



RMP
REGIONAL MONITORING
PROGRAM FOR WATER QUALITY
IN SAN FRANCISCO BAY

sfei.org/rmp

2017 RMP Water Cruise Report

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Cruise Report

2017 RMP Water Cruise

Contract No. 1300

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Submitted to:

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1. Introduction

This report details activities associated with the annual Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) water cruise. The RMP water sampling program was redesigned in 2002 to adopt a randomized sampling design at thirty-one sites in place of the twenty-six “spine of the Estuary” stations sampled previously. In 2007, the number of sites was decreased to twenty-two stations and it remains as such for 2017.

2. Cruise Report

2.1. Objectives

All sampling was conducted from the *RV Turning Tide*. The objectives of the sampling effort were to collect the following:

Collect Real-time Data on Field Parameters

1. Real-time data over the duration of sampling for conductivity, temperature, optical back scatter (OBS), and dissolved oxygen (DO) by AMS (1 meter CTD cast for duration of sampling, plus a full water column profile where water depth allows).
2. Water samples from 22 sites for on-board (field meter) measurement of DO, pH, salinity, conductivity, and temperature by SFEI.
3. Document current and recent weather conditions at each site.

Collect Water Samples – Total Fraction (Unfiltered water samples)

4. 22 sites (and 1 replicate and 1 blank) for analysis of Weak Acid Dissociable (WAD) Cyanide by colorimetry (ALS)
5. 2 sites (and 1 replicate and 1 blank) for analysis of SSC (ALS)
6. 9 sites (and 0 replicates) for analysis of aquatic toxicity by Pacific EcoRisk (PER), with extra volume collected at BG20 and BG30 to support potential TIE work.
7. 22 sites (and 2 replicates and 1 blank) for analysis of bisphenols and phosphate flame retardants (SIU).
8. 22 sites (and 2 replicates and 1 blank) for analysis of neonicotinoids by SGS AXYS (AXYS)
9. 1 site (and 1 replicate, plus extra samples for lab QC taken at the same site) for analysis of total phosphorous (CCCSD)
10. 1 site (and 1 replicate, plus extra samples for lab QC taken at the same site) for analysis of organic nitrogen (CCCSD)

Collect Water Samples – Particulate Fraction (Filters)

11. 22 sites (and 1 replicate and 1 blank) for Particulate Organic Carbon (POC) analysis by ALS Environmental (ALS) [1 filter per sample]
12. 22 sites (and 2 replicates and 1 blank and 1 extra sample for lab matrix spike) for analysis of MeHg by ethylation/CVAFS, Cu by column chelation and ICP-MS, and Se by column chelation and ICP-MS (BAL) [3 filters of 0.4 um pore size, 47 mm diameter per sample]
13. 6 sites for analysis of Se for lab intercomp study (Cutter lab) [3 filters per site, same type as BAL]
14. 6 sites for analysis of Se for lab intercomp study (USGS lab) [3 filters per site, same type as BAL]
15. 6 sites for analysis of Se for lab intercomp study (CCSF lab) [1 to 3 filters per site, same type as BAL]

16. 1 site (and 1 replicate and 1 extra sample for lab QC) for analysis of chlorophyll-a (CCCSO)

Collect Water Samples – Dissolved Fraction (Filtrate)

17. 22 sites (and 2 replicate and 1 blank) for analysis of MeHg by ethylation/CVAFS (BAL)
18. 22 sites (and 2 replicate and 1 blank) for analysis of Cu by column chelation and ICP-MS (BAL)
19. 22 sites (and 2 replicate and 1 blank) for analysis of Se by IC column separation and ICP-MS (BAL)
20. 22 sites (and 2 replicate and 1 blank) for analysis of Se by RP separation and ICP-MS (BAL)
21. 6 sites for analysis of Se for lab intercomp study (Cutter lab) in glass
22. 6 sites for analysis of Se for lab intercomp study (USGS) in glass
23. 6 sites for analysis of Se for lab intercomp study (CCSF) in HDPE
24. 22 sites (and 1 replicate and 1 blank) for analysis of DOC (ALS)
25. 22 sites (and 1 replicate) for analysis of hardness (ALS)
26. 1 site (and 1 replicate) for analysis of silica (ALS)

Filter (using labeled FlipMate Filter Assemblies)

27. 1 site (and 1 replicate plus extra samples at the same site for lab QC) for analysis of nitrate, nitrite (CCCSO)
28. 1 site (and 1 replicate plus extra samples at the same site for lab QC) for analysis of orthophosphate (CCCSO)
29. 1 site (and 1 replicate plus extra samples at the same site for lab QC) for analysis of ammonium (CCCSO)

2.2. Personnel

The personnel and work assignments for this cruise are shown in Table 1.

