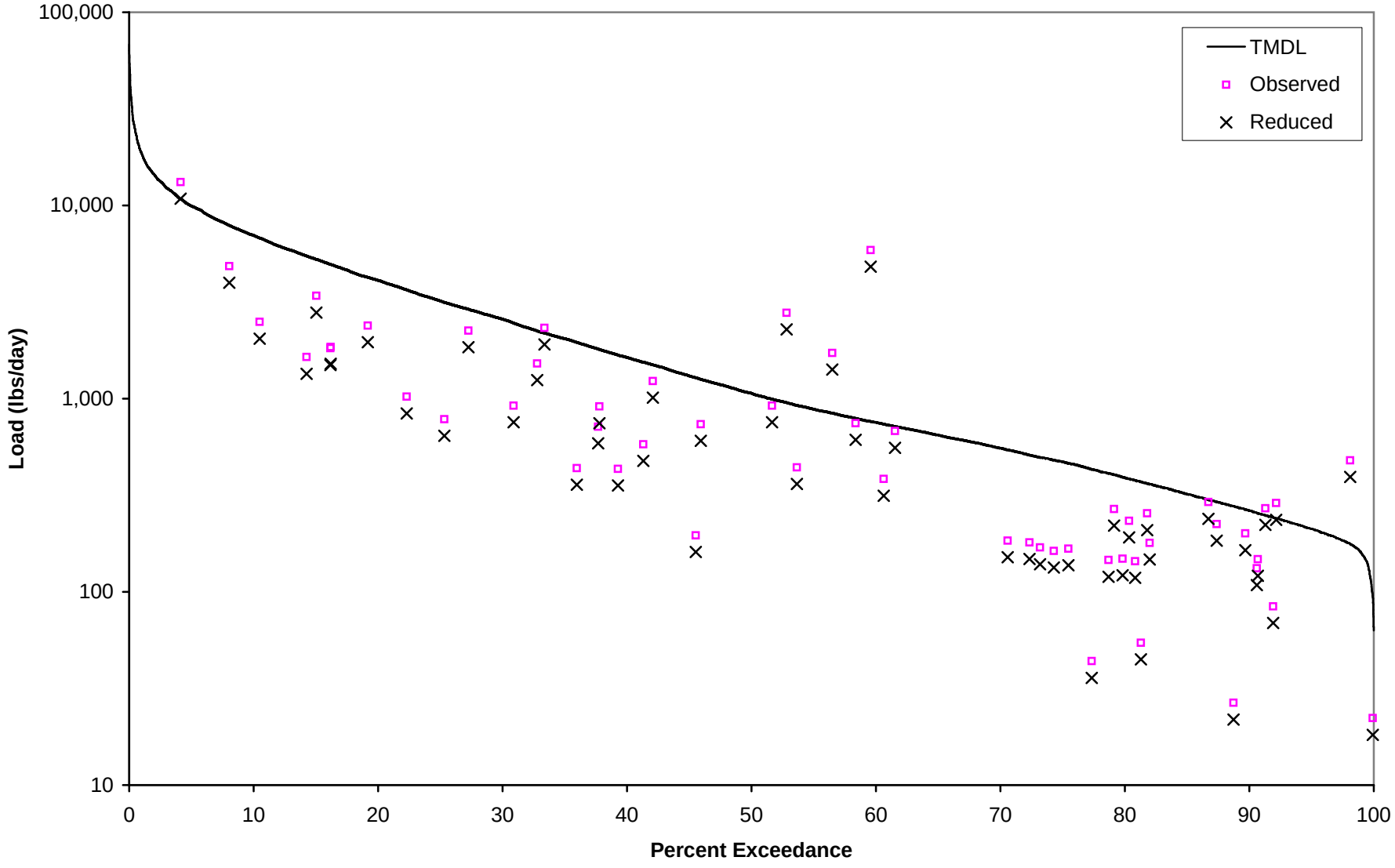

Figure H.3. Copper Load Duration Curve for Ouachita River (OUA0008B)

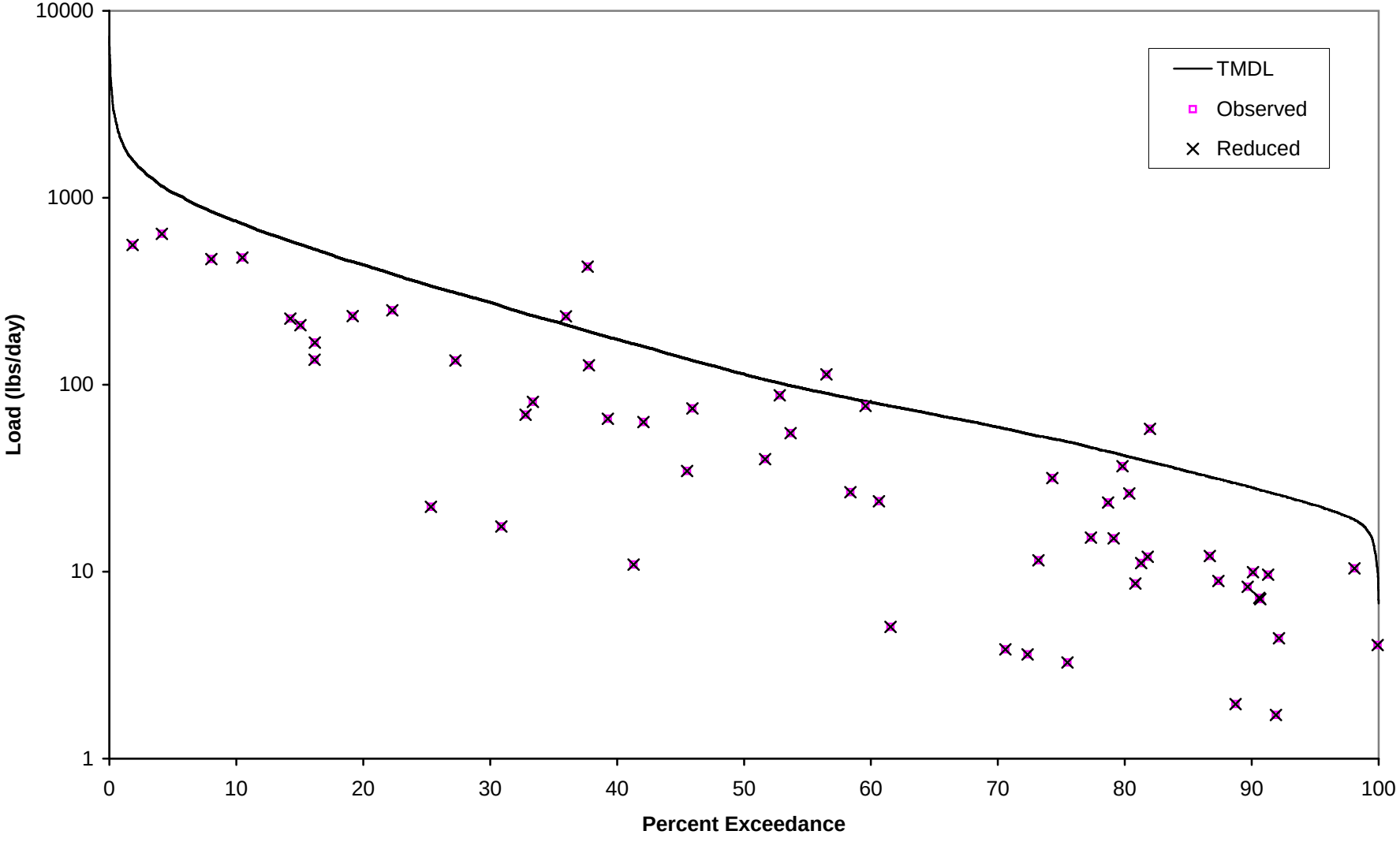

Table H.1. Estimated flow for downsream end of Ouachita River Reach 08040202-002.

