Appendix A

Supplemental Lake Water Sampling Data (1999 and 2001)

Appendix A1

Sampling Locations (1999)

Table A-1. Locations of Supplemental Lake Water Sampling Stations in 1999

Location	Latitude Degrees	Latitude Minutes	Latitude Seconds	Longitude Degrees	Longitude Minutes	Longitude Seconds
W1	43	4	41.833	76	11	50.6487
W2	43	6	3.7046	76	13	55.7469
W12	43	6	54.879	76	14	32.6947
W50	43	4	3.6346	76	11	55.0259
W51	43	4	25.27	76	12	20.3824
W52	43	5	2.5396	76	12	48.5888
W53	43	5	23.038	76	13	32.1143
W54	43	6	28.425	76	14	40.2886
W55	43	3	49.133	76	11	10.8281
W56	43	6	49.716	76	14	2.8697
W57	43	5	58.181	76	12	37.856
W58	43	5	0.8122	76	11	17.1899

Source: Exponent, 2001c

Appendix A2

Field Parameters (1999)

Table A-2. 1999 Onondaga Lake Water Sampling Field Parameters

Station	Depth (m)	Date	pH (S.U.)	Dissolved Oxygen (mg/L)	Temperature (°C)	Turbidity (NTU)	Conductivity (mS/cm)	ORP (mV)	Specific Conductivity (mS/cm)	Sample Number	Duplicate Sample
W1	0	09/27/99	8.5	10.1	18	1	13	149.7		LW0001	
W1	3	09/27/99	8.42	10.5	19	1	2.3	162		LW0002	
W1	6	09/27/99	8.6	10.7	19	NR	2.3	148.5		LW0003	
W1	9	09/27/99	8.36	11.1	18	NR	2.4	166.4		LW0004	
W1	12	09/27/99	NR	13.5	14	1	2.4	–282		LW0005	
W1	15	09/27/99	NR	14.3	10	1	2.4	–260		LW0006	
W1	17.5	09/27/99	NR	16.9	8	3	2.4	–249		LW0007	
W12	0.9	09/28/99	7.78	9.1	19.1	–10	2.21	NR		no sample	
W12	2	09/28/99	7.9	9.82	19.1	–10	2.22	104.8		LW0015	LW0016
W12	2.9	09/28/99	7.72	9.3	19	–10	2.23			no sample	
W12	5.5	09/28/99	NR	NR	18.8	–10	2.21	NR		no sample	
W2	0	09/27/99	6.94	10.5	17	1	2.3	252.8		LW0008	
W2	3	09/27/99	6.82	9.9	20	9	2.2	258.2		LW0009	
W2	6	09/27/99	7.04	10	21	8	2.2	246.5		LW0010	
W2	9	09/27/99	7.25	11.4	19	7	2.2	235.5		LW0011	
W2	12	09/27/99	13.3	13	16	7	2.4	–165		LW0012	
W2	15	09/27/99	9.5	13	16	1	2.4	100.1		LW0013	
W2	18	09/27/99	NR	13.6	15	1	2.3	–276.2		LW0014	
W50	0.75	09/28/99	8.18	8.64	20.5	–10	2.2	93.7		LW0022	
W51	0.6	09/28/99	8.11	8.19	19	–10	2.21	95.9		LW0021	
W52	0.6	09/28/99	8.29	10.45	19.5	–10	2.22	101.3		LW0020	
W53	0.6	09/28/99	8.3	10.32	20	–10	2.23	118		LW0019	LW0026
W54	0.1	09/28/99	7.85	10.88	21.1	–10	2.21	107		LW0017	
W55	0.6	09/28/99	8.05	7.68	18.8	1	2.18	96.8		LW0023	
W56	0.5	09/28/99	8.11	8.62	19.6	–10	2.23	137.7		LW0018	
W57	0.5	09/28/99	8.36	11.48	21.3	–10	2.21	128		LW0025	
W58	0.7	09/28/99	8.32	11.65	21.6	–10	2.21	92.9		LW0024	
W12	1	10/14/99	7.49	3.35	14	13.5	1.821	19.1	2,304	LW0042	
W12	3	10/14/99	7.49	3.54	13.98	10.6	1.818	10.3	2,303	LW0043	
W1	0	10/15/99	7.75	6.86	14.45	–4.5	1.809	–5.6	2,266	LW0028	
W1	3	10/15/99	7.71	6.39	14.2	–4.4	1.796	9.3	2,262	LW0029	
W1	6	10/15/99	7.72	6.27	14.19	–4.5	1.794	16.3	2,261	LW0030	
W1	9	10/15/99	6.87	7.62	14.3	–10	2.37	NR		LW0031	LW0027
W1	12	10/15/99	7.24	4.65	14.2	–10	2.33	NR		LW0032	
W1	15	10/15/99	7.26	3	13.9	–10	2.37	NR		LW0033	
W1	18	10/15/99	7.22	2.3	13.2	–10	2.47	NR		LW0034	
W2	0	10/15/99	7.66	5.62	14.13	–0.5	1.81	57	2,284	LW0035	

Table A-2. (cont.)

Station	Depth (m)	Date	pH (S.U.)	Dissolved Oxygen (mg/L)	Temperature (°C)	Turbidity (NTU)	Conductivity (mS/cm)	ORP (mV)	Specific Conductivity (mS/cm)	Sample Number	Duplicate Sample
W2	3	10/15/99	7.65	5.48	14.13	–4.8	1.808	58.7	2,281	LW0036	
W2	6	10/15/99	7.64	5.22	14.13	–4.6	1.807	59.8	2,279	LW0037	
W2	9	10/15/99	7.64	5.14	14.12	–4.3	1.806	60.9	2,282	LW0038	
W2	12	10/15/99	7.61	5.12	14.11	–4.6	1.807	62.3	2,282	LW0039	
W2	15	10/15/99	7.56	3.55	13.9	2.8	1.8	–144.1	2,284	LW0040	
W2	18	10/15/99	7.32	0.59	11.92	38.1	1.826	–265.1	2,412	LW0041	
W2	0	10/25/99	7.48	7.22	12.48	6.9	1.764	35.5	2,317	LW0052	
W2	3	10/25/99	7.63	6.31	12.52	6.9	1.764	40.4	2,317	LW0053	
W2	6	10/25/99	7.65	5.89	12.52	6.3	1.764	43.1	2,316	LW0054	
W2	9	10/25/99	7.64	6.42	12.52	6.5	1.761	44.4	2,317	LW0055	
W2	12	10/25/99	7.65	5.94	12.51	6.3	1.762	45.4	2,312	LW0056	
W2	15	10/25/99	7.65	6.43	12.5	6.2	1.765	46.1	2,314	LW0057	
W2	18	10/25/99	7.63	5.76	12.47	10.9	1.767	–33.3	2,326	LW0058	
W1	0	10/25/99	7.73	7.18	12.52	5.9	1.776	13.3	2,333	LW0044	
W1	3	10/25/99	7.71	7.19	12.48	6.4	1.774	19.4	2,332	LW0045	
W1	6	10/25/99	7.7	6.07	12.45	6.1	1.772	24.6	2,329	LW0046	
W1	9	10/25/99	7.69	6.02	12.44	8	1.77	28.4	2,327	LW0047	LW0051
W1	12	10/25/99	7.68	6.32	12.4	6.3	1.767	31.3	2,325	LW0048	
W1	15	10/25/99	7.68	5.86	12.4	6.2	1.765	33.5	2,324	LW0049	
W1	18	10/25/99	7.67	5.56	12.27	7.5	1.757	34.9	2,321	LW0050	
W58	0	10/25/99	7.7	7.34	11.23	9.7	1.615	39.5	2,190	LW0061	
W54	0	10/25/99	7.74	5.95	12.2	7.2	1.76	28.6	2,330	LW0060	
W52	0	10/25/99	7.8	6.99	12.1	7.5	1.779	30.5	2,359	LW0059	
W12	1	10/26/99	7.81	6.54	12.03	7.6	1.749	66.3	2,325	no sample	
W12	2	10/26/99	7.78	6.05	12.04	7.3	1.751	58.6	2,327	LW0062	
W12	3	10/26/99	7.77	5.91	12.04	7	1.752	53.5	2,329	no sample	
W12	4	10/26/99	7.76	5.83	12.05	7.2	1.753	49.9	2,328	no sample	
W12	5	10/26/99	7.75	5.8	12.04	7.2	1.75	47.1	2,327	no sample	
W12	6	10/26/99	7.75	5.8	12.04	46.7	1.752	44.2	2,328	no sample	
W1	0	11/09/99	7.3	9.5	10.83	8	1.729	155.2	2,371	LW0063	
W1	3	11/09/99	7.79	8.7	10.82	9	1.734	107.4	2,378	LW0064	
W1	6	11/09/99	7.81	8.43	10.8	8	1.734	93.3	2,379	LW0065	
W1	9	11/09/99	7.81	8.56	10.78	7.6	1.734	76.3	2,382	LW0066	
W1	12	11/09/99	7.81	8.55	10.77	7.4	1.736	73.3	2,392	LW0067	LW0068
W1	15	11/09/99	7.8	8.77	10.75	8	1.736	71.1	2,384	LW0069	
W1	18	11/09/99	7.8	8.62	10.73	7.3	1.739	73.1	2,390	LW0070	
W1	0	12/02/99	7.87	9.98	7.13	4.9	1.426	NR		LW0071	
W1	3	12/02/99	7.88	9.66	7.13	4.4	1.426	NR		LW0072	
W1	6	12/02/99	7.87	9.39	7.12	3.8	1.427	NR		LW0073	

Table A-2. (cont.)

Station	Depth (m)	Date	pH (S.U.)	Dissolved Oxygen (mg/L)	Temperature (°C)	Turbidity (NTU)	Conductivity (mS/cm)	ORP (mV)	Specific Conductivity (mS/cm)	Sample Number	Duplicate Sample
W1	9	12/02/99	7.87	9.87	7.12	3.4	1.437	NR		LW0074	
W1	12	12/02/99	7.87	9.46	7.1	3.1	1.441	NR		LW0075	LW0076
W1	15	12/02/99	7.89	9.51	7.11	3.1	1.442	NR		LW0077	
W1	18	12/02/99	7.88	9.21	7.11	2.9	1.446	NR		LW0078	
W12	0	12/02/99	7.89	9.39	7.17	NR	1.487	NR		no sample	
W12	0.3	12/02/99	7.89	9.31	7.19	NR	1.488	NR		no sample	
W12	0.6	12/02/99	7.88	9.23	7.19	NR	1.487	NR		no sample	
W12	1	12/02/99	7.88	9.14	7.19	2.3	1.487	NR		no sample	
W12	2	12/02/99	7.89	9.24	7.14	NR	1.486	NR		LW0079	
W12	3	12/02/99	7.88	8.91	7.16	NR	1.485	NR		no sample	
W12	4	12/02/99	7.87	8.76	7.14	NR	1.484	NR		no sample	
W12	5	12/02/99	7.86	8.77	7.13	NR	1.483	NR		no sample	
W12	6	12/02/99	7.84	8.57	7.11	NR	1.472	NR		no sample	

Source: Exponent, 2001c

Notes: NR - Not Recorded
ORP - Oxidation/Reduction Potential

Appendix A3

Chemical Data Tables (1999)

Table A3-1. Volatile Organic Compounds in Supplemental Lake Water Samples – 1999

	Station:	W1	W2	W50	W51	W52	W53	W53	W54	W55	W56	W57	W58
	Date:	9/27/1999	9/27/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999
	Depth (m):	0	0	1	0	1	1	1	0	0	1	0	1
	Duplicate:						1	2					
	Sample Number:	LW0001	LW0008	LW0022	LW0021	LW0020	LW0019	LW0026	LW0017	LW0023	LW0018	LW0025	LW0024
Chemical	**Units**												
Volatile Organics Compounds													
1,1,1-Trichloroethane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,1,2-Trichloroethane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	µg/L-ww	0.5 U	0.5 U	3.2	0.11 J	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.17 J	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	µg/L-ww	0.18 J	0.15 J	3.4	0.31 J	0.16 J	0.18 J	0.5 U	0.16 J	0.53	0.14 J	0.5 U	0.19 J
2-Butanone	µg/L-ww	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 UJ
2-Hexanone	µg/L-ww	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	µg/L-ww	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	µg/L-ww	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR	10 UR
Benzene	µg/L-ww	0.5 U	0.5 U	6.3	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.11 J	0.5 U	0.5 U	0.5 U
Bromodichloromethane	µg/L-ww	0.12 J	0.5 U	0.24 J	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U	0.17 J	0.5 U	0.5 U	0.5 U
Bromoform	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	µg/L-ww	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	µg/L-ww	0.5 U	0.5 U	12	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.51	0.5 U	0.5 U	0.5 U
Chloroethane	µg/L-ww	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	µg/L-ww	0.45 J	0.2 J	0.84	0.85 J	0.22 J	0.16 J	0.16 J	0.15 J	0.59	0.13 J	0.19 J	0.36 J
Chloromethane	µg/L-ww	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,2-dichloroethene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,3-dichloropropene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	µg/L-ww	0.21 UJ	0.14 UJ	0.34 UJ	0.17 UJ	0.16 UJ	0.17 UJ	0.15 UJ	0.44 UJ	0.19 UJ	0.33 UJ	0.13 UJ	0.19 UJ
Styrene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table A3-1. (cont.)

	Station:	W1	W2	W50	W51	W52	W53	W53	W54	W55	W56	W57	W58
	Date:	9/27/1999	9/27/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999
	Depth (m):	0	0	1	0	1	1	1	0	0	1	0	1
	Duplicate:						1	2					
	Sample Number:	LW0001	LW0008	LW0022	LW0021	LW0020	LW0019	LW0026	LW0017	LW0023	LW0018	LW0025	LW0024
Chemical	**Units**												
Volatile Organics Compounds													
Toluene	µg/L-ww	0.5 U	0.5 U	0.16 J	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-dichloroethene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,3-dichloropropene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	µg/L-ww	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene (Total)	µg/L-ww	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.33 J	0.5 U	0.5 U	0.5 U

Note: Results reported as µg/L unfiltered

Table A3-2. Conventional Parameters and Inorganic and Organometallics in Supplemental Lake Water Samples – 1999

	Station:	W1	W1	W1	W1	W1	W1	W1	W1	W1	W1
	Date:	9/27/1999	9/27/1999	9/27/1999	9/27/1999	9/27/1999	9/27/1999	9/27/1999	10/15/1999	10/15/1999	10/15/1999
	Depth (m):	0	3	6	9	12	15	18	0	3	6
	Duplicate:										
	Sample Number:	LW0001	LW0002	LW0003	LW0004	LW0005	LW0006	LW0007	LW0028	LW0029	LW0030
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	20.6	22.2	9.2	8.3	10.8	12.2	19.8	18.9	16.3	14.6
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	1000 U	1000 U	5100	7200	9900	1000 U	1000 U	1000 U
Sulfate	mg/L-ww	194.3	191.7	180.7	168.6	170.3	161.7	154.3	178.7	181.3	188.6
Sulfides	mg/L-ww	1 U	1 U	1 U	1 U	11.78	14.46	19.7	1 U	1 U	1 U
Total alkalinity	mg/L-ww	114	114.5	116	154.3	222.6	235.8	258.5	141.5	139.5	141.5
Total suspended solids – 2540D-GF	mg/L-su	3.3	3	2	2.9	2.4	2.6	2.6	4	3.1	3.8
Total suspended solids – 2540D-MF	mg/L-su	1.6	2.4	0.1 U	0.6	0.7	1	0.4	3.5	5	5
Total suspended solids – E2-GF	mg/L-sus	2									
Total suspended solids – E2-MF	mg/L-sus	3									
Volatile suspended solids	mg/L-ww	2.7	2.5	1.4	2.1	1.9	1.9	2.4	1.6	2.1	1.9
Inorganics and Organometallics											
Chromium	µg/L-ww	3.5									
Iron	µg/L-ww	596	245	160	113	273	147	257	125	141	132
Iron – dissolved	µg/L-dis	300	110	27	128	256	223	131	12	28	68
Lead	µg/L-ww	1.6 U									
Manganese	µg/L-ww	30 J	25	24	230	389	420	477	79	65	69
Manganese – dissolved	µg/L-dis	6	3	2	367	410	429	487	14	8	6
Total mercury	ng/L-ww	13.7	5.52	4.1	13.2	19.6	19.9	26.8	6.6	7.5	7.7
Total mercury – dissolved	ng/L-dis	1.27	1.01	0.96	11.4	17.2	19.6	23.5	1.8	1.9	2.1
Methylmercury	ng/L-ww	1.12	0.72	0.547	12.1	6.31	1.9	0.618 J	2.77	2.41	2.53
Methylmercury – dissolved	ng/L-dis	0.144	0.071	0.101	12.6	8.24	1.65	1.16 J	0.858	1.06	1.18
Nickel	µg/L-ww	3.6 J									

Table A3-2. (cont.)

	Station:	W1	W1	W1	W1	W1	W1	W1	W1	W1	W1
	Date:	10/15/1999	########	10/15/1999	10/15/1999	10/15/1999	10/25/1999	10/25/1999	10/25/1999	10/25/1999	10/25/1999
	Depth (m):	9	9	12	15	18	0	3	6	9	9
	Duplicate:	1	2							1	2
	Sample Number:	LW0031	LW0027	LW0032	LW0033	LW0034	LW0044	LW0045	LW0046	LW0047	LW0051
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	14	14.1	13	9.1	11.3	10	9.4	9.7	9.1	9.1
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	1000 U	1000 U	4800	1000 U	1000 U	1000 U	1000 U	1000 U
Sulfate	mg/L-ww	181.3		189.5	173.2	176.5	188.8	188.1	188.6		146.8
Sulfides	mg/L-ww	1 U	1 U	1 U	1 U	7.18	1 U	1 U	1 U	1 U	1 U
Total alkalinity	mg/L-ww	140.5	141	142	159.2	217.2	148.9	148.4	147.9	147.4	148.4
Total suspended solids – 2540D-GF	mg/L-su	3.1	3.1	3.1	3.6	3.7	2	2.4	3.4	3.5	3
Total suspended solids – 2540D-MF	mg/L-su	3	2.2	3.8	0.5	12	2.2	2.5	1.2	1	0.3
Total suspended solids – E2-GF	mg/L-sus										
Total suspended solids – E2-MF	mg/L-sus										
Volatile suspended solids	mg/L-ww	1.8	2	1.9	2.4	3.4	1.4	0.5	1.6	1.9	1.3
Inorganics and Organometallics											
Chromium	µg/L-ww										
Iron	µg/L-ww	133	76	133	152	278	43	39	41	39	83
Iron – dissolved	µg/L-dis	15	11	54	81	124	2	18	4	1	6
Lead	µg/L-ww										
Manganese	µg/L-ww	73	99	82	240	601	119	120	126	98	88
Manganese – dissolved	µg/L-dis	10	18	15	239	604	35	35	36	20	19
Total mercury	ng/L-ww	7.2	7.6	8	10	24	6.45	6.49	5.33	6.74	6.5
Total mercury – dissolved	ng/L-dis	2.5	1.9	2	4.6	21	2.18	1.97	2.28	2.26	1.37 J
Methylmercury	ng/L-ww	2.24	2.28	1.93	5.37	9.35	2.77	1.87	2.97	2.23	1.93
Methylmercury – dissolved	ng/L-dis	1.15	1.08	1.09	3.13	6.11	0.659	1.31	0.912	0.949	1.15
Nickel	µg/L-ww										

Table A3-2. (cont.)

	Station:	W1	W1	W1	W1	W1	W1	W1	W1	W1	W1
	Date:	10/25/1999	10/25/1999	10/25/1999	11/9/1999	11/9/1999	11/9/1999	11/9/1999	11/9/1999	11/9/1999	11/9/1999
	Depth (m):	12	15	18	0	3	6	9	12	12	15
	Duplicate:								1	2	
	Sample Number:	LW0048	LW0049	LW0050	LW0063	LW0064	LW0065	LW0066	LW0067	LW0068	LW0069
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	8.4	7.8	6.2	12.5	12.5	12.8	11.8	11.1	10.7	7.9
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Sulfate	mg/L-ww		193.8	187.2	192.6	191.8	192.7	180.3	192.9	179.5	180.9
Sulfides	mg/L-ww	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total alkalinity	mg/L-ww	148.9	149.4	151.3	147.6	149.1	150	149.1	148.1	150	150
Total suspended solids – 2540D-GF	mg/L-su	3.2	3.1	2.7	1.3	2.9	2.7	2.5	2.1	1.9	3.1
Total suspended solids – 2540D-MF	mg/L-su	3.1	2	1.1	0.7	1	0.7	2.2	0.1 U	0.1 U	0.5
Total suspended solids – E2-GF	mg/L-sus										
Total suspended solids – E2-MF	mg/L-sus										
Volatile suspended solids	mg/L-ww	1.3	0.7	1.4	0.9	1.2	1.3	1.6	1.5	0.8	1.6
Inorganics and Organometallics											
Chromium	µg/L-ww										
Iron	µg/L-ww	45	90	64	63	73	62	59	54	63	70
Iron – dissolved	µg/L-dis	1	50	18	12	27	4	0.1 U	0.1 U	1	90
Lead	µg/L-ww										
Manganese	µg/L-ww	128	136	185	112	106	104	110	95	107	112
Manganese – dissolved	µg/L-dis	36	46	112	7	9	8	7	0.035 U	6	7
Total mercury	ng/L-ww	6.78	6.87	10.3	11.2	10.4	11.9	10.6	10.8	11.4	11.8
Total mercury – dissolved	ng/L-dis	2.22	1.7	2.35	1.75	2.01	1.76	1.72	1.62	1.89	1.9
Methylmercury	ng/L-ww	0.818	2.84	2.83	1.62	1.41	1.79	1.79	1.65	1.6	1.65
Methylmercury – dissolved	ng/L-dis	0.555	1.22	1.12	0.665	0.677	0.644	0.638	0.66	0.763	0.707
Nickel	µg/L-ww										

Table A3-2. (cont.)

	Station:	W1	W1	W1	W1	W1	W1	W1	W1	W1	W12
	Date:	11/9/1999	12/2/1999	12/2/1999	12/2/1999	12/2/1999	12/2/1999	12/2/1999	12/2/1999	12/2/1999	9/28/1999
	Depth (m):	18	0	3	6	9	12	12	15	18	2
	Duplicate:						1	2			1
	Sample Number:	LW0070	LW0071	LW0072	LW0073	LW0074	LW0076	LW0075	LW0077	LW0078	LW0015
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	7.2	11.9	11.7	6.4	12.6	11.7	12	12.3	7.2	22.8
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
Sulfate	mg/L-ww	192.9									196
Sulfides	mg/L-ww	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total alkalinity	mg/L-ww	151.5	123.3	148.1	150.5	148.6	150	147.2	148.6	148.6	116.9
Total suspended solids – 2540D-GF	mg/L-su	2.7	4.3	3.9	3.5	3.2	2.4	3.5	3.1	2.3	2.9
Total suspended solids – 2540D-MF	mg/L-su	0.1 U	5	4.8	3.5	2.8	2	1	2.7	0.7	0.1 U
Total suspended solids – E2-GF	mg/L-sus										
Total suspended solids – E2-MF	mg/L-sus										
Volatile suspended solids	mg/L-ww	1.5	2.7	1.7	1.5	1.8	1.5	2.4	1.9	1.3	2.6
Inorganics and Organometallics											
Chromium	µg/L-ww										
Iron	µg/L-ww	82	173	144	113	121	96	92		80	76
Iron – dissolved	µg/L-dis	6	23	9	6	12	5	1	1	7	28
Lead	µg/L-ww										
Manganese	µg/L-ww	109	61	59	61	66	69	68		71	32
Manganese – dissolved	µg/L-dis	7	12	11	7	7	6	7	5	9	5
Total mercury	ng/L-ww	11.2	7.14	7.29	7.35	6.65	6.55	6.95	7.19	7.21	4.83
Total mercury – dissolved	ng/L-dis	1.66	1.27	1.59	1.28	1.48	1.36	1.61	1.18	1.35 J	0.83
Methylmercury	ng/L-ww	1.67	1.22	0.98	1.09	1.08	1.19	1.35	1.38	0.931	1.12
Methylmercury – dissolved	ng/L-dis	0.797	0.388	0.475	0.503	0.569	0.547	0.571	0.384	0.335	0.315
Nickel	µg/L-ww										

Table A3-2. (cont.)

	Station:	W12	W12	W12	W12	W12	W2	W2	W2	W2	W2
	Date:	9/28/1999	10/14/1999	10/14/1999	10/26/1999	12/2/1999	9/27/1999	9/27/1999	9/27/1999	9/27/1999	9/27/1999
	Depth (m):	2	1	3	2	2	0	3	6	9	12
	Duplicate:	2									
	Sample Number:	LW0016	LW0042	LW0043	LW0062	LW0079	LW0008	LW0009	LW0010	LW0011	LW0012
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	44.6	15.5	15.5	8.4	11.4	28.7	28.8	14.3	8.1	6.9
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	5000
Sulfate	mg/L-ww	198.9			191.4		186.6	185.9	197.3	184.1	174
Sulfides	mg/L-ww	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10.06
Total alkalinity	mg/L-ww	116	154.3	156.7	146.9	150	115	116	117.4	119.4	209.3
Total suspended solids – 2540D-GF	mg/L-su	4.9	4.9	5.4	2.9	3.5	3.9	4.2	3	1.5	2.3
Total suspended solids – 2540D-MF	mg/L-su	0.1 U	3.8	4.2	4.3	0.1 U	0.1 U	2.7	0.1 U	0.3	0.1 U
Total suspended solids – E2-GF	mg/L-sus						2				
Total suspended solids – E2-MF	mg/L-sus						3				
Volatile suspended solids	mg/L-ww	4.1	2.7	3.4	0.5	2.4	3.3	3.4	1.7	1	1.6
Inorganics and Organometallics											
Chromium	µg/L-ww						3.7				
Iron	µg/L-ww	65	71	81	36	63	51	64	46	107	371
Iron – dissolved	µg/L-dis	13	9	18	0.1 U	7	28	15	58	27	204
Lead	µg/L-ww						1.6 U				
Manganese	µg/L-ww	25	244	257	94	90	26 J	28	30	60	428
Manganese – dissolved	µg/L-dis	2	219	247	10	10	6	5	3	4	451
Total mercury	ng/L-ww	3.95	10	10	6.26	6.62	3.49	4.12	4.16	3.59	18.9
Total mercury – dissolved	ng/L-dis	0.25	4.6	4.2	1.98	1.78	1.03	1.02	0.77	1.24	15.3
Methylmercury	ng/L-ww	1.67	5.82	5.93	2.08	1.27 J	0.846	0.854	1.09	1.2	13.7
Methylmercury – dissolved	ng/L-dis	0.361	3	3.07	0.934	0.494 J	0.157	0.161	0.281	0.639	15.3
Nickel	µg/L-ww						3.7 J				

Table A3-2. (cont.)

	Station:	W2	W2	W2	W2	W2	W2	W2	W2	W2	W2
	Date:	9/27/1999	9/27/1999	10/15/1999	10/15/1999	########	10/15/1999	10/15/1999	10/15/1999	10/15/1999	10/25/1999
	Depth (m):	15	18	0	3	6	9	12	15	18	0
	Duplicate:										
	Sample Number:	LW0013	LW0014	LW0035	LW0036	LW0037	LW0038	LW0039	LW0040	LW0041	LW0052
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	8.5	11.5	18.9	17.3	17.3	17.3	12.8	9.9	11.7	9.2
Hydrogen sulfide	µg/L-ww	6500	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	3200	5600	1000 U
Sulfate	mg/L-ww	168.5	145.4	189.2							178.3
Sulfides	mg/L-ww	12.98	1 U	1 U	1 U	1 U	1 U	1 U	5.16	9.86	1 U
Total alkalinity	mg/L-ww	224.1	229	141.5	142.5	142	142.5	145.4	202.9	220.1	148.4
Total suspended solids – 2540D-GF	mg/L-su	2.8	2.8	3.4	2.6	3	2.6	2.8	2.5	3.6	2
Total suspended solids – 2540D-MF	mg/L-su	2.5	0.7	3.5	2.2	2	3.5	2.8	9.5	6.4	1.1
Total suspended solids – E2-GF	mg/L-sus										
Total suspended solids – E2-MF	mg/L-sus										
Volatile suspended solids	mg/L-ww	2.4	2.7	2.2	0.9	1.9	0.9	1.7	1.7	2.1	0
Inorganics and Organometallics											
Chromium	µg/L-ww										
Iron	µg/L-ww	208	359	93	46	49	50	51	145	182	40
Iron – dissolved	µg/L-dis	223	222	14	5	5	46	34	72	66	2
Lead	µg/L-ww										
Manganese	µg/L-ww	392	489	105	116	123	118	155	474	577	132
Manganese – dissolved	µg/L-dis	447	500	40	51	51	55	119	510	556	31
Total mercury	ng/L-ww	20.1	25.4	6.2	6.6	6.8	6.6	7.5	20	25	4.77
Total mercury – dissolved	ng/L-dis	17	19.2	2.5	2.3	2.1	1.1	3	18	24	1.84
Methylmercury	ng/L-ww	7.39	4.94 J	3.44	2.08	3.63	3.04	3.28	14.3	12.3	2.32
Methylmercury – dissolved	ng/L-dis	5.69	12.1 J	1.42	1.21	1.31	1.4	1.75	10.7	5.15	1.3
Nickel	µg/L-ww										

Table A3-2. (cont.)

	Station:	W2	W2	W2	W2	W2	W2	W50	W51	W52	W52
	Date:	10/25/1999	10/25/1999	10/25/1999	10/25/1999	10/25/1999	10/25/1999	9/28/1999	9/28/1999	9/28/1999	10/25/1999
	Depth (m):	3	6	9	12	15	18	1	0	1	1
	Duplicate:										
	Sample Number:	LW0053	LW0054	LW0055	LW0056	LW0057	LW0058	LW0022	LW0021	LW0020	LW0059
Chemical	**Units**										
Conventional/Wet Chemistry											
Chlorophyll-a	µg/L-ww	9.1	8.7	9.1	8.7	8.4	6.2				10.1
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U				1000 U
Sulfate	mg/L-ww	179.4	145.4	188	186.2	190	189.9				180.6
Sulfides	mg/L-ww	1 U	1 U	1 U	1 U	1 U	1 U				1 U
Total alkalinity	mg/L-ww	147.4	147.4	146.9	147.9	148.4	149.4				146.4
Total suspended solids – 2540D-GF	mg/L-su	2.6	2.2	2.5	2.7	3.1	3				3.1
Total suspended solids – 2540D-MF	mg/L-su	2	2	0.1 U	0.1 U	0.1 U	1.4				0.3
Total suspended solids – E2-GF	mg/L-sus							3	8	3	
Total suspended solids – E2-MF	mg/L-sus							4	9	3	
Volatile suspended solids	mg/L-ww	2	1.4	1	1.3	0.9	2.3				1.4
Inorganics and Organometallics											
Chromium	µg/L-ww							3.9	3.7	3.5	
Iron	µg/L-ww	34	32	41	23	33	43				39
Iron – dissolved	µg/L-dis	3	0.1 U	2	0.1 U	35	7				0.1 U
Lead	µg/L-ww							3.1	1.6 U	1.6 U	
Manganese	µg/L-ww	92	97	98	104	103	163	20.6 J	27.4 J	15 J	87
Manganese – dissolved	µg/L-dis	13	13	15	14	15	77				20
Total mercury	ng/L-ww	5.79	5.5	4.93	5.59	5.85	9.95	12.2	11	2.33	7.51
Total mercury – dissolved	ng/L-dis	1.82	2.11	1.99	1.71	2.07	2.35	1.8	1.71	2.92	2.63 J
Methylmercury	ng/L-ww	2.36	2.71	2.24	2.84	2.3	4.38	0.984	0.803	0.816	1.49
Methylmercury – dissolved	ng/L-dis	1.21	0.838	0.703	1.2	1.21	1.59	0.366	0.346	0.259	1.01
Nickel	µg/L-ww							4.6 J	4.7 J	4.2 J	

Table A3-2. (cont.)

	Station:	W53	W53	W54	W54	W55	W56	W57	W58	W58
	Date:	9/28/1999	9/28/1999	9/28/1999	10/25/1999	9/28/1999	9/28/1999	9/28/1999	9/28/1999	10/26/1999
	Depth (m):	1	1	0	1	0	1	0	1	1
	Duplicate:	1	2							
	Sample Number:	LW0019	LW0026	LW0017	LW0060	LW0023	LW0018	LW0025	LW0024	LW0061
Chemical	**Units**									
Conventional/Wet Chemistry										
Chlorophyll-a	µg/L-ww				8.1					10.3
Hydrogen sulfide	µg/L-ww				1000 U					1000 U
Sulfate	mg/L-ww				189.6					190.5
Sulfides	mg/L-ww				1 U					1 U
Total alkalinity	mg/L-ww				146.9					155.8
Total suspended solids – 2540D-GF	mg/L-su				2.4					5.5
Total suspended solids – 2540D-MF	mg/L-su				0.1 U					4.6
Total suspended solids – E2-GF	mg/L-sus	2.8	3	3		7	4	9	8	
Total suspended solids – E2-MF	mg/L-sus	3.3	3	3		8	4	9	8	
Volatile suspended solids	mg/L-ww				2					1.5
Inorganics and Organometallics										
Chromium	µg/L-ww	3.5	2.6	3.13		3.8	3.6	3.2	3.2	
Iron	µg/L-ww				26					216
Iron – dissolved	µg/L-dis				0.1 U					25
Lead	µg/L-ww	1.6 U	1.6 U	1.6 U		1.6 U	1.6 U	1.6 U	1.6 U	
Manganese	µg/L-ww	15 J	15.4 J	14.3 J	102	30.6 J	18.6 J	16 J	16.4 J	110
Manganese – dissolved	µg/L-dis				9					63
Total mercury	ng/L-ww	26.2	9.81	6.16	6.5	103	4.84	10.3	8.12	14.3
Total mercury – dissolved	ng/L-dis	7.83	4.11	1.23	2.81 J	1.82	2.62	2.74	1.8	2.12 J
Methylmercury	ng/L-ww	0.815	0.822	0.759	2.41	1.09	0.606	0.784	0.843	0.769
Methylmercury – dissolved	ng/L-dis	0.25	0.216	0.16	0.806	0.347	0.15	0.147	0.214	0.219
Nickel	µg/L-ww	4 J	3.9 J	3.7 J		4.2 J	3.5 J	3.9 J	4 J	

Appendix A4

Quality Assurance Review—1999 Supplemental Lake Water Study

APPENDIX A4. QUALITY ASSURANCE REVIEW – 1999 SUPPLEMENTAL LAKE WATER STUDY

(Modified from Exponent, 2001c)

Introduction

This data quality report summarizes the results of a quality assurance review of laboratory procedures and data for chemical analyses of lake water samples. The analyses were completed as part of the 1999 supplemental lake water study for the Onondaga Lake remedial investigation and feasibility study (RI/FS). Details of the sampling procedures for each task are provided in Section 2.7 of the RI. Descriptions of the procedures used for chemical analyses, data validation, and data management are provided in the quality assurance project plan (QAPP) for the first phase of the RI, conducted in 1992 (PTI, 1991).

The data quality review was conducted to verify that field and laboratory quality assurance and quality control (QA/QC) procedures were completed and documented as required, and that the quality of the data is sufficiently high to support its use in the RI/FS. All data qualified as estimated (*J*) have an acceptable degree of uncertainty and represent data of good quality and reasonable confidence (USEPA, 1989). These results are acceptable for use in the RI/FS, including the human health risk assessment (HHRA) and baseline ecological risk assessment (BERA). Rejected data (*R*) are unusable for their intended purposes.

The 1999 supplemental lake water study included collection of water samples near the lake surface during one sampling event prior to lake turnover, and collection of water column samples during five sampling events before, during, and after turnover (Section 2.7 of the RI). Surface water samples were analyzed for the following constituents:

- Target compound list volatile organic compounds (VOCs) and 1,2-dichlorobenzene and 1,4-dichlorobenzene.
- Total chromium, lead, manganese, and nickel.
- Total and dissolved mercury and methylmercury.
- Total suspended solids (TSS).

Water column samples were analyzed for the following constituents:

- Total and dissolved mercury and methylmercury.
- Total and dissolved iron and manganese.
- Sulfate, sulfide, chlorophyll *a*, and alkalinity.

- TSS (two analyses were completed using different filters) and fraction of organic carbon (i.e., volatile organic carbon) in the suspended solids.

A summary of the number of samples collected for this study and the analyses and methods for each sample type is provided in Table A4-1.

Data validation procedures and qualifier assignments were completed according to standard operating procedures (SOPs) prepared by USEPA Region 2, including SOP HW-24 for validation of data for VOCs (USEPA, 1999b) and SOP HW-2 for validation of metals by inductively coupled plasma-atomic emission spectrometry (ICP-AES) (USEPA, 1992).

Mercury and methylmercury data were validated according to general procedures described in SOP HW-2, with modifications made to comply with QA/QC procedures and control limits provided in the descriptions for USEPA Methods 1631B and 1630. Data for iron, manganese, and conventional parameters (except total manganese and TSS, analyzed by O'Brien & Gere Laboratories, Syracuse, NY) could not be validated, because quality control data were not provided.

Volatile Organic Compounds, Metals, and Total Suspended Solids

The total number of lake water samples and field duplicate samples collected for the 1999 supplemental lake water investigation is indicated in Table A4-1. Analyses for VOCs, metals (total chromium, lead, manganese, and nickel), and TSS were completed by O'Brien & Gere Laboratories. Laboratory methods are referenced in Table A4-1. QA/QC results for laboratory and field procedures and implications for data usability are provided below.

Summary of Qualified Data

The chemical data were generally of acceptable quality. Data reported for the water samples included 432 results for VOCs, 320 results for metals, and 162 results for TSS. A total of 12 results for VOCs (3 percent of all VOC results) were rejected. No results for metals or TSS were rejected. A total of 83 results for VOCs (19 percent of all VOC results) and 24 results for metals (8 percent of all metals results) were qualified as estimated because control limits were exceeded for one or more laboratory quality control samples or procedures. These qualified data may have a larger associated bias or may be less precise than unqualified data, but are of acceptable quality for use in the RI.

Data Quality Assessment

The laboratory data were evaluated in terms of completeness, holding times, instrument performance, bias, and precision. The results of the quality control procedures used during sample analyses are discussed below.

Completeness

All analyses were completed by the laboratory as requested. However, 12 results for VOCs were rejected during the quality assurance review. Completeness after data validation was 98 percent, slightly below the project data quality objective (DQO) of 100 percent.

Holding Times and Sample Preservation

All holding time constraints and sample-preservation requirements were met for all sample types and all analyses. The NYSDEC holding time for VOC analysis for aqueous samples is seven days from the date of collection. Although the pH of the samples for VOCs could not be verified, all analyses were performed within seven days of sample collection; therefore, no action was required. The holding time is six months for metals and seven days for TSS.

Calibration

The calibration of the analytical instruments, as documented by the laboratory, was acceptable. No changes in instrument performance that would have resulted in the degradation of data quality were indicated during any analytical sequence. Calibration does not apply to TSS determinations.

- **Initial and Continuing Calibrations** – Initial and continuing calibrations were completed as required for all target analytes and met the criteria for acceptable performance, with several exceptions for VOCs.

  The relative response factor for acetone was below the control limit of 0.05 for several continuing calibration standards. Acetone was not detected in any sample. The reporting limits for acetone in all 12 surface water samples were rejected (*R*).

  In several continuing calibration standards, the results for 2-butanone, 1,2-dichlorobenzene, and 1,1,2,2-tetrachloroethane did not meet the control limit of 25 percent difference relative to the initial calibration result. These analytes were not detected in any associated samples. The reporting limits for these analytes in associated samples were qualified as estimated (*J*). Qualifiers were assigned to reporting limits for 2-butanone in Samples LW0001, LW0002, LW0017, LW0018, LW0019, LW0022, LW0023, and LW0024, as well as for 1,2-dichlorobenzene and 1,1,2,2-tetrachlorobenzene in Samples LW0020, LW0021, LW0025, and LW0026.

- **Initial and Continuing Calibration Blanks** – The initial and continuing calibration blank (ICB and CCB) analyses met the criteria for acceptable performance, with the following exception: nickel was present at levels above the instrument detection limits in all of the CCBs. All surface water samples contained a consistent, higher concentration of nickel than these blanks. However, since the

results for the CCBs indicate possible baseline fluctuation in the instrument or low-level laboratory contamination, the 12 results for nickel in the surface water samples were qualified as estimated (*J*).

Method Blank Analyses

Method blanks were prepared and analyzed at the required frequency. Target analytes were not detected in any method blank.

Instrument-Specific Quality Control Procedures for Metals

Quality control procedures that are specific to metals analyses include:

- Analysis of a contract-required detection limit standard.
- An ICP interference-check sample.
- Serial dilution of a sample for each sample batch.

The results for these quality control procedures met the frequency requirements and control limits, with the exception of the serial dilution for manganese. All 12 of the results for manganese in surface water were qualified as estimated (*J*).

Accuracy

The accuracy of the analytical results is evaluated in the following sections in terms of analytical bias (recoveries for laboratory control samples [LCSs], matrix spike [MS] samples, and, for VOCs, surrogate compounds) and precision (matrix spike duplicates [MSDs] for VOCs and laboratory duplicates for metals and TSS).

Laboratory Control Sample Recoveries

LCSs are required for VOCs and total metals and were analyzed by the laboratory at the required frequency. The recoveries met control limits, with the exception of 1,1,2,2-tetrachloroethane in the LCSs associated with Sample LW0019. The recoveries for this analyte were above the upper control limit of 132 percent. 1,1,2,2-Tetrachloroethane was not detected in the sample. The LCS results indicate a positive bias, but the reporting limit is not affected. Consequently, no results were qualified based on this exceedance.

Matrix Spike Recoveries

MS samples were analyzed by the laboratory at the required frequency and spiking levels. MS samples are required for metals analyses, and MSDs are required for VOCs. The recoveries met control limits, with the exception of several analytes in the spike of Sample LW0019, where the MS and MSD recoveries for acetone and 2-butanone were above the upper laboratory-control limits of 151 and 129 percent, respectively. The MSD recovery for 1,1,2,2-tetrachloroethane was above the upper laboratory-control limit of 132 percent. None of these analytes were detected in any sample. The high results indicate a positive bias, but the reporting limits are not affected. Consequently, no results were qualified based on these exceedances. The MS and MSD recoveries for styrene were slightly below the lower laboratory-control limit of 86 percent. There was no indication of serious bias to the reporting limits and no data were qualified.

Surrogate-Compound Recoveries

Surrogate-compounds are added to all field and quality control samples for analysis of VOCs. The recoveries reported by the laboratory for surrogate compounds met the laboratory control limits, with one exception: the recovery for the surrogate bromofluorobenzene in surface water Sample LW0021 was 73 percent, below the laboratory's lower control limit (77 percent). All VOC results for this sample (with the exception of the acetone result, which was previously rejected) were qualified as estimated (*J*). A total of 36 compounds were qualified based on this exceedance.

Precision

The results for laboratory duplicate analyses (TSS and total metals) and MSD analyses (VOCs) met the criteria for acceptable performance. Laboratory duplicates and MSDs were analyzed at the required frequency.

Analyte Quantification and Method Reporting Limits

The calculations for analyte quantification were acceptable for all target analytes.

Sample concentrations for VOCs that were reported between the method detection limit and the method reporting limit (MRL) were qualified as estimated (*J*). The following results were qualified:

- 1,2-Dichlorobenzene (two results): LW0021* and LW0023.*
- 1,4-Dichlorobenzene (eight results): LW0001, LW0008, LW0017 through LW0021, and LW0024.
- Benzene (one result): LW0023.
- Bromodichloromethane (four results): LW001, LW0021,* LW0022, and LW0023.

- Chloroform (10 results): LWFB02,* LW0001, LW0008, LW0017 through LW0020, and LW0024 through LW0026.
- Methylene chloride (12 results): LWFB01, LW0001, LW0008, LW0017 through LW0020, LW0021,* and LW0023 through LW0026.
- Toluene (two results): LWFB02* and LW0022.
- Xylene (one result): LW0023.

Sample results that are noted with an asterisk (*) were previously qualified as estimated (*J*) for an additional control-limit exceedance.

Field Quality Control

The field quality control samples consisted of one field duplicate, two field blanks, and two trip blanks (for VOCs only).

Field Duplicates

The field duplicate sample pair LW0019 and LW0026 was analyzed for VOCs, total metals, and TSS. Chloroform was the only VOC detected in both field duplicates, but at a concentration below the reporting limit. No data required qualification for field duplicate results.

Field Blanks and Trip Blanks

The two field blanks (Samples LWFB01 and LWFB02) were analyzed for VOCs, total metals, and conventional parameters. The trip blanks (Samples QCTB and LWTB02) were analyzed for VOCs only. No target analytes were detected in these blanks, with the following exception: methylene chloride was present in all surface water samples, field blanks, and trip blanks. The laboratory method blanks did not contain detectable concentrations of methylene chloride, which indicates that contamination was introduced during shipping or storage. Methylene chloride concentrations in the lake water samples were below the quantification limit and below the concentrations found in the field blanks. All results for methylene chloride in the lake water samples were restated as undetected.

Total Mercury and Methylmercury

A total of 73 discrete lake water samples and six field duplicates were collected over a period of four months during the 1999 supplemental lake water investigation. Samples included surface water samples and depth profile samples, as indicated in Table A4-1. Analyses were completed by Frontier Geosciences in Seattle, WA. Laboratory methods are summarized in Table A4-1. QA/QC results for laboratory and field procedures and implications for data usability are provided below.

Summary of Data Quality

The results for dissolved and unfiltered total mercury and methylmercury in lake water samples were of acceptable quality. No results were rejected. A total of 11 results (4 percent of all results) were qualified as estimated because control limits were exceeded for one or more laboratory quality control samples or procedures. These qualified data may have a larger associated bias or may be less precise than unqualified data, but are of acceptable quality for use in the RI.

Data Quality Assessment

The laboratory data were evaluated in terms of completeness, holding times, instrument performance, bias, and precision. The results of the quality control procedures used during sample analyses are discussed below.

Completeness

The results reported by the laboratories were 100 percent complete. No results were rejected during data validation.

Holding Times and Sample Preservation

All holding time constraints and sample-preservation requirements were met for all sample types and all analyses.

The chains of custody for Sampling Events 1, 2, and 4 noted that some or all of the samples were received at a temperature in excess of $4 \pm 2^{\circ}C$, the storage temperature required by USEPA Region 2 for mercury analyses. Temperatures in the coolers were below $10^{\circ}C$ in all cases. All samples were properly preserved (temperature, acidification, and storage in the dark) after receipt by the laboratory. There were no qualifications to the data from these temperature exceedances, based upon supporting documentation from the laboratory and guidance from USEPA Region 2.

Frontier Geosciences (Bloom, 1997) detailed the relationship between methylmercury concentrations in unpreserved (non-acidified) samples kept in the light at room temperature. Specifically, it was shown by the laboratory that no significant degradation of the methylmercury occurred over 20 days in unpreserved water samples that were stored in the light at room temperature. The concentration of total mercury in the unpreserved samples did decrease over 20 days by approximately one-third when stored in the light at room temperature. These results indicate that minimal loss of mercury and methylmercury from the samples with cooler temperatures above $6^{\circ}C$ would be expected. Samples were stored as required upon receipt at the laboratory.

The 8260B SOP HW-24 USEPA Region 2-Revision 2, December 1996 (USEPA, 1999b) offers clear guidance on the qualification of VOCs due to temperature exceedances alone. This document states that "if samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the

cooler was elevated (>10°C), flag all positive results 'J' and all non-detects "UJ."" The samples in question met the criteria for storage.

Calibration

The calibration of the analytical instruments, as documented by the laboratory, was acceptable. No changes in instrument performance that would have resulted in the degradation of data quality were indicated during any analytical sequence.

- **Initial and Continuing Calibration** – Initial calibrations and continuing calibration verification were completed as required for total and methylmercury analyses and met the criteria for acceptable performance. The initial calibration results were verified daily by the analysis of an independently prepared standard, the DORM-2 standard reference material (SRM). All SRM recoveries were between the project-specific control limits of 75 to 125 percent for total mercury and 70 to 130 percent for methylmercury.

- **Initial and Continuing Calibration Blanks** – The ICBs and CCBs met the criteria for acceptable performance and frequency of analysis. Bubbler blanks were analyzed at an appropriate frequency as a demonstration that the system was free of spurious contamination. Total mercury or methylmercury was detected above the MRL in some blanks. In all cases, the levels detected in the blank did not significantly bias the sample results based upon application of a 5-times action limit, with the following exception: the third CCB for total mercury for Event 5 contained significant amounts of total mercury. Only one of the samples bracketed by this CCB contained less than 5 times the total mercury concentration in the blank. This sample, LW0078, was analyzed using the same bubbler as the blank. The total mercury result for Sample LW0078 was qualified as estimated (*J*).

Method Blank Analyses

Method blanks were prepared and analyzed at the required frequency. Total mercury or methylmercury was detected above the MRL for several method blanks. In all cases, the levels detected in the blank were less than 20 percent of the concentrations in the samples.

Accuracy

The accuracy of the analytical results is evaluated in the following sections in terms of analytical bias (LCS and MS recoveries) and precision (laboratory duplicates). The control limits for recovery were 75 to 125 percent for total mercury and 70 to 130 percent for methylmercury.

Laboratory Control Sample Recoveries

The recoveries for all LCSs (blank spikes) and the frequency of analysis met the criteria for acceptable performance.

Matrix Spike Recoveries

The recoveries for MS and MSD samples generally met the criteria for acceptable performance. MSs and MSDs were analyzed at the required frequency. Results did not comply with control limits or other requirements in three cases.

The recovery of methylmercury from the MSD for Sample LW0044 (65.5 percent) was below the lower control limit (70 percent). The MS for Sample LW0044 (110 percent recovery) and all other associated quality control criteria for the sample batch were in control, so no action was taken. In addition, another MS and MSD (using Sample LW0047) were analyzed during a later analysis sequence for Event 3 to provide additional information regarding matrix interferences. Recoveries for the MS and MSD were 100 percent and 79 percent respectively, both within control limits. These results support the conclusion that the low MSD recovery for Sample LW0044 was an isolated incident and did not reflect any systematic error. No data were qualified for these MS results.

A field blank was initially used to prepare the MS and MSD for methylmercury for the Event 4 samples. The MS and MSD recoveries for these samples were acceptable. The precision for the MS and the MSD did not meet control limits. Filtered Sample LW0066 was subsequently spiked to check for matrix interferences. Recoveries for the MS and MSD were acceptable. There were ample quality-control results to support the initial Event 4 results, and no data were qualified as estimated.

The methylmercury samples for Event 5 were reanalyzed at lower aliquot sizes to minimize matrix interferences. The samples were initially analyzed four times because of matrix interference. These initial analyses failed to produce acceptable results for MSs and MSDs and laboratory duplicates. The reanalyses were conducted on smaller aliquots of sample. Two MSs and MSDs and six additional MSs were analyzed. The MS and MSD recoveries met control limits (70 to 130 percent) for 8 of these 10 MSs and MSDs. Control limits were not met for the MS added to filtered and unfiltered portions of Sample LW0079. The two methylmercury results for Sample LW0079 were qualified as estimated (*J*), based on these spike recovery exceedances. Sample LW0075 was later analyzed separately from the other Event 5 samples for dissolved methylmercury because a problem was encountered with analyzer gas flow during the initial analysis. Method quality-control results associated with this sample indicated that the analytical system was clearly in control.

Precision

Laboratory duplicates were analyzed at the required frequency for all sample events. The results reported by the laboratory for duplicate analyses generally met the criteria for acceptable performance. The control limits for precision were 20 relative percent difference (RPD) for total mercury and 25 RPD for methylmercury.

A field blank was analyzed in duplicate for the initial analysis of Event 4 samples for methylmercury. Precision could not be determined from the laboratory duplicates because methylmercury was undetected in both sample aliquots. Filtered Sample LW0066 was subsequently analyzed in duplicate to check for matrix interferences. The RPD for the duplicates was acceptable. There were ample quality-control results to support the initial Event 4 results, and no data were qualified as estimated.

For the total mercury analyses in Event 5, the RPD between the MS and MSD was used to assess precision. All results for these spiked duplicates were within control limits. This procedure is consistent with requirements of USEPA Method 1631.

The methylmercury samples from Event 5 were reanalyzed using smaller sample aliquots to minimize matrix interferences. The initial analyses (four trials) failed to produce acceptable MS/MSD or laboratory duplicate results. Several sets of MSs and MSDs and laboratory duplicate samples were included with the reanalyses. The RPDs were not within control limits for the laboratory duplicates. However, all results were within control limits for the MSs and MSDs. No data were qualified.

Analyte Quantification and Method Reporting Limits

The calculations for analyte quantification were acceptable for all target analytes. MRLs met project DQOs in most cases.

The laboratory performed reanalyses for methylmercury on three samples for Events 3 and 4. For unfiltered Sample LW0047, the reanalysis result agreed with the initial result (9 RPD). These results were averaged in the database. Reanalyses were completed for total and dissolved methylmercury in Sample LW0060. This sample was also used for the MS and MSD and laboratory duplicate. Since the reanalysis results contained accuracy and precision data on the sample itself and are, therefore, more reliable, these results for the reanalysis were reported in the database. The quality control samples for Event 4 were reanalyzed for methylmercury because a field blank was used for the MS/MSD and laboratory duplicate. Filtered Sample LW0066 was reanalyzed when it was used for additional MS/MSDs and laboratory duplicates. The average of the initial methylmercury result and both reanalysis results (i.e., the laboratory duplicates) was reported in the database for filtered Sample LW0066.

Comparison of Concentrations in Whole and Filtered Samples

The laboratory noted that the dissolved methylmercury concentrations were higher than the total (unfiltered) methylmercury concentrations for Samples LW0005, LW0007, LW0012, and LW0014, collected for

Event 1. These samples were redistilled and reanalyzed and the same trend was noted. The laboratory reported methylmercury concentrations for the initial analyses for all samples except LW0014. Sample LW0014 was reanalyzed for total and dissolved methylmercury using smaller sample aliquots. The dissolved value was even higher than the value reported initially and the difference between the two values (total/dissolved) was greater. The laboratory suggested that a chemical interference may have been present that was related to the particulates and was partially removed during the sample filtration. This would lead to the higher methylmercury results in the filtered sample (i.e., an interference associated with particulate matter would be more pronounced in the unfiltered sample). The remainders of both the filtered and unfiltered samples were consumed in these reanalyses, and no further tests could be performed.

The methylmercury results for the reanalysis of Sample LW0014 were reported and qualified as estimated (*J*) because of the discrepancies between the whole and dissolved concentrations. The methylmercury results for Sample LW0007 were also qualified as estimated (*J*), because they share a depth profile similar to Sample LW0014.

Total and dissolved methylmercury in Sample LW0036 were also reanalyzed using smaller aliquot volumes because the dissolved fraction concentration was higher than the whole fraction concentration in the first analyses. Result for dissolved methylmercury were similar in the two runs, but the result for total mercury was higher in the reanalysis. Results for the reanalysis were reported.

Field Quality Control

The field quality control samples included six field duplicate pairs (12 samples) and seven field-blank samples.

Field Duplicates

The precision for field duplicate analyses was acceptable, with several qualifications. Results for field duplicates are provided in Tables A4-2 and A4-3.

Five of the 12 field duplicate sample results for total mercury and one result for methylmercury exceeded the control limit for precision (25 RPD). These duplicate results were qualified as estimated.

Field Blanks

Target analytes were detected in several field blanks. Sample concentrations were greater than 5 times the blank concentration in all except two cases.

The total mercury level measured in the field blank for Event 1, LWFB01, was higher than most total mercury results in the associated surface water samples. Only one whole surface water result (Sample LW0023) was above the action limit (sample concentration at least 5 times the blank). This field blank was collected at the end of the day, after all of the nearshore surface water samples. The last sample to be collected had a total mercury concentration of 10.3 ng/L, whereas the blank contained 16 ng/L. The

equipment decontamination procedure involves rinsing the sampler with dilute nitric acid, followed by numerous rinses with distilled, deionized water. A limited amount of water remained at the end of the day for the field samplers to rinse their equipment according to protocol, and the rinse was apparently inadequate. In this situation, the blank did not accurately reflect procedures in the field to minimize cross-contamination between samples. The concentration of mercury in this field blank was noted, but no action was taken.

Dissolved total mercury was detected in field blank LWFB05, collected for Event 3. The results for dissolved total mercury in Samples LW0051, LW0059, LW0060, and LW0061 were less than 5 times the blank and were qualified as estimated (*J*). These results may be biased high.

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Table A4-1. Summary of Field Samples, Analyses, and Methods for the 1999 Supplemental Lake Water Study

Parameter	Method	Laboratory	Field Blanks	Lake Water Samples	Field Duplicates
Organic analyses					
Volatile organic compounds	USEPA Method 8260B (USEPA, 1997)	OBG	2[a]	11	1
Conventional parameters					
Chlorophyll *a*	NP	UFI	6	64	5
Hydrogen sulfide	NP	UFI	3	64	5
Sulfate	USEPA Method 375.2 (USEPA, 1983)	UFI	–	64	4
Sulfides	USEPA Method 376.1 (USEPA, 1983)	UFI	3	64	5
Total alkalinity	NP	UFI	–	64	5
Total suspended solids (MF)	SM 2540D (Franson, 1992)	UFI	1	64	5
Total suspended solids (GF)	SM 2540D (modified)[b] (Franson, 1992)	UFI	–	64	5
Total suspended solids (MF)	USEPA Method 160.2 (USEPA, 1983)	OBG	–	11	1
Total suspended solids (GF)	USEPA Method 160.2 (modified)[b] (USEPA, 1983)	OBG	–	11	1
Volatile suspended solids[c]	NP	UFI	–	64	5
Inorganics and Organometallics					
Chromium (total)	USEPA Method 200.7 (USEPA, 1983)	OBG	2	11	1
Lead (total)	USEPA Method 200.7 (USEPA, 1983)	OBG	2	11	1
Manganese (total)	USEPA Method 200.7 (USEPA, 1983)	OBG	2	11	1
Manganese (total and dissolved)	NP	UFI	6	64	5
Nickel (total)	USEPA Method 200.7 (USEPA, 1983)	OBG	2	11	1
Iron (total and dissolved)	NP	UFI	6	64	5
Methylmercury (total and dissolved)	USEPA Method 1630 (USEPA, 1998)	FGS	7	73	6
Total mercury (total and dissolved)	USEPA Method 1631B (USEPA, 1999a)	FGS	7	73	6

Source: Exponent, 2001c

Notes: USEPA – US Environmental Protection Agency
FGS – Frontier Geosciences
GF – glass-fiber filter
MF – membrane filter
NP – information not provided
OBG – O'Brien & Gere Laboratories
SM – standard method
UFI – Upstate Freshwater Institute Laboratory

[a] Two trip blanks were also collected for volatile organic compounds.

[b] Modification consists of the use of a membrane filter with a pore size of 0.45 µm rather than the glass-fiber filter specified in the method description. This modification is made to provide a consistent pore size for sample filtration for dissolved mercury concentrations and total suspended solids.

[c] Total volatile solids in the suspended solids.

Table A4-2. Results for Field Duplicates, Surface Water Samples

		Survey:	O-WCSUP		
		Station:	W53		
		Date:	9/28/1999		
		Depth (m):	1		
		Duplicate:	D1	D2	
		Sample Number:	LW0019	LW0026	
Chemical	**Units**				**RPD**
Volatile Organic Compounds					
1,1,1-Trichloroethane	µg/L-ww		0.5 U	0.5 U	consistent
1,1,2,2-Tetrachloroethane	µg/L-ww		0.5 U	0.5 UJ	consistent
1,1,2-Trichloroethane	µg/L-ww		0.5 U	0.5 U	consistent
1,1-Dichloroethane	µg/L-ww		0.5 U	0.5 U	consistent
1,1-Dichloroethene	µg/L-ww		0.5 U	0.5 U	consistent
1,2-Dichlorobenzene	µg/L-ww		0.5 U	0.5 UJ	consistent
1,2-Dichloroethane	µg/L-ww		0.5 U	0.5 U	consistent
1,2-Dichloropropane	µg/L-ww		0.5 U	0.5 U	consistent
1,4-Dichlorobenzene	µg/L-ww		0.18 J	0.5 U	–
2-Butanone	µg/L-ww		10 UJ	10 U	consistent
2-Hexanone	µg/L-ww		5 U	5 U	consistent
4-Methyl-2-pentanone	µg/L-ww		5 U	5 U	consistent
Benzene	µg/L-ww		0.5 U	0.5 U	consistent
Bromodichloromethane	µg/L-ww		0.5 U	0.5 U	consistent
Bromoform	µg/L-ww		0.5 U	0.5 U	consistent
Bromomethane	µg/L-ww		1 U	1 U	consistent
Carbon disulfide	µg/L-ww		0.5 U	0.5 U	consistent
Carbon tetrachloride	µg/L-ww		0.5 U	0.5 U	consistent
Chlorobenzene	µg/L-ww		0.5 U	0.5 U	consistent
Chloroethane	µg/L-ww		1 U	1 U	consistent
Chloroform	µg/L-ww		0.16 J	0.16 J	0.0%
Chloromethane	µg/L-ww		1 U	1 U	consistent
Cis-1,2-dichloroethene	µg/L-ww		0.5 U	0.5 U	consistent
Cis-1,3-dichloropropene	µg/L-ww		0.5 U	0.5 U	consistent
Dibromochloromethane	µg/L-ww		0.5 U	0.5 U	consistent
Ethylbenzene	µg/L-ww		0.5 U	0.5 U	consistent
Methylene chloride	µg/L-ww		0.17 UJ	0.15 UJ	consistent
Styrene	µg/L-ww		0.5 U	0.5 U	consistent
Tetrachloroethene	µg/L-ww		0.5 U	0.5 U	consistent
Toluene	µg/L-ww		0.5 U	0.5 U	consistent
Trans-1,2-dichloroethene	µg/L-ww		0.5 U	0.5 U	consistent
Trans-1,3-dichloropropene	µg/L-ww		0.5 U	0.5 U	consistent
Trichloroethene	µg/L-ww		0.5 U	0.5 U	consistent
Vinyl chloride	µg/L-ww		1 U	1 U	consistent
Xylene (Total)	µg/L-ww		0.5 U	0.5 U	consistent
Conventional/Wet Chemistry					
Total suspended solids – E2-GF	mg/L-sus		2.8	3	6.9%
Total suspended solids – E2-MF	mg/L-sus		3.3	3	9.5%

Table A4-2. (cont.)