Table 1. Personnel for 2017 RMP Water Cruise

Name	Affiliation	Dates Aboard	Duties
Paul Salop	AMS	8/29, 8/30	Cruise Manager
Natalie Dornan	AMS	8/29, 8/30, 8/31, 9/17	Cruise Manager
Winn McEnery	AMS	8/31, 9/6, 9/7	Cruise Manager
Don Yee	SFEI	8/29, 8/30, 8/31	Field Sampling
Amy Franz	SFEI	8/29, 9/6, 9/7	Field Sampling
Jennifer Sun	SFEI	8/30, 8/31, 9/7	Field Sampling
Phil Trowbridge	SFEI	31-Aug	Field Sampling
Adam Wong	SFEI	8/29, 8/30, 9/6 9/7,	Field Sampling
Emily Clark	SFEI	8/30, 9/6, 9/7	Field Sampling
Katie McKnight	SFEI	6-Sep	Field Sampling
Shira Bezalel	SFEI	30-Aug	Photography
Chris Vallee	USGS	8/29 - 9/7	<i>RV Turning Tide</i> , Captain
Norbert Vanden Branden	USGS	8/29 - 9/7	<i>RV Turning Tide</i> , Mate
Jerry Eldorado	Aloha Trans	NA	Logistics

2.3. Sampling Activities

Sampling activities for the 2017 RMP Water Cruise are shown in Table 2

Table 2. Sampling Activities for 2017 RMP Water Cruise

Date	Time	Activity
August 28	0900 - 1400	RV <i>Turning Tide</i> transits from Oakley to Redwood City Marina.
	1400 - 1700	AMS and SFEI personnel mobilize sampling equipment and load aboard vessel RV <i>Turning Tide</i> at Redwood City Marina.
August 29	0700 - 1530	Mobilize remaining sampling gear aboard vessel at Redwood City Marina. Sample BA30, LSB069W, LSB073W, LSB067W, LSB072W, and LSB070W. Return to Redwood City Marina and demobilize vessel.
	1500 - 1730	Aloha retrieves all samples for transfer to AMS.
August 30	0700 - 1430	Mobilize sampling gear aboard vessel at Redwood City Marina. Sample field blank, SB073W, SB072W, SB071W, and CB046W. Transit to Emeryville Marina and demobilize vessel.
	1100 - 1300	Aloha Transportation delivers 8/29 toxicity samples to PER.
	1415 - 1715	Aloha Transportation meets vessel at Emeryville Marina and retrieves all personnel for transfer to personal vehicles in Redwood City and all samples for transport to AMS.
August 31	0700 - 1315	Mobilize sampling gear aboard vessel at Emeryville Marina. Pre-preserve organic-N and Total P sample bottles at dock. Sample BC20, CB045W, and BC10. Transit to Emeryville Marina and demobilize vessel.
	1000 - 1200	Aloha Transportation delivers 8/30 toxicity samples to PER.
	1315 - 1700	Aloha Transportation meets vessel at Emeryville Marina and retrieves all samples, delivers 8/31 bisphenol samples to the Emeryville FedEx Center on Christie Street and all remaining samples to AMS.
September 01	1000 - 1300	Aloha Transportation delivers 8/31 nutrient samples to CCCSD and toxicity samples to PER.
September 06	0730 - 1630	Mobilize sampling gear aboard vessel at Emeryville Marina. Sample CB043W, SPB043W, SPB044W, and SPB042W. Transit to Benicia Marina and demobilize vessel.
	1600 - 1800	Aloha Transportation meets vessel at Benicia Marina and retrieves all personnel for transfer to personal vehicles in Emeryville and all samples for transport to AMS.
September 07	0700 - 1445	Mobilize sampling gear aboard vessel at Benicia Marina. Sample SU051W, SU052W, SU054W, BG20, and BG30. Transit to Driftwood Marina and demobilize vessel.
	1200 - 1700	Aloha Transportation transfers 9/6/17 toxicity samples to PER. Meets vessel at Antioch Marina and retrieves bisphenol samples for delivery to Fedex shipping facility.
	1430 - 1700	Mr. Salop meets vessel at Driftwood Marina and sampling personnel demobilize all samples and sampling equipment. AMS retains all remaining samples and sampling equipment for delivery to AMS. Aloha meets vessel at Driftwood Marina and transfers sampling personnel to personal vehicles at Benicia Marina.
September 08	1000-1230	AMS transfers 9/7/17 toxicity samples to PER.