Smackover Creek USGS gage DA =	385	mi^2
Ouachita Reach 002 DA =	10,886	mi^2
Ouachita River at Camden USGS gage DA =	5,357	mi^2
Saline River at Rye DA =	2,102	mi^2
Reach 002 minus the DA of Camden Gage and DA of Rye Gage =	3,427	mi^2

Date	07362100 Smackover Creek near Smackover (cfs)	Smackover Creek flow per unit area (cfs/mi^2)	Smackover flow/area times Reach 004 DA less Camden Gage DA less Rye Gage (cfs)	07362000 Ouachita River at Camden (cfs)	07363500 Saline River at Rye (cfs)	Estimated Flow of combined Camden Gage plus Rye Gage plus Smackover estimated (cfs)
10/1/1961	243.0	0.6	2,163.0	4,010.0	170.0	6,343.0
10/2/1961	706.0	1.8	6,284.3	3,840.0	183.0	10,307.3
10/3/1961	1,200.0	3.1	10,681.6	5,850.0	140.0	16,671.6
10/4/1961	2,180.0	5.7	19,404.8	7,900.0	150.0	27,454.8
10/5/1961	1,730.0	4.5	15,399.2	8,770.0	166.0	24,335.2
10/6/1961	1,290.0	3.4	11,482.7	6,920.0	164.0	18,566.7
10/7/1961	810.0	2.1	7,210.1	5,580.0	148.0	12,938.1
10/8/1961	255.0	0.7	2,269.8	4,640.0	135.0	7,044.8
Data between the dates 10/8/1961 and 12/4/2006 have been hidden for the sake of brevity.						
12/4/2006	9.5	0.0	84.6	2,120.0	787.0	2,991.6
12/5/2006	8.7	0.0	77.4	0.0	1,550.0	1,627.4
12/6/2006	8.1	0.0	72.1	1,290.0	1,870.0	3,232.1
12/7/2006	7.5	0.0	66.8	0.0	1,770.0	1,836.8
12/8/2006	6.7	0.0	59.6	0.0	1,290.0	1,349.6
12/9/2006	6.2	0.0	55.2	0.0	866.0	921.2
12/10/2006	5.9	0.0	52.5	2,270.0	668.0	2,990.5
12/11/2006	6.8	0.0	60.5	1,240.0	571.0	1,871.5

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TABLE H.2. ALLOWABLE LOAD FOR COPPER AND ZINC FOR OUACHITA RIVER 08040202-002

			3.8 ug/L = diss. Cu crit			35.5 ug/L = diss. Zn crit		
Est flow at DS end of 08040202-002 (cfs)	Percent exceed - ance	Width on plot between data points (unitless)	Cu TMDL load (lbs/day)	Cu TMDL - MOS load (lbs/day)	Cu Area under TMDL curve (width times allowable load) (lbs/day)	Zn TMDL load (lbs/day)	Zn TMDL - MOS load (lbs/day)	Zn Area under TMDL curve (width times allowable load) (lbs/day)
330	99.997%	0.0061	6.76	6.09	4.0973E-02	63.19	56.87	3.8277E-01
344	99.991%	0.0061	7.05	6.35	4.2711E-02	65.87	59.28	3.9901E-01
346	99.985%	0.0061	7.09	6.38	4.2959E-02	66.25	59.63	4.0133E-01
387	99.979%	0.0061	7.93	7.14	4.8050E-02	74.10	66.69	4.4889E-01
390	99.973%	0.0061	7.99	7.19	4.8422E-02	74.68	67.21	4.5237E-01
403	99.967%	0.0061	8.26	7.43	5.0037E-02	77.17	69.45	4.6745E-01
421	99.961%	0.0061	8.63	7.77	5.2271E-02	80.61	72.55	4.8833E-01
451	99.955%	0.0061	9.24	8.32	5.5996E-02	86.36	77.72	5.2312E-01
The rows between percent exceedances 99.954% and 0.045% are not shown for the sake of brevity.								
268,074	0.045%	0.0061	5,495	4,945	33.2841	51,331	46,198	310.9436
270,164	0.039%	0.0061	5,537	4,984	33.5436	51,731	46,558	313.3678
282,226	0.033%	0.0061	5,785	5,206	35.0412	54,040	48,636	327.3587
286,053	0.027%	0.0061	5,863	5,277	35.5164	54,773	49,296	331.7977
304,012	0.021%	0.0061	6,231	5,608	37.7462	58,212	52,391	352.6287
309,144	0.015%	0.0061	6,336	5,703	38.3834	59,195	53,275	358.5814
330,983	0.009%	0.0030	6,784	6,106	20.5474	63,376	57,039	191.9564
356,316	0.009%	0.0091	7,303	6,573	66.3604	68,227	61,404	619.9455
			Total area under TMDL curve for copper (lbs/day) =		28549.21	Total area under TMDL curve for zinc (lbs/day) =		266709.70
Explicit MOS (lbs/day) = TMDL × 10% =					2,854.9			26,671.0
WLA for point sources (lbs/day) (from Appendix J) =					0.0			0.0
LA for nonpoint sources (lbs/day) = TMDL - MOS - WLA =					25,694.3			240,038.7

TABLE H.3. PERCENT REDUCTION FOR Zn FOR OUACHITA RIVER 08040202-002

Zn Target = 35.5 ug/L
Explicit MOS (% of TMDL) = 10%
Zn Target reduced by MOS = 32.0 ug/L
Percent reduction = 18%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed Zn at OUA0008B (ug/L)	Est flow at DS end of 08040201-002 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load without MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
2/20/1996	12	2,847	70.58	184.27	151.10	545.14	490.63	Yes
3/12/1996	12.5	2,674	72.34	180.29	147.84	512.02	460.81	Yes
4/23/1996	8.8	16,497	25.32	783.03	642.09	3,158.83	2,842.95	Yes
5/21/1996	13.3	8,100	41.31	581.07	476.48	1,550.98	1,395.88	Yes
6/18/1996	12.8	2,422	75.47	167.22	137.12	463.76	417.39	Yes
7/16/1996	7.9	10,247	35.97	436.63	358.04	1,962.09	1,765.88	Yes
9/10/1996	17.6	1,890	81.99	179.42	147.12	361.90	325.71	Yes
11/19/1996	13.2	12,920	30.88	919.88	754.30	2,473.91	2,226.52	Yes
1/28/1997	13	35,563	10.48	2,493.65	2,044.79	6,809.57	6,128.61	Yes
3/11/1997	43.3	56,574	4.13	13,212.89	10,834.57	10,832.74	9,749.46	No
7/22/1998	27.2	1,530	87.38	224.47	184.06	292.96	263.67	Yes
9/1/1998	38.5	1,303	91.28	270.58	221.88	249.50	224.55	Yes
11/16/1998	18.4	3,866	60.63	383.68	314.62	740.26	666.23	Yes
1/26/1999	10.6	28,704	14.25	1,641.12	1,345.72	5,496.22	4,946.59	Yes
3/23/1999	22.9	27,551	15.04	3,403.03	2,790.49	5,275.44	4,747.90	Yes
5/25/1999	5.4	6,734	45.52	196.14	160.83	1,289.42	1,160.48	Yes
7/27/1999	23.5	2,117	79.13	268.34	220.04	405.36	364.83	Yes
9/21/1999	18.3	1,340	90.60	132.27	108.46	256.58	230.92	Yes
11/22/1999	20.5	1,335	90.68	147.61	121.04	255.62	230.06	Yes
1/25/2000	26.6	1,398	89.67	200.58	164.47	267.69	240.92	Yes
3/27/2000	9.1	8,825	39.27	433.16	355.19	1,689.80	1,520.82	Yes
5/30/2000	37.6	11,455	33.37	2,323.14	1,904.98	2,193.39	1,974.05	Yes
9/18/2000	3.4	1,452	88.73	26.63	21.83	278.03	250.22	Yes
12/19/2000	13	25,992	16.17	1,822.54	1,494.48	4,976.92	4,479.23	Yes
1/30/2001	13.2	25,974	16.20	1,849.29	1,516.42	4,973.48	4,476.13	Yes

