

**Winkler Titration Data
Calibration of Dissolved
Oxygen Sensors**

APPENDIX Q

Winkler Titrations Savannah Harbor DO Study

Volumetric Adjustments

Bottle 1 297 mL - 2 mL = 295 1.02
 Bottle 2 298 mL - 2 mL = 296 1.01

Date: _____ 08/03/1999
 Time: _____
 Person: _____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	6.1	12.6	6.5	6.61	6.64
2	12.7	19.28	6.58	6.67	

Date: _____ 08/04/1999
 Time: _____
 Person: _____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	10.39	6.39	6.50	6.50
2	11	17.42	6.42	6.51	

Date: _____ 08/04/1999
 Time: _____ 12:00
 Person: _____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	10.07	6.07	6.17	6.13
2	10.5	16.5	6	6.08	

Date: _____ 08/05/1999
 Time: _____ 7:30
 Person: _____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	9.34	5.4	5.49	5.43
2	9.4	14.69	5.29	5.36	

Date:___ 08/06/1999

Time:___ 8:20

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	10.1	6.1	6.20	6.15
2	10.1	16.12	6.02	6.10	

Date:___ 08/08/1999

Time:___ 9:15

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7	12.78	5.78	5.88	5.89
2	12.78	18.6	5.82	5.90	

Date:___ 08/08/1999

Time:___ 2:45

Person:_____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	5	11	6	6.10	6.09
2	11	17	6	6.08	

Date:___ 08/09/1999

Time:___ 10:20

Person:_____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	10.4	6.4	6.51	6.50
2	10.4	16.81	6.41	6.50	

Date:___ 08/10/1999

Time:___ 9:08

Person:_____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4.05	9.44	5.39	5.48	5.46
2	9.44	14.8	5.36	5.43	

Date:___ 08/10/1999
 Time:___ 5:57
 Person:_____

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7	12.9	5.9	6.00	6.04
2	12.9	18.9	6	6.08	

Date:___ 08/11/1999
 Time:___ 7:30
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.9	13.94	6.04	6.14	6.12
2	13.94	19.95	6.01	6.09	

Date:___ 08/12/1999
 Time:___ 7:40
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9.9	16.71	6.81	6.93	7.01
2	16.71	23.7	6.99	7.08	

Date:___ 08/13/1999
 Time:___ 7:30
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9.7	16.38	6.68	6.79	6.77
2	16.38	23.03	6.65	6.74	

Date:___ 08/16/1999
 Time:___ 7:35
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	11	16.86	5.86	5.96	6.00
2	16.86	22.82	5.96	6.04	

Date:___ 08/17/1999

Time:___ 7:15

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	12.4	19.45	7.05	7.17	7.59
2	19.45	27.35	7.9	8.01	

Date:___ 08/18/1999

Time:___ 7:20

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9.24	15.89	6.65	6.76	6.78
2	15.89	22.6	6.71	6.80	

Date:___ 08/19/1999

Time:___ 7:00

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.93	14.87	6.94	7.06	7.09
2	14.87	21.9	7.03	7.13	

Date:___ 08/23/1999

Time:___ 16:56

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9	12.72	3.72	3.78	3.91
2	12.72	16.7	3.98	4.03	

Date:___ 08/24/1999

Time:___ 15:55

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.32	15.85	5.53	5.62	5.52
2	15.85	21.2	5.35	5.42	

Date:___ 08/25/1999

Time:___ 8:30

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	11.6	17.27	5.67	5.77	5.73
2	17.27	22.88	5.61	5.69	

Date:___ 08/30/1999

Time:___ 7:15

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	11.36	15.56	4.2	4.27	4.31
2	15.56	19.84	4.28	4.34	

Date:___ 08/31/1999

Time:___ 6:25

Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	5	10.14	5.14	5.23	5.21
2	10.14	15.27	5.13	5.20	

Date:___ 08/31/1999

Time:___ 3:00

Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	5	10.81	5.81	5.91	5.90
2	10.81	16.63	5.82	5.90	

Date:___ 08/31/1999

Time:___ 10:55

Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	5	11.55	6.55	6.66	6.68
2	11.55	18.15	6.6	6.69	

Date:___ 09/01/1999

Time:___ 8:00

Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	5	10.15	5.15	5.24	5.21
2	10.15	15.26	5.11	5.18	

Date:___ 09/01/1999

Time:___ 12:40

Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7	13.14	6.14	6.24	6.19
2	13.14	19.2	6.06	6.14	

Date:___ 09/02/1999

Time:___ 10:40

Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	7.7	3.7	3.76	3.76
2	7.7	11.41	3.71	3.76	

