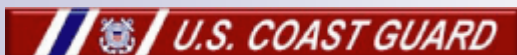




USCG/ABYC
Carbon Monoxide Safe
Distance Study

September 2003





Setting Standards for Safer Boating

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Carbon Monoxide Safe Distance Study
September 2003

Purpose:

Determine the need of a minimum safe distance to tow persons behind a gasoline powered vessel.

Plan:

Record CO levels at various distances behind an inboard powered boat.

Assumptions:

The following assumptions were developed prior to developing a test plan:

- CO concentrations are greatest near the transom of the tow boat and decrease as a function of the distance aft of the transom.
- CO concentrations are greatest in the tow boat's path and decrease as a function of the distance to the side of the path of the tow boat.
- CO concentrations close to the water surface aft of the tow boat are greatest in hot, humid conditions with no wind.
- Tubers are towed closer to the tow boat transom than are wake boarders and water skiers.
- 20 feet is the minimum tuber tow line length.
- 75 feet is the maximum skier tow line length.
- Tuber's heads are closer to the water than are the heads of wake boarders and water skiers.
- Tuber's heads tend to be approximately 2 feet above the water.
- Wake boarder's and Skier's heads tend to be about 5 feet above the water.
- Tubers tend to ride directly behind the tow boat, whereas wake boarders and water skiers tend to swing out and away from the path of the tow boat.
- The maximum speed for tubing, wake boarding or water skiing is 30 mph.
- A tow boat powered with a 350 cubic inch or larger carbureted inboard engine will produce more CO than boats powered by outboard engines or fuel injected inboard engines.
- CO production increases as a function engine loading.
- Engine load is greatest when the tow boat is at its highest trim angle between displacement and planing speeds. For planning purposes this speed is assumed to be at approximately 1.7 times the square root of the water line length of a 20 foot long tow boat or about 7.5 mph.
- The towed load is greatest when the wake boarder or skier is being dragged through the water prior to being pulled up to the water's surface.
- Slow speed drag of a wake boarder or water skier is greater than the slow speed drag of a tuber.
- CO production from the tow boat is greatest during the short time period when the wake boarder or water skier is being pulled up to the surface of the water.

Test plan:

Tow a planing hulled dinghy behind a ski boat powered by an inboard engine of a minimum of 350 cubic inches. Mount two CO recorders on the bow of the dinghy; one at two feet above the water and one at five feet above the water. See Photo 1. Record CO concentrations at various speeds, wind directions, distances and boat loadings as specified below.

Because CO concentrations aft of the tow boat are greatest in minimal wind conditions, the decision was made to test only when the wind speed was less than 5 mph. Tests would be terminated when the wind speed reaches 5 mph.

The first test would determine the number of variables in subsequent tests. Measurements to establish variables for subsequent tests included:

- Boat speed vs. CO level
 - Record CO levels at 7.5, 10, 20 and 30 mph.
 - Number of speeds in subsequent tests would be determined by the greatest speed at which measurable CO levels were recorded.
- CO monitor distance from transom vs. CO level.
 - Record CO levels at 20, 40, 60, and 80 feet behind transom of tow boat.
 - Number of distances in subsequent tests would be determined by the greatest distance in which measurable CO levels were recorded.
- Wind direction vs. CO level
 - Record CO levels in upwind, downwind and crosswind directions.
 - Requirement for recording CO levels at multiple wind directions in subsequent tests would be determined by recorded differences in CO levels. If cross wind CO levels measured below 35 ppm, subsequent tests would focus on wind directions that produced the highest CO concentrations.

Results of the first test showed that:

- CO was measured at all boat speeds,
- CO was measured at all distances, and
- CO concentrations above 35 ppm were measured at all wind directions.

Therefore, it was determined that all boat speeds, all distances and all wind directions indicated above would be used in subsequent tests.

Test Equipment

- Tow boat
19 foot Correct Craft, HIN CTC147680483-83SN
350 cubic inch V-8 inboard engine, carbureted.



- Towed boat
10.5 foot Boss Boat Hardbody 10, HIN WOK32009H001
15 hp Yamaha outboard engine mounted on transom, tilted up.
Modified bow area with mounting apparatus for CO monitors.



- CO recording monitors
Toxi Ultra Single Sensor Gas Detector
S/n G35933 and s/n G35816
Monitors set to record CO concentrations at 10 second intervals.



Toxi Ultra: The Toxi Ultra is a personal, portable, microprocessor controlled single sensor gas detector. ABYC's Toxi Ultra is equipped with a Carbon Monoxide (CO) gas sensor. The CO sensor measures from 0-500 parts per million (ppm) in the nominal range, and up to a max level of 1000 ppm for an instantaneous reading.

The Toxi Ultra uses a top-mounted LCD to show readings of the CO measurements. In addition to the LCD the Toxi Ultra internally stores data collected during each sampling session. During sampling the Toxi Ultra was set to take readings at ten (10) second intervals. When the sampling session was finished the data was downloaded to a computer, and then converted to an excel file.

- Weather measuring devices
Speedtech WS2010 Weather Station
Kestral 2000 Wind Speed Indicator

Weather

Tests were run on three separate days when beginning and predicted weather conditions were favorable. On all three test days, testing ended when wind speed exceeded 5 mph. Weather conditions were as follows:

- Day 1 - 68 degrees at beginning of tests, 75 degrees at end of tests. 45% relative humidity.
Wind speed 3 mph and built to 5 mph.
- Day 2 - 65 degrees at beginning of tests, 75 degrees at end of tests. 45% relative humidity.
Wind speed 0-2 mph and built to 4-6 mph

Day 3 – 83 degrees at beginning of tests, 85 degrees at end of tests. 35% relative humidity. Wind speed 5 mph at beginning of test, dropped to 0 mph, then built to 6 to 8 mph. Testing stopped when wind speed exceeded 5 mph.

Test results

Test variables were speed, distance from the stern of the ski boat to the bow of the towed boat and wind direction. The distance that the stern wave of the ski boat extended aft of the transom was proportional to the boat speed. As the boat speed increased, the stern wave moved aft and caused the towed dinghy to veer, cross the stern wave and become unstable. Therefore, CO measurements at speeds over 10 mph were not recordable at distances less than 60 feet. See Photo 2 and Photo 3. The maximum towed speed was reduced to 25 mph because the dinghy became unstable at 30 mph. CO concentrations were measured at all speeds and all distances except as noted above.

1964 CO data measurements were recorded on the two CO monitors. The data from the three tests were transferred to Excel spreadsheets, were combined and were sorted by distance, then boat speed, then wind direction. Data from CO recorders located 2 feet and 5 feet above the water were averaged and are summarized in Figures 1 and 2. During a portion of the cross wind tests, the CO monitor mounted at the 5 foot level malfunctioned and did not record data. Beam wind data shown with an asterisk were recorded in totally calm conditions and tend to reflect upwind/downwind readings. All data for tests 1, 2 and 3 are in Appendix 1.

Data were sorted by distance then boat speed. In this case, wind direction was not considered since combining all wind directions more closely represents typical water sports activities. These data are summarized in Figure 3.

251 CO data measurements were recorded 21 inches above the center of the stern seat. See Photo 4. Data are summarized in Figure 4.

Results

The highest concentrations of CO were measured above the stern seat of the ski boat at slow boat speeds. CO levels averaged 135 ppm at 7.5 mph with peak CO levels measuring 434 ppm. CO levels dropped as speed increased. At 25 mph, average CO concentrations measured 19 ppm with peak readings measuring 110 ppm.

Results of the towed tests showed that CO concentrations:

- were highest at the 2 foot level,
- were highest at 20 feet behind the tow boat,
- tended to remain relatively consistent at distances greater than 20 feet,
- at greater distances, tended to increase with boat speed,
- tended to average below 35 ppm at distances over 20 feet, and
- were higher in the upwind and down wind directions.

Highest CO readings tended to occur during acceleration and tended to last for a relatively short duration. CO levels at 2 feet above the water were higher than CO levels at 5 feet above the water. CO levels were highest at slow speeds, close to the water and close behind the ski boat.

The calmest conditions of 0 to 2 mph wind speeds occurred during the time when the higher speed beam wind data was being collected. Note the asterisks beside that data in Figure 1. The higher

numbers suggest that in totally calm conditions, skiers and tubers could ingest more CO than was measured during this study.

Conclusions

CO levels in the stern seat of a ski boat are high enough to be cause for concern. CO levels at 20 feet behind the towed boat are high enough to affect towed tubers who tend to be young children. CO levels at 5 feet above the water in excess of 60 feet behind the ski boat are low enough to not be of concern to recreational skiers. This is shown graphically Figure 6.

Figure 1

Summary Data from 2 feet above water

Wind fore & aft
Average CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	75	11	22	12
10 mph	65	34	31	19
20 mph	n/a	n/a	38	33
25 mph	n/a	n/a	35	30

Wind fore & aft
Peak CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	244	64	54	39
10 mph	171	77	65	47
20 mph	n/a	n/a	88	54
25 mph	n/a	n/a	93	48

Beam Wind
Average CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	14	4	5	11
10 mph	33	15	9	15*
20 mph	n/a	n/a	31*	32*
25 mph	n/a	n/a	22*	31*

Beam Wind
Peak CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	59	34	37	11
10 mph	147	51	36	47*
20 mph	n/a	n/a	88*	54*
25 mph	n/a	n/a	93*	58*

*- Beam wind data was recorded with wind speed measured at 0 to 2 mph.

Figure 2

Summary Data from 5 feet above water

Wind fore & aft
Average CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	10	1	4	4
10 mph	10	3	7	8
20 mph	n/a	n/a	14	13
25 mph	n/a	n/a	14	10

Wind fore & aft
Peak CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	94	14	4	8
10 mph	56	15	12	28
20 mph	n/a	n/a	24	18
25 mph	n/a	n/a	40	17

Beam Wind
Average CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	0	0	0	2
10 mph	3	0	0	n/a
20 mph	n/a	n/a	n/a	n/a
25 mph	n/a	n/a	n/a	n/a

Beam Wind
Peak CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	9	0	3	8
10 mph	22	9	3	n/a
20 mph	n/a	n/a	n/a	n/a
25 mph	n/a	n/a	n/a	n/a

Figure 3

Summary data from all wind directions

2 feet above water
Average CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	45	11	15	12
10 mph	45	30	21	15
20 mph	n/a	n/a	31	32
25 mph	n/a	n/a	22	31

2 feet above water
Peak CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	244	64	54	39
10 mph	171	77	65	47
20 mph	n/a	n/a	88	54
25 mph	n/a	n/a	93	58

5 feet above water
Average CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	7	1	2	4
10 mph	5	3	4	8
20 mph	n/a	n/a	13	13
25 mph	n/a	n/a	13	8

5 feet above water
Peak CO ppm

	20 ft	40 ft	60 ft	80 ft
7.5 mph	94	14	18	33
10 mph	56	15	29	28
20 mph	n/a	n/a	40	21
25 mph	n/a	n/a	40	18