Date	Observed Zn at OUA0008B (ug/L)	Est flow at DS end of 08040201-002 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load without MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
5/22/2001	17.9	9,428	37.78	910.26	746.41	1,805.26	1,624.74	Yes
7/24/2001	12	2,516	74.30	162.85	133.54	481.76	433.59	Yes
9/17/2001	21.5	2,013	80.35	233.44	191.42	385.45	346.90	Yes
11/19/2001	3.6	2,255	77.33	43.79	35.91	431.79	388.61	Yes
5/28/2002	20.7	6,602	45.93	737.12	604.44	1,264.14	1,137.73	Yes
7/23/2002	273	3,994	59.57	5,881.17	4,822.56	764.77	688.29	No
9/17/2002	24.8	1,904	81.80	254.69	208.85	364.58	328.12	Yes
11/5/2002	32.7	5,213	51.65	919.45	753.95	998.18	898.36	Yes
1/21/2003	72.5	4,411	56.49	1,724.92	1,414.43	844.61	760.15	No
3/25/2003	24	11,741	32.79	1,519.88	1,246.30	2,248.16	2,023.34	Yes
5/20/2003	27.4	15,216	27.26	2,248.77	1,843.99	2,913.55	2,622.19	Yes
7/15/2003	103	5,005	52.82	2,780.57	2,280.07	958.35	862.52	No
9/23/2003	95.9	927	98.10	479.50	393.19	177.50	159.75	No
11/11/2003	12.1	2,598	73.19	169.56	139.04	497.46	447.72	Yes
1/20/2004	33.5	3,760	61.53	679.40	557.11	719.96	647.97	Yes
3/16/2004	9.89	19,174	22.29	1,022.83	838.72	3,671.42	3,304.28	Yes
5/11/2004	29.1	7,852	42.07	1,232.44	1,010.60	1,503.49	1,353.14	Yes
7/20/2004	16.9	4,838	53.66	441.01	361.63	926.38	833.74	Yes
9/21/2004	12.6	2,149	78.69	146.05	119.76	411.49	370.34	Yes
11/30/2004	21.8	41,299	8.04	4,856.12	3,982.02	7,907.90	7,117.11	Yes
3/28/2005	19.9	22,273	19.16	2,390.70	1,960.37	4,264.81	3,838.33	Yes
5/23/2005	34.4	1,570	86.71	291.31	238.87	300.62	270.56	Yes
7/25/2005	13.5	1,978	80.82	144.03	118.10	378.75	340.87	Yes
9/27/2005	33.4	4,144	58.37	746.55	612.17	793.49	714.14	Yes
11/29/2005	42.5	1,256	92.15	287.92	236.09	240.50	216.45	No
1/17/2006	12.3	1,269	91.91	84.19	69.04	242.99	218.69	Yes
5/16/2006	14	9,470	37.68	715.11	586.39	1,813.31	1,631.98	Yes
7/25/2006	13.4	2,056	79.81	148.60	121.85	393.68	354.31	Yes
9/26/2006	5.2	1,944	81.29	54.52	44.71	372.24	335.01	Yes
11/28/2006	8.38	491	99.92	22.19	18.20	94.02	84.61	Yes

Total number of values of loads = 55

Table H3
Percent Reductions

Date	Observed Zn at OUA0008B (ug/L)	Est flow at DS end of 08040201-002 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load without MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
							Allowable % of exceedances of loads =	10%
							Allowable no. of exceedances of loads =	6
							No. of exceedances before reductions of loads =	12
							No. of exceedances after reductions of loads =	6

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Table H3
Percent Reductions

TABLE H.4. PERCENT REDUCTION FOR Cu FOR OUACHITA RIVER 08040202-002

Cu Target = 3.8 ug/L
Explicit MOS (% of TMDL) = 10%

Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Date	Observed Cu at OUA0008B (ug/L)	Est flow at DS end of 08040201-002 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
2/20/1996	0.25	2,847	70.58	3.84	3.84	58.35	52.52	Yes
3/12/1996	0.25	2,674	72.34	3.61	3.61	54.81	49.33	Yes
4/23/1996	0.25	16,497	25.32	22.25	22.25	338.13	304.32	Yes
5/21/1996	0.25	8,100	41.31	10.92	10.92	166.02	149.42	Yes
6/18/1996	0.25	2,422	75.47	3.27	3.27	49.64	44.68	Yes
7/16/1996	4.2	10,247	35.97	232.13	232.13	210.03	189.02	No
9/10/1996	5.7	1,890	81.99	58.11	58.11	38.74	34.86	No
11/19/1996	0.25	12,920	30.88	17.42	17.42	264.81	238.33	Yes
1/28/1997	2.5	35,563	10.48	479.55	479.55	728.91	656.02	Yes
3/11/1997	2.1	56,574	4.13	640.81	640.81	1,159.56	1,043.60	Yes
7/22/1998	1.08	1,530	87.38	8.91	8.91	31.36	28.22	Yes
9/1/1998	1.37	1,303	91.28	9.63	9.63	26.71	24.04	Yes
11/16/1998	1.14	3,866	60.63	23.77	23.77	79.24	71.32	Yes
1/26/1999	1.46	28,704	14.25	226.04	226.04	588.33	529.49	Yes
3/23/1999	1.4	27,551	15.04	208.05	208.05	564.70	508.23	Yes
5/25/1999	0.95	6,734	45.52	34.51	34.51	138.02	124.22	Yes
7/27/1999	1.32	2,117	79.13	15.07	15.07	43.39	39.05	Yes
9/21/1999	1	1,340	90.60	7.23	7.23	27.47	24.72	Yes
11/22/1999	0.99	1,335	90.68	7.13	7.13	27.36	24.63	Yes
1/25/2000	1.1	1,398	89.67	8.29	8.29	28.65	25.79	Yes
3/27/2000	1.38	8,825	39.27	65.69	65.69	180.88	162.79	Yes
5/30/2000	1.31	11,455	33.37	80.94	80.94	234.79	211.31	Yes
7/25/2000	1.34	1,373	90.10	9.92	9.92	28.14	25.33	Yes
9/18/2000	0.25	1,452	88.73	1.96	1.96	29.76	26.78	Yes
12/19/2000	0.97	25,992	16.17	135.99	135.99	532.74	479.47	Yes

Date	Observed Cu at OUA0008B (ug/L)	Est flow at DS end of 08040201-002 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/30/2001	1.2	25,974	16.20	168.12	168.12	532.37	479.14	Yes
5/22/2001	2.5	9,428	37.78	127.13	127.13	193.24	173.92	Yes
7/24/2001	2.332	2,516	74.30	31.65	31.65	51.57	46.41	Yes
9/17/2001	2.41	2,013	80.35	26.17	26.17	41.26	37.13	Yes
11/19/2001	1.25	2,255	77.33	15.20	15.20	46.22	41.60	Yes
3/26/2002	1.33	77,966	1.84	559.31	559.31	1,598.02	1,438.22	Yes
5/28/2002	2.1	6,602	45.93	74.78	74.78	135.32	121.79	Yes
7/23/2002	3.58	3,994	59.57	77.12	77.12	81.86	73.68	No
9/17/2002	1.17	1,904	81.80	12.02	12.02	39.03	35.12	Yes
11/5/2002	1.42	5,213	51.65	39.93	39.93	106.85	96.16	Yes
1/21/2003	4.78	4,411	56.49	113.73	113.73	90.41	81.37	No
3/25/2003	1.09	11,741	32.79	69.03	69.03	240.65	216.58	Yes
5/20/2003	1.64	15,216	27.26	134.60	134.60	311.87	280.69	Yes
7/15/2003	3.25	5,005	52.82	87.74	87.74	102.58	92.33	Yes
9/23/2003	2.08	927	98.10	10.40	10.40	19.00	17.10	Yes
11/11/2003	0.82	2,598	73.19	11.49	11.49	53.25	47.92	Yes
1/20/2004	0.25	3,760	61.53	5.07	5.07	77.07	69.36	Yes
3/16/2004	2.42	19,174	22.29	250.28	250.28	393.00	353.70	Yes
5/11/2004	1.49	7,852	42.07	63.10	63.10	160.94	144.84	Yes
7/20/2004	2.11	4,838	53.66	55.06	55.06	99.16	89.25	Yes
9/21/2004	2.02	2,149	78.69	23.41	23.41	44.05	39.64	Yes
11/30/2004	2.11	41,299	8.04	470.02	470.02	846.48	761.83	Yes
3/28/2005	1.94	22,273	19.16	233.06	233.06	456.52	410.86	Yes
5/23/2005	1.43	1,570	86.71	12.11	12.11	32.18	28.96	Yes
7/25/2005	0.81	1,978	80.82	8.64	8.64	40.54	36.49	Yes
9/27/2005	1.19	4,144	58.37	26.60	26.60	84.94	76.44	Yes
11/29/2005	0.65	1,256	92.15	4.40	4.40	25.74	23.17	Yes
1/17/2006	0.25	1,269	91.91	1.71	1.71	26.01	23.41	Yes
5/16/2006	8.38	9,470	37.68	428.04	428.04	194.10	174.69	No
7/25/2006	3.3	2,056	79.81	36.60	36.60	42.14	37.93	Yes
9/26/2006	1.06	1,944	81.29	11.11	11.11	39.84	35.86	Yes
11/28/2006	1.53	491	99.92	4.05	4.05	10.06	9.06	Yes