	Survey:	O-WCSUP		
	Station:	W53		
	Date:	9/28/1999		
	Depth (m):	1		
	Duplicate:	D1	D2	
	Sample Number:	LW0019	LW0026	
Chemical	**Units**			**RPD**
Inorganics and Organometallics				
Chromium	µg/L-ww	3.5	2.6	29.5%
Lead	µg/L-ww	1.6 U	1.6 U	consistent
Manganese	µg/L-ww	15 J	15.4 J	2.6%
Total mercury	ng/L-ww	26.2	9.81	91.0%
Total mercury – dissolved	ng/L-dis	7.83	4.11	62.3%
Methylmercury	ng/L-ww	0.815	0.822	0.9%
Methylmercury – dissolved	ng/L-dis	0.25	0.216	14.6%
Nickel	µg/L-ww	4 J	3.9 J	2.5%

Notes: 1. RPD – relative percent difference
2. If one of the samples was non-detect and the other was detected, the RPD could not be calculated.
3. If both samples were non-detects, the RPD was classified as "consistent."
4. GF – glass-fiber filter
5. MF– membrane filter

Table A4-3. Results for Field Duplicates – Water Column Samples

	Survey:	O-WCSUP			O-WCSUP			O-WCSUP		
	Station:	W1			W1			W1		
	Date:	10/15/1999			10/25/1999			11/9/1999		
	Depth (m):	9			9			12		
	Duplicate:	D1	D2		D1	D2		D1	D2	
	Sample Number:	LW0031	LW0027		LW0047	LW0051		LW0067	LW0068	
Chemical	**Units**			**RPD**			**RPD**			**RPD**
Conventional/Wet Chemistry										
Chlorophyll-a	µg/L-ww	14	14.1	0.7%	9.1	9.1	0.0%	11.1	10.7	3.7%
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	consistent	1000 U	1000 U	consistent	1000 U	1000 U	consistent
Sulfate	mg/L-ww	181.3		–		146.8	–	192.9	179.5	7.2%
Sulfides	mg/L-ww	1 U	1 U	consistent	1 U	1 U	consistent	1 U	1 U	consistent
Total alkalinity	mg/L-ww	140.5	141	0.4%	147.4	148.4	0.7%	148.1	150	1.3%
Total suspended solids – 2540D-GF	mg/L-sus	3.1	3.1	0.0%	3.5	3	15.4%	2.1	1.9	10.0%
Total suspended solids – 2540D-MF	mg/L-sus	3	2.2	30.8%	1	0.3	107.7%	0.1 U	0.1 U	consistent
Volatile suspended solids	mg/L-ww	1.8	2	10.5%	1.9	1.3	37.5%	1.5	0.8	60.9%
Inorganics and Organometallics										
Iron	µg/L-ww	133	76	54.5%	39	83	72.1%	54	63	15.4%
Iron – dissolved	µg/L-dis	15	11	30.8%	1	6	142.9%	0.1 U	1	inconsistent
Manganese	µg/L-ww	73	99	30.2%	98	88	10.8%	95	107	11.9%
Manganese – dissolved	µg/L-dis	10	18	57.1%	20	19	5.1%	0.035 U	6	inconsistent
Total mercury	ng/L-ww	7.2	7.6	5.4%	6.74	6.5	3.6%	10.8	11.4	5.4%
Total mercury – dissolved	ng/L-dis	2.5	1.9	27.3%	2.26	1.37 J	49.0%	1.62	1.89	15.4%
Methylmercury	ng/L-ww	2.24	2.28	1.8%	2.23	1.93	14.4%	1.65	1.6	3.1%
Methylmercury – dissolved	ng/L-dis	1.15	1.08	6.3%	0.949	1.15	19.2%	0.66	0.763	14.5%

Table A4-3. (cont.)

	Survey:	O-WCSUP			O-WCSUP		
	Station:	W1			W12		
	Date:	12/2/1999			9/28/1999		
	Depth (m):	12			2		
	Duplicate:	D1	D2		D1	D2	
	Sample Number:	LW0076	LW0075		LW0015	LW0016	
Chemical	**Units**			**RPD**			**RPD**
Conventional/Wet Chemistry							
Chlorophyll-a	µg/L-ww	11.7	12	2.5%	22.8	44.6	64.7%
Hydrogen sulfide	µg/L-ww	1000 U	1000 U	consistent	1000 U	1000 U	consistent
Sulfate	mg/L-ww				196	198.9	1.5%
Sulfides	mg/L-ww	1 U	1 U	consistent	1 U	1 U	consistent
Total alkalinity	mg/L-ww	150	147.2	1.9%	116.9	116	0.8%
Total suspended solids – 2540D-GF	mg/L-sus	2.4	3.5	37.3%	2.9	4.9	51.3%
Total suspended solids – 2540D-MF	mg/L-sus	2	1	66.7%	0.1 U	0.1 U	consistent
Volatile suspended solids	mg/L-ww	1.5	2.4	46.2%	2.6	4.1	44.8%
Inorganics and Organometallics							
Iron	µg/L-ww	96	92	4.3%	76	65	15.6%
Iron – dissolved	µg/L-dis	5	1	133.3%	28	13	73.2%
Manganese	µg/L-ww	69	68	1.5%	32	25	24.6%
Manganese – dissolved	µg/L-dis	6	7	15.4%	5	2	85.7%
Mercury – total	ng/L-ww	6.55	6.95	5.9%	4.83	3.95	20.0%
Mercury – dissolved	ng/L-dis	1.36	1.61	16.8%	0.83	0.25	107.4%
Methylmercury	ng/L-ww	1.19	1.35	12.6%	1.12	1.67	39.4%
Methylmercury – dissolved	ng/L-dis	0.547	0.571	4.3%	0.315	0.361	13.6%

Notes: 1. RPD = relative percent difference

2. If one of the samples was non-detect and the other was detected, the RPD could not be calculated.

3. If both samples were non-detects, the RPD was classified as consistent.

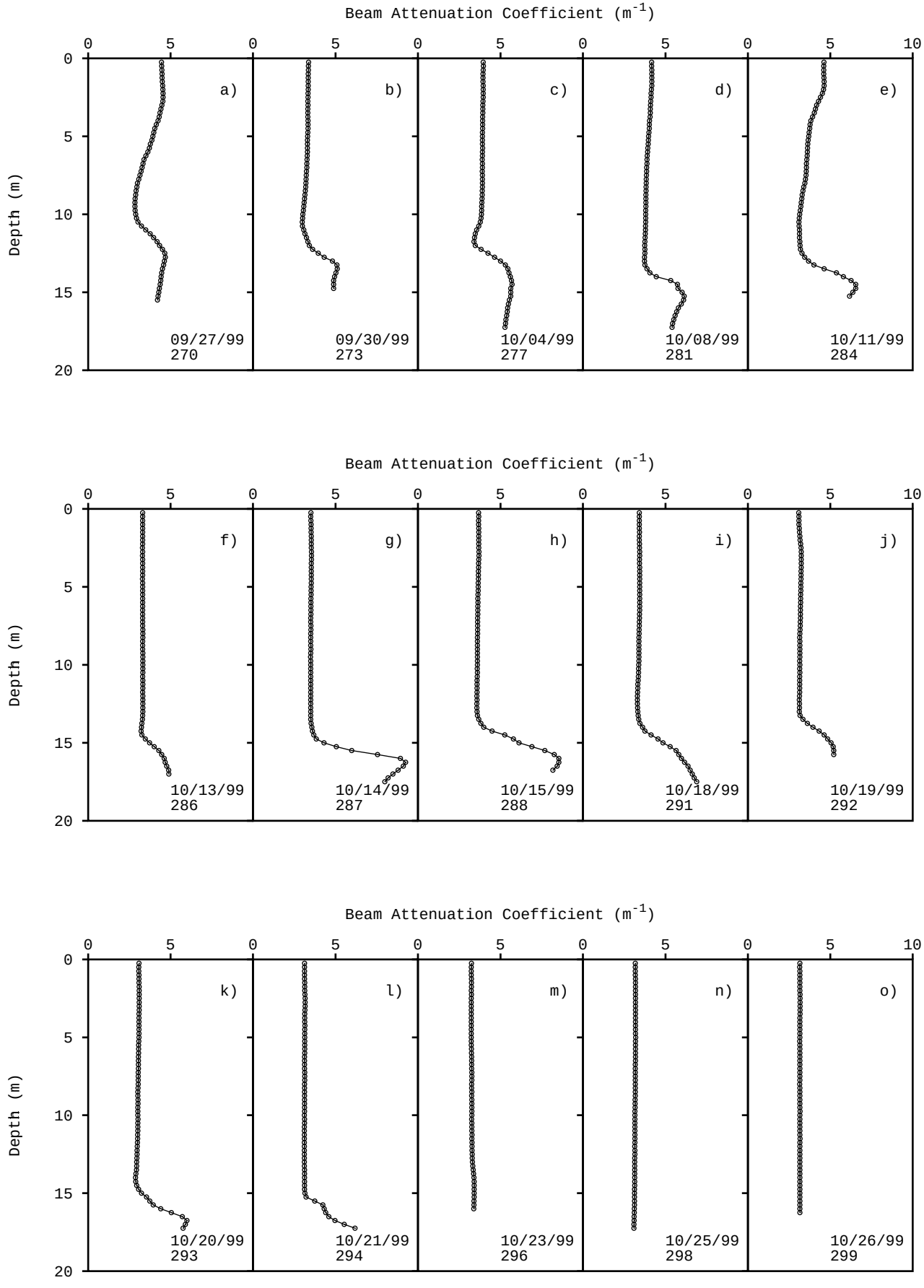
4. GF – glass fiber filter

5. MF– membrane filter

Appendix A5

Data Provided by Upstate Freshwater Institute (1999)

1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: North Deep



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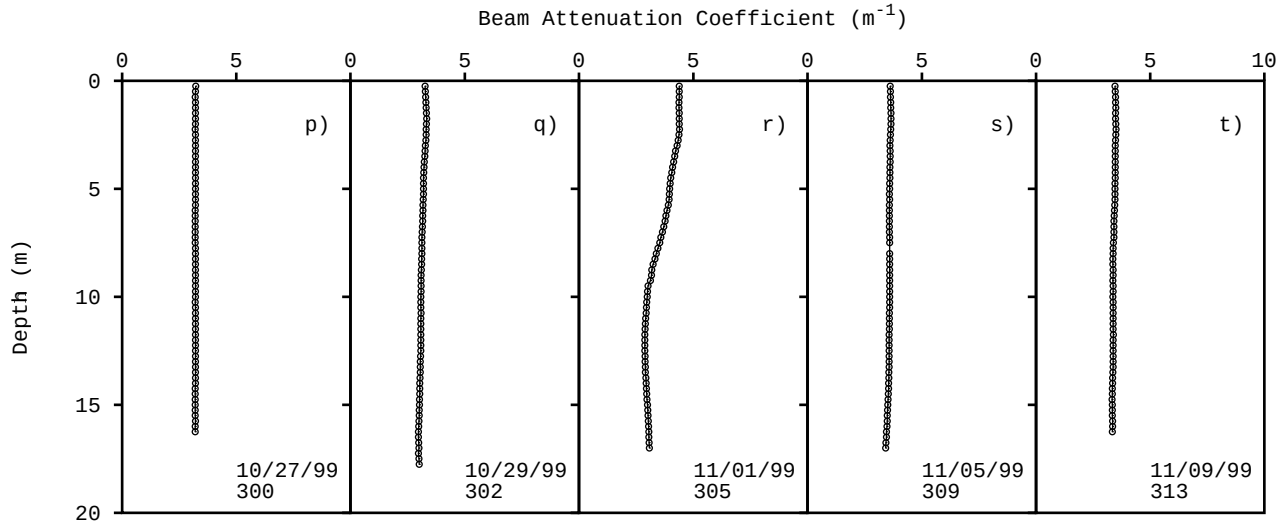
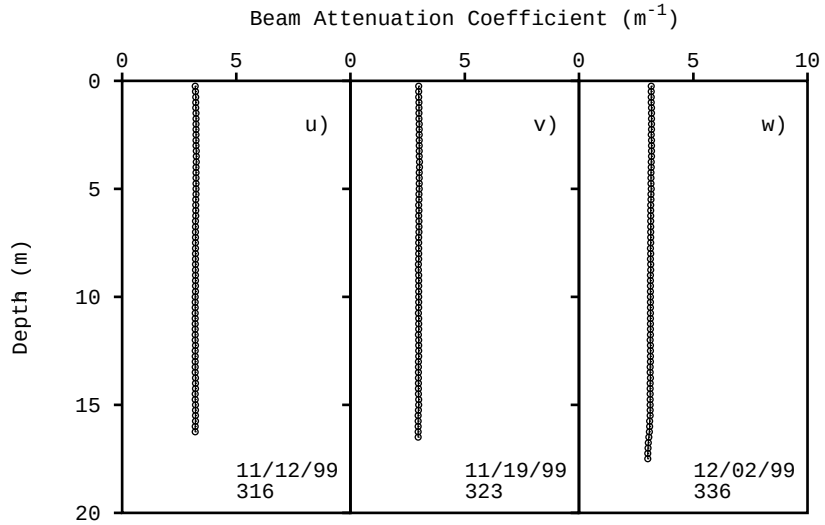
Thu Dec 02 15:00:41 1999

1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: North Deep





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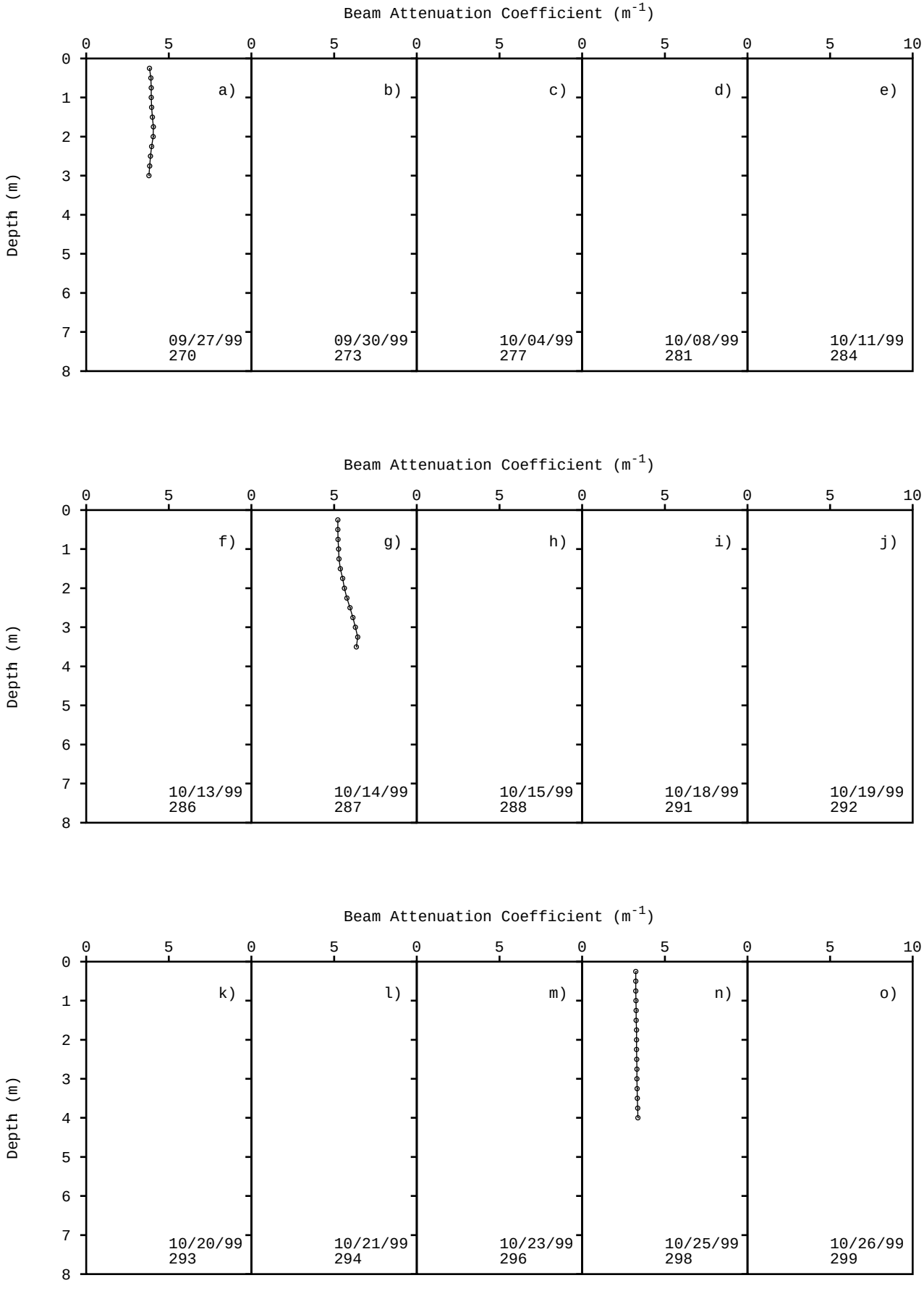
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: Outlet



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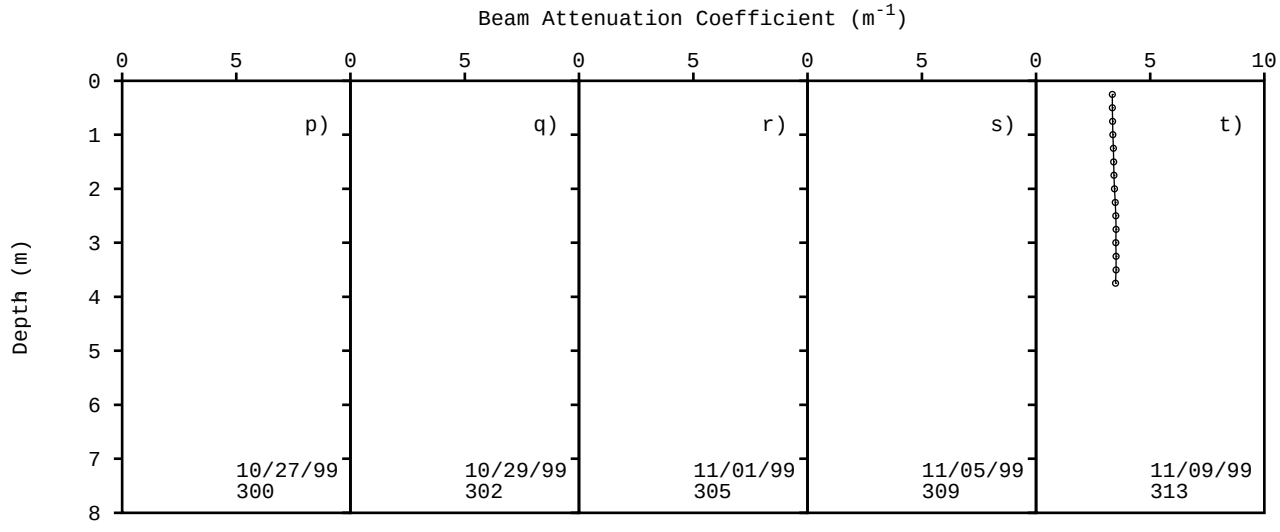
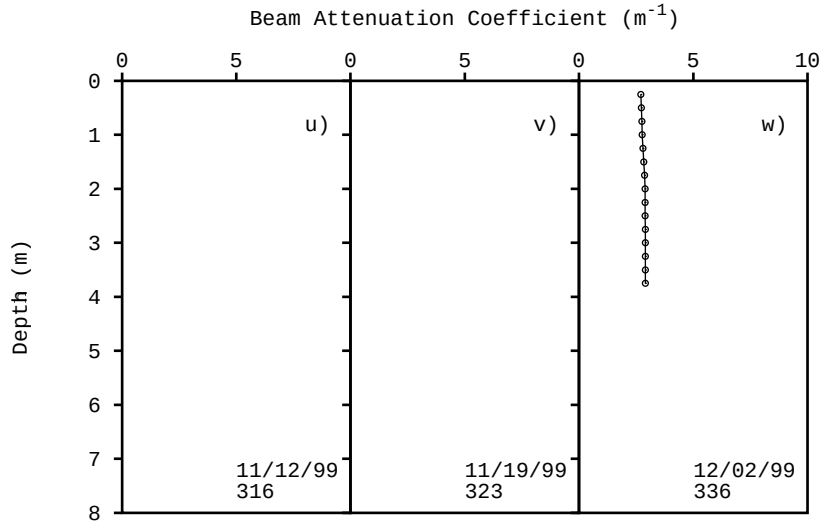
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: Outlet





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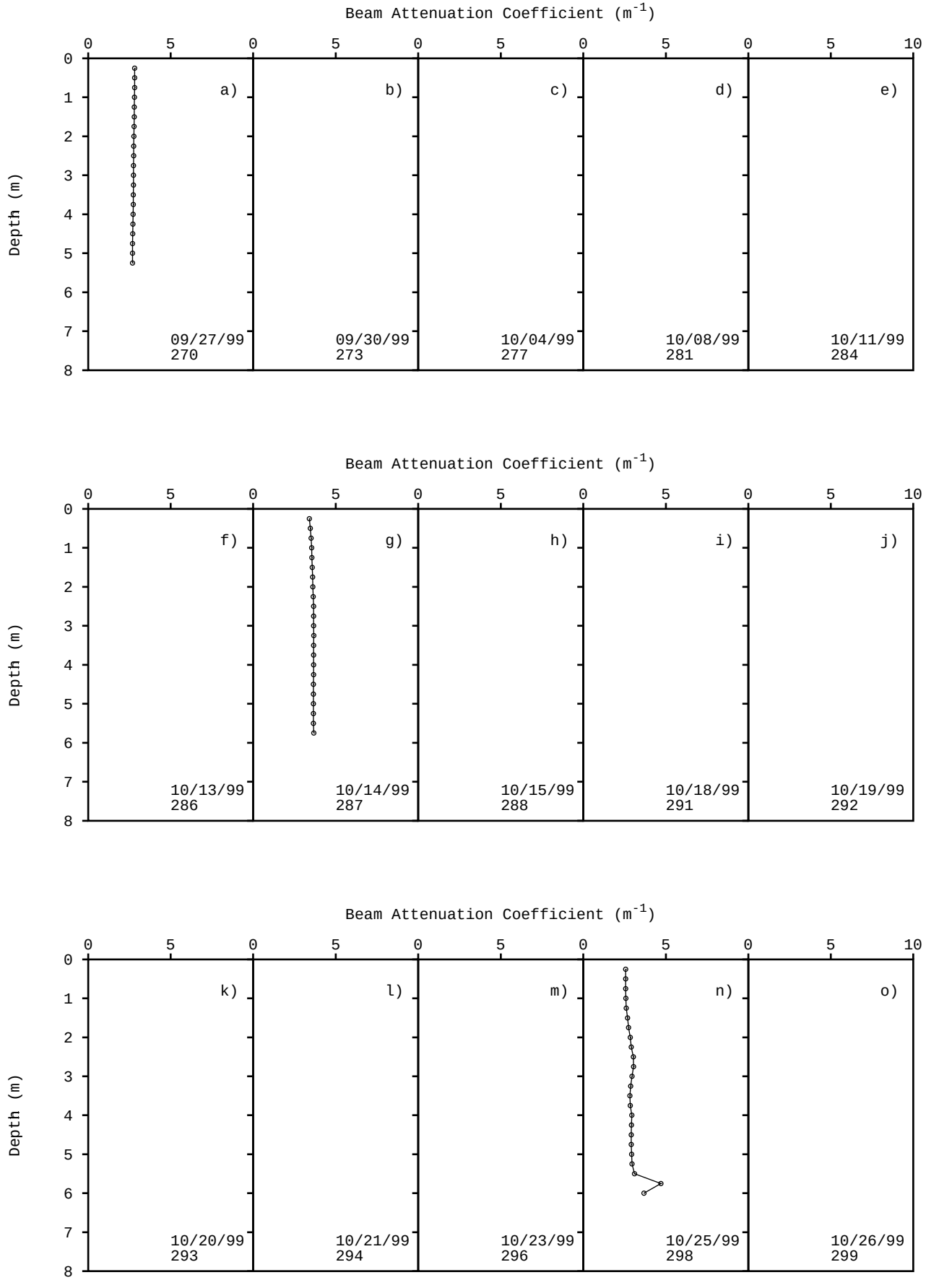
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: River Downstream



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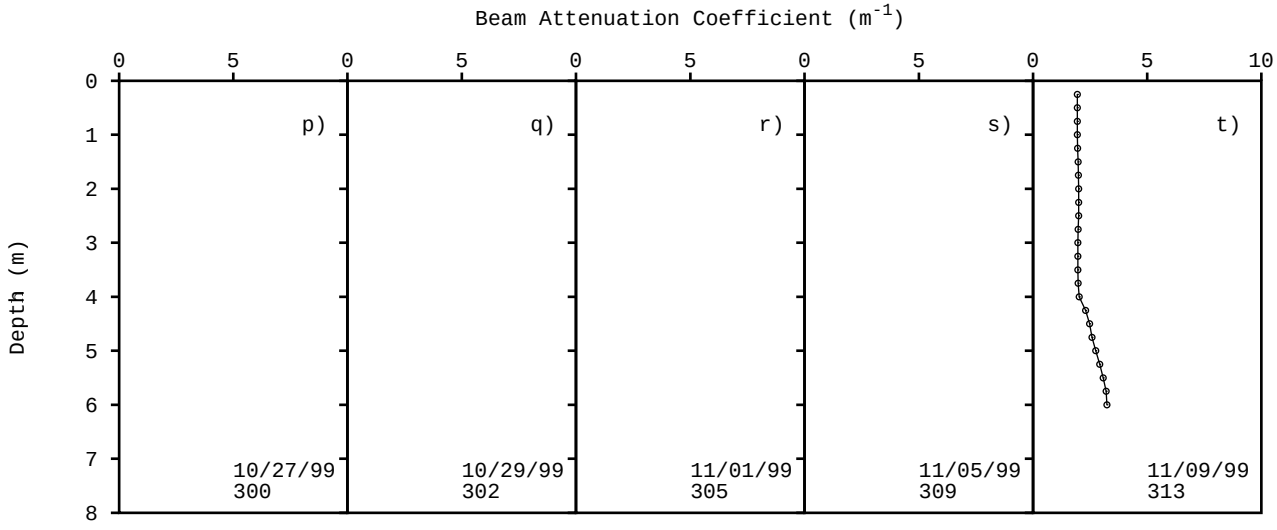
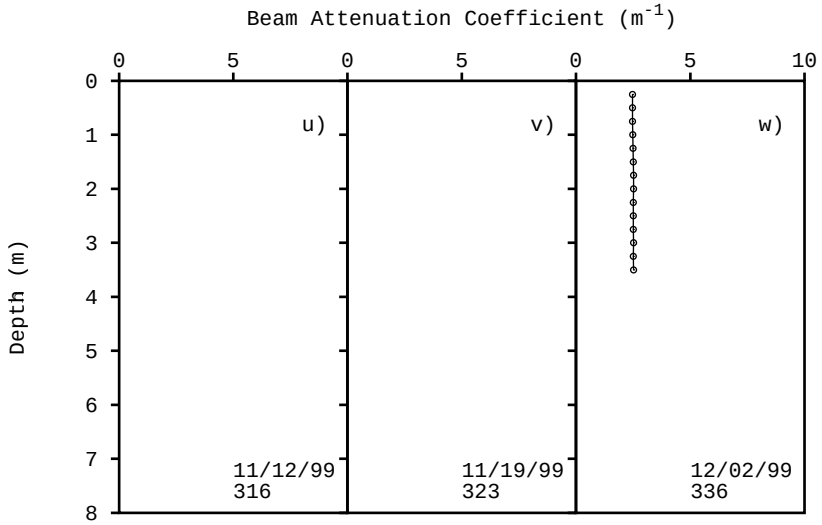
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: River Downstream





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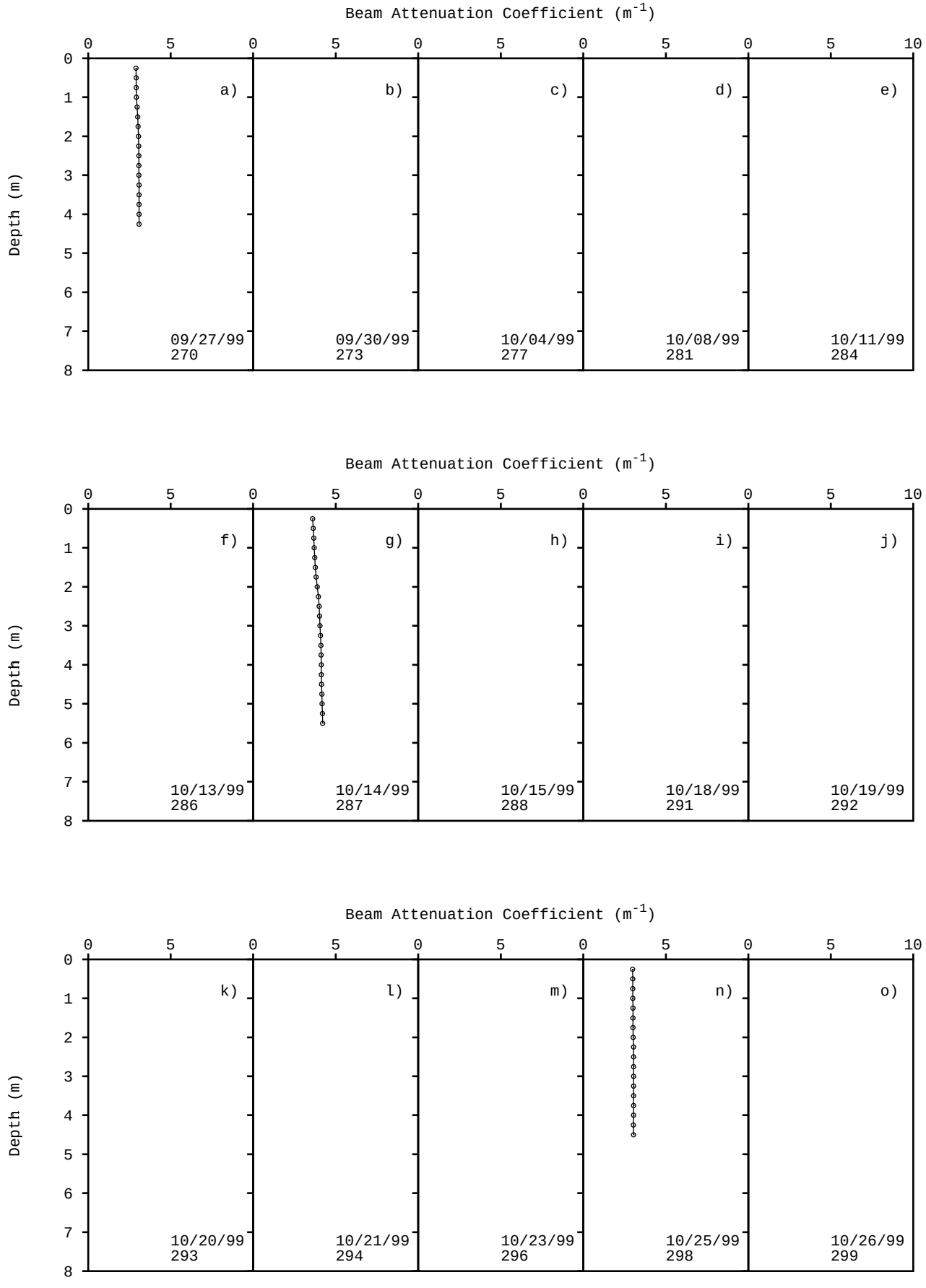
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: River Upstream



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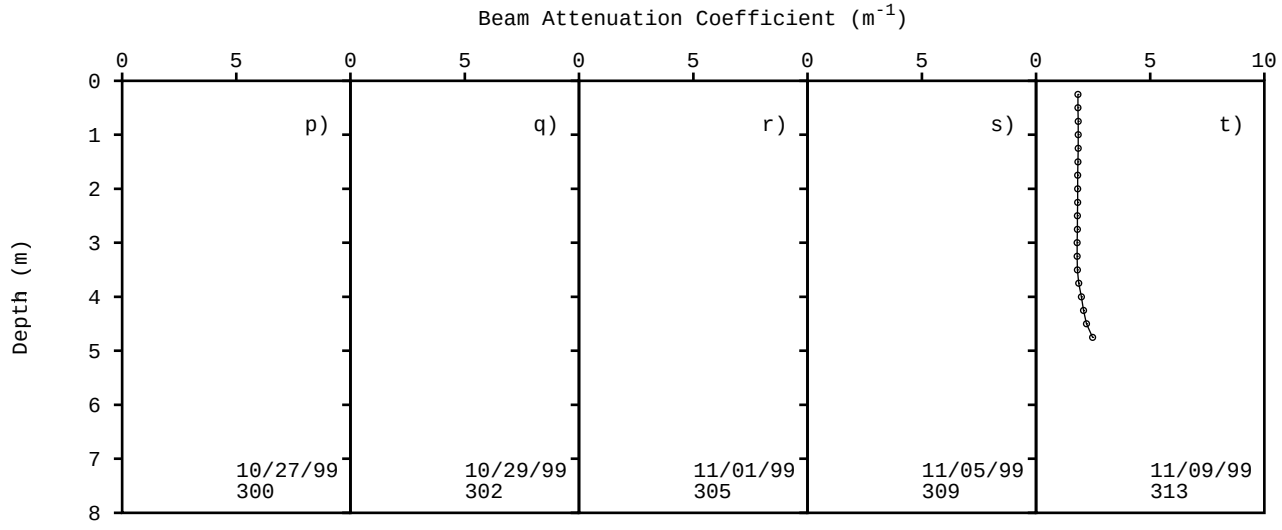

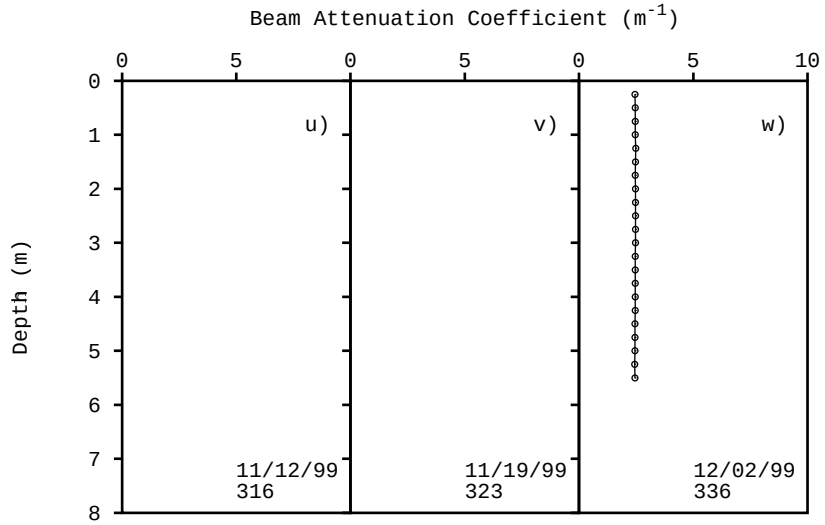

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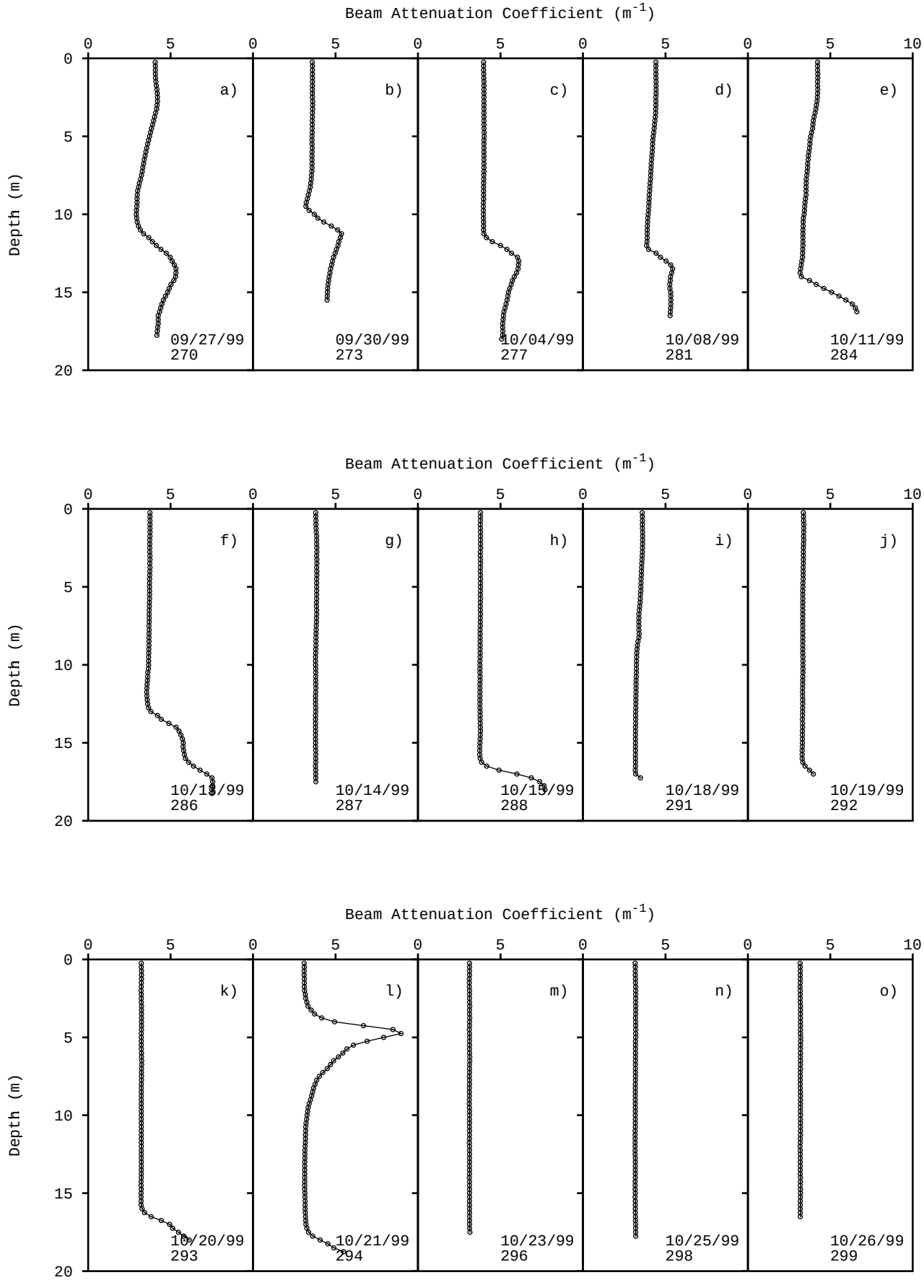
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: South Deep



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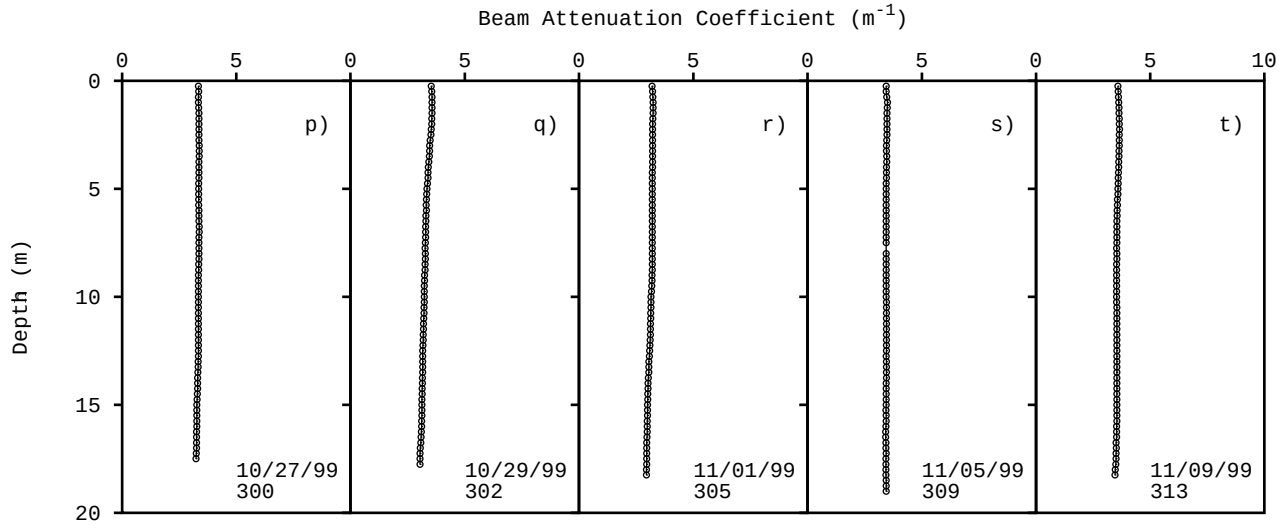
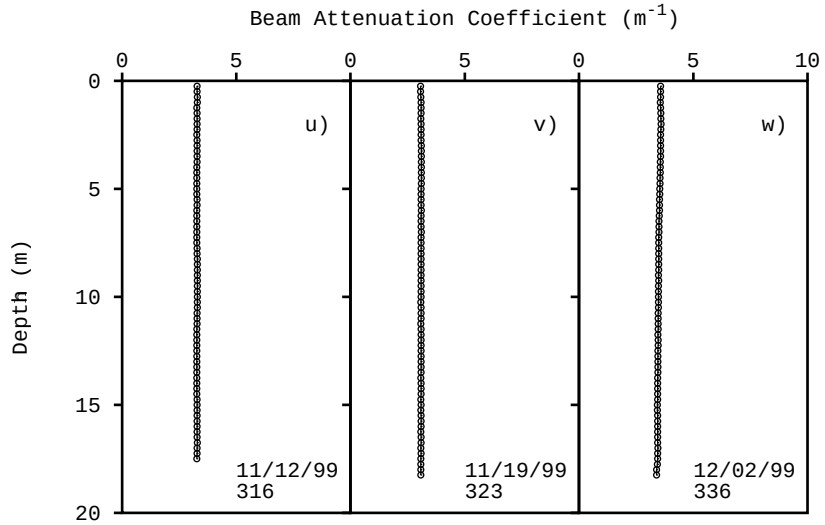
1999 Beam Attenuation Coefficient Profiles for Onondaga Lake: South Deep





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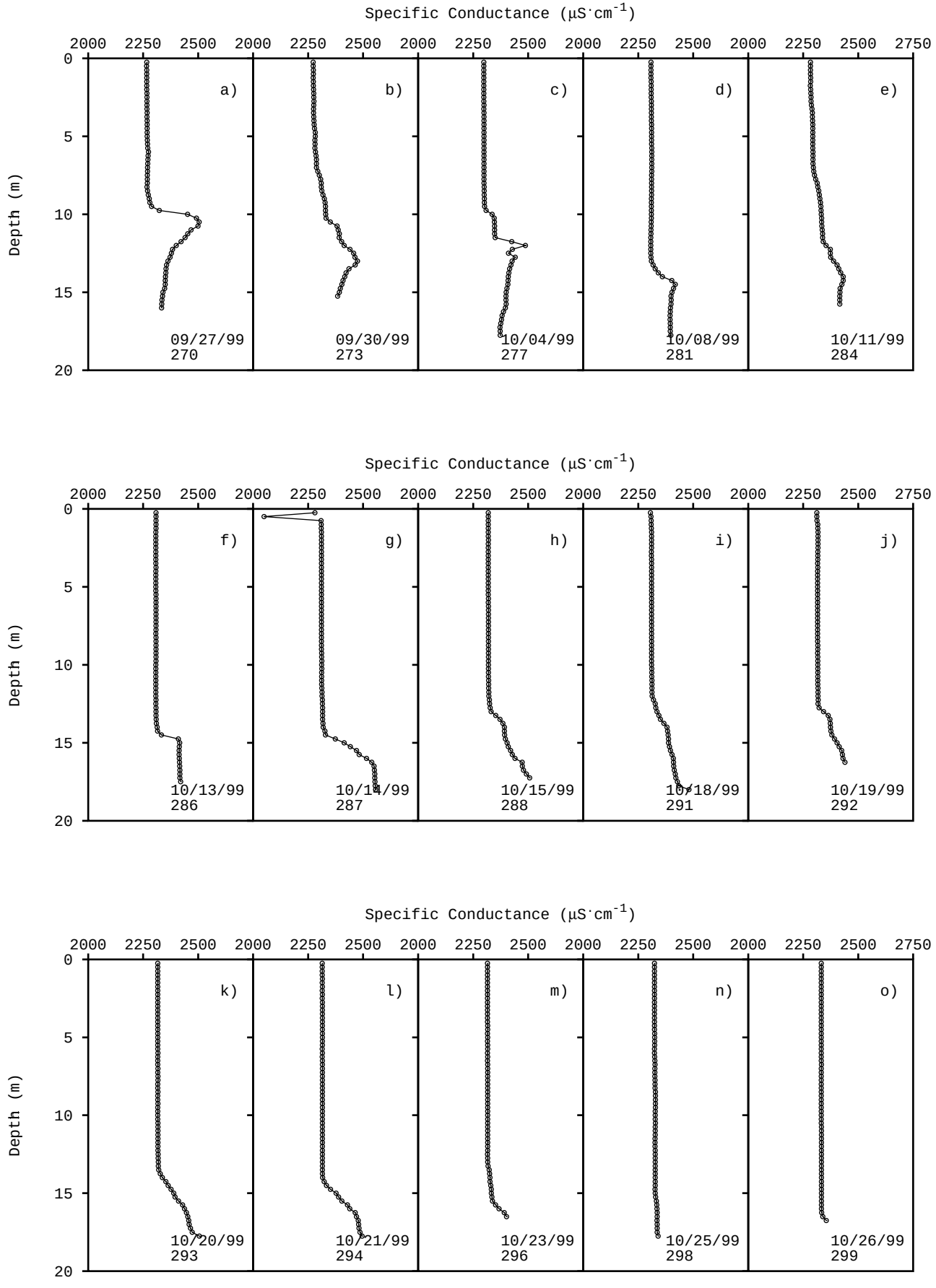
1999 Specific Conductance Profiles for Onondaga Lake: North Deep



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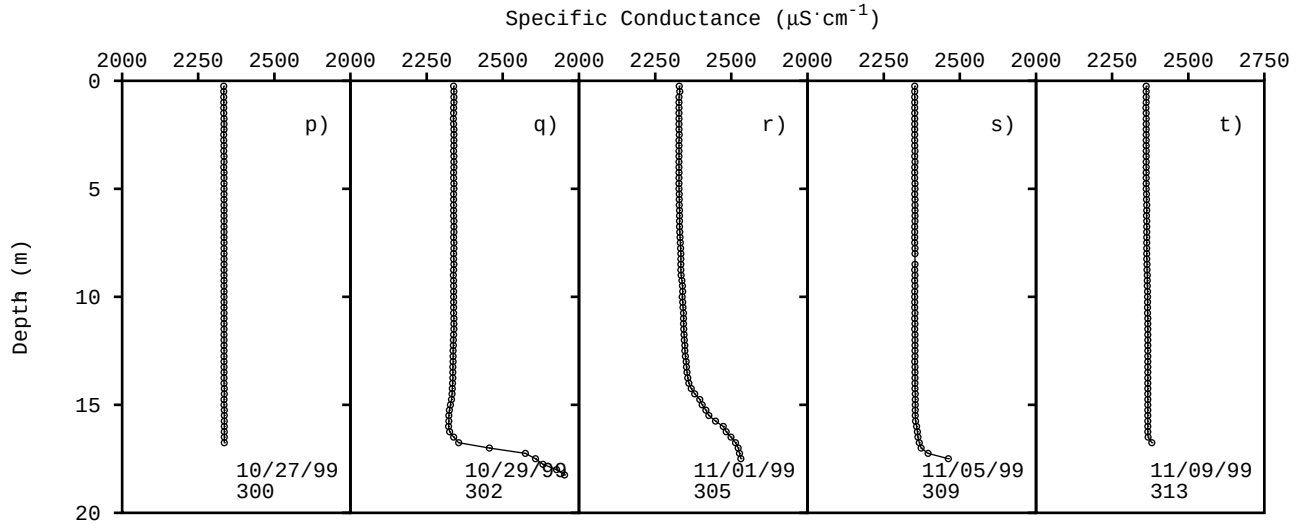

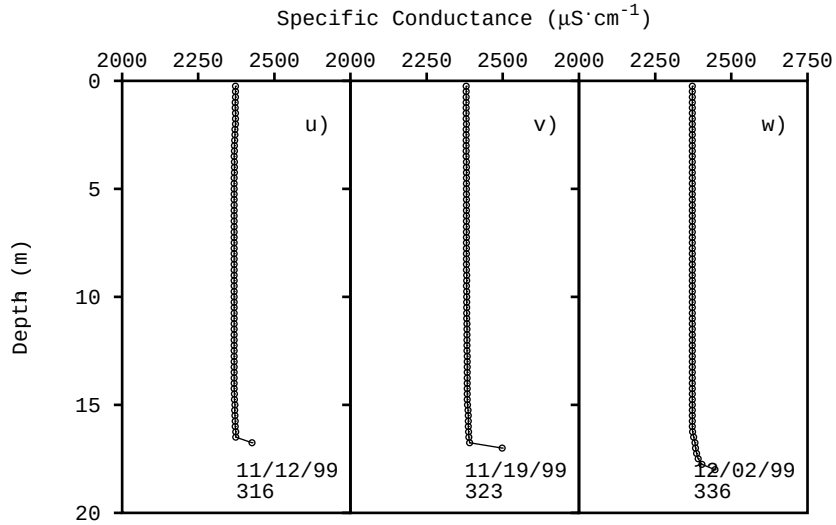

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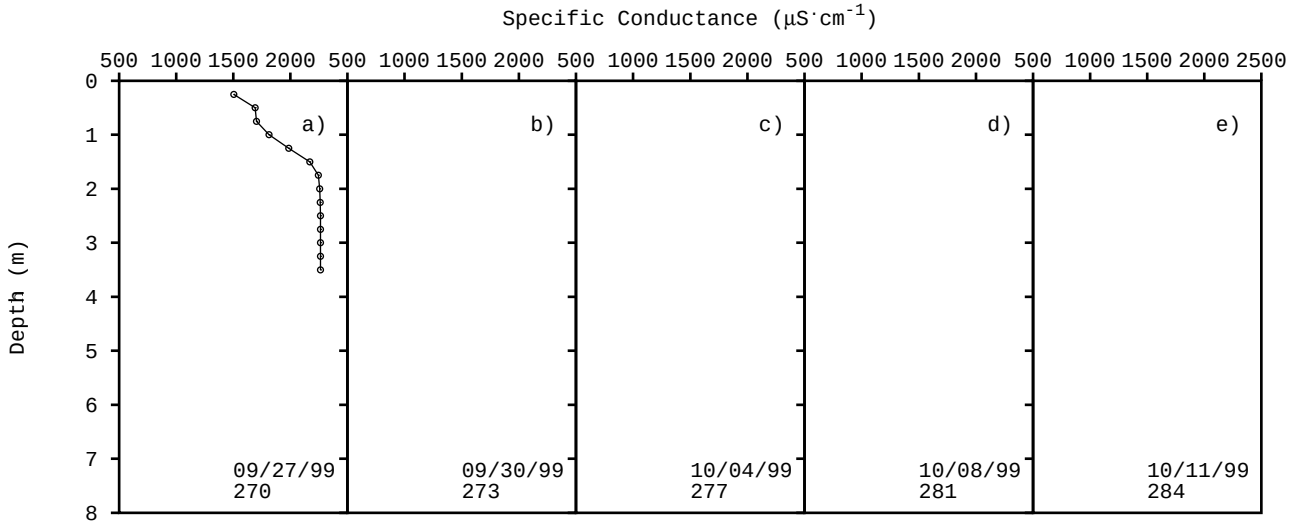
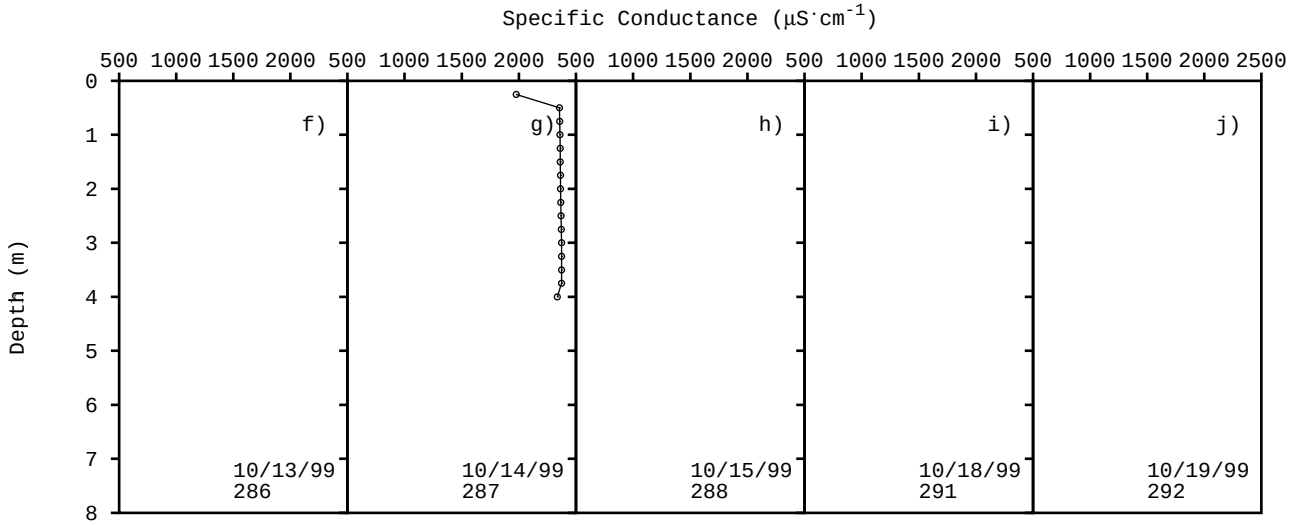
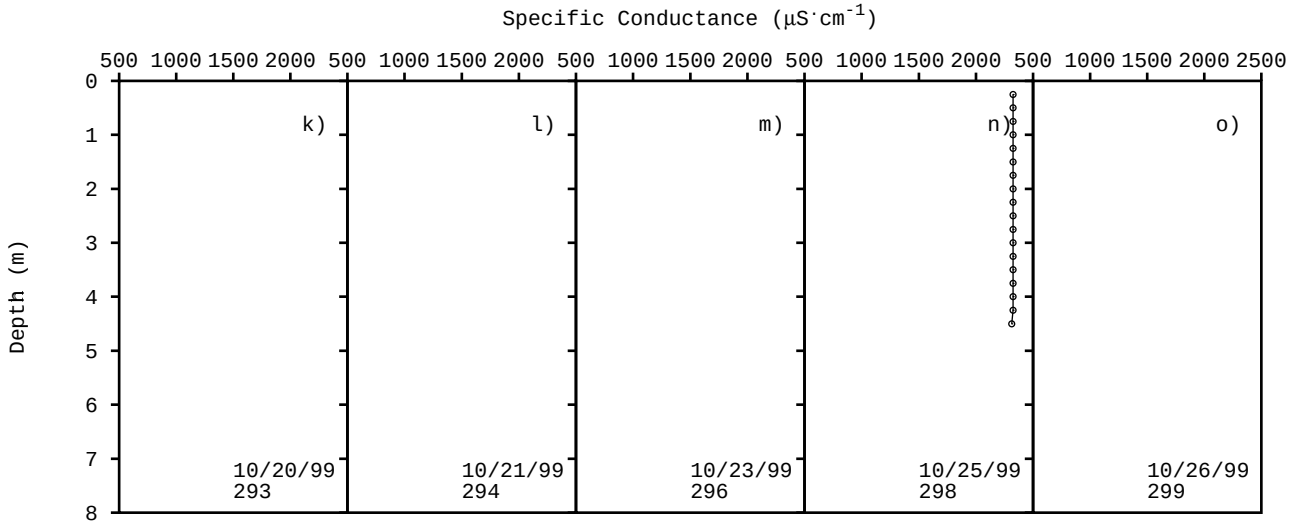
1999 Specific Conductance Profiles for Onondaga Lake: Outlet







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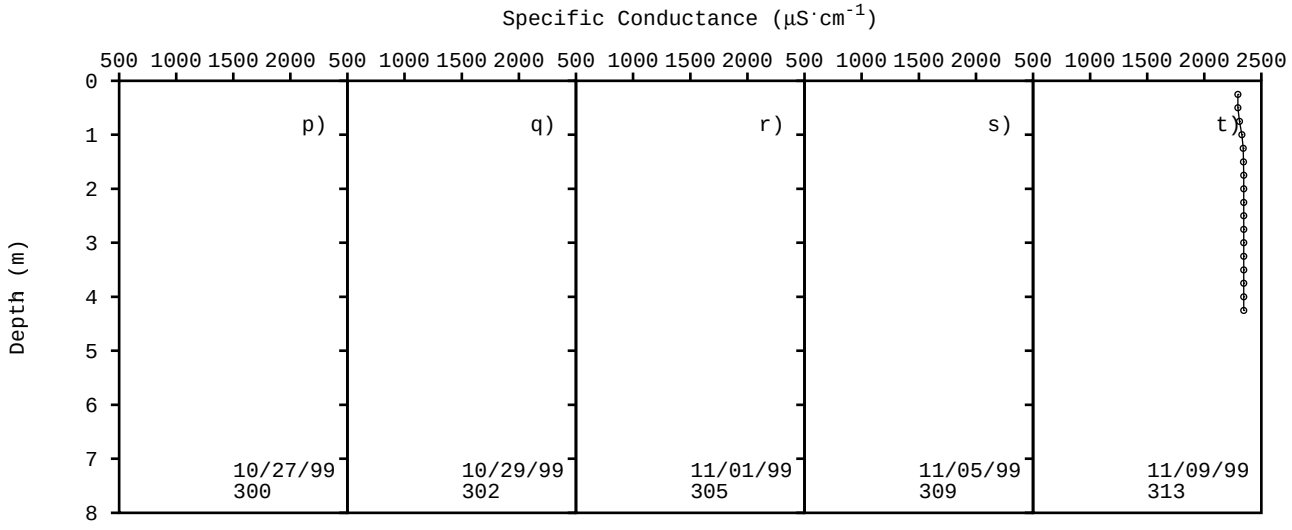
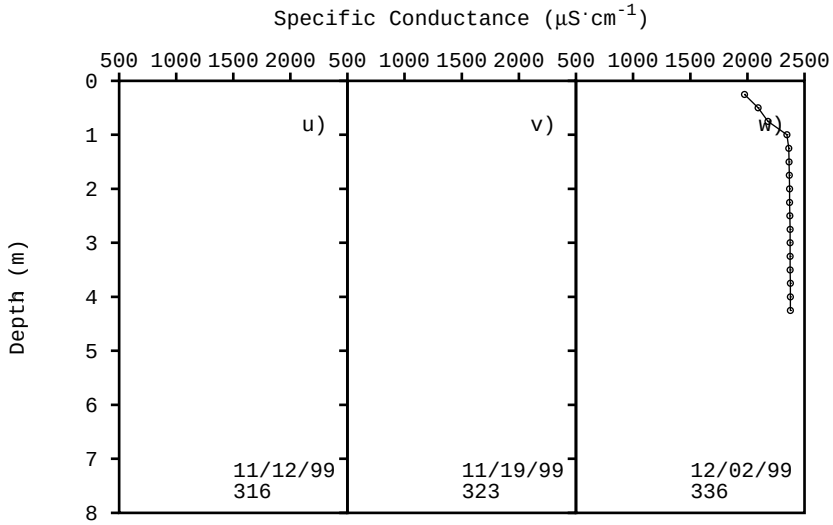
1999 Specific Conductance Profiles for Onondaga Lake: Outlet