Figure 4

Summary data from 21 inches above the stern seat

Average CO ppm

7.5 mph	135
10 mph	47
25 mph	19

Peak CO ppm

7.5 mph	434
10 mph	290
25 mph	110

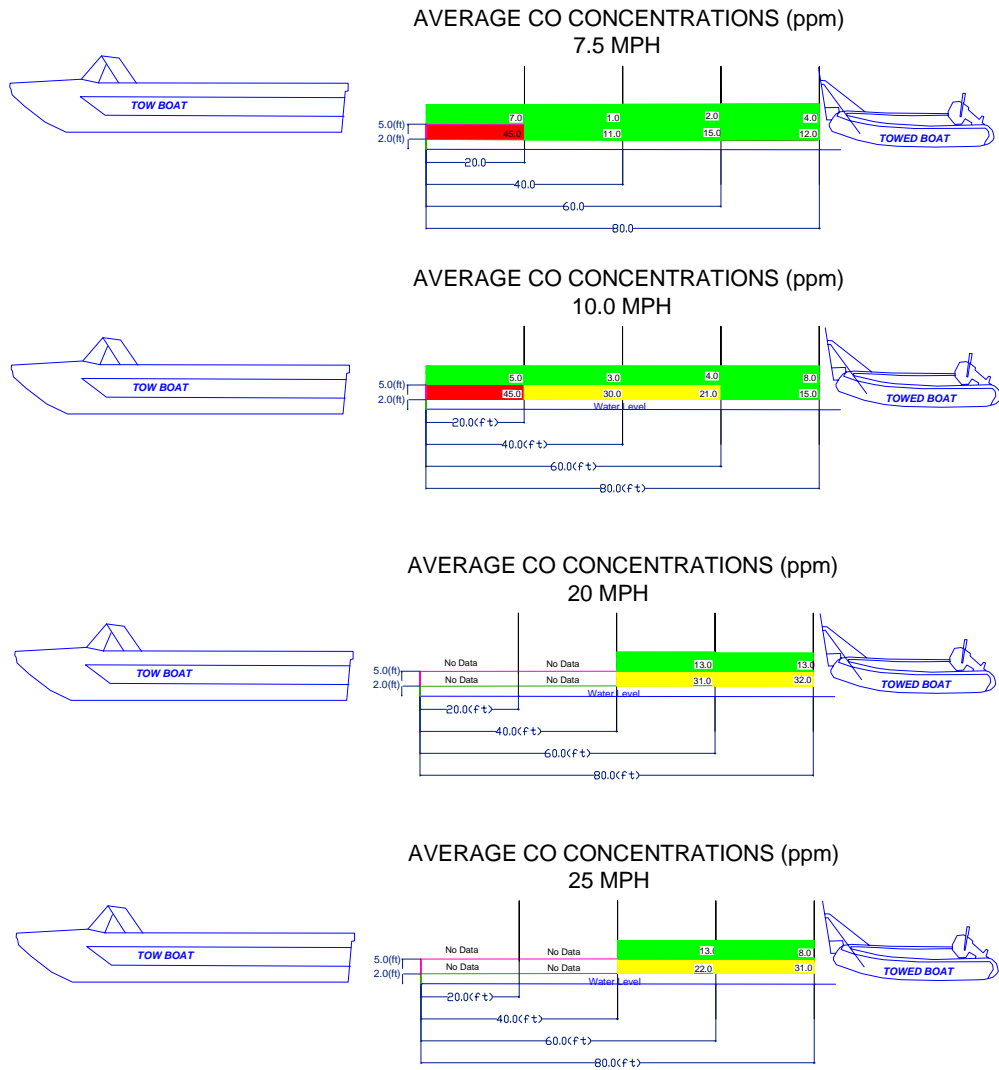
Figure 5

Summary data from the center of the dash

CO ppm

Average	2
Peak	28

Figure 6



CO Concentrations

- 0.0 - 19.99 ppm
- 20.0 - 34.99 ppm
- 35.0 < ppm

The National Institute for Occupational Safety and Health (NIOSH) has established a recommended exposure limit (REL) for carbon monoxide of 35 ppm (40 mg/m³) as an 8-hour TWA and 200 ppm (229 mg/m³) as a ceiling [NIOSH 1992].

Photo 1

Dinghy

CO Monitors mounted at
2 feet and 5 feet above water



Photo 2

Towed Dinghy
Speed - 10 mph
Distance - 20 feet



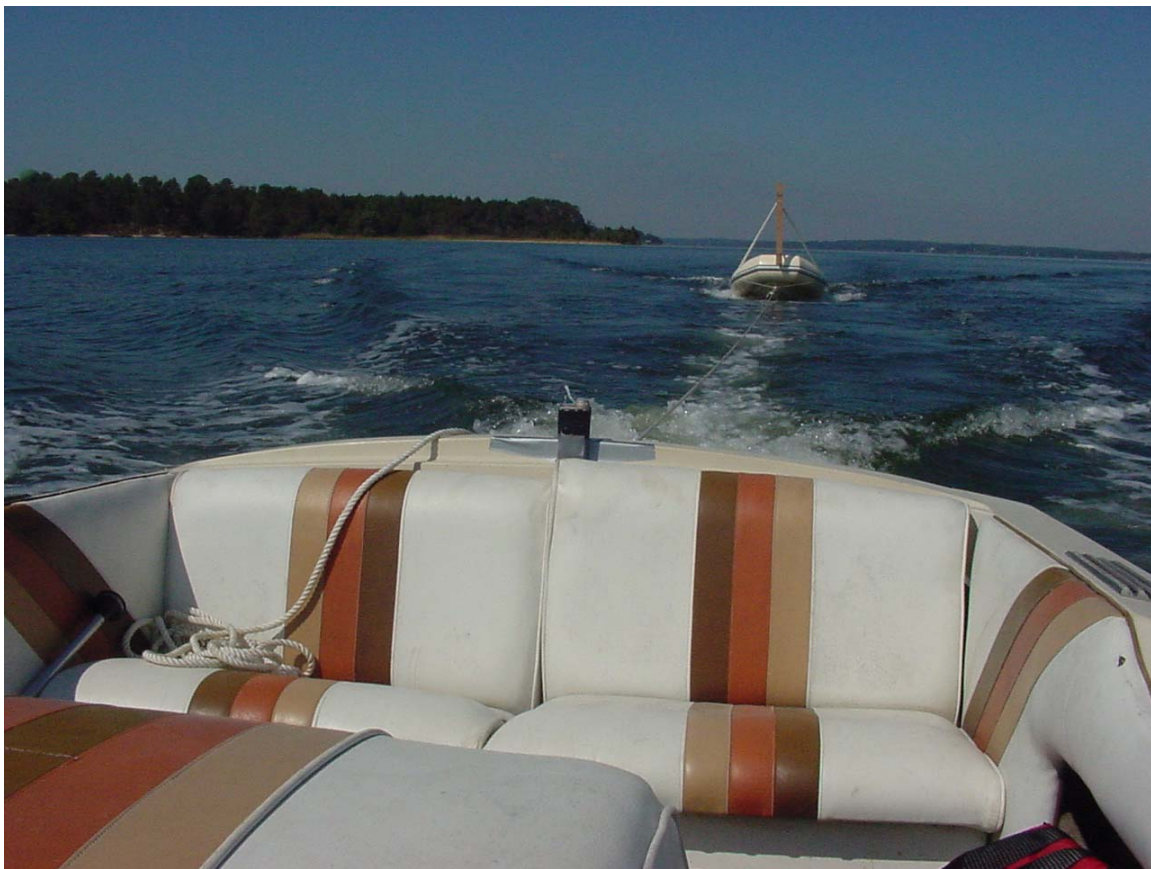
Photo 3

Towed Dinghy
Speed - 20 mph
Distance - 40 feet



Photo 4

CO monitor
Center of Stern Seat



Carbon Monoxide Safe Distance Study
September 2003

Appendix 1

- Spreadsheet, Combined test data, 2 feet above water
- Worksheet, Combined test data, 2 feet above water
- Spreadsheet, Combined test data, 5 feet above water
- Worksheet, Combined test data, 5 feet above water
- Worksheet, Stern seat

Spreadsheet
 Combined Test Data
 2 feet above waterline

	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	10	2	N/A	N/A	Port	3	7.5	20
	9	3	N/A	N/A	Port	3	7.5	20
	1	2	N/A	N/A	Port	3	7.5	20
	1	2	N/A	N/A	Port	3	7.5	20
	1	2	N/A	N/A	Port	3	7.5	20
	0	2	N/A	N/A	Port	3	7.5	20
	6	2	N/A	N/A	Port	3	7.5	20
	3	2	N/A	N/A	Port	3	7.5	20
	1	2	N/A	N/A	Port	3	7.5	20
	0	2	N/A	N/A	Port	3	7.5	20
	0	2	N/A	N/A	Port	3	7.5	20
	0	2	N/A	N/A	Port	3	7.5	20
	0	2	N/A	N/A	Port	3	7.5	20
	2	2	N/A	N/A	Stb	3	7.5	20
	1	2	N/A	N/A	Stb	3	7.5	20
	29	3	N/A	N/A	Stb	3	7.5	20
	59	5	N/A	N/A	Stb	3	7.5	20
	27	6	N/A	N/A	Stb	3	7.5	20
	18	6	N/A	N/A	Stb	3	7.5	20
	25	7	N/A	N/A	Stb	3	7.5	20
	22	7	N/A	N/A	Stb	3	7.5	20
	14	8	N/A	N/A	Stb	3	7.5	20
	10	8	N/A	N/A	Stb	3	7.5	20
	19	8	N/A	N/A	Stb	3	7.5	20
	18	8	N/A	N/A	Stb	3	7.5	20
	12	9	N/A	N/A	Stb	3	7.5	20
	32	9	N/A	N/A	Stb	3	7.5	20
	22	10	N/A	N/A	Stb	3	7.5	20
	11	10	N/A	N/A	Stb	3	7.5	20
	2	9	N/A	N/A	Stb	3	7.5	20
	1	9	N/A	N/A	Stb	3	7.5	20
	1	9	N/A	N/A	Aft	3	7.5	20
	1	9	N/A	N/A	Aft	3	7.5	20
	1	9	N/A	N/A	Aft	3	7.5	20
	1	8	N/A	N/A	Aft	3	7.5	20
	1	8	N/A	N/A	Aft	3	7.5	20
	2	8	N/A	N/A	Aft	3	7.5	20
	198	12	N/A	N/A	Aft	3	7.5	20
	203	16	N/A	N/A	Aft	3	7.5	20
	146	19	N/A	N/A	Aft	3	7.5	20
	59	20	N/A	N/A	Aft	3	7.5	20
	18	20	N/A	N/A	Aft	3	7.5	20
	7	20	N/A	N/A	Aft	3	7.5	20

Spreadsheet
 Combined Test Data
 2 feet above waterline

	Peak				Direction Relative	Speed MPH	Speed MPH	Feet
	219	26	N/A	N/A	Aft	3	7.5	20
	115	28	N/A	N/A	Aft	3	7.5	20
	38	28	N/A	N/A	Aft	3	7.5	20
	46	28	N/A	N/A	Fwd	3	7.5	20
	24	28	N/A	N/A	Fwd	3	7.5	20
	45	28	N/A	N/A	Fwd	3	7.5	20
	49	29	N/A	N/A	Fwd	3	7.5	20
	51	29	N/A	N/A	Fwd	3	7.5	20
	51	29	N/A	N/A	Fwd	3	7.5	20
	69	30	N/A	N/A	Fwd	3	7.5	20
	76	31	N/A	N/A	Fwd	3	7.5	20
	67	31	N/A	N/A	Fwd	3	7.5	20
	68	32	N/A	N/A	Fwd	3	7.5	20
	61	32	N/A	N/A	Fwd	3	7.5	20
	64	33	N/A	N/A	Fwd	3	7.5	20
	62	33	N/A	N/A	Fwd	3	7.5	20
	70	34	N/A	N/A	Fwd	3	7.5	20
	68	34	N/A	N/A	Fwd	3	7.5	20
	13	34	N/A	N/A	Fwd	3	7.5	20
	95	35	N/A	N/A	Fwd	3	7.5	20
	136	36	N/A	N/A	Fwd	3	7.5	20
	0	0	N/A	N/A	Aft	0-2	7.5	20
	0	0	N/A	N/A	Aft	0-2	7.5	20
	0	0	N/A	N/A	Aft	0-2	7.5	20
	-1	0	N/A	N/A	Aft	0-2	7.5	20
	-1	0	N/A	N/A	Aft	0-2	7.5	20
	0	0	N/A	N/A	Aft	0-2	7.5	20
	-1	0	N/A	N/A	Aft	0-2	7.5	20
	-1	0	N/A	N/A	Aft	0-2	7.5	20
	0	0	N/A	N/A	Aft	0-2	7.5	20
	25	1	N/A	N/A	Aft	0-2	7.5	20
	244	12	N/A	N/A	Aft	0-2	7.5	20
	199	20	N/A	N/A	Aft	0-2	7.5	20
	27	20	N/A	N/A	Aft	0-2	7.5	20
	144	25	N/A	N/A	Aft	0-2	7.5	20
	166	31	N/A	N/A	Aft	0-2	7.5	20
	77	41	N/A	N/A	Fwd	0-2	7.5	20
	77	42	N/A	N/A	Fwd	0-2	7.5	20
	83	43	N/A	N/A	Fwd	0-2	7.5	20
	88	44	N/A	N/A	Fwd	0-2	7.5	20
	68	44	N/A	N/A	Fwd	0-2	7.5	20
	76	45	N/A	N/A	Fwd	0-2	7.5	20
	4	39	46	N/A	Stbd	3 to 5	7.5	40
	4	39	46	N/A	Stbd	3 to 5	7.5	40

