

**Cruise:** HB2204

**Ship:** R/V Henry Bigelow

**Expo Code:** 33HH20220531

**Funding Project Title:** Ocean acidification measurements from Ships of opportunity, SOOP-OA

**Funding Project ID:** 20711

**Dates:** May 31, 2022 – June 17, 2022

**Chief Scientist:** Jerry Prezioso

**Equipment:** CTD-Niskin and Flow-Through (FT)

**Total number of stations:** 55

**Location:** U.S. Mid-Atlantic and New England coastal region

The samples were run for Chris Melrose of the NEFSC as part of our coastal ocean acidification monitoring project.

### Sample Collection

The discrete samples were collected from the CTD-Niskin/rosette and Flow-Through system onboard the R/V Henry Bigelow by Chris Taylor. The date and time listed in the data file are UTC when each sample bottle was collected.

#### **DIC:**

55 locations, 135 samples each 500-ml, 16 duplicate samples.

Sample ID#: 90101, etc.; Station, cast number and Niskin bottle number

PI: Dr. Rik Wanninkhof

Analyzed by: Patrick Mears

#### **pH:**

55 locations, 135 samples each 500-ml, 16 duplicate samples.

Sample\_ID#: 90101, etc.; Station, cast number and Niskin bottle number

PI: Dr. Rik Wanninkhof

Analyzed by: Patrick Mears

#### **Talk:**

55 locations, 135 samples each 500-ml, 16 duplicate samples.

Sample ID#: 90101, etc.; Station, cast number and Niskin bottle number

PI: Dr. Rik Wanninkhof

Analyzed by: Dismey Sosa-Rodriguez and Patrick Mears

### Sample Analysis

#### **DIC:**

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Instrument ID	Date	Certified CRM ( $\mu\text{mol/kg}$ )	CRM Value ( $\mu\text{mol/kg}$ )	CRM Offset ( $\mu\text{mol/kg}$ )	Blank (Counts)	Avg. Sample Analysis Time
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AOML 5	06/29/2022	1952.65	1957.40	4.75	12.0	8
AOML 5	07/05/2022	2025.17	2027.08	1.91	21.0	7
AOML 5	07/06/2022	2025.17	2027.22	2.05	17.3	8
AOML 5	07/12/2022	2025.17	2026.64	1.47	21.0	9
AOML 6	06/29/2022	1952.65	1959.13	6.48	12.0	12
AOML 6	07/05/2022	2025.17	2024.73	1.14	12.0	9
AOML 6	07/06/2022	2025.17	2021.73	3.87	12.0	8
AOML 6	07/12/2022	2025.17	2027.25	2.08	12.0	10

Analysis date: 06/29/2022

Coulometer used: DICE–CM5017O-AOML 5

Blanks: 12.0 counts/min

CRM # 321 was used and with an assigned value of (includes both DIC and salinity):

Batch 178, c: 1952.65  $\mu\text{mol/kg}$ , S: 33.782

CRM values measured: AOML 5: offset 4.75  $\mu\text{mol/kg}$  (1957.40  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 8, 7 and 8 min.

Analysis date: 07/05/2022

Coulometer used: DICE–CM5017O-AOML 5

Blanks: 21.0 counts/min

CRM # 404 was used and with an assigned value of (includes both DIC and salinity):

Batch 194, c: 2025.17  $\mu\text{mol/kg}$ , S: 33.361

CRM values measured: AOML 5: offset 1.91  $\mu\text{mol/kg}$  (2027.08  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 7, 7 and 11 min.

Analysis date: 07/06/2022

Coulometer used: DICE–CM5017O-AOML 5

Blanks: 17.3 counts/min

CRM # 17 was used and with an assigned value of (includes both DIC and salinity):

Batch 194, c: 2025.17  $\mu\text{mol/kg}$ , S: 33.361

CRM values measured: AOML 5: offset 2.05  $\mu\text{mol/kg}$  (2027.22  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 8, 7 and 11 min.

Analysis date: 07/12/2022

Coulometer used: DICE–CM5017O-AOML 5

Blanks: 21.0 counts/min

CRM # 3 was used and with an assigned value of (includes both DIC and salinity): Batch

194, c: 2025.17  $\mu\text{mol/kg}$ , S: 33.361

CRM values measured: AOML 5: offset 1.47  $\mu\text{mol/kg}$  (2026.64  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 9, 7 and 12 min.