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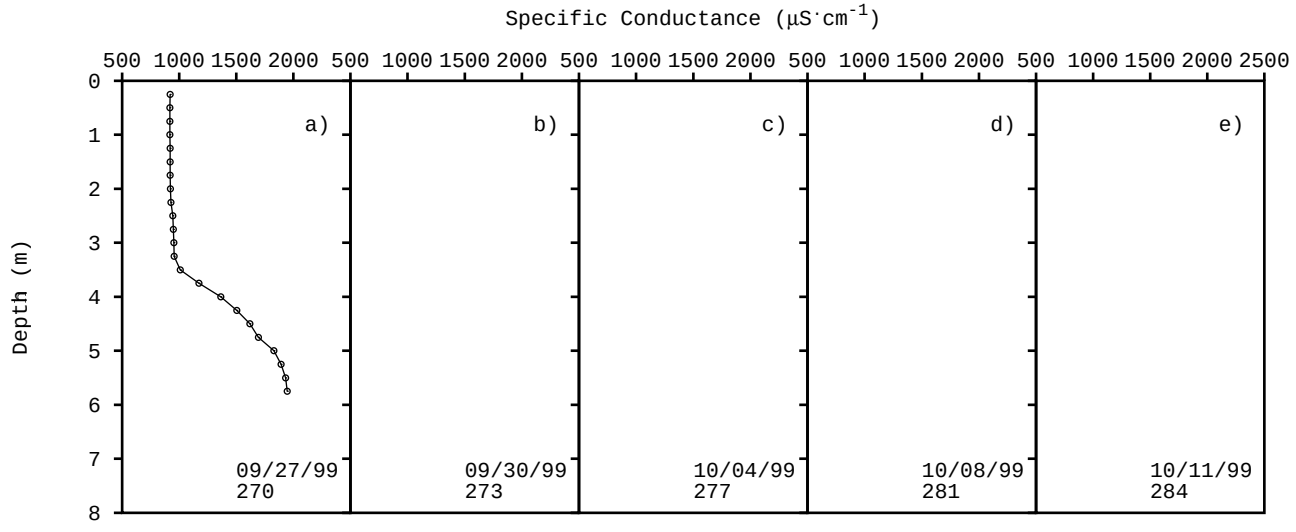
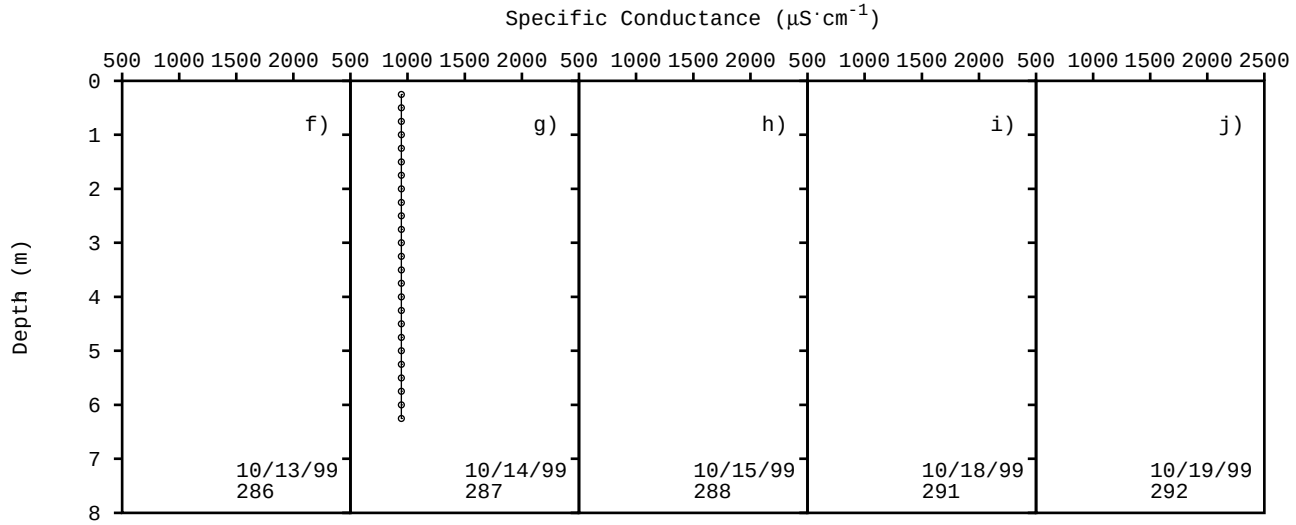
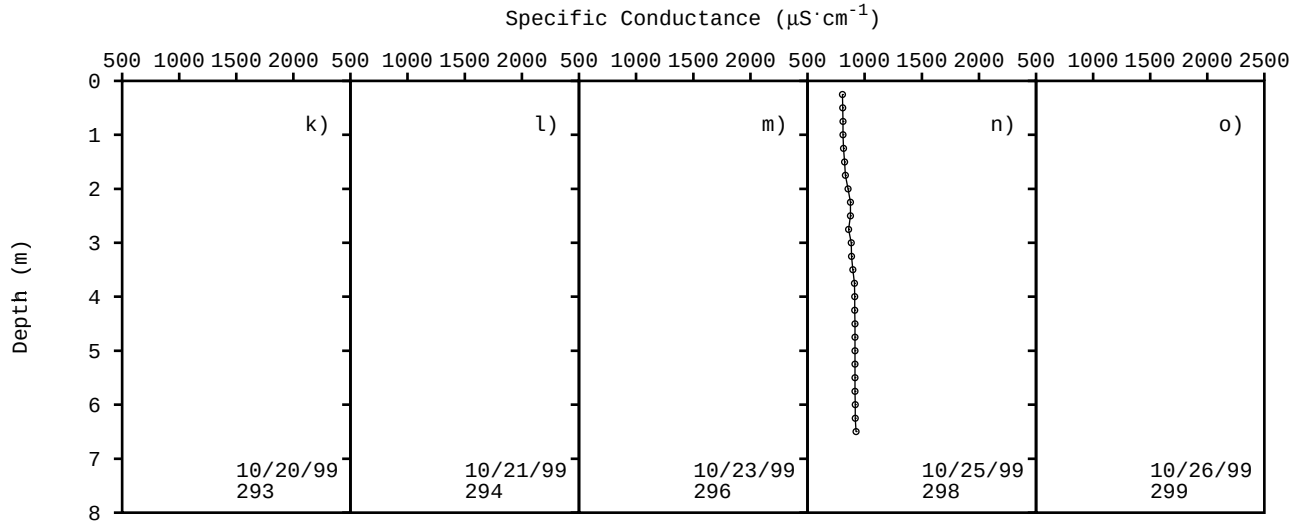
1999 Specific Conductance Profiles for Onondaga Lake: River Downstream







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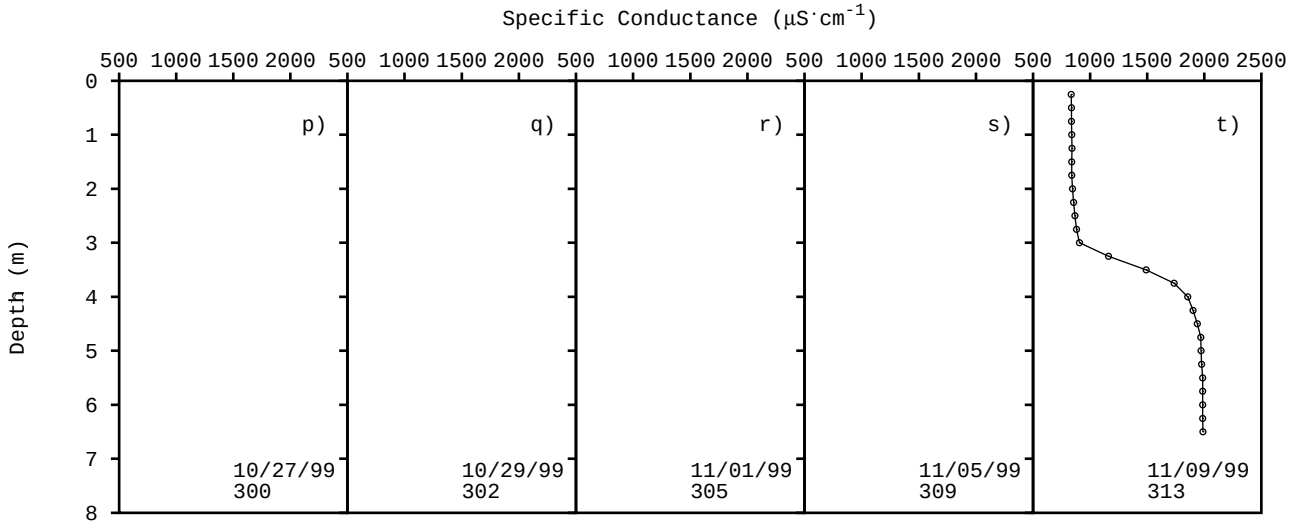
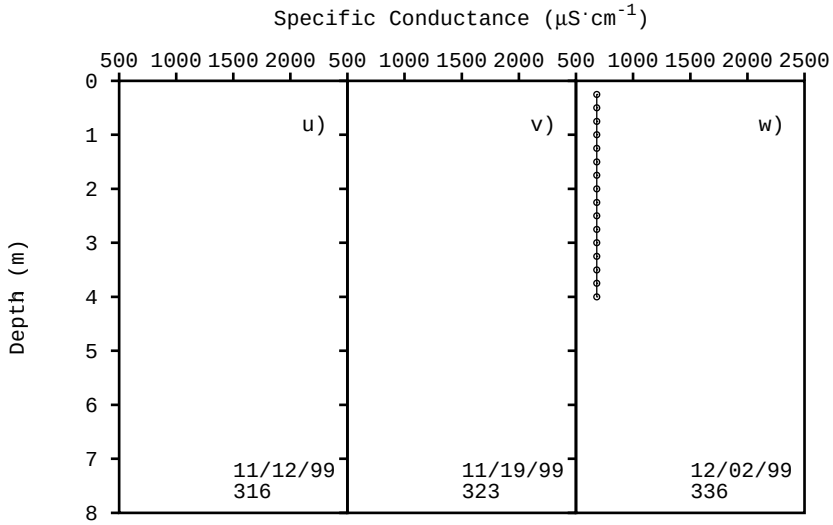
1999 Specific Conductance Profiles for Onondaga Lake: River Downstream





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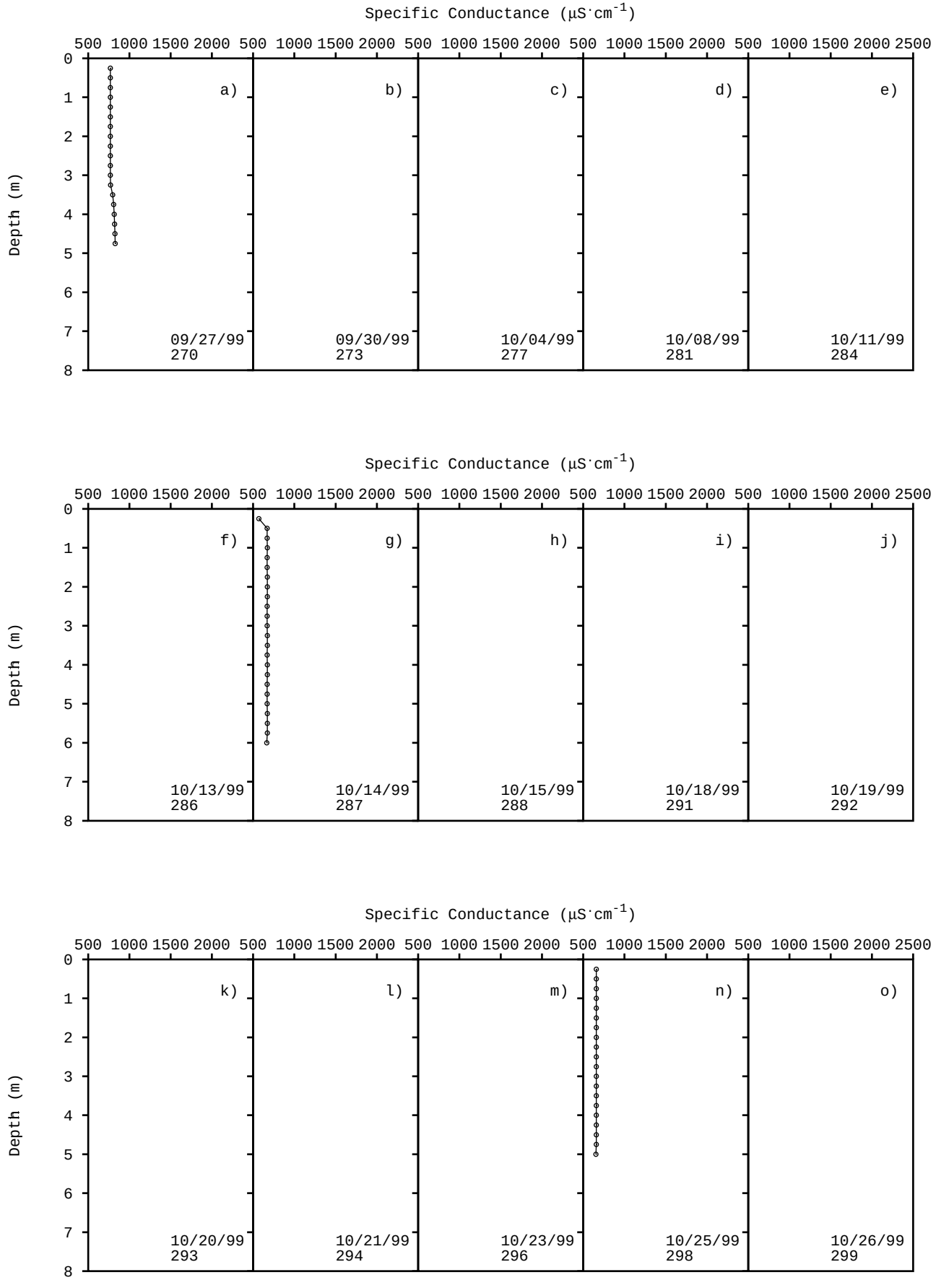
1999 Specific Conductance Profiles for Onondaga Lake: River Upstream



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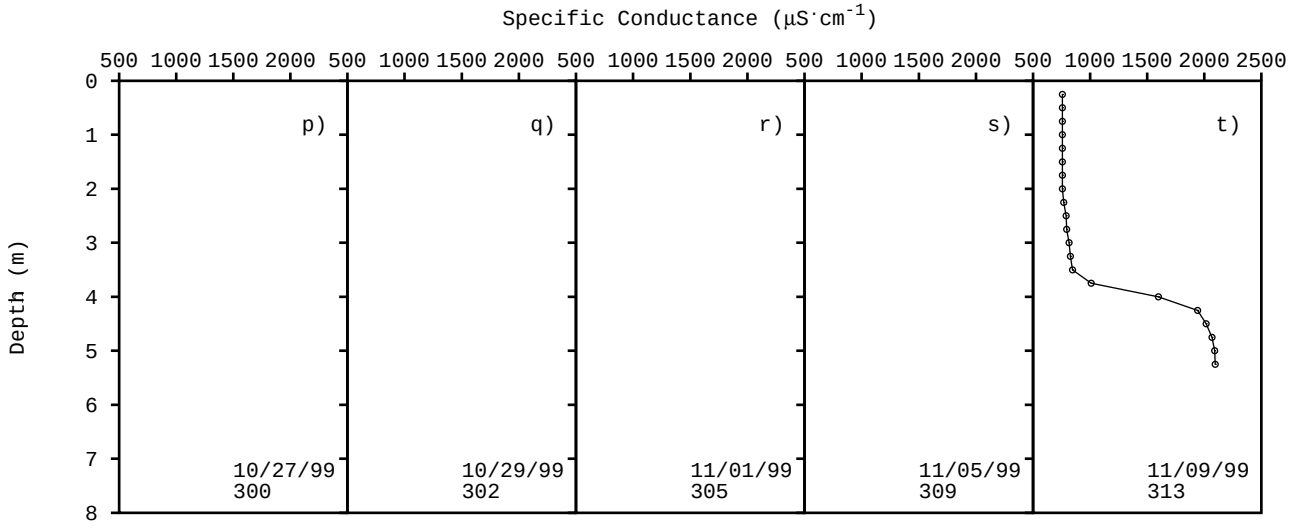
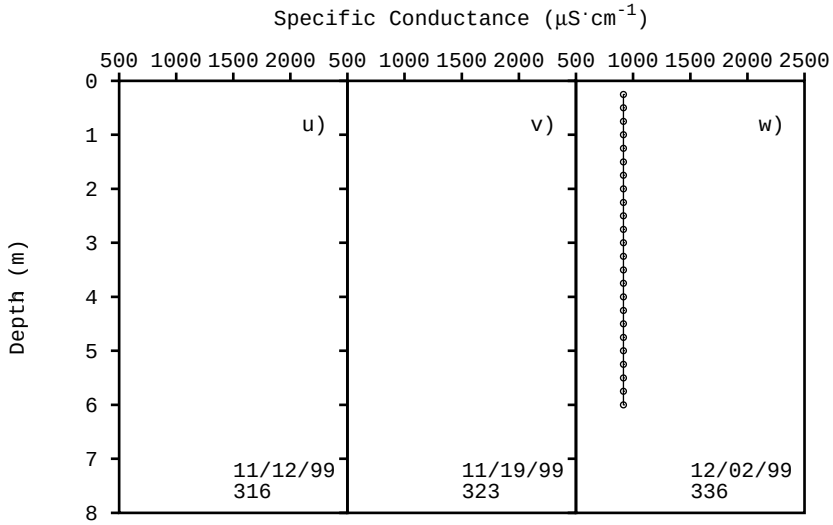
1999 Specific Conductance Profiles for Onondaga Lake: River Upstream





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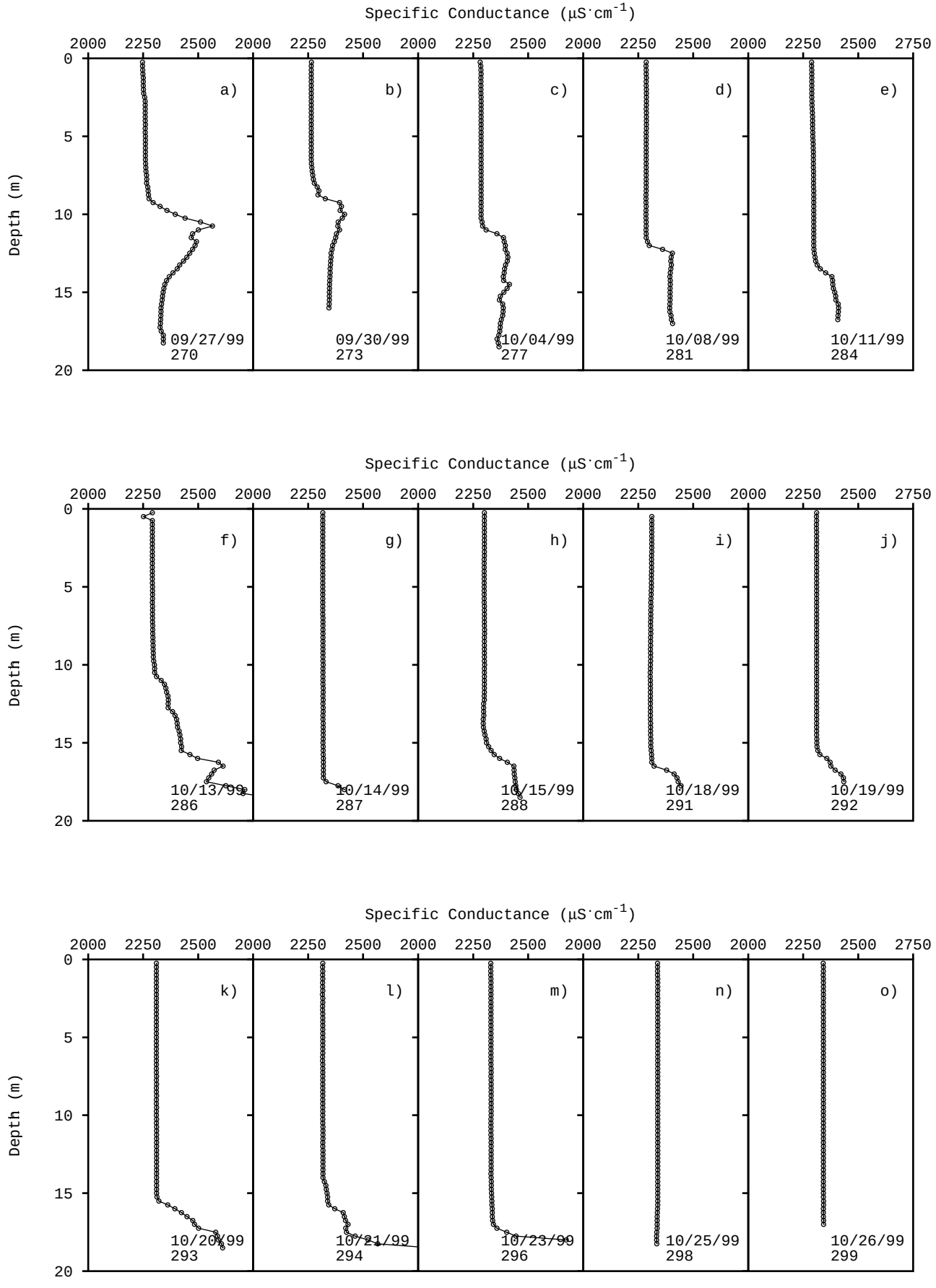
1999 Specific Conductance Profiles for Onondaga Lake: South Deep



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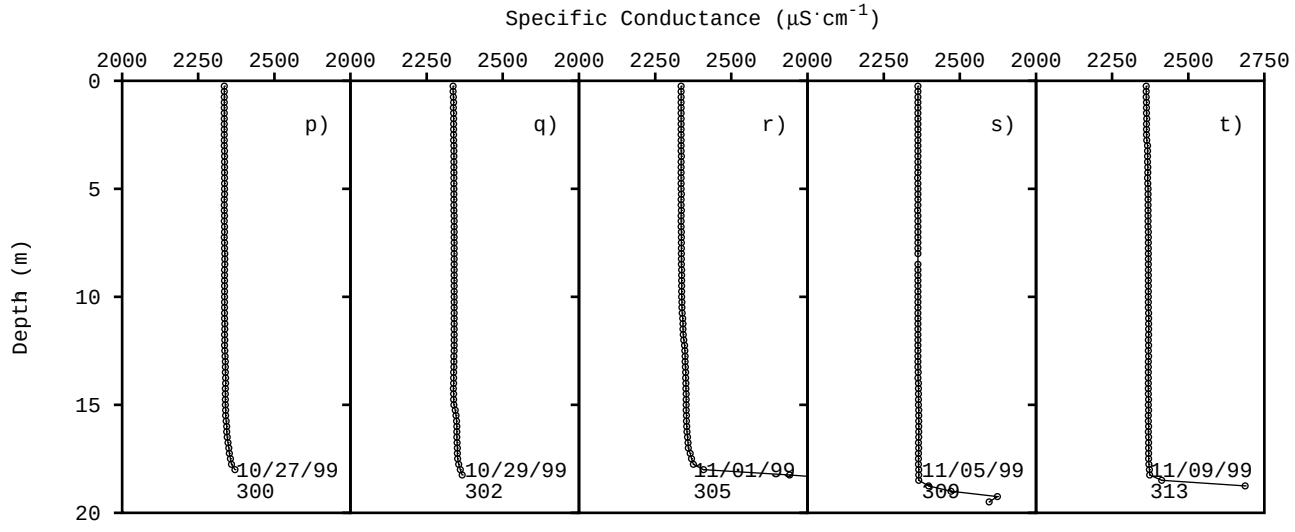
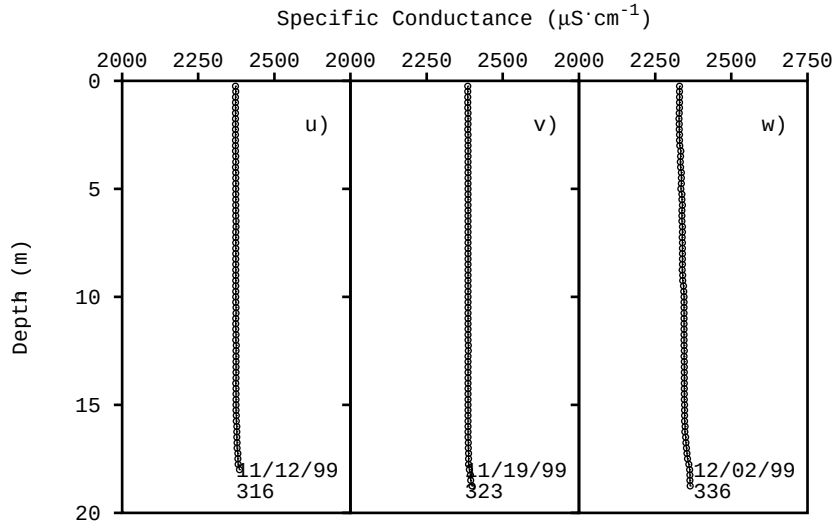
1999 Specific Conductance Profiles for Onondaga Lake: South Deep





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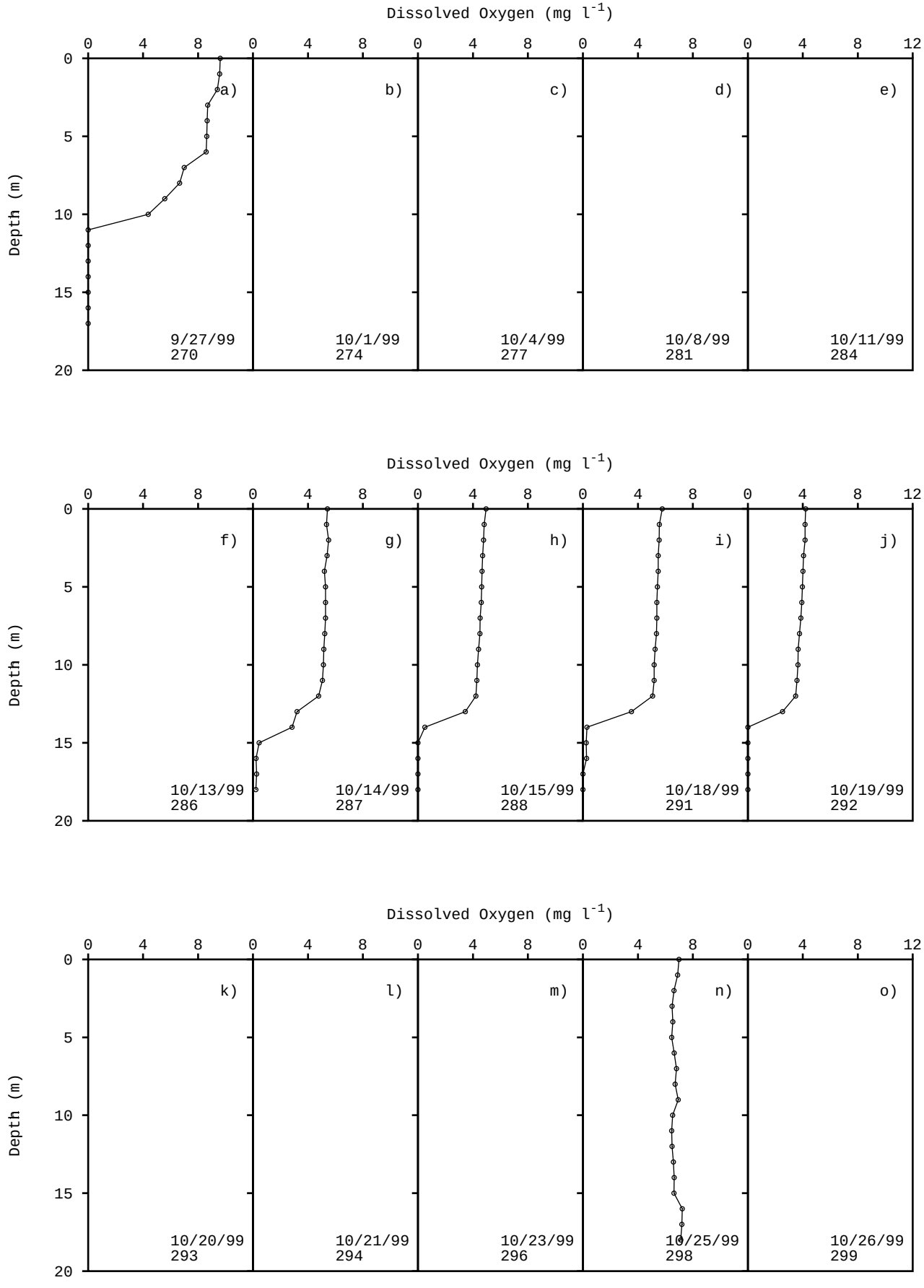
1999 Dissolved Oxygen Profiles for Onondaga Lake: North Deep



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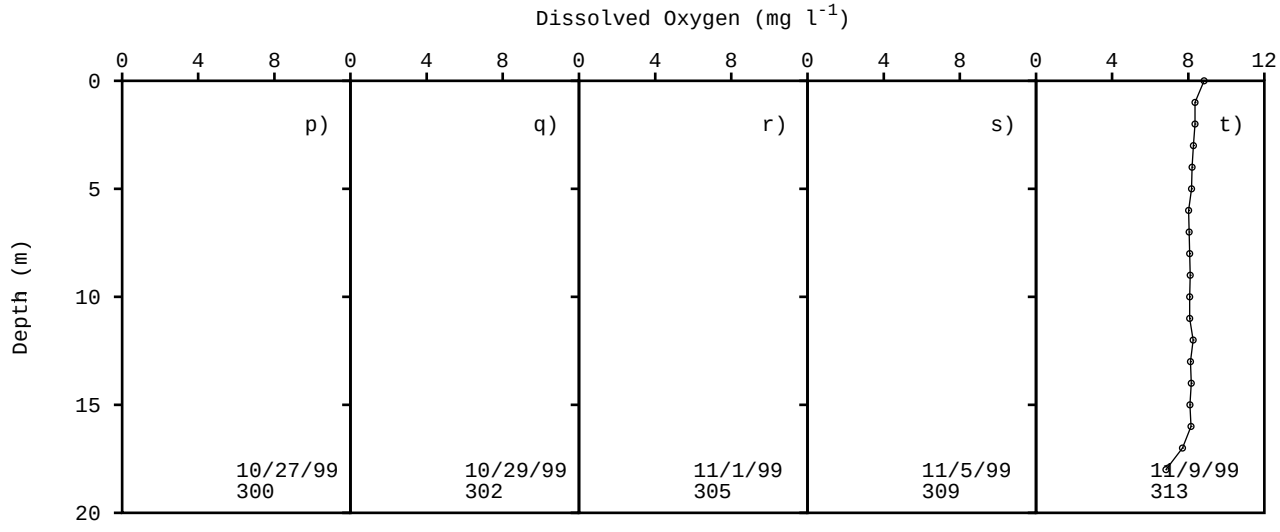
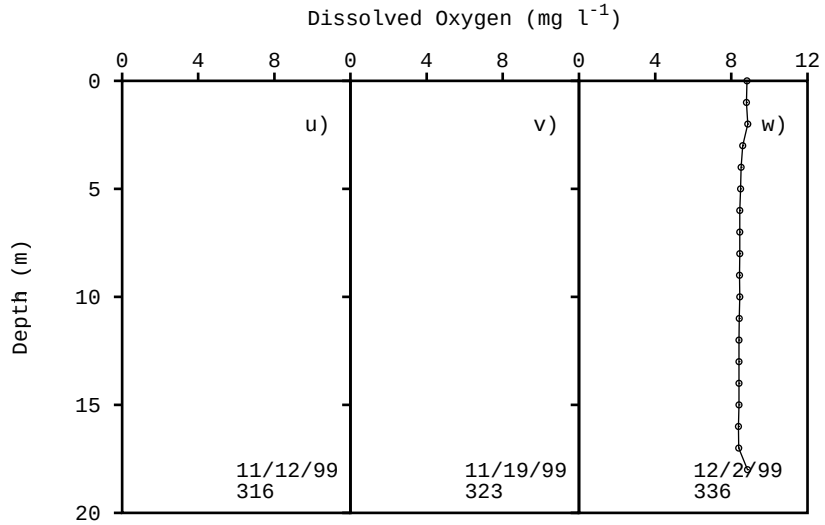
1999 Dissolved Oxygen Profiles for Onondaga Lake: North Deep





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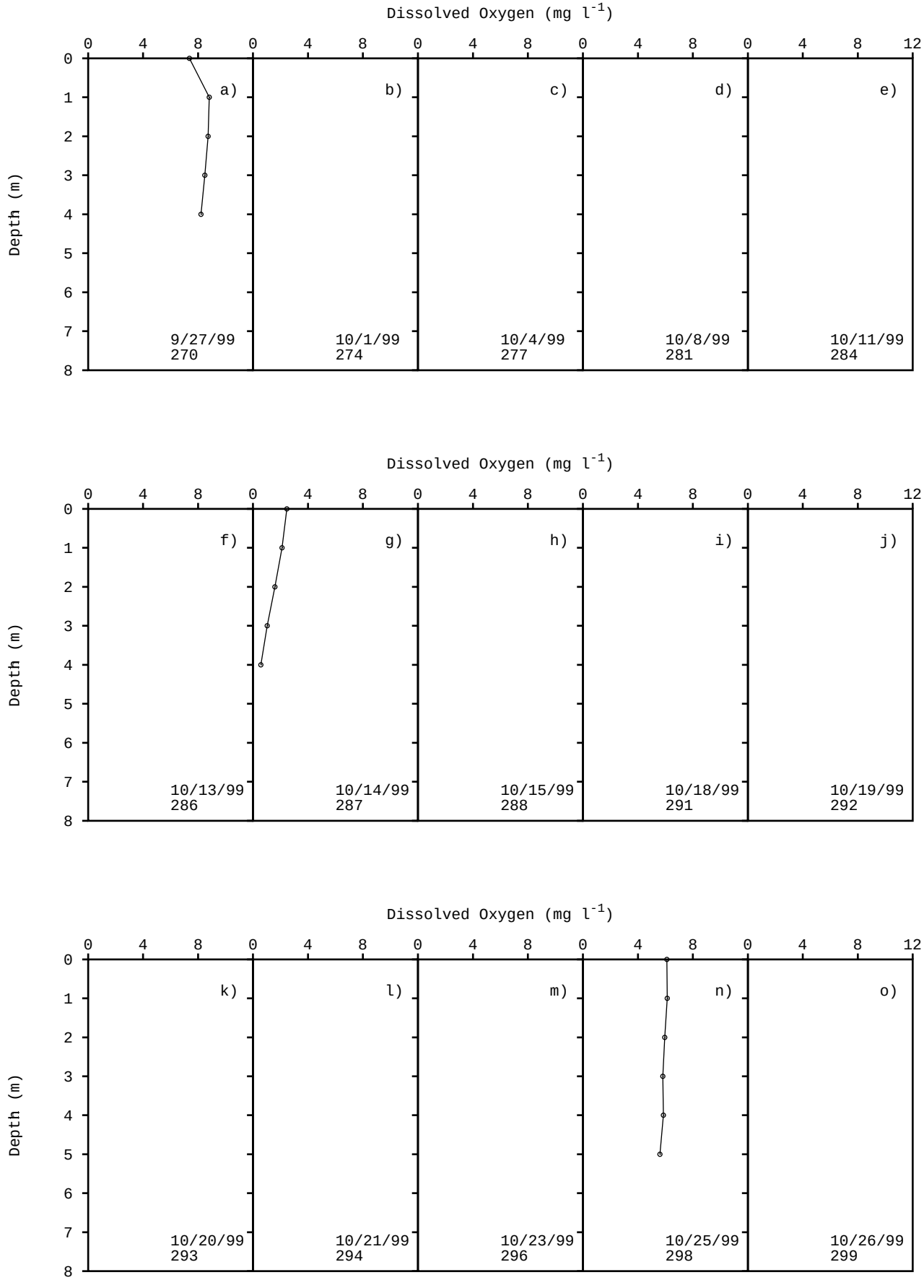
1999 Dissolved Oxygen Profiles for Onondaga Lake: Outlet



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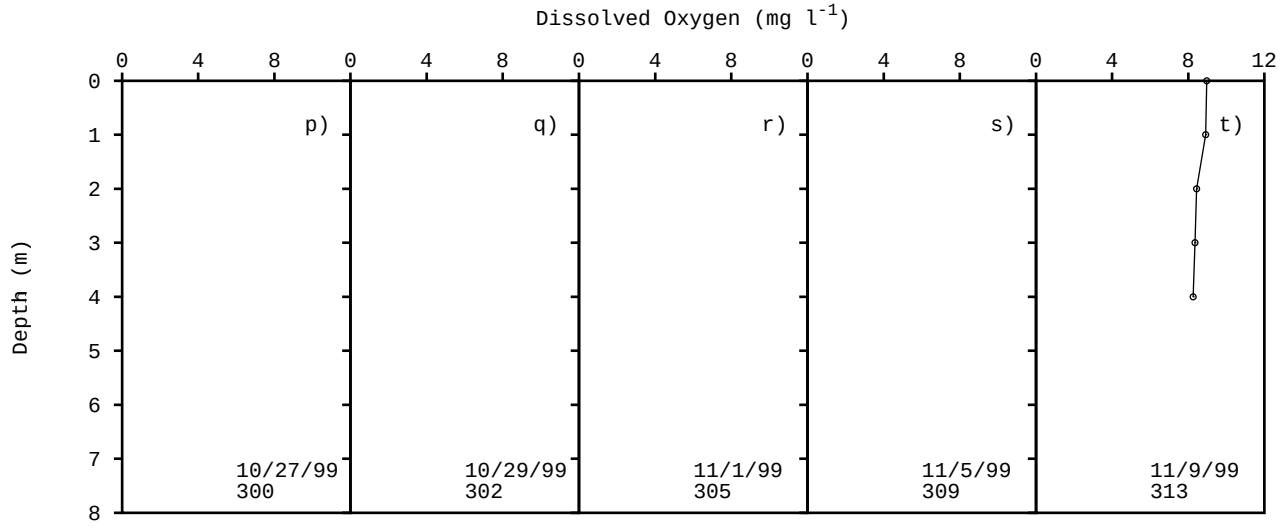
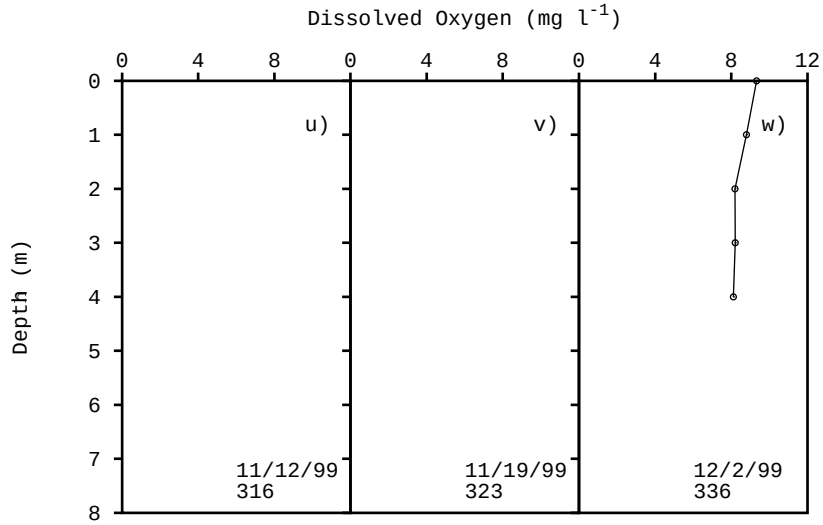
1999 Dissolved Oxygen Profiles for Onondaga Lake: Outlet





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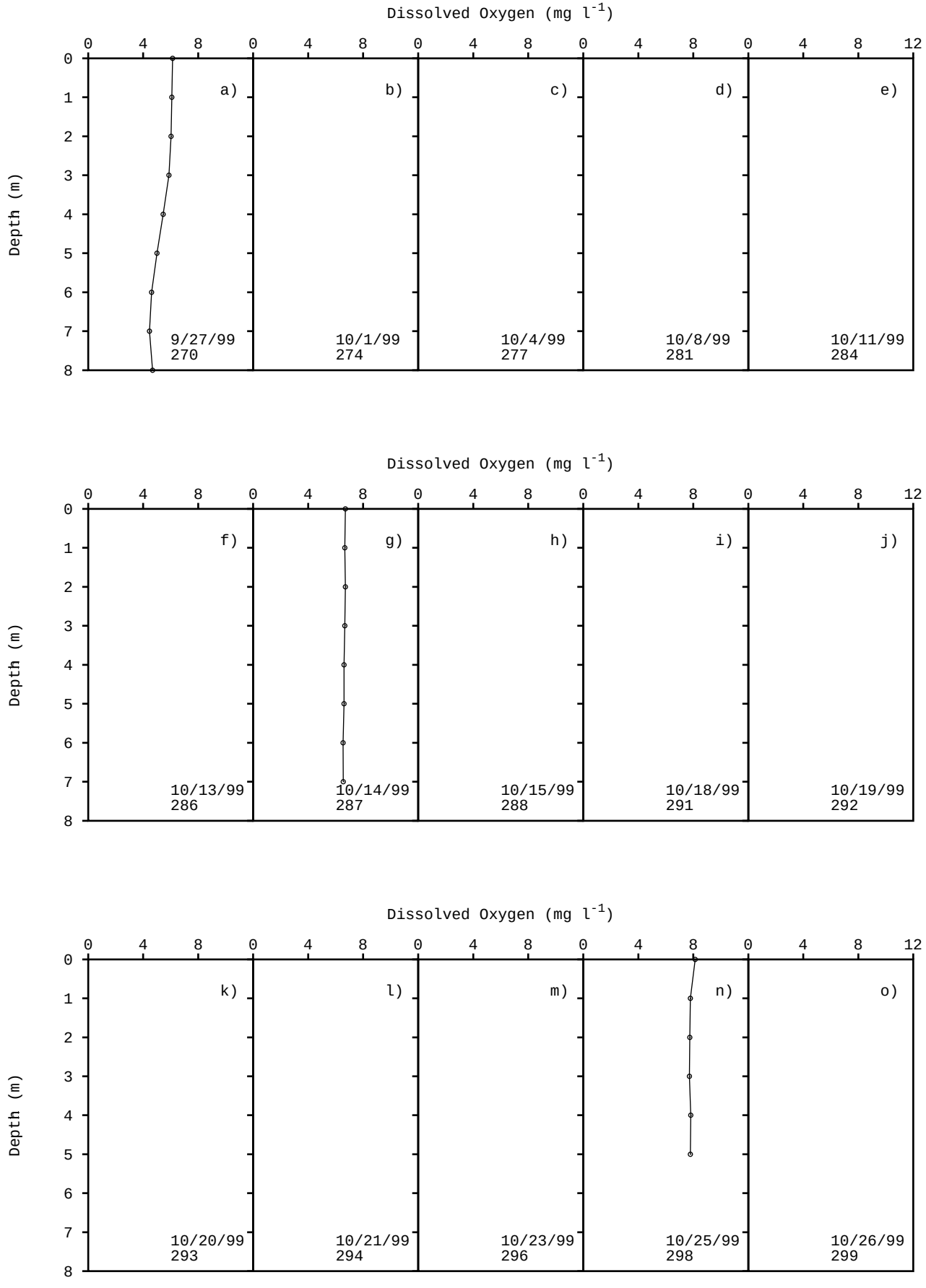
1999 Dissolved Oxygen Profiles for Onondaga Lake: River Downstream



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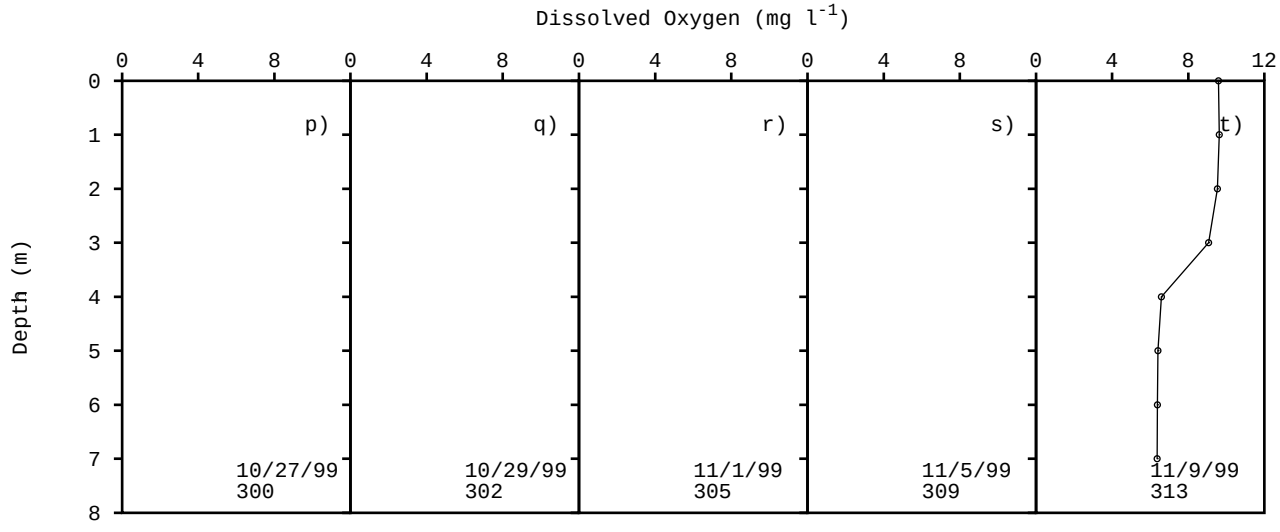
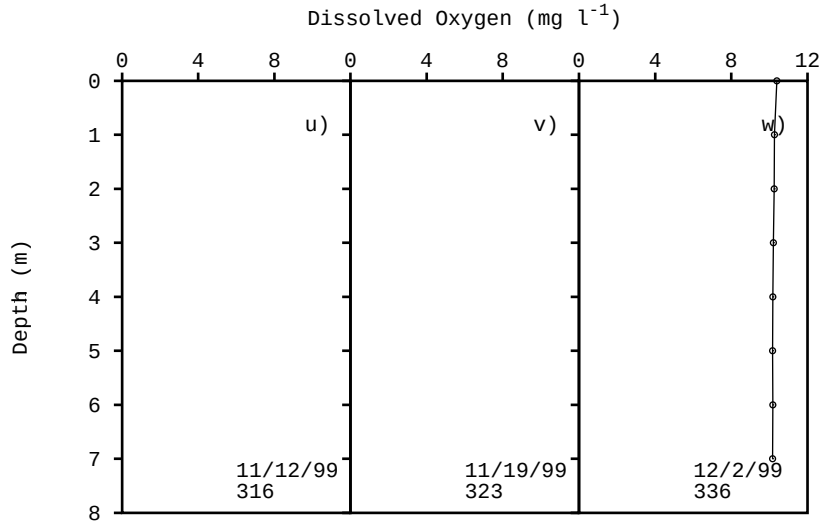
1999 Dissolved Oxygen Profiles for Onondaga Lake: River Downstream





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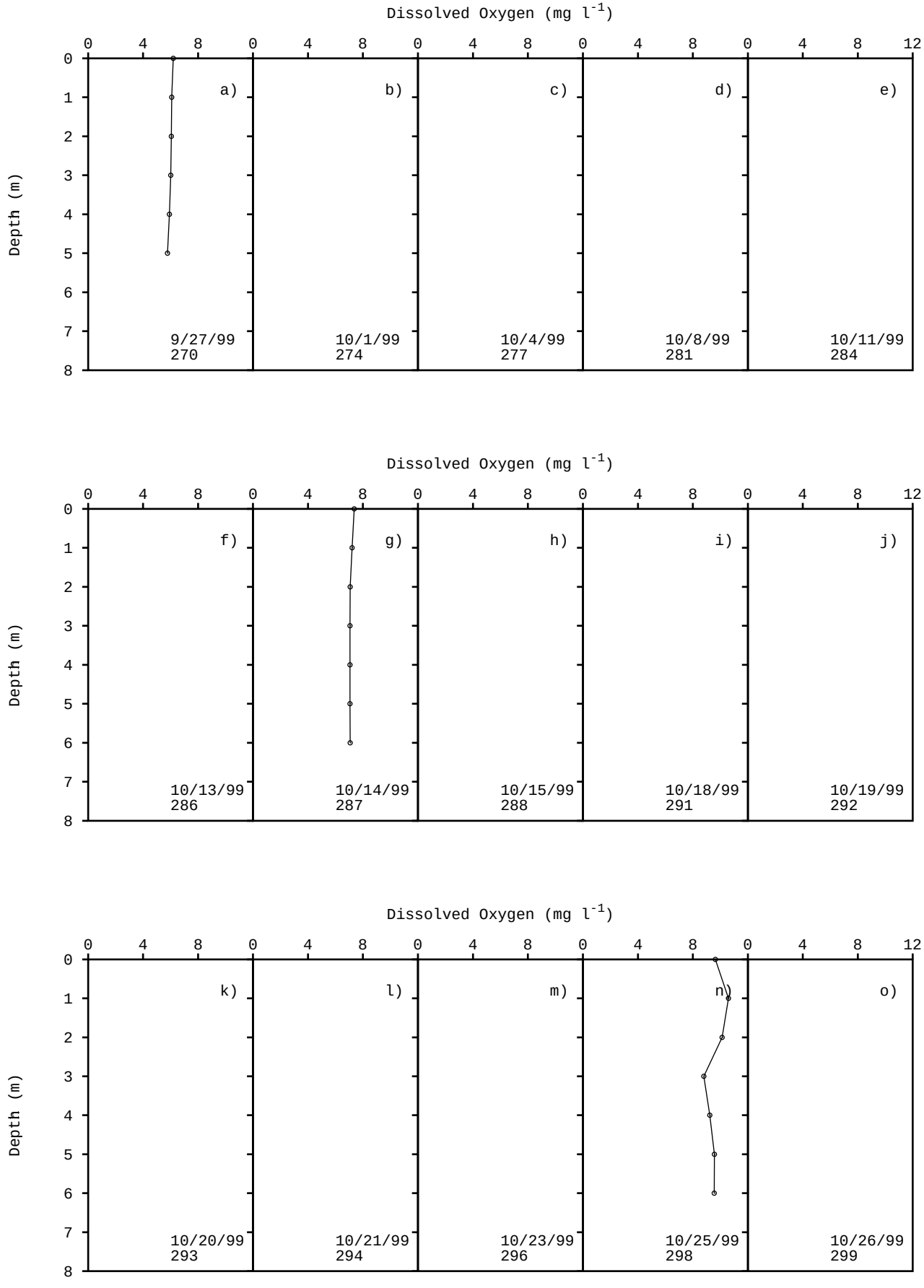
1999 Dissolved Oxygen Profiles for Onondaga Lake: River Upstream



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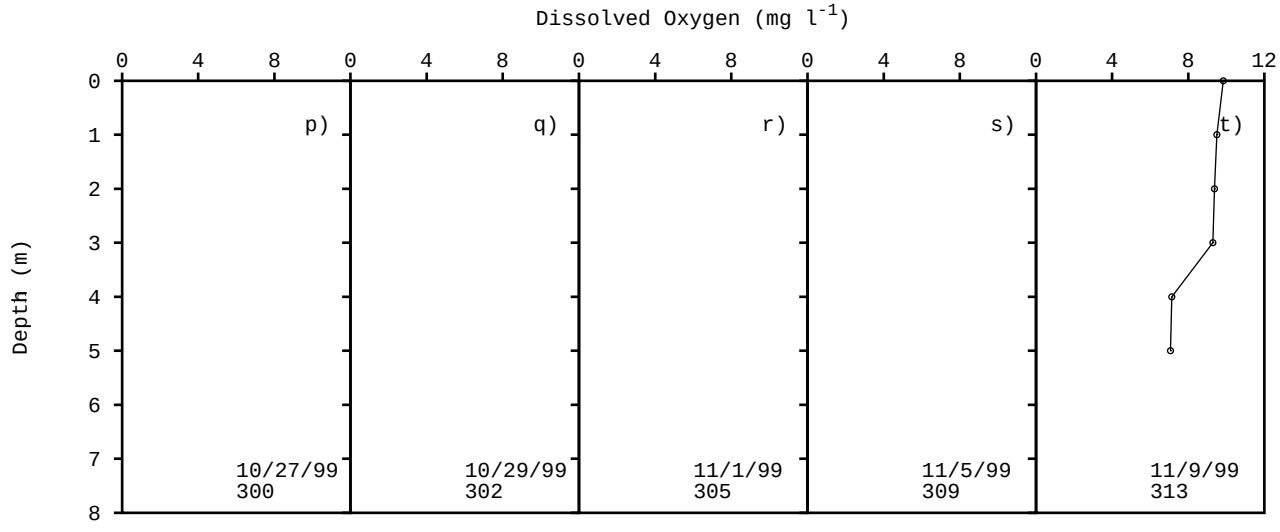
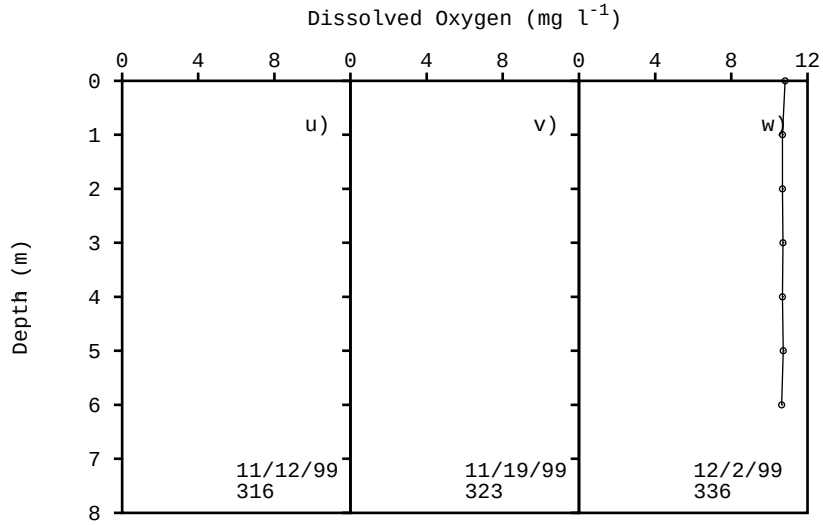
Thu Dec 02 15:13:56 1999

1999 Dissolved Oxygen Profiles for Onondaga Lake: River Upstream





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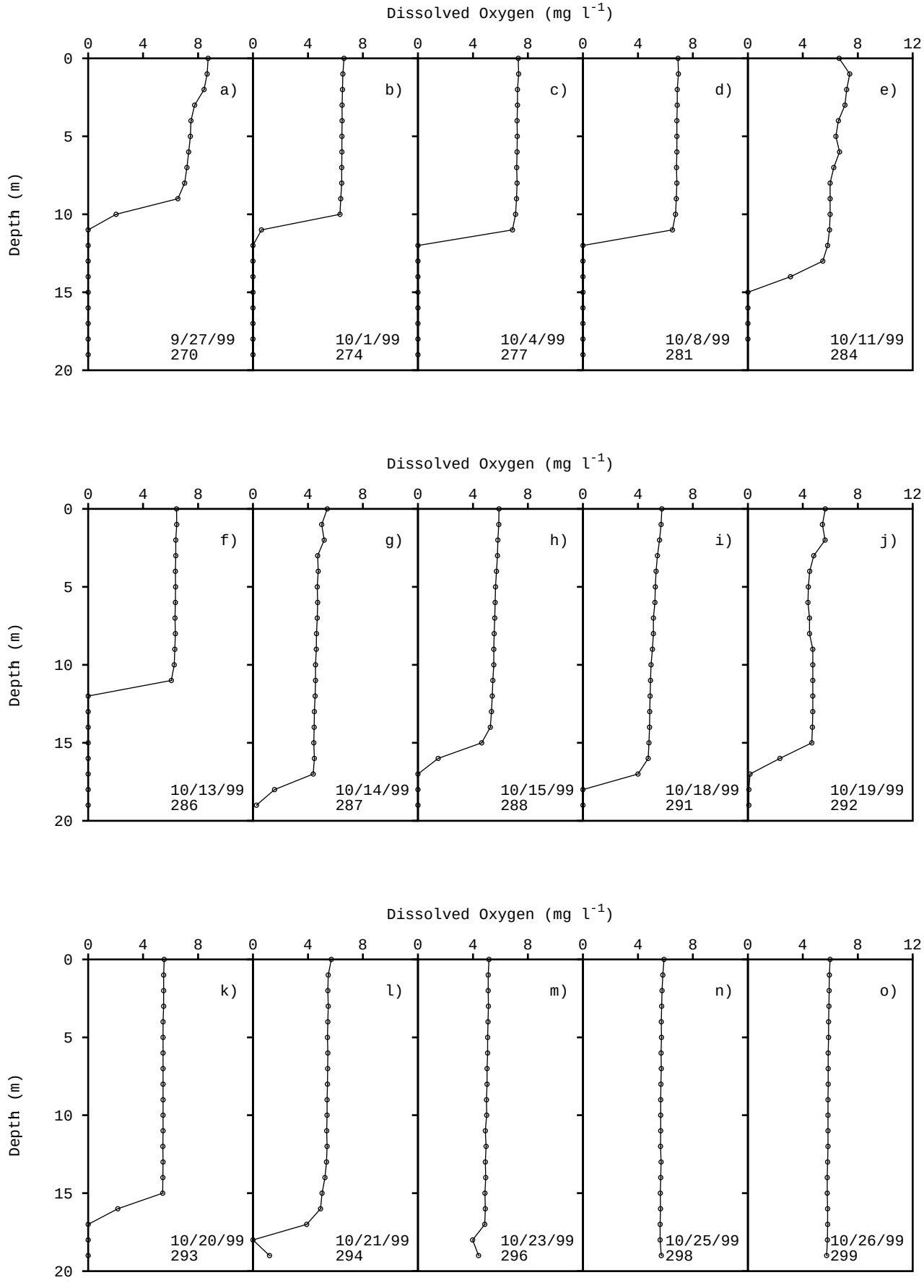
Thu Dec 02 15:13:56 1999

1999 Dissolved Oxygen Profiles for Onondaga Lake: South Deep



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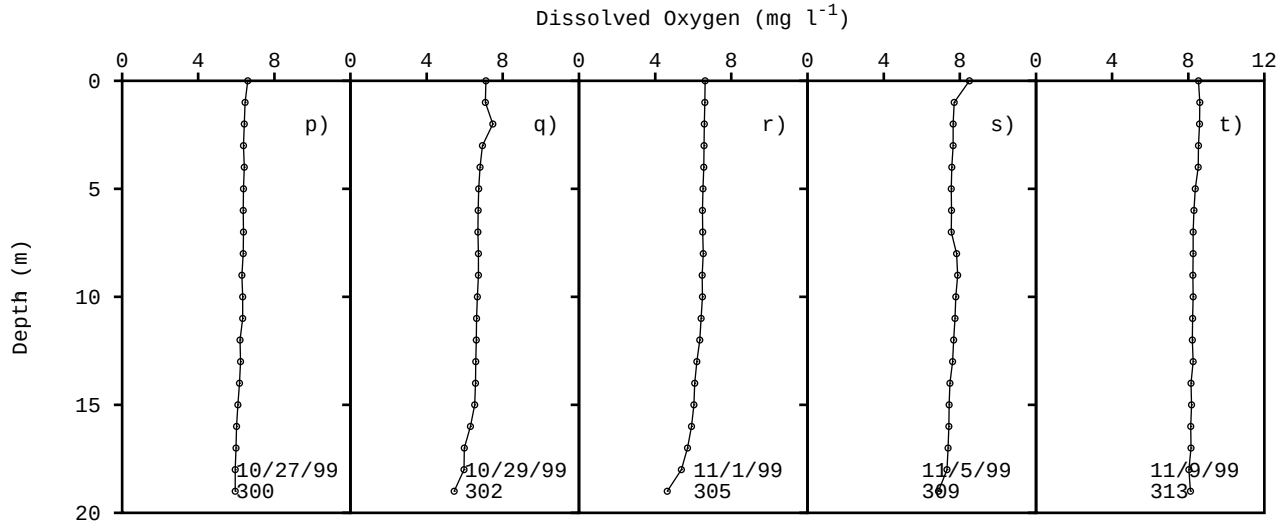
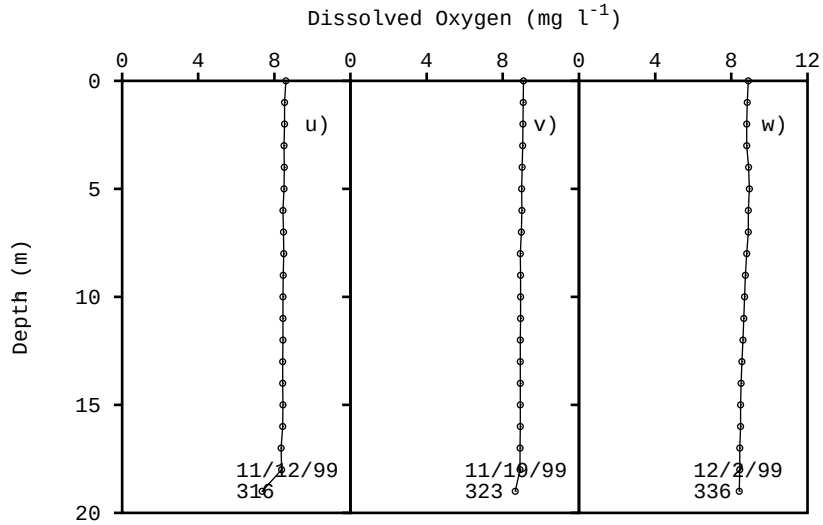
Thu Dec 02 15:13:28 1999

1999 Dissolved Oxygen Profiles for Onondaga Lake: South Deep





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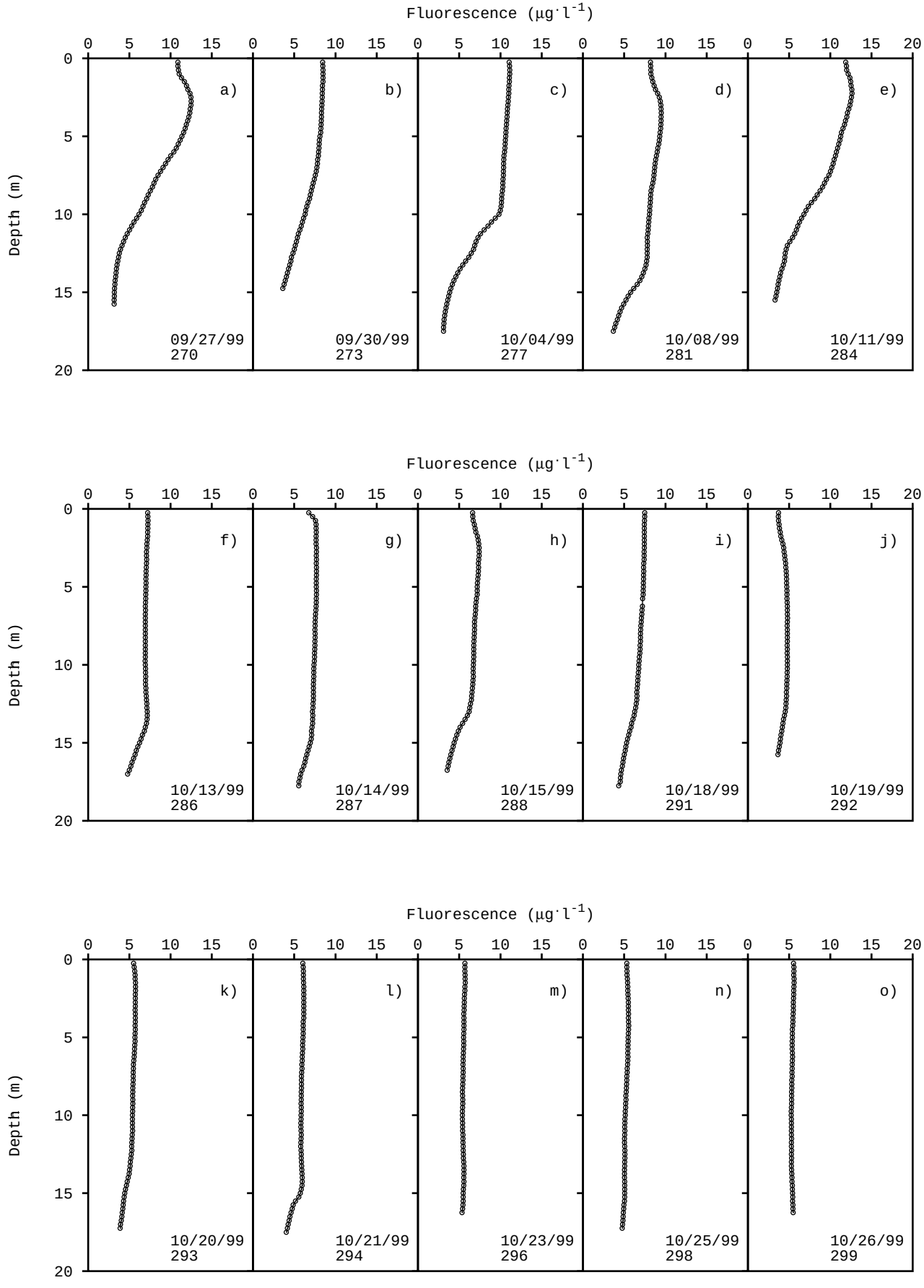
Thu Dec 02 15:13:28 1999