Spreadsheet
 Combined Test Data
 2 feet above waterline

					Relative	MPH	MPH	
	3	38	44	N/A	Stbd	3 to 5	7.5	40
	2	38	43	N/A	Stbd	3 to 5	7.5	40
	2	37	42	N/A	Stbd	3 to 5	7.5	40
	2	37	42	N/A	Stbd	3 to 5	7.5	40
	2	37	41	N/A	Stbd	3 to 5	7.5	40
	1	37	40	N/A	Stbd	3 to 5	7.5	40
	1	37	40	N/A	Stbd	3 to 5	7.5	40
	4	36	39	N/A	Port	3 to 5	7.5	40
	34	36	39	N/A	Port	3 to 5	7.5	40
	18	36	38	N/A	Port	3 to 5	7.5	40
	3	36	38	N/A	Port	3 to 5	7.5	40
	1	36	37	N/A	Port	3 to 5	7.5	40
	0	36	35	N/A	Port	3 to 5	7.5	40
	0	35	33	N/A	Port	3 to 5	7.5	40
	0	35	32	N/A	Port	3 to 5	7.5	40
	0	35	30	N/A	Port	3 to 5	7.5	40
	0	35	29	N/A	Port	3 to 5	7.5	40
	0	35	29	N/A	Port	3 to 5	7.5	40
	0	34	29	N/A	Port	3 to 5	7.5	40
	1	34	28	N/A	Fwd	3 to 5	7.5	40
	0	34	27	N/A	Fwd	3 to 5	7.5	40
	1	34	26	N/A	Fwd	3 to 5	7.5	40
	8	34	25	N/A	Fwd	3 to 5	7.5	40
	5	33	25	N/A	Fwd	3 to 5	7.5	40
	4	33	25	N/A	Fwd	3 to 5	7.5	40
	5	33	25	N/A	Fwd	3 to 5	7.5	40
	3	33	25	N/A	Fwd	3 to 5	7.5	40
	4	33	25	N/A	Fwd	3 to 5	7.5	40
	7	33	25	N/A	Fwd	3 to 5	7.5	40
	7	33	24	N/A	Fwd	3 to 5	7.5	40
	7	32	24	N/A	Fwd	3 to 5	7.5	40
	36	32	24	N/A	AFT	3 to 5	7.5	40
	44	32	25	N/A	AFT	3 to 5	7.5	40
	38	33	25	N/A	AFT	3 to 5	7.5	40
	64	33	26	N/A	AFT	3 to 5	7.5	40
	25	33	26	N/A	AFT	3 to 5	7.5	40
	7	32	26	N/A	AFT	3 to 5	7.5	40
	5	32	26	N/A	AFT	3 to 5	7.5	40
	3	32	26	N/A	AFT	3 to 5	7.5	40
	3	32	26	N/A	AFT	3 to 5	7.5	40
	2	32	26	N/A	AFT	3 to 5	7.5	40
	2	32	26	N/A	AFT	3 to 5	7.5	40
	1	32	25	N/A	AFT	3 to 5	7.5	40
	1	31	24	N/A	AFT	3 to 5	7.5	40
	2	31	24	N/A	AFT	3 to 5	7.5	40

Spreadsheet
 Combined Test Data
 2 feet above waterline

	10	46	N/A	N/A	Aft	0-2	7.5	40
	7	45	N/A	N/A	Aft	0-2	7.5	40
	3	45	N/A	N/A	Aft	0-2	7.5	40
	3	44	N/A	N/A	Aft	0-2	7.5	40
	2	44	N/A	N/A	Aft	0-2	7.5	40
	2	43	N/A	N/A	Aft	0-2	7.5	40
	2	42	N/A	N/A	Aft	0-2	7.5	40
	48	38	40	N/A	Fwd	1-2	7.5	40
	20	38	41	N/A	Fwd	1-2	7.5	40
	8	37	41	N/A	Fwd	1-2	7.5	40
	9	37	41	N/A	Fwd	1-2	7.5	40
	8	37	41	N/A	Fwd	1-2	7.5	40
	7	36	41	N/A	Fwd	1-2	7.5	40
	10	36	41	N/A	Fwd	1-2	7.5	40
	46	26	36	5	Various	5+	7.5	40
	52	26	36	5	Various	5+	7.5	40
	57	26	37	5	Various	5+	7.5	40
	44	26	37	5	Various	5+	7.5	40
	39	26	37	5	Various	5+	7.5	40
	37	26	37	5	Various	5+	7.5	40
	1	29	18	N/A	FWD	3 to 5	7.5	60
	3	29	18	N/A	FWD	3 to 5	7.5	60
	15	29	18	N/A	FWD	3 to 5	7.5	60
	17	29	18	N/A	FWD	3 to 5	7.5	60
	30	29	19	N/A	FWD	3 to 5	7.5	60
	33	29	19	N/A	FWD	3 to 5	7.5	60
	11	29	19	N/A	FWD	3 to 5	7.5	60
	25	29	19	N/A	FWD	3 to 5	7.5	60
	28	29	20	N/A	FWD	3 to 5	7.5	60
	28	29	20	N/A	AFT	3 to 5	7.5	60
	25	29	20	N/A	AFT	3 to 5	7.5	60
	6	29	20	N/A	AFT	3 to 5	7.5	60
	35	29	21	N/A	AFT	3 to 5	7.5	60
	37	29	21	N/A	AFT	3 to 5	7.5	60
	31	29	21	N/A	AFT	3 to 5	7.5	60
	22	29	21	N/A	AFT	3 to 5	7.5	60
	7	29	21	N/A	AFT	3 to 5	7.5	60
	3	29	21	N/A	AFT	3 to 5	7.5	60
	5	29	21	N/A	AFT	3 to 5	7.5	60
	4	29	21	N/A	AFT	3 to 5	7.5	60
	2	29	21	N/A	AFT	3 to 5	7.5	60
	1	28	20	N/A	Stbd	3 to 5	7.5	60
	1	28	19	N/A	Stbd	3 to 5	7.5	60
	1	28	19	N/A	Stbd	3 to 5	7.5	60
	1	28	19	N/A	Stbd	3 to 5	7.5	60
	2	28	19	N/A	Stbd	3 to 5	7.5	60

Spreadsheet
 Combined Test Data
 2 feet above waterline

	1	28	19	N/A	Stbd	3 to 5	7.5	60
	1	28	19	N/A	Stbd	3 to 5	7.5	60
	1	28	19	N/A	Stbd	3 to 5	7.5	60
	1	28	19	N/A	Stbd	3 to 5	7.5	60
	0	27	19	N/A	Stbd	3 to 5	7.5	60
	1	27	19	N/A	Port	3 to 5	7.5	60
	1	27	19	N/A	Port	3 to 5	7.5	60
	33	27	19	N/A	Port	3 to 5	7.5	60
	37	27	19	N/A	Port	3 to 5	7.5	60
	22	27	18	N/A	Port	3 to 5	7.5	60
	4	27	18	N/A	Port	3 to 5	7.5	60
	0	27	17	N/A	Port	3 to 5	7.5	60
	-1	27	17	N/A	Port	3 to 5	7.5	60
	0	27	16	N/A	Port	3 to 5	7.5	60
	0	27	15	N/A	Port	3 to 5	7.5	60
	-1	27	15	N/A	Port	3 to 5	7.5	60
	-1	27	14	N/A	Port	3 to 5	7.5	60
	4	37	36	N/A	Aft	1-3	7.5	60
	4	37	35	N/A	Aft	1-3	7.5	60
	4	36	35	N/A	Aft	1-3	7.5	60
	4	36	34	N/A	Aft	1-3	7.5	60
	4	36	34	N/A	Aft	1-3	7.5	60
	6	36	34	N/A	Aft	1-3	7.5	60
	21	36	33	N/A	Aft	1-3	7.5	60
	23	36	33	N/A	Aft	1-3	7.5	60
	16	35	32	N/A	Aft	1-3	7.5	60
	4	37	36	N/A	Aft	1-3	7.5	60
	4	37	35	N/A	Aft	1-3	7.5	60
	4	36	35	N/A	Aft	1-3	7.5	60
	4	36	34	N/A	Aft	1-3	7.5	60
	4	36	34	N/A	Aft	1-3	7.5	60
	6	36	34	N/A	Aft	1-3	7.5	60
	21	36	33	N/A	Aft	1-3	7.5	60
	23	36	33	N/A	Aft	1-3	7.5	60
	16	35	32	N/A	Aft	1-3	7.5	60
	30	37	32	N/A	Fwd	1-3	7.5	60
	43	37	33	N/A	Fwd	1-3	7.5	60
	48	37	33	N/A	Fwd	1-3	7.5	60
	48	37	34	N/A	Fwd	1-3	7.5	60
	54	37	34	N/A	Fwd	1-3	7.5	60
	54	38	34	N/A	Fwd	1-3	7.5	60
	47	38	35	N/A	Fwd	1-3	7.5	60
	43	38	35	N/A	Fwd	1-3	7.5	60
	40	38	35	N/A	Fwd	1-3	7.5	60
	3	26	21	3	Fwd	3 to 5	7.5	80
	3	25	21	3	Fwd	5	7.5	80

Spreadsheet
 Combined Test Data
 2 feet above waterline

	20	25	22	3	Fwd	5	7.5	80
	20	25	22	4	Fwd	5	7.5	80
	20	25	22	4	Fwd	5	7.5	80
	36	25	22	4	Fwd	5	7.5	80
	37	25	23	4	Fwd	5	7.5	80
	37	25	23	4	Fwd	5	7.5	80
	39	25	24	4	Fwd	5	7.5	80
	33	25	24	4	Fwd	5	7.5	80
	27	25	24	4	Port	5	7.5	80
	33	25	25	4	Port	5	7.5	80
	34	26	25	4	Port	5	7.5	80
	16	25	24	4	Port	5	7.5	80
	5	25	24	4	Port	5	7.5	80
	3	25	24	4	Port	5	7.5	80
	2	25	23	4	Aft	5	7.5	80
	1	25	23	4	Aft	5	7.5	80
	1	25	22	4	Aft	5	7.5	80
	2	25	22	4	Aft	5	7.5	80
	6	25	22	4	Aft	5	7.5	80
	6	25	21	4	Aft	5	7.5	80
	6	25	21	4	Aft	5	7.5	80
	8	25	21	4	Aft	5	7.5	80
	3	25	21	4	Aft	5	7.5	80
	2	25	21	4	Aft	5	7.5	80
	2	25	21	4	Aft	5	7.5	80
	2	25	21	4	Aft	5	7.5	80
	4	25	21	4	Port	5	7.5	80
	14	25	22	4	Port	5	7.5	80
	13	25	21	4	Port	5	7.5	80
	4	25	21	4	Port	5	7.5	80
	3	25	21	4	Port	5	7.5	80
	3	24	21	4	Port	5	7.5	80
	2	24	21	4	Port	5	7.5	80
	1	24	21	4	Port	5	7.5	80
	1	24	21	4	Port	5	7.5	80
	31	35	33	N/A	Aft	1-3	7.5	80
	38	35	33	N/A	Aft	1-3	7.5	80
	13	35	32	N/A	Aft	1-3	7.5	80
	0	35	32	N/A	Aft	1-3	7.5	80
	8	35	31	N/A	Aft	1-3	7.5	80
	13	35	31	N/A	Aft	1-3	7.5	80
	24	33	28	N/A	Fwd	1-3	7.5	80
	13	33	28	N/A	Fwd	1-3	7.5	80
	5	32	27	N/A	Fwd	1-3	7.5	80
	1	32	27	N/A	Fwd	1-3	7.5	80
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance

Spreadsheet
 Combined Test Data
 2 feet above waterline

	4	32	23	N/A	Fwd	1-3	7.5	80
	171	38	N/A	N/A	Aft	3 to 5	10	20
	122	39	N/A	N/A	Aft	3 to 5	10	20
	168	40	N/A	N/A	Aft	3 to 5	10	20
	65	41	N/A	N/A	Aft	3 to 5	10	20
	54	41	N/A	N/A	Aft	3 to 5	10	20
	28	41	N/A	N/A	Aft	3 to 5	10	20
	43	41	N/A	N/A	Aft	3 to 5	10	20
	99	41	N/A	N/A	Aft	3 to 5	10	20
	100	42	N/A	N/A	Aft	3 to 5	10	20
	65	42	N/A	N/A	Aft	3 to 5	10	20
	23	42	N/A	N/A	Aft	3 to 5	10	20
	10	42	N/A	N/A	Aft	3 to 5	10	20
	10	41	N/A	N/A	Stbd	3 to 5	10	20
	15	41	N/A	N/A	Stbd	3 to 5	10	20
	17	41	N/A	N/A	Stbd	3 to 5	10	20
	17	41	N/A	N/A	Stbd	3 to 5	10	20
	25	40	N/A	N/A	Stbd	3 to 5	10	20
	23	40	N/A	N/A	Stbd	3 to 5	10	20
	23	40	N/A	N/A	Stbd	3 to 5	10	20
	14	40	N/A	N/A	Stbd	3 to 5	10	20
	8	40	N/A	N/A	Stbd	3 to 5	10	20
	4	39	N/A	N/A	Stbd	3 to 5	10	20
	3	39	N/A	N/A	Stbd	3 to 5	10	20
	5	38	N/A	N/A	Stbd	3 to 5	10	20
	6	38	N/A	N/A	Stbd	3 to 5	10	20
	3	38	N/A	N/A	Stbd	3 to 5	10	20
	3	37	N/A	N/A	Stbd	3 to 5	10	20
	2	27	N/A	N/A	Stbd	3 to 5	10	20
	19	37	N/A	N/A	Stbd	3 to 5	10	20
	44	37	N/A	N/A	Stbd	3 to 5	10	20
	71	37	N/A	N/A	Stbd	3 to 5	10	20
	79	38	45	N/A	Fwd	3 to 5	10	20
	59	38	45	N/A	Fwd	3 to 5	10	20
	37	38	46	N/A	Fwd	3 to 5	10	20
	44	38	46	N/A	Fwd	3 to 5	10	20
	96	38	47	N/A	Fwd	3 to 5	10	20
	92	39	48	N/A	Port	3 to 5	10	20
	38	39	49	N/A	Port	3 to 5	10	20
	69	39	49	N/A	Port	3 to 5	10	20
	75	40	49	N/A	Port	3 to 5	10	20
	119	40	50	N/A	Port	3 to 5	10	20
	147	41	52	N/A	Port	3 to 5	10	20
	47	41	52	N/A	Port	3 to 5	10	20
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet

Spreadsheet
 Combined Test Data
 2 feet above waterline

	34	41	53	N/A	Port	3 to 5	10	20
	26	41	53	N/A	Port	3 to 5	10	20
	14	40	53	N/A	Port	3 to 5	10	20
	103	41	54	N/A	Port	3 to 5	10	20
	124	42	55	N/A	Port	3 to 5	10	20
	84	42	56	N/A	Port	3 to 5	10	20
	50	42	56	N/A	Port	3 to 5	10	20
	25	42	57	N/A	Port	3 to 5	10	20
	36	42	57	N/A	Port	3 to 5	10	20
	44	42	58	N/A	Port	3 to 5	10	20
	51	42	58	N/A	Port	3 to 5	10	20
	43	42	59	N/A	Port	3 to 5	10	20
	25	42	57	N/A	Port	3 to 5	10	20
	30	42	55	N/A	Port	3 to 5	10	20
	34	42	54	N/A	Port	3 to 5	10	20
	33	42	53	N/A	Port	3 to 5	10	20
	11	41	53	N/A	Port	3 to 5	10	20
	5	41	53	N/A	Port	3 to 5	10	20
	5	41	53	N/A	Port	3 to 5	10	20
	5	41	53	N/A	Port	3 to 5	10	20
	5	40	53	N/A	Port	3 to 5	10	20
	4	40	51	N/A	Port	3 to 5	10	20
	4	40	48	N/A	Port	3 to 5	10	20
	4	40	47	N/A	Port	3 to 5	10	20
	4	39	47	N/A	Port	3 to 5	10	20
	91	33	N/A	N/A	Aft	0-2	10	20
	99	35	N/A	N/A	Aft	0-2	10	20
	60	36	N/A	N/A	Aft	0-2	10	20
	93	38	N/A	N/A	Aft	0-2	10	20
	33	38	N/A	N/A	Aft	0-2	10	20
	28	38	N/A	N/A	Aft	0-2	10	20
	11	37	N/A	N/A	Aft	0-2	10	20
	4	36	N/A	N/A	Aft	0-2	10	20
	58	45	N/A	N/A	Fwd	0-2	10	20
	63	45	N/A	N/A	Fwd	0-2	10	20
	51	46	N/A	N/A	Fwd	0-2	10	20
	32	45	N/A	N/A	Fwd	0-2	10	20
	61	46	N/A	N/A	Fwd	0-2	10	20
	62	46	N/A	N/A	Fwd	0-2	10	20
	59	46	N/A	N/A	Fwd	0-2	10	20
	64	46	N/A	N/A	Fwd	0-2	10	20
	61	47	N/A	N/A	Fwd	0-2	10	20
	8	31	23	N/A	FWD	3 to 5	10	40
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	

Spreadsheet
 Combined Test Data
 2 feet above waterline

	44	31	22	N/A	FWD	3 to 5	10	40
	41	32	21	N/A	FWD	3 to 5	10	40
	77	32	21	N/A	FWD	3 to 5	10	40
	69	32	20	N/A	AFT	3 to 5	10	40
	52	32	20	N/A	AFT	3 to 5	10	40
	56	32	20	N/A	AFT	3 to 5	10	40
	53	32	20	N/A	AFT	3 to 5	10	40
	18	32	20	N/A	AFT	3 to 5	10	40
	20	32	20	N/A	AFT	3 to 5	10	40
	32	32	20	N/A	AFT	3 to 5	10	40
	29	32	20	N/A	AFT	3 to 5	10	40
	11	32	20	N/A	AFT	3 to 5	10	40
	7	32	19	N/A	AFT	3 to 5	10	40
	22	32	18	N/A	AFT	3 to 5	10	40
	40	32	17	N/A	AFT	3 to 5	10	40
	29	32	17	N/A	AFT	3 to 5	10	40
	10	32	17	N/A	Stbd	3 to 5	10	40
	27	32	17	N/A	Stbd	3 to 5	10	40
	51	32	17	N/A	Stbd	3 to 5	10	40
	49	32	17	N/A	Stbd	3 to 5	10	40
	14	32	17	N/A	Stbd	3 to 5	10	40
	8	32	17	N/A	Stbd	3 to 5	10	40
	7	32	16	N/A	Port	3 to 5	10	40
	6	31	16	N/A	Port	3 to 5	10	40
	4	31	16	N/A	Port	3 to 5	10	40
	10	31	16	N/A	Port	3 to 5	10	40
	10	31	16	N/A	Port	3 to 5	10	40
	4	31	16	N/A	Port	3 to 5	10	40
	5	31	16	N/A	Port	3 to 5	10	40
	31	31	16	N/A	Port	3 to 5	10	40
	27	31	16	N/A	Port	3 to 5	10	40
	11	31	16	N/A	Port	3 to 5	10	40
	4	31	16	N/A	Port	3 to 5	10	40
	8	31	16	N/A	Port	3 to 5	10	40
	38	31	17	N/A	Port	3 to 5	10	40
	38	31	17	N/A	Port	3 to 5	10	40
	12	31	17	N/A	Port	3 to 5	10	40
	6	31	17	N/A	Port	3 to 5	10	40
	21	30	17	N/A	Port	3 to 5	10	40
	45	31	18	N/A	Port	3 to 5	10	40
	44	31	18	N/A	Port	3 to 5	10	40
	11	30	18	N/A	Port	3 to 5	10	40
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	4	30	18	N/A	Port	3 to 5	10	40

Spreadsheet
 Combined Test Data
 2 feet above waterline

	1	30	18	N/A	Port	3 to 5	10	40
	2	30	19	N/A	Port	3 to 5	10	40
	1	30	18	N/A	Port	3 to 5	10	40
	8	42	N/A	N/A	Aft	0-2	10	40
	17	42	N/A	N/A	Aft	0-2	10	40
	14	41	N/A	N/A	Aft	0-2	10	40
	26	41	N/A	N/A	Aft	0-2	10	40
	22	41	N/A	N/A	Aft	0-2	10	40
	21	40	N/A	N/A	Aft	0-2	10	40
	19	40	N/A	N/A	Aft	0-2	10	40
	20	40	N/A	N/A	Aft	0-2	10	40
	20	40	N/A	N/A	Aft	0-2	10	40
	17	36	41	N/A	Fwd	1-2	10	40
	39	36	42	N/A	Fwd	1-2	10	40
	37	36	42	N/A	Fwd	1-2	10	40
	56	36	43	N/A	Fwd	1-2	10	40
	55	36	44	N/A	Fwd	1-2	10	40
	62	37	44	N/A	Fwd	1-2	10	40
	48	37	45	N/A	Fwd	1-2	10	40
	65	37	45	N/A	Fwd	1-2	10	40
	45	25	29	5	Various	5+	10	40
	43	26	29	5	Various	5+	10	40
	37	26	29	5	Various	5+	10	40
	30	26	30	5	Various	5+	10	40
	35	26	30	5	Various	5+	10	40
	39	26	30	5	Various	5+	10	40
	45	26	31	5	Various	5+	10	40
	45	26	31	5	Various	5+	10	40
	50	26	32	5	Various	5+	10	40
	49	26	32	5	Various	5+	10	40
	41	26	33	5	Various	5+	10	40
	47	26	33	5	Various	5+	10	40
	54	26	34	5	Various	5+	10	40
	55	26	34	5	Various	5+	10	40
	51	26	34	5	Various	5+	10	40
	47	26	35	5	Various	5+	10	40
	44	26	35	5	Various	5+	10	40
	39	26	35	5	Various	5+	10	40
	40	26	36	5	Various	5+	10	40
	52	26	36	5	Various	5+	10	40
	44	26	36	5	Various	5+	10	40
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	38	25	27	4	Various	5+	10	40
	21	25	28	4	Various	5+	10	40

Spreadsheet
 Combined Test Data
 2 feet above waterline

	3	26	12	N/A	Port	3 to 5	10	60
	3	26	12	N/A	Port	3 to 5	10	60
	1	26	12	N/A	Port	3 to 5	10	60
	1	26	12	N/A	Port	3 to 5	10	60
	4	26	12	N/A	Port	3 to 5	10	60
	4	26	11	N/A	Port	3 to 5	10	60
	0	26	11	N/A	Fwd	3 to 5	10	60
	20	26	11	N/A	Fwd	3 to 5	10	60
	35	26	11	N/A	Fwd	3 to 5	10	60
	36	26	11	N/A	Fwd	3 to 5	10	60
	36	26	11	N/A	Fwd	3 to 5	10	60
	37	26	11	N/A	Fwd	3 to 5	10	60
	48	26	12	N/A	Fwd	3 to 5	10	60
	50	26	12	N/A	Fwd	3 to 5	10	60
	36	26	13	N/A	Stbd	3 to 5	10	60
	26	26	13	N/A	Stbd	3 to 5	10	60
	25	26	13	N/A	Stbd	3 to 5	10	60
	10	26	13	N/A	Stbd	3 to 5	10	60
	8	26	13	N/A	Stbd	3 to 5	10	60
	6	26	13	N/A	Stbd	3 to 5	10	60
	3	26	13	N/A	Stbd	3 to 5	10	60
	3	26	12	N/A	Stbd	3 to 5	10	60
	3	26	12	N/A	Stbd	3 to 5	10	60
	2	26	12	N/A	Stbd	3 to 5	10	60
	2	26	12	N/A	Stbd	3 to 5	10	60
	26	26	12	N/A	Stbd	3 to 5	10	60
	34	26	12	N/A	Stbd	3 to 5	10	60
	14	26	12	N/A	Stbd	3 to 5	10	60
	4	25	12	N/A	Stbd	3 to 5	10	60
	17	25	12	N/A	Aft	3 to 5	10	60
	17	25	11	N/A	Aft	3 to 5	10	60
	5	25	11	N/A	Aft	3 to 5	10	60
	4	25	11	N/A	Aft	3 to 5	10	60
	2	25	11	N/A	Aft	3 to 5	10	60
	1	25	11	N/A	Aft	3 to 5	10	60
	30	35	31	N/A	Aft	1-3	10	60
	37	35	31	N/A	Aft	1-3	10	60
	56	36	31	N/A	Aft	1-3	10	60
	17	35	30	N/A	Aft	1-3	10	60
	37	35	30	N/A	Aft	1-3	10	60
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	40	36	30	N/A	Aft	1-3	10	60
	29	35	30	N/A	Aft	1-3	10	60
	43	36	30	N/A	Aft	1-3	10	60

Spreadsheet
 Combined Test Data
 2 feet above waterline

	51	38	36	N/A	Fwd	1-3	10	60
	48	38	36	N/A	Fwd	1-3	10	60
	23	38	36	N/A	Fwd	1-3	10	60
	1	24	20	4	Fwd	5	10	80
	14	24	21	4	Fwd	5	10	80
	20	24	21	4	Fwd	5	10	80
	11	24	21	4	Fwd	5	10	80
	15	24	21	4	Fwd	5	10	80
	21	24	21	4	Fwd	5	10	80
	20	24	20	4	Fwd	5	10	80
	33	24	20	4	Fwd	5	10	80
	33	24	20	4	Fwd	5	10	80
	30	24	20	4	Aft	5	10	80
	41	24	20	4	Aft	5	10	80
	47	24	20	4	Aft	5	10	80
	33	24	21	4	Aft	5+	10	80
	46	25	21	4	Aft	5+	10	80
	29	25	21	4	Aft	5+	10	80
	30	25	22	4	Aft	5+	10	80
	32	35	30	N/A	Aft	1-3	10	80
	28	35	30	N/A	Aft	1-3	10	80
	25	35	30	N/A	Aft	1-3	10	80
	16	35	30	N/A	Aft	1-3	10	80
	3	34	30	N/A	Aft	1-3	10	80
	1	34	29	N/A	Aft	1-3	10	80
	1	34	29	N/A	Aft	1-3	10	80
	1	34	29	N/A	Aft	1-3	10	80
	1	34	29	N/A	Aft	1-3	10	80
	4	32	22	N/A	Fwd	1-3	10	80
	2	32	21	N/A	Fwd	1-3	10	80
	13	32	21	N/A	Fwd	1-3	10	80
	14	31	20	N/A	Fwd	1-3	10	80
	2	31	20	N/A	Fwd	1-3	10	80
	1	31	20	N/A	Fwd	1-3	10	80
	3	19	N/A	N/A	Stbd	5	10	80
	1	19	N/A	N/A	Stbd	5	10	80
	-3	18	N/A	N/A	Stbd	5	10	80
	3	18	N/A	N/A	Stbd	5	10	80
	3	18	N/A	N/A	Stbd	5	10	80
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	-2	17	N/A	N/A	Stbd	5	10	80
	12	16	N/A	N/A	Port	0	10	80
	21	16	N/A	N/A	Port	0	10	80
	20	16	N/A	N/A	Port	0	10	80