Table H4
Percent Reductions

Date	Observed Cu at OUA0008B (ug/L)	Est flow at DS end of 08040201-002 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?

Total number of values of loads =	57
Allowable % of exceedances of loads =	10%
Allowable no. of exceedances of loads =	6
No. of exceedances before reductions of loads =	5
No. of exceedances after reductions of loads =	5

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Table H4

Percent Reductions

APPENDIX I

TMDL Calculations for 08040201-004

Figure I.1. Flow duration curve for Ouachita Reach 08040201-004

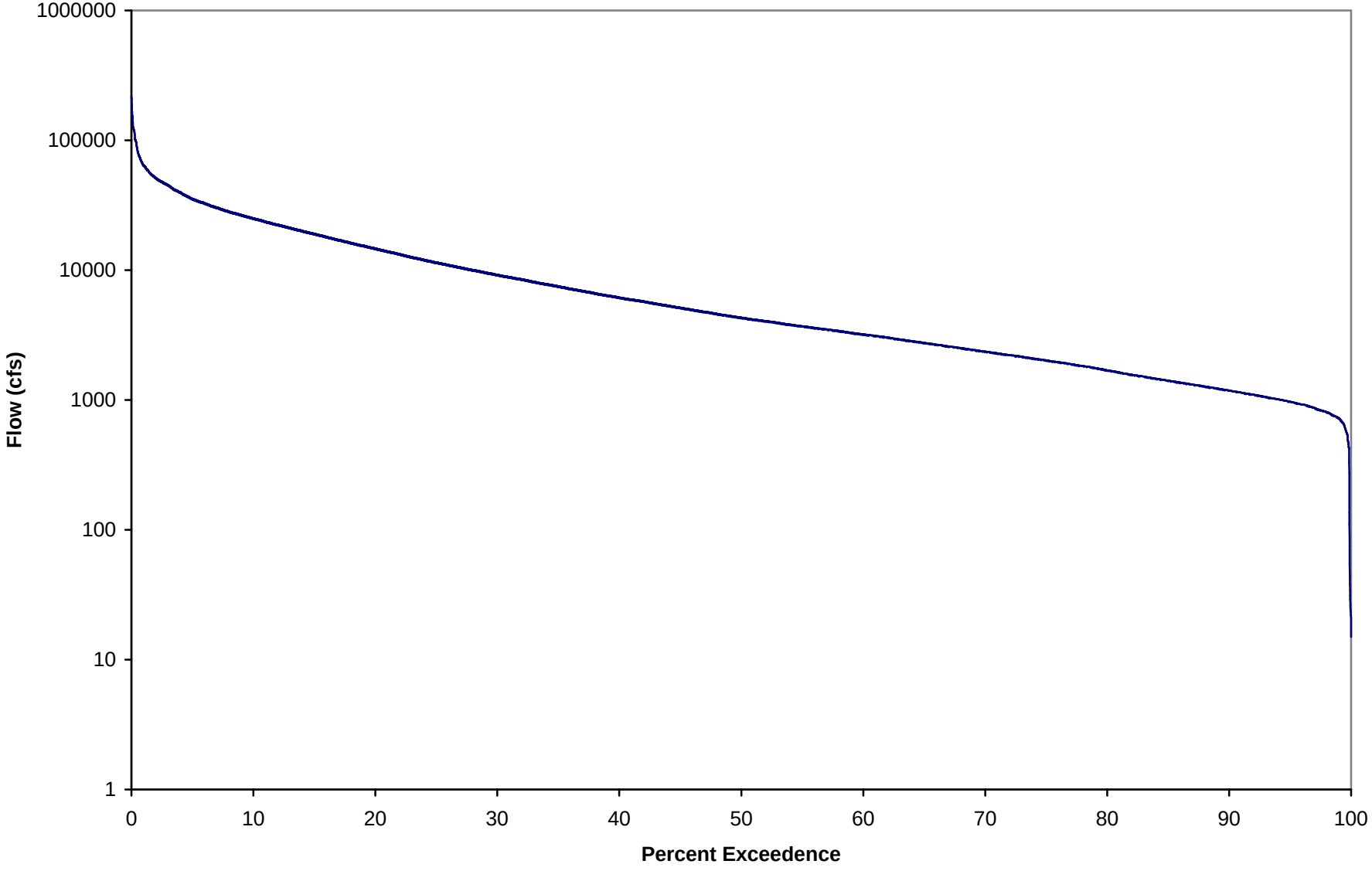

Figure I.2. Zinc Load Duration Curve for Ouachita River (08040201-004)