Analysis date: 06/29/2022

Coulometer used: DICE–CM5017O-AOML 6

Blanks: 12.0 counts/min

CRM # 683 was used and with an assigned value of (includes both DIC and salinity):  
 Batch 178, c: 1952.65  $\mu\text{mol/kg}$ , S: 33.782  
 CRM values measured: AOML 6: offset 6.48  $\mu\text{mol/kg}$  (1959.13  $\mu\text{mol/kg}$ ).  
 Average run time, minimum run time, maximum run time: 12, 10 and 14 min.

Analysis date: 07/05/2022

Coulometer used: DICE-CM5017O-AOML 6

Blanks: 12.0 counts/min

CRM # 584 was used and with an assigned value of (includes both DIC and salinity):

Batch 194, c: 2025.17  $\mu\text{mol/kg}$ , S: 33.361

CRM values measured: AOML 6: offset 1.14  $\mu\text{mol/kg}$  (2024.03  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 9, 7 and 12 min.

Analysis date: 07/06/2022

Coulometer used: DICE-CM5017O-AOML 6

Blanks: 12.0 counts/min

CRM # 34 was used and with an assigned value of (includes both DIC and salinity):

Batch 194, c: 2025.17  $\mu\text{mol/kg}$ , S: 33.361

CRM values measured: AOML 6: offset 3.87  $\mu\text{mol/kg}$  (2021.73  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 8, 7 and 10 min.

Analysis date: 07/12/2022

Coulometer used: DICE-CM5017O-AOML 6

Blanks: 12.0 counts/min

CRM # 82 was used and with an assigned value of (includes both DIC and salinity):

Batch 194, c: 2025.17  $\mu\text{mol/kg}$ , S: 33.361

CRM values measured: AOML 6: offset 2.08  $\mu\text{mol/kg}$  (2027.25  $\mu\text{mol/kg}$ ).

Average run time, minimum run time, maximum run time: 10, 8 and 12 min.

**Reproducibility:** (# samples and average difference): 16 duplicate samples were collected with an average difference of 1.05 (0.39-8.72) and average STDEV of 0.74 (0.27-6.16).

Instrument	Sample ID	Bottle #	DIC			
			( $\mu\text{mol/kg}$ )	Average	STDEV	Difference
AOML5	40101	1	2067.30			
AOML5	40101	2	2065.23	2066.3	1.46	2.07
AOML5	90207	6	2084.95			
AOML5	90207	7	2084.46	2084.7	0.35	0.49
AOML5	300606	22	2115.19			
AOML5	300606	23	2119.82	2117.5	3.27	4.62
AOML6	430824	40	1987.76			
AOML5	430824	41	1996.47	1992.1	6.16	8.72
AOML5	571001	49	2178.21			

AOML5	571001	50	2179.45	2178.8	0.88	1.24
AOML5	581108	54	2209.57			
AOML5	581108	55	2208.18	2208.9	0.98	1.39
AOML5	651301	61	2205.31			
AOML5	651301	62	2204.05	2204.7	0.89	1.26
AOML6	771501	68	2133.33			
AOML6	771501	69	2130.80	2132.1	1.79	2.52
AOML5	841924	463	1966.11			
AOML5	841924	464	1965.30	1965.7	0.57	0.81
AOML5	902101	468	2154.82			
AOML5	902101	469	2156.12	2155.5	0.92	1.30
AOML6	1072606	89	2097.8			
AOML6	1072606	90	2097.2	2097.5	0.40	0.57
AOML5	1092701	93	2202.5			
AOML5	1092701	94	2203.8	2203.2	0.88	1.25
AOML5	1092706	95	2131.3			
AOML5	1092706	96	2131.7	2131.5	0.27	0.39
AOML5	1092724	97	2007.5			
AOML5	1092724	98	2008.4	2008.0	0.63	0.88
AOML6	1252924	104	1975.5			
AOML6	1252924	105	1974.6	1975.0	0.59	0.84
AOML6	1343101	109	2093.6			
AOML6	1343101	110	2092.3	2092.9	0.93	1.31
Average					0.74	1.05

CRM, salinity and HgCl<sub>2</sub> correction applied: Salinity correction was applied using TSG salinity.

### **Remarks**

Duplicates highlighted in yellow are the values that are questionable. The other value was reported in the final data file instead of the average and flagged as 2 instead of 6.