1999 Fluorescence Profiles for Onondaga Lake: North Deep



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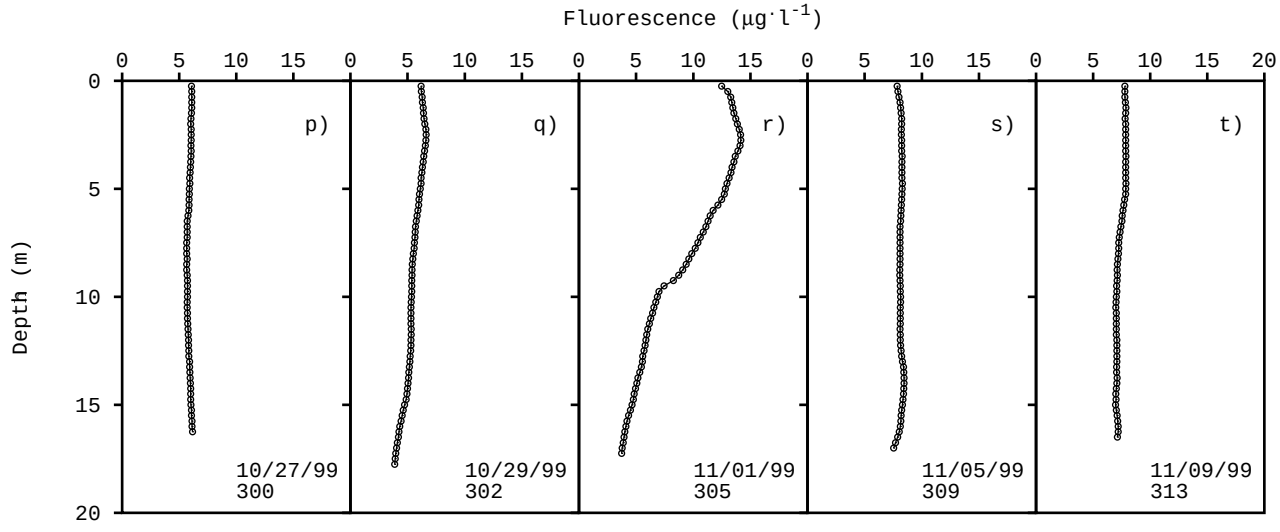
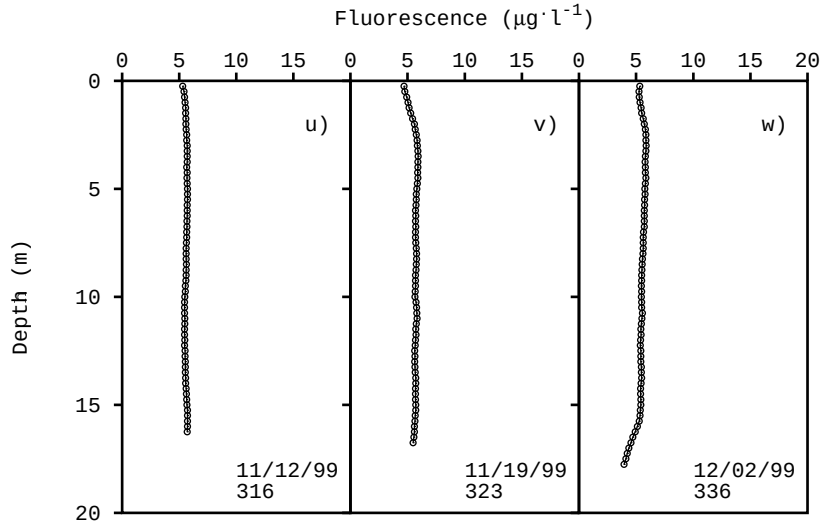
Thu Dec 02 15:00:59 1999

1999 Fluorescence Profiles for Onondaga Lake: North Deep





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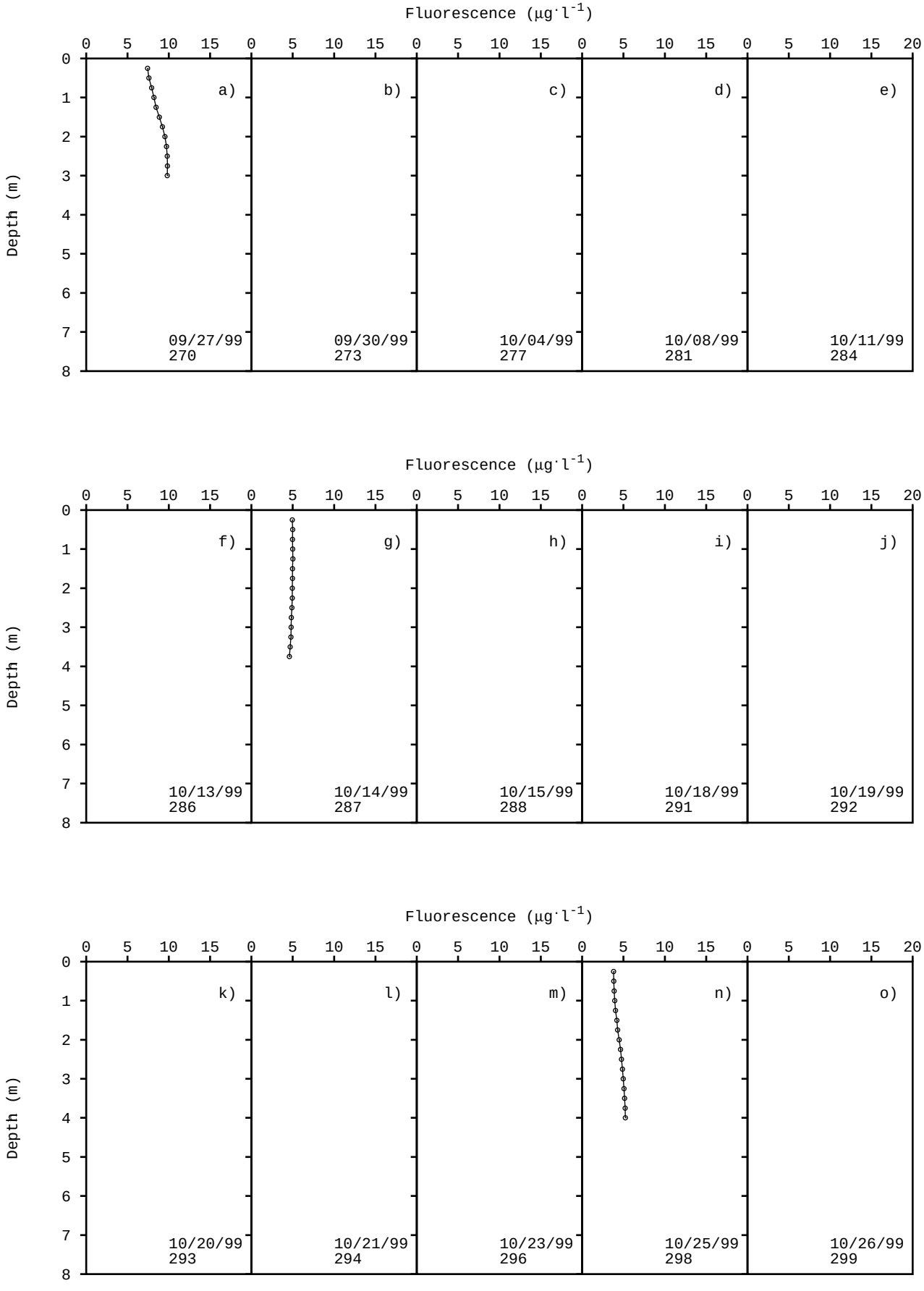
Thu Dec 02 15:01:00 1999

1999 Fluorescence Profiles for Onondaga Lake: Outlet



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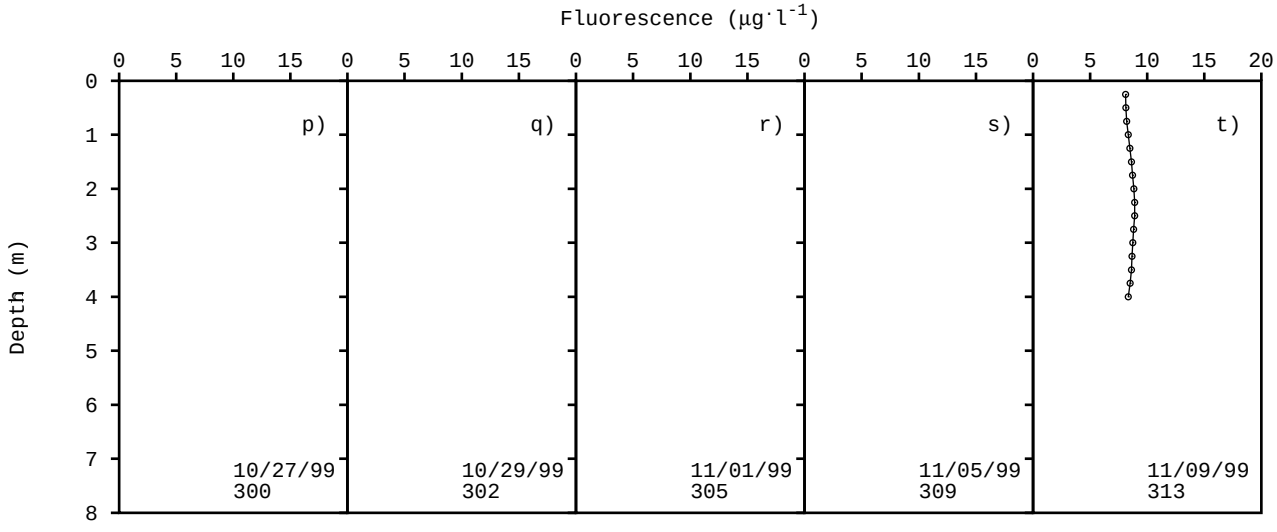
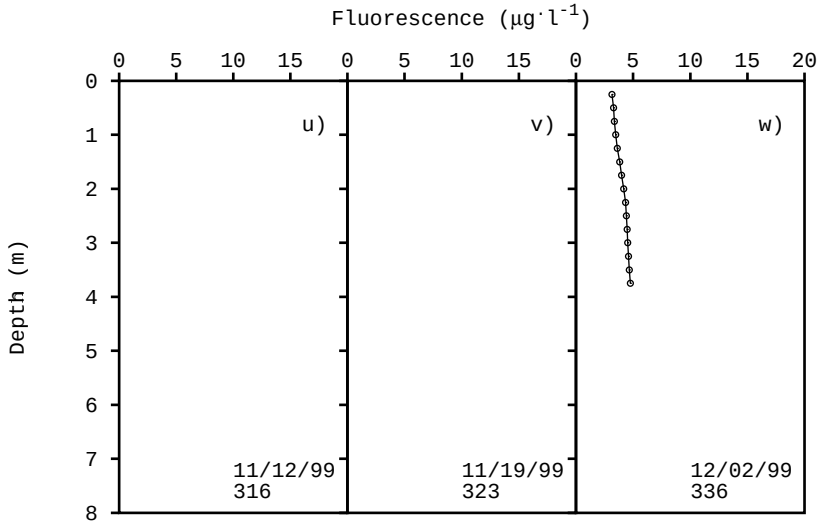
Thu Dec 02 15:03:21 1999

1999 Fluorescence Profiles for Onondaga Lake: Outlet





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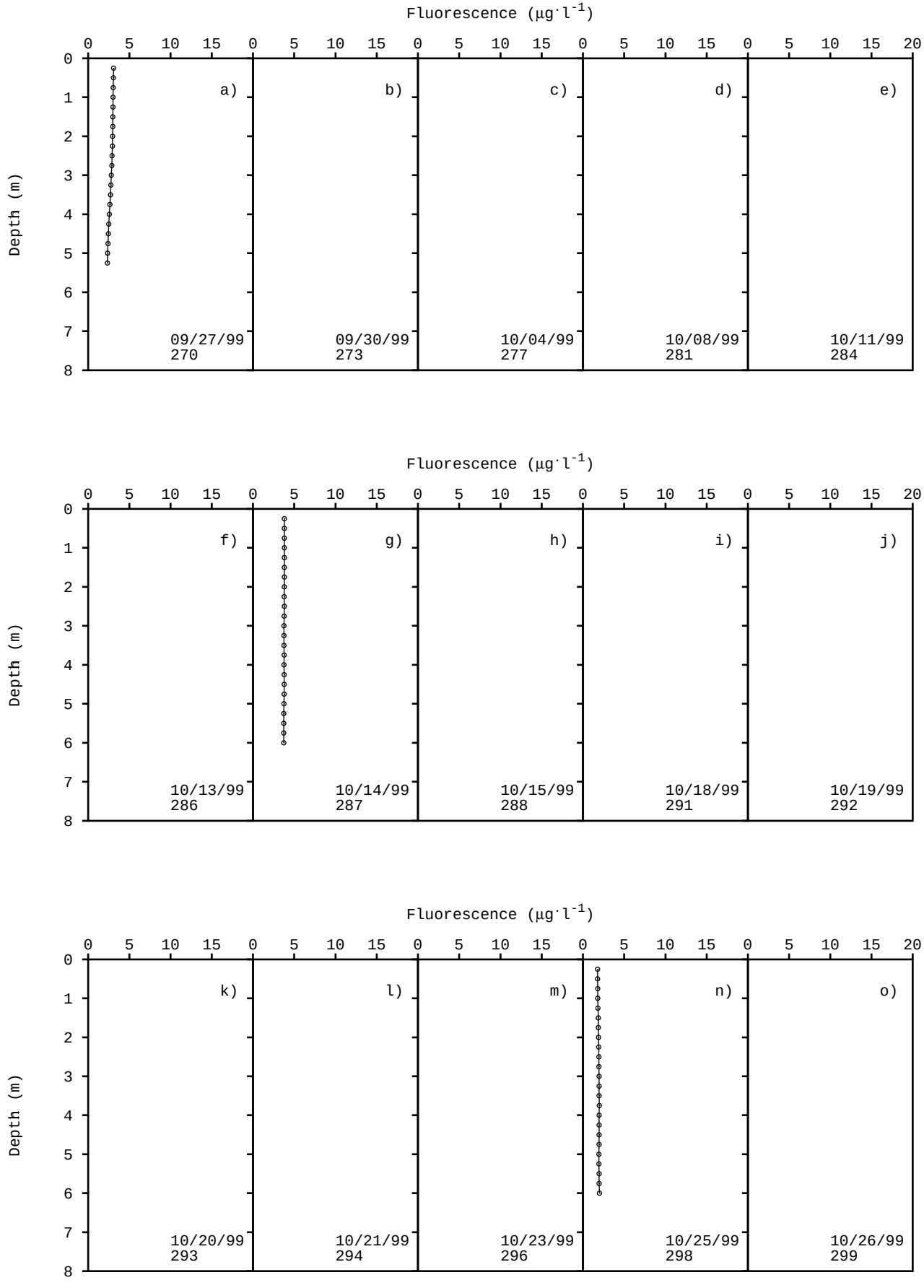
1999 Fluorescence Profiles for Onondaga Lake: River Downstream



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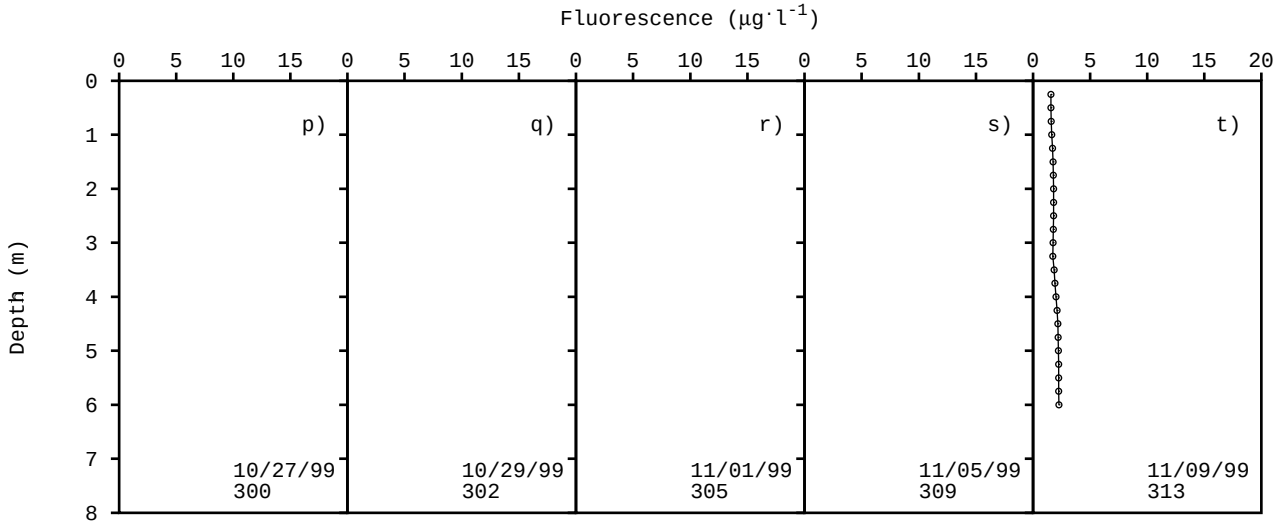
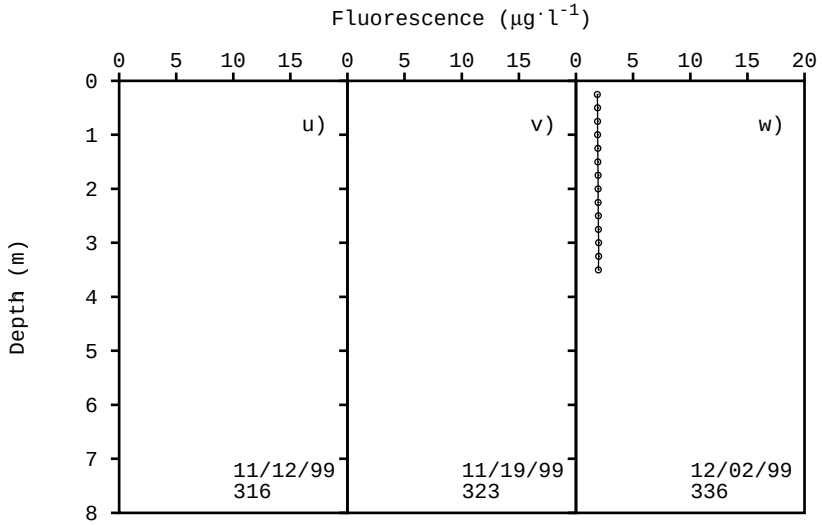
Thu Dec 02 15:02:36 1999

1999 Fluorescence Profiles for Onondaga Lake: River Downstream





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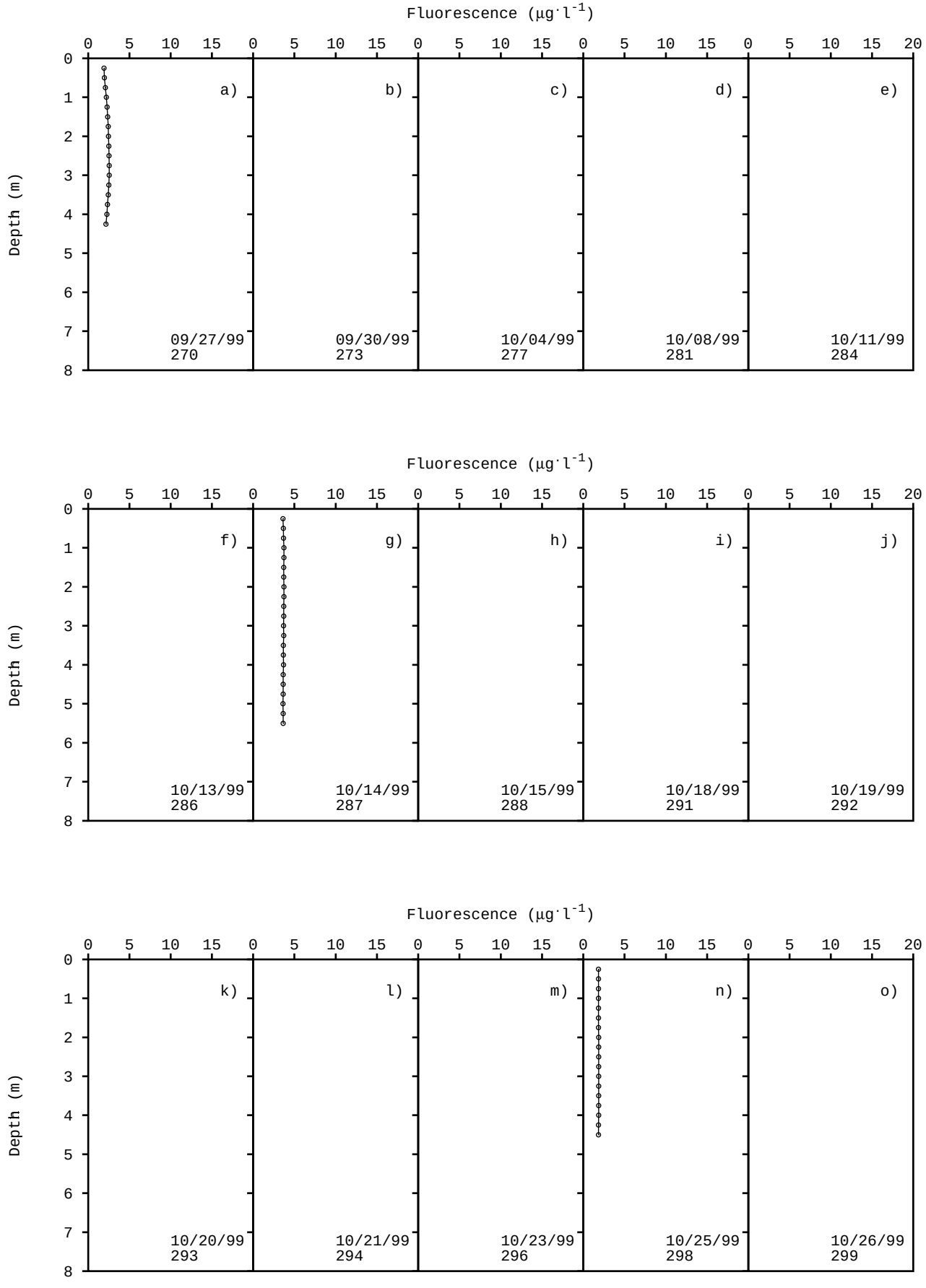
Thu Dec 02 15:02:36 1999

1999 Fluorescence Profiles for Onondaga Lake: River Upstream



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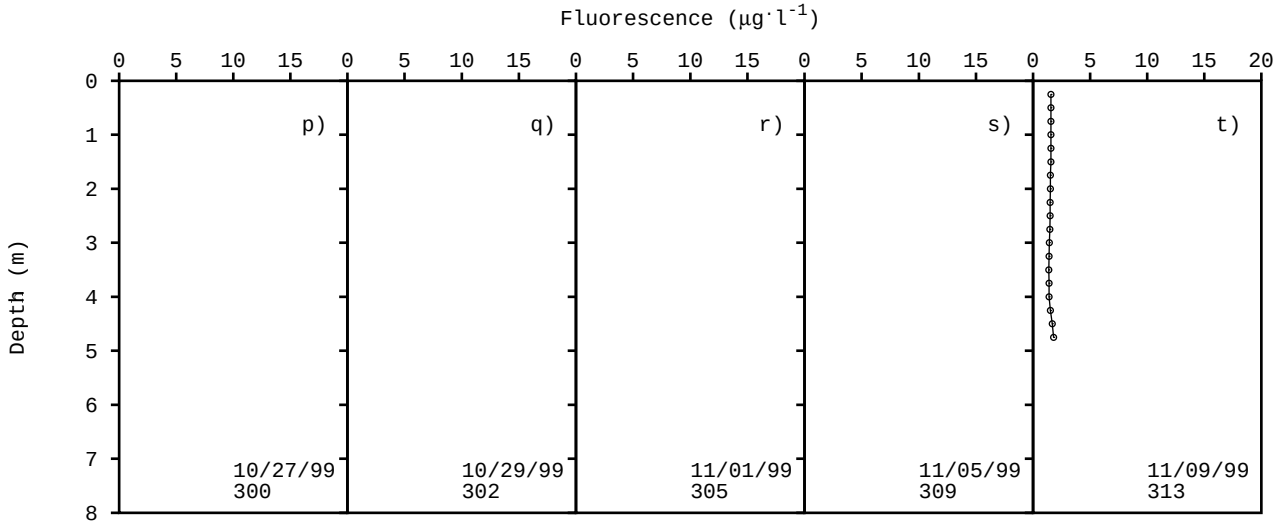
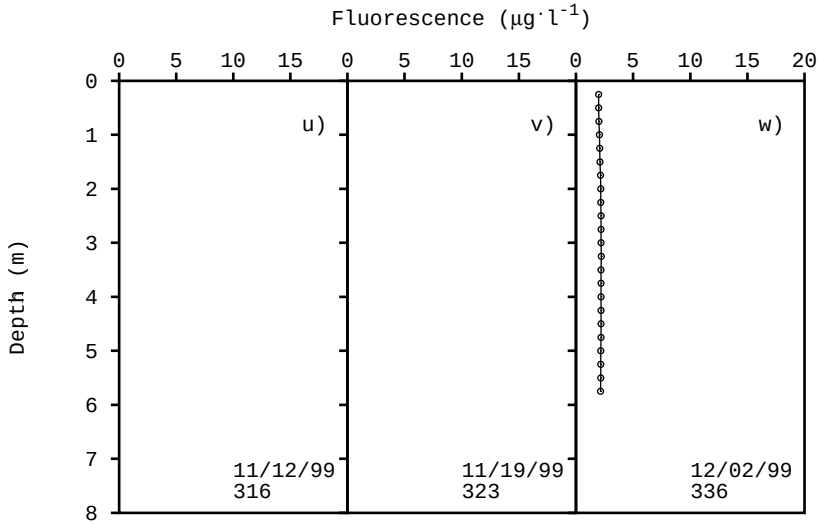
Thu Dec 02 15:01:48 1999

1999 Fluorescence Profiles for Onondaga Lake: River Upstream





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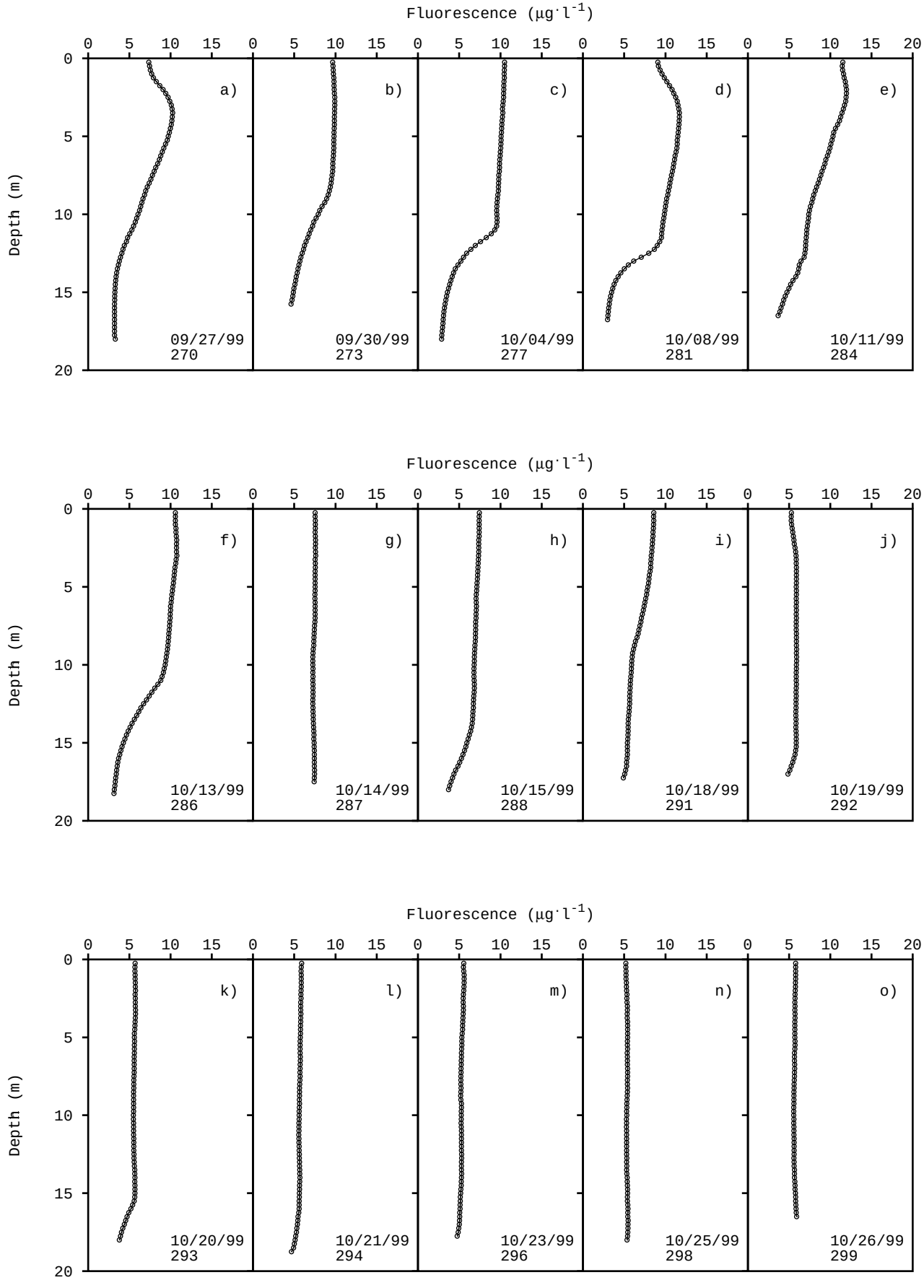
1999 Fluorescence Profiles for Onondaga Lake: South Deep



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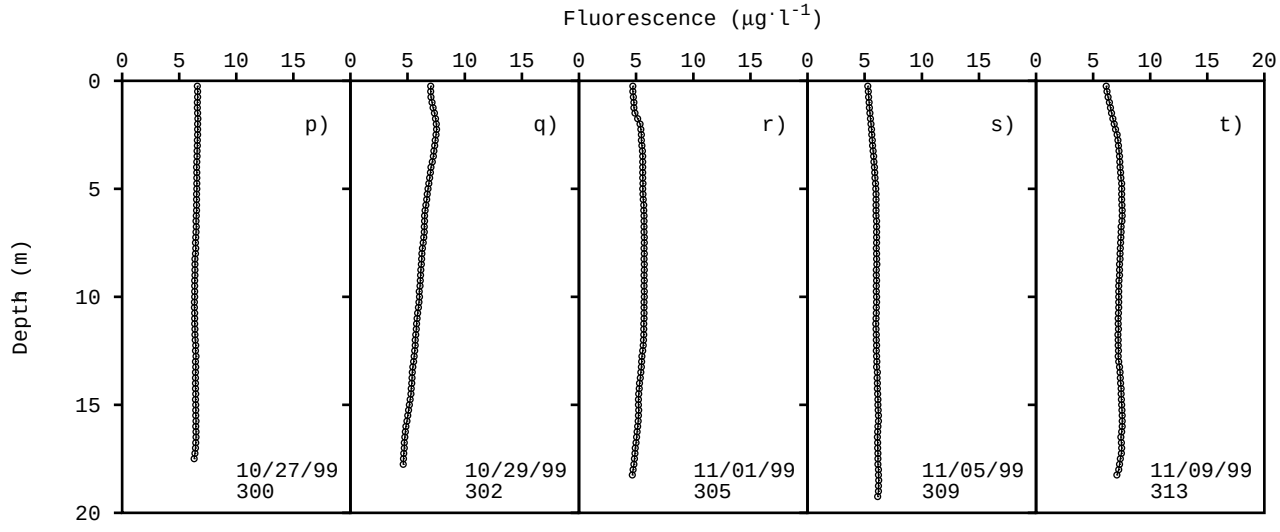
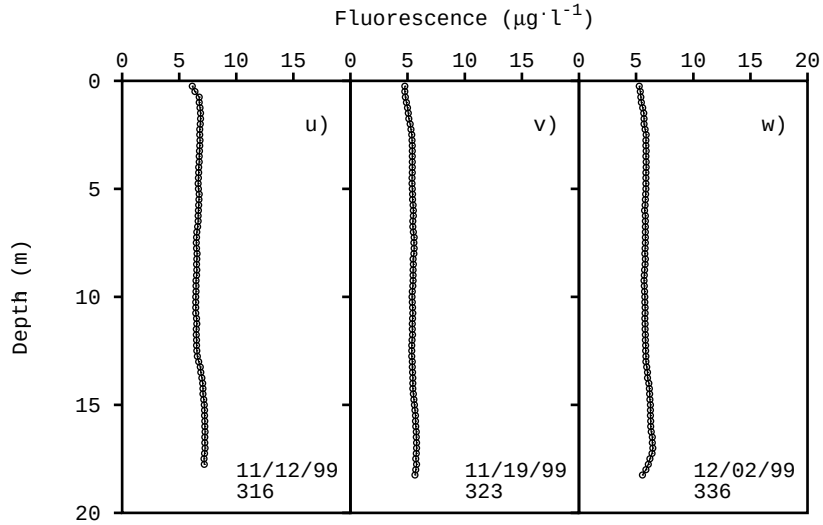
Thu Dec 02 15:00:11 1999

1999 Fluorescence Profiles for Onondaga Lake: South Deep





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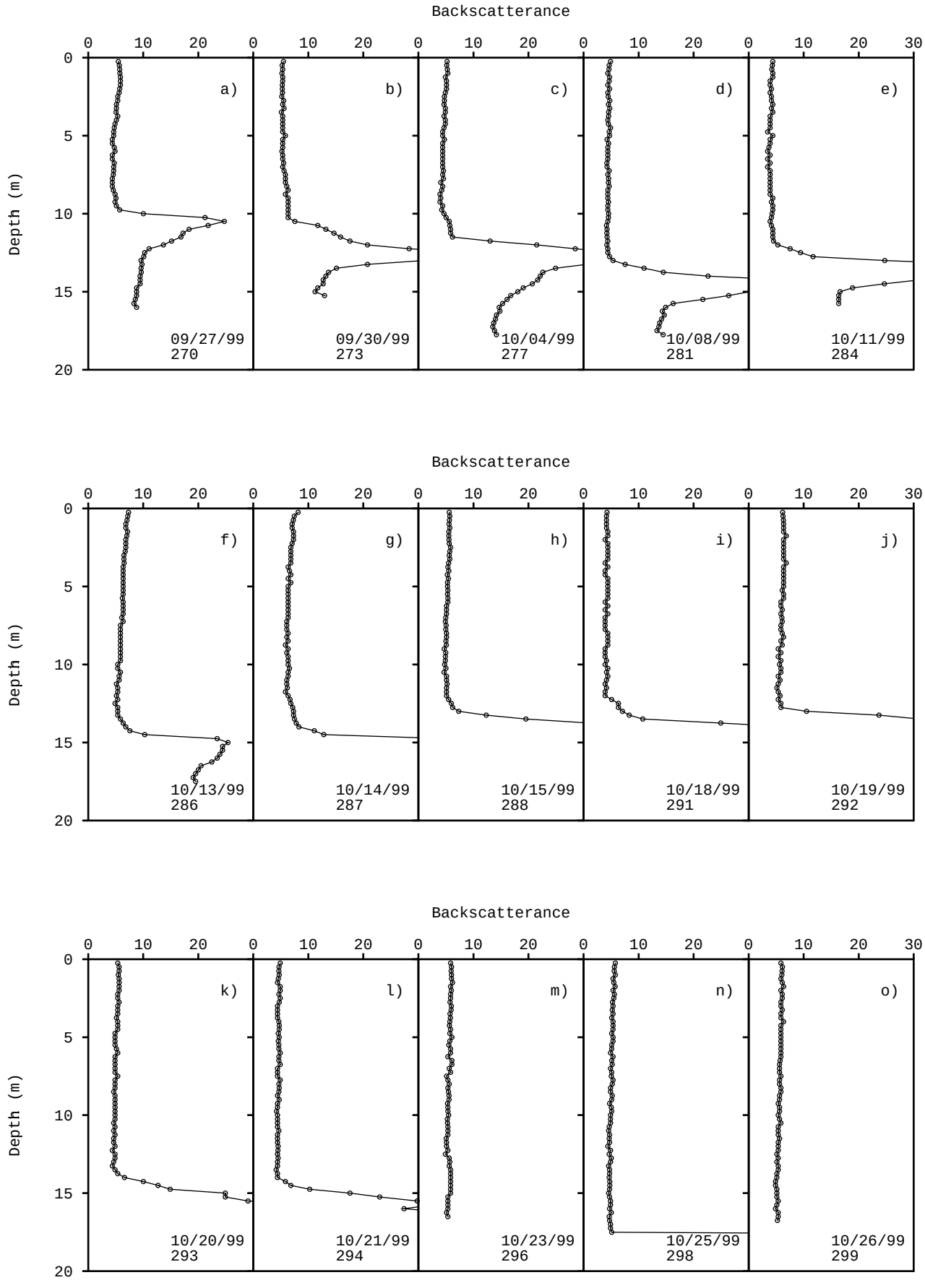
Thu Dec 02 15:00:11 1999

1999 Backscatterance Profiles for Onondaga Lake: North Deep



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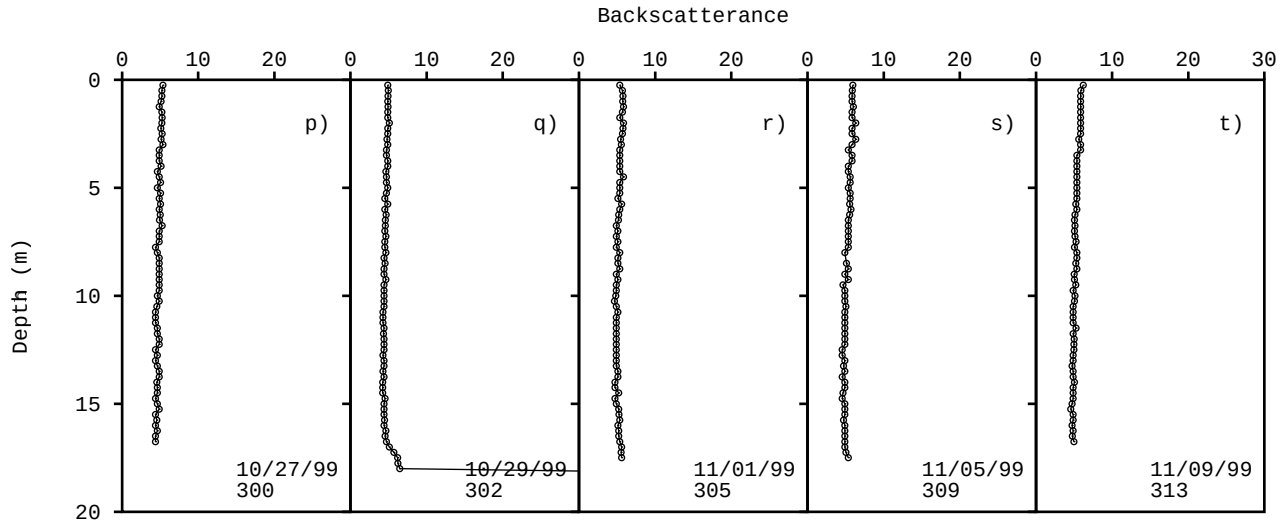
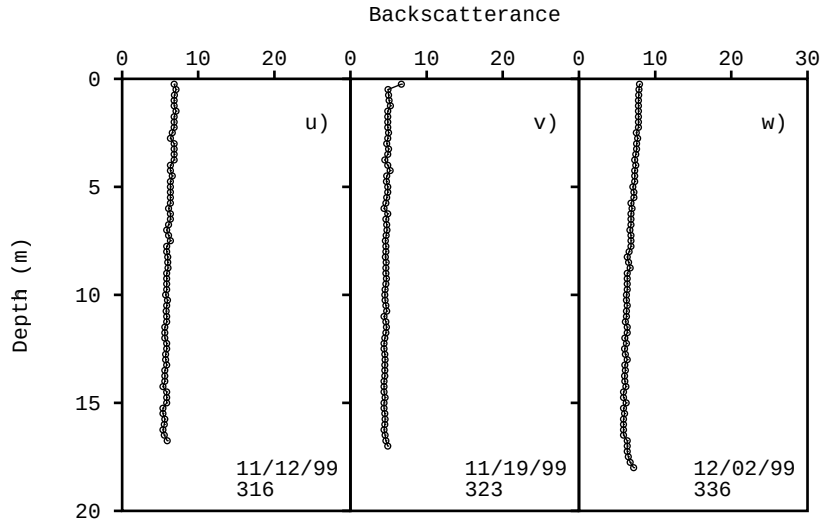
Thu Dec 02 15:01:06 1999

1999 Backscatterance Profiles for Onondaga Lake: North Deep





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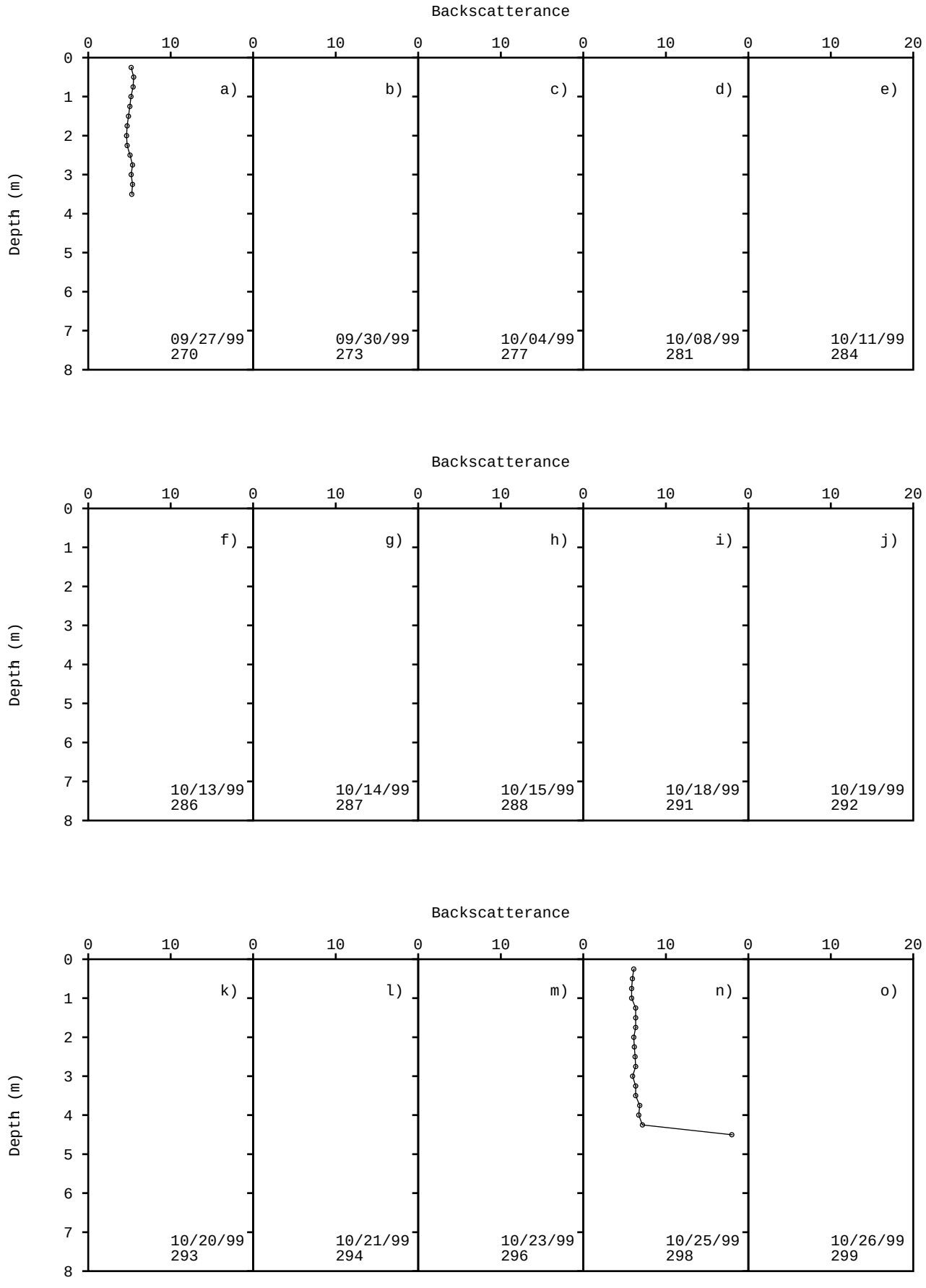
Thu Dec 02 15:01:06 1999

1999 Backscatterance Profiles for Onondaga Lake: Outlet



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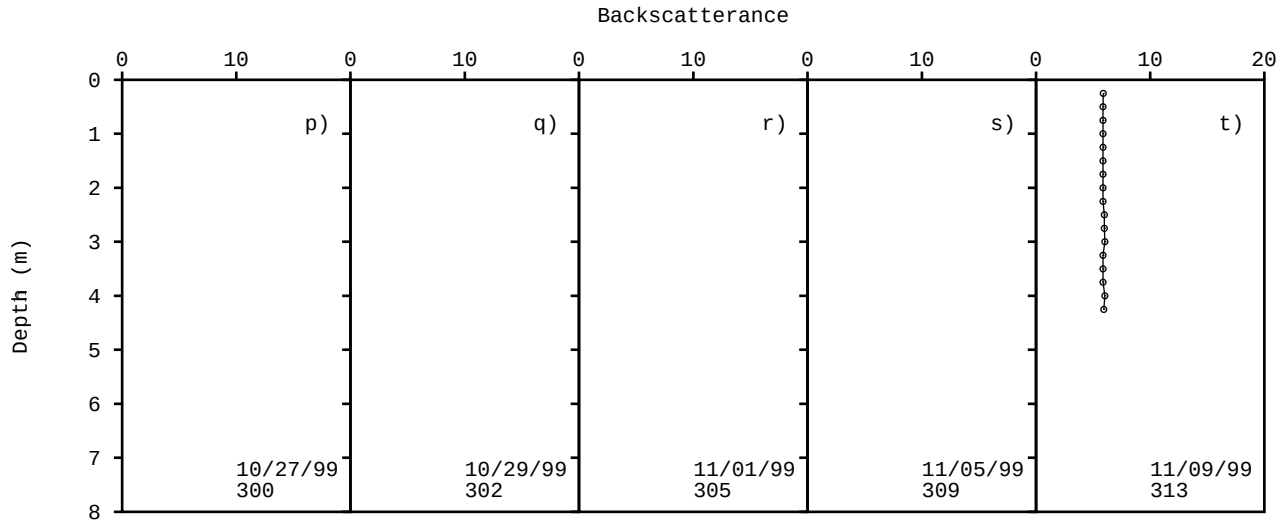
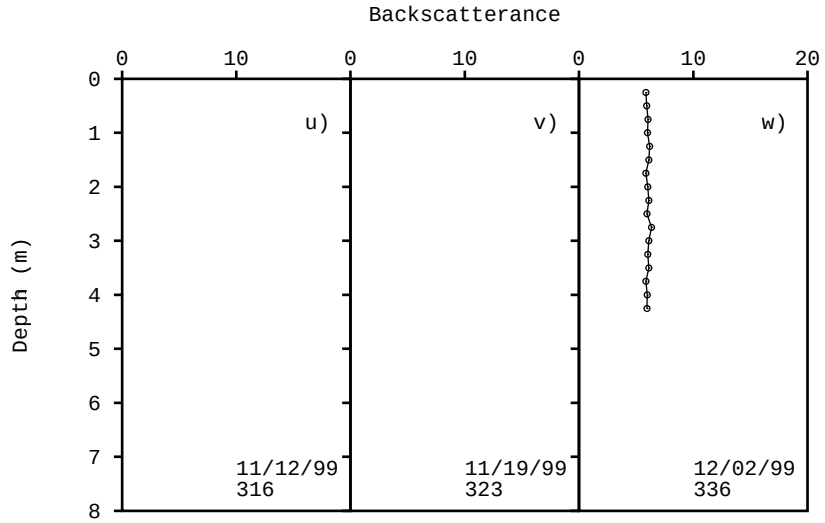
Thu Dec 02 15:03:27 1999

1999 Backscatterance Profiles for Onondaga Lake: Outlet





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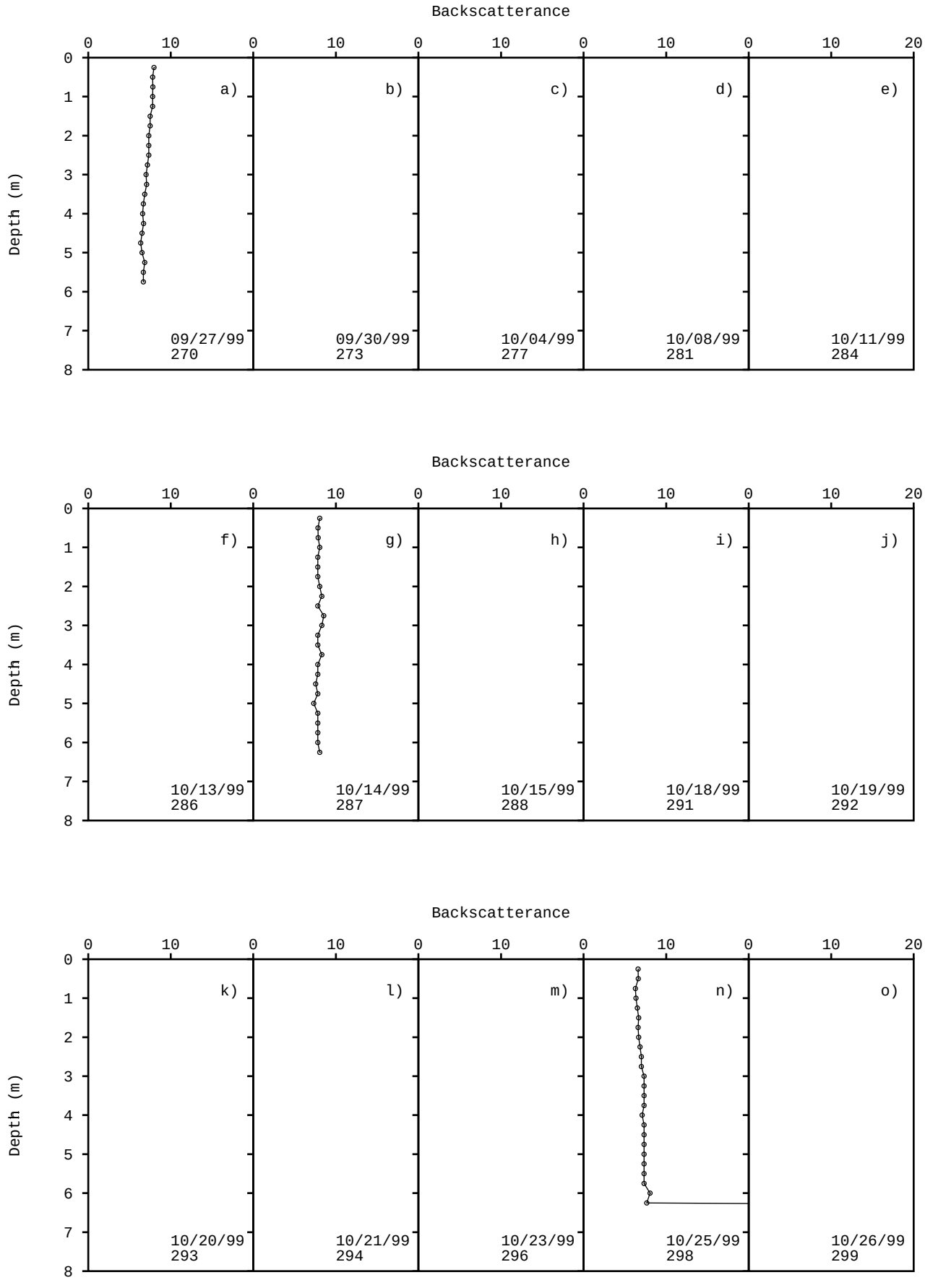
1999 Backscatterance Profiles for Onondaga Lake: River Downstream



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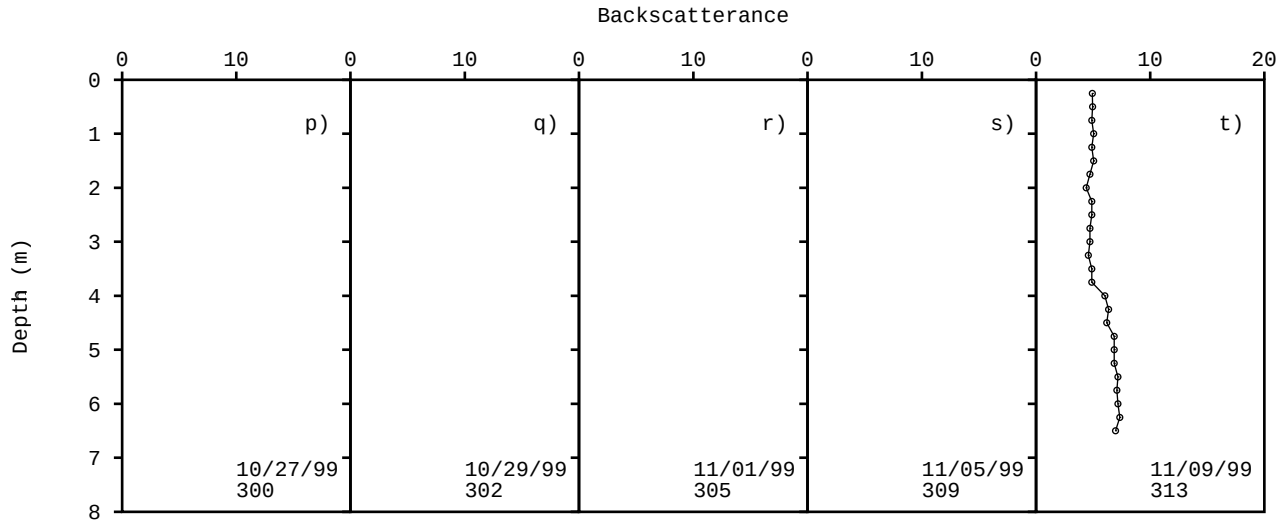
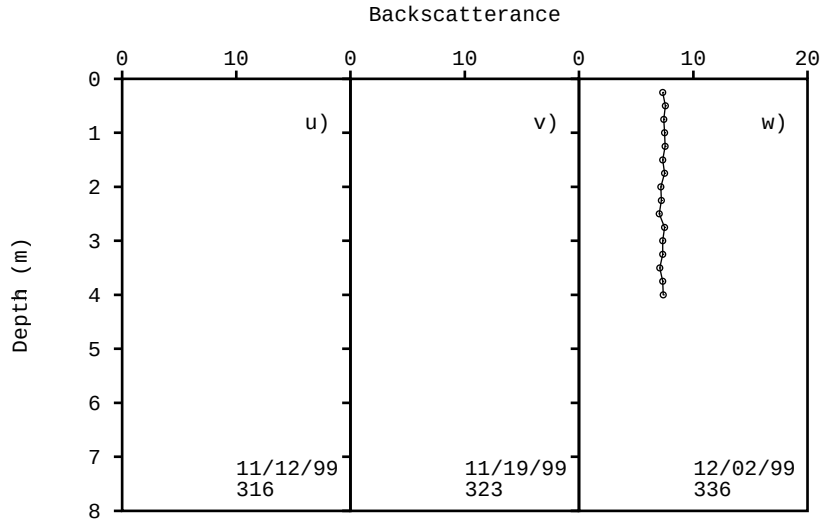
Thu Dec 02 15:02:42 1999

1999 Backscatterance Profiles for Onondaga Lake: River Downstream





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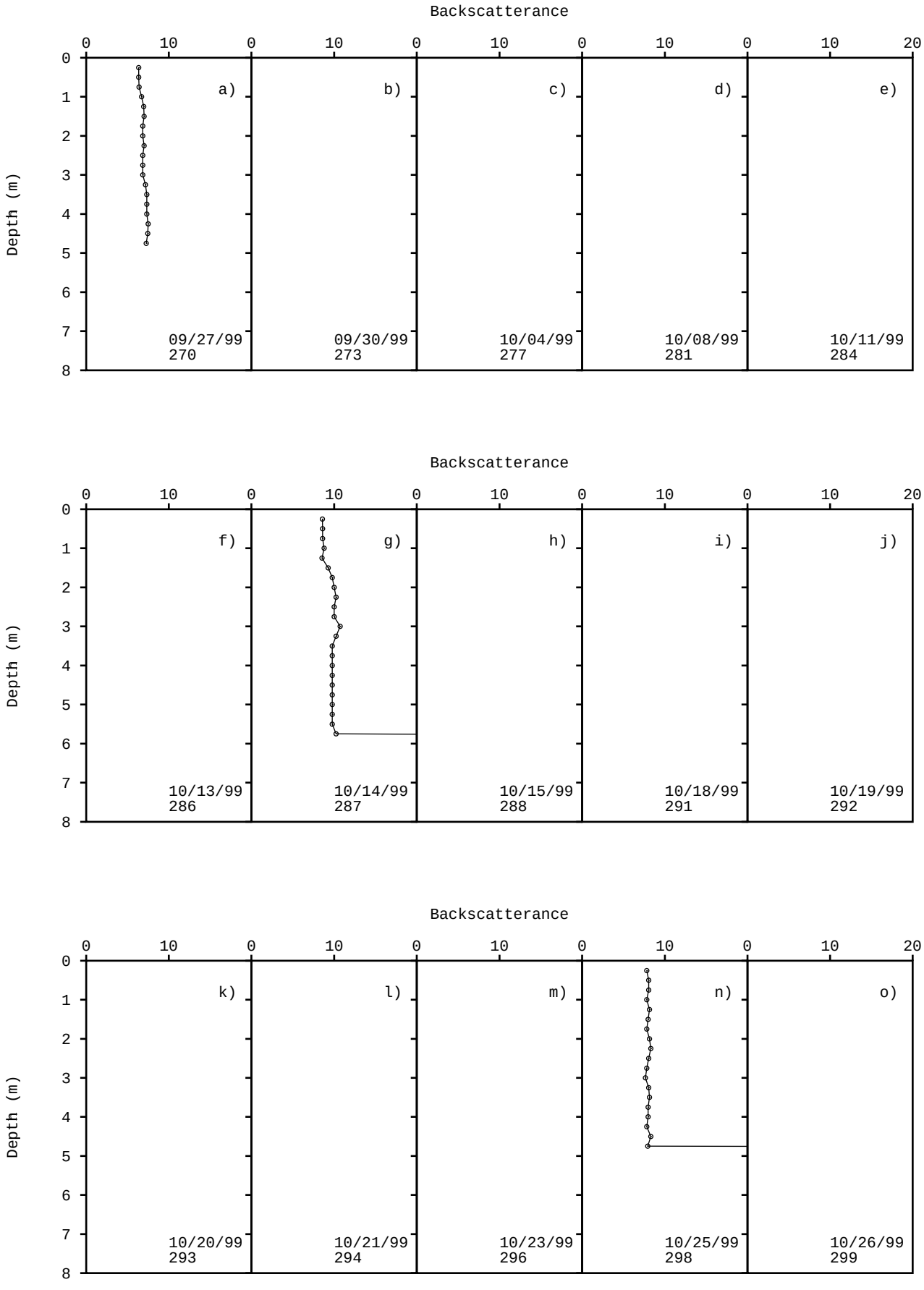
1999 Backscatterance Profiles for Onondaga Lake: River Upstream



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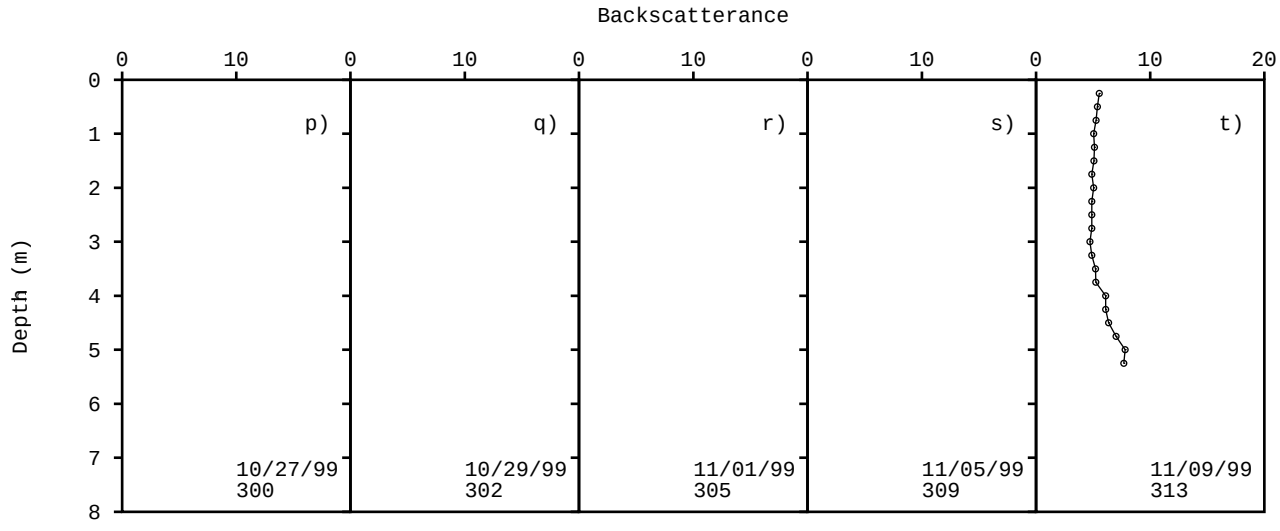
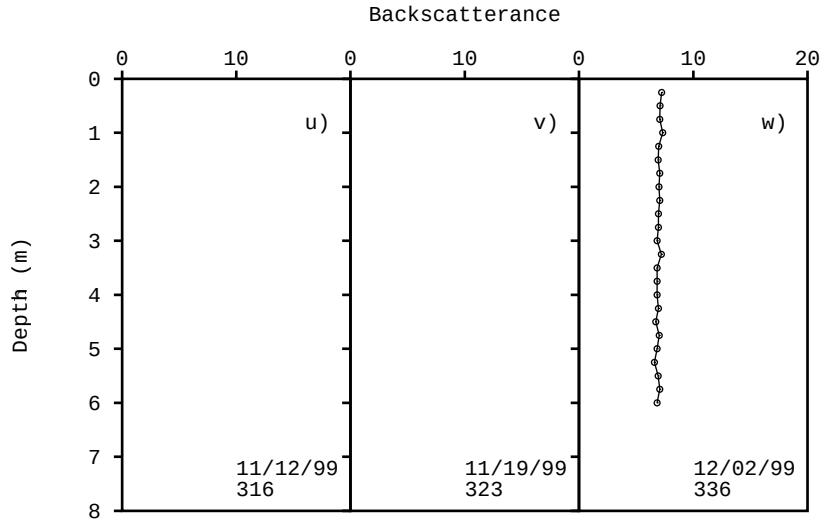
Thu Dec 02 15:01:54 1999