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	17	16	N/A	N/A	Port	0	10	80
	25	16	N/A	N/A	Port	0	10	80
	2	16	N/A	N/A	Port	0	10	80
	18	16	N/A	N/A	Port	0	10	80
	18	15	N/A	N/A	Stbd	0-2	10	80
	4	15	N/A	N/A	Stbd	0-2	10	80
	10	15	N/A	N/A	Stbd	0-2	10	80
	10	15	N/A	N/A	Stbd	0-2	10	80
	9	15	N/A	N/A	Stbd	0-2	10	80
	19	15	N/A	N/A	Stbd	0-2	10	80
	18	15	N/A	N/A	Stbd	0-2	10	80
	14	15	N/A	N/A	Stbd	0-2	10	80
	36	15	N/A	N/A	Stbd	0-2	10	80
	32	16	N/A	N/A	Stbd	0-2	10	80
	3	15	N/A	N/A	Stbd	0-2	10	80
	-1	15	N/A	N/A	Stbd	0-2	10	80
	-1	15	N/A	N/A	Stbd	0-2	10	80
	25	40	N/A	N/A	Aft	0-2	20	40
	65	40	N/A	N/A	Aft	0-2	20	40
	52	40	N/A	N/A	Aft	0-2	20	40
	16	40	N/A	N/A	Aft	0-2	20	40
	63	37	46	N/A	Fwd	1-2	20	40
	63	38	44	N/A	Fwd	1-3	20	40
	3	25	11	N/A	Aft	3 to 5	20	60
	12	25	11	N/A	Aft	3 to 5	20	60
	59	25	12	N/A	Aft	3 to 5	20	60
	58	25	13	N/A	Aft	3 to 5	20	60
	37	25	13	N/A	Aft	3 to 5	20	60
	23	25	13	N/A	Aft	3 to 5	20	60
	54	25	14	N/A	Aft	3 to 5	20	60
	33	25	14	N/A	Aft	3 to 5	20	60
	21	25	14	N/A	Aft	3 to 5	20	60
	11	25	14	N/A	Aft	3 to 5	20	60
	3	25	14	N/A	Aft	3 to 5	20	60
	15	25	14	N/A	Aft	3 to 5	20	60
	13	25	14	N/A	Aft	3 to 5	20	60
	22	25	14	N/A	Aft	3 to 5	20	60
	47	25	14	N/A	Aft	3 to 5	20	60
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	46	25	14	N/A	Aft	3 to 5	20	60
	42	25	14	N/A	Aft	3 to 5	20	60
	47	25	15	N/A	Aft	3 to 5	20	60
	48	25	15	N/A	Aft	3 to 5	20	60
	50	26	15	N/A	Aft	3 to 5	20	60

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	9	25	15	3	Aft	3 to 5	20	60
	5	25	15	3	Aft	3 to 5	20	60
	67	36	30	N/A	Aft	1-3	20	60
	88	36	30	N/A	Aft	1-3	20	60
	80	37	29	N/A	Aft	1-3	20	60
	44	37	29	N/A	Aft	1-3	20	60
	84	37	29	N/A	Aft	1-3	20	60
	31	38	36	N/A	Fwd	1-3	20	60
	39	38	36	N/A	Fwd	1-3	20	60
	34	38	36	N/A	Fwd	1-3	20	60
	22	38	36	N/A	Fwd	1-3	20	60
	22	37	36	N/A	Fwd	1-3	20	60
	14	37	36	N/A	Fwd	1-3	20	60
	30	23	31	N/A	Port	0-2	20	60
	42	23	31	N/A	Port	0-2	20	60
	45	24	31	N/A	Port	0-2	20	60
	34	24	31	N/A	Port	0-2	20	60
	31	24	31	N/A	Port	0-2	20	60
	24	24	30	N/A	Port	0-2	20	60
	17	24	30	N/A	Port	0-2	20	60
	24	24	30	N/A	Port	0-2	20	60
	32	24	30	N/A	Port	0-2	20	60
	35	24	29	N/A	Port	0-2	20	60
	22	24	29	N/A	Port	0-2	20	60
	29	24	29	N/A	Port	0-2	20	60
	17	24	29	N/A	Port	0-2	20	60
	5	24	29	N/A	Port	0-2	20	60
	15	24	29	N/A	Port	0-2	20	60
	56	24	30	N/A	Various	0-2	20	60
	49	24	30	N/A	Various	0-2	20	60
	22	24	30	N/A	Various	0-2	20	60
	40	24	30	N/A	Various	0-2	20	60
	37	24	30	N/A	Various	0-2	20	60
	30	24	30	N/A	Stbd	0-2	20	60
	35	24	30	N/A	Stbd	0-2	20	60
	45	24	30	N/A	Stbd	0-2	20	60
	34	24	30	N/A	Stbd	0-2	20	60
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	28	24	30	N/A	Stbd	0-2	20	60
	31	24	30	N/A	Stbd	0-2	20	60
	34	24	30	N/A	Stbd	0-2	20	60
	17	24	30	N/A	Stbd	0-2	20	60
	21	24	30	N/A	Stbd	0-2	20	60
	22	24	30	N/A	Stbd	0-2	20	60

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	37	24	20	4	Fwd	5	20	80
	37	24	20	4	Fwd	5	20	80
	28	24	20	4	Fwd	5	20	80
	30	24	20	4	Fwd	5	20	80
	31	24	4	4	Fwd	5	20	80
	35	24	21	4	Fwd	5	20	80
	34	25	22	4	Aft	5+	20	80
	54	25	22	4	Aft	5+	20	80
	47	25	22	4	Aft	5+	20	80
	44	25	22	4	Aft	5+	20	80
	47	25	21	4	Aft	5+	20	80
	46	25	21	4	Aft	5+	20	80
	44	25	21	4	Aft	5+	20	80
	30	25	21	4	Aft	5+	20	80
	22	34	30	N/A	Aft	1-3	20	80
	22	34	30	N/A	Aft	1-3	20	80
	26	34	30	N/A	Aft	1-3	20	80
	25	34	30	N/A	Aft	1-3	20	80
	18	34	30	N/A	Aft	1-3	20	80
	32	31	21	N/A	Fwd	1-3	20	80
	32	31	21	N/A	Fwd	1-3	20	80
	34	31	21	N/A	Fwd	1-3	20	80
	35	31	21	N/A	Fwd	1-3	20	80
	34	31	21	N/A	Fwd	1-3	20	80
	47	17	N/A	N/A	Port	0-2	20	80
	52	17	N/A	N/A	Port	0-2	20	80
	54	18	N/A	N/A	Port	0-2	20	80
	53	18	N/A	N/A	Port	0-2	20	80
	44	18	N/A	N/A	Port	0-2	20	80
	21	18	18	N/A	Port	0-2	20	80
	14	18	19	N/A	Port	0-2	20	80
	22	18	19	N/A	Port	0-2	20	80
	17	18	19	N/A	Port	0-2	20	80
	3	18	19	N/A	Port	0-2	20	80
	0	18	18	N/A	Port	0-2	20	80
	38	18	18	N/A	Various	0-2	20	80
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	38	18	18	N/A	Various	0-2	20	80
	33	18	18	N/A	Various	0-2	20	80
	33	19	19	N/A	Various	0-2	20	80
	33	19	19	N/A	Various	0-2	20	80
	33	19	19	N/A	Various	0-2	20	80
	29	19	19	N/A	Stbd	0-2	20	80
	29	19	18	N/A	Stbd	0-2	20	80

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	33	20	20	N/A	Stbd	0-2	20	80
	10	20	20	N/A	Stbd	0-2	20	80
	4	20	20	N/A	Stbd	0-2	20	80
	3	20	20	N/A	Stbd	0-2	20	80
	1	20	19	N/A	Stbd	0-2	20	80
	35	20	19	N/A	Various	0-2	20	80
	44	20	20	N/A	Various	0-2	20	80
	39	20	20	N/A	Various	0-2	20	80
	42	20	20	N/A	Various	0-2	20	80
	40	20	21	N/A	Various	0-2	20	80
	36	20	21	N/A	Various	0-2	20	80
	3	25	16	3	Aft	3 to 5	25	60
	3	25	16	3	Aft	3 to 5	25	60
	44	25	16	3	Aft	3 to 5	25	60
	66	25	17	3	Aft	3 to 5	25	60
	66	26	17	3	Aft	3 to 5	25	60
	69	26	18	3	Aft	3 to 5	25	60
	66	26	19	3	Aft	3 to 5	25	60
	66	26	20	3	Aft	3 to 5	25	60
	40	26	20	3	Aft	3 to 5	25	60
	30	26	20	3	Aft	3 to 5	25	60
	22	26	21	3	Aft	3 to 5	25	60
	14	26	21	3	Aft	3 to 5	25	60
	13	26	21	3	Aft	3 to 5	25	60
	17	26	21	3	Aft	3 to 5	25	60
	26	26	21	3	Aft	3 to 5	25	60
	31	26	21	3	Aft	3 to 5	25	60
	19	26	21	3	Aft	3 to 5	25	60
	6	26	21	3	Aft	3 to 5	25	60
	4	26	21	3	Aft	3 to 5	25	60
	3	26	21	3	Aft	3 to 5	25	60
	3	26	21	3	Aft	3 to 5	25	60
	93	37	30	N/A	Aft	1-3	25	60
	84	38	30	N/A	Aft	1-3	25	60
	62	38	31	N/A	Aft	1-3	25	60
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	19	36	36	N/A	Fwd	1-3	25	60
	16	36	36	N/A	Fwd	1-3	25	60
	18	36	36	N/A	Fwd	1-3	25	60
	19	36	36	N/A	Fwd	1-3	25	60
	17	36	36	N/A	Fwd	1-3	25	60
	27	24	29	N/A	Port	0-2	25	60
	16	24	29	N/A	Port	0-2	25	60
	22	24	29	N/A	Port	0-2	25	60

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	6	24	28	N/A	Port	0-2	25	60
	3	24	27	N/A	Port	0-2	25	60
	8	24	27	N/A	Port	0-2	25	60
	9	24	27	N/A	Port	0-2	25	60
	7	25	26	N/A	Stbd	0-2	25	60
	5	25	26	N/A	Stbd	0-2	25	60
	4	24	26	N/A	Stbd	0-2	25	60
	2	24	26	N/A	Stbd	0-2	25	60
	2	24	26	N/A	Stbd	0-2	25	60
	2	24	26	N/A	Stbd	0-2	25	60
	1	24	25	N/A	Stbd	0-2	25	60
	0	24	24	N/A	Stbd	0-2	25	60
	0	24	24	N/A	Stbd	0-2	25	60
	0	24	24	N/A	Stbd	0-2	25	60
	1	24	24	N/A	Stbd	0-2	25	60
	1	24	24	N/A	Stbd	0-2	25	60
	0	24	24	N/A	Stbd	0-2	25	60
	37	24	21	4	Fwd	5	25	80
	36	24	21	4	Fwd	5	25	80
	35	24	21	4	Fwd	5	25	80
	34	24	21	4	Fwd	5	25	80
	41	25	21	4	Aft	5+	25	80
	19	34	30	N/A	Aft	1-3	25	80
	22	34	30	N/A	Aft	1-3	25	80
	25	33	30	N/A	Aft	1-3	25	80
	25	33	30	N/A	Aft	1-3	25	80
	37	31	20	N/A	Fwd	1-3	25	80
	35	31	20	N/A	Fwd	1-3	25	80
	31	31	20	N/A	Fwd	1-3	25	80
	13	31	20	N/A	Fwd	1-3	25	80
	2	31	19	N/A	Fwd	1-3	25	80
	23	31	19	N/A	Fwd	1-3	25	80
	28	31	19	N/A	Fwd	1-3	25	80
	33	31	19	N/A	Fwd	1-3	25	80
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	17	31	19	N/A	Fwd	1-3	25	80
	9	31	18	N/A	Fwd	1-3	25	80
	2	31	18	N/A	Fwd	1-3	25	80
	11	31	18	N/A	Fwd	1-3	25	80
	22	31	17	N/A	Fwd	1-3	25	80
	15	31	17	N/A	Fwd	1-3	25	80
	48	31	17	N/A	Fwd	1-3	25	80
	32	21	21	N/A	Port	0-2	25	80
	45	21	21	N/A	Port	0-2	25	80