The volume correction was applied due to added HgCl<sub>2</sub> (Measured DIC\*1.00037).  
The first CRM of each cell was used for a CRM correction.

The DIC instruments were stable: the gas loop and CRM values did not change significantly throughout the life span of each cell

**pH:**

Analysis date: 06/29/2022, 07/05/2022, 07/06/2022 and 07/12/2022  
No CRMs was analyzed before sample analysis.

Spectrophotometer used: HP Agilent 8453

Temperature and salinity of pH samples analyzed.

Sample ID	Sample BTL #	Salinity	Analysis T (°C)
40101	1	32.51	19.995
40101	2	32.51	19.993
40109	3	32.34	19.985
40124	4	32.26	20.025
90201	5	33.44	20.002
90207	6	33.07	19.995
90207	7	33.07	19.989
90224	8	32.90	19.987
220301	9	35.07	19.988
220305	10	35.49	19.998
220324	11	35.71	19.988
230401	12	35.60	19.988
230406	13	35.25	19.988
230424	14	34.68	20.010
252500	15	32.99	20.008
262600	16	33.02	20.002
272700	17	35.13	20.003
290501	18	33.56	19.998
290510	19	33.40	20.002
290524	20	33.33	20.006
300606	22	34.26	20.018
300606	23	34.26	20.017
300616	21	34.34	20.026
300624	24	33.79	20.017
313200	25	33.37	20.015
323300	26	33.11	20.009
333400	27	31.65	20.009
340701	28	32.37	20.010

340716	29	31.31	20.011
340724	30	31.24	20.012
353600	31	31.99	20.020
373800	32	33.09	20.011
383900	33	33.14	20.017
394000	34	33.04	20.008
404100	35	32.97	20.010
414200	36	33.02	20.005
424300	37	32.93	20.000
430801	38	33.09	20.010
430806	39	33.06	20.014
430824	40	32.66	20.021
430824	41	32.66	19.985
450901	42	32.25	19.981
450910	43	32.06	19.987
450924	44	30.71	19.984
495000	48	31.42	19.999
505100	47	31.54	19.999
515200	45	31.32	19.990
535400	46	33.11	20.002
571001	49	35.61	20.001
571001	50	35.61	20.016
571008	51	35.35	20.009
571024	52	34.11	20.024
581101	53	35.10	20.017
581108	54	35.36	20.022
581108	55	35.36	20.016
581123	56	35.47	20.012
606300	57	34.09	20.017
641201	58	35.08	20.015
641206	59	35.48	20.019
641224	60	35.66	20.024
651301	61	35.45	20.040
651301	62	35.45	20.039
651306	63	35.64	20.033
651324	64	35.63	20.032
721401	65	33.24	20.041
721407	66	33.20	20.032
721424	67	32.42	19.988
771501	68	32.54	19.987
771501	69	32.54	19.984

771506	70	32.37	19.994
771524	71	31.14	19.991
781601	72	32.52	20.003
781606	73	32.42	20.006
781624	74	31.41	20.001
791701	75	32.34	20.010
791706	76	32.31	20.017
791724	77	31.60	20.019
811801	78	34.19	20.023
811806	79	33.36	20.014
811824	80	32.20	20.022
841901	461	35.14	19.980
841906	462	35.05	19.973
841924	463	32.36	19.969
841924	464	32.36	19.976
892001	465	31.94	-999
892006	466	31.98	19.972
892024	467	31.68	19.969
902101	468	33.20	19.970
902101	469	33.20	19.975
902106	470	33.12	19.979
902124	471	31.95	19.985
922201	472	31.35	19.987
922210	473	35.20	20.010
922224	474	35.20	20.032
962301	475	34.45	19.972
962309	476	34.45	19.979
962324	477	31.37	19.994
982401	478	31.37	19.991
982406	479	35.09	19.996
982424	480	35.23	19.984
1012501	81	32.14	20.028
1012506	82	33.22	20.033
1012524	83	33.10	20.050
1029900	84	32.78	20.058
10310000	85	32.78	20.043
10410200	86	33.09	20.044
10610400	87	33.09	20.045
1072601	88	33.09	20.045
1072606	89	33.08	20.040
1072606	90	33.08	20.047