2.4. Discussion

The sample ID system for all samples was as follows:

RMP-17WC-XXXX

Where:

RMP	=	Project
17	=	Cruise Year
WC	=	Matrix (Water Cruise)
XXXX	=	Unique ID number

Due to the unpredictable nature of sampling in the bay and delta, two sampling sites were unable to be sampled during the cruise. In each case, access routes around shallow flats were unable to be located; for this reason site LSB068W was replaced with site LSB073W and site SU053W was replaced with site SU054.

In addition, site CB043W was sampled outside of the target 200 m distance of the site coordinates (measured as approximately 210 m) due to the shallow water depth and the fact that the replacement site was over an hour in transit time in the wrong direction. Use of the replacement site for CB043W would have precluded completion of the remainder of the cruise sites within the target number of days.

RMP staff planned for a dissolved Se intercomparison study at 5 sites for 2017. Stations for the dissolved fraction samples were changed at the onset of the cruise to be consistent with the sampling stations for particulate Se. This included moving planned LSB073W, SB071W, and SPB042W dissolved fraction samples to BA30, BC10, and BG20, respectively. Also, a duplicate sample for the intercomparison study was collected at BC10 instead of SU051W to save time on filtering during the last day.

Due to delayed communications from the intercomparison labs, dissolved fraction intercomparison samples collected during the first week for Cutter and USGS labs at sites BA30 and BC10 were not acidified at time of collection. When the preservation issue was identified by the labs, 8 mL of 10% HCl was subsequently added to the samples at AMS after approximately 45 hours and 96 hours to samples collected at BC10 and BA30, respectively. Consequently, a 6th sampling site, CB043W was added to the study. All dissolved fraction intercomparison samples for these two labs collected the 2nd week of the cruise were collected in pre-preserved containers. The dissolved fraction samples for the CCSF portion of the intercomparison study were all collected non-preserved and immediately field frozen on dry ice.

At station BC20, only one chlorophyll sample was filtered with a small GF filter and crucible provided by the lab. Due to time constraints and the difficulty of using the small filter, an additional two samples were collected and filtered using a large GF filter typically used for POC and DOC. Nutrient samples, Ortho-P, NH₄, NO₂, and NO₃, were collected using a FlipMate device at BC20; multiple of the FlipMate containers spilled during transit, but the lab was given the go-ahead to complete analyses.

On the second to last day of sampling, a blind duplicate for analysis of particulate metals was not collected at SPB042W and was instead was taken at SU051W.

Due to an error in deployment, the CTD data collected on the final day of the cruise was recorded as a single compilation rather than individual casts. We were able to retrieve usable data for four of the five stations sampled (BG20, BG30, SU052W, and SU054W), but were unable to obtain meaningful data for the fifth station (SU051W). YSI data collected by SFEI personnel at SU051W may provide backup surface water data. Additionally, the depth bins for measurements recorded on this day will vary slightly from the typical 0.25 m bins reported. Time casts appear unaffected.

A total of 4 sample containers broke while in transit or at a lab, all at BAL. Se collected at BC10 sent in a 1 L bottle broke during transit. Therefore, both Se separation methods were run using the remaining sample in the 125 mL bottle of dissolved Se. Two 125 mL samples for dissolve Se analysis broke at BAL and the 1 L samples were used instead. A filter container for analysis of particulate metals broke in transit and the filter was transferred into a new container at the lab.

2.5. Sampling Sites

2017 RMP Water Cruise sampling sites are listed in

Table 3. All samples collected are listed in Table 4. Sample containers and sample handling procedures are summarized in Table 5. Weather conditions encountered at time of sampling are shown in Table 6. Snapshot of water quality parameters recorded from SFEI YSI meter are shown in **Table 7**.

Table 3. 2017 RMP Water Cruise Site Coordinates and Water Depth. Sample depths are not corrected for tidal action.