1999 Backscatterance Profiles for Onondaga Lake: River Upstream





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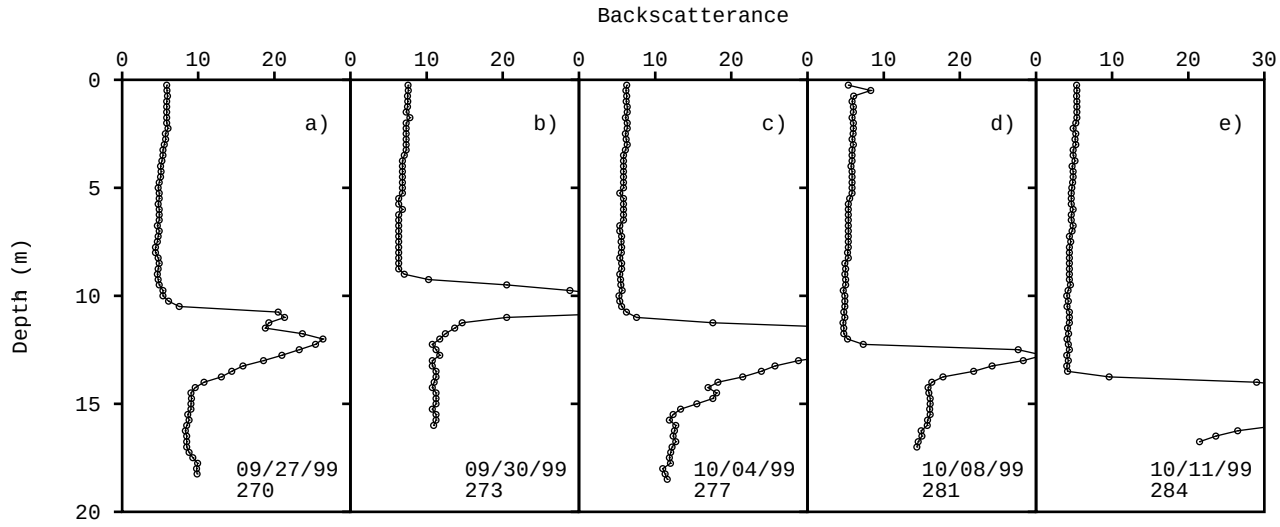
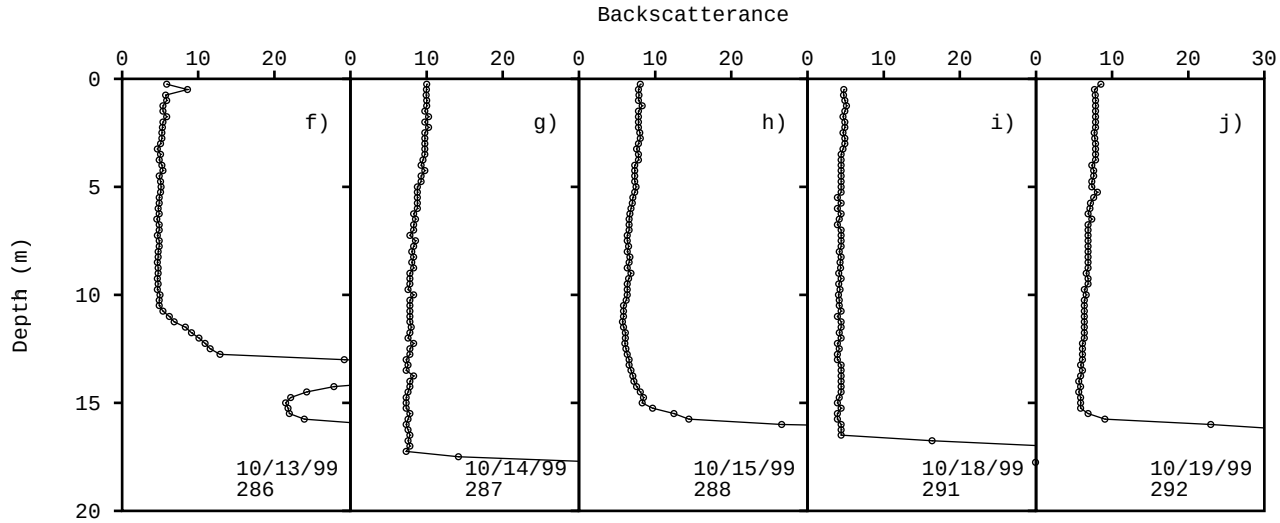
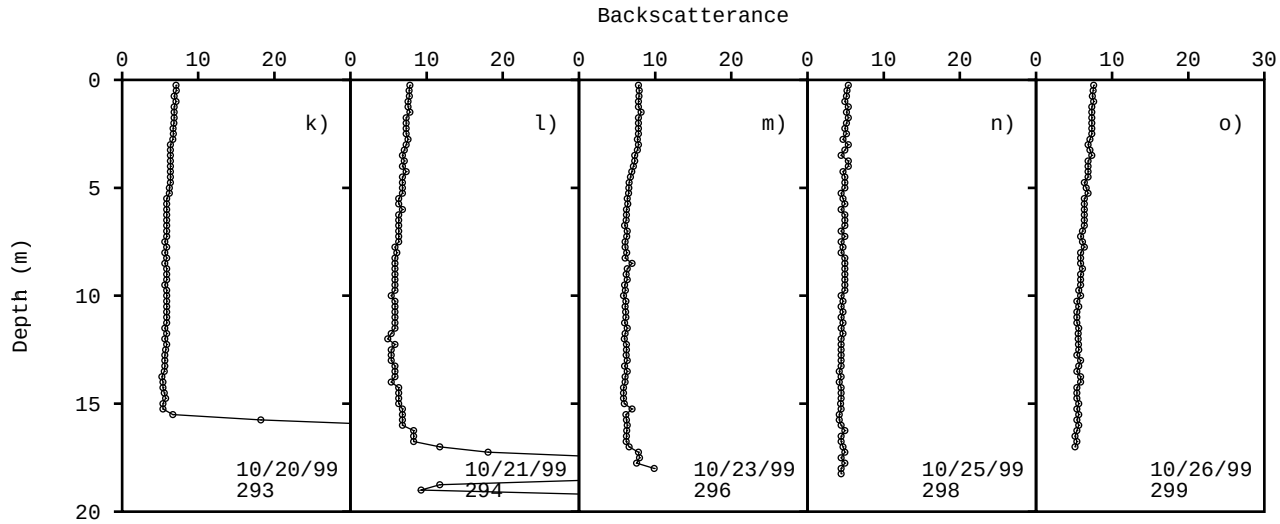
Thu Dec 02 15:01:54 1999

1999 Backscatterance Profiles for Onondaga Lake: South Deep







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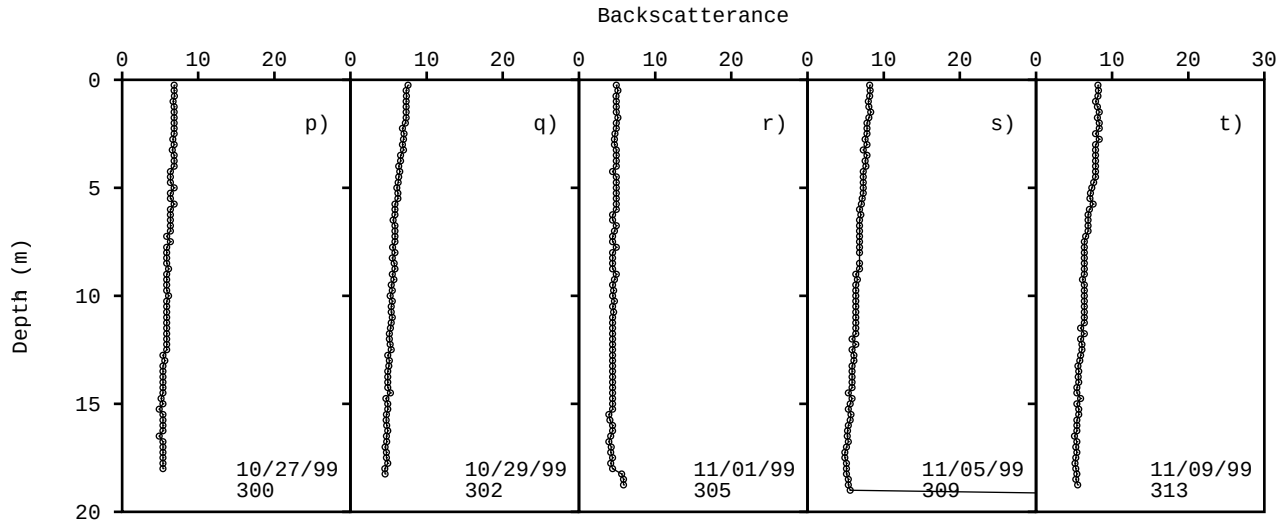
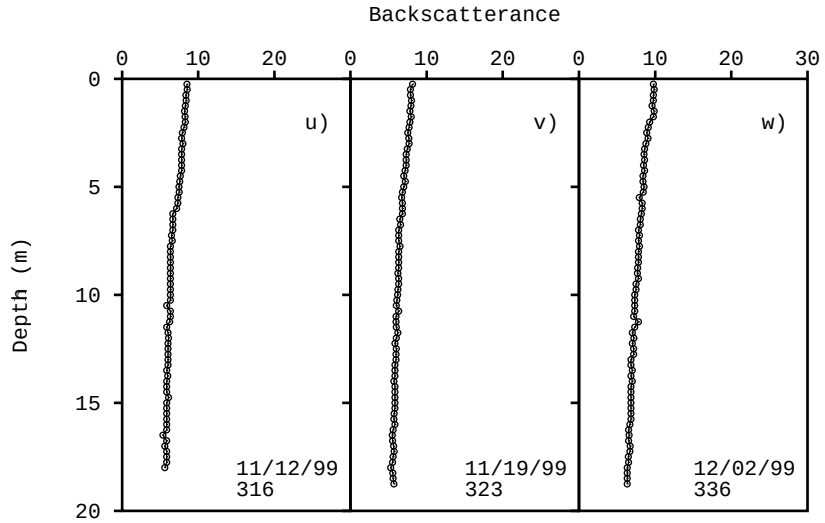
Thu Dec 02 15:00:18 1999

1999 Backscatterance Profiles for Onondaga Lake: South Deep





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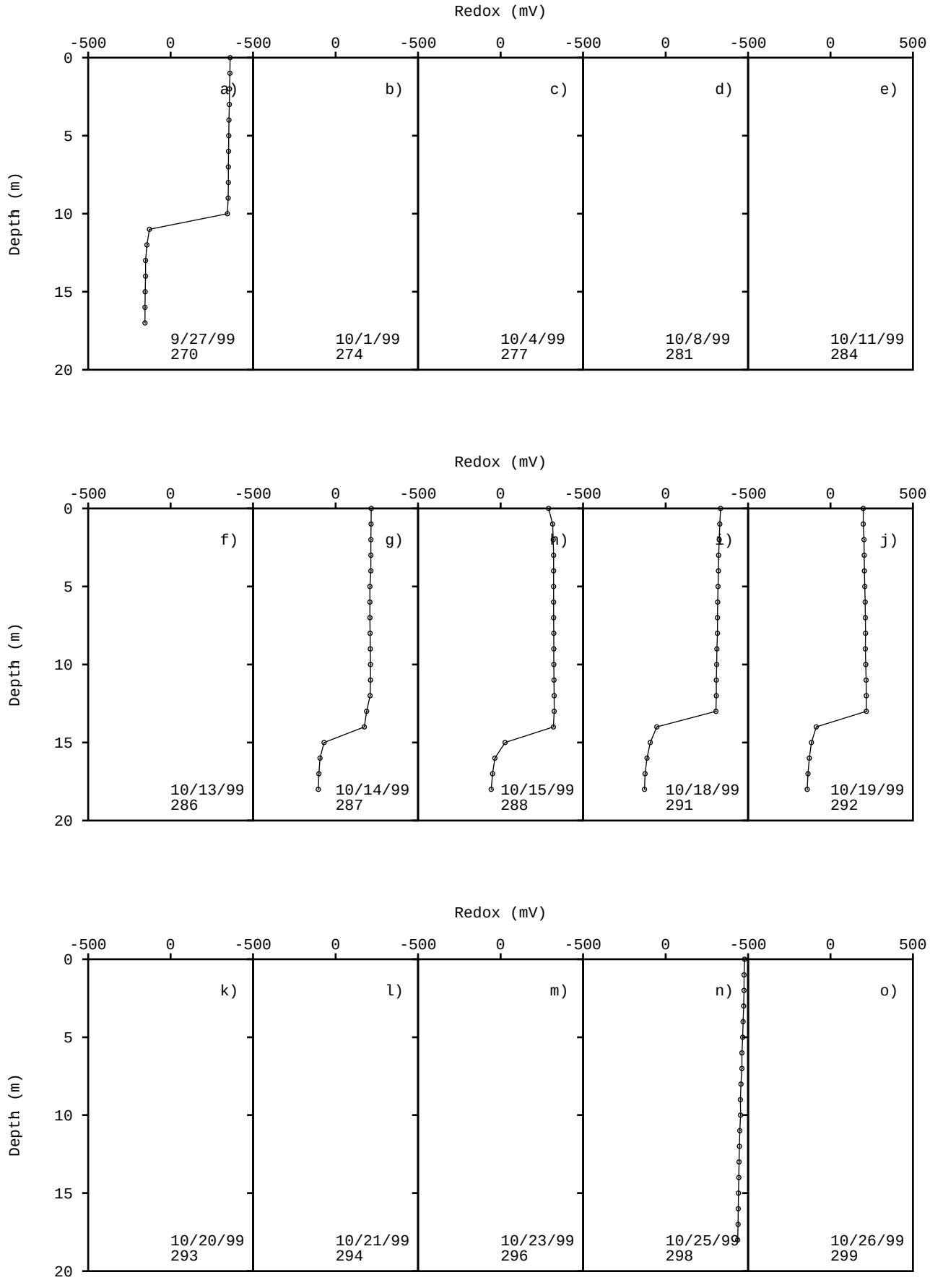
1999 Redox Profiles for Onondaga Lake: North Deep



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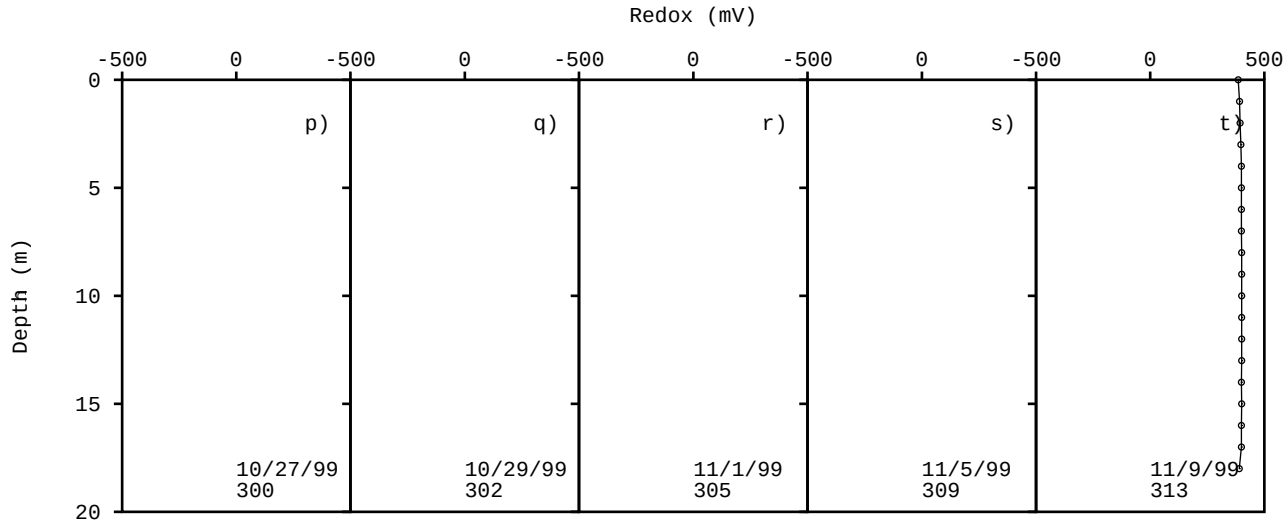
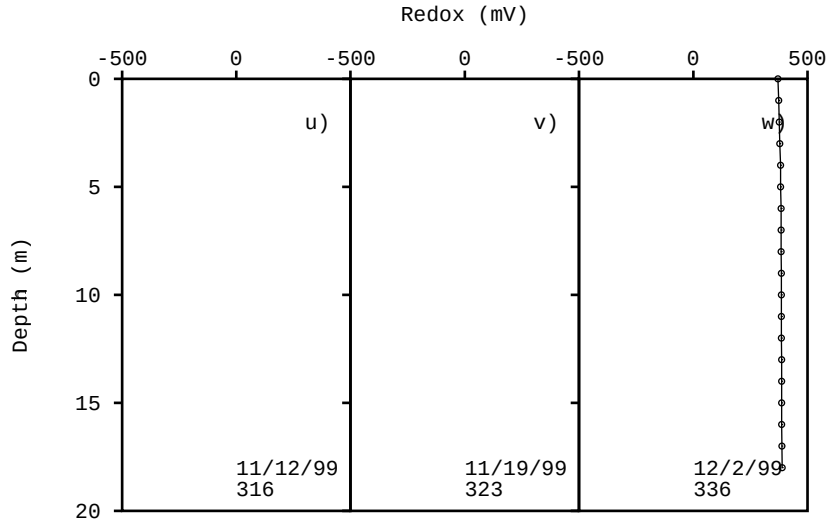
Thu Dec 02 15:13:47 1999

1999 Redox Profiles for Onondaga Lake: North Deep





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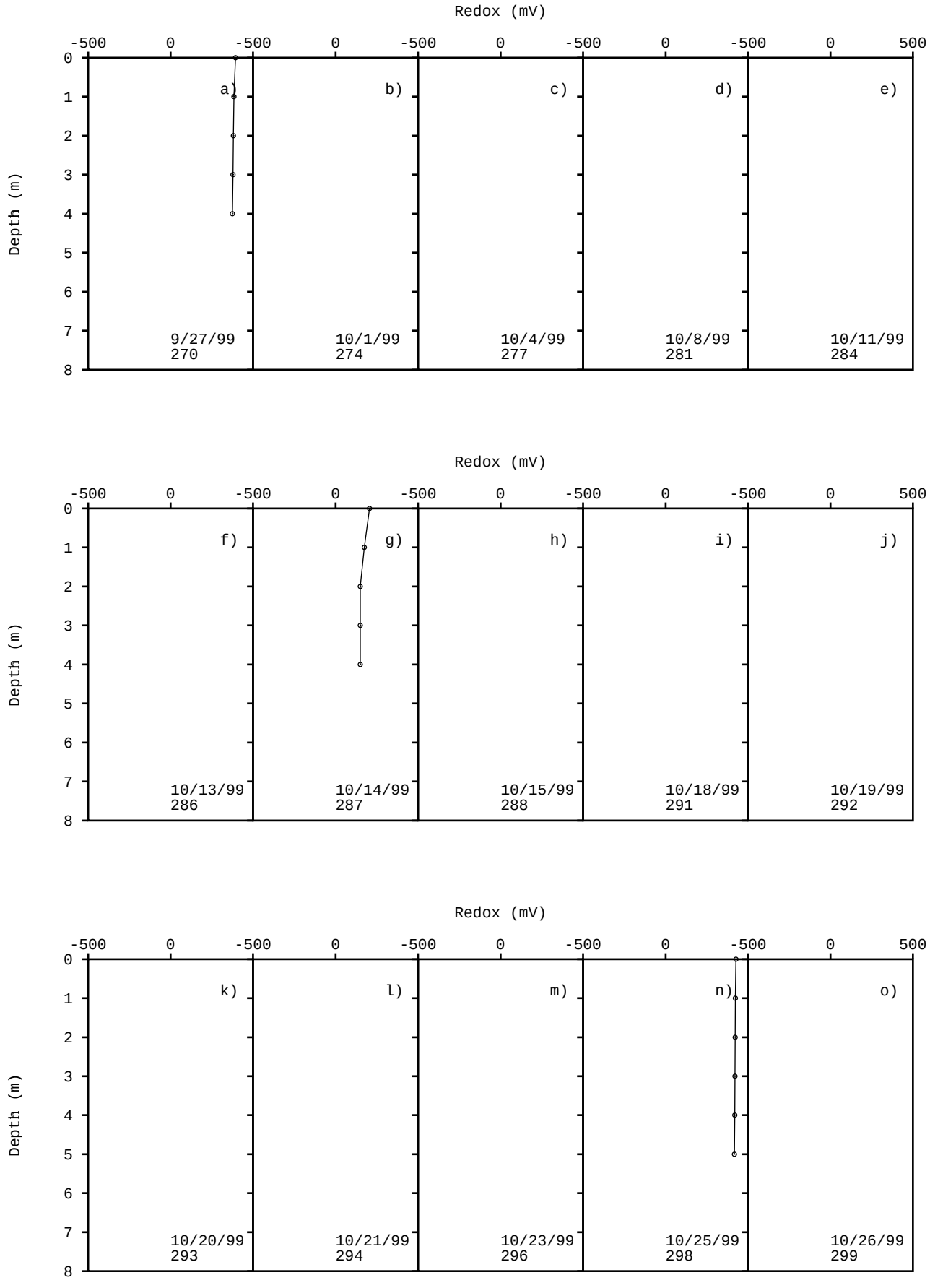
1999 Redox Profiles for Onondaga Lake: Outlet



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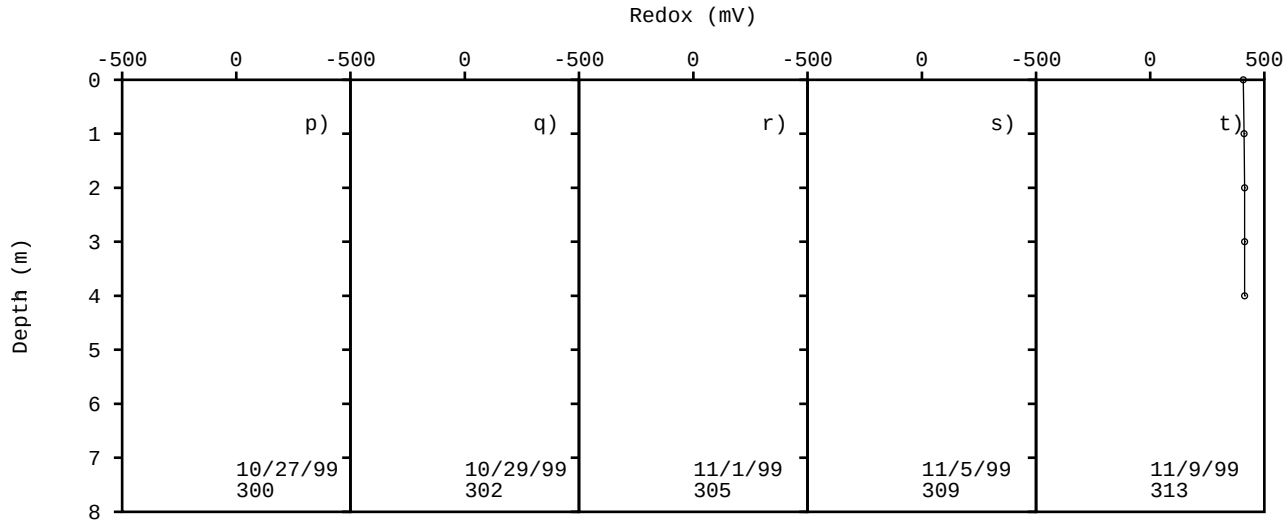
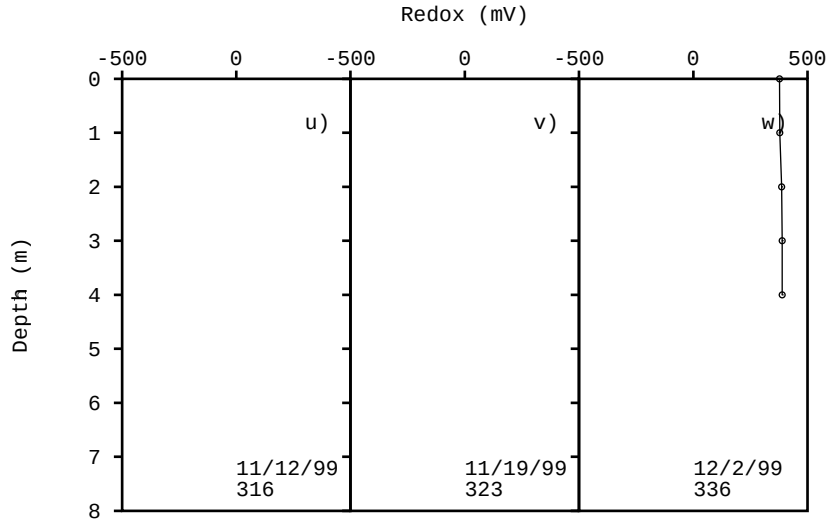
1999 Redox Profiles for Onondaga Lake: Outlet





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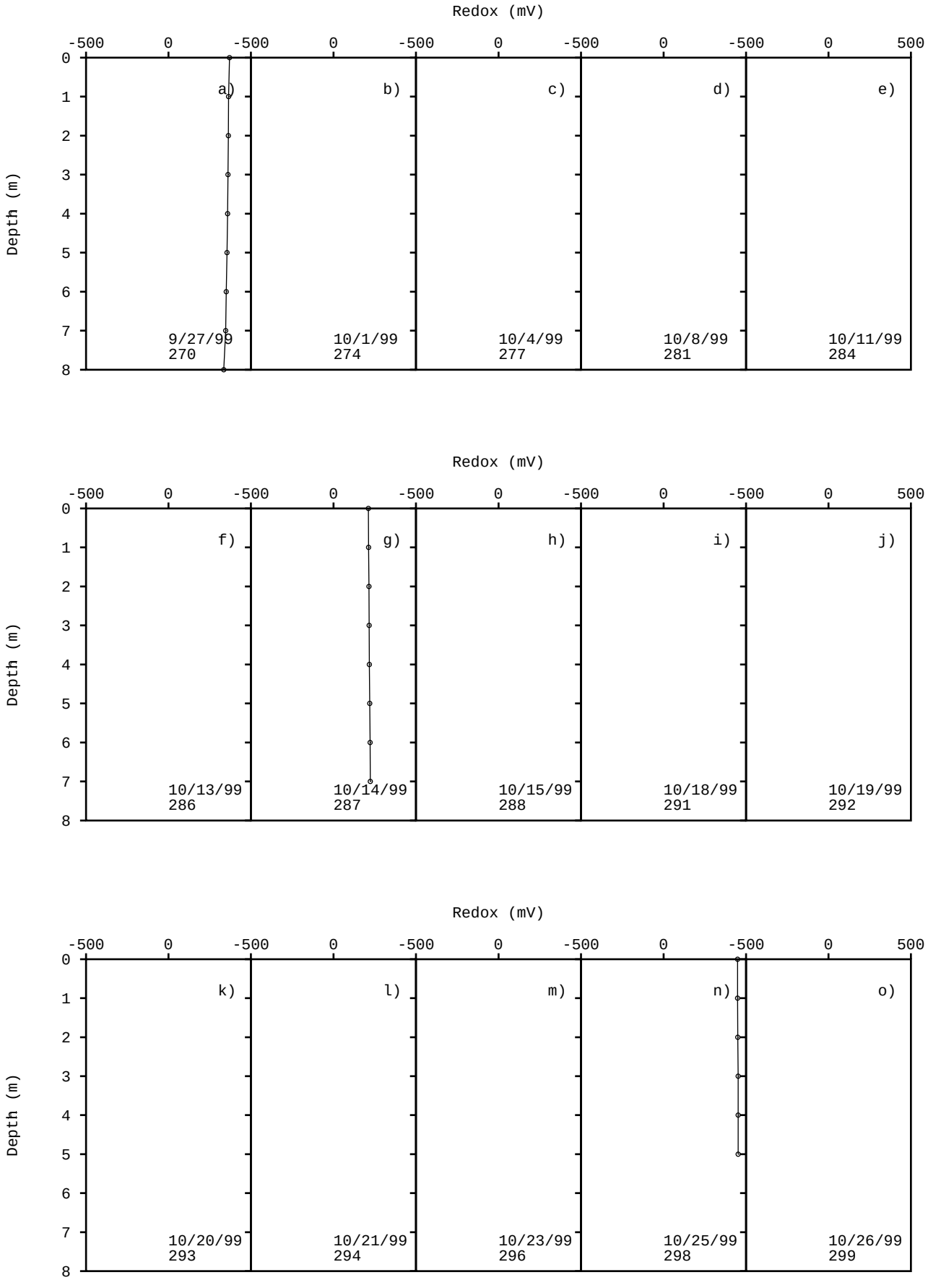
Thu Dec 02 15:14:30 1999

1999 Redox Profiles for Onondaga Lake: River Downstream



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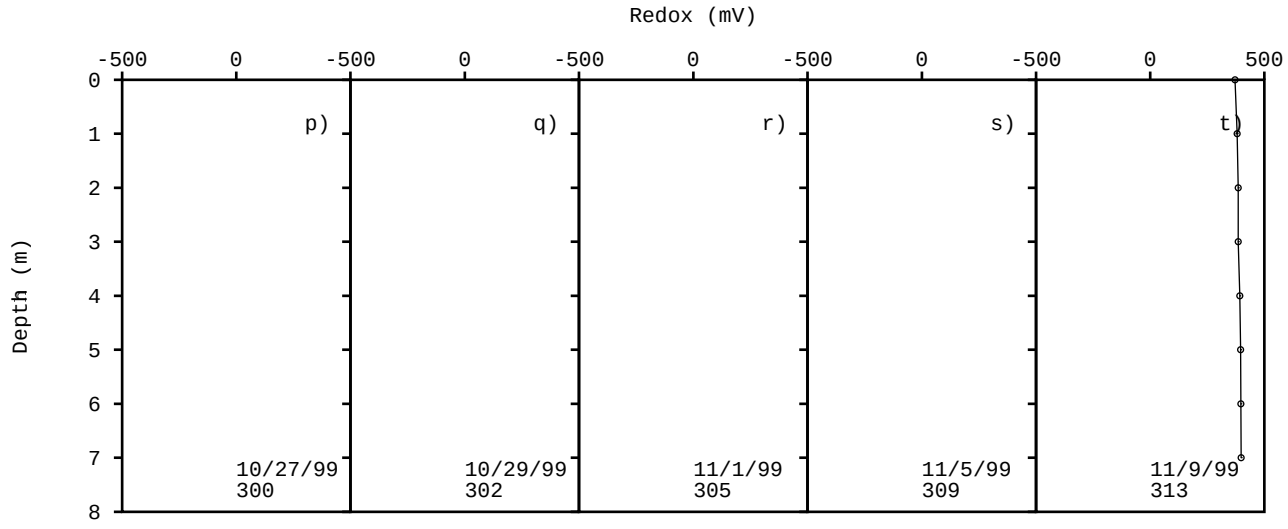
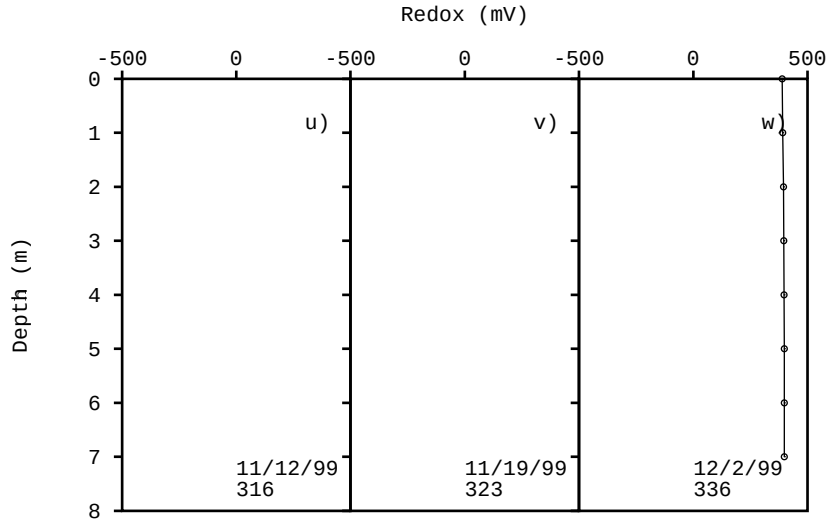
Thu Dec 02 15:14:15 1999

1999 Redox Profiles for Onondaga Lake: River Downstream





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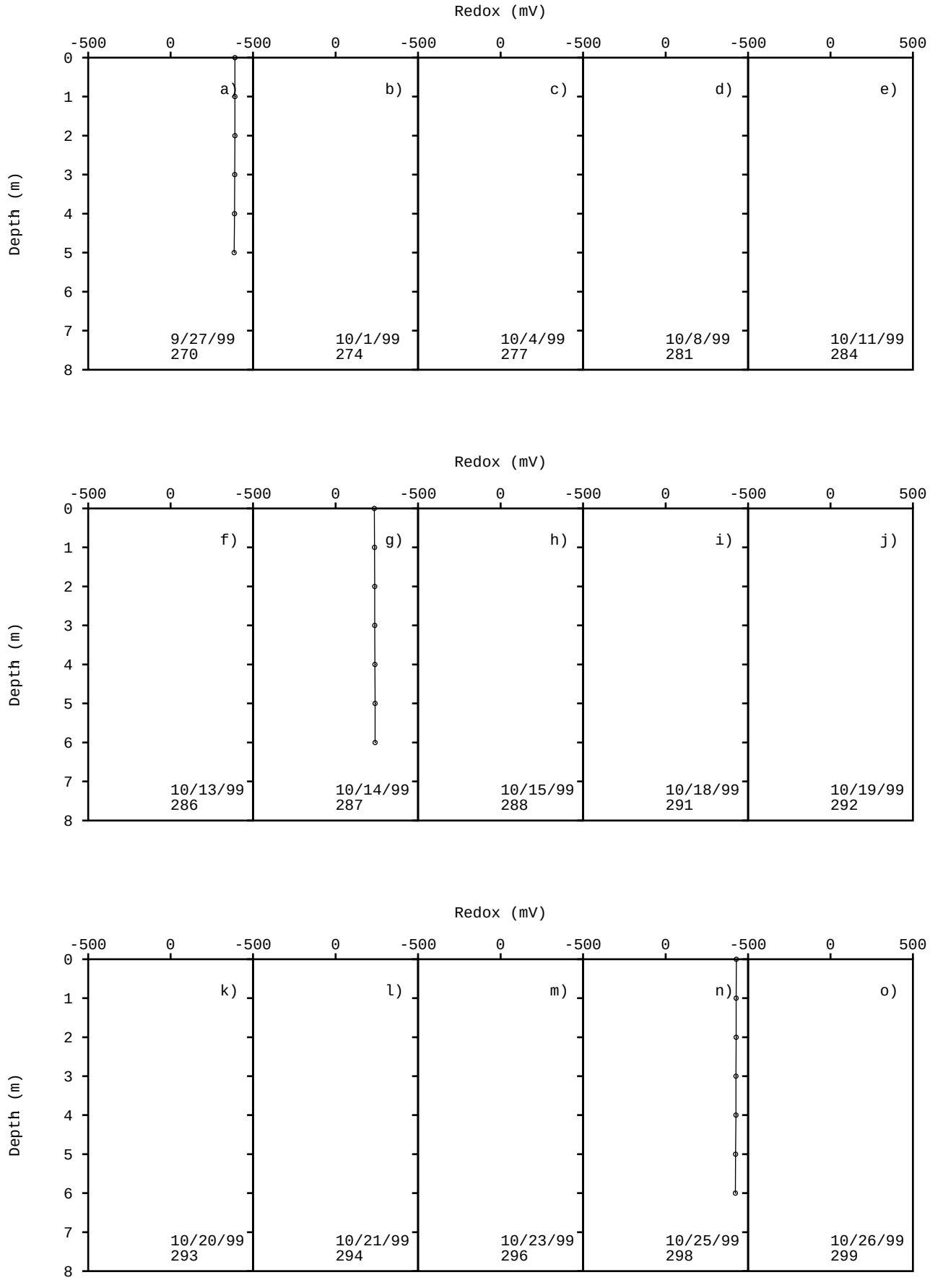
Thu Dec 02 15:14:15 1999

1999 Redox Profiles for Onondaga Lake: River Upstream



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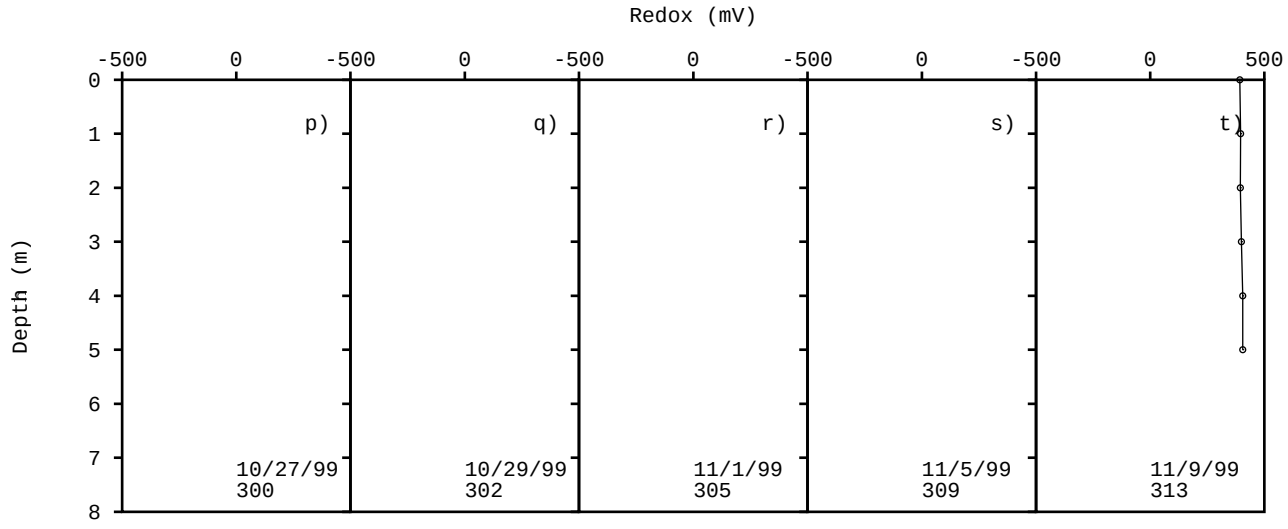
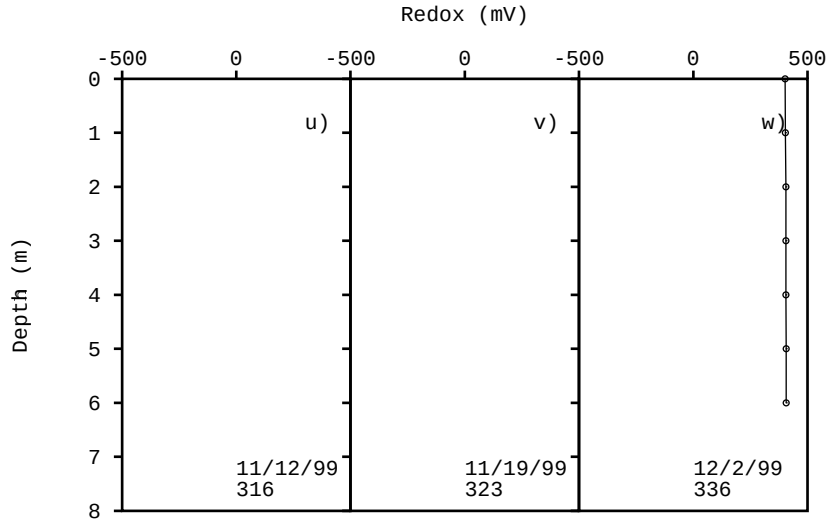
Thu Dec 02 15:14:01 1999

1999 Redox Profiles for Onondaga Lake: River Upstream





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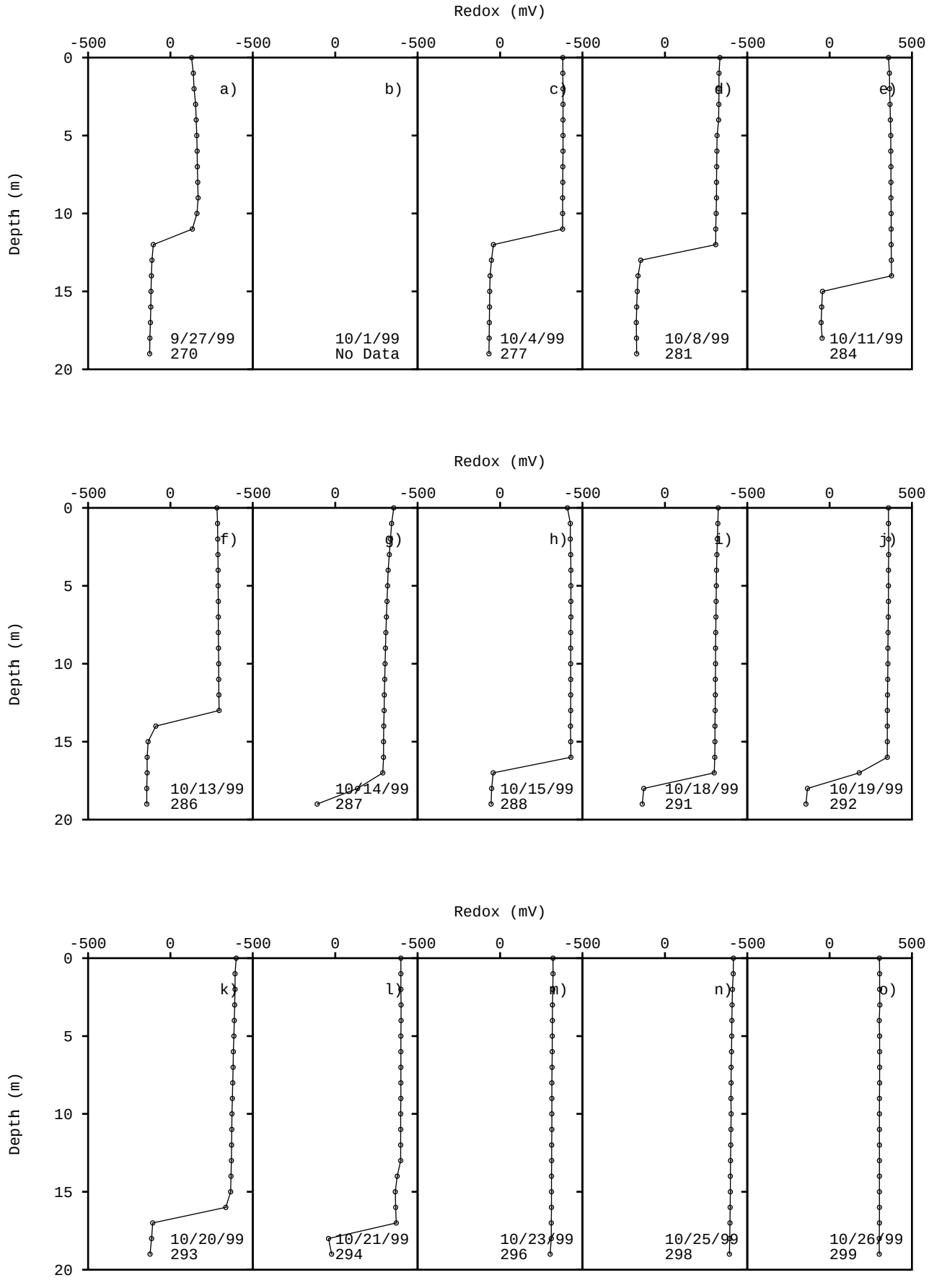
Thu Dec 02 15:14:01 1999

1999 Redox Profiles for Onondaga Lake: South Deep



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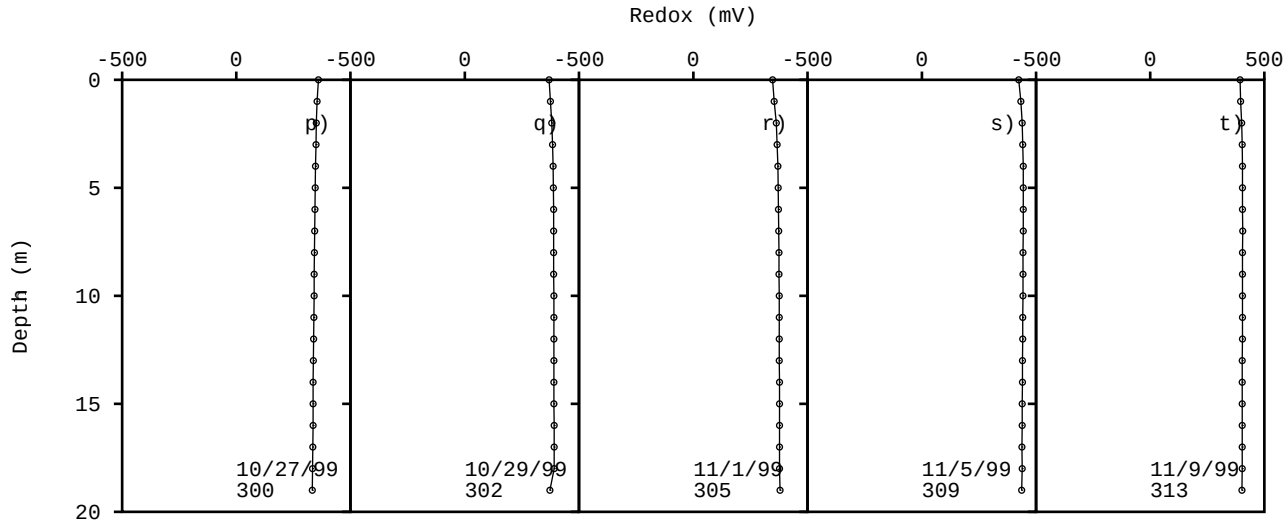
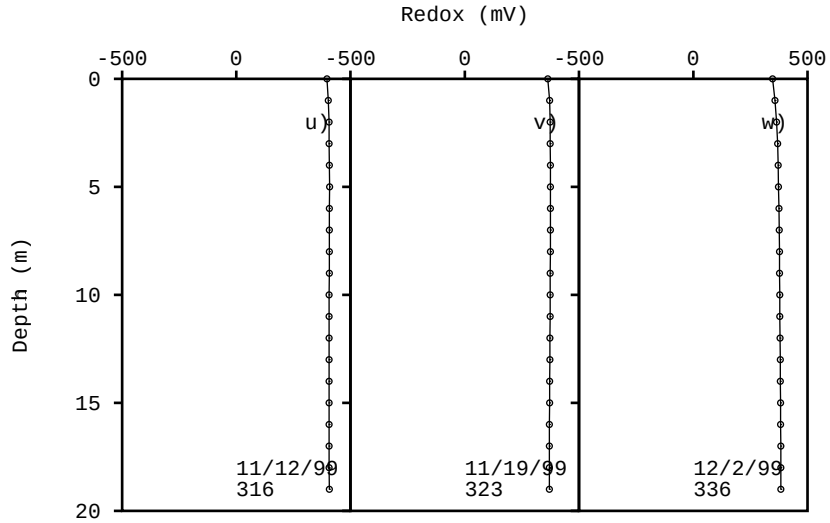
Thu Dec 02 15:13:33 1999

1999 Redox Profiles for Onondaga Lake: South Deep





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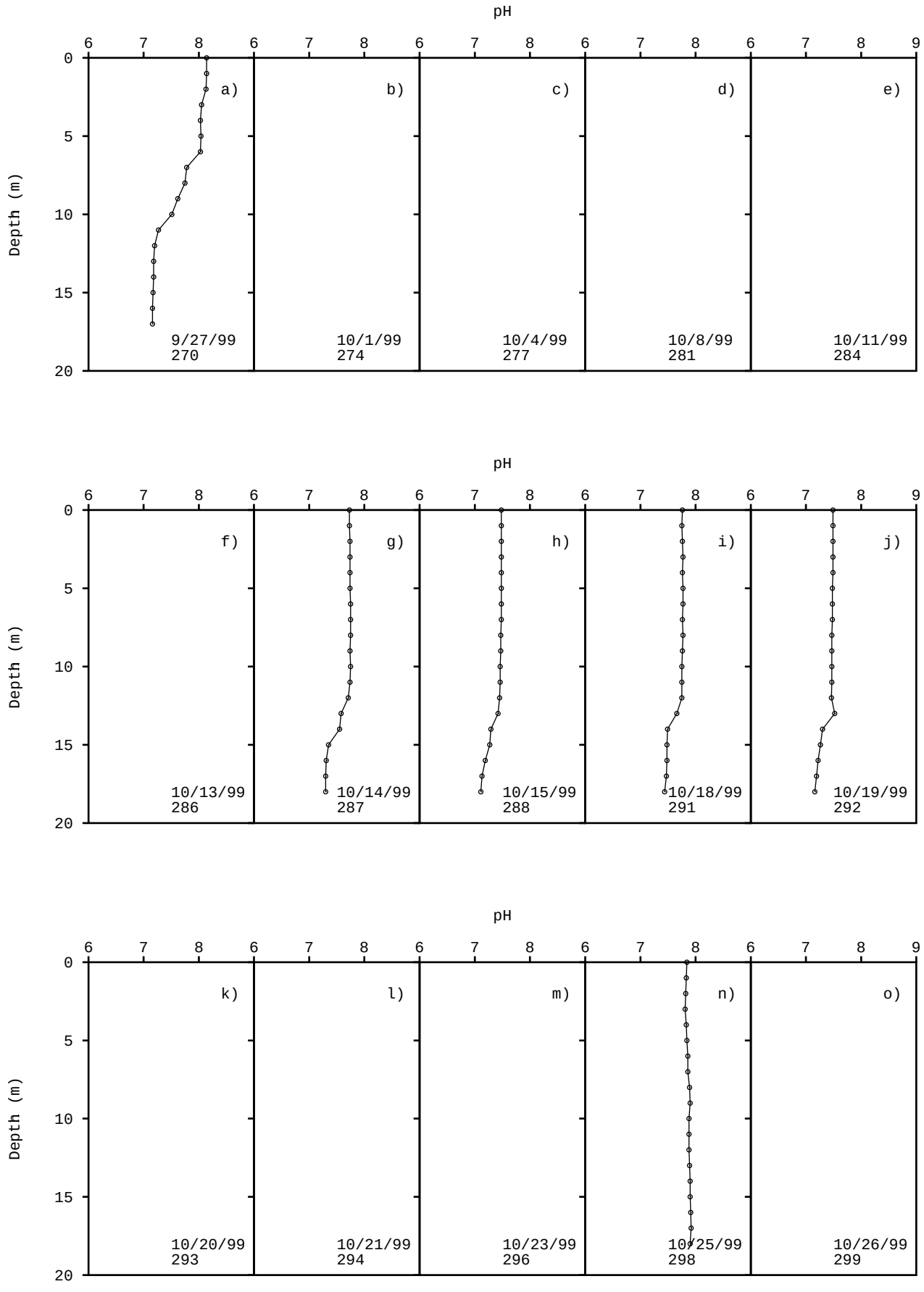
1999 pH Profiles for Onondaga Lake: North Deep



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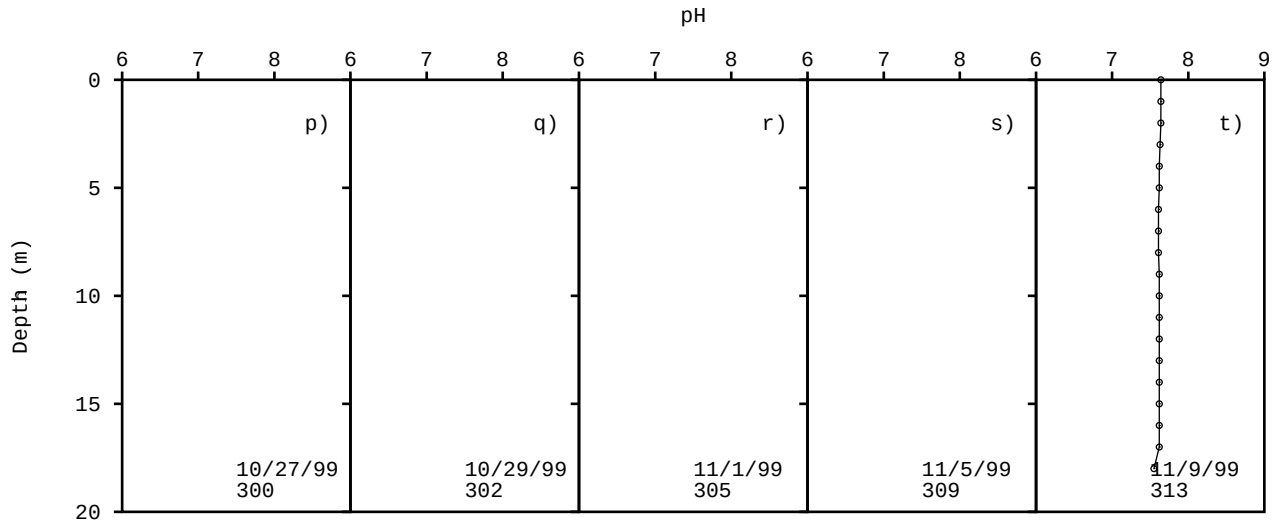
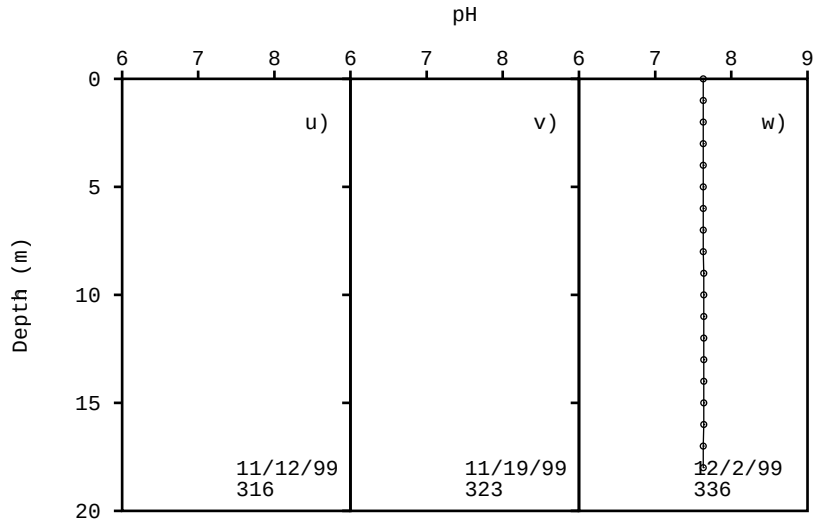
1999 pH Profiles for Onondaga Lake: North Deep





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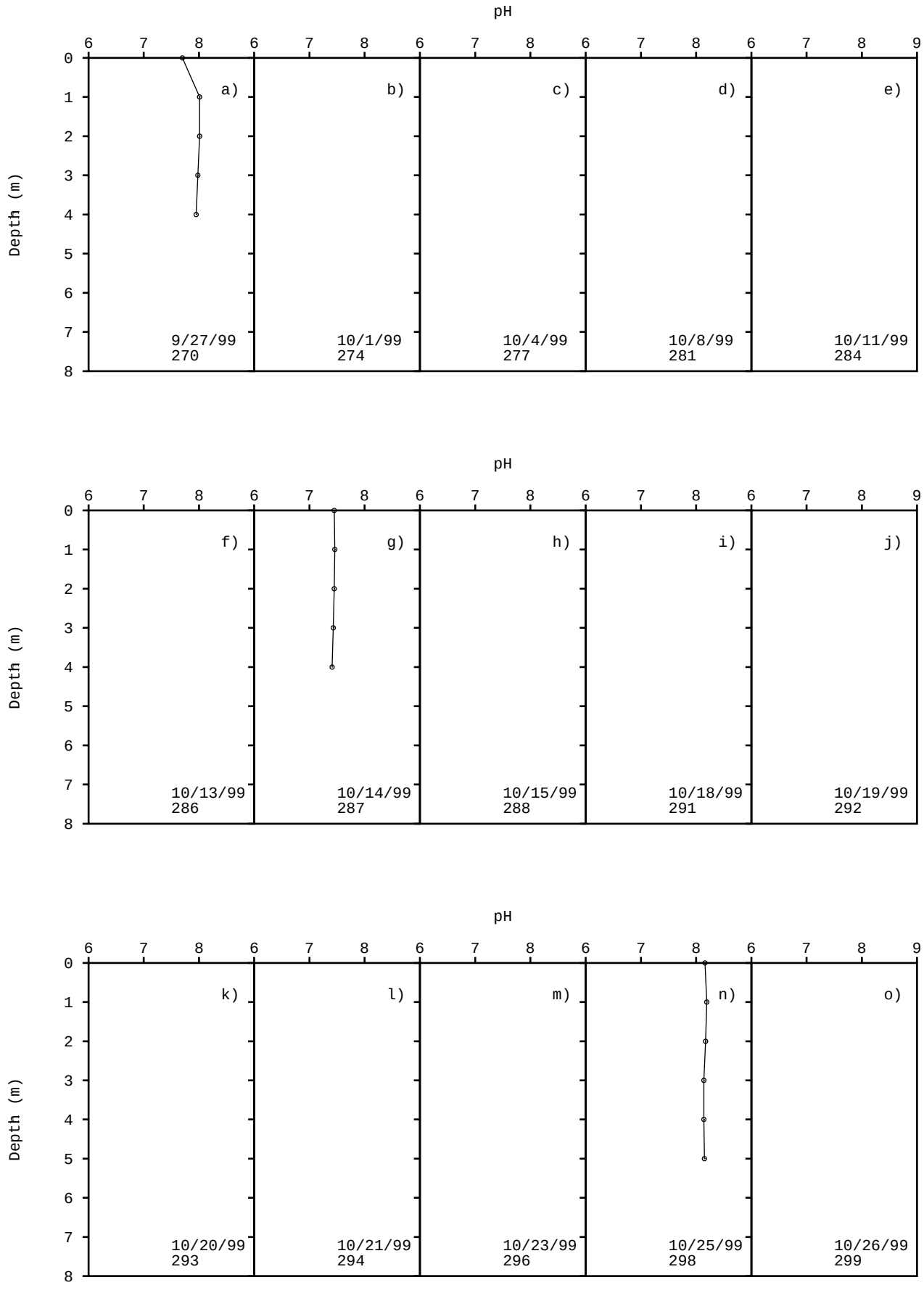

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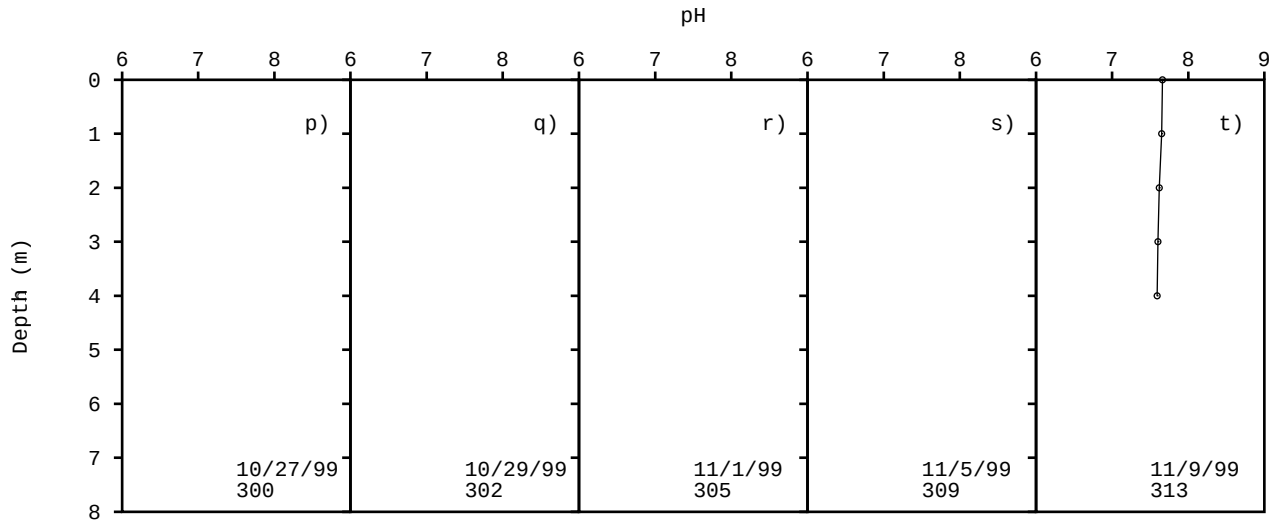