1072624	91	32.96	20.037
10810500	92	32.61	20.035
1092701	93	34.20	20.020
1092701	94	34.20	20.045
1092706	95	32.49	20.056
1092706	96	32.49	20.062
1092724	97	32.22	20.043
1092724	98	32.22	20.058
1102801	99	31.55	20.042
1102806	100	32.90	20.031
1102824	101	32.26	19.985
1252901	102	31.50	19.988
1252906	103	33.63	19.995
1252924	104	33.63	19.994
1252924	105	33.63	19.996
1313001	106	31.87	19.999
1313010	107	32.29	20.003
1313024	108	32.19	20.005
1343101	109	32.04	20.004
1343101	110	32.04	20.001
1343106	111	33.42	19.999
1343124	112	32.10	20.020
1373201	113	34.30	20.009
1373206	114	33.48	20.018
1373224	115	32.67	20.020

**Reproducibility:** pH @ 20<sup>0</sup>C (# samples and average difference): 16 duplicate samples were collected with an average difference of 0.04561 (0.00064 – 0.31090) and an average STDEV of 0.03225 (0.00045 – 0.21981).

Instrument	Sample ID	Bottle #	pH @20 °C	Average	STDEV	Difference
HP Agilent 8453	40101	1	7.82061			
HP Agilent 8453	40101	2	7.82212	7.82137	0.00107	0.00152
HP Agilent 8453	90207	6	7.84089			
HP Agilent 8453	90207	7	7.83340	7.83714	0.00530	0.00749
HP Agilent 8453	300606	22	7.93414			
HP Agilent 8453	300606	23	7.90619	7.92017	0.01977	0.02796



HP Agilent 8453	430824	40	7.97355				
HP Agilent 8453	430824	41	7.97073	7.97214	0.00199	0.00282	
HP Agilent 8453	571001	49	7.85868				
HP Agilent 8453	571001	50	7.85560	7.85714	0.00218	0.00308	
HP Agilent 8453	581108	54	7.75337				
HP Agilent 8453	581108	55	7.75256	7.75297	0.00057	0.00081	
HP Agilent 8453	651301	61	7.77388				
HP Agilent 8453	651301	62	7.77315	7.77352	0.00051	0.00073	
HP Agilent 8453	771501	68	7.66385				
HP Agilent 8453	771501	69	7.66449	7.66417	0.00045	0.00064	
HP Agilent 8453	841924	463	7.95616				
HP Agilent 8453	841924	464	7.91252	7.93434	0.03086	0.04364	
HP Agilent 8453	902101	468	7.79013				
HP Agilent 8453	902101	469	7.79150	7.79081	0.00097	0.00138	
HP Agilent 8453	1072606	89	7.81415				
HP Agilent 8453	1072606	90	7.81384	7.81400	0.00022	0.00030	
HP Agilent 8453	1092701	93	7.70514				
HP Agilent 8453	1092701	94	7.73677	7.72095	0.02237	0.03164	
HP Agilent 8453	1092706	95	8.01926				
HP Agilent 8453	1092706	96	7.70836	7.86381	0.21984	0.31090	
HP Agilent 8453	1092724	97	7.75985				
HP Agilent 8453	1092724	98	7.97111	7.86548	0.14938	0.21126	
HP Agilent 8453	1252924	104	7.74424				
HP Agilent 8453	1252924	105	7.78714	7.76569	0.03033	0.04289	
HP Agilent 8453	1343101	109	7.69244				
HP Agilent 8453	1343101	110	7.73511	7.71377	0.03017	0.04266	
Average						0.03225	0.04561

**Reproducibility:** pH @ 25<sup>0</sup>C (# samples and average difference): 16 duplicate samples were collected with an average difference of 0.04482 (0.00062 – 0.30569) and an average STDEV of 0.03169 (0.00044 – 0.21616).