Site Code	Target		Actual		Depth (ft)
	Lat	Long	Lat	Long	
BG20	38.05970	-121.81127	38.05974	-121.81106	10
BG30	38.02054	-121.80627	38.02051	-121.80578	10
BC10	37.82158	-122.34950	37.82158	-122.34940	7
BC 20	37.79150	-122.67333	37.79325	-122.67191	32
BA 30	37.51375	-122.13462	37.51414	-122.13523	8
SU051W	38.06700	-122.09372	38.06707	-122.09318	5
SU052W	38.06318	-122.04534	38.06332	-122.04515	8
SU054W	38.05072	-121.94378	38.05083	-121.94359	18
SPB042W	38.03764	-122.36424	38.03777	-122.36373	13
SPB043W	38.06833	-122.46670	38.06857	-122.46705	2
SPB044W	38.022191	-122.39384	38.02260	-122.39331	14
CB043W	37.92714	-122.48111	37.92638	-122.47891	2
CB045W	37.82842	-122.38950	37.82911	-122.38966	13
CB046W	37.64344	-122.31729	37.64362	-122.31657	11
SB071W	37.62125	-122.33572	37.62107	-122.33468	5
SB072W	37.62978	-122.21385	37.63003	-122.21366	4
SB073W	37.62464	-122.26202	37.62424	-122.26116	4
LSB067W	37.46960	-122.06567	37.47056	-122.06518	6
LSB069W	37.48930	-122.08118	37.48894	-122.08203	2
LSB070W	37.49390	-122.10527	37.49350	-122.10501	10
LSB072W	37.47575	-122.070584	37.47573	-122.07069	13
LSB073W	37.49195	-122.08387	37.49181	-122.08545	3

Table 4. 2017 RMP Water Samples Collected by Site.

SITECODE	CTD -AMS	CN, (WAD) - ALS	SSC - ALS	Toxicity - PER	Bisphenols- SIU	Neonics	POC - ALS	DOC - ALS	MeHg, Cu, Se (P) - BAL	MeHg (D) - BRL	Cu (D) - BRL	Se 1L (D) - BRL	Se 125 mL (D) - BRL	Hardness (D) - ALS	Se (P) - Cutter	Se (P)- USGS	Se (P)- CCSF	Se (D) - Cutter	Se (D)- USGS	Se (D)- CCSF	Organic N, N03, N02, NH4, Total P - CCCSD	Silica - ALS	Chl a - CCCSD
BA30	1	1	1	1	1	2	1	1	3	1	1	1	1	1	3	3	1	1	1	1			
LSB067W	1	1	1	1	2	4	1	1	3	1	1	1	1	1									
LSB069W	1	1	1		1	2	1	1	3	1	1	1	1	1									
LSB073W	1	1	1		1	2	1	1	3	1	1	1	1	1									
LSB072W	1	1	1		2	4	1	1	3	1	1	1	1	1									
LSB070W	1	1	1		1	2	1	1	3	1	1	1	1	1									
FB		1	1		1	2	1	1	3	1	1	1	1	1									
SB073W	1	1	1		1	2	1	1	3	1	1	1	1	1									
SB072W	1	2	2		1	2	2	2	3	2	2	2	2	2									
SB071W	1	1	1	1	1	2	1	1	3	1	1	1	1	1									
CB046W	1	1	1		1	2	1	1	9	1	1	1	1	1									
BC20	1	1	1		1	2	1	1	3	1	1	1	1	1							5	2	3
CB045W	1	1	1		1	2	1	1	3	1	1	1	1	1									
BC10	1	1	1	1	1	2	1	1	3	1	1	1	1	1	6	6	1	1	1	1			
CB043W	1	1	1	1	1	2	1	1	3	1	1	1	1	1	3	3	1	1	1	1			
SPB043W	1	1	1		1	2	1	1	3	1	1	1	1	1									
SPB44W	1	1	1		1	2	1	1	3	1	1	1	1	1									
SPB042W	1	1	1	1	1	2	1	1	3	1	1	1	1	1									
SU051W		1	1	1	1	2	1	1	6	2	2	2	2	1	3	3	1	1	1	1			
SU052W	1	1	1		1	2	1	1	3	1	1	1	1	1									
SU054W	1	1	1		1	2	1	1	3	1	1	1	1	1									
BG20	1	1	1	3	1	2	1	1	3	1	1	1	1	1	3	3	1	1					
BG30	1	1	1	3	1	2	1	1	3	1	1	1	1	1	3	3	1	1					
Total	21	24	24	13	25	50	24	24	78	25	25	25	24	24	21	21	6	6	4	4	5	2	3

Table 5. Containers and Sample Handling for 2017 RMP Water Cruise (T=total, P=particulate, D=dissolved). Samples to be stored with no additional preservation, on wet ice or refrigerated (4C), and in the dark, unless otherwise noted.