Date:___ 09/03/1999

Time:___ 7:45

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.98	15.18	4.2	4.27	4.31
2	15.18	19.46	4.28	4.34	

Date:___ 09/06/1999

Time:___ 11:20

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	11	17.24	6.24	6.35	6.33
2	17.24	23.47	6.23	6.31	

Date:___ 09/07/1999

Time:___ 7:30

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9.6	16.19	6.59	6.70	6.70
2	16.19	22.8	6.61	6.70	

Date:___ 09/08/1999

Time:___ 7:20

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	12.04	18.77	6.73	6.84	6.85
2	16.02	22.79	6.77	6.86	

Date:___ 09/08/1999

Time:___ 15:24

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	8.02	14.71	6.69	6.80	6.82
2	14.71	21.45	6.74	6.83	

Date:___ 09/09/1999

Time:___ 7:30

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9.68	16.77	7.09	7.21	7.23
2	16.77	23.92	7.15	7.25	

Date:___ 09/09/1999

Time:___ 15:40

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.53	14.47	6.94	7.06	7.10
2	14.47	21.52	7.05	7.15	

Date:___ 09/10/1999

Time:___ 7:30

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.3	14.05	6.75	6.86	6.86
2	14.05	20.82	6.77	6.86	

Date:___ 09/10/1999

Time:___ 16:00

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	9.22	15.91	6.69	6.80	6.81
2	15.91	22.63	6.72	6.81	

Date:___ 09/11/1999

Time:___ 10:40

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.54	14.2	6.66	6.77	6.77
2	14.2	20.87	6.67	6.76	

Date:___ 09/12/1999

Time:___ 12:45

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	8.6	15.46	6.86	6.98	6.98
2	15.46	22.34	6.88	6.97	

Date:___ 09/13/1999

Time:___ 9:00

Person:___ HMR

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10	16.97	6.97	7.09	7.13
2	17.1	24.17	7.07	7.17	

Date:___ 09/20/1999

Time:___ 7:47

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.73	14.01	6.28	6.39	6.41
2	14.01	20.36	6.35	6.44	

Date:___ 09/20/1999

Time:___ 17:10

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.1	16.01	5.91	6.01	6.04
2	16.01	22	5.99	6.07	

Date:___ 09/21/1999

Time:___ 7:30

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.2	16.55	6.35	6.46	6.44
2	16.55	22.88	6.33	6.42	

Date:___ 09/21/1999

Time:___ 17:15

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	8.76	14.98	6.22	6.33	6.33
2	14.98	21.22	6.24	6.32	

Date:___ 09/22/1999

Time:___ 8:45

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.49	16.8	6.31	6.42	6.40
2	16.8	23.1	6.3	6.39	

Date:___ 09/23/1999

Time:___ 9:00

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.95	14.64	6.69	6.80	6.77
2	14.64	21.28	6.64	6.73	

Date:___ 09/24/1999

Time:___ 7:45

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.97	14.79	6.82	6.94	6.93
2	14.79	21.63	6.84	6.93	

Date:___ 09/27/1999

Time:___ 8:00

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.77	17.55	6.78	6.90	6.87
2	17.55	24.3	6.75	6.84	

Date:___ 09/27/1999

Time:___ 15:00

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	8.61	15.11	6.5	6.61	6.62
2	15.11	21.66	6.55	6.64	

Date:___ 09/28/1999

Time:___ 8:00

Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	7.83	13.5	5.67	5.77	5.77
2	13.5	19.21	5.71	5.79	

Date:___ 09/28/1999
 Time:___ 17:00
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	8.5	13.83	5.33	5.42	5.45
2	13.83	19.24	5.41	5.48	

Date:___ 09/29/1999
 Time:___ 7:30
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	10.07	16.39	6.32	6.43	6.42
2	16.39	22.72	6.33	6.42	

Date:___ 09/29/1999
 Time:___ 15:30
 Person:___ JMH

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	8.21	14.4	6.19	6.30	6.29
2	14.4	30.6	6.2	6.28	

Date:___ 10/19/1999
 Time:___ 11:40
 Person:___ SDR

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	11.8	7.8	7.93	7.93
2	11.8	19.62	7.82	7.93	

Date:___ 10/25/1999
 Time:___ 16:05
 Person:___ SRD

Bottle	Initial Reading	Final Reading	Difference (mg/L)	Volumetric Adjustment (mg/L)	Average Concentration of 2 Bottles (mg/L)
1	4	11.32	7.32	7.44	7.44
2	11.32	18.66	7.34	7.44	