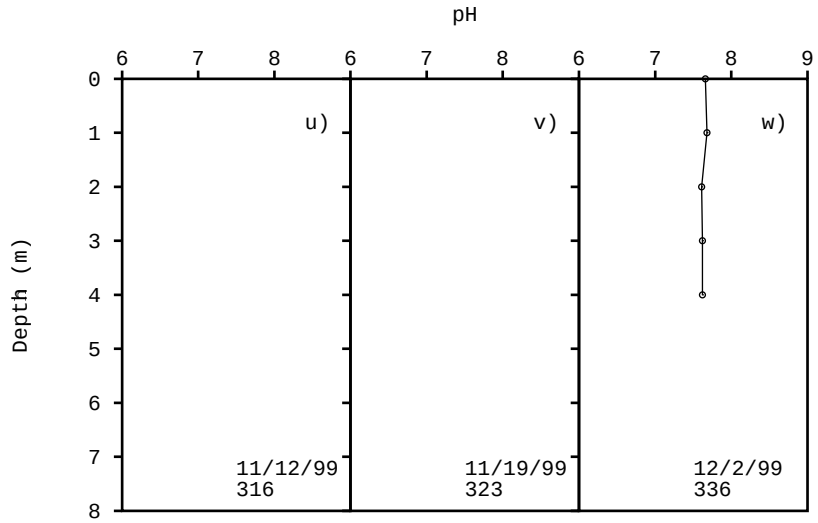

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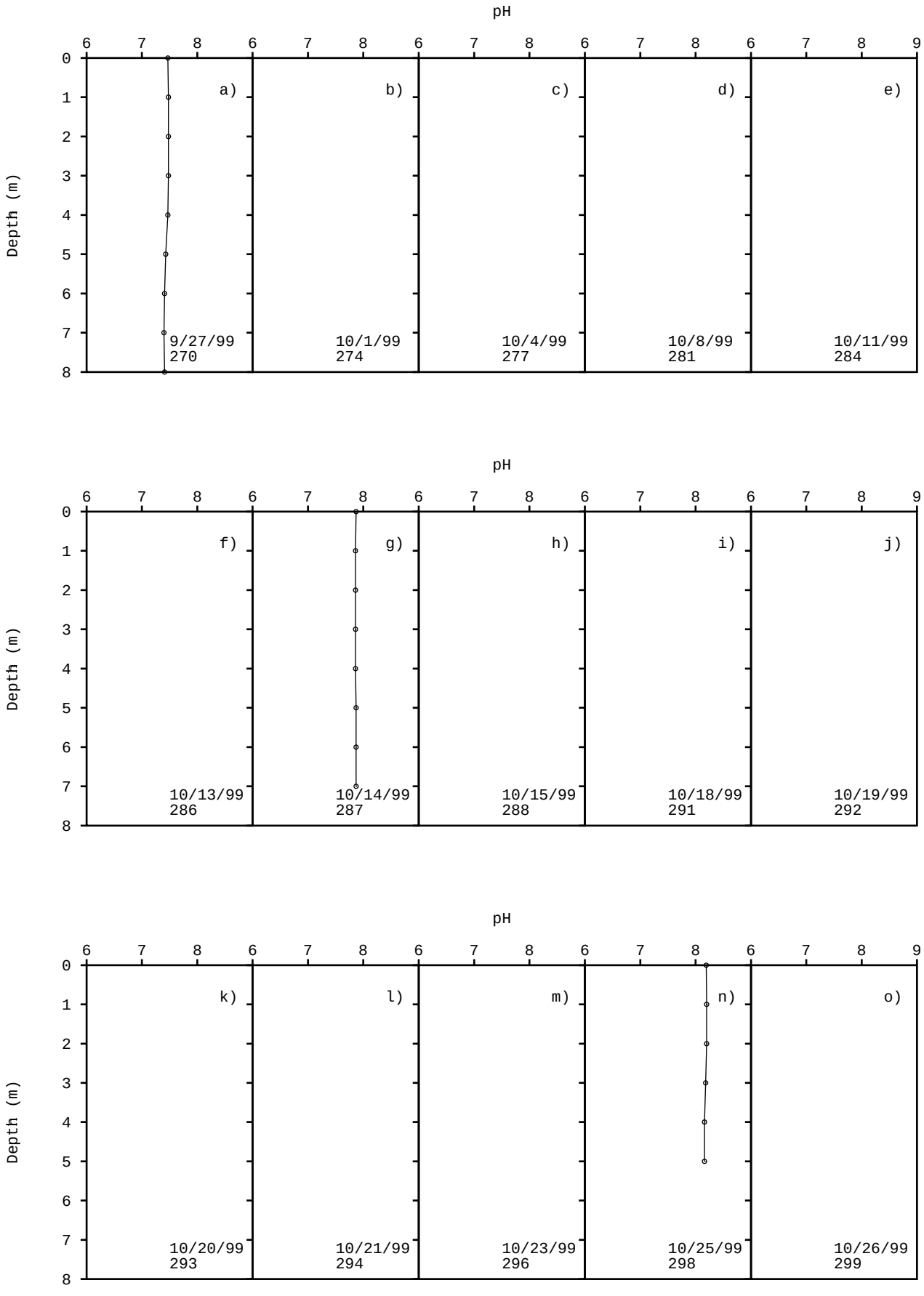
1999 pH Profiles for Onondaga Lake: River Downstream



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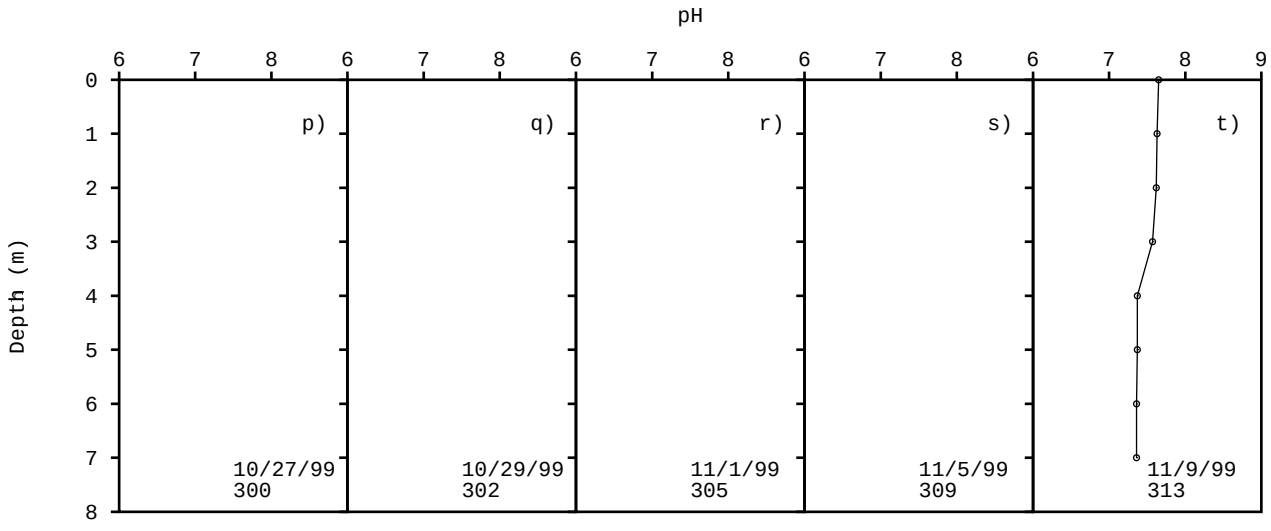

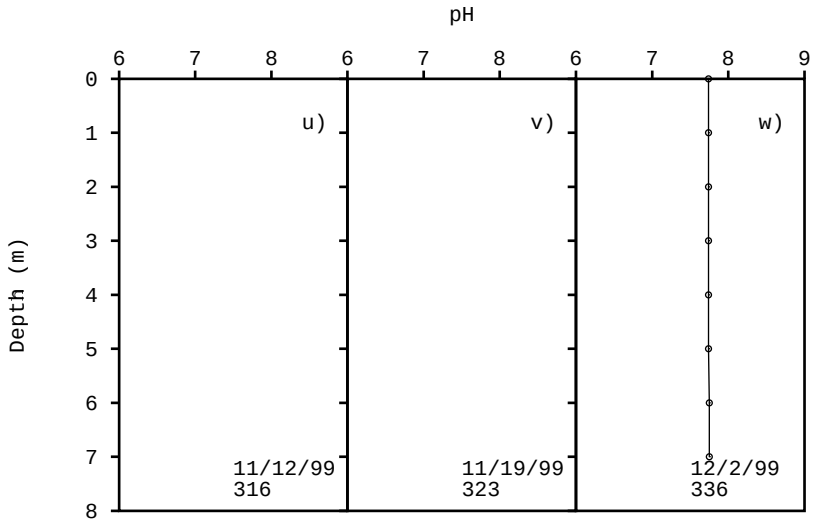

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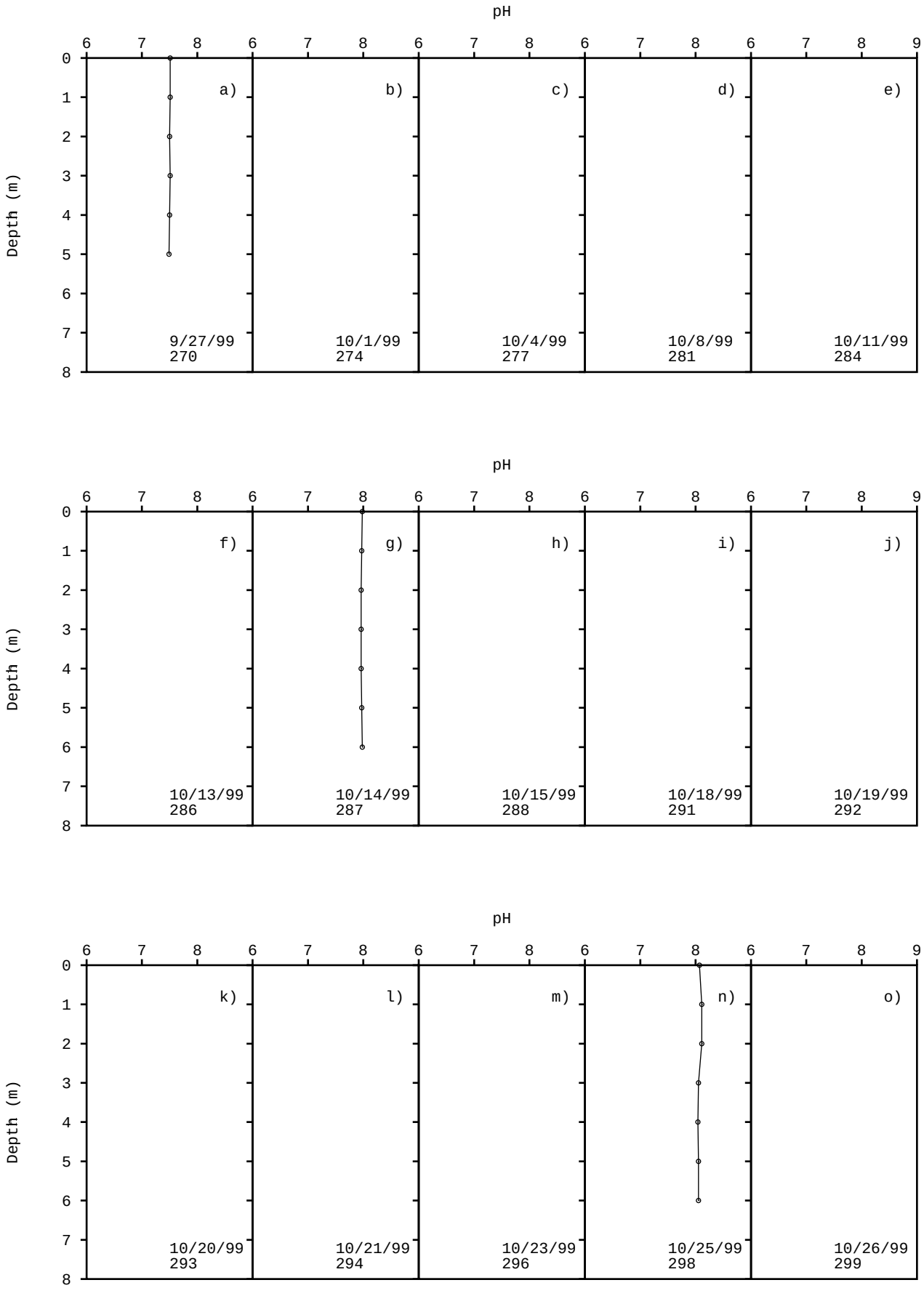
1999 pH Profiles for Onondaga Lake: River Upstream



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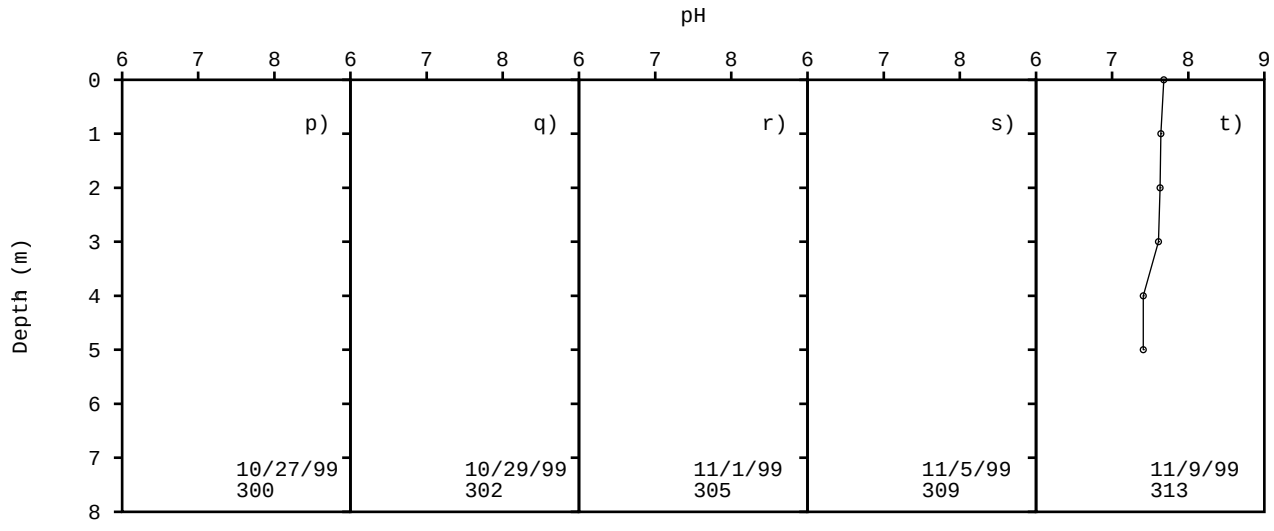

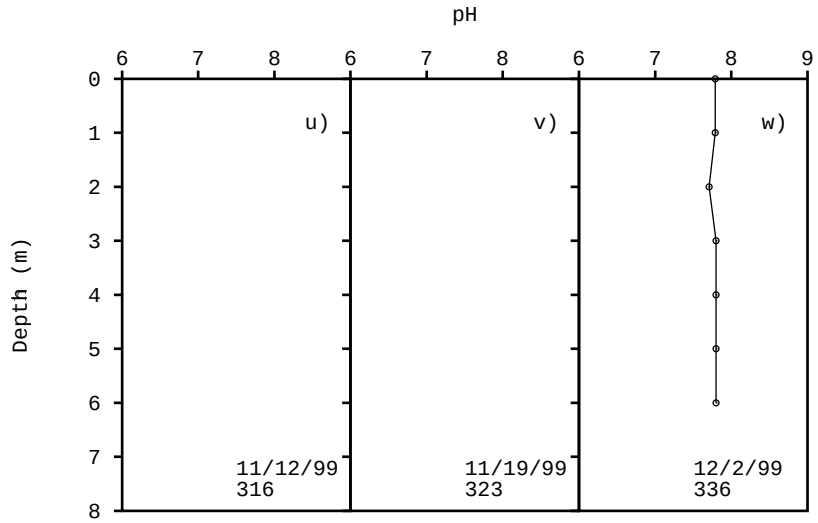

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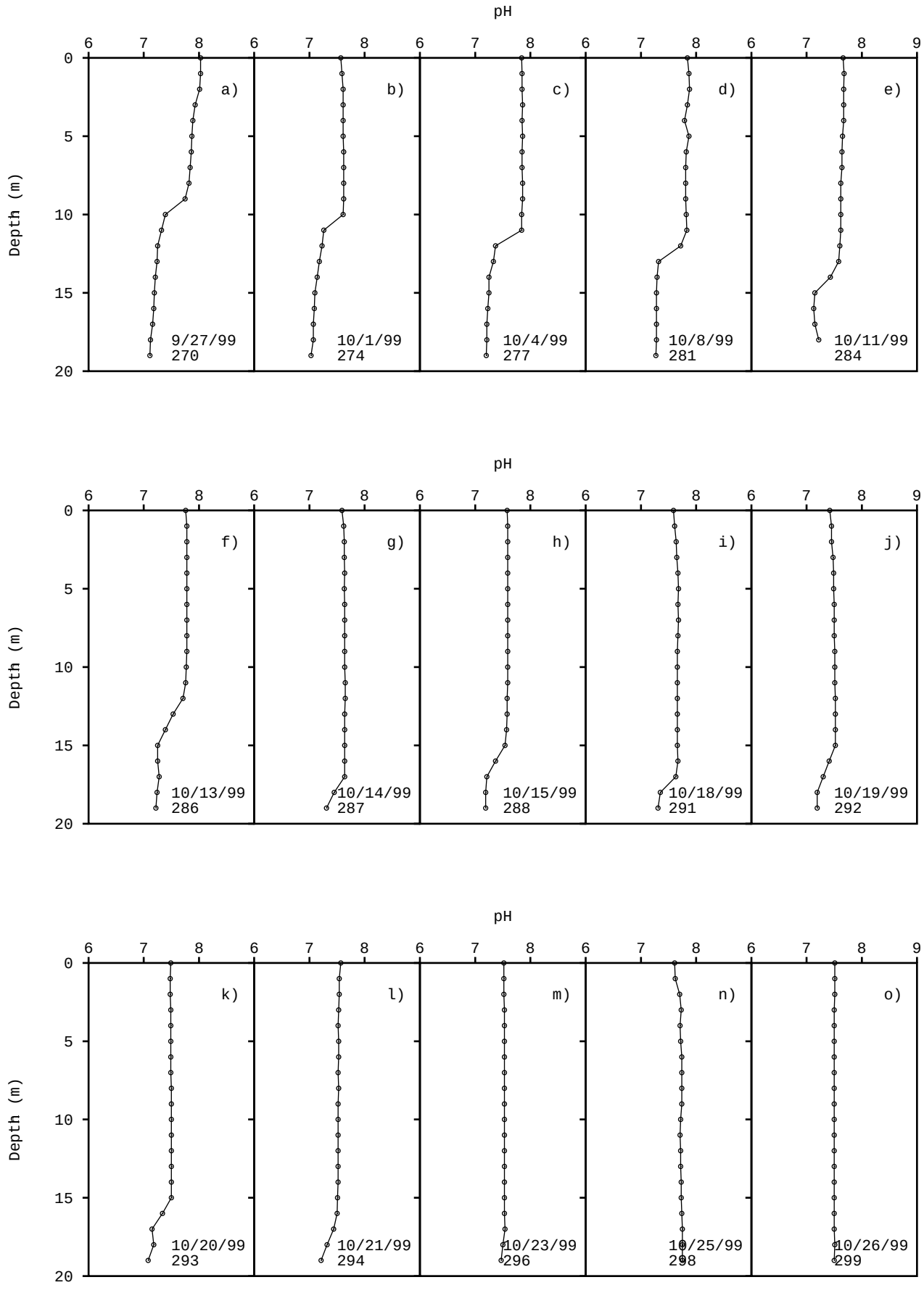
1999 pH Profiles for Onondaga Lake: South Deep



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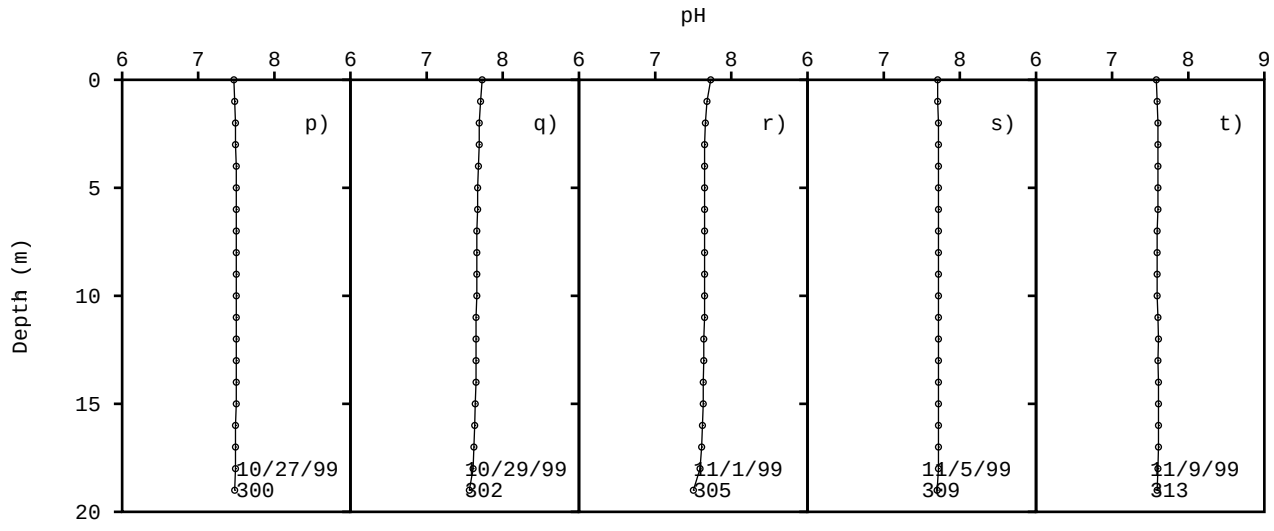

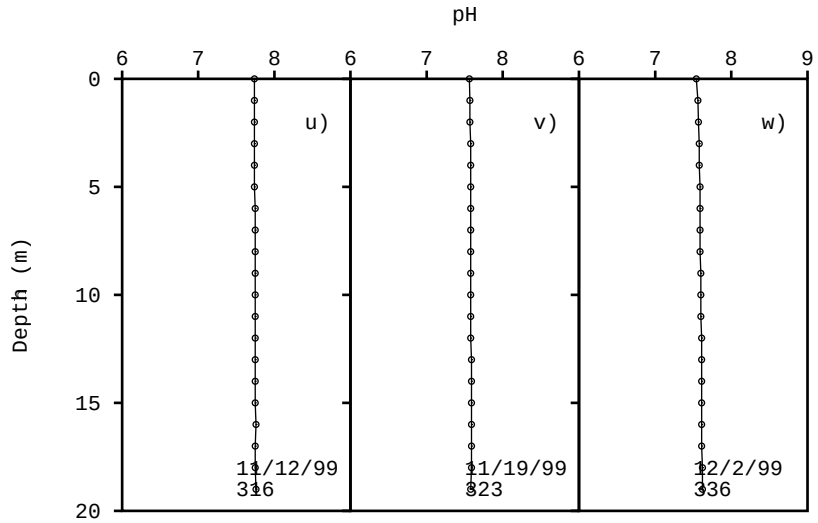

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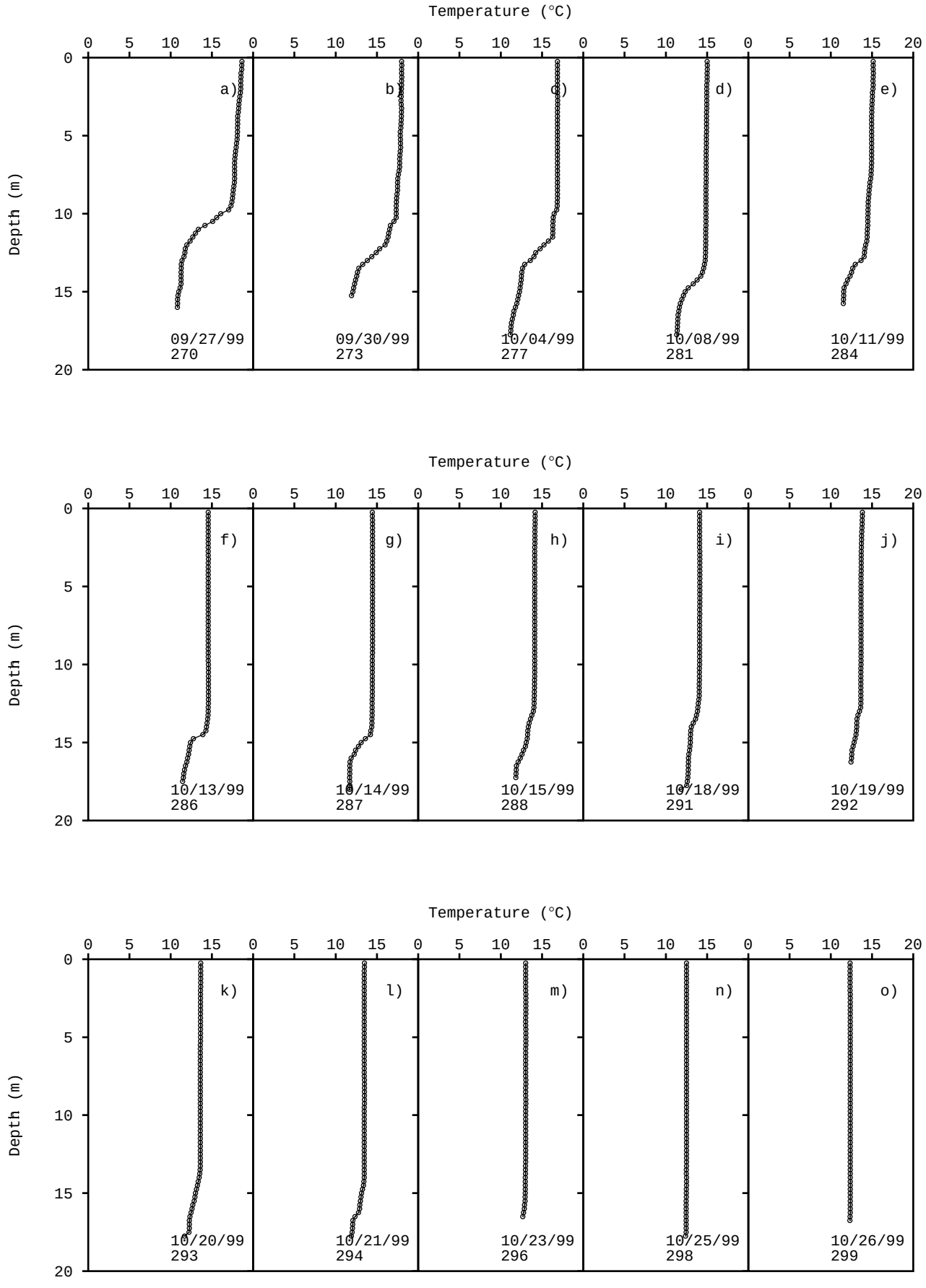

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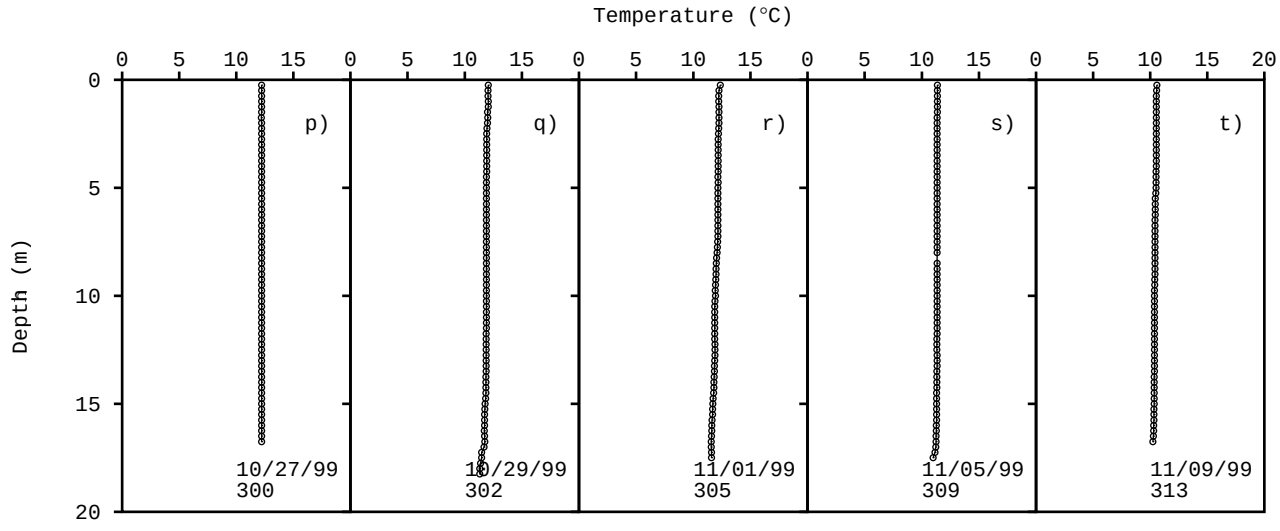
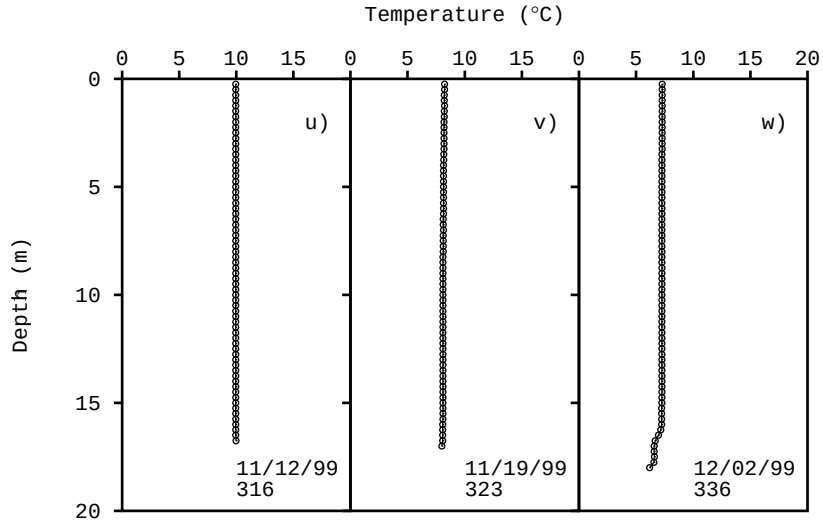
1999 Temperature Profiles for Onondaga Lake: North Deep





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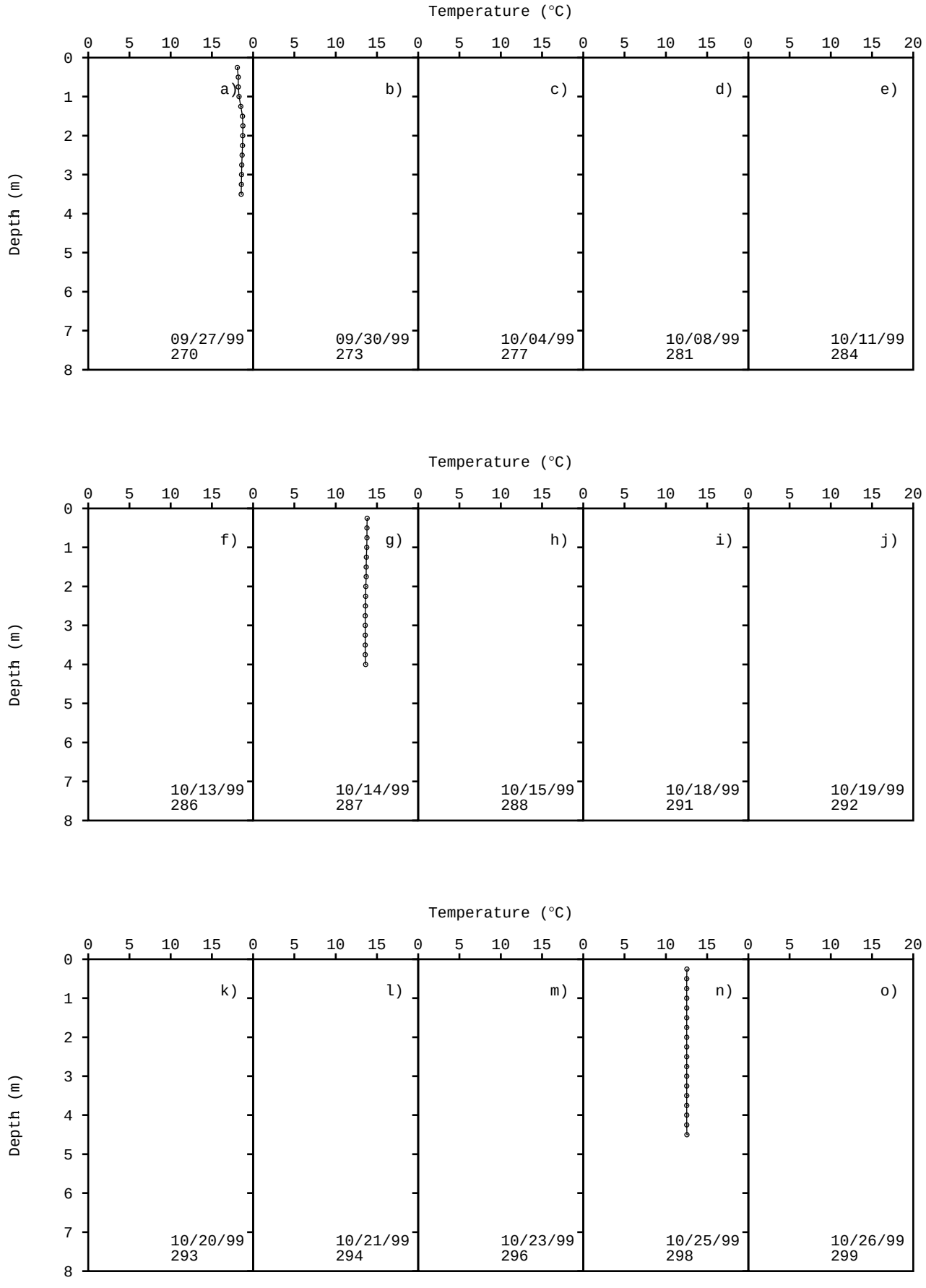

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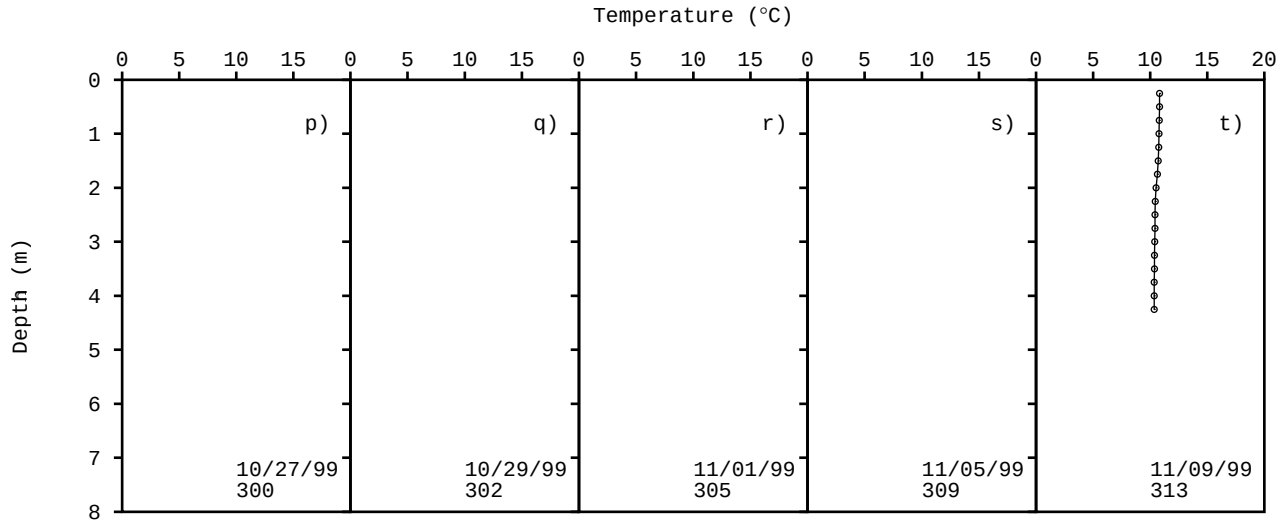
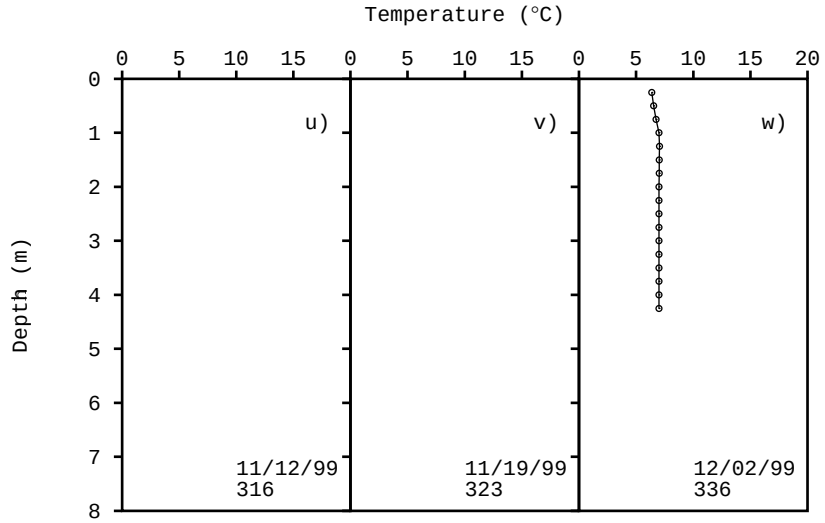
1999 Temperature Profiles for Onondaga Lake: Outlet





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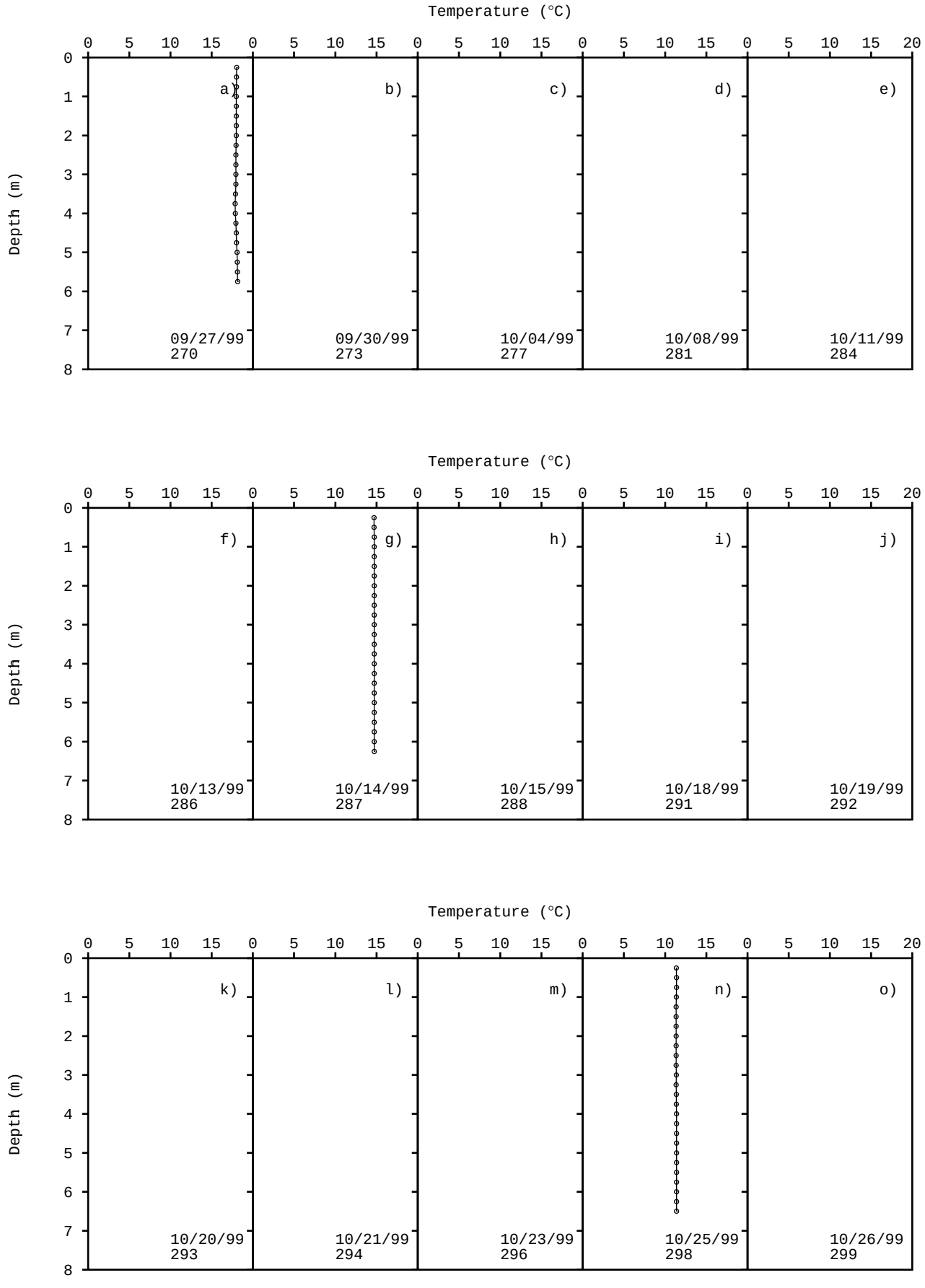
1999 Temperature Profiles for Onondaga Lake: River Downstream



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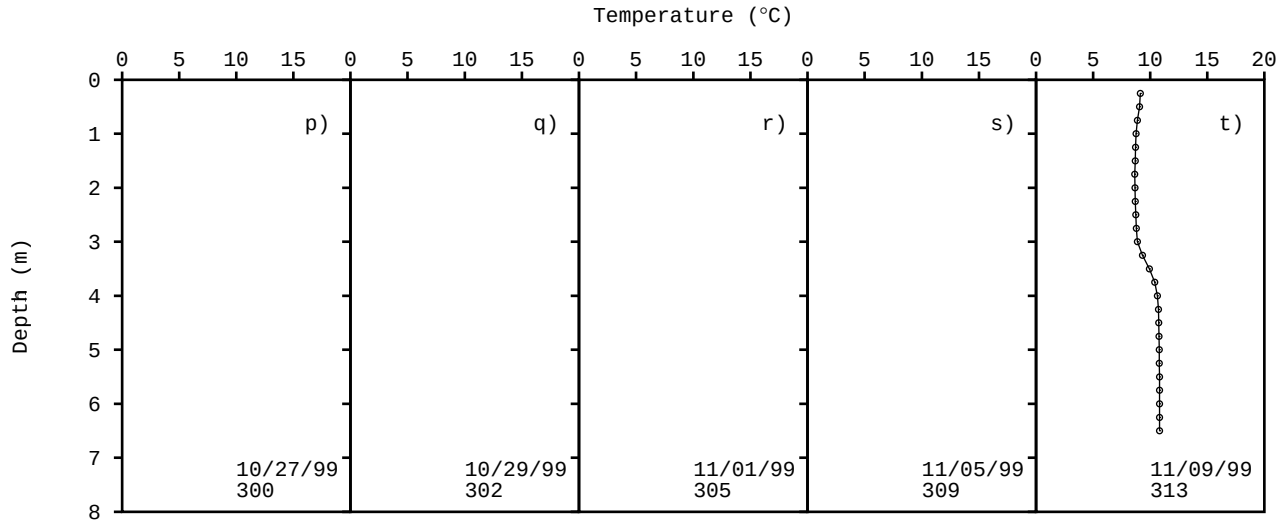
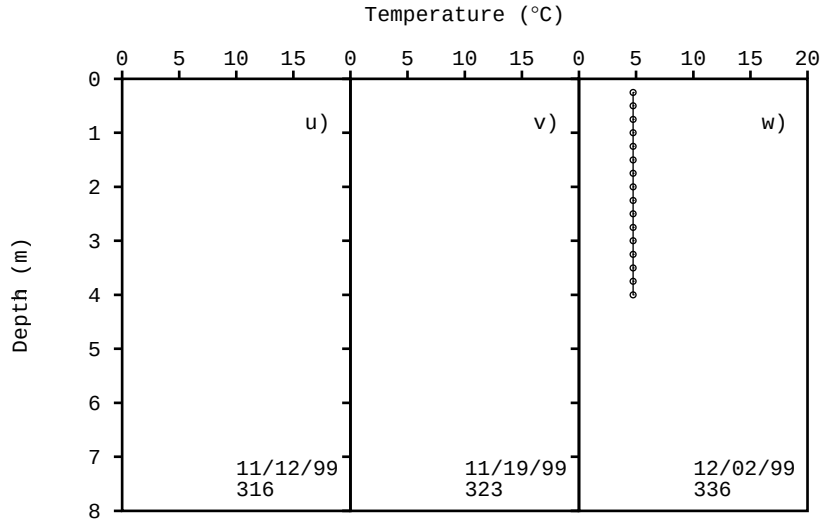
1999 Temperature Profiles for Onondaga Lake: River Downstream





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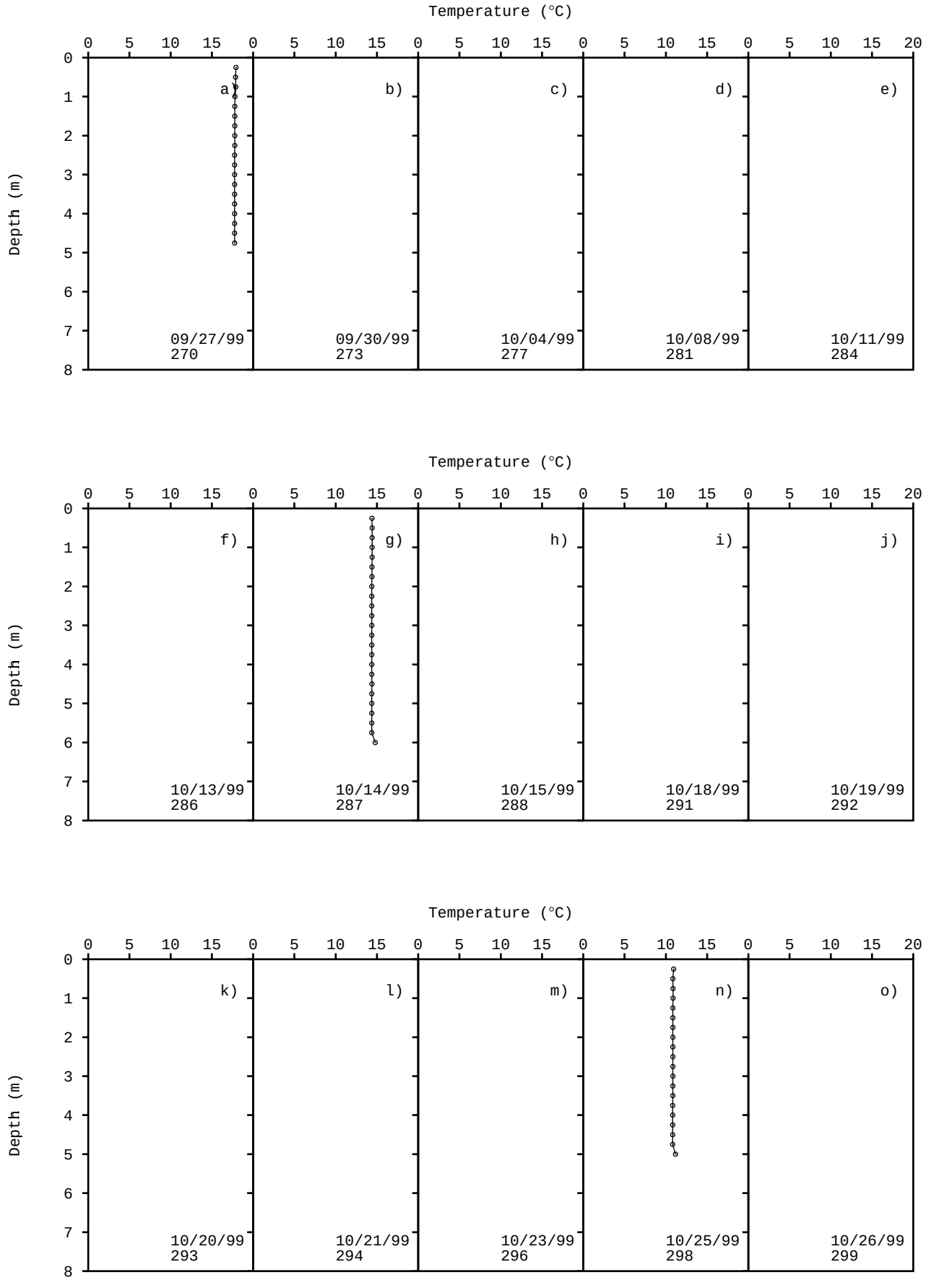
1999 Temperature Profiles for Onondaga Lake: River Upstream



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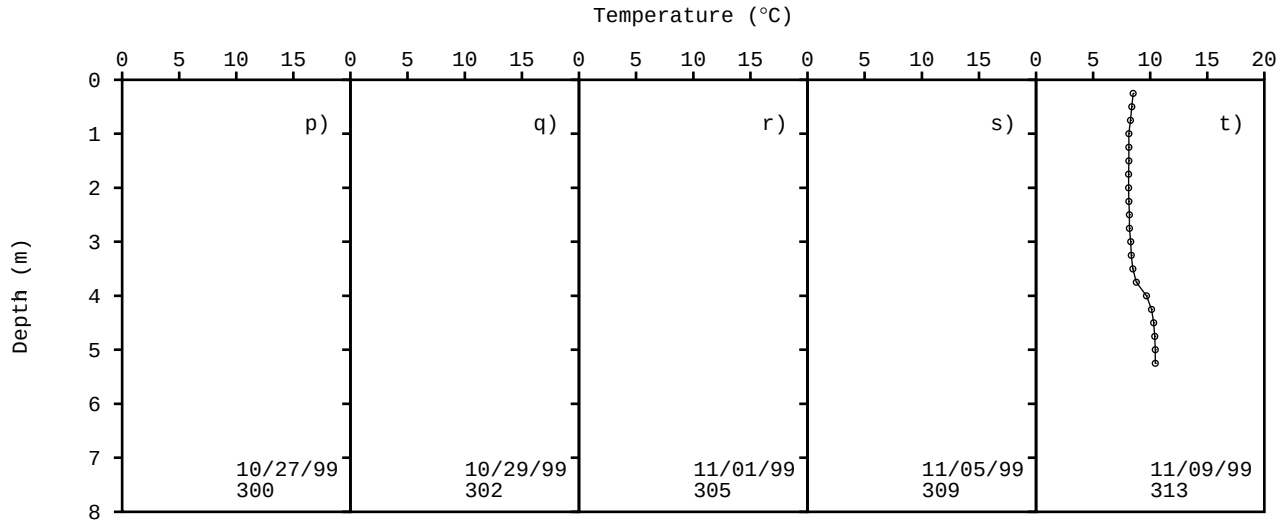
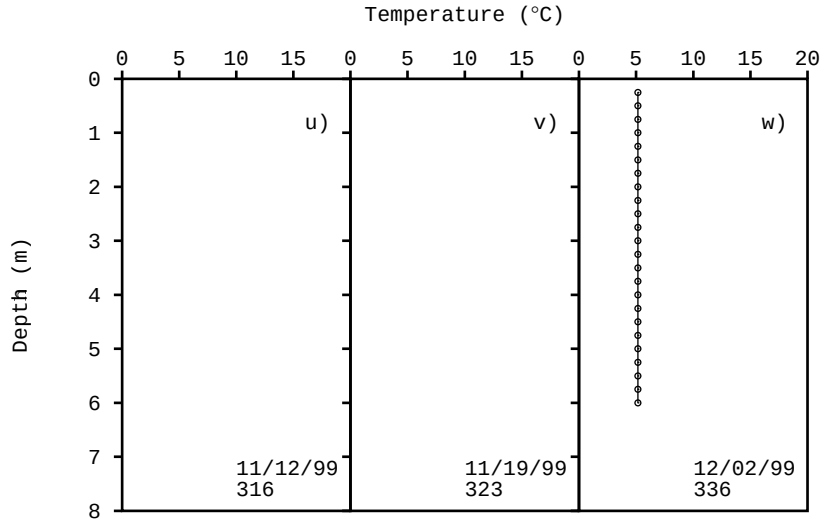
1999 Temperature Profiles for Onondaga Lake: River Upstream





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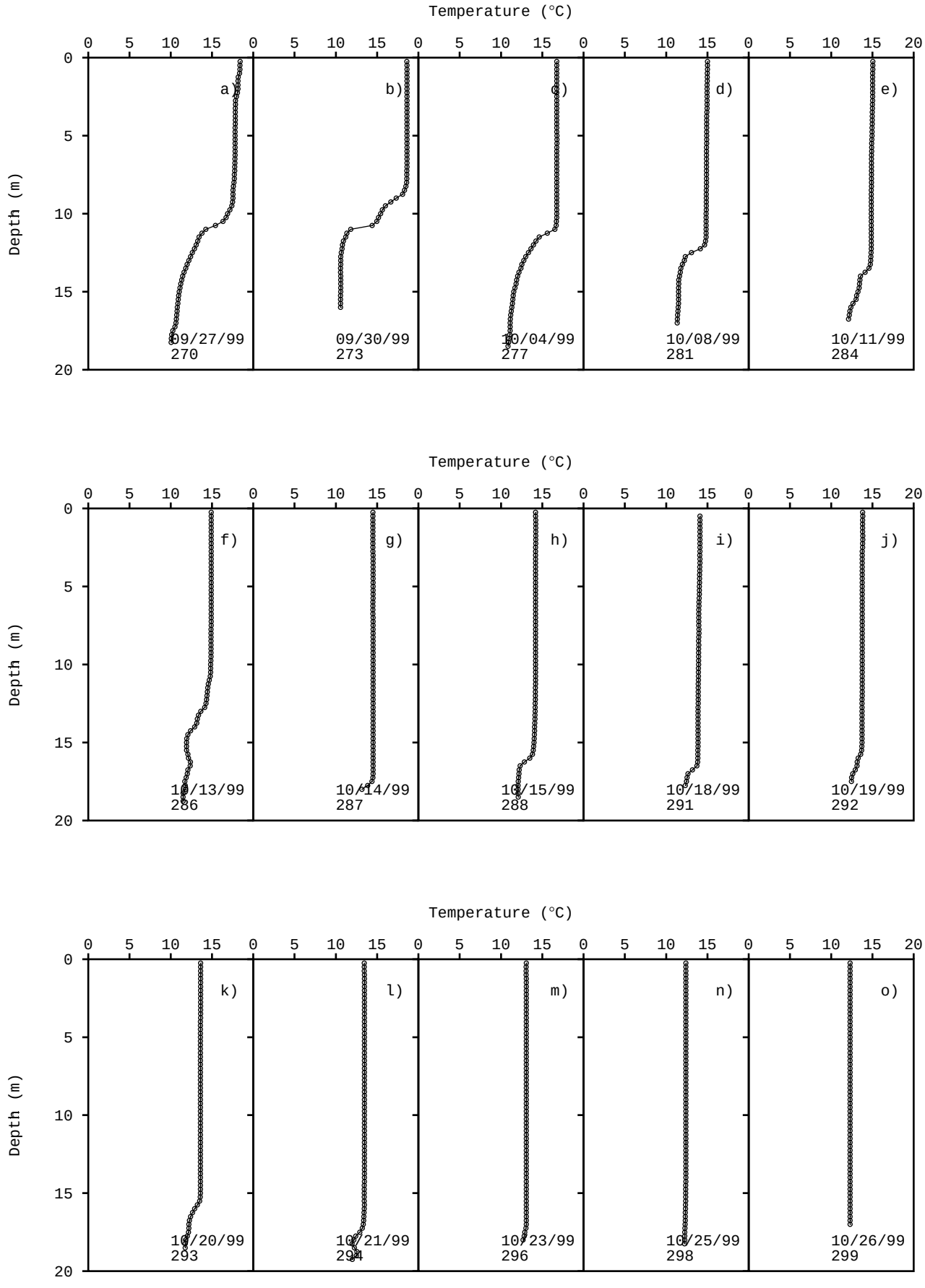
1999 Temperature Profiles for Onondaga Lake: South Deep



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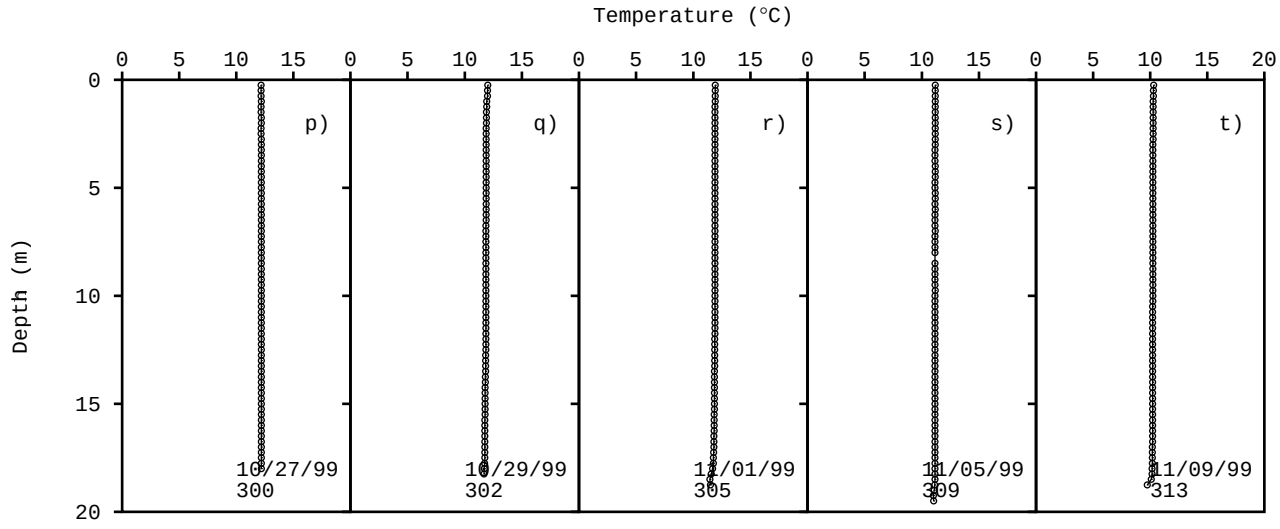

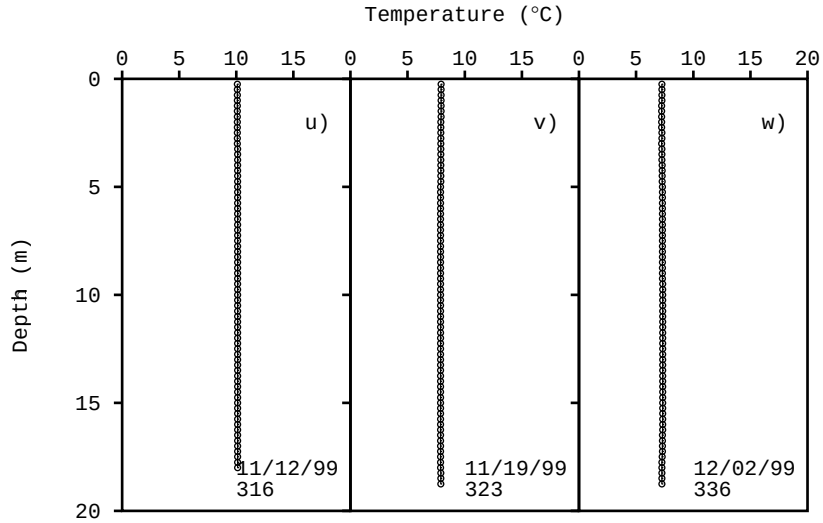

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Appendix A6

Phase 2B Water Data and Validation Report (2001)

Table A6-1. Mercury and TSS Data for 2001 Phase 2B Supplemental Water Sampling

Station	Sample depth (m)	Water depth (m)	Date - Event	Latitude	Longitude	Hg (ng/L)	TSS (mg/L)	Sample Number	DEC ID
W1	1	19 (RUSS)	12/4/2001 - Calm	43 04.77N	76 11.89 W	3.57	<1.5	W1-1m-120401	D63803
W1	1	19 (RUSS)	12/4/2001 - Calm	43 04.77N	76 11.89 W	2.82		W1-1m-120401-dis	D63804
W1	6	19 (RUSS)	12/4/2001 - Calm	43 04.77N	76 11.89 W	4.22	5	W1-6m-120401	D63805
W60	1	3	12/4/2001 - Calm	43 05.15 N	76 11.56 W	4.52	4	W60-1m-120401	D63802
W61	1	19	12/4/2001 - Calm	43 04.54 N	76 11.71 W	5.09	3.5	W61-1m-120401	D63806
W62	1	15	12/4/2001 - Calm	43 04.24 N	76 11.48 W	4.45	6.5	W62-1m-120401	D63807
W63	1	6	12/4/2001 - Calm	43 04.09 N	76 11.36 W	9.02	5.5	W63-1m-120401	D63808
W63	4*	6	12/4/2001 - Calm	43 04.09 N	76 11.36 W	6.12	3	W63-4m-120401	D63809
W67	1	3	12/4/2001 - Calm	43 04.06 N	76 11.40 W	14.1	3	W67-1m-120401	D63810
W64	2	3 (RUSS)	12/4/2001 - Calm	43 04.05 N	76 11.33 W	4.89	4.5	W64-2m-120401	D63811
W64	2	3 (RUSS)	12/4/2001 - Calm	43 04.05 N	76 11.33 W	0.99		W64-2m-120401-dis	D63813
W65	1	2	12/4/2001 - Calm	43 03.93 N	76 11.22 W	14.8	<1.5	W65-1m-120401	D63815
W66	0.3	1	12/4/2001 - Calm	43 03.91 N	76 11.32 W	10.5	1.5	W66-0.3-120401	D63816
W68	0.3	1	12/4/2001 - Calm	43 04.03 N	76 11.47 W	10.2	3	W68-0.3-120401	D63817
W1	1	19 (RUSS)	12/18/2001 - Windy	43 04.77N	76 11.89W	3.72	1.5	W1-1m-121801	D63820
W1	1	19 (RUSS)	12/18/2001 - Windy	43 04.77N	76 11.89W	0.77		W1-1m-121801-dis	D63821
W1	4.5	19 (RUSS)	12/18/2001 - Windy	43 04.77N	76 11.89W	3.77	<1.5	W1-4.5m-121801	D63822
W60	1	3	12/18/2001 - Windy	43 05.15N	76 11.55W	4.7	<1.5	W60-1m-121801	D63819
W61	1	19	12/18/2001 - Windy	43 04.53N	76 11.69W	4.26	1.5	W61-1m-121801	D63823
W62	1	15	12/18/2001 - Windy	43 04.22N	76 11.46W	9.59	<1.5	W62-1m-121801	D63824
W63	1	6	12/18/2001 - Windy	43 04.09N	76 11.35W	14.9	1.5	W63-1m-121801	D63825
W63	4*	6	12/18/2001 - Windy	43 04.09N	76 11.35W	17.2	3.5	W63-4m-121801	D63826
W67	1	3	12/18/2001 - Windy	43 04.05N	76 11.37W	20.5	<1.5	W67-1m-121801	D63827
W64	2	3 (RUSS)	12/18/2001 - Windy	43 04.05N	76 11.33W	15.1	2	W64-2m-121801	D63828
W64	2	3 (RUSS)	12/18/2001 - Windy	43 04.05N	76 11.33W	1.01		W64-2m-121801-dis	D63830
W65	1	2	12/18/2001 - Windy	43 03.94N	76 11.29W	11.8	<1.5	W65-1m-121801	D63832
W66	0.3	1	12/18/2001 - Windy	43 03.90N	76 11.30W	49.4	3	W66-0.3-121801	D63833
W68	0.3	1	12/18/2001 - Windy	43 04.00N	76 11.47W	19.9	4.5	W68-0.3-121801	D63834
QA/QC SAMPLES									
W64	2	3 (RUSS)	12/4/2001 - Calm	43 04.05 N	76 11.33 W	4.89	5	W64-2m-120401-dup	D63812
W64	2	3 (RUSS)	12/4/2001 - Calm	43 04.05 N	76 11.33 W	1.1		W64-2m-120401-dis/dup	D63814
BLNK	NA	NA	12/4/2001 - Calm	-	-	0.44		BLNK-00-120301	D63801
W64	2	3 (RUSS)	12/18/2001 - Windy	43 04.05 N	76 11.33 W	21.9	<1.5	W64-2m-121801-dup	D63829
W64	2	3 (RUSS)	12/18/2001 - Windy	43 04.05 N	76 11.33 W	1.05		W64-2m-121801-dis/dup	D63831
BLNK	NA	NA	12/18/2001 - Windy	-	-	<0.33		BLNK-00-121801	D63818

Note: * The planned sample to be taken at a depth of 5 m at station W63 was changed and taken at 4 m during both events.