Sample	T/P/D	Lab	Container	Handling Requirements
DO, cond, pH, temp, OBS	T	AMS	None	CTD deployment
DO, cond, pH, temp, sal	T	SFEI	None	Grab measurement on board vessel
CN (WAD)	T	ALS	500 mL HDPE	Preloaded with NaOH to a pH ≥ 12 and stored on wet ice; 1 dupe, 1 field blank collected; 14 day hold time
SSC	T	ALS	1 L	Stored on wet ice, 1 dupe, 1 field blank collected
Toxicity	T	PER	20 L carboy	Stored on wet ice; 2 extra samples collected at BG20 and BG30; 36 hour hold time
Bisphenols and Phosphate Flame Retardants	T	SIU	4 L amber glass	Stored on wet ice; 1 field blank; 3 day hold time
Neonics	T	SGS-AXYS	2 1-L amber glass per site	Stored on wet ice in dark environment; 2 dupes; 1 field blank; 9 day hold time
POC	P	ALS	1 filter per site	Field filtered and stored with dry ice to (-20C); 1 dupe, 1 field blank collected; 100 day hold time
DOC	D	ALS	250 mL HDPE	Field filtered (filtrate of POC sample) and preloaded with 1-2 mL H ₂ SO ₄ ; 1 dupe collected, 1 field blank collected, 28 day hold time
MeHg, Cu, Se	P	BAL	3 filters per sample, all put in a 50mL tube	Field filtered and stored with dry ice (-20C); 2 dupes; 1 field blank; extra dupe at CB046W for lab QC collected
Se	P	Cutter	3 filters per sample, all put in a 50mL tube	Field filtered and stored with dry ice (-20C); 1 dupe collected
Se	P	USGS	3 filters per sample, all put in a 50mL tube	Field filtered and stored with dry ice (-20C); 1 dupe collected
Se	P	CCSF	3 filters per sample, all put in a 50mL tube	Field filtered and stored with dry ice (-20)
MeHg	D	BAL	250 ml FLPE	Preloaded with 1-2 ml of 50% H ₂ SO ₄ ; 2 dupes and extra dupe for lab QC collected; 6 month hold time

Sample	T/P/D	Lab	Container	Handling Requirements
Cu	D	BAL	1 L HDPE	Stored on wet ice; Analysis of Cu by Column Chelation; 2 dupes, 1 field blank collected
Se	D	BAL	1 L glass	Stored on wet ice; Analysis of Se by EPA 1640 with RP separation; 2 dupes, 1 field blank
Se	D	BAL	125 mL glass	Stored on wet ice; Analysis of Se by EPA 1640 with IC column separation; 2 dupes; 1 blank.
Se	D	Cutter	1 L glass	First week samples stored on wet ice, preserved at AMS; second week samples pre-preserved with 8 mL HCL, stored on wet ice.
Se	D	USGS	1 L glass	First week samples stored on wet ice, preserved at AMS; second week samples pre-preserved with 8 mL HCL, stored on wet ice.
Se	D	CCSF	1 L HDPE	Stored on dry ice
Hardness	D	ALS	125 mL PE	Stored on wet ice. 1 dupe; 1 field blank
Organic N	T	CCSD	HDPE	H2SO4 added prior to collecting sample. Stored on blue ice on vessel, refrigerated overnight; 1 sample, 1 field dupe collected, extra volume for MS/MD collected
NO3, NO2	D	CCSD	FlipMate Unit, 125 mL container	Filtered with FlipMate. Stored on blue ice on vessel, refrigerated overnight; 1 sample, 1 field dupe collected, extra volume for MS/MD collected
NH4	D	CCSD	FlipMate Unit, 125 mL container	Filtered with FlipMate. Stored on blue ice on vessel, refrigerated overnight; 1 sample, 1 field dupe collected, extra volume for MS/MD collected
Total P	T	CCSD	HDPE	H2SO4 added prior to collecting sample. Stored on blue ice on vessel, refrigerated overnight; 1 sample, 1 field dupe collected, extra volume for MS/MD collected:
Ortho P	D	CCSD	FlipMate Unit, 125 mL container	Filtered with FlipMate. Stored on blue ice on vessel, refrigerated overnight; 1 sample, 1 field dupe collected, extra volume for MS/MD collected
Silica	D	ALS	500 ml HDPE	Field Filtered (cartridge filters). Stored below 4 C; 28-day hold time.
Chl-a	P	CCSD	1 filter (25 mm GF/F filter)	1 sample filtered using GF filter; samples filtered using GF filter used for POC/DOC; stored with dry ice; 1 day hold time

Table 6. Weather Conditions for 2017 RMP Water Cruise.