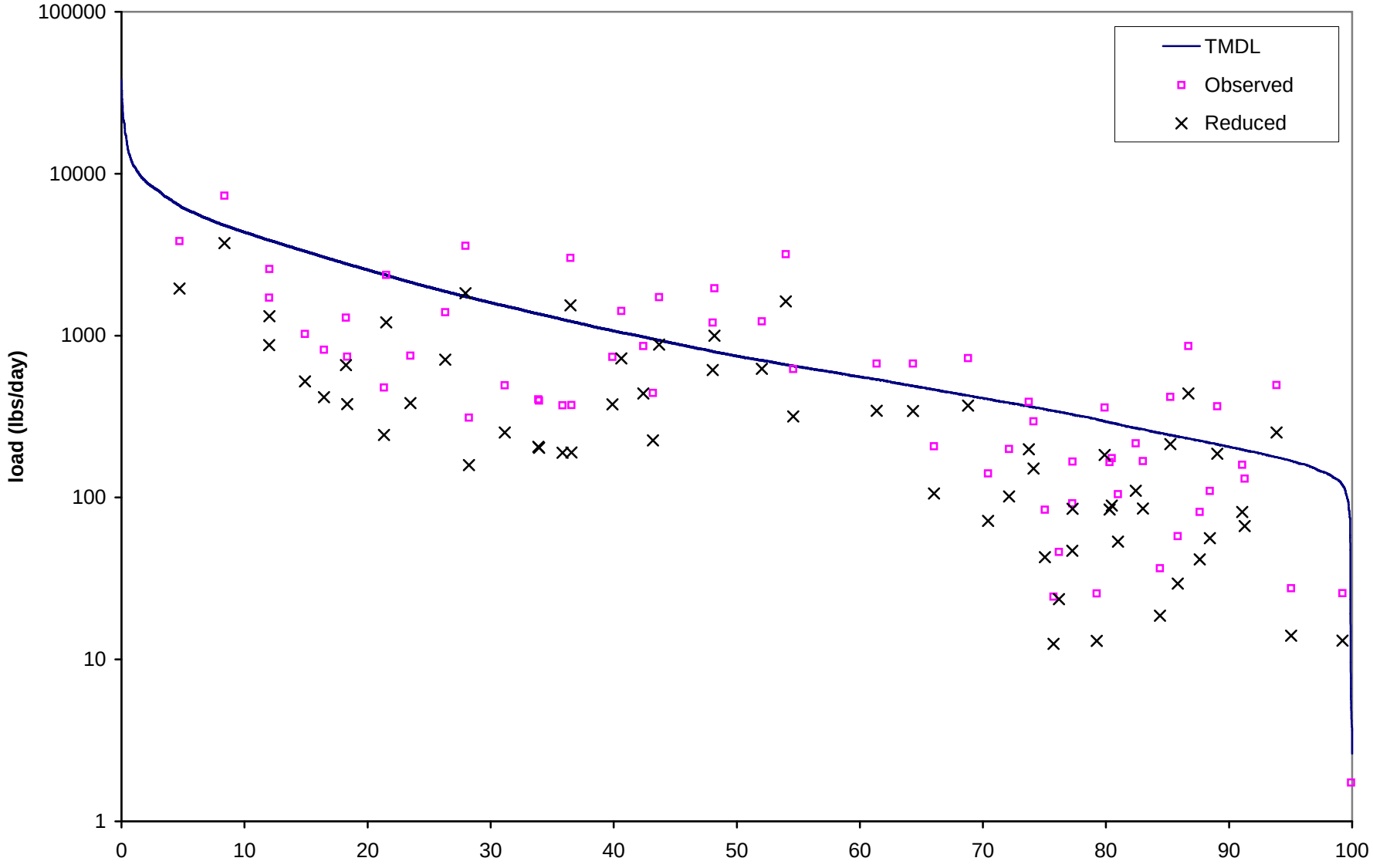

Figure I.3. Copper Load Duration Curve for Ouachita River (08040201-004)

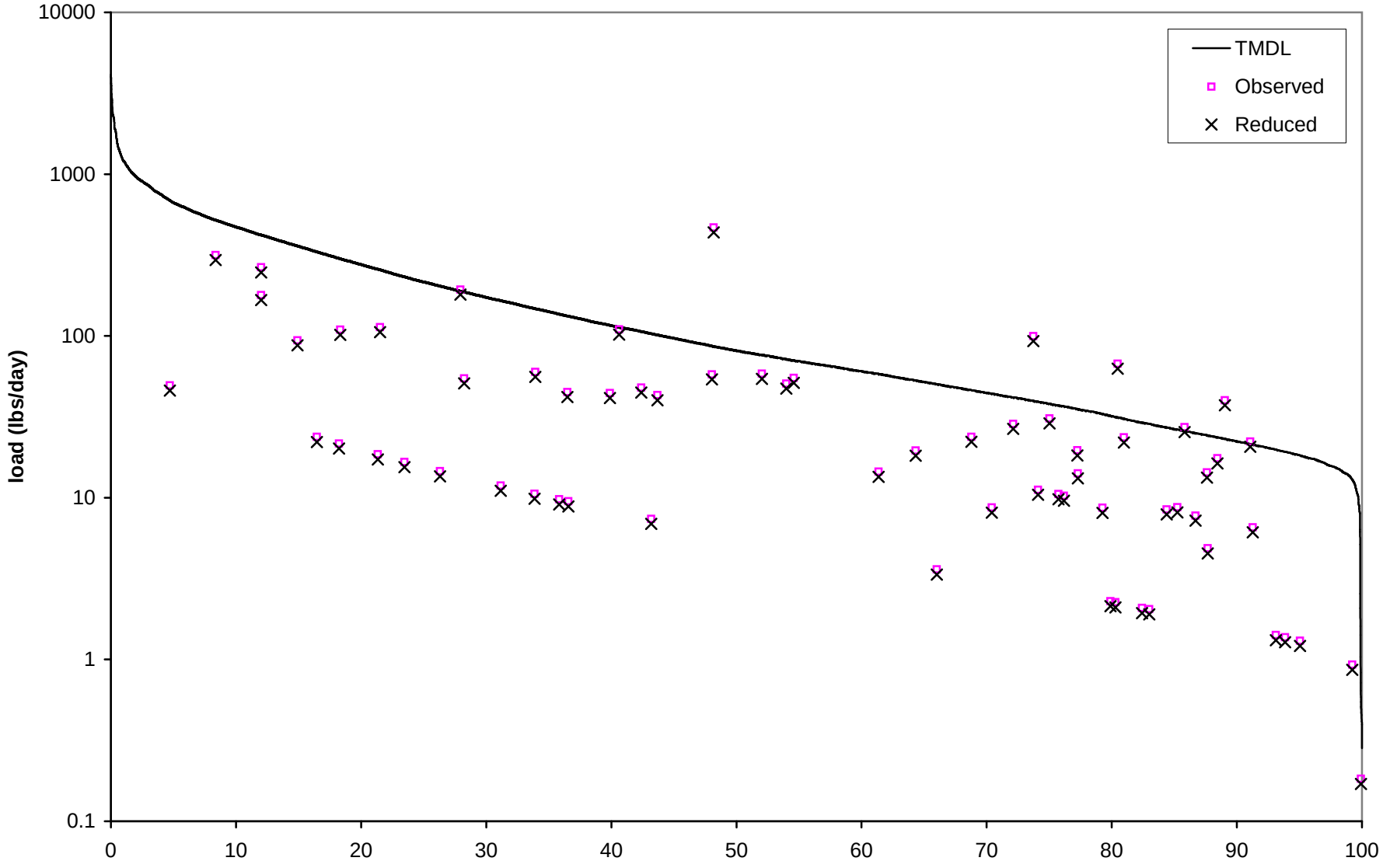

Table I.1. Flow Calculatations to estimate the flow at downstream end of the Ouachtia River (08040202-004).

Drainage Area Smackover Creek USGS gage =	385	mi^2
Drainage area for Ouachita River at Camden =	5,357	mi^2
Drainage area for Ouachita Reach 004 =	7,285	mi^2
Reach 004 minus the Drainage area of the USGS Gage at Camden	1,928	mi^2

Date	07362100 Smackover Creek near Smackover (cfs)	Smackover Creek flow per unit area (cfs/mi^2)	Smackover flow/area times Reach 004 DA minus Camden Gage DA (cfs)	07362000 Ouachita River at Camden, AR (cfs)	Estimated Flow of combined Camden Gage plus Smackover estimate (cfs)
11/5/2006	3	0.0	15.0	0	15
11/15/2006	4	0.0	21.0	0	21
11/14/2006	4	0.0	21.5	0	22
11/16/2006	5	0.0	24.0	0	24
11/20/2006	5	0.0	24.0	0	24
11/21/2006	5	0.0	24.0	0	24
11/22/2006	5	0.0	24.0	0	24
11/27/2006	5	0.0	24.0	0	24
Data for dates between 11/27/2006 and 6/12/1974 is hidden for the sake of brevity.					
6/12/1974	2,250	5.8	11,267.5	136,000	147,268
2/3/1969	4,230	11.0	21,183.0	137,000	158,183
12/30/1987	3,680	9.6	18,428.7	138,000	156,429
12/28/1987	17,100	44.4	85,633.2	133,000	218,633
5/18/1968	5,130	13.3	25,690.0	152,000	177,690
5/16/1968	1,490	3.9	7,461.6	158,000	165,462
12/29/1987	8,780	22.8	43,968.4	168,000	211,968
5/17/1968	2,080	5.4	10,416.2	182,000	192,416

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TABLE I.2. ALLOWABLE LOAD FOR COPPER AND ZINC FOR OUACHITA RIVER 08040202-004