Instrument	Sample ID	Bottle		pH @25 <sup>0</sup> C	Average	STDEV	Difference
		#					
HP Agilent 8453	40101	1		7.74876			
HP Agilent 8453	40101	2		7.75025	7.74951	0.00105	0.00149
HP Agilent 8453	90207	6		7.76863			
HP Agilent 8453	90207	7		7.76127	7.76495	0.00520	0.00736
HP Agilent 8453	300606	22		7.86038			
HP Agilent 8453	300606	23		7.83279	7.84659	0.01951	0.02759
HP Agilent 8453	430824	40		7.89942			
HP Agilent 8453	430824	41		7.89664	7.89803	0.00197	0.00278
HP Agilent 8453	571001	49		7.78587			
HP Agilent 8453	571001	50		7.78285	7.78436	0.00214	0.00302
HP Agilent 8453	581108	54		7.68246			
HP Agilent 8453	581108	55		7.68167	7.68207	0.00056	0.00079
HP Agilent 8453	651301	61		7.70255			
HP Agilent 8453	651301	62		7.70184	7.70220	0.00050	0.00071
HP Agilent 8453	771501	68		7.59545			
HP Agilent 8453	771501	69		7.59607	7.59576	0.00044	0.00062
HP Agilent 8453	841924	463		7.88229			
HP Agilent 8453	841924	464		7.83925	7.86077	0.03043	0.04304
HP Agilent 8453	902101	468		7.71875			
HP Agilent 8453	902101	469		7.72010	7.71942	0.00095	0.00135
HP Agilent 8453	1072606	89		7.74235			
HP Agilent 8453	1072606	90		7.74205	7.74220	0.00021	0.00030
HP Agilent 8453	1092701	93		7.63542			
HP Agilent 8453	1092701	94		7.66634	7.65088	0.02187	0.03092

HP Agilent 8453	1092706	95	7.94452				
HP Agilent 8453	1092706	96	7.63883	7.79168	0.21616	0.30569	
HP Agilent 8453	1092724	97	7.68926				
HP Agilent 8453	1092724	98	7.89707	7.79316	0.14694	0.20781	
HP Agilent 8453	1252924	104	7.67380				
HP Agilent 8453	1252924	105	7.71582	7.69481	0.02971	0.04202	
HP Agilent 8453	1343101	109	7.62340				
HP Agilent 8453	1343101	110	7.66505	7.64422	0.02945	0.04165	
Average						0.03169	0.04482

### Remarks

Duplicates highlighted in yellow are the values that are questionable. The other value was reported in the final data file instead of the average and flagged as 2 instead of 6.

The equations of Liu et al, 2011 formulated using the purified m-cresol purple indicator was used to determine pH of the samples. pH samples were analyzed at 20<sup>0</sup>C at Full Scale (pH 0-14). The pH was reported at 20<sup>0</sup>C and 25<sup>0</sup>C.

Temperature for each sample was measured before analysis using a Hart Scientific Fluke 1523 reference thermometer.

Approximately 80 mL of sample was extracted from each DIC sample bottle by automatic syringe before DIC analysis to determine the pH.

### **Talk:**

Analysis date: 06/30/2022, 07/06/2022, 07/07/2022 and 07/13/2022

Titration system used: Open cell

Batch 178, CRM #683 Salinity = 33.782, cert. TA = 2216.53  $\mu$ mol/kg.

Batch 178, CRM #381 Salinity = 33.782, cert. TA = 2216.53  $\mu$ mol/kg.

Batch 178, CRM #321 Salinity = 33.782, cert. TA = 2216.53  $\mu$ mol/kg.

Batch 194, CRM #404 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

Batch 194, CRM #34 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

Batch 194, CRM #82 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

Batch 194, CRM #3 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

Batch 194, CRM #584 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

Batch 194, CRM #17 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

Batch 194, CRM #3 Salinity = 33.361, cert. TA = 2169.83  $\mu$ mol/kg.

**System 1:**

On 06/30/2022 CRM #683 was analyzed before sample analysis on System 1.  
 On 06/30/2022 CRM #381 was analyzed after sample analysis on System 1.  
 On 07/06/2022 CRM #404 was analyzed before and after sample analysis on System 1.  
 On 07/07/2022 CRM #34 was analyzed before and after sample analysis on System 1.  
 On 07/13/2022 CRM #82 was analyzed before and after analysis on System 1.  
 On 07/13/2022 CRM #3 was analyzed after sample analysis on System 1.

**System 2:**

On 06/30/2022 CRM #321 was analyzed before sample analysis on System 1.  
 On 06/30/2022 CRM #381 was analyzed after sample analysis on System 1.  
 On 07/06/2022 CRM #584 was analyzed before and after sample analysis on System 1.  
 On 07/07/2022 CRM #17 was analyzed before and after sample analysis on System 1.  
 On 07/13/2022 CRM #82 was analyzed before and after analysis on System 1.  
 On 07/13/2022 CRM #3 was analyzed after sample analysis on System 1.

The TA for the water samples was corrected using the daily averaged ratios between the certified and measured values of the CRMs run on system 1 and 2 cells. The following table shows the CRM measurements for each day and cell.