Site	Sea State	Tide Stage & Current (fps)	Wind Speed (kts)	Wind Dir.	Cloud Cover, % Overcast	Comments
Field Blank	Moderate chop	< 1	10.8	North Northwest	60%	
BG20	Chop, white capping	< 1	16	West Southwest	80%	
BG30	Mild chop	1	14.7	NA	80%	
BC10	Calm	1	6	North Northwest	0%	PSe FDs (Cutter, USGS)
BC20	Calm	NA	1.5	North	0%	BLIND7 collected
BA30	Light calm	< 1	6.2	North	100%	
SU051W	Calm	< 1	3	West	95%	BLIND5,6 collected
SU052W	Light chop	1	5.3	Southwest	100%	
SU054W	Calm	1	7.2	West Southwest	NA	
SPB042W	Small chop	< 1	16	Southwest	5%	
SPB043W	White caps, rough	> 1	15	West	15%	
SPB044W	White caps, rough	1.5	17.3	South Southwest	30%	
CB043W	Rippled	1	6.5	East	85%	
CB045W	Calm	1	1.6	North Northwest	5%	
CB046W	White caps, rough	NA	25	West Northwest	0%	
SB071W	Choppy, white caps	NA	17.8	North Northwest	0%	
SB072W	Moderate chop	< 1	4	North Northwest	5%	BLIND3 collected
SB073W	Moderate chop	< 1	10.4	North Northwest	100%	
LSB067W	Calm	1	8	North	50%	BLIND1 collected
LSB069W	Calm	< 1	4.7	North	100%	
LSB070W	Moderate chop	1	21.1	North Northwest	0%	
LSB072W	Wind chop	< 1	19.2	North Northwest	0%	BLIND2 collected
LSB073W	Calm	< 1	8	North	10%	

Table 7. Recorded Water Quality Parameters. All results recorded as snapshot from SFEI YSI meter deployed at approximately 1m depth for duration of sampling. NR=Not recorded.

Site	DO (%)	DO (mg/L)	Cond. (mS/cm)	Temp (°C)	pH	Salinity (ppt)	Comments
BG20	91.8	7.89	165	22.87	6.77	0.08	
BG30	90.6	7.71	0.589	23.32	6.54	0.29	
BC10	94.3	7.18	46.46	20.2	8.28	30.23	
BC20	100.4	8.3	51.08	14.65	8.18	33.54	
BA30	99.7	7.31	47.38	22.36	8.35	30.88	
SU051W	93.1	7.64	16.85	22.05	7.44	9.91	
SU052W	93.1	7.85	7.844	22.68	7.13	4.34	
SU054W	91.2	7.78	22.58	22.87	6.35	1.16	
SPB042W	91.5	7.14	41.3	20.06	8.57	26.51	
SPB043W	89.2	6.71	34.92	23.55	8.66	21.98	
SPB044W	NR	NR	NR	NR	NR	NR	
CB043W	91.4	7.09	38.06	20.7	8.56	24.15	
CB045W	95.2	7.43	46.49	18.56	8.41	30.26	
CB046W	87.6	6.57	45.6	20.95	8.07	29.6	
SB071W	86.6	6.61	47.01	19.62	8.02	30.62	
SB072W	83	6.34	45.66	20.17	7.92	29.64	
SB073W	81.5	6.19	45.91	20.17	7.9	29.83	
LSB067W	89.4	6.51	23.75	23.75	8.55	26.26	
LSB069W	88.3	6.57	40.36	22.44	8.04	25.82	
LSB070W	102.5	7.4	46.51	22.86	8.43	30.23	
LSB072W	100.1	7.31	43.69	22.92	8.4	28.22	
LSB073W	95.7	6.98	46.08	22.42	8.34	29.92	