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	49	22	22	N/A	Port	0-2	25	80
	54	22	23	N/A	Port	0-2	25	80
	37	22	24	N/A	Port	0-2	25	80
	11	22	24	N/A	Various	0-2	25	80
	58	22	24	N/A	Various	0-2	25	80
	58	22	25	N/A	Various	0-2	25	80
	27	22	25	N/A	Various	0-2	25	80
	34	22	26	N/A	Various	0-2	25	80
	33	22	26	N/A	Various	0-2	25	80
	29	23	26	N/A	Stbd	0-2	25	80
	48	23	26	N/A	Stbd	0-2	25	80
	49	23	27	N/A	Stbd	0-2	25	80
	47	23	27	N/A	Stbd	0-2	25	80
	51	23	28	N/A	Stbd	0-2	25	80
	51	24	28	N/A	Stbd	0-2	25	80
	50	24	28	N/A	Stbd	0-2	25	80
	27	24	28	N/A	Stbd	0-2	25	80
	14	24	28	N/A	Stbd	0-2	25	80
	8	24	28	N/A	Stbd	0-2	25	80
	4	23	28	N/A	Stbd	0-2	25	80
	2	23	28	N/A	Stbd	0-2	25	80
	20	25	21	4	Various	5+	6	40
	7	25	21	4	Various	5+	6	40
	14	25	21	4	Various	5+	6	40
	36	25	22	4	Various	5+	6	40
	45	25	22	4	Various	5+	6	40
	50	25	22	4	Various	5+	6	40
	34	25	23	4	Various	5+	6	40
	16	25	22	4	Various	5+	6	40
	37	25	23	4	Various	5+	6	40
	41	25	23	4	Various	5+	6	40
	33	25	23	4	Various	5+	6	40
	37	25	23	4	Various	5+	6	40
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	44	25	23	4	Various	5+	6	40
	43	25	23	4	Various	5+	6	40
	39	25	23	4	Various	5+	6	40
	44	25	23	4	Various	5+	6	40
	48	25	23	4	Various	5+	6	40
	43	25	24	4	Various	5+	6	40
	40	25	24	4	Various	5+	6	40
	41	25	24	4	Various	5+	6	40
	51	25	25	4	Various	5+	6	40
	50	25	25	4	Various	5+	6	40

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	14	24	20	4	Various	5	6	80
	10	24	20	4	Various	5	6	80
	25	24	20	4	Various	5	6	80
	28	24	20	4	Various	5	6	80
	18	26	37	5	Various	5+	6.5	40
	8	26	36	5	Various	5+	6.5	40
	18	26	36	5	Various	5+	6.5	40
	20	26	36	5	Various	5+	6.5	40
	9	26	36	5	Various	5+	6.5	40
	29	26	36	5	Various	5+	6.5	40
	40	26	36	5	Various	5+	6.5	40
	24	26	36	5	Various	5+	6.5	40
	28	26	36	5	Various	5+	6.5	40
	35	26	36	5	Various	5+	6.5	40
	36	26	36	5	Various	5+	6.5	40
	13	26	36	5	Various	5+	6.5	40
	21	26	36	5	Various	5+	6.5	40
	51	26	36	5	Various	5+	6.5	40
	49	26	36	5	Various	5+	6.5	40
	43	26	36	5	Various	5+	6.5	40
	26	26	36	5	Various	5+	6.5	40
	32	26	36	5	Various	5+	6.5	40
	33	27	36	5	Various	5+	6.5	40
	24	27	36	5	Various	5+	6.5	40
	24	27	35	5	Various	5+	6.5	40
	33	27	35	5	Various	5+	6.5	40
	31	27	35	5	Various	5+	6.5	40
	10	26	35	5	Various	5+	6.5	40
	4	26	34	5	Various	5+	6.5	40
	3	26	34	5	Various	5+	6.5	40
	2	26	34	5	Various	5+	6.5	40
	2	26	34	5	Various	5+	6.5	40
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	3	26	34	5	Various	5+	6.5	40
	2	26	34	5	Various	5+	6.5	40
	2	26	34	5	Various	5+	6.5	40
	2	26	33	5	Various	5+	6.5	40
	2	26	33	5	Various	5+	6.5	40
	2	26	33	5	Various	5+	6.5	40
	3	26	33	5	Various	5+	6.5	40
	3	26	33	5	Various	5+	6.5	40
	3	26	33	5	Various	5+	6.5	40
	3	26	32	5	Various	5+	6.5	40
	3	26	32	5	Various	5+	6.5	40

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	2	26	30	5	Various	5+	6.5	40
	2	26	29	5	Various	5+	6.5	40
	3	26	29	5	Various	5+	6.5	40
	2	26	28	5	Various	5+	6.5	40
	3	25	28	5	Various	5+	6.5	40
	3	25	27	5	Various	5+	6.5	40
	2	25	27	5	Various	5+	6.5	40
	2	25	26	5	Various	5+	6.5	40
	2	25	26	5	Various	5+	6.5	40
	2	25	26	5	Various	5+	6.5	40
	1	25	25	5	Various	5+	6.5	40
	2	25	24	5	Various	5+	6.5	40
	2	25	24	5	Various	5+	6.5	40
	2	25	24	5	Various	5+	6.5	40
	2	25	23	5	Various	5+	6.5	40
	6	25	23	5	Various	5+	6.5	40
	27	25	23	5	Various	5+	6.5	40
	38	25	23	5	Various	5+	6.5	40
	17	25	21	4	Various	5+	slow	
	7	25	21	4	Various	5+	slow	
	5	25	21	4	Various	5+	slow	
	18	25	21	4	Various	5+	slow	
	20	25	21	4	Various	5+	slow	
	9	25	20	4	Various	5+	slow	
	21	25	20	4	Various	5+	slow	
	31	25	21	4	Various	5+	slow	
	24	25	21	4	Various	5+	slow	
	0	0	N/A	N/A	various	3	various	various
	1	1	N/A	N/A	various	3	various	various
	0	1	N/A	N/A	various	3	various	various
	0	0	N/A	N/A	various	3	various	various
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	1	1	N/A	N/A	various	3	various	various
	1	1	N/A	N/A	various	3	various	various
	4	1	N/A	N/A	various	3	various	various
	4	1	N/A	N/A	various	3	various	various
	1	1	N/A	N/A	various	3	various	various
	0	0	N/A	N/A	Various	0-2	Various	20
	-1	0	N/A	N/A	Various	0-2	Various	20
	0	0	N/A	N/A	Various	0-2	Various	20
	-1	-1	N/A	N/A	Various	0-2	Various	20
	0	0	N/A	N/A	Various	0-2	Various	20
	0	0	N/A	N/A	Various	0-2	Various	20
	-1	0	N/A	N/A	Various	0-2	Various	20

Spreadsheet
 Combined Test Data
 2 feet above waterline

	123	40	N/A	N/A	Various	0-2	Slow	20
	113	42	N/A	N/A	Various	0-2	Slow	20
	18	41	N/A	N/A	Various	0-2	Slow	20
	15	40	N/A	N/A	Various	0-2	Slow	20
	26	40	N/A	N/A	Various	0-2	Slow	20
	41	40	N/A	N/A	Various	0-2	Slow	20
	119	48	N/A	N/A	Various	0-2	Various	20
	121	49	N/A	N/A	Various	0-2	Various	20
	53	49	N/A	N/A	Various	0-2	Various	20
	23	49	N/A	N/A	Various	0-2	Various	40
	23	48	N/A	N/A	Various	0-2	Various	40
	10	48	N/A	N/A	Various	0-2	Various	40
	25	39	N/A	N/A	Various	0-2	Various	40
	8	38	39	N/A	Various	0-2	Various	40
	3	38	39	N/A	Various	0-2	Various	40
	3	38	39	N/A	Various	0-2	Various	40
	48	38	39	N/A	Various	0-2	Various	40
	48	38	40	N/A	Various	0-2	Various	40
	38	38	38	N/A	Various	1-3	Various	40
	26	38	38	N/A	Various	1-3	Various	40
	16	38	38	N/A	Various	1-3	Various	40
	16	38	38	N/A	Various	1-3	Various	60
	6	38	38	N/A	Various	1-3	Various	60
	4	37	37	N/A	Various	1-3	Various	60
	48	38	31	N/A	Various	1-3	Various	60
	30	38	32	N/A	Various	1-3	Various	60
	11	38	32	N/A	Various	1-3	Various	60
	7	38	32	N/A	Various	1-3	Various	60
	5	37	32	N/A	Various	1-3	Various	60
	16	37	32	N/A	Various	1-3	Various	60
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	14	37	36	N/A	Fwd	1-3	Various	60
	34	37	36	N/A	Fwd	1-3	Various	60
	40	37	36	N/A	Fwd	1-3	Various	60
	11	37	36	N/A	Fwd	1-3	Various	60
	9	37	36	N/A	Fwd	1-3	Various	60
	17	37	36	N/A	Fwd	1-3	Various	60
	15	37	35	N/A	Fwd	1-3	Various	60
	27	37	35	N/A	Fwd	1-3	Various	60
	19	36	36	N/A	Fwd	1-3	Various	60
	17	36	36	N/A	Various	1-3	Various	60
	12	36	35	N/A	Various	1-3	Various	60
	37	36	35	N/A	Various	1-3	Various	60
	34	36	35	N/A	Various	1-3	Various	60

Spreadsheet
 Combined Test Data
 2 feet above waterline

	1	33	30	N/A	Various	1-3	Various	80
	0	33	29	N/A	Various	1-3	Various	80
	0	33	29	N/A	Various	1-3	Various	80
	21	33	28	N/A	Various	1-3	Various	80
	49	31	18	N/A	Various	1-3	Various	80
	20	31	18	N/A	Various	1-3	Various	80
	37	31	18	N/A	Various	1-3	Various	80
	59	31	18	N/A	Various	1-3	Various	80
	67	31	19	N/A	Various	1-3	Various	20
	74	31	19	N/A	Various	1-3	Various	20
	58	31	20	N/A	Various	1-3	Various	20
	41	31	20	N/A	Various	1-3	Various	20
	71	31	20	N/A	Various	1-3	Various	20
	66	32	21	N/A	Various	1-3	Various	20
	66	32	22	N/A	Various	1-3	Various	20
	71	32	22	N/A	Various	1-3	Various	20
	70	32	23	N/A	Various	1-3	Various	20
	22	32	23	N/A	Various	1-3	Various	20
	28	32	23	N/A	Various	1-3	Various	20
	16	32	23	N/A	Various	1-3	Various	20
	1	1	N/A	N/A	Various	5	Various	80
	-1	0	N/A	N/A	Various	5	Various	80
	-2	-1	N/A	N/A	Various	5	Various	80
	-2	-1	N/A	N/A	Various	5	Various	80
	30	5	N/A	N/A	Various	5	Various	80
	95	20	N/A	N/A	Various	5	Various	80
	49	24	N/A	N/A	Various	5	Various	80
	6	22	N/A	N/A	Various	5	Various	80
	3	20	N/A	N/A	Various	5	Various	80
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	-1	18	N/A	N/A	Various	5	Various	80
	7	17	N/A	N/A	Various	5	Various	80
	8	16	N/A	N/A	Various	5	Various	80
	84	21	N/A	N/A	Various	5	Various	80
	86	26	N/A	N/A	Various	5	Various	80
	43	27	N/A	N/A	Various	5	Various	80
	7	26	N/A	N/A	Various	5	Various	80
	3	24	N/A	N/A	Various	5	Various	80
	1	23	N/A	N/A	Various	5	Various	80
	16	23	N/A	N/A	Various	5	Various	80
	5	22	N/A	N/A	Various	5	Various	80
	-1	21	N/A	N/A	Various	5	Various	80
	2	20	N/A	N/A	Various	5	Various	80
	13	20	N/A	N/A	Various	5	Various	80