Cell System	Date	Time	Bottle #	TA	Difference
1	06/30/2022	09:05:49	683	2221.23	4.70
1	06/30/2022	16:55:40	381	2211.13	5.40
1	07/06/2022	08:33:23	404	2190.88	21.05
1	07/06/2022	14:28:27	404	2184.95	15.12
1	07/07/2022	08:03:27	34	2174.54	4.71
1	07/07/2022	15:30:57	34	2162.66	7.17
1	07/13/2022	08:10:50	82	2157.85	11.98
1	07/13/2022	13:27:30	3	2167.21	2.62
2	06/30/2022	08:48:47	321	2219.28	2.75
2	06/30/2022	16:36:06	381	2222.78	6.25
2	07/06/2022	08:45:09	584	2170.61	0.78
2	07/06/2022	14:30:04	584	2172.61	2.78
2	07/07/2022	07:53:24	17	2168.62	1.21
2	07/07/2022	15:49:59	17	2172.58	2.75

2	07/13/2022	08:00:27	82	2169.17	0.66
2	07/13/2022	13:14:26	3	2169.54	0.29

**Reproducibility:** (# samples and average difference): 16 duplicate samples were collected with an average difference of 7.14 (0.01 – 21.64) and an average STDEV of 5.05 (0.01 – 15.30).

Station	Sample ID	Sample Bottle #	TA (μmol/kg)	Average	STDEV	Difference
4	40101	1	2190.1			
4	40101	2	2190.1	2190.1	0.01	0.01
9	90207	6	2216.7			
9	90207	7	2210.0	2213.4	4.74	6.71
30	300606	22	2271.1			
30	300606	23	2279.5	2275.3	5.98	8.46
43	430824	40	2178.3			
43	430824	41	2180.7	2179.5	1.69	2.39
57	571001	49	2335.0			
57	571001	50	2319.6	2327.3	10.90	15.42
58	581108	54	2319.9			
58	581108	55	2323.0	2321.5	2.17	3.07
65	651301	61	2328.1			
65	651301	62	2313.2	2320.7	10.54	14.90
77	771501	68	2216.1			
77	771501	69	2237.7	2226.9	15.30	21.64
84	841924	463	2154.1			
84	841924	464	2141.1	2147.6	9.16	12.96
90	902101	468	2252.5			
90	902101	469	2254.2	2253.4	1.24	1.75
107	1072606	89	2215.1			

107	1072606	90	2223.1	2219.1	5.60	7.92
109	1092701	93	2328.8			
109	1092701	94	2325.1	2327.0	2.60	3.68
109	1092706	95	2286.9			
109	1092706	96	2288.7	2287.8	1.33	1.88
109	1092724	97	2140.5			
109	1092724	98	2140.0	2140.2	0.36	0.50
125	1252924	104	2160.8			
125	1252924	105	2172.5	2166.6	8.27	11.69
134	1343101	109	2209.6			
134	1343101	110	2210.8	2210.2	0.85	1.20
Average					5.05	7.14

### **Remarks**

Duplicates highlighted in yellow are the values that are questionable. The other value was reported in the final data file instead of the average and flagged as 2 instead of 6.

### **Comments**

The latitude, longitude, date, and time reported with the DIC, pH and TALK measurements were taken from the sample field log. The field log values are provided for reference; no post-cruise assurance of accuracy has been done to this data. The Niskin bottles are approximately one-half meter above the CTD sensors on the rosette. Therefore, Temp and Sal are bin-averaged CTD values representing the next shallower depth from that recorded by the CTD (CTD Depth) at the time the Niskin bottles were fired with the exception of the surface values, which are the same as the CTD Depth values (as per the log sheet).

The Sample ID is the station number, cast number and niskin number.

The Sample ID for Flow Through samples is the station number, 00 if no cast number, and 00 for the niskin number

Sample bottle #465 was broken upon arrival and was marked as 5 (Sample ID 892001)

Sample bottle #19 was lost due breakage of bottle stopper no DIC marked as 5 (Sample ID 290510)

Flow Through temperature and salinity was taken from the TSG data found in the UW pCO<sub>2</sub> file. The data nearest to the sample collection time was us used.

Corresponding UW pCO<sub>2</sub> data can be found at the following website  
<http://www.aoml.noaa.gov/ocd/ocdweb/occ.html>