			3.5 ug/L = diss. Cu crit.			32.3 ug/L = diss. Zn crit.		
Est flow at DS end of 08040202-004 (cfs)	Percent exceed- ance	Width on plot between data points (unitless)	Cu TMDL load (lbs/day)	Cu TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)	Zn TMDL load (lbs/day)	Zn TMDL - MOS load (lbs/day)	Area under TMDL curve (width times allowable load) (lbs/day)
15	99.997	0.006	0.28	0.25	1.715370E-05	2.61	2.35	1.583042E-04
21	99.991	0.006	0.40	0.36	2.401518E-05	3.66	3.29	2.216258E-04
22	99.985	0.012	0.42	0.37	5.031753E-05	3.83	3.45	4.643589E-04
24	99.967	0.020	0.45	0.41	8.919925E-05	4.18	3.76	8.231817E-04
25	99.945	0.015	0.47	0.42	7.147376E-05	4.36	3.92	6.596007E-04
26	99.936	0.008	0.49	0.44	3.716635E-05	4.53	4.08	3.429924E-04
27	99.930	0.006	0.51	0.46	3.087666E-05	4.70	4.23	2.849475E-04
29	99.924	0.006	0.55	0.49	3.316382E-05	5.05	4.55	3.060547E-04
The rows between percent exceedances 99.924% and 0.045% are not shown for the sake of brevity.								
166,817	0.045	0.006	3,149	2,834	1.907686E-01	29,063	26,156	1.760522E+00
177,690	0.039	0.006	3,354	3,019	2.032028E-01	30,957	27,861	1.875271E+00
187,146	0.033	0.006	3,533	3,180	2.140164E-01	32,604	29,344	1.975066E+00
192,416	0.027	0.006	3,632	3,269	2.200431E-01	33,523	30,170	2.030684E+00
193,358	0.021	0.006	3,650	3,285	2.211204E-01	33,687	30,318	2.040625E+00
208,475	0.015	0.006	3,936	3,542	2.384079E-01	36,320	32,688	2.200164E+00
211,968	0.009	0.006	4,002	3,601	2.424024E-01	36,929	33,236	2.237028E+00
218,633	0.003	0.006	4,127	3,715	2.500244E-01	38,090	34,281	2.307368E+00
			Total area under TMDL curve for copper (lbs/day) =		184.05	Total area under TMDL curve for zinc (lbs/day) =		1698.53
Explicit MOS (lbs/day) = TMDL × 10% =					18.4			169.9
WLA for point sources (lbs/day) (from Appendix J) =					0.0			2.4
LA for nonpoint sources (lbs/day) = TMDL - MOS - WLA =					165.7			1,526.2

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TABLE I.3. PERCENT REDUCTION FOR Zn FOR OUACHITA RIVER 08040202-004

Zn Target = 32.3 ug/L
Explicit MOS (% of TMDL) = 10%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Percent reduction = 49%

Date	Observed Zn at OUA0124B (ug/L)	Est flow at DS end of 08040201-004 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load without MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/10/1995	6.44	13756.00	21.34	477.83	243.69	2,396.56	2,156.90	Yes
2/14/1995	9.52	7852.00	33.87	403.19	205.63	1,367.97	1,231.17	Yes
3/28/1995	11.3	12332.00	23.47	751.63	383.33	2,148.47	1,933.62	Yes
4/25/1995	8.6	17614.00	16.46	817.05	416.70	3,068.69	2,761.82	Yes
5/23/1995	14.9	5495.00	43.18	441.62	225.23	957.33	861.60	Yes
6/20/1995	34.3	2105.00	73.72	389.44	198.61	366.73	330.06	Yes
7/17/1995	14.4	2670.00	66.03	207.38	105.76	465.16	418.65	Yes
8/8/1995	16.3	1250.00	88.44	109.90	56.05	217.77	196.00	Yes
10/17/1995	6.9	689.00	99.22	25.64	13.08	120.04	108.03	Yes
11/13/1995	7.8	1370.00	85.83	57.64	29.40	238.68	214.81	Yes
12/18/1995	20.5	1516.00	83.00	167.63	85.49	264.12	237.70	Yes
1/30/1996	25.9	1545.00	82.42	215.83	110.08	269.17	242.25	Yes
2/20/1996	16.7	2210.00	72.12	199.07	101.52	385.02	346.52	Yes
3/12/1996	18.3	1675.00	80.29	165.33	84.32	291.82	262.64	Yes
4/23/1996	10.4	8802.00	31.15	493.75	251.81	1,533.48	1,380.13	Yes
5/21/1996	9.5	7245.00	35.84	371.24	189.33	1,262.22	1,136.00	Yes
6/18/1996	39.2	1701.00	79.90	359.65	183.42	296.35	266.71	Yes
7/16/1996	9.8	7046.00	36.57	372.44	189.95	1,227.55	1,104.79	Yes
9/10/1996	19.5	1665.00	80.46	175.12	89.31	290.07	261.07	Yes
11/19/1996	23.9	10807.00	26.31	1,393.14	710.50	1,882.78	1,694.51	Yes
1/28/1997	21.4	22364.00	12.02	2,581.41	1,316.52	3,896.23	3,506.61	Yes
3/11/1997	19.4	36636.00	4.72	3,833.56	1,955.12	6,382.69	5,744.42	Yes
7/22/1998	55.6	1396.00	85.24	418.65	213.51	243.21	218.89	Yes
9/1/1998	55.3	1226.00	89.04	365.69	186.50	213.59	192.23	Yes
11/16/1998	44.3	2811.00	64.32	671.67	342.55	489.73	440.76	Yes
1/26/1999	14.2	22400.00	12.00	1,715.65	874.98	3,902.51	3,512.26	Yes

Date	Observed Zn at OUA0124B (ug/L)	Est flow at DS end of 08040201-004 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load without MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
3/23/1999	32.2	13647.00	21.51	2,370.21	1,208.81	2,377.57	2,139.81	Yes
5/25/1999	59.4	5395.00	43.68	1,728.51	881.54	939.91	845.92	No
7/27/1999	2.3	1971.00	75.74	24.45	12.47	343.39	309.05	Yes
9/21/1999	11.7	1290.00	87.62	81.41	41.52	224.74	202.27	Yes
11/22/1999	21.5	1126.00	91.28	130.58	66.59	196.17	176.55	Yes
1/25/2000	26	1137.00	91.06	159.45	81.32	198.09	178.28	Yes
3/27/2000	28.2	5663.00	42.39	861.37	439.30	986.60	887.94	Yes
5/30/2000	5.8	9941.00	28.24	310.99	158.61	1,731.91	1,558.72	Yes
9/18/2000	4.7	1440.00	84.39	36.51	18.62	250.88	225.79	Yes
12/19/2000	9.9	19158.00	14.91	1,023.01	521.73	3,337.69	3,003.92	Yes
1/30/2001	8.6	15958.00	18.33	740.24	377.52	2,780.19	2,502.17	Yes
5/22/2001	9.4	7832.00	33.93	397.09	202.52	1,364.48	1,228.03	Yes
7/24/2001	11.2	2330.00	70.42	140.76	71.79	405.93	365.34	Yes
9/17/2001	9.1	1875.00	77.26	92.03	46.94	326.66	293.99	Yes
11/19/2001	4.4	1945.00	76.19	46.16	23.54	338.86	304.97	Yes
5/28/2002	48.5	4602.00	48.04	1,203.87	613.98	801.76	721.58	Yes
9/17/2002	16.5	1874.00	77.29	166.78	85.06	326.49	293.84	Yes
11/5/2002	56	4051.00	52.03	1,223.61	624.04	705.76	635.19	Yes
1/21/2003	40.4	3086.00	61.37	672.47	342.96	537.64	483.88	Yes
3/25/2003	79.1	7068.00	36.49	3,015.55	1,537.93	1,231.38	1,108.24	No
5/20/2003	66	10054.00	27.95	3,579.12	1,825.35	1,751.60	1,576.44	No
7/15/2003	79.4	4570.00	48.19	1,957.18	998.16	796.18	716.56	No
11/11/2003	54.9	2450.00	68.79	725.49	370.00	426.84	384.15	Yes
5/11/2004	22.1	6186.00	39.89	737.39	376.07	1,077.72	969.95	Yes
7/20/2004	30.8	3741.00	54.58	621.49	316.96	651.75	586.58	Yes
9/21/2004	26.4	2077.00	74.11	295.76	150.84	361.85	325.67	Yes
11/30/2004	49	27660.00	8.37	7,310.40	3,728.31	4,818.90	4,337.01	Yes
3/28/2005	14.9	16039.00	18.24	1,289.01	657.40	2,794.30	2,514.87	Yes
5/23/2005	120	1330.00	86.69	860.85	439.03	231.71	208.54	No
7/26/2005	11.9	1632.00	80.98	104.75	53.42	284.33	255.89	Yes
9/27/2005	155	3811.00	53.99	3,186.13	1,624.93	663.95	597.55	No
11/29/2005	90.1	1018.00	93.85	494.73	252.31	177.35	159.62	No