Spreadsheet
 Combined Test Data
 2 feet above waterline

	15	20	N/A	N/A	Fwd	5	Various	80
	6	19	N/A	N/A	Fwd	5	Various	80
	22	19	N/A	N/A	Fwd	5	Various	80
	29	20	N/A	N/A	Fwd	5	Various	80
	31	20	N/A	N/A	Fwd	5	Various	80
	30	20	N/A	N/A	Fwd	5	Various	80
	22	20	N/A	N/A	Fwd	5	Various	80
	16	20	N/A	N/A	Fwd	5	Various	80
	4	20	N/A	N/A	Fwd	5	Various	80
	-1	17	N/A	N/A	Various	5	Slow	80
	0	16	N/A	N/A	Various	5	Slow	80
	7	16	N/A	N/A	Various	5	Slow	80
	12	16	N/A	N/A	Various	0-1	Slow	80
	-3	16	N/A	N/A	Various	0-1	Slow	80
	-3	16	N/A	N/A	Various	0-1	Slow	80
	-2	15	N/A	N/A	Various	0-1	Slow	80
	7	15	N/A	N/A	Various	0-1	Slow	80
	17	15	N/A	N/A	Various	0-1	Slow	80
	21	15	N/A	N/A	Various	0-1	Slow	80
	20	15	N/A	N/A	Various	0-1	Slow	80
	20	15	N/A	N/A	Various	0-2	Slow	80
	40	15	N/A	N/A	Various	0-2	Slow	80
	39	16	N/A	N/A	Various	0-2	Slow	80
	39	16	N/A	N/A	Various	0-2	Slow	80
	32	16	N/A	N/A	Various	0-2	Slow	80
	43	16	N/A	N/A	Various	0-2	Slow	80
	2	23	28	N/A	Various	0-2	Slow	80
	1	23	28	N/A	Various	0-2	Slow	80
	CO	Average	STEL	TWA	Wind	Wind	Boat	Distance
	Peak				Direction	Speed	Speed	Feet
					Relative	MPH	MPH	
	5	23	28	N/A	Various	0-2	Slow	80
	115	24	29	N/A	Various	0-2	Slow	80
	80	24	30	N/A	Various	0-2	Slow	80
	13	24	30	N/A	Various	0-2	Slow	80
	8	24	30	N/A	Various	0-2	Slow	80
	30	24	30	N/A	Various	0-2	Slow	80
	15	24	30	N/A	Various	0-2	Slow	80
	4	24	30	N/A	Various	0-2	Slow	80
	4	23	30	N/A	Various	0-2	Slow	80
	8	23	30	N/A	Various	0-2	Slow	80
	14	23	30	N/A	Various	0-2	Slow	80
	27	23	30	N/A	Various	0-2	Slow	80
	40	23	30	N/A	Various	0-2	Slow	80
	33	23	30	N/A	Various	0-2	Slow	80
	18	23	30	N/A	Various	0-2	Slow	80

Spreadsheet
 Combined Test Data
 2 feet above waterline

	28	24	29	N/A	Various	0-2	Slow	60
	28	24	29	N/A	Various	0-2	Slow	60
	43	24	29	N/A	Various	0-2	Slow	60
	45	24	29	N/A	Various	0-2	Slow	60
	38	24	29	N/A	Various	0-2	Slow	60
	1	24	26	N/A	Various	0-2	Slow	60
	0	24	26	N/A	Various	0-2	Slow	60
	48	24	26	N/A	Various	0-2	Slow	60
	36	24	26	N/A	Various	0-2	Slow	60
	23	24	26	N/A	Various	0-2	Slow	60
	28	24	26	N/A	Various	0-2	Slow	60
	40	24	26	N/A	Various	0-2	Slow	60
	49	24	26	N/A	Various	0-2	Slow	60
	59	24	26	N/A	Various	0-2	Slow	60
	64	24	26	N/A	Various	0-2	Slow	60
	69	25	26	N/A	Various	0-2	Slow	60
	65	25	26	N/A	Various	0-2	Slow	60
	20	25	26	N/A	Various	0-2	Slow	60
Average	26		27	4				
Maximum	244		59	5				
Count	1119							

Worksheet
 Combined Test Data
 2 feet above waterline

	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	10	Port	3	7.5	20
	9	Port	3	7.5	20
	1	Port	3	7.5	20
	1	Port	3	7.5	20
	1	Port	3	7.5	20
	0	Port	3	7.5	20
	6	Port	3	7.5	20
	3	Port	3	7.5	20
	1	Port	3	7.5	20
	0	Port	3	7.5	20
	0	Port	3	7.5	20
	0	Port	3	7.5	20
	0	Port	3	7.5	20
	2	Stb	3	7.5	20
	1	Stb	3	7.5	20
	29	Stb	3	7.5	20
	59	Stb	3	7.5	20
	27	Stb	3	7.5	20
	18	Stb	3	7.5	20
	25	Stb	3	7.5	20
	22	Stb	3	7.5	20
	14	Stb	3	7.5	20
	10	Stb	3	7.5	20
	19	Stb	3	7.5	20
	18	Stb	3	7.5	20
	12	Stb	3	7.5	20
	32	Stb	3	7.5	20
	22	Stb	3	7.5	20
	11	Stb	3	7.5	20
	2	Stb	3	7.5	20
	1	Stb	3	7.5	20
	1	Aft	3	7.5	20
	1	Aft	3	7.5	20
	1	Aft	3	7.5	20
	1	Aft	3	7.5	20
	1	Aft	3	7.5	20
	2	Aft	3	7.5	20
	198	Aft	3	7.5	20
	203	Aft	3	7.5	20
	146	Aft	3	7.5	20
	59	Aft	3	7.5	20
	18	Aft	3	7.5	20
	7	Aft	3	7.5	20

Worksheet
 Combined Test Data
 2 feet above waterline

	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	219	Aft	3	7.5	20
	115	Aft	3	7.5	20
	38	Aft	3	7.5	20
	46	Fwd	3	7.5	20
	24	Fwd	3	7.5	20
	45	Fwd	3	7.5	20
	49	Fwd	3	7.5	20
	51	Fwd	3	7.5	20
	51	Fwd	3	7.5	20
	69	Fwd	3	7.5	20
	76	Fwd	3	7.5	20
	67	Fwd	3	7.5	20
	68	Fwd	3	7.5	20
	61	Fwd	3	7.5	20
	64	Fwd	3	7.5	20
	62	Fwd	3	7.5	20
	70	Fwd	3	7.5	20
	68	Fwd	3	7.5	20
	13	Fwd	3	7.5	20
	95	Fwd	3	7.5	20
	136	Fwd	3	7.5	20
	0	Aft	0-2	7.5	20
	0	Aft	0-2	7.5	20
	0	Aft	0-2	7.5	20
	-1	Aft	0-2	7.5	20
	-1	Aft	0-2	7.5	20
	0	Aft	0-2	7.5	20
	-1	Aft	0-2	7.5	20
	-1	Aft	0-2	7.5	20
	0	Aft	0-2	7.5	20
	25	Aft	0-2	7.5	20
	244	Aft	0-2	7.5	20
	199	Aft	0-2	7.5	20
	27	Aft	0-2	7.5	20
	144	Aft	0-2	7.5	20
	166	Aft	0-2	7.5	20
	77	Fwd	0-2	7.5	20
	77	Fwd	0-2	7.5	20
	83	Fwd	0-2	7.5	20
	88	Fwd	0-2	7.5	20
	68	Fwd	0-2	7.5	20
	76	Fwd	0-2	7.5	20
Av	45				
Max	244				

Worksheet
 Combined Test Data
 2 feet above waterline

		Relative	MPH	MPH	Feet
	4	Stbd	3 to 5	7.5	40
	4	Stbd	3 to 5	7.5	40
	4	Stbd	3 to 5	7.5	40
	2	Stbd	3 to 5	7.5	40
	3	Stbd	3 to 5	7.5	40
	3	Stbd	3 to 5	7.5	40
	2	Stbd	3 to 5	7.5	40
	2	Stbd	3 to 5	7.5	40
	2	Stbd	3 to 5	7.5	40
	2	Stbd	3 to 5	7.5	40
	2	Stbd	3 to 5	7.5	40
	1	Stbd	3 to 5	7.5	40
	1	Stbd	3 to 5	7.5	40
	4	Port	3 to 5	7.5	40
	34	Port	3 to 5	7.5	40
	18	Port	3 to 5	7.5	40
	3	Port	3 to 5	7.5	40
	1	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	0	Port	3 to 5	7.5	40
	1	Fwd	3 to 5	7.5	40
	0	Fwd	3 to 5	7.5	40
	1	Fwd	3 to 5	7.5	40
	8	Fwd	3 to 5	7.5	40
	5	Fwd	3 to 5	7.5	40
	4	Fwd	3 to 5	7.5	40
	5	Fwd	3 to 5	7.5	40
	3	Fwd	3 to 5	7.5	40
	4	Fwd	3 to 5	7.5	40
	7	Fwd	3 to 5	7.5	40
	7	Fwd	3 to 5	7.5	40
	7	Fwd	3 to 5	7.5	40
	36	AFT	3 to 5	7.5	40
	44	AFT	3 to 5	7.5	40
	38	AFT	3 to 5	7.5	40
	64	AFT	3 to 5	7.5	40
	25	AFT	3 to 5	7.5	40
	7	AFT	3 to 5	7.5	40
	5	AFT	3 to 5	7.5	40
	3	AFT	3 to 5	7.5	40
	3	AFT	3 to 5	7.5	40

Worksheet
 Combined Test Data
 2 feet above waterline

	1	AFT	3 to 5	7.5	40
	1	AFT	3 to 5	7.5	40
	2	AFT	3 to 5	7.5	40
	8	Aft	0-2	7.5	40
	6	Aft	0-2	7.5	40
	10	Aft	0-2	7.5	40
	7	Aft	0-2	7.5	40
	3	Aft	0-2	7.5	40
	3	Aft	0-2	7.5	40
	2	Aft	0-2	7.5	40
	2	Aft	0-2	7.5	40
	2	Aft	0-2	7.5	40
	48	Fwd	1-2	7.5	40
	20	Fwd	1-2	7.5	40
	8	Fwd	1-2	7.5	40
	9	Fwd	1-2	7.5	40
	8	Fwd	1-2	7.5	40
	7	Fwd	1-2	7.5	40
	10	Fwd	1-2	7.5	40
	46	Various	5+	7.5	40
	52	Various	5+	7.5	40
	57	Various	5+	7.5	40
	44	Various	5+	7.5	40
	39	Various	5+	7.5	40
	37	Various	5+	7.5	40
Av	11				
Max	64				
	1	FWD	3 to 5	7.5	60
	3	FWD	3 to 5	7.5	60
	15	FWD	3 to 5	7.5	60
	17	FWD	3 to 5	7.5	60
	30	FWD	3 to 5	7.5	60
	33	FWD	3 to 5	7.5	60
	11	FWD	3 to 5	7.5	60
	25	FWD	3 to 5	7.5	60
	28	FWD	3 to 5	7.5	60
	28	AFT	3 to 5	7.5	60
	25	AFT	3 to 5	7.5	60
	6	AFT	3 to 5	7.5	60
	35	AFT	3 to 5	7.5	60
	37	AFT	3 to 5	7.5	60
	31	AFT	3 to 5	7.5	60
	22	AFT	3 to 5	7.5	60
	7	AFT	3 to 5	7.5	60
	3	AFT	3 to 5	7.5	60

Worksheet
 Combined Test Data
 2 feet above waterline

	2	AFT	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	2	Stbd	3 to 5	7.5	60
	2	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	1	Stbd	3 to 5	7.5	60
	0	Stbd	3 to 5	7.5	60
	1	Port	3 to 5	7.5	60
	1	Port	3 to 5	7.5	60
	33	Port	3 to 5	7.5	60
	37	Port	3 to 5	7.5	60
	22	Port	3 to 5	7.5	60
	4	Port	3 to 5	7.5	60
	0	Port	3 to 5	7.5	60
	-1	Port	3 to 5	7.5	60
	0	Port	3 to 5	7.5	60
	0	Port	3 to 5	7.5	60
	-1	Port	3 to 5	7.5	60
	-1	Port	3 to 5	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	6	Aft	1-3	7.5	60
	21	Aft	1-3	7.5	60
	23	Aft	1-3	7.5	60
	16	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	6	Aft	1-3	7.5	60
	21	Aft	1-3	7.5	60
	23	Aft	1-3	7.5	60
	16	Aft	1-3	7.5	60
	30	Fwd	1-3	7.5	60
	43	Fwd	1-3	7.5	60
	48	Fwd	1-3	7.5	60

Worksheet
 Combined Test Data
 2 feet above waterline

	54	Fwd	1-3	7.5	60
	47	Fwd	1-3	7.5	60
	43	Fwd	1-3	7.5	60
	40	Fwd	1-3	7.5	60
Av	15				
Max	54				
	3	Fwd	3 to 5	7.5	80
	3	Fwd	5	7.5	80
	3	Fwd	5	7.5	80
	15	Fwd	5	7.5	80
	20	Fwd	5	7.5	80
	20	Fwd	5	7.5	80
	20	Fwd	5	7.5	80
	36	Fwd	5	7.5	80
	37	Fwd	5	7.5	80
	37	Fwd	5	7.5	80
	39	Fwd	5	7.5	80
	33	Fwd	5	7.5	80
	27	Port	5	7.5	80
	33	Port	5	7.5	80
	34	Port	5	7.5	80
	16	Port	5	7.5	80
	5	Port	5	7.5	80
	3	Port	5	7.5	80
	2	Aft	5	7.5	80
	1	Aft	5	7.5	80
	1	Aft	5	7.5	80
	2	Aft	5	7.5	80
	6	Aft	5	7.5	80
	6	Aft	5	7.5	80
	6	Aft	5	7.5	80
	8	Aft	5	7.5	80
	3	Aft	5	7.5	80
	2	Aft	5	7.5	80
	2	Aft	5	7.5	80
	2	Aft	5	7.5	80
	4	Port	5	7.5	80
	14	Port	5	7.5	80
	13	Port	5	7.5	80
	4	Port	5	7.5	80
	3	Port	5	7.5	80
	3	Port	5	7.5	80
	2	Port	5	7.5	80
	1	Port	5	7.5	80
	CO	Wind	Wind	Boat	Distance