Table A6-2. RUSS Monitoring Data, November 2001 - December 2001

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/13/2001	0:20							1.55	2.6	141.19	0
11/13/2001	1:00							2.07	2.57	144.44	0
11/13/2001	2:00							2.7	2	139.71	0
11/13/2001	3:00							3.13	1.67	152.14	0
11/13/2001	4:00							3.43	2	142.31	0
11/13/2001	5:00							2.8	2.67	117.99	0
11/13/2001	6:00							2.63	2.2	107.24	0
11/13/2001	7:00							3.07	1.53	99.85	21.63
11/13/2001	8:00							4.73	1.57	124.72	148.9
11/13/2001	9:00							7	2.57	210.39	283.97
11/13/2001	10:00							8.73	3.9	215.74	386.5
11/13/2001	11:00							10.03	5.2	219.6	441.2
11/13/2001	12:00							10.93	4.27	209.48	452.57
11/13/2001	13:00							11.97	3.7	227.02	385.6
11/13/2001	14:00							12.77	3.2	214.26	312.47
11/13/2001	15:00							13.03	2.9	206.76	141.93
11/13/2001	16:00							12.67	2.3	195.95	54.83
11/13/2001	17:00							11.47	1.9	154.55	0.93
11/13/2001	18:00							10.93	1.23	144.16	0
11/13/2001	19:00							10.97	2.47	155.16	0
11/13/2001	20:00							11.2	2.8	182.23	0
11/13/2001	21:00							10.83	2.83	187.1	0
11/13/2001	22:00							10.73	2.37	171.58	0
11/13/2001	23:00							10.38	2.8	125.91	0
11/14/2001	0:20							10.75	2.8	152.4	0
11/14/2001	1:00							10.43	2.3	116.84	0
11/14/2001	2:00							10.37	1.67	177.66	0
11/14/2001	3:00							10.37	3.1	174.19	0
11/14/2001	4:00							10.87	2.23	187.68	0
11/14/2001	5:00							11.27	2.47	239.71	0
11/14/2001	6:00							11.2	1.97	236.48	0
11/14/2001	7:00							10.57	2	171.19	3.67
11/14/2001	8:00							10.17	2.13	137.43	17.17
11/14/2001	9:00							9.9	2.67	162.88	51.2
11/14/2001	10:00							10.3	2.87	209.04	44.5
11/14/2001	11:00							10.7	3.1	219.37	66.77
11/14/2001	11:13				9.92	2297	0.8				
11/14/2001	12:00							11.67	4.13	217.68	200.2
11/14/2001	13:20							13.25	4.25	229.24	273.75
11/14/2001	14:00							13.6	3.5	244.21	105.37
11/14/2001	15:00	9.92	2236	1.6				13.83	2.83	242.28	49.63
11/14/2001	16:00	9.91	2237	1.5				13.23	1.27	191.88	21.47
11/14/2001	17:00	9.86	2239	1.3				13.37	1.53	180.69	0.1
11/14/2001	18:00	9.96	2235	1.9				12.3	1.2	139.07	0
11/14/2001	19:00	9.93	2233	1.7				10.17	0.37	280.62	0
11/14/2001	20:00	10.09	2226	2.1				9.83	1.03	315.96	0
11/14/2001	21:00	9.99	2234	1.2				9.77	0.4	308.54	0
11/14/2001	22:00	9.96	2231	1.9				10	0.27	293.03	0
11/14/2001	23:00	9.93	2232	1.4				10.1	0.55	344.92	0
11/15/2001	0:00	9.92	2234	1.8							
11/15/2001	0:20							12.05	1.65	249.34	0
11/15/2001	1:00	9.92	2237	2.0				12.23	1.03	260.24	0
11/15/2001	2:00	9.9	2238	1.9				11.97	1.03	295.91	0
11/15/2001	3:00	9.9	2239	1.9				12.33	2.33	266.67	0
11/15/2001	4:00	9.9	2240	1.5				11.93	1.83	255.71	0
11/15/2001	5:00	9.91	2242	1.8				12.2	2.3	254.73	0
11/15/2001	6:00	9.91	2242	1.5				12.6	1.8	253.08	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/15/2001	7:00	9.91	2242	1.9				12.9	2.47	221.78	3.97
11/15/2001	8:00	9.92	2243	1.9				13.47	2.6	238.47	29.83
11/15/2001	9:00	9.93	2243	1.9				13.87	2.03	225.07	74.2
11/15/2001	10:00	10.05	2224	1.4				14.9	4.1	229.02	201.33
11/15/2001	11:00	10.08	2230	1.5				15.63	5.37	256.59	273.53
11/15/2001	11:13				9.93	2292	0.8				
11/15/2001	12:00	10.1	2235	1.7				15.23	4.33	237.6	123.03
11/15/2001	13:00	10.08	2237	2.4				15.8	3.73	215.9	72.67
11/15/2001	14:00	9.95	2242	1.7				16.33	4.4	220.5	55.93
11/15/2001	15:00	9.95	2243	2.4				16.6	4.57	218.51	33.7
11/15/2001	16:00	10.2	2238	1.6				16.27	4.2	213.88	8.43
11/15/2001	17:00	10.15	2239	1.4				15.7	4.1	208.87	0
11/15/2001	18:00	10.22	2236	1.4				14.93	4.53	207.92	0
11/15/2001	19:00	10.16	2239	1.6				15.5	4.97	227.43	0
11/15/2001	20:00	10.12	2240	1.5				15.93	5.13	237.62	0
11/15/2001	21:00	10.11	2242	1.6				16.17	4.53	236.45	0
11/15/2001	22:00	10.13	2244	1.5				16.57	4.93	234.35	0
11/15/2001	23:00	10.11	2247	2.0				16.78	5.35	236.46	0
11/16/2001	0:00	10.15	2246	2.3							
11/16/2001	0:20							16.7	5.8	239.05	0
11/16/2001	1:00	10.13	2249	3.0				16.77	5.4	241.16	0
11/16/2001	2:00	10.13	2250	1.5				16.67	4.9	246.25	0
11/16/2001	3:00	10.12	2250	1.4				16.5	4.6	250.66	0
11/16/2001	4:00	10.12	2250	2.1				16.23	4.4	265.81	0
11/16/2001	5:00	10.12	2250	1.9				15.77	4.2	268.02	0
11/16/2001	6:00	10.12	2251	1.9				15.1	3.87	268.3	0
11/16/2001	7:00	10.12	2251	2.1				14.7	4.83	272.12	5.67
11/16/2001	8:00	10.06	2252	1.8				14.73	6.07	278.38	58.3
11/16/2001	9:00	10.09	2252	1.8				14.2	6.77	297.09	121.77
11/16/2001	10:00	10.16	2252	2.2				13.3	6.9	308.91	266.93
11/16/2001	11:00	10.2	2252	1.7				13.2	7.5	319.95	385.57
11/16/2001	11:12				10.05	2291	1.0				
11/16/2001	12:00	10.22	2252	1.6				12.57	7.13	322.81	241.27
11/16/2001	13:00	10.21	2251	1.9				12.17	5	326.84	179.77
11/16/2001	14:00	10.21	2252	2.0				11.87	5.67	347.94	191.8
11/16/2001	15:00	10.22	2252	2.4				11.63	4.9	340.77	126.9
11/16/2001	16:00	10.19	2252	2.1				10.97	4.7	339.76	29.43
11/16/2001	17:00	10.44	2238	2.7				10.03	3.73	339.48	0.27
11/16/2001	18:00	10.56	2231	2.9				9.17	3.73	341.26	0
11/16/2001	19:00	10.45	2235	2.8				8.1	3.37	342.48	0
11/16/2001	20:00	10.64	2205	2.7				7.2	2.93	335.54	0
11/16/2001	21:00	10.61	2199	3.0				6.07	3.13	349.16	0
11/16/2001	22:00	10.67	2188	3.5				5.43	3.43	347.11	0
11/16/2001	23:00	10.72	2174	3.5				4.32	2.85	3.86	0
11/17/2001	0:00	10.71	2178	3.7							
11/17/2001	0:20							3.55	1.1	38.56	0
11/17/2001	1:00	10.36	2207	2.8				3.13	1.57	345.6	0
11/17/2001	2:00	10.27	2237	2.1				2.63	1.53	357.09	0
11/17/2001	3:00	10.27	2246	2.4				1.6	2.13	268.18	0
11/17/2001	4:00	10.22	2254	2.7				0.9	2.8	263.47	0
11/17/2001	5:00	10.21	2253	2.4				1.23	1.6	262.09	0
11/17/2001	6:00	10.17	2255	2.0				1.1	1.53	251.3	0
11/17/2001	7:00	10.16	2252	2.1				0.87	1.4	182.41	18
11/17/2001	8:00	10.12	2242	2.6				1.43	2	140.23	149.9
11/17/2001	9:00	10.09	2211	3.0				2.7	1.4	93.16	251.57
11/17/2001	10:00	10.13	2238	2.3				3.47	2.17	109.77	363.6
11/17/2001	11:00	10.16	2248	1.5				5.43	0.47	99.81	428.9
11/17/2001	11:13				10.05	2288	0.5				

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/17/2001	12:00	10.16	2250	2.4				5.7	1.07	5.74	431.73
11/17/2001	13:00	10.19	2250	2.5				7	1.13	327.41	400.93
11/17/2001	14:00	10.24	2251	2.4				7.97	0.87	25.45	301.13
11/17/2001	15:00	10.28	2249	2.0				8.77	1.13	31.95	174.6
11/17/2001	16:00	10.3	2247	2.3				8.97	1.5	44.9	53.43
11/17/2001	17:00	10.28	2249	3.0				7.37	2.67	87.58	1.73
11/17/2001	18:00	10.29	2248	3.0				7.1	1.73	79.61	0
11/17/2001	19:00	10.94	2163	2.9				6.6	2.47	102	0
11/17/2001	20:00	10.34	2247	2.3				5.87	2.67	141.64	0
11/17/2001	21:00	10.22	2247	2.4				4.87	2.9	145.37	0
11/17/2001	22:00	10.17	2250	3.0				4.37	1.73	139.62	0
11/17/2001	23:00	10.14	2232	1.9				4.12	1.08	87.13	0
11/18/2001	0:00	10.03	2244	1.5							
11/18/2001	0:20							3.15	2	84.66	0
11/18/2001	1:00	10.08	2229	1.8				3	2	88.24	0
11/18/2001	2:00	10.01	2245	1.9				2.73	1.47	95.91	0
11/18/2001	3:00	10.01	2246	1.8				2.4	1.73	98.05	0
11/18/2001	4:00	10.01	2247	2.1				2.4	1.07	71.16	0
11/18/2001	5:00	10.03	2244	1.9				2.2	1.3	92.06	0
11/18/2001	6:00	10.05	2248	1.5				2.23	1.43	100.76	0
11/18/2001	7:00	10.06	2245	1.5				2.9	1.13	101.79	16.6
11/18/2001	8:00	10.02	2248	2.1				3.67	1.2	103.02	134.73
11/18/2001	9:00	10	2236	2.0				6.3	0.33	67.55	259.87
11/18/2001	10:00	10.03	2241	1.5				7.8	0.67	311.03	361
11/18/2001	11:00	10.07	2247	3.0				9.87	0.93	313.97	425.2
11/18/2001	11:12				9.95	2290	0.6				
11/18/2001	12:00	10.09	2248	2.6				12.8	1.37	27.35	414.4
11/18/2001	13:00	10.14	2248	2.9				14.33	1.33	22.97	346.9
11/18/2001	14:00	10.18	2225	3.2				14.73	1.43	26.52	286.1
11/18/2001	15:00	10.2	2202	2.6				15.83	0.53	57.32	146.83
11/18/2001	16:00	10.22	2197	1.8				13.87	0.17	151.69	29.77
11/18/2001	17:00	10.24	2195	1.8				13.13	1.73	120.56	0.07
11/18/2001	18:00	10.23	2228	2.3				11.73	0.47	28.9	0
11/18/2001	19:00	10.18	2235	2.1				10.3	0.57	342.23	0
11/18/2001	20:00	10.15	2233	2.4				10.07	0.87	343.03	0
11/18/2001	21:00	10.17	2249	1.8				9.37	0.67	321.58	0
11/18/2001	22:00	10.15	2249	1.4				9.27	0.5	336.98	0
11/18/2001	23:00	10.18	2249	1.3				11.4	0.78	147.87	0
11/19/2001	0:00	10.2	2248	1.4							
11/19/2001	0:20							10.5	0.55	73.99	0
11/19/2001	1:00	10.23	2248	1.0				10.47	1.6	105.01	0
11/19/2001	2:00	10.21	2246	1.2				10.37	2.4	116.63	0
11/19/2001	3:00	10.16	2250	2.0				10.3	2.03	122.24	0
11/19/2001	4:00	10.12	2250	1.5				9.9	2	112.12	0
11/19/2001	5:00	10.07	2252	1.4				9.87	2.8	122.15	0
11/19/2001	6:00	10.1	2251	1.2				10.13	2.2	124.3	0
11/19/2001	7:00	10.07	2250	1.3				9.97	2.57	101.22	4.6
11/19/2001	8:00	9.99	2244	1.5				10.63	1.87	94.42	85.97
11/19/2001	9:00	10.02	2245	1.4				13.17	3.47	176.58	200.7
11/19/2001	10:00	10.04	2233	2.0				14.8	5	197.92	316.17
11/19/2001	11:00	10.08	2236	2.5				16.63	5.37	204.04	394.1
11/19/2001	12:00	10.05	2245	2.6				17.53	5.6	203	365.13
11/19/2001	13:00	10.19	2242	2.4				17.6	6.77	196.56	327.5
11/19/2001	14:00	10.2	2247	2.0				17.6	6.07	184.09	227.83
11/19/2001	15:00	10.17	2249	2.3				17.83	4.93	188.9	113.3
11/19/2001	16:00	10.07	2253	2.2				17.4	5.6	186.56	24.07
11/19/2001	17:00	9.98	2257	2.1				16.97	6.37	189.7	0.27
11/19/2001	18:00	9.95	2259	3.0				16.97	7.9	192.56	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/19/2001	19:00	9.96	2259	2.4				16.8	7.83	208.38	0
11/19/2001	20:00	9.99	2260	2.5				16.1	7.7	221.59	0
11/19/2001	21:00	9.99	2263	2.7				14.6	6.53	215.6	0
11/19/2001	22:00	10.02	2262	2.2				8.8	9.63	289.24	0
11/19/2001	23:00	10.01	2260	2.1				6.55	7.38	278.15	0
11/20/2001	0:00	9.98	2259	2.0							
11/20/2001	0:20							5.65	5.1	263.93	0
11/20/2001	1:00	9.94	2261	2.1				5.6	4.87	257.22	0
11/20/2001	2:00	9.83	2266	2.1				5.6	5.97	272.17	0
11/20/2001	3:00	9.74	2270	2.3				5.17	4.67	268.36	0
11/20/2001	4:00	9.81	2265	2.1				4.87	4.7	254.07	0
11/20/2001	5:00	9.81	2261	1.9				3.97	5.83	278.76	0
11/20/2001	6:00	9.66	2273	2.2				3.67	5.77	275.91	0
11/20/2001	7:00	9.67	2269	2.4				2.57	5.13	300.12	3.13
11/20/2001	8:00	9.76	2261	1.9				2.67	4.37	274.5	48.67
11/20/2001	9:00	9.67	2263	1.9				2.07	4.83	265.32	66.87
11/20/2001	10:00	9.7	2262	2.6				2.4	5.33	261.34	126.97
11/20/2001	11:00	9.71	2261	1.9				1.87	4.6	269.95	73
11/20/2001	11:13				9.89	2287	0.8				
11/20/2001	12:00	9.73	2258	1.9				1.93	4.87	264.92	141.63
11/20/2001	13:00	9.78	2256	2.6				2.6	5.83	269.47	129.63
11/20/2001	14:00	9.75	2257	1.8				2.13	5.77	262.87	82.33
11/20/2001	15:00	9.73	2257	2.4				3.07	5.6	272.46	167.83
11/20/2001	16:00	9.77	2255	2.3				3.37	6.83	281.97	27.23
11/20/2001	17:00	9.7	2255	1.9				2.2	5.3	287.38	0
11/20/2001	18:00	9.69	2258	2.2				1.77	5.7	271.34	0
11/20/2001	19:00	9.68	2258	2.5				1.97	5.47	261.93	0
11/20/2001	20:00	9.66	2258	2.5				2.4	4.8	258.49	0
11/20/2001	21:00	9.62	2257	2.4				2.57	4	251.76	0
11/20/2001	22:00	9.61	2256	2.0				2.7	4.6	257.08	0
11/20/2001	23:00	9.59	2257	2.3				2.52	4.2	256.33	0
11/21/2001	0:00	9.64	2251	2.2							
11/21/2001	0:20							2.35	3.65	252.38	0
11/21/2001	1:00	9.63	2248	2.3				2.33	3.2	255.14	0
11/21/2001	2:00	9.61	2245	2.2				2.63	2.9	259.01	0
11/21/2001	3:00	9.58	2246	2.7				2.8	2.23	258	0
11/21/2001	4:00	9.54	2245	3.1				3.2	2.93	254.37	0
11/21/2001	5:00	9.55	2245	3.0				3.43	4.87	261.88	0
11/21/2001	6:00	9.48	2248	3.1				3.13	3.37	246.59	0
11/21/2001	7:00	9.49	2247	3.0				2.87	3.37	242.4	14.03
11/21/2001	8:00	9.43	2243	2.5				3.33	4.2	209.64	124.63
11/21/2001	9:00	9.44	2243	2.6				3.93	4.5	194.85	182.93
11/21/2001	10:00	9.45	2243	2.8				4.7	3.83	195.22	213.3
11/21/2001	11:00	9.47	2245	2.8				5.83	4.2	184.49	348.37
11/21/2001	12:00	9.51	2247	2.6				6.73	4.73	192.27	347.77
11/21/2001	12:12				9.58	2285	4.7				
11/21/2001	13:00	9.53	2247	2.4				7.27	4	187.4	265.7
11/21/2001	14:00	9.55	2248	2.4				8.03	5.07	207.94	219.17
11/21/2001	15:00	9.52	2249	2.2				8.3	4.57	217.19	100.9
11/21/2001	16:00	9.49	2248	2.1				8.2	4.03	221.74	30.37
11/21/2001	17:00	9.38	2248	2.4				7.83	3.4	197.87	0.1
11/21/2001	18:00	9.35	2248	2.5				7.23	3.47	167.23	0
11/21/2001	19:00	9.18	2248	3.5				6.73	3.73	184.97	0
11/21/2001	20:00	9.17	2248	3.0				6.9	3	205.33	0
11/21/2001	21:00	9.17	2247	3.0				7.2	4	209.85	0
11/21/2001	22:00	9.15	2248	3.0				7.67	5.63	205.66	0
11/21/2001	23:00	9.1	2251	3.4				7.65	4.08	226.73	0
11/22/2001	0:00	8.95	2251	3.5							

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/22/2001	0:20							7.3	2.55	245.76	0
11/22/2001	1:00	8.88	2251	2.8				7.17	3.17	215.85	0
11/22/2001	2:00	9.19	2250	1.9				7.43	3.67	214.27	0
11/22/2001	3:00	9.28	2249	1.9				7.83	3.7	226.91	0
11/22/2001	4:00	9.3	2251	1.6				7.8	3.63	228.03	0
11/22/2001	5:00	9.29	2251	1.9				7.33	2.73	222.09	0
11/22/2001	6:00	9.27	2251	1.6				6.7	2.1	224.93	0
11/22/2001	7:00	9.28	2252	1.6				6.33	2.73	216.69	9.47
11/22/2001	8:00	9.29	2252	1.7				6.8	2.8	214.87	103.73
11/22/2001	9:00	9.3	2253	1.6				7.83	2.27	233.05	225.23
11/22/2001	10:00	9.34	2254	1.5				8.83	3.8	261.04	333
11/22/2001	11:00	9.42	2254	1.9				9.43	3.73	264.71	395
11/22/2001	12:00	9.46	2252	1.7				9.97	3.23	268.31	380.1
11/22/2001	12:13				9.44	2290	1.4				
11/22/2001	13:00	9.44	2253	1.4				10.3	1.73	310.13	342.3
11/22/2001	14:00	9.56	2253	1.5				10.6	1.13	52.68	254.4
11/22/2001	15:00	9.61	2254	1.4				10.73	0.53	93.66	89.83
11/22/2001	16:00	9.68	2253	1.4				10.3	0.8	90.92	23.57
11/22/2001	17:00	9.68	2251	1.4				9.33	2.3	86.42	0
11/22/2001	18:00	9.69	2247	1.4				8.8	1.5	98.19	0
11/22/2001	19:00	9.66	2251	1.4				8.27	1.67	97.31	0
11/22/2001	20:00	9.63	2253	2.7				7.63	1.73	117.67	0
11/22/2001	21:00	9.62	2252	1.4				6.87	2	127.88	0
11/22/2001	22:00	9.6	2253	1.3				6.43	2.17	82.1	0
11/22/2001	23:00	9.61	2243	1.6				6.48	2.98	72.4	0
11/23/2001	0:00	9.61	2238	1.6							
11/23/2001	0:20							6.25	3.7	80.63	0
11/23/2001	1:00	9.57	2248	1.8				6.1	3.1	88.65	0
11/23/2001	2:00	9.55	2264	1.9				6.03	3.17	90.71	0
11/23/2001	3:00	9.64	2222	2.7				5.87	2.83	84.98	0
11/23/2001	4:00	9.6	2222	1.8				5.9	3.27	81.19	0
11/23/2001	5:00	9.66	2212	1.9				5.37	3.37	71.74	0
11/23/2001	6:00	9.66	2209	3.0				4.77	3.97	65.98	0
11/23/2001	7:00	9.57	2240	2.1				4.93	3.5	61.25	13.57
11/23/2001	8:00	9.47	2260	2.3				5.7	2.57	52.14	103.87
11/23/2001	9:00	9.44	2211	2.0				6.9	2.67	49	244.43
11/23/2001	10:00	9.53	2220	4.7				9.57	1.53	49.31	352.87
11/23/2001	11:00	9.52	2249	2.1				11.93	3.33	151.36	406.07
11/23/2001	12:00	9.48	2270	1.9				13.03	3.5	163.48	426.27
11/23/2001	12:12				9.39	2292	0.9				
11/23/2001	13:00	9.59	2250	1.9				13.67	4.07	165.84	389.23
11/23/2001	14:00	9.6	2249	2.2				14.17	4.5	163.22	298.3
11/23/2001	15:00	9.67	2245	2.1				14.33	3.93	164.12	174.53
11/23/2001	16:00	9.68	2259	2.4				14.13	4.23	171.73	39.63
11/23/2001	17:00	9.51	2255	1.9				13.1	2.87	159.66	0.2
11/23/2001	18:00	9.43	2247	1.9				11.97	2.63	104	0
11/23/2001	19:00	9.45	2240	2.2				11.1	1.97	89.13	0
11/23/2001	20:00	9.59	2211	2.1				10.03	1.87	57.52	0
11/23/2001	21:00	9.48	2234	2.7				11.13	3.87	145.75	0
11/23/2001	22:00	9.45	2236	3.5				10.7	4.07	121.19	0
11/23/2001	23:00	9.44	2232	2.6				9.78	3.15	94.16	0
11/24/2001	0:00	9.55	2217	2.5							
11/24/2001	0:20							10.25	4.55	140.78	0
11/24/2001	1:00	9.44	2237	1.9				9.97	6.13	150.45	0
11/24/2001	2:00	9.41	2234	2.1				9.87	3.87	137.65	0
11/24/2001	3:00	9.38	2240	1.9				9.3	3.6	97.42	0
11/24/2001	4:00	9.42	2226	2.0				6.87	3.73	95.11	0
11/24/2001	5:00	9.45	2218	2.4				6.6	4.2	89.56	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/24/2001	6:00	9.42	2228	3.0				6.13	5.17	89.89	0
11/24/2001	7:00	9.39	2227	1.9				5.67	3.83	98.62	6.13
11/24/2001	8:00	9.47	2208	2.5				5.6	4.37	86.26	77.27
11/24/2001	9:00	9.43	2221	1.9				7.07	4.37	79.71	221.07
11/24/2001	10:00	9.47	2211	2.0				9.57	3.77	83.49	317.97
11/24/2001	11:00	9.62	2207	2.4				12.53	4.73	131.94	392.23
11/24/2001	12:00	9.58	2220	2.7				14.23	4.53	148.38	445.53
11/24/2001	12:12				9.31	2293	1.1				
11/24/2001	13:00	9.62	2232	2.6				15.17	6.9	169.45	272.07
11/24/2001	14:00	9.62	2243	2.7				15.17	6.1	170.66	202.57
11/24/2001	15:00	9.74	2239	3.0				14.53	4.87	139.52	59.93
11/24/2001	16:00	9.59	2249	2.8				14.47	4.67	128.91	7.83
11/24/2001	17:00	9.45	2260	2.0				15.23	4.8	132.75	0
11/24/2001	18:00	9.67	2239	2.4				14.93	5.2	135.64	0
11/24/2001	19:00	9.83	2223	3.0				15.07	6.03	135.71	0
11/24/2001	20:00	9.57	2244	2.4				15.3	5.8	135.13	0
11/24/2001	21:00	9.52	2248	2.5				15.57	7.03	140.51	0
11/24/2001	22:00	9.59	2243	2.5				15.83	5.9	148.08	0
11/24/2001	23:00	9.49	2254	2.4				15.82	7.38	146.26	0
11/25/2001	0:00	9.44	2259	2.2							
11/25/2001	0:20							16.1	6.35	138.96	0
11/25/2001	1:00	9.4	2261	2.4				16.63	7.7	154.33	0
11/25/2001	2:00	9.4	2267	2.1				16.77	8.97	167.23	0
11/25/2001	3:00	9.42	2273	2.2				16.67	8.67	163.07	0
11/25/2001	4:00	9.36	2284	2.2				16.67	9.43	161.22	0
11/25/2001	5:00	9.39	2287	2.4				16.7	9.37	167.02	0
11/25/2001	6:00	9.4	2288	2.1				16.67	11.4	171.1	0
11/25/2001	7:00	9.41	2293	3.5				17.03	11.83	172.47	0.97
11/25/2001	8:00	9.45	2295	2.5				16.97	10.23	162.05	10.13
11/25/2001	9:00	9.45	2304	2.8				17.53	10.5	164.22	25.97
11/25/2001	10:00	9.49	2314	2.8				17.8	12.53	174.78	38
11/25/2001	11:00	9.53	2314	2.9				17.43	9.6	185.91	43.4
11/25/2001	12:00	9.56	2310	2.4				15.97	8.17	198.28	55.8
11/25/2001	12:14				9.48	2299	1.7				
11/25/2001	13:00	9.56	2314	3.0				15.57	6.1	187.47	51.77
11/25/2001	14:00	9.56	2315	2.2				14.57	5.33	156.67	33.97
11/25/2001	15:00	9.59	2317	2.1				15.8	5	190.23	44.87
11/25/2001	16:00	9.6	2317	2.4				14.6	4.9	176.43	6.27
11/25/2001	17:00	9.79	2296	2.3				13.63	4.67	178.88	0
11/25/2001	18:00	10	2267	2.4				13.67	6.23	184.18	0
11/25/2001	19:00	9.77	2287	2.1				13.63	4.97	207.55	0
11/25/2001	20:00	9.72	2282	2.1				13.67	3.43	232.07	0
11/25/2001	21:00	9.68	2286	2.4				13.43	3.13	241.77	0
11/25/2001	22:00	9.65	2288	1.4				12.77	1.37	205.41	0
11/25/2001	23:00	9.67	2286	1.7				12.28	0.78	149.15	0
11/26/2001	0:00	9.69	2288	2.0				11.45	1.55	328.48	0
11/26/2001	1:00	9.69	2287	2.3				11	2.03	321.34	0
11/26/2001	2:00	9.69	2291	2.4				11.1	4.4	302.96	0
11/26/2001	3:00	9.96	2249	2.6				10.17	2.6	293.96	0
11/26/2001	4:00	9.77	2272	1.9				9.93	1.33	266.46	0
11/26/2001	5:00	9.71	2276	1.8				10.17	1.87	268.48	0
11/26/2001	6:00							10	1.5	267.83	0
11/26/2001	7:00							9.83	1.5	265.88	0.9
11/26/2001	8:00							9.77	2.5	294.99	12.3
11/26/2001	9:00							8.27	5.83	307.94	31.23
11/26/2001	10:00							8.3	2.13	251.74	46.43
11/26/2001	11:00							8.97	2.67	269.47	57.33
11/26/2001	12:00							9.2	3.27	273.61	62.97

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/26/2001	12:13				9.53	2297	1.3				
11/26/2001	13:00							9.27	3.23	281.99	79.17
11/26/2001	14:00							9.3	3.07	288.36	44.87
11/26/2001	15:00							9.3	2.73	300.69	18.43
11/26/2001	16:00							9.13	2	300.11	4.53
11/26/2001	17:00							8.93	2.43	297.57	0
11/26/2001	18:00							8.8	2.03	284.23	0
11/26/2001	19:00							8.6	1.37	281.57	0
11/26/2001	20:00							8.43	1.4	267.54	0
11/26/2001	21:00							8.4	1.6	261.06	0
11/26/2001	22:00							8.23	1.37	258.64	0
11/26/2001	23:00							8.2	0.95	249.64	0
11/27/2001	0:20							8.4	0.95	164.78	0
11/27/2001	1:00							8.43	1.57	141.7	0
11/27/2001	2:00							8.3	1.17	85.07	0
11/27/2001	3:00							8.4	2.17	116.99	0
11/27/2001	4:00							8.23	1.37	130.28	0
11/27/2001	5:00							7.8	1.43	28.07	0
11/27/2001	6:00							7.4	1.87	86.84	0
11/27/2001	7:00							7.33	2.47	127.2	2.6
11/27/2001	8:00							7.7	2.63	142.27	20.07
11/27/2001	9:00							8.03	3.33	138.2	33.57
11/27/2001	10:00							8.5	2.4	138.68	76.77
11/27/2001	11:00							8.93	3.6	134.63	103.9
11/27/2001	12:00							9.37	2.97	107.03	143.97
11/27/2001	12:12				9.51	2249	1.5				
11/27/2001	13:00	9.85	2220	1.0				9.63	4.17	103.82	117.83
11/27/2001	14:00	9.8	2225	1.2				10.2	2.33	116.18	56.17
11/27/2001	15:00	9.73	2228	1.5				10.1	3.1	149.43	11.83
11/27/2001	16:00	9.6	2243	2.7				9.47	2.87	102.03	4.57
11/27/2001	17:00	9.81	2223	1.7				9.27	4.43	88.45	0
11/27/2001	18:00	9.73	2224	1.3				9.1	2.87	82.05	0
11/27/2001	19:00	9.77	2222	1.8				9.27	2.17	71.9	0
11/27/2001	20:00	9.79	2224					9.7	0.9	52.03	0
11/27/2001	21:00	9.62	2245	1.6				9.8	0.87	0.23	0
11/27/2001	22:00	9.55	2254	1.2				9.27	2.07	341.52	0
11/27/2001	23:00	9.55	2255	1.2				9.05	0.72	24.64	0
11/28/2001	0:00	9.56	2253	0.9				8.95	0.7	211.69	0
11/28/2001	1:00	9.59	2251	1.9				10.57	2.7	264	0
11/28/2001	2:00	9.69	2235	1.4				11.23	3.37	281.73	0
11/28/2001	3:00	9.68	2235	2.0				10.27	4.7	312	0
11/28/2001	4:00	9.64	2241	1.7				9.4	3.77	303.88	0
11/28/2001	5:00	9.6	2243	1.8				8.67	3.33	318.24	0
11/28/2001	6:00	9.52	2245					7.97	3	330.73	0
11/28/2001	7:00	9.54	2245	2.1				6.73	3.3	349.54	0.83
11/28/2001	8:00	9.58	2244	1.2				5.73	3.77	355.72	9.8
11/28/2001	9:00	9.58	2247	1.3				5.07	2.8	4.98	32.5
11/28/2001	10:00	9.58	2244	3.2				5.23	2.63	337.03	67.4
11/28/2001	11:00	9.57	2241	3.1				5.3	2.67	321.52	93.7
11/28/2001	12:00	9.58	2244	1.6				5.37	1.93	311.8	121.8
11/28/2001	12:13				9.53	2232	1.4				
11/28/2001	13:00	9.8	2214	1.7				5.7	2.4	318.53	77.93
11/28/2001	14:00	9.78	2217	1.7				5.83	3.53	311.81	18.17
11/28/2001	15:00	9.69	2225	2.8				5.43	1.97	324.06	18.03
11/28/2001	16:00	9.67	2227	2.5				5.27	2.37	306.27	2.9
11/28/2001	17:00	9.61	2230	4.0				4.77	3.53	338.01	0
11/28/2001	18:00	9.7	2207	1.9				4.23	2.3	1.09	0
11/28/2001	19:00	9.75	2202	2.0				4.1	0.9	35.44	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
11/28/2001	20:00	9.78	2187	1.6				4.27	1.2	23.46	0
11/28/2001	21:00	9.67	2204	1.5				4.2	1.63	33.24	0
11/28/2001	22:00	9.56	2222	1.7				4.33	1.63	47.12	0
11/28/2001	23:00	9.58	2221	3.5				4.67	2.5	67.55	0
11/29/2001	0:00	9.64	2217	2.0							
11/29/2001	0:20							4.65	3.25	90.14	0
11/29/2001	1:00	9.82	2208	2.6				4.57	3.4	78.49	0
11/29/2001	2:00	10.06	2177	2.0				4.27	3.97	80.34	0
11/29/2001	3:00	9.92	2190	1.8				4.2	4.37	87.43	0
11/29/2001	4:00	9.91	2188	1.8				4.17	4.73	76.2	0
11/29/2001	5:00	9.83	2187	2.2				4.13	5.4	84.34	0
11/29/2001	6:00	9.67	2200	2.4				3.7	4.37	90	0
11/29/2001	7:00	9.67	2191	2.8				3.73	5	94.41	0.13
11/29/2001	8:00	9.57	2197	3.8				4.23	4.77	94.46	5.17
11/29/2001	9:00	9.63	2171	2.6				5.17	5.2	78.42	14.3
11/29/2001	10:00	9.53	2191	3.2				8.6	5.03	116.67	24.17
11/29/2001	11:00	9.62	2171	3.5				11.13	5.33	143.14	28.43
11/29/2001	12:00	9.78	2152	2.9				11.3	4.53	147.06	54.63
11/29/2001	12:13				9.41	2236	1.4				
11/29/2001	13:00	9.64	2193	3.3				11.43	3	116.2	32.23
11/29/2001	14:00	9.6	2203	2.8				11.67	2.83	121.19	28.67
11/29/2001	15:00	9.62	2203	3.3				12.03	2.9	155.41	24.83
11/29/2001	16:00	9.8	2172	4.8				12.37	4.57	173.39	3.13
11/29/2001	17:00	9.67	2201	2.9				12.6	3.87	170.56	0
11/29/2001	18:00	9.6	2214	2.8				13	5.03	183.73	0
11/29/2001	19:00	9.53	2233	1.7				13.57	4.67	200.05	0
11/29/2001	20:00	9.51	2238	6.8				14	2.43	184.11	0
11/29/2001	21:00	9.47	2259	2.2				13.63	2.33	289.3	0
11/29/2001	22:00	9.51	2246	2.5				12	1.03	16.42	0
11/29/2001	23:00	9.51	2240	2.3				11.5	1.62	343.69	0
11/30/2001	0:00	9.52	2242	3.4							
11/30/2001	0:20							10.2	2.75	315.76	0
11/30/2001	1:00	9.53	2240	2.0				9.93	1.57	305.54	0
11/30/2001	2:00	9.53	2241	2.6				9.9	0.87	314.76	0
11/30/2001	3:00	9.63	2225	4.1				9.77	1	35.65	0
11/30/2001	4:00	9.7	2185	4.1				9.73	1.13	47.14	0
11/30/2001	5:00	9.72	2190	1.1				9.83	0.9	97.16	0
11/30/2001	6:00	9.67	2204	2.0				10.4	1.7	109.59	0
11/30/2001	7:00	9.6	2228	2.7				10.93	4.07	78.22	0.33
11/30/2001	8:00	9.57	2229	3.9				11.63	3.87	77.55	19.3
11/30/2001	9:00	9.57	2232	2.6				12.2	3.03	71.14	38.67
11/30/2001	10:00	9.58	2230	2.5				14.47	3.17	111.2	53.87
11/30/2001	11:00	9.9	2192	2.4				17.03	4.07	148.99	54.13
11/30/2001	12:00	9.87	2203					17.83	6.4	183.67	40.9
11/30/2001	12:13				9.49	2230	1.8				
11/30/2001	13:00	9.74	2226	5.0				18.07	6.93	196.29	76.87
11/30/2001	14:00	9.6	2242	3.6				18.03	7.1	197.45	15.3
11/30/2001	15:00	9.68	2238	2.1				15.83	7.13	180.21	5.57
11/30/2001	16:00	9.75	2231	2.2				14.17	3.33	139.02	1.23
11/30/2001	17:00	9.43	2257	2.5				13.73	2.5	237.82	0
11/30/2001	18:00	9.64	2248	2.7				13.7	1.1	284.53	0
11/30/2001	19:00	9.66	2238	2.5				13.37	0.9	147.03	0
11/30/2001	20:00	9.55	2255	2.0				12.93	0.73	161.58	0
11/30/2001	21:00	9.58	2250	4.3				12.63	1.47	300.09	0
11/30/2001	22:00	9.58	2246	1.4				11.57	2.2	303.95	0
11/30/2001	23:00	9.61	2241	2.6				11.1	2.2	317.32	0
12/1/2001	0:00	9.62	2240	2.0							
12/1/2001	0:20							10.85	1.8	308.75	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/1/2001	1:00	9.69	2256	1.9				11.13	0.73	239.85	0
12/1/2001	2:00	10.62	2139	5.2				10.93	0.8	103.22	0
12/1/2001	3:00	10.41	2157	2.7				10.5	0.93	323.53	0
12/1/2001	4:00	9.87	2223	2.6				10.27	0.5	297.64	0
12/1/2001	5:00	9.63	2237	1.2				10.17	1.9	317.1	0
12/1/2001	6:00	9.61	2244	2.2				10.2	1.13	274.19	0
12/1/2001	7:00	9.59	2242	1.8				10.43	1.03	268.64	1
12/1/2001	8:00	9.65	2244	2.2				10.73	0.7	276.64	22.57
12/1/2001	9:00	9.63	2240	3.1				11.17	1.83	271.17	52.33
12/1/2001	10:00	9.61	2238	1.8				11.4	4.77	282.6	60.97
12/1/2001	11:00	10.3	2136	4.7				11.27	5.87	281.26	80
12/1/2001	12:00	9.96	2188	4.1				10.27	7.17	290.64	77.27
12/1/2001	12:18				9.52	2239	1.7				
12/1/2001	13:00	9.71	2225	2.0				9.7	6.3	275.37	46.1
12/1/2001	14:00	9.68	2233	2.3				9.97	7.1	269.17	63.93
12/1/2001	15:00	9.59	2241	2.6				9.87	6.63	259.06	31.07
12/1/2001	16:00	9.59	2239	3.0				9.47	5.87	264.71	3.7
12/1/2001	17:00	9.51	2250	1.8				9.03	4.8	269.76	0
12/1/2001	18:00	9.52	2245	2.1				8.63	4.9	267.82	0
12/1/2001	19:00	9.49	2246	1.6				8.3	4.2	261.59	0
12/1/2001	20:00	9.47	2249	1.6				8.5	3.4	265.57	0
12/1/2001	21:00	9.42	2251	1.6				8.87	3.43	269.75	0
12/1/2001	22:00	9.52	2241	2.0				8.97	3.3	262.82	0
12/1/2001	23:00	9.59	2224	2.5				8.95	3.02	265.71	0
12/2/2001	0:00	9.62	2218	2.6							
12/2/2001	0:20							8.9	3.1	256.7	0
12/2/2001	1:00	9.62	2221	1.9				8.73	2.63	249.41	0
12/2/2001	2:00	9.72	2200	3.0				8.6	2.5	255.4	0
12/2/2001	3:00	9.71	2203	9.9				8.43	2.43	261.08	0
12/2/2001	4:00	9.68	2198	3.1				8.4	3.07	269.48	0
12/2/2001	5:00	9.63	2201	2.8				8.27	2.6	262.56	0
12/2/2001	6:00	9.63	2204	3.9				8.53	2.17	230.49	0
12/2/2001	7:00	9.56	2203	2.9				9.6	2	240.7	0
12/2/2001	8:00	9.71	2189	3.2							
12/2/2001	9:00	9.69	2187	3.0							
12/2/2001	10:00	9.78	2173	2.7							
12/2/2001	10:40							8.7	5.8	254.8	90.9
12/2/2001	11:00	9.8	2171	3.2				7.83	5.3	286.69	89.57
12/2/2001	12:00	9.76	2178	3.2				7.53	4.8	297.46	192.97
12/2/2001	12:14				9.44	2241	2.2				
12/2/2001	13:00	10.25	2103	5.5				8	4.2	291.16	383.3
12/2/2001	14:00	10.92	2020	6.4				8.33	3.5	321.07	302.8
12/2/2001	15:00	10.22	2000	17.7				8.63	2.47	320.07	137.43
12/2/2001	16:00	10.04	2138	4.1				8.57	1.7	341.23	31.27
12/2/2001	17:00	10.49	2028	9.1				7.5	1.37	32.93	0.1
12/2/2001	18:00	10.54	2035	8.2				6.83	0.63	355.86	0
12/2/2001	19:00	9.74	2177	3.4				6.33	1.1	180.08	0
12/2/2001	20:00	9.64	2195	2.4				5.13	1.7	152.77	0
12/2/2001	21:00	9.71	2175	3.7				4.1	1.8	148.64	0
12/2/2001	22:00	9.61	2209	3.2				3.5	1.8	151.64	0
12/2/2001	23:00	9.58	2214	2.6				3.3	2.37	134.58	0
12/3/2001	0:00	9.57	2214	1.7							
12/3/2001	1:00	9.58	2212	2.9							
12/3/2001	2:00	9.61	2193	5.1							
12/3/2001	3:00	9.59	2208	2.5							
12/3/2001	4:00	9.56	2225	2.7							
12/3/2001	5:00	9.53	2236	1.9							
12/3/2001	6:00	9.53	2235	2.3							

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/3/2001	7:00	9.53	2235	2.1							
12/3/2001	8:00	9.76	2123	4.2							
12/3/2001	9:00	9.56	2196	4.0							
12/3/2001	10:00	9.54	2245	2.5							
12/3/2001	11:00	9.55	2258	2.5							
12/3/2001	12:00	9.55	2261	3.2							
12/3/2001	12:13				9.37	2232	1.9				
12/3/2001	13:00	9.58	2262	1.8							
12/3/2001	14:00	9.55	2252	1.5							
12/3/2001	15:00	9.56	2257	4.2							
12/3/2001	16:00	9.56	2250	1.4							
12/3/2001	17:00	9.56	2239	1.5							
12/3/2001	18:00	9.6	2231	1.3							
12/3/2001	19:00	9.56	2231	1.7							
12/3/2001	20:00	9.55	2232	0.9							
12/3/2001	21:00	9.51	2226	1.7							
12/3/2001	22:00	9.52	2237	1.5							
12/3/2001	23:00	9.52	2237	1.7							
12/4/2001	0:00	9.53	2219	1.5							
12/4/2001	0:20							9.1	3.8	260.23	0
12/4/2001	1:00	9.5	2193	2.3				8.87	2.77	250.1	0
12/4/2001	2:00	9.53	2215	2.1				8.33	1.1	174.98	0
12/4/2001	3:00	9.55	2219	1.7				6.67	1.93	139.59	0
12/4/2001	4:00	9.77	2198	1.9				5.9	1.57	110.3	0
12/4/2001	5:00	9.49	2219	3.0				5.57	1.8	142.43	0
12/4/2001	6:00	9.53	2222	1.8				5.7	1.9	139.16	0
12/4/2001	7:00	9.51	2226	3.3				5.1	2.77	138.79	6.87
12/4/2001	8:00	9.5	2200	2.9				4.9	3.13	140.19	57.97
12/4/2001	9:00	9.49	2199	2.0				6.33	2.93	133.63	157.77
12/4/2001	**10:00**	**9.53**	**2195**	**4.1**				**8.6**	**2.57**	**124.74**	**305.37**
12/4/2001	**11:00**	**9.62**	**2198**	**3.3**				**10.53**	**1.8**	**87.56**	**232.03**
12/4/2001	**12:00**	**9.47**	**2211**	**3.3**				**11.77**	**1.5**	**59.3**	**233.43**
12/4/2001	**12:14**				**9.31**	**2237**	**1.5**				
12/4/2001	**13:00**	**9.51**	**2206**	**3.7**				**13.27**	**2.1**	**92.37**	**179.5**
12/4/2001	**14:00**	**9.43**	**2149**	**2.0**				**13.47**	**2.43**	**138.06**	**93.97**
12/4/2001	15:00	9.41	2155	1.9				13.4	2.7	142.3	125.5
12/4/2001	16:00	9.41	2151	2.3				13.37	2.6	130.29	5.97
12/4/2001	17:00	9.41	2154	2.1				13.13	3.97	155.6	0
12/4/2001	18:00	9.53	2151	2.4				13.6	3.87	159.49	0
12/4/2001	19:00	9.52	2153	2.0				14.3	2.77	192.8	0
12/4/2001	20:00	9.52	2150	1.9				13.77	2.67	241.73	0
12/4/2001	21:00	9.46	2157	1.8				12.6	1.1	37.29	0
12/4/2001	22:00	9.42	2158	1.7				12.93	0.93	186.51	0
12/4/2001	23:00	9.42	2157	1.7				14.85	3.22	240.24	0
12/5/2001	0:00	9.42	2150	1.8							
12/5/2001	0:20							15.05	2.95	249.85	0
12/5/2001	1:00	9.39	2145	1.9				15	3.47	248.69	0
12/5/2001	2:00	9.38	2139	2.5				14.43	2.2	274.39	0
12/5/2001	3:00	9.5	2138	1.9				14.53	2.5	256.43	0
12/5/2001	4:00	9.55	2137	2.0				14.63	3	253.12	0
12/5/2001	5:00	9.55	2142	2.0				14.33	2.63	252.59	0
12/5/2001	6:00	9.59	2146	2.1				13.77	2.07	244.43	0
12/5/2001	7:00	9.56	2144	1.5				13.5	1.93	252.91	0.6
12/5/2001	8:00	9.55	2141	1.7				14.07	2.37	242.24	12.23
12/5/2001	9:00	9.55	2140	1.7				14.07	1.9	204.8	59.37
12/5/2001	10:00	9.65	2145	1.5				15.1	3.77	233.66	158.87
12/5/2001	11:00	9.55	2136	2.1				15.87	4	231.03	336.53
12/5/2001	12:00	9.5	2134	2.0				16.53	2.77	246.67	326.07

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/5/2001	12:13				9.31	2311	1.5				
12/5/2001	13:00	9.51	2134	2.1				17	3.13	236.21	242.7
12/5/2001	14:00	9.56	2135	2.0				16.9	3.63	222.71	92.3
12/5/2001	15:00	9.46	2135	2.1				16.87	1.63	186.51	102.13
12/5/2001	16:00	9.44	2136	2.1				15.67	2.33	132.94	7.23
12/5/2001	17:00	9.59	2138	1.8				15.3	2.33	115.12	0
12/5/2001	18:00	9.67	2133	2.0				15.93	0.63	120.78	0
12/5/2001	19:00	9.67	2136	1.9				17.9	2.43	183.15	0
12/5/2001	20:00	9.73	2137	1.9				18.53	4.57	202.93	0
12/5/2001	21:00	9.73	2133	2.1				18.3	4.93	197.69	0
12/5/2001	22:00	9.58	2137	2.1				18.9	4.9	196.26	0
12/5/2001	23:00	9.56	2149	1.9				19.8	5.8	218.49	0
12/6/2001	0:00	9.48	2150	1.9							
12/6/2001	0:20							20.35	5.9	221.85	0
12/6/2001	1:00	9.61	2145	2.1				20.6	6.77	220.46	0
12/6/2001	2:00	9.57	2154	2.1				20.67	8.03	216.35	0
12/6/2001	3:00	9.37	2165	1.6				20.4	7.1	206.2	0
12/6/2001	4:00	9.35	2169	2.0				20.5	7.8	202.18	0
12/6/2001	5:00	9.4	2167	1.8				19.93	5.9	212.26	0
12/6/2001	6:00	9.36	2167	1.6				19.7	4.87	230.51	0
12/6/2001	7:00	9.43	2165	1.7				19.4	5.77	268.2	0
12/6/2001	8:00	9.44	2166	1.8				16.67	10.9	288.94	2.8
12/6/2001	9:00	9.43	2167	1.9				14.9	6.13	279.08	9.17
12/6/2001	10:00	9.45	2164	2.0				14.1	5.13	236.14	23.3
12/6/2001	11:00	9.32	2172	1.7				13.83	4.93	251.7	47
12/6/2001	12:00	9.34	2171	1.7				13.83	7.87	267.09	64.83
12/6/2001	12:13				9.33	2308	1.7				
12/6/2001	13:00	9.33	2171	1.8				13.3	7.73	264.09	60.17
12/6/2001	14:00	9.49	2161	1.7				13.07	5.87	264.88	71.63
12/6/2001	15:00	9.49	2161	1.8				12.9	5.6	264.02	53.57
12/6/2001	16:00	9.52	2159	1.7				12.63	4.87	260.45	11.87
12/6/2001	17:00	9.44	2162	1.7				11.83	5.4	262.62	0
12/6/2001	18:00	9.47	2158	1.7				11.07	3.77	263.06	0
12/6/2001	19:00	9.48	2156	1.8				10.53	3.03	257.88	0
12/6/2001	20:00	9.48	2156	1.8				9.87	3.43	253.58	0
12/6/2001	21:00	9.44	2157	1.9				8.83	2.57	265.94	0
12/6/2001	22:00	9.5	2149	2.1				8.23	2.37	246.92	0
12/6/2001	23:00	9.62	2142	2.8				7.55	1.65	230.87	0
12/7/2001	0:00	9.57	2144	2.8							
12/7/2001	0:20							6.75	0.45	184.79	0
12/7/2001	1:00	9.56	2147	2.3				5.77	1	301.52	0
12/7/2001	2:00	9.53	2146	2.9				5.1	1.63	172.12	0
12/7/2001	3:00	9.46	2143	2.2				4.67	1.13	142.58	0
12/7/2001	4:00	9.54	2130	2.5				4.67	1.07	139.17	0
12/7/2001	5:00	9.55	2133	2.7				6.17	1.97	258.94	0
12/7/2001	6:00	9.5	2133	2.7				6.4	2.07	264.85	0
12/7/2001	7:00	9.51	2140	2.7				6.23	1.57	275.35	2.43
12/7/2001	8:00	9.53	2143	2.2				5.97	2.63	263.26	97.43
12/7/2001	9:00	9.45	2143	2.2				6.9	4.13	265.18	234.6
12/7/2001	10:00	9	2153	1.7				7.27	4.2	275.93	338.73
12/7/2001	11:00	9.45	2136	2.3				7.97	4.33	281.22	401.4
12/7/2001	12:00	9.45	2134	2.2				9.1	4.9	275.86	407.6
12/7/2001	12:12				9.44	2292	1.7				
12/7/2001	13:00	9.55	2151	1.9				9.2	6.23	294.46	308.9
12/7/2001	14:00	9.58	2152	2.0				9	7.23	307.6	274.63
12/7/2001	15:00	9.57	2151	2.1				8.27	7.6	306.21	140.43
12/7/2001	16:00	9.52	2150	1.8				7.7	5.87	299.56	25.47
12/7/2001	17:00	9.5	2152	1.8				7.23	5.07	295.56	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/7/2001	18:00	9.44	2152	2.0				6.17	2.97	269.65	0
12/7/2001	19:00	9.42	2151	2.1				5.27	2.63	262.11	0
12/7/2001	20:00	9.39	2151	3.8				4.53	3.13	256.35	0
12/7/2001	21:00	9.34	2150	2.0				3.87	3.2	257.33	0
12/7/2001	22:00	9.33	2151	2.1				3.4	3.07	256.09	0
12/7/2001	23:00	9.26	2152	1.9				3.58	3.4	274.36	0
12/8/2001	0:00	9.28	2150	1.9							
12/8/2001	0:20							3.7	3.9	288.67	0
12/8/2001	1:00	9.34	2150	2.0				2.57	2.97	251.54	0
12/8/2001	2:00	9.28	2149	2.0				2.43	2.9	281.67	0
12/8/2001	3:00	9.29	2149	2.0				1.4	3.03	351.99	0
12/8/2001	4:00	9.25	2149	2.2				0.7	2.57	350.48	0
12/8/2001	5:00	9.24	2149	2.3				0.23	1.53	354.2	0
12/8/2001	6:00	9.21	2149	2.8				-0.37	1.53	27.39	0
12/8/2001	7:00	9.21	2148	2.3				-0.73	1.7	68.79	2.53
12/8/2001	8:00	9.21	2149	2.6				-0.2	1.57	97.04	25.87
12/8/2001	9:00	9.18	2148	2.6				-0.47	2.33	82.16	73.03
12/8/2001	10:00	9.14	2149	3.1				-0.03	2.27	100.04	112.97
12/8/2001	11:00	9.07	2149	2.3				0.67	1.33	110.91	114.87
12/8/2001	12:00	8.99	2116	1.8				1.1	2.07	61.84	86.1
12/8/2001	12:16				9.23	2293	1.8				
12/8/2001	13:00	9.16	2117	1.9				1.3	3.13	60.88	78.77
12/8/2001	14:00	9.13	2130	2.2				1.53	3.33	65.75	35.77
12/8/2001	15:00	9.3	2114	2.2				1.57	3.77	74.62	14.63
12/8/2001	16:00	9.22	2120	2.8				1.5	3.7	83.36	1.9
12/8/2001	17:00	9.16	2122	2.3				1.63	3.1	95.21	0
12/8/2001	18:00	9.08	2121	2.2				1.9	3.17	92.42	0
12/8/2001	19:00	9.06	2132	2.3				1.83	3.87	80.47	0
12/8/2001	20:00	8.97	2139	2.8				0.8	4.73	77.47	0
12/8/2001	21:00	8.93	2144	2.4				0.7	4.43	86.4	0
12/8/2001	22:00	8.85	2153	2.7				0.73	4.3	77.61	0
12/8/2001	23:00	8.8	2154	2.3				0.38	3.92	71.3	0
12/9/2001	0:00	8.74	2154	2.2							
12/9/2001	0:20							0	2.75	66.51	0
12/9/2001	1:00	8.67	2154	2.6				0	3.5	92.93	0
12/9/2001	2:00	8.65	2149	2.2				-0.13	3.37	93.12	0
12/9/2001	3:00	8.7	2152	2.8				-0.27	2.17	72.29	0
12/9/2001	4:00	8.72	2155	2.1				-0.23	1.87	76.61	0
12/9/2001	5:00	8.79	2154	2.0				-0.33	1.7	53.29	0
12/9/2001	6:00	8.77	2143	1.8				-0.17	1.4	21.83	0
12/9/2001	7:00	8.77	2143	2.2				0.43	3.13	339.31	0.53
12/9/2001	8:00	8.68	2125	2.3				0.5	3.23	341.79	26.77
12/9/2001	9:00	8.68	2127	2.4				0.83	2.23	310.62	68.17
12/9/2001	10:00	8.76	2119	6.0				1.13	2.73	256.42	162.8
12/9/2001	11:00	8.8	2102	2.6				2	2.53	269.48	316.77
12/9/2001	12:00	8.41	2097	1.3				3	1.53	290.01	410.4
12/9/2001	12:14				8.99	2292	2.1				
12/9/2001	13:00	8.59	2106	1.7				3.37	2.67	275.49	116.37
12/9/2001	14:00	8.67	2107	2.1				2.7	3.33	272.15	84.87
12/9/2001	15:00	8.69	2119	1.9				2.73	3.1	247.72	40.33
12/9/2001	16:00	8.78	2133	1.7				3	2.73	247.38	8.37
12/9/2001	17:00	8.76	2135	1.5				2.8	2.73	240.1	0
12/9/2001	18:00	8.77	2134	1.7				3.13	2.03	221.17	0
12/9/2001	19:00	8.71	2134	1.7				3.27	2.5	164.35	0
12/9/2001	20:00	8.66	2121	2.2				3.47	2	182.02	0
12/9/2001	21:00	8.67	2119	2.0				3.17	1.93	160.87	0
12/9/2001	22:00	8.77	2137	2.1				2.87	1.7	183.86	0
12/9/2001	23:00	8.74	2143	2.0				2.52	2.05	149.5	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/10/2001	0:00	8.64	2139	2.2							
12/10/2001	0:20							2.6	1.9	156.1	0
12/10/2001	1:00	8.65	2138	2.3				2.73	2.3	174.94	0
12/10/2001	2:00	8.65	2144	2.3				2.2	2.2	149.26	0
12/10/2001	3:00	8.75	2161	2.0				1.67	1.83	95.77	0
12/10/2001	4:00	8.92	2180	2.1				1.77	2.37	106.59	0
12/10/2001	5:00	8.84	2174	2.3				1.83	2	125.78	0
12/10/2001	6:00	8.75	2168	2.0				2.73	3.83	176.57	0
12/10/2001	7:00	8.66	2155	2.2				2.87	3.73	170.2	6.67
12/10/2001	8:00	8.63	2158	2.0				3.3	4.63	182.09	110.8
12/10/2001	9:00	8.77	2179	2.2				3.93	6.63	190.05	238.77
12/10/2001	10:00	8.66	2166	2.3				4.7	5.5	198.51	343.4
12/10/2001	11:00	8.66	2162	2.2				5.57	5.17	193.68	397.87
12/10/2001	12:00	8.68	2161	2.5				6.3	5.53	192.13	403.1
12/10/2001	12:17				8.74	2293	1.7				
12/10/2001	13:00	8.7	2160	2.3				6.73	5.7	194.51	358.47
12/10/2001	14:00	8.72	2159	2.3				6.87	5.17	176.86	273.27
12/10/2001	15:00	8.71	2159	2.9				6.47	4.63	183.72	68.53
12/10/2001	16:00	8.73	2162	2.3				5.97	4.93	180.01	16.57
12/10/2001	17:00	8.7	2164	2.3				5.3	4.67	164.86	0
12/10/2001	18:00	8.67	2163	2.6				4.8	4.2	155.92	0
12/10/2001	19:00	8.61	2162	2.4				5.07	2.6	161.99	0
12/10/2001	20:00	8.6	2158	2.7				5.73	3.27	193.44	0
12/10/2001	21:00	8.59	2151	2.1				5.77	3.03	192.63	0
12/10/2001	22:00	8.64	2149	2.2				5.7	2.83	202.28	0
12/10/2001	23:00	8.57	2151	1.9				5.55	3.62	202.09	0
12/11/2001	0:00	8.53	2149	2.2							
12/11/2001	0:20							5.5	3.6	208.89	0
12/11/2001	1:00	8.49	2148	2.3				5.13	2.2	193.77	0
12/11/2001	2:00	8.51	2147	1.9				5.03	2.3	204.55	0
12/11/2001	3:00	8.48	2151	2.6				4.93	2.13	198.83	0
12/11/2001	4:00	8.43	2152	2.2				4.47	0.83	238.19	0
12/11/2001	5:00	8.44	2150	2.2				4.33	1	223.17	0
12/11/2001	6:00	8.42	2150	2.1				3.93	1	244.98	0
12/11/2001	7:00	8.43	2149	2.6				3.33	1.27	133.53	3.03
12/11/2001	8:00	8.55	2141	2.1				2.73	1.53	108.95	84.83
12/11/2001	9:00	8.49	2148	1.9				3.17	1.1	88.18	118.47
12/11/2001	10:00	8.53	2150	1.7				4.07	1.03	36.8	200
12/11/2001	11:00	8.52	2153	1.7				4.7	0.6	15.5	186.9
								6.47	0.6	32.74	382.27
12/11/2001	12:12				8.63	2230	2.2				
12/11/2001	13:00	8.54	2206	1.7				7.73	0.13	31.53	332.87
12/11/2001	14:00	8.58	2207	1.3				8.4	0.2	38.4	235.9
12/11/2001	15:00	8.62	2205	1.4				8.6	0.33	299.81	117.9
12/11/2001	16:00	8.58	2202	1.2				7.73	0.63	146.98	13.43
12/11/2001	17:00	8.7	2198	1.4				7.1	0.83	89.61	0
12/11/2001	18:00	8.66	2199	1.5				6.2	2.03	321.45	0
12/11/2001	19:00	8.58	2202	1.5				5.37	0.63	68.57	0
12/11/2001	20:00	8.94	2189	1.3				4.1	1.73	150.43	0
12/11/2001	21:00	8.54	2203	1.7				3.17	1.2	154.58	0
12/11/2001	22:00	8.98	2182	1.4				2.23	1.13	148.42	0
12/11/2001	23:00	8.56	2205	2.0				1.55	1.88	129.5	0
12/12/2001	0:00	8.63	2205	1.5							
12/12/2001	0:20							0.95	2.75	146.53	0
12/12/2001	1:00	8.6	2196	1.6				1	2.97	134.9	0
12/12/2001	2:00	8.67	2191	1.6				0.83	1.9	92.12	0
12/12/2001	3:00	8.55	2200	1.4				0.67	1.67	78.47	0
								-0.03	2.2	77.83	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/12/2001	5:00	8.5	2199	1.5				-0.47	2.57	85.01	0
12/12/2001	6:00	8.46	2202	1.6				-0.63	2.63	89.77	0
12/12/2001	7:00	8.45	2202	1.9				-0.4	2.17	91.51	9.2
12/12/2001	8:00	8.45	2200	1.9				0.27	2.77	84.69	117.73
12/12/2001	9:00	8.44	2206	2.1				1.9	4.3	91.73	246.23
12/12/2001	10:00	8.54	2188	1.9				3.87	4.87	76.38	329.8
12/12/2001	11:00	8.62	2194	1.8				6.7	3.2	88.29	385.27
12/12/2001	12:00	8.62	2196	2.0				9.5	1.6	141.48	368.53
12/12/2001	12:12				8.48	2233	2.4				
12/12/2001	13:00	8.62	2198	1.5				9.63	2.93	160.58	169.37
12/12/2001	14:00	8.42	2204	1.4				9.3	2.93	152.24	82.33
12/12/2001	15:00	8.74	2192	1.7				9.23	4.27	144.52	29.2
12/12/2001	16:00	8.64	2193	1.9				8.93	3.13	151.82	3.53
12/12/2001	17:00	8.58	2196	1.8				8.57	4.03	126.03	0
12/12/2001	18:00	8.74	2190	2.2				7.87	6.87	161.79	0
12/12/2001	19:00	8.51	2199	2.0				7.4	5.87	159.17	0
12/12/2001	20:00	8.44	2203	1.9				7.23	4.87	154.44	0
12/12/2001	21:00	8.39	2207	1.9				7.27	7.1	153.84	0
12/12/2001	22:00	8.36	2208	2.2				7.57	6.97	153.39	0
12/12/2001	23:00	8.34	2211	2.0				7.7	8.62	157.52	0
12/13/2001	0:00	8.36	2211	2.2							
12/13/2001	0:20							7.85	8.35	152.97	0
12/13/2001	1:00	8.33	2214	2.2				7.93	6.37	147.67	0
12/13/2001	2:00	8.33	2215	2.0				8.23	5.7	148.61	0
12/13/2001	3:00	8.34	2217	1.9				8.37	4.23	148.93	0
12/13/2001	4:00	8.34	2218	2.3				8.23	2.5	150.23	0
12/13/2001	5:00	8.35	2219	1.5				7.9	3.23	133.7	0
12/13/2001	6:00	8.35	2218	2.1				8.13	3.6	149.89	0
12/13/2001	7:00	8.35	2218	1.7				8	2.3	100.77	1.8
12/13/2001	8:00	8.43	2212	1.7				8.8	2.3	77.71	28.27
12/13/2001	9:00	8.43	2213	2.3				10.83	2.93	183.72	63.27
12/13/2001	10:00	8.41	2214	2.0				11.8	4.43	205.29	78.13
12/13/2001	11:00	8.45	2212	1.5				12.37	4.8	217.8	82.97
12/13/2001	12:00							12.8	4.9	210.34	140.87
12/13/2001	12:03	8.38	2217	1.7							
12/13/2001	12:12				8.37	2239	2.6				
12/13/2001	13:01	8.5	2213	1.9				13.37	5.3	213.63	100.1
								13.1	4.1	204.37	38.1
12/13/2001	14:10	8.39	2215	1.6				13.07	4.43	196.61	19.77
								13.47	3.77	201.22	2.5
								13.4	2.97	214.35	0
								13.07	3.37	269.38	0
12/13/2001	18:37	8.44	2219	1.7							
								12.93	3.9	265.21	0
12/13/2001	19:13	8.51	2218	1.8							
12/13/2001	20:00	8.6	2214	1.7				13	4.97	269.57	0
12/13/2001	21:00	8.48	2220	1.7				12.67	4.5	273.32	0
12/13/2001	22:00	8.48	2217	1.5				12.07	5.7	286.18	0
12/13/2001	23:00	8.42	2217	1.7				11.45	4.62	283.95	0
12/14/2001	0:00	8.41	2217	1.8							
12/14/2001	0:20							11.15	3.6	267.47	0
12/14/2001	1:00	8.4	2217	1.5				10.3	5.27	293.48	0
12/14/2001	2:00	8.39	2217	1.7				9.23	4.8	299.02	0
12/14/2001	3:00	8.38	2217	1.6				8.8	4.83	309.94	0
12/14/2001	4:00	8.37	2218	1.7				8.33	4.13	313.45	0
12/14/2001	5:00	8.37	2217	1.5				8.17	2.07	324.51	0
12/14/2001	6:00	8.36	2217	1.7				7.93	2.2	349.08	0
12/14/2001	7:00	8.35	2217	1.6				7.7	2.4	357.1	1.17