Table I3
Percent Reductions

Date	Observed Zn at OUA0124B (ug/L)	Est flow at DS end of 08040201-004 (cfs)	Percent exceedance for flow on sampling day	Current Zn load (lbs/day)	Reduced Zn load (lbs/day)	Allowable Zn load without MOS incorporated (lbs/day)	Allowable Zn load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/17/2006	5.27	967.00	95.04	27.49	14.02	168.47	151.62	Yes
5/16/2006	43.7	6015.00	40.62	1,417.78	723.07	1,047.93	943.13	Yes
7/25/2006	7.71	2018.00	75.03	83.92	42.80	351.57	316.42	Yes
9/26/2006	2.71	1747.00	79.26	25.54	13.02	304.36	273.92	Yes
11/28/2006	11.1	29.00	99.92	1.74	0.89	5.05	4.55	Yes

Total number of values =	63
Allowable % of exceedances =	10%
Allowable no. of exceedances =	7
No. of exceedances before reductions =	20
No. of exceedances after reductions =	7

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Table I3

Percent Reductions

TABLE I.4. PERCENT REDUCTION FOR Cu FOR OUACHITA RIVER 08040202-004

Cu Target = 3.5 ug/L
Explicit MOS (% of TMDL) = 10%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Percent reduction = 7%

Date	Observed Cu at OUA0124B (ug/L)	Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/10/1995	0.25	13,756	21.34	18.55	17.25	259.69	233.72	Yes
2/14/1995	0.25	7,852	33.87	10.59	9.85	148.23	133.41	Yes
3/28/1995	0.25	12,332	23.47	16.63	15.46	232.81	209.53	Yes
4/25/1995	0.25	17,614	16.46	23.75	22.09	332.52	299.27	Yes
5/23/1995	0.25	5,495	43.18	7.41	6.89	103.74	93.36	Yes
6/20/1995	8.79	2,105	73.72	99.80	92.81	39.74	35.76	No
7/17/1995	0.25	2,670	66.03	3.60	3.35	50.40	45.36	Yes
8/8/1995	2.6	1,250	88.44	17.53	16.30	23.60	21.24	Yes
9/19/1995	0.25	1,050	93.11	1.42	1.32	19.82	17.84	Yes
10/17/1995	0.25	689	99.22	0.93	0.86	13.01	11.71	Yes
11/13/1995	3.7	1,370	85.83	27.34	25.43	25.86	23.28	No
12/18/1995	0.25	1,516	83.00	2.04	1.90	28.62	25.76	Yes
1/30/1996	0.25	1,545	82.42	2.08	1.94	29.17	26.25	Yes
2/20/1996	2.4	2,210	72.12	28.61	26.61	41.72	37.55	Yes
3/12/1996	0.25	1,675	80.29	2.26	2.10	31.62	28.46	Yes
4/23/1996	0.25	8,802	31.15	11.87	11.04	166.17	149.55	Yes
5/21/1996	0.25	7,245	35.84	9.77	9.09	136.77	123.10	Yes
6/18/1996	0.25	1,701	79.90	2.29	2.13	32.11	28.90	Yes
7/16/1996	0.25	7,046	36.57	9.50	8.84	133.02	119.71	Yes
9/10/1996	7.5	1,665	80.46	67.35	62.64	31.43	28.29	No
11/19/1996	0.25	10,807	26.31	14.57	13.55	204.02	183.62	Yes
1/28/1997	2.2	22,364	12.02	265.38	246.80	422.19	379.97	Yes
3/11/1997	0.25	36,636	4.72	49.40	45.94	691.62	622.46	Yes
7/22/1998	1.16	1,396	85.24	8.73	8.12	26.35	23.72	Yes
9/1/1998	6.06	1,226	89.04	40.07	37.27	23.14	20.83	No
11/16/1998	1.29	2,811	64.32	19.56	18.19	53.07	47.76	Yes

Date	Observed Cu at OUA0124B (ug/L)	Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
1/26/1999	1.48	22,400	12.00	178.81	166.30	422.87	380.58	Yes
3/23/1999	1.54	13,647	21.51	113.36	105.42	257.63	231.87	Yes
5/25/1999	1.48	5,395	43.68	43.07	40.05	101.85	91.66	Yes
7/27/1999	0.99	1,971	75.74	10.52	9.79	37.21	33.49	Yes
9/21/1999	2.06	1,290	87.62	14.33	13.33	24.35	21.92	Yes
11/22/1999	1.08	1,126	91.28	6.56	6.10	21.26	19.13	Yes
1/25/2000	3.62	1,137	91.06	22.20	20.65	21.46	19.32	No
3/27/2000	1.57	5,663	42.39	47.96	44.60	106.91	96.22	Yes
5/30/2000	1.02	9,941	28.24	54.69	50.86	187.67	168.90	Yes
7/25/2000	0.7	1,289	87.67	4.87	4.53	24.33	21.90	Yes
9/18/2000	1.09	1,440	84.39	8.47	7.87	27.18	24.47	Yes
12/19/2000	0.91	19,158	14.91	94.03	87.45	361.67	325.50	Yes
1/30/2001	1.27	15,958	18.33	109.31	101.66	301.26	271.13	Yes
5/22/2001	1.42	7,832	33.93	59.99	55.79	147.85	133.07	Yes
7/24/2001	0.6918	2,330	70.42	8.69	8.09	43.99	39.59	Yes
9/17/2001	1.94	1,875	77.26	19.62	18.25	35.40	31.86	Yes
11/19/2001	0.98	1,945	76.19	10.28	9.56	36.72	33.05	Yes
5/28/2002	2.33	4,602	48.04	57.84	53.79	86.88	78.19	Yes
9/17/2002	1.4	1,874	77.29	14.15	13.16	35.38	31.84	Yes
11/5/2002	2.67	4,051	52.03	58.34	54.26	76.48	68.83	Yes
1/21/2003	0.87	3,086	61.37	14.48	13.47	58.26	52.43	Yes
3/25/2003	1.18	7,068	36.49	44.99	41.84	133.43	120.09	Yes
5/20/2003	3.57	10,054	27.95	193.60	180.05	189.80	170.82	No
7/15/2003	19	4,570	48.19	468.34	435.56	86.27	77.65	No
11/11/2003	1.8	2,450	68.79	23.79	22.12	46.25	41.63	Yes
5/11/2004	1.33	6,186	39.89	44.38	41.27	116.78	105.10	Yes
7/20/2004	2.73	3,741	54.58	55.09	51.23	70.62	63.56	Yes
9/21/2004	1	2,077	74.11	11.20	10.42	39.21	35.29	Yes
11/30/2004	2.12	27,660	8.37	316.29	294.15	522.17	469.95	Yes
3/28/2005	0.25	16,039	18.24	21.63	20.11	302.79	272.51	Yes
5/23/2005	1.08	1,330	86.69	7.75	7.21	25.11	22.60	Yes
7/26/2005	2.68	1,632	80.98	23.59	21.94	30.81	27.73	Yes

Table I4
Percent Reductions

Date	Observed Cu at OUA0124B (ug/L)	Est flow at DS end of 08040201-005 (cfs)	Percent exceedance for flow on sampling day	Current Cu load (lbs/day)	Reduced Cu load (lbs/day)	Allowable Cu load without MOS incorporated (lbs/day)	Allowable Cu load with MOS incorporated (lbs/day)	Reduced load less than or equal to allow. load?
9/27/2005	2.47	3,811	53.99	50.77	47.22	71.94	64.75	Yes
11/29/2005	0.25	1,018	93.85	1.37	1.28	19.22	17.30	Yes
1/17/2006	0.25	967	95.04	1.30	1.21	18.26	16.43	Yes
5/16/2006	3.38	6,015	40.62	109.66	101.98	113.55	102.20	Yes
7/25/2006	2.84	2,018	75.03	30.91	28.75	38.10	34.29	Yes
9/26/2006	0.92	1,747	79.26	8.67	8.06	32.98	29.68	Yes
11/28/2006	1.17	29	99.92	0.18	0.17	0.55	0.49	Yes

Total number of values =	65
Allowable % of exceedances =	10%
Allowable no. of exceedances =	7
No. of exceedances before reductions =	8
No. of exceedances after reductions =	7

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Table I4

Percent Reductions

APPENDIX J

Wasteload Allocations for TMDLs

Table J.1. Dissolved zinc WLAs for impaired reaches.

Permit	Company	Facility Type	Outfall	Flow (MGD)	Impaired Receiving Waterbody	Effluent Conc. (ug/L)		WLA (lbs/day)
						Total zinc	Dissolved zinc	Dissolved Zinc
AR0000752	EL DORADO CHEMICAL CO, INC	NITROGEN FERTILIZERS	001	1.845	ELCC trib 606	115.62	37.48	0.577
			002	0.5	ELCC trib 606	115.62	37.48	0.156
			004	--	ELCC trib 606	115.62	37.48	--
			005	0.002	ELCC trib 606	115.62	37.48	0.001
			006	0.028	ELCC trib 606	115.62	37.48	0.009
			007	0.046	ELCC trib 606	115.62	37.48	0.014
AR0034363	SHUMAKER PUBLIC SERVICE CORP	COMBINATION UTILITIES, NEC		1.5	Ouachita -005	120.56	39.09	0.489
AR0049140	UNION POWER PARTNERS, LP-UNION	ELECTRICAL SERVICES	01C	0.9	Ouachita -004	1000	324.20	2.435

Total for reach 08040201-606 (ELCC Tributary) = 0.757
Total for reach 08040201-005 (Ouachita River) = 0.489
Total for reach 08040201-004 (Ouachita River) = 2.435

Notes:

A. ELCC Outfall 001 flow (1.845 MGD) was taken from Statement of Basis for 2004 modified permit

B. ELCC Outfall 002 flow (0.50 MGD) is maximum 30-day average flow as specified in Form 2C of Dec. 2006 application

C. ELCC Outfall 004's flow was set to zero because modifications made to the facility in 2006 have made any release from this outfall unlikely except in case of very large storm events.

D. ELCC Outfall 005 flow (0.002 MGD) was the outfall drainage area (1 acre) times the annual rainfall (51.8 in) times 0.6 (60% of rainfall becomes runoff)

E. ELCC Outfall 006 flow (0.028 MGD) was the outfall drainage area (12 acres) times the annual rainfall (51.8 in) times 0.6 (60% of rainfall becomes runoff)

F. ELCC Outfall 007 flow (0.046 MGD) was the outfall drainage area (20 acres) times the annual rainfall (51.8 in) times 0.6 (60% of rainfall becomes runoff)

G. Union Power Outfall 01C flow (0.90 MGD) was back-calculated from mass limit (7.5 lbs/day) and conc. limit (1 mg/L) for total zinc in current permit

H. Total zinc concentrations are monthly average limits from current permits.

I. Dissolved zinc concentrations are calculated as total concentrations multiplied times 0.3242, which is the ratio of dissolved to total zinc based on equations in the CPP and a TSS value of 5.5 mg/L for the Gulf Coastal ecoregion.

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Table J.2. Dissolved copper WLAs for impaired reaches.

Permit	Company	Facility Type	Outfall	Flow (MGD)	Impaired Receiving Waterbody	Effluent Conc. (ug/L)		WLA (lbs/day)
						Total copper	Dissolved copper	Dissolved copper
AR0000752	EL DORADO CHEMICAL CO, INC	NITROGEN FERTILIZERS	001	1.845	ELCC Trib -606	12.2	4.66	0.072
			002	0.5	ELCC Trib -606	12.2	4.66	0.019
AR0034363	SHUMAKER PUBLIC SERVICE CORP	COMBINATION UTILITIES, NEC		1.5	Ouachita -005	13.26	5.06	0.063
AR0000841	ARKANSAS ELECTRIC COOP-MCCLELL	ELECTRICAL SERVICES	001	99.6	Ouachita -005	12.5	4.77	3.965

Total for reach 08040201-606 (ELCC Tributary) = 0.091
Total for reach 08040201-005 (Ouachita River) = 4.028

Notes:
A. ELCC Outfall 001 flow (1.845 MGD) was taken from Statement of Basis for 2004 modified permit

B. ELCC Outfall 002 flow (0.50 MGD) is maximum 30-day average flow as specified in Form 2C of Dec. 2006 application

C. Arkansas Electric flow (99.6 MGD) is from Statement of Basis in current permit. This discharge is once-through non-contact cooling water.

D. Total copper concentrations are monthly average limits from current permits.

E. Dissolved copper concentrations are calculated as total concentrations multiplied times 0.3817, which is the ratio of dissolved to total copper based on equations in the CPP and a TSS value of 5.5 mg/L for the Gulf Coastal ecoregion.

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Table J.3. Nitrate WLAs for El Dorado Chemical Company Tributary (Reach 08040201-606).

Permit	Company	Facility Type	Outfall	Flow (MGD)	Nitrate Conc. (mg/L)	Nitrate Load (lbs/day)
AR0000752	EL DORADO CHEMICAL CO, INC	NITROGEN FERTILIZERS	001	1.845	10	154.0
			002	0.50	10	41.7
			003	0.017	10	1.4
			005	0.002	10	0.2
			006	0.028	10	2.3
			007	0.046	10	3.8
AR0035653	NORPHLET, CITY OF	SEWERAGE SYSTEMS		0.18	10	15.0
AR0044733	CEDARWOOD LEISURE PARK, LLC	OPER OF RES MOBILE HOME SITES		0.031	10	2.6
					Total =	221.0

Notes:

A. ELCC Outfall 001 flow (1.845 MGD) was taken from Statement of Basis for 2004 modified permit

B. ELCC Outfall 002 flow (0.50 MGD) is maximum 30-day average flow as specified in Form 2C of Dec. 2006 application

C. ELCC Outfall 003 flow (0.017 MGD) was taken from Statement of Basis for 2004 modified permit

D. ELCC Outfall 005 flow (0.002 MGD) was the outfall drainage area (1 acre) times the annual rainfall (51.8 in) times 0.6 (60% of rainfall becomes runoff)

E. ELCC Outfall 006 flow (0.028 MGD) was the outfall drainage area (12 acres) times the annual rainfall (51.8 in) times 0.6 (60% of rainfall becomes runoff)

F. ELCC Outfall 007 flow (0.046 MGD) was the outfall drainage area (20 acres) times the annual rainfall (51.8 in) times 0.6 (60% of rainfall becomes runoff)

G. ELCC Outfalls 001 and 002 have monthly average limit of 26.3 mg/L, but this limit is not a water quality based limit to protect the drinking water designated use. Monthly average permit limit of 10 mg/L is needed to maintain instream target conc. (10 mg/L).

H. ELCC Outfall 003 (domestic wastewater) has no permit limit for nitrate. A conc. of 10 mg/L was used here to maintain the instream target concentration because this outfall is expected to discharge under 7Q10 conditions with no upstream dilution water.

I. ELCC Outfalls 005, 006, and 007 (stormwater) have no permit limits for nitrate. An effluent conc. of 10 mg/L (assuming no dilution) was used here because other limits for these outfalls (toxicity and zinc) were based on no upstream dilution water.

J. City of Norphlet and Cedarwood Leisure Park do not have nitrate limits. A conc. of 10 mg/L was used here to maintain the instream target concentration because these facilities are expected to discharge under 7Q10 conditions with no upstream dilution water.

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