Worksheet
 Combined Test Data
 2 feet above waterline

	13	Aft	1-3	7.5	80
	0	Aft	1-3	7.5	80
	8	Aft	1-3	7.5	80
	13	Aft	1-3	7.5	80
	24	Fwd	1-3	7.5	80
	13	Fwd	1-3	7.5	80
	5	Fwd	1-3	7.5	80
	1	Fwd	1-3	7.5	80
	1	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
	-1	Fwd	1-3	7.5	80
	4	Fwd	1-3	7.5	80
Av	12				
Max	39				
	171	Aft	3 to 5	10	20
	122	Aft	3 to 5	10	20
	168	Aft	3 to 5	10	20
	65	Aft	3 to 5	10	20
	54	Aft	3 to 5	10	20
	28	Aft	3 to 5	10	20
	43	Aft	3 to 5	10	20
	99	Aft	3 to 5	10	20
	100	Aft	3 to 5	10	20
	65	Aft	3 to 5	10	20
	23	Aft	3 to 5	10	20
	10	Aft	3 to 5	10	20
	10	Stbd	3 to 5	10	20
	15	Stbd	3 to 5	10	20
	17	Stbd	3 to 5	10	20
	17	Stbd	3 to 5	10	20
	25	Stbd	3 to 5	10	20
	23	Stbd	3 to 5	10	20
	23	Stbd	3 to 5	10	20
	14	Stbd	3 to 5	10	20
	8	Stbd	3 to 5	10	20
	4	Stbd	3 to 5	10	20
	3	Stbd	3 to 5	10	20
	5	Stbd	3 to 5	10	20
	6	Stbd	3 to 5	10	20
	3	Stbd	3 to 5	10	20
	3	Stbd	3 to 5	10	20
	2	Stbd	3 to 5	10	20
	19	Stbd	3 to 5	10	20
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	

Worksheet
 Combined Test Data
 2 feet above waterline

	37	Fwd	3 to 5	10	20
	44	Fwd	3 to 5	10	20
	96	Fwd	3 to 5	10	20
	92	Port	3 to 5	10	20
	38	Port	3 to 5	10	20
	69	Port	3 to 5	10	20
	75	Port	3 to 5	10	20
	119	Port	3 to 5	10	20
	147	Port	3 to 5	10	20
	47	Port	3 to 5	10	20
	42	Port	3 to 5	10	20
	41	Port	3 to 5	10	20
	26	Port	3 to 5	10	20
	10	Port	3 to 5	10	20
	34	Port	3 to 5	10	20
	26	Port	3 to 5	10	20
	14	Port	3 to 5	10	20
	103	Port	3 to 5	10	20
	124	Port	3 to 5	10	20
	84	Port	3 to 5	10	20
	50	Port	3 to 5	10	20
	25	Port	3 to 5	10	20
	36	Port	3 to 5	10	20
	44	Port	3 to 5	10	20
	51	Port	3 to 5	10	20
	43	Port	3 to 5	10	20
	25	Port	3 to 5	10	20
	30	Port	3 to 5	10	20
	34	Port	3 to 5	10	20
	33	Port	3 to 5	10	20
	11	Port	3 to 5	10	20
	5	Port	3 to 5	10	20
	5	Port	3 to 5	10	20
	5	Port	3 to 5	10	20
	5	Port	3 to 5	10	20
	4	Port	3 to 5	10	20
	4	Port	3 to 5	10	20
	4	Port	3 to 5	10	20
	4	Port	3 to 5	10	20
	91	Aft	0-2	10	20
	99	Aft	0-2	10	20
	60	Aft	0-2	10	20
	93	Aft	0-2	10	20
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet

Worksheet
 Combined Test Data
 2 feet above waterline

	63	Fwd	0-2	10	20
	51	Fwd	0-2	10	20
	32	Fwd	0-2	10	20
	61	Fwd	0-2	10	20
	62	Fwd	0-2	10	20
	59	Fwd	0-2	10	20
	64	Fwd	0-2	10	20
	61	Fwd	0-2	10	20
Av	45				
Max	171				
	8	FWD	3 to 5	10	40
	5	FWD	3 to 5	10	40
	45	FWD	3 to 5	10	40
	55	FWD	3 to 5	10	40
	56	FWD	3 to 5	10	40
	44	FWD	3 to 5	10	40
	44	FWD	3 to 5	10	40
	41	FWD	3 to 5	10	40
	77	FWD	3 to 5	10	40
	69	AFT	3 to 5	10	40
	52	AFT	3 to 5	10	40
	56	AFT	3 to 5	10	40
	53	AFT	3 to 5	10	40
	18	AFT	3 to 5	10	40
	20	AFT	3 to 5	10	40
	32	AFT	3 to 5	10	40
	29	AFT	3 to 5	10	40
	11	AFT	3 to 5	10	40
	7	AFT	3 to 5	10	40
	22	AFT	3 to 5	10	40
	40	AFT	3 to 5	10	40
	29	AFT	3 to 5	10	40
	10	Stbd	3 to 5	10	40
	27	Stbd	3 to 5	10	40
	51	Stbd	3 to 5	10	40
	49	Stbd	3 to 5	10	40
	14	Stbd	3 to 5	10	40
	8	Stbd	3 to 5	10	40
	7	Port	3 to 5	10	40
	6	Port	3 to 5	10	40
	4	Port	3 to 5	10	40
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	10	Port	3 to 5	10	40

Worksheet
 Combined Test Data
 2 feet above waterline

	11	Port	3 to 5	10	40
	4	Port	3 to 5	10	40
	8	Port	3 to 5	10	40
	38	Port	3 to 5	10	40
	38	Port	3 to 5	10	40
	12	Port	3 to 5	10	40
	6	Port	3 to 5	10	40
	21	Port	3 to 5	10	40
	45	Port	3 to 5	10	40
	44	Port	3 to 5	10	40
	11	Port	3 to 5	10	40
	4	Port	3 to 5	10	40
	4	Port	3 to 5	10	40
	4	Port	3 to 5	10	40
	2	Port	3 to 5	10	40
	1	Port	3 to 5	10	40
	2	Port	3 to 5	10	40
	1	Port	3 to 5	10	40
	2	Port	3 to 5	10	40
	1	Port	3 to 5	10	40
	8	Aft	0-2	10	40
	17	Aft	0-2	10	40
	14	Aft	0-2	10	40
	26	Aft	0-2	10	40
	22	Aft	0-2	10	40
	21	Aft	0-2	10	40
	19	Aft	0-2	10	40
	20	Aft	0-2	10	40
	20	Aft	0-2	10	40
	17	Fwd	1-2	10	40
	39	Fwd	1-2	10	40
	37	Fwd	1-2	10	40
	56	Fwd	1-2	10	40
	55	Fwd	1-2	10	40
	62	Fwd	1-2	10	40
	48	Fwd	1-2	10	40
	65	Fwd	1-2	10	40
	45	Various	5+	10	40
	43	Various	5+	10	40
	37	Various	5+	10	40
	30	Various	5+	10	40
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	35	Various	5+	10	40
	39	Various	5+	10	40

Worksheet
 Combined Test Data
 2 feet above waterline

	47	Various	5+	10	40
	54	Various	5+	10	40
	55	Various	5+	10	40
	51	Various	5+	10	40
	47	Various	5+	10	40
	44	Various	5+	10	40
	39	Various	5+	10	40
	40	Various	5+	10	40
	52	Various	5+	10	40
	44	Various	5+	10	40
	38	Various	5+	10	40
	21	Various	5+	10	40
	41	Various	5+	10	40
Av	30				
Max	77				
	-1	Port	3 to 5	10	60
	-1	Port	3 to 5	10	60
	0	Port	3 to 5	10	60
	1	Port	3 to 5	10	60
	3	Port	3 to 5	10	60
	3	Port	3 to 5	10	60
	1	Port	3 to 5	10	60
	1	Port	3 to 5	10	60
	4	Port	3 to 5	10	60
	4	Port	3 to 5	10	60
	0	Fwd	3 to 5	10	60
	20	Fwd	3 to 5	10	60
	35	Fwd	3 to 5	10	60
	36	Fwd	3 to 5	10	60
	36	Fwd	3 to 5	10	60
	37	Fwd	3 to 5	10	60
	48	Fwd	3 to 5	10	60
	50	Fwd	3 to 5	10	60
	36	Stbd	3 to 5	10	60
	26	Stbd	3 to 5	10	60
	25	Stbd	3 to 5	10	60
	10	Stbd	3 to 5	10	60
	8	Stbd	3 to 5	10	60
	6	Stbd	3 to 5	10	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	3	Stbd	3 to 5	10	60
	3	Stbd	3 to 5	10	60
	3	Stbd	3 to 5	10	60

Worksheet
 Combined Test Data
 2 feet above waterline

	4	Stbd	3 to 5	10	60
	17	Aft	3 to 5	10	60
	17	Aft	3 to 5	10	60
	5	Aft	3 to 5	10	60
	4	Aft	3 to 5	10	60
	2	Aft	3 to 5	10	60
	1	Aft	3 to 5	10	60
	30	Aft	1-3	10	60
	37	Aft	1-3	10	60
	56	Aft	1-3	10	60
	17	Aft	1-3	10	60
	37	Aft	1-3	10	60
	40	Aft	1-3	10	60
	29	Aft	1-3	10	60
	43	Aft	1-3	10	60
	44	Aft	1-3	10	60
	65	Aft	1-3	10	60
	40	Fwd	1-3	10	60
	34	Fwd	1-3	10	60
	42	Fwd	1-3	10	60
	51	Fwd	1-3	10	60
	48	Fwd	1-3	10	60
	23	Fwd	1-3	10	60
Av	21				
Max	65				
	1	Fwd	5	10	80
	14	Fwd	5	10	80
	20	Fwd	5	10	80
	11	Fwd	5	10	80
	15	Fwd	5	10	80
	21	Fwd	5	10	80
	20	Fwd	5	10	80
	33	Fwd	5	10	80
	33	Fwd	5	10	80
	30	Aft	5	10	80
	41	Aft	5	10	80
	47	Aft	5	10	80
	33	Aft	5+	10	80
CO	Wind	Wind	Boat	Distance	
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	46	Aft	5+	10	80
	29	Aft	5+	10	80
	30	Aft	5+	10	80
	32	Aft	1-3	10	80

Worksheet
 Combined Test Data
 2 feet above waterline

	1	Aft	1-3	10	80
	1	Aft	1-3	10	80
	1	Aft	1-3	10	80
	4	Fwd	1-3	10	80
	2	Fwd	1-3	10	80
	13	Fwd	1-3	10	80
	14	Fwd	1-3	10	80
	2	Fwd	1-3	10	80
	1	Fwd	1-3	10	80
	3	Stbd	5	10	80
	1	Stbd	5	10	80
	-3	Stbd	5	10	80
	3	Stbd	5	10	80
	3	Stbd	5	10	80
	-2	Stbd	5	10	80
	12	Port	0	10	80
	21	Port	0	10	80
	20	Port	0	10	80
	4	Port	0	10	80
	18	Port	0	10	80
	30	Port	0	10	80
	19	Port	0	10	80
	18	Port	0	10	80
	17	Port	0	10	80
	25	Port	0	10	80
	2	Port	0	10	80
	18	Port	0	10	80
	18	Stbd	0-2	10	80
	4	Stbd	0-2	10	80
	10	Stbd	0-2	10	80
	10	Stbd	0-2	10	80
	9	Stbd	0-2	10	80
	19	Stbd	0-2	10	80
	18	Stbd	0-2	10	80
	14	Stbd	0-2	10	80
	36	Stbd	0-2	10	80
	32	Stbd	0-2	10	80
	3	Stbd	0-2	10	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	-1	Stbd	0-2	10	80
	-1	Stbd	0-2	10	80
Av	15				
Max	47				

Worksheet
 Combined Test Data
 2 feet above waterline

	63	Fwd	1-3	20	40
	59	Fwd	1-3	20	40
Av	49				
Max	65				
	3	Aft	3 to 5	20	60
	12	Aft	3 to 5	20	60
	59	Aft	3 to 5	20	60
	58	Aft	3 to 5	20	60
	37	Aft	3 to 5	20	60
	23	Aft	3 to 5	20	60
	54	Aft	3 to 5	20	60
	33	Aft	3 to 5	20	60
	21	Aft	3 to 5	20	60
	11	Aft	3 to 5	20	60
	3	Aft	3 to