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/14/2001	8:00	8.35	2216	1.8				7.43	2.17	42.26	16.9
12/14/2001	9:00	8.36	2217	1.7				7.43	2.43	84.42	27.77
12/14/2001	10:00	8.68	2204	1.7				7.4	3.07	58.89	33.17
12/14/2001	11:00	8.96	2195	1.8				7.1	3.63	64.53	45.63
12/14/2001	12:00	9.02	2193	1.9				6.53	2.87	61.34	65.43
12/14/2001	12:13				8.4	2236	2.5				
12/14/2001	13:00							6.07	3.63	74.74	48.67
12/14/2001	14:00							5.53	4.77	71.37	33.43
12/14/2001	15:00							5	4.97	71.3	7.97
12/14/2001	16:00							4.73	4.13	73.75	0.3
12/14/2001	17:00							4.97	4.43	65.06	0
12/14/2001	18:00							5.37	4.23	68.81	0
12/14/2001	19:00							5.43	3.47	54.84	0
12/14/2001	20:00							5.33	3.17	38.95	0
12/14/2001	21:00							5.67	3.8	9.24	0
12/14/2001	22:00							4.6	5.33	329.43	0
12/14/2001	23:00							3.05	6.98	309.3	0
12/15/2001	0:20							2.2	7.25	307	0
12/15/2001	0:37	8.96	2168	3.0							
12/15/2001	1:00	8.82	2176	2.7				2.23	8.3	309.51	0
12/15/2001	2:00	8.62	2180	2.8				2.2	8.1	302.29	0
12/15/2001	3:00	8.52	2185	2.6				2.13	7.7	306.19	0
12/15/2001	4:00	8.42	2190	2.6				1.97	7.87	326.32	0
12/15/2001	5:00	8.33	2196	2.9				1.8	6.47	326.49	0
12/15/2001	6:00	8.28	2199	2.1				1.77	6.23	326.95	0
12/15/2001	7:00	8.33	2141	4.5				1.67	6.17	329.26	1.23
12/15/2001	8:00	8.14	2142	6.3				1.63	4.37	301.46	13.6
12/15/2001	9:00	8.12	2166	3.9				1.93	4.37	326.33	37.63
12/15/2001	10:00	8.18	2162	4.1				1.3	4.07	6.99	62.67
12/15/2001	11:00	8.13	2178	3.2				1.23	3.2	359.44	65.3
12/15/2001	12:00	8.14	2168	3.2				1.23	3.3	2.45	62
12/15/2001	12:13				8.24	2241	2.4				
12/15/2001	13:00	8.14	2111	5.1				1.4	3.5	337.87	78.4
12/15/2001	14:00	7.94	2062	8.0				2.07	5.43	325.3	129.77
12/15/2001	15:00	7.91	2071	8.0				2.07	5.43	319.23	85.07
12/15/2001	16:00	8	2108	6.0				1.73	5.07	304.18	4.03
12/15/2001	17:00	7.74	2092	8.3				1.2	3.2	291.58	0
12/15/2001	18:00	7.84	2140	7.0				0.9	2.67	274.52	0
12/15/2001	19:00	7.82	2154	6.5				1	3.2	278.26	0
12/15/2001	20:00	7.81	2152	4.8				1.1	3.37	257.17	0
12/15/2001	21:00	7.86	2164	4.5				0.8	1.8	285.01	0
12/15/2001	22:00	7.87	2167	3.8				0.67	1.63	282.7	0
12/15/2001	23:00	7.87	2170	3.2				0.7	0.92	269.39	0
12/16/2001	0:00	7.85	2172	3.4							
12/16/2001	0:20							0.65	1.2	260.46	0
12/16/2001	1:00	7.85	2177	2.9				0.67	1.37	290.07	0
12/16/2001	2:00	7.84	2178	2.8				0.47	1.77	314.82	0
12/16/2001	3:00	7.81	2237	2.4				0.13	1.67	303.49	0
12/16/2001	4:00	7.81	2191	2.7				-0.5	2.13	55.73	0
12/16/2001	5:00	7.79	2180	2.8				-0.57	2.37	52.8	0
12/16/2001	6:00	7.74	2203	2.8				-0.77	2.03	62.31	0
12/16/2001	7:00	7.7	2172	3.1				-1.23	2.37	46.09	10.9
12/16/2001	8:00	7.68	2198	2.8				-0.97	1.3	17.23	62.1
12/16/2001	9:00	7.67	2189	2.7				-0.73	1.3	282.8	129
12/16/2001	10:00	7.69	2231	2.3				0.4	0.5	50.93	303.07
12/16/2001	11:00	7.71	2199	2.4				1.1	0.57	165.79	322.67
12/16/2001	12:00	7.67	2171	2.8				1.6	0.77	111.27	272.47
12/16/2001	12:13				8.05	2234	2.7				

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/16/2001	13:00	7.68	2171	2.7				1.97	0.83	25.91	186.2
12/16/2001	14:00	7.67	2178	2.8				2.23	1.83	36.19	115.87
12/16/2001	15:00	7.68	2154	3.0				2.1	3.87	56.02	71.07
12/16/2001	16:00	7.55	2167	2.8				1.43	2.13	76.85	2.27
12/16/2001	17:00	7.51	2170	3.0				1.57	1.93	89.08	0
12/16/2001	18:00	7.46	2158	2.5				1.63	3.2	94.97	0
12/16/2001	19:00	7.46	2156	2.5				1.67	3.13	107.69	0
12/16/2001	20:00	7.52	2170	2.2				1.53	3	84.95	0
12/16/2001	21:00	7.46	2173	5.1				1.57	3.07	93.8	0
12/16/2001	22:00	7.36	2168	2.6				1.8	3.47	95.88	0
12/16/2001	23:00	7.34	2184	2.9				1.75	4.08	97.03	0
12/17/2001	0:00	7.3	2182	3.0							
12/17/2001	0:20							1.75	3.75	93.04	0
12/17/2001	1:00	7.26	2185	2.7				1.7	3.23	85.35	0
12/17/2001	2:00	7.26	2160	2.9				1.87	4.33	78.28	0
12/17/2001	3:00	7.23	2156	2.9				1.83	3.93	79.27	0
12/17/2001	4:00	7.2	2165	2.9				2.1	3.47	89.42	0
12/17/2001	5:00	7.24	2167	3.0				4.1	4.67	117.13	0
12/17/2001	6:00	7.32	2182	2.6				2.43	4.43	77.9	0
12/17/2001	7:00	7.36	2221	2.5				2.43	4.07	79.98	1.5
12/17/2001	8:00	7.45	2211	2.1				3.83	5.87	146.49	12.43
12/17/2001	9:03	7.48	2201	2.0				4.13	5.37	148.79	17.23
12/17/2001	10:00							4.23	5.17	141.94	16.43
12/17/2001	11:00							4.2	4.57	129.38	24.6
12/17/2001	12:00							4.4	3.5	138.64	25.35
12/17/2001	12:13				7.89	2225	2.5				
12/18/2001	12:14				7.71	2226	2.0				
12/17/2001	13:20							4.45	2.75	127.53	23.35
12/17/2001	14:00							4.17	3	93.13	15.33
12/17/2001	15:00							3.27	2.93	62.95	5.83
12/17/2001	16:00							3.5	2.67	79.98	1.67
12/17/2001	17:00							3.17	3.57	75.98	0
12/17/2001	18:00							3.43	2.9	69.4	0
12/17/2001	19:00							3.47	3.3	69.66	0
12/17/2001	20:00							2.97	2.9	50.95	0
12/17/2001	21:00							2.67	2.87	77.83	0
12/17/2001	22:00							2.73	1.8	79.69	0
12/17/2001	23:00							2.72	1.5	56.99	0
12/18/2001	0:20							2.55	1.55	75.19	0
12/18/2001	1:00							2.43	1.57	41.9	0
12/18/2001	2:00							2.77	1.87	2.3	0
12/18/2001	3:00							2.87	3.53	322.18	0
12/18/2001	4:00							3.03	4.67	325.54	0
12/18/2001	5:00							2.9	4.8	322.06	0
12/18/2001	6:00							2.7	5.5	328.4	0
12/18/2001	7:00							2.33	5.03	312.45	0
12/18/2001	8:00							2.2	5.53	304.73	3.87
12/18/2001	9:00							2.43	6	303.97	14.13
12/18/2001	10:00							2.33	6.3	300.86	34.9
12/18/2001	11:00							2.23	4.6	303.08	31.5
12/18/2001	12:00							1.83	3.07	267.55	61.93
12/18/2001	**13:00**							**1.63**	**2.9**	**254.33**	**51.23**
12/18/2001	**14:00**							**2.93**	**3**	**268.88**	**42.13**
12/18/2001	**15:00**							**4.3**	**7.03**	**297.06**	**24.73**
12/18/2001	**16:00**							**4.17**	**5**	**284.54**	**5.4**
12/18/2001	17:00							4.27	5.33	270.11	0
12/18/2001	18:00							4.23	5.03	274.48	0
12/18/2001	19:00							4.37	4.77	284.54	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/18/2001	19:55	7.47	2210	2.1							
12/18/2001	20:01	7.46	2210	1.9				3.9	3.73	258.95	0
12/18/2001	21:03	7.45	2211	1.7				4.07	3.37	256.29	0
12/18/2001	22:00	7.43	2211	1.9				4.57	4.67	276.08	0
12/18/2001	23:00	7.42	2210	2.2				4.97	4.43	281.19	0
12/19/2001	0:00	7.33	2197	1.9				4.15	5.45	279.91	0
12/19/2001	1:00	7.33	2190	2.1				3.87	5.47	288.75	0
12/19/2001	2:00	7.36	2203	1.8				3.7	3.77	272.68	0
12/19/2001	3:00	7.31	2194	2.0				4.07	4.93	258.39	0
12/19/2001	4:00	7.32	2201	1.9				4.07	5.77	255.41	0
12/19/2001	5:00	7.35	2209	2.1				3.67	4.3	261.13	0
12/19/2001	6:00	7.34	2211	2.0				3.13	4.3	253.17	0
12/19/2001	7:00	7.31	2207	2.2				2.9	3.5	247.86	1.5
12/19/2001	8:00	7.31	2198	1.8				3.6	3.63	220.35	24.5
12/19/2001	9:00	7.32	2199	1.9				4.33	3.7	215.02	51.3
12/19/2001	10:00	7.26	2182	2.1				4.97	2.7	200.45	76.1
12/19/2001	11:00	7.29	2186	1.8				5.97	3.5	186.53	116.47
12/19/2001	12:00	7.35	2200	1.8				6.43	3.2	197.25	127.63
12/19/2001	12:12				7.5	2240	2.3				
12/19/2001	13:00	7.34	2197	1.8				6.87	2.47	178.89	133.77
12/19/2001	14:00	7.33	2192	1.7				7.23	2.43	146.14	209.6
12/19/2001	15:01	7.32	2196	1.4				7.63	2.83	150.72	84.1
12/19/2001	16:00							7.3	2.77	108.11	11.57
12/19/2001	17:00							6.17	2.33	92.07	0
12/19/2001	18:00							5.4	2.63	83.76	0
12/19/2001	19:00							4.8	2.27	75.14	0
12/19/2001	20:00							4.77	1.27	59.65	0
12/19/2001	21:00							6.47	2.1	170.43	0
12/19/2001	22:00							6.33	3.57	183.91	0
12/19/2001	23:00							6.68	6.72	182.86	0
12/20/2001	0:20							6.7	4.7	195.38	0
12/20/2001	1:00							6.9	3.97	201.1	0
12/20/2001	2:00							6.57	4.1	191.83	0
12/20/2001	3:00							6.23	5.53	201.63	0
12/20/2001	4:00							5.73	7.23	249.49	0
12/20/2001	5:00							4.87	7.6	260.88	0
12/20/2001	6:00							4.53	8	263.56	0
12/20/2001	6:50	7.26	2199	2.1							
12/20/2001	7:01	7.22	2202	2.0				3.6	7	267.71	1.13
12/20/2001	8:01	7.25	2201	1.6				3.43	7.2	258.43	69.57
12/20/2001	9:00	7.25	2200	1.8				3.4	8	254.34	187.53
12/20/2001	10:00	7.25	2198	2.3				3.5	8.07	257.75	165.4
12/20/2001	11:00	7.22	2208	1.8				3.33	8.03	254.33	99.73
12/20/2001	12:01	7.24	2203	2.2				3.73	7.93	257.67	241.8
12/20/2001	12:14				7.33	2224	2.6				
12/20/2001	13:06	7.26	2197	2.1				4.2	7.83	259.71	216.5
12/20/2001	14:00	7.25	2197	2.1				4	7.43	252.84	74.43
12/20/2001	15:02	7.23	2195	1.8				3.67	7.6	256.9	31.33
12/20/2001	16:00	7.22	2194	2.3				1.73	5.67	251.07	3.07
12/20/2001	17:03	7.18	2193	2.2				1.67	6.73	250.08	0
12/20/2001	18:08	7.16	2189	2.6				1.57	8.23	261.66	0
12/20/2001	19:00	7.1	2190	2.1				1.23	7.13	267.4	0
12/20/2001	20:00	7.03	2187	2.1				1.4	7	274.66	0
12/20/2001	21:00	7.04	2181	2.2				1.6	7.33	276.68	0
12/20/2001	22:00	7.04	2187	2.2				1.77	7.67	285.87	0
12/20/2001	23:00	7.02	2185	2.0				1.68	7.65	294.67	0
12/21/2001	0:00	6.99	2184	2.2							
12/21/2001	0:20							1.65	8.15	297.22	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/21/2001	1:00	6.97	2188	2.2				1.5	8.37	300.62	0
12/21/2001	2:00	6.94	2186	2.2				1.3	6.9	299.4	0
12/21/2001	3:00	6.93	2185	2.6				1.3	6.17	298.79	0
12/21/2001	4:00	6.69	2069	2.5				1.07	5.8	301.36	0
12/21/2001	5:00	6.48	2061	4.3				0.6	4.77	287.89	0
12/21/2001	6:00	6.37	2050	3.9				0.87	7.33	302.83	0
12/21/2001	7:00	6.65	2132	3.0				0.5	6.17	293.76	0.83
12/21/2001	8:00	6.79	2063	3.3				0.33	5.23	304.65	29.13
12/21/2001	9:00	6.39	2119	3.0				0	4.4	289.39	68.17
12/21/2001	10:00	6.39	2054	3.7				0.17	5.07	287.65	141.3
12/21/2001	11:00	6.47	2115	4.8				0.23	5.73	285.73	101
12/21/2001	12:00	6.49	2106	6.2				0.13	5.93	299.75	56.63
12/21/2001	12:11				6.75	2160	4.7				
12/21/2001	13:00	6.45	2117	6.7				0.2	6.25	315.88	88
12/21/2001	14:00	6.24	2118	5.3				0.47	6.03	318.33	78.3
12/21/2001	15:00	6.48	2149	4.2				0.37	5.23	301.51	30.2
12/21/2001	16:00	6.5	2150	4.5				0.23	4.13	288.23	6.53
12/21/2001	17:00	5.7	2060	6.9				-0.23	3.4	278.86	0
12/21/2001	18:00	5.65	2053	6.5				-0.2	2.97	284.38	0
12/21/2001	19:00	5.81	2074	6.1				0.2	3.8	288.66	0
12/21/2001	20:00	5.98	2093	5.1				0.87	6.33	311.68	0
12/21/2001	21:00	6.15	2117	4.2				0.5	4.97	312.34	0
12/21/2001	22:00	6.13	2117	5.6				0.4	4.83	312	0
12/21/2001	23:00	6.18	2123	4.3				0	4.45	298.25	0
12/22/2001	0:00	6.18	2139	4.2							
12/22/2001	0:20							-0.6	4.9	290.91	0
12/22/2001	1:00	6.19	2163	4.1				-1	4.3	287.95	0
12/22/2001	2:00	6.13	2154	4.3				-0.7	4.83	309.15	0
12/22/2001	3:00	5.48	2084	5.8				-0.8	4.67	322.03	0
12/22/2001	4:00	5.71	2112	5.6				-1.83	3.07	275.48	0
12/22/2001	5:00	5.78	2118	4.4				-2.43	3.03	7.37	0
12/22/2001	6:00	5.84	2142	4.4				-2.97	2.83	5.59	0
12/22/2001	7:00	5.16	2082	5.5				-3.7	2.93	6.49	0.43
12/22/2001	8:00	5.14	2081	6.2				-4.37	2.23	26.55	19.23
12/22/2001	9:00	5.01	2071	5.7				-4.2	1.33	46.39	86.37
12/22/2001	10:00	6.08	2149	3.5				-3.7	0.97	61.19	136.13
12/22/2001	11:00	6.29	2157	3.5				-3.17	0.67	23.09	162.73
12/22/2001	12:00	6.44	2173	3.3				-2.67	1.03	307.63	177.3
12/22/2001	12:13				6.57	2187	3.2				
12/22/2001	13:00	6.52	2168	3.0				-2.27	1.07	280.27	219.63
12/22/2001	14:00	6.52	2165	5.1				-2	1	232.7	132.97
12/22/2001	15:00	6.42	2145	3.1				-1.27	1.03	287.3	161.97
12/22/2001	16:00	6.51	2162	2.7				-1.5	0.97	9.64	34.4
12/22/2001	17:00	6.5	2160	3.3				-1.87	2.3	61.61	0.03
12/22/2001	18:00	6.39	2151	3.2				-2.2	2.97	83.15	0
12/22/2001	19:00	5.97	2115	3.7				-2.43	3.5	93.84	0
12/22/2001	20:00	5.87	2094	4.0				-2.63	3.57	88.95	0
12/22/2001	21:00	6.07	2098	5.1				-2.73	3.1	85.55	0
12/22/2001	22:00	6.44	2148	3.2				-2.63	3.7	92.65	0
12/22/2001	23:00	6.54	2137	3.2				-2.9	3.28	88.32	0
12/23/2001	0:00	6.5	2137	3.5							
12/23/2001	0:20							-3.05	4.05	89.1	0
12/23/2001	1:00	6.48	2143	3.2				-2.8	4.27	93.78	0
12/23/2001	2:00	6.44	2143	3.3				-2.5	4.67	81.85	0
12/23/2001	3:00	6.37	2130	3.3				-2.3	5.13	76.92	0
12/23/2001	4:00	6.2	2155	3.5				-2.3	5.73	76.02	0
12/23/2001	5:00	6.15	2083	4.1				-1.87	5.03	78.26	0
12/23/2001	6:00	6.19	2115	3.1				-2.1	5.23	65.54	0

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/23/2001	7:00	6.12	2125	3.6				-2.47	4.43	84.64	2.13
12/23/2001	8:00	6.04	2106	3.3				-1.73	3.97	78.37	72.73
12/23/2001	9:00	6.02	2118	3.3				-0.93	3.27	77.7	71.2
12/23/2001	10:00	5.92	2096	3.9				-0.2	3.73	78.01	101.8
12/23/2001	11:00	6	2092	4.1				1.2	4.6	74.13	88.63
12/23/2001	12:00	5.94	2113	3.6				2.33	3.97	76.91	162.37
12/23/2001	12:12				6.28	2177	3.2				
12/23/2001	13:00	6.08	2093	3.7				3.43	3.4	69.79	79.77
12/23/2001	14:00	6.08	2083	3.6				3.8	3.87	75.95	45.1
12/23/2001	15:00	6.17	2073	3.7				5.5	4.6	117.14	11.9
12/23/2001	16:00	5.84	2089	4.0				6.23	3.9	127.37	2.07
12/23/2001	17:00	5.77	2090	4.0				6.57	5.17	156.74	0
12/23/2001	18:00	5.95	2130	4.0				6.47	4.73	146.57	0
12/23/2001	19:00	6.03	2133	3.5				6	4.83	144.19	0
12/23/2001	20:00	6.08	2144	3.3				5.57	4.03	102.59	0
12/23/2001	21:00	6.11	2119	3.3				6.13	3.47	125.27	0
12/23/2001	22:00	6.18	2117	3.0				5.07	2	164.23	0
12/23/2001	23:00	6.24	2141	2.9				4.88	2.95	161.19	0
12/24/2001	0:03	6.26	2131	3.0							
12/24/2001	0:20							5	3.8	188.24	0
12/24/2001	1:00	6.29	2151	3.0				5.1	3.83	253.96	0
12/24/2001	2:00	6.29	2189	3.1				3.57	4.87	281.32	0
12/24/2001	3:00	6.26	2144	3.1				3.17	2.63	254.87	0
12/24/2001	4:00	6.23	2130	3.0				2.83	3.8	264.66	0
12/24/2001	5:00	6.2	2136	2.8				2.6	2.1	271.16	0
12/24/2001	6:00	6.16	2138	2.6				2.23	1.67	194.27	0
12/24/2001	7:00	6.17	2135	2.5				1.67	1.47	204.08	0.4
12/24/2001	8:00	6.1	2140	2.3				1.63	2.07	230.85	60.13
12/24/2001	9:00	6.1	2135	3.0				2.17	2	236.89	201.97
12/24/2001	10:00	6.09	2137	2.9				2.63	3.67	223.82	259.37
12/24/2001	11:00	6.09	2214	2.6				3.17	4.07	236.54	359.73
12/24/2001	12:02	6.14	2217	2.7				3.17	5.7	238.87	314.6
12/24/2001	12:13				6.23	2182	3.0				
12/24/2001	13:35	6.16	2141	2.8				2.83	4.83	256.3	101.93
12/24/2001	14:01	6.02	2167	2.4				2.37	4.43	282.58	54.27
12/24/2001	15:00	6.13	2137	2.9				2.3	3.07	280.07	54.1
12/24/2001	16:00	6.09	2136	2.6				2.27	1.53	272.27	15.13
12/24/2001	17:00	6.09	2154	2.7				2.13	1	232.3	0.13
12/24/2001	18:00	6.11	2158	2.8				2.2	2.23	233.77	0
12/24/2001	19:00	6.09	2143	2.4				1.8	2.6	288.78	0
12/24/2001	20:00	6.04	2153	2.7				0.73	3	257.53	0
12/24/2001	21:00	6.01	2142	2.6				0.7	4.47	241.84	0
12/24/2001	22:00	6.01	2164	2.4				0.07	5.2	244.21	0
12/24/2001	23:00	5.95	2149	2.8				-0.48	4.75	241.6	0
12/25/2001	0:00	5.97	2147	2.6							
12/25/2001	0:20							-0.85	4	237.98	0
12/25/2001	1:00	6	2162	2.6				-0.93	3.67	225.2	0
12/25/2001	2:00	5.88	2140	2.6				-1.07	3.4	217.85	0
12/25/2001	3:00	5.93	2138	3.0				-1.27	3.47	202.29	0
12/25/2001	4:00	5.95	2139	2.7				-1.03	3.53	226.31	0
12/25/2001	5:00	5.77	2142	2.4				-0.7	4.33	231.08	0
12/25/2001	6:00	5.71	2157	2.1				-0.53	5	226.08	0
12/25/2001	7:00	5.88	2163	2.6				-0.43	5.03	223.78	0.37
12/25/2001	8:00	5.87	2152	2.8				-0.43	5.07	217.8	49.07
12/25/2001	9:00	5.72	2151	2.4				-0.2	5.6	220.33	197.03
12/25/2001	10:00	5.78	2160	2.3				0.07	5.73	225.53	312.33
12/25/2001	11:00	5.81	2168	2.5				0.2	4.97	222.95	388.33
12/25/2001	12:00	5.58	2178	1.8				0.63	4.5	235.02	408.9

Table A6-2. (cont.)

		East Flume RUSS			South Deep RUSS						
Date	Time	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Air Temperature (°C)	Wind Speed (m/s)	Wind Direction (Degrees from North)	Incident Light (W/m^2)
12/25/2001	12:13				6.02	2153	2.6				
12/25/2001	13:00	5.96	2155	2.4				1.17	4.77	242.74	380.6
12/25/2001	14:00	5.99	2151	2.5				1.47	4.33	239.34	215.73
12/25/2001	15:00	5.97	2136	2.4				1.33	3.8	240.43	78.37
12/25/2001	16:00	5.94	2134	2.9				1.17	3.03	240.19	20.27
12/25/2001	17:00	5.94	2139	2.4				0.9	2.07	235.38	0.1
12/25/2001	18:00	5.92	2162	2.4				0.9	1.43	195.46	0
12/25/2001	19:00	5.87	2149	2.2				0.83	1.13	230.93	0
12/25/2001	20:00	5.88	2146	2.5				0.57	1.93	278.89	0
12/25/2001	21:00	5.83	2146	2.9				-0.33	3.3	277.12	0
12/25/2001	22:00	5.8	2194	2.4				-1.17	2.03	259.8	0
12/25/2001	23:00	5.81	2158	2.5				-0.88	3.38	242.78	0
12/26/2001	0:00	5.79	2141	2.5							
12/26/2001	0:20							-1.65	5.5	221.75	0
12/26/2001	1:00	5.73	2143	2.4				-2.33	4.73	217.74	0
12/26/2001	2:00	5.72	2166	2.6				-3.1	3.5	202.58	0
12/26/2001	3:00	5.71	2160	2.6				-3.6	2.97	186.14	0
12/26/2001	4:00	5.66	2186	2.4				-3.97	3.3	179.29	0
12/26/2001	5:00	5.55	2184	2.4				-4.27	3.17	172.71	0
12/26/2001	6:00							-4.47	3	176.15	0
12/26/2001	7:00							-4.87	2.17	172.97	0.63
12/26/2001	8:00							-4.97	2.97	171.03	55.87
12/26/2001	9:00							-4.57	3.57	190.06	198.43
12/26/2001	10:00							-3.8	4.1	220.63	330.83
12/26/2001	11:00							-3.2	3.4	240.11	423.8
12/26/2001	12:00							-2.93	2.6	232	359.33
12/26/2001	12:13				5.87	2188	2.4				
12/26/2001	13:00							-2.6	2.9	198.6	365.5

BOLD outlined values show Event sampling times.

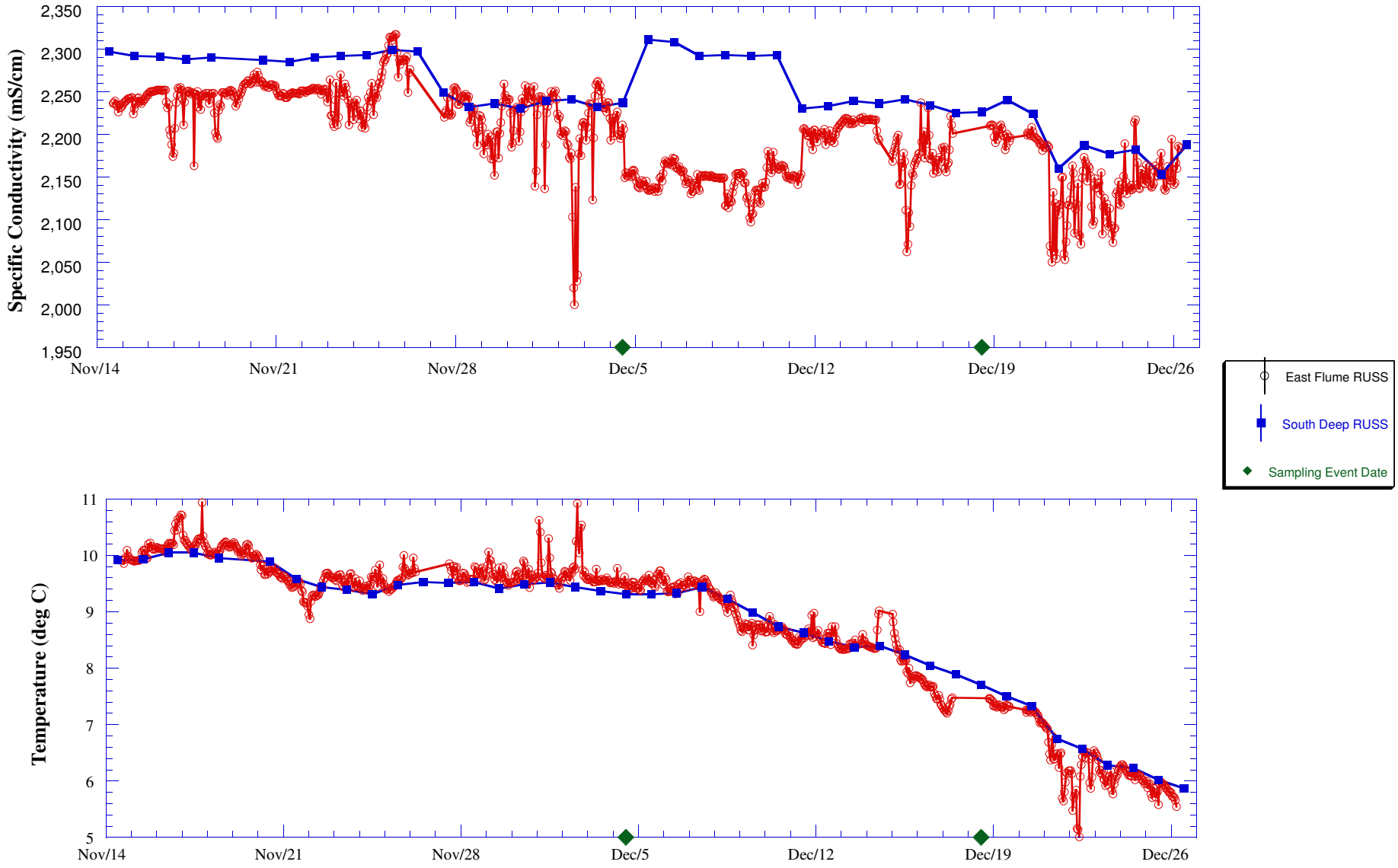
Table A6-3. Hydrolab Monitoring Measurements

		Calm Event - December 4, 2001					Windy Event - December 18, 2001				
Station	Depth (m)	Temperature (°C)	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	ORP (mV)
W60	0	9.16	2,065	7.55	9.37	337					
	1	9.15	2,065	7.62	9.29	339	7.41	2,204	7.59	10.67	402
	2	9.13	2,070	7.7	8.62	337	-	-	-	-	-
	3	9.14	2,080	7.7	8.56	339	-	-	-	-	-
W1	0	9.21	2,100	7.75	9.2	333	-	-	-	-	-
	1	9.21	2,096	7.75	8.95	339	7.54	2,195	7.9	9.8	377
	2	9.2	2,100	7.74	8.81	345	7.58	2,190	8.07	9.47	361
	3	9.15	2,110	7.74	8.84	346	7.58	2,192	8.09	9.44	359
	4	9.15	2,100	7.73	8.85	347	7.59	2,192	8.11	9.41	358
	4.5						7.59	2,193	8.12	9.39	356
	5	9.16	2,110	7.73	8.89	347					
	6	9.16	2,100	7.73	8.92	347	-	-	-	-	-
W61	0	-	-	-	-	-	-	-	-	-	-
	1	9.36	2,078	7.79	9.18	328	7.47	2,185	8.29	10.15	270
	2	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
W62	0	9.44	2,069	7.76	9.43	331	-	-	-	-	-
	1	9.39	2,070	7.74	9.44	338	7.24	2,128	8.3	10.09	285
	2	9.31	2,070	7.73	9.41	345	-	-	-	-	-
	3	9.26	2,080	7.73	9.56	346	-	-	-	-	-
	4	9.23	2,080*	7.73	9.69	347	-	-	-	-	-
	5	9.23	2,080*	7.73	9.79	347	-	-	-	-	-
	6	9.21	2,080*	7.73	9.20*	347	-	-	-	-	-

Table A6-3. (cont.)

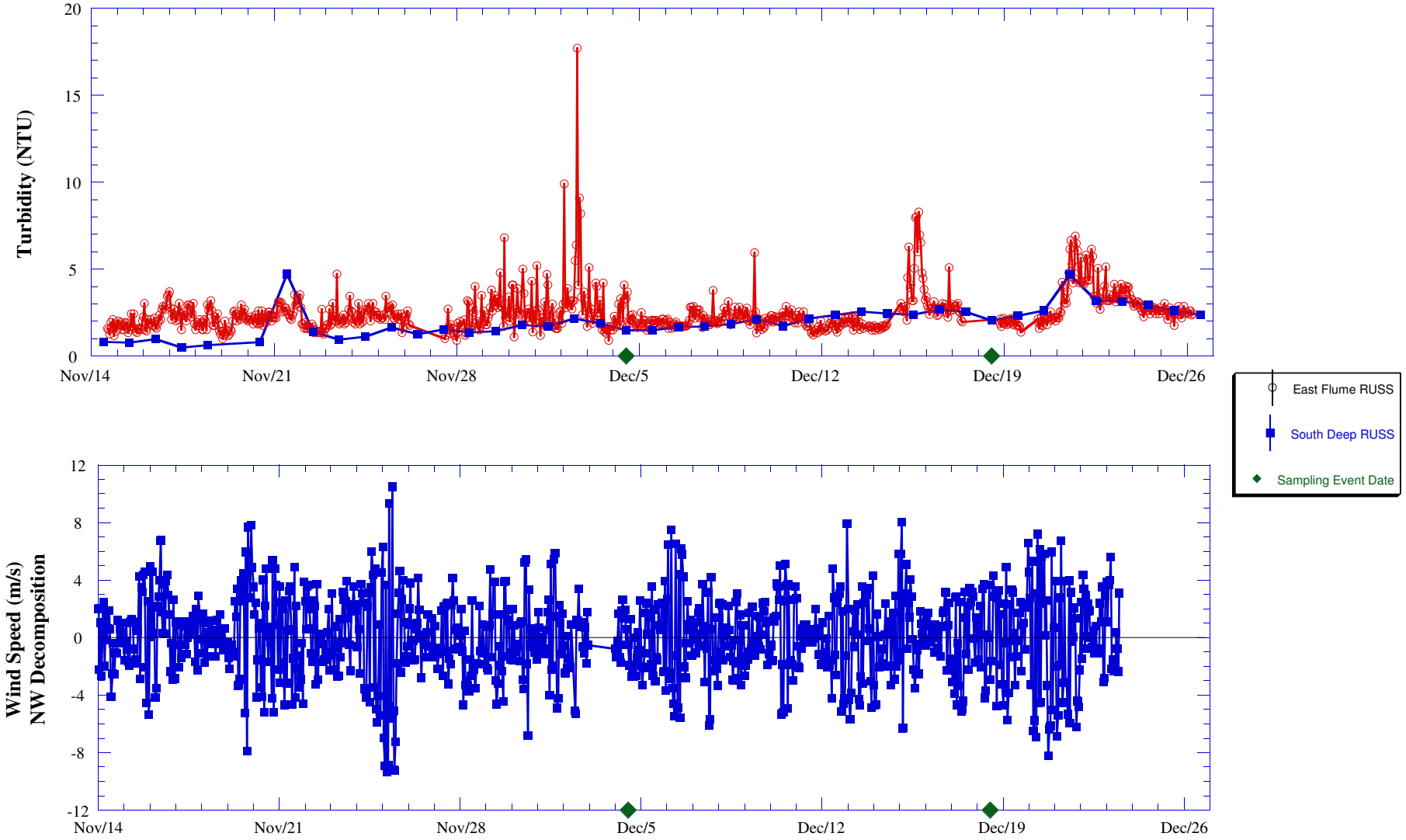
		Calm Event - December 4, 2001					Windy Event - December 18, 2001				
Station	Depth (m)	Temperature (°C)	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	ORP (mV)
W63	0	9.82	2,053	7.72	8.69	336	-	-	-	-	-
	1	9.69	2,060	7.69	8.7	340	7.16	2,108	8.32	10.53	285
	2	9.38	2,068	7.71	8.54	345	7.14	2,118	8.38	10.12	281
	3	9.23	2,079*	7.72	8.66	346	7.14	2,148	8.44	9.71	280
	4	9.23	2,070	7.72	8.6	346	7.19	2,156	8.47	9.65	280
	5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
W67	0	9.82	2,053	7.72	9.07	340	-	-	-	-	-
	1	9.56	2,060	7.71	8.58	342	7.4	2,170	8.64	9.95	275
	2	9.46	2,073	7.71	8.36	343	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-
W64	0	10.03	2,040	7.66	8.55	337	-	-	-	-	-
	1	9.98	2,046	7.67	8.55	338	-	-	-	-	-
	2	9.29	2,069	7.71	8.62	340	7.3	2,169	8.69	9.64	273
	3	-	-	-	-	-	-	-	-	-	-
W65	0	10.54	2,030	7.68	8.6	338	-	-	-	-	-
	1	9.44	2,070	7.73	8.39	345	6.97	2,140	8.72	9.65	282
W66	0	10.79	2,014	7.66	9	346	6.81	2,114	8.8	10	279
W68	0	10.21	2,032	7.67	8.77	340	7.2	2,156	8.78	9.44	273

Notes: The approximate average was recorded.
* The readings from the Hydrolab for the marked samples were fluctuating and would not settle.



TAMS

Figure A6-1
Monitoring Data - Specific Conductivity and Temperature
November 2001 - December 2001



Note: Wind Speed NW Decomposition = Wind Speed x cos(Wind direction (degrees from N) - 315)
Wind from the NW = 1, Wind from SE = -1. Wind across lake (from SW) = 0

TAMS

Figure A6-2
Monitoring Data - Turbidity and NW Wind Decomposition
November 2001 - December 2001

ENVIRONMENTAL QUALITY ASSOCIATES, INC.

April 11, 2002

RECEIVED
APR 18 2002
TAMS CONSULTANTS, INC.
BLOOMFIELD, NJ

TAMS Consultants, Inc.
Att: Mr. Allen Burton
300 Broadacres Drive
Bloomfield, New Jersey 07003

Re: Data Review of Onandaga Lake Low-Level Mercury Samples
Case No. R0001, SDG Nos. 1204 and 1218

Dear Mr. Burton,

Enclosed please find the data review summaries for the subject analytical reports. Data review was performed utilizing EPA's Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring (EPA 821-B-96-002), along with Method 1631, Revision C (EPA 821-R-01-024) and its' associated guidance document (EPA 821-R-01-023). Discussion with the laboratory manager (M. Gauthier) indicated that the laboratory utilizes it's own developed method for low-level Hg, and not EPA 1631; she also indicated that the analytical SOP for this method had been approved by Larry Bailey of NYSDEC prior to performance of analyses. Further discussion with Ms. Gauthier revealed that the differences between the laboratory's method and EPA 1631 were largely based on different terminologies used to describe the various required QC elements. After reviewing both the laboratory SOP and a supporting document (attached) describing the key differences between EPA 1631 and Frontier Geosciences low-level Hg method, it is the reviewer's professional opinion that the differences as documented and described are inconsequential to the validity and usability of the reported sample results.

Samples were collected on 12/04/2001 and 12/18/2001, with 17 freshwater samples in each sampling round, designated as SDG Nos. 1204 and 1218, respectively. Samples were shipped to the laboratory via overnight courier on the same day as samples were collected, and arrived at Frontier Geosciences, Inc., Seattle, WA one day after collection, on 12/05 and 12/19/2001. Sample cooler temperatures upon receipt at the laboratory were between 3 and 4 degrees C, and samples were acid-preserved upon receipt at the laboratory.

Chain of Custody documents were dated and signed by shipping and receiving staff. Several cross-outs on the custody documents were not initialed or were not legible; the sampler was contacted directly to verify correct sample IDs. Also, the date of collection was not filled in on page 3 of 3 of the chain-of-custody for SDG 1218; the sampler verified verbally that all samples for that SDG were collected on 12/18/2001. It was noted that the equipment blank for SDG 1204 was inadvertently collected in a TSS bottle, which was not fluoropolymer. This sample was transferred to a fluoropolymer bottle at the laboratory prior to digestion and analysis. This blank exhibited a positive result for Hg of 0.44 ng/L; it is unknown what portion of the reported Hg value, if any, was due to potential contamination from the original sample container. All associated values, with the exception of the two dissolved (filtered) Hg samples, were above 5x the concentration in the equipment blank. It is further noted that no filter blank was collected, therefore any potential contamination resulting from the filtration device cannot be determined.

Method 1631 stipulates a frequency for field blank collection of one per 10 samples, while only one field (equipment) blank was collected for each sampling round of 17 samples. Further, the method requires one matrix spike / duplicate pair for each 10 samples collected, while only one MS/MSD pair were submitted for each sampling round. These excursions are stated as protocol deviations from Method 1631only; potential effects on the reported data are estimated to be minimal, and no data qualifiers were applied.

Spike recoveries were acceptable with recoveries ranging from 96.8% to 102.3%, indicative of no significant matrix interference effects. Blank spike recoveries ranged from 90.6% to 97.1%, indicating analytical process control; it is noted that the samples which the laboratory terms as Blank Spikes effectively function as the Ongoing Precision and Recovery samples (OPR) referred to in Method 1631.

Matrix duplicates exhibited acceptable precision, ranging from 4.5% to 19.9% RPD. Field duplicate samples were collected for both total and dissolved (filtered) Hg, with precision values ranging from 0% to 37% for total Hg, and from 3.9% to 10.5% for dissolved Hg. Method 1631, Section 9.7, states as follows: "... The RPD between field duplicates should be less than 20%. If the RPD of the field duplicates exceeds 20%, the laboratory should communicate this to the sampling team so that the source of error can be identified and corrective measures taken before the next sampling event." The RPD between field duplicate samples D63828 and D63829 for total Hg was 36.8%, therefore the sampling team should be informed of this exceedance, and investigate the potential cause of the high RPD value.

Initial calibrations were performed for each analysis sequence at five non-blank concentrations, per method requirements, and verified with a mid-point ICV standard immediately after calibration. ICV recoveries ranged from 91.1% to 96.4%. Continuing calibration recoveries were acceptable, ranging from 94.4% to 101.3%. All reported sample concentrations were calculated from a best-fit regression line established from the associated initial calibration; r-squared values ranged from 0.9976 to 0.9999. The equation used to calculate the reported Hg values is given in the laboratory reports. Several values were randomly re-calculated from the raw data and were verified against reported values with no disparities noted.

The laboratory did not include the results from the initial demonstration of laboratory capability (accuracy and precision); although the inclusion of these data are not mandatory, the laboratory is required to perform this demonstration, keep the results on file at the laboratory, and repeat the demonstration if any significant equipment or method modifications are implemented. Discussion with the laboratory director indicated that this analytical exercise had been successfully performed, and that the results were maintained on file at the laboratory. Also, the results of ongoing compilation of precision and recovery values from matrix spikes / duplicates, and resultant derived error band limits, were not included in the data report. The laboratory director attributed this omission as due to the lab not having a 'LIMS' system. Therefore, the reviewer has deferred to the Method 1631 published acceptance values (Tables 2 and 3, page 29) for data evaluation; all reported recovery and precision values were within these stated limits.

In summation, all reported data results are unqualified on the basis of reported QC results as compared against published acceptance ranges within EPA Method 1631.

Should you have any questions or comments pertaining to the above information or attached documents, please do not hesitate to contact me.

Very truly yours,
Environmental Quality Associates, Inc.

Chris W. Taylor
Vice President

Attachments

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1218

Freshwater Samples Collected

Field Sample ID		Date	Comments
D63818	Blank	12/18/01	Equipment Blank
D63819	W60-1m	12/18/01	(total Hg)
D63820	W1-1m	12/18/01	(total Hg)
D63821	W1-1m	12/18/01	(dissolved Hg)
D63822	W1-6m	12/18/01	(total Hg)
D63823	W61-1m	12/18/01	(total Hg)
D63824	W62-1m	12/18/01	(total Hg)
D63825	W63-1m	12/18/01	(total Hg)
D63826	W63-4m	12/18/01	(total Hg)
D63827	W67-1m	12/18/01	(total Hg)
D63828	W64-2m	12/18/01	(total Hg)
D63829	W64-2m	12/18/01	Field Dupe (total Hg)
D63830	W64-2m	12/18/01	(dissolved Hg)
D63831	W64-2m	12/18/01	Field Dupe (diss. Hg)
D63832	W65-1m	12/18/01	(total Hg)
D63833	W66-0.3m	12/18/01	(total Hg)
D63834	W68-0.3m	12/18/01	(total Hg)

Freshwater Samples Analyzed

Field Sample ID		Date	Hg Result, ng/L (ppt)
D63818	Blank	01/10/02	0.33 U
D63819	W60-1m	01/10/02	4.70
D63820	W1-1m	01/10/02	3.72
D63821	W1-1m	01/10/02	0.77
D63822	W1-6m	01/10/02	3.77
D63823	W61-1m	01/10/02	4.26
D63824	W62-1m	01/10/02	9.59
D63825	W63-1m	01/10/02	14.9
D63826	W63-4m	01/10/02	17.2
D63827	W67-1m	01/10/02	20.5
D63828	W64-2m	01/10/02	15.1
D63829	W64-2m	01/10/02	21.9
D63830	W64-2m	01/11/02	1.01
D63831	W64-2m	01/11/02	1.05
D63832	W65-1m	01/11/02	11.8
D63833	W66-0.3m	01/11/02	49.4
D63834	W68-0.3m	01/11/02	19.9

CCVs required per method	4	CCVs reported:	4
CCBs required per method	4	CCBs reported:	4
Field Blanks required per method:	2	Field Blanks collected:	1
Lab Blanks required per method:	6	Lab Blanks reported:	6
OPR analyses required:	2	OPR analyses reported:	2
MS/MSD samples required:	2	MS/MSD samples reported:	1
Field Duplicates required:	2	Field Duplicates reported:	2
MDL results required:	1	MDL results reported:	1

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1218

Initial Calibration

	Yes	No
Was a multi-point initial calibration (ICAL) performed ?	X	
Were all reported sample concentrations within calibrated range ?	X	
If No, list affected samples.		
Did the ICAL meet linearity criteria ?	n/a	
If No, was a calibration curve used to calculate sample concentrations ?	X	

Method Detection Limit (MDL) / Minimum Level (ML)

	Yes	No
Did the laboratory demonstrate the ability to achieve the required MDL ?		X

Note: the laboratory's estimated MDL is 0.33 ng/L (p. 0019); the Method 1631 required ML is 0.50 ng/L. The ML is derived by multiplying the MDL by 3.18, and then rounding upward; in this case the laboratory's ML would be 1.0 ng/L. Samples 63818 and 63821 were reported below the calculated ML. Refer to the data review narrative for discussion / details.

Did the ICAL range encompass the ML ?	X	
Were all field samples detected below the ML reported as non-detects ?		X

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
See Note above. Impact on data integrity is considered to be inconsequential.

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1218

Initial Calibration Verification (ICV) / Initial Calibration Blanks (ICB)

	Yes	No
Was an ICV run prior to field sample analysis ?	X	
Were ICV recoveries within acceptable range ?	X	
Was the ICV followed directly by an ICB ?	X	
Was the ICB free from contamination above the ML concentration ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

Initial Precision and Recovery (IPR)

	Yes	No
Were IPR data reported for each analyte ?		X

Note: IPR data are not required to be reported with the data package. The laboratory must maintain records of IPR performance, and repeat the IPR process whenever significant equipment changes or method changes are made. Refer to data review narrative.

Ongoing Precision and Recovery (OPR)

Were OPR data reported for each analyte, instrument and batch ? Note: the laboratory's Blank Spike serves as the OPR.	X	
Did all OPR samples meet required recovery criteria (77 - 123%) ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1218

Continuing Calibration Verification (CCV) / Continuing Calibration Blanks (CCB)

	Yes	No
Were CCVs run prior to each batch of 10 samples on each Instrument ?	X	
Were all CCV recoveries within acceptable range ?	X	
Was each CCV followed directly by a CCB ?	X	
Was each CCB free from contamination above the ML concentration ?		X

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
CCB2 on 01/10/02 exhibited Hg conc. of 0.267 ng/L. Samples D63830 - 34 were re-analyzed on 01/11/02, with acceptable CCBs. Samples D63823 - 29, which were analyzed between CCB1 & 2 on 01/10/02, all exhibited Hg concs. >10x CCB2 conc.; therefore all reported values for these samples are unaffected.

Laboratory (Method) Blanks

	Yes	No
Was a method blank analyzed for each instrument and sample batch ?	X	
Was each method blank free of contamination above the ML value ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

Field Blanks

Was a field blank analyzed for each 10 samples per site ?		X
Was each field blank free of contamination above the ML value ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
One field (equipment) blank was submitted for all field samples collected. No filter blank was analyzed for the dissolved Hg samples; therefore the potential impact of filter device contamination on reported dissolved Hg concentrations cannot be estimated.

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1218

Matrix Spike (MS) / Matrix Duplicate (MD) Results

	Yes	No
Were appropriate number of MS/MD samples analyzed ?		X
Were MS recoveries within acceptable range ?	X	
Were MD precision values (%RPD) within limits ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
Method 1631 specifies that a spiked duplicate pair for each 10 samples collected from a site is required; therefore the method frequency was not met for this sampling event. This is noted as a method compliance excursion; no data qualifiers were warranted.

Additional Information

	Yes	No
Were statements of data quality provided for MS/MSD and Blank Spikes ? (see EPA / 821-B-96-002, Sect. 10 & 11)		X
Did field duplicate samples exhibit acceptable precision ?		X

Calculate the %RPD for each field duplicate pair:

Sample ID:	D63828	D63829	total Hg % RPD
Result:	15.1	21.9	**36.8**

Sample ID:	D63830	D63831	diss. Hg % RPD
Result:	1.01	1.05	3.9

If both total and dissolved samples were analyzed, were dissolved values lower than total values ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
No lab-generated MS / MD / LCS acceptable recovery / precision ranges were included with the data package. No data qualifiers were warranted, however the lab should include these data in future reports.
Method 1631 specifies an acceptable RPD limit between field dupe samples of 20%; the RPD for total Hg exceeded this value, at 37%. See data review narrative for discussion / details.

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1204

Freshwater Samples Collected

Field Sample ID		Date	Comments
D63801	Blank	12/04/01	Equipment Blank
D63802	W60-1m	12/04/01	(total Hg)
D63803	W1-1m	12/04/01	(total Hg)
D63804	W1-1m	12/04/01	(dissolved Hg)
D63805	W1-6m	12/04/01	(total Hg)
D63806	W61-1m	12/04/01	(total Hg)
D63807	W62-1m	12/04/01	(total Hg)
D63808	W63-1m	12/04/01	(total Hg)
D63809	W63-4m	12/04/01	(total Hg)
D63810	W67-1m	12/04/01	(total Hg)
D63811	W64-2m	12/04/01	(total Hg)
D63812	W64-2m	12/04/01	Field Dupe (total Hg)
D63813	W64-2m	12/04/01	(dissolved Hg)
D63814	W64-2m	12/04/01	Field Dupe (diss. Hg)
D63815	W65-1m	12/04/01	(total Hg)
D63816	W66-0.3m	12/04/01	(total Hg)
D63817	W68-0.3m	12/04/01	(total Hg)

Freshwater Samples Analyzed

Field Sample ID		Date	Hg Result, ng/L (ppt)
D63801	Blank	12/19/01	0.44
D63802	W60-1m	12/19/01	4.52
D63803	W1-1m	12/19/01	3.57
D63804	W1-1m	12/19/01	2.82
D63805	W1-6m	12/19/01	4.22
D63806	W61-1m	12/19/01	5.09
D63807	W62-1m	12/19/01	4.45
D63808	W63-1m	12/19/01	9.02
D63809	W63-4m	12/19/01	6.12
D63810	W67-1m	12/19/01	14.1
D63811	W64-2m	12/19/01	4.89
D63812	W64-2m	12/19/01	4.89
D63813	W64-2m	12/19/01	0.99
D63814	W64-2m	12/19/01	1.10
D63815	W65-1m	12/19/01	14.8
D63816	W66-0.3m	12/19/01	10.5
D63817	W68-0.3m	12/19/01	10.2

CCVs required per method	3	CCVs reported:	3
CCBs required per method	3	CCBs reported:	3
Field Blanks required per method:	2	Field Blanks collected:	1
Lab Blanks required per method:	3	Lab Blanks reported:	3
OPR analyses required:	1	OPR analyses reported:	1
MS/MSD samples required:	2	MS/MSD samples reported:	1
Field Duplicates required:	2	Field Duplicates reported:	2
MDL results required:	1	MDL results reported:	1

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1204

Initial Calibration

	Yes	No
Was a multi-point initial calibration (ICAL) performed ?	X	
Were all reported sample concentrations within calibrated range ?	X	
If No, list affected samples.		
Did the ICAL meet linearity criteria ?	n/a	
If No, was a calibration curve used to calculate sample concentrations ?	X	

Method Detection Limit (MDL) / Minimum Level (ML)

	Yes	No
Did the laboratory demonstrate the ability to achieve the required MDL ?	X	

Note: the laboratory's estimated MDL is 0.10 ng/L (p. 0035); the Method 1631 required ML is 0.50 ng/L. The ML is derived by multiplying the MDL by 3.18, and then rounding upward; in this case the laboratory's ML would be 0.4 ng/L. All samples reported were above the calculated ML.

Did the ICAL range encompass the ML ?	X	
Were all field samples detected below the ML reported as non-detects ?	n/a	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1204

Initial Calibration Verification (ICV) / Initial Calibration Blanks (ICB)

	Yes	No
Was an ICV run prior to field sample analysis ?	X	
Were ICV recoveries within acceptable range ?	X	
Was the ICV followed directly by an ICB ?	X	
Was the ICB free from contamination above the ML concentration ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

_____

_____

_____

_____

Initial Precision and Recovery (IPR)

	Yes	No
Were IPR data reported for each analyte ?		X

Note: IPR data are not required to be reported with the data package. The laboratory must maintain records of IPR performance, and repeat the IPR process whenever significant equipment changes or method changes are made. Refer to data review narrative.

Ongoing Precision and Recovery (OPR)

Were OPR data reported for each analyte, instrument and batch ? Note: the laboratory's Blank Spike serves as the OPR.	X	
Did all OPR samples meet required recovery criteria (77 - 123%) ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

_____

_____

_____

_____

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1204

Continuing Calibration Verification (CCV) / Continuing Calibration Blanks (CCB)

	Yes	No
Were CCVs run prior to each batch of 10 samples on each instrument ?	X	
Were all CCV recoveries within acceptable range ?	X	
Was each CCV followed directly by a CCB ?	X	
Was each CCB free from contamination above the ML concentration ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

Laboratory (Method) Blanks

	Yes	No
Was a method blank analyzed for each instrument and sample batch ?	X	
Was each method blank free of contamination above the ML value ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

Field Blanks

Was a field blank analyzed for each 10 samples per site ?		X
Was each field blank free of contamination above the ML value ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:

One field (equipment) blank was submitted for all field samples collected. No filter blank was analyzed for the dissolved Hg samples; therefore the potential impact of filter device contamination on reported dissolved Hg concentrations cannot be estimated. Also, the Hg field blank was inadvertently collected in a poly bottle, and transferred to a Teflon bottle at the laboratory; it is unknown whether this container contributed to the reported value of 0.44 ng/L.

Data Inspection Checklist

Low-Level Mercury by EPA Method 1631

Reviewer Name:	Chris W. Taylor	Company:	Environmental Quality Associates, Inc.
Review Date(s):	4/08-09/2002	Client:	TAMS Consultants, Inc.
Case Number:	R0001	SDG Number:	1204

Matrix Spike (MS) / Matrix Duplicate (MD) Results

	Yes	No
Were appropriate number of MS/MD samples analyzed ?		X
Were MS recoveries within acceptable range ?	X	
Were MD precision values (%RPD) within limits ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
Method 1631 specifies that a spiked duplicate pair for each 10 samples collected from a site is required; therefore the method frequency was not met for this sampling event. This is noted as a method compliance excursion; no data qualifiers were warranted.

Additional Information

	Yes	No
Were statements of data quality provided for MS/MSD and Blank Spikes ? (see EPA / 821-B-96-002, Sect. 10 & 11)		X
Did field duplicate samples exhibit acceptable precision ?	X	

Calculate the %RPD for each field duplicate pair:

Sample ID:	D63811	D63812	total Hg % RPD
Result:	4.89	4.89	0

Sample ID:	D63813	D63814	diss. Hg % RPD
Result:	0.99	1.10	10.5

If both total and dissolved samples were analyzed, were dissolved values lower than total values ?	X	

If No to any of the above questions, describe problem and provide evaluation of impacts on reported data:
No lab-generated MS / MD / LCS acceptable recovery / precision ranges were included with the data package. No data qualifiers were warranted, however the lab should include these data in future reports.Refer to data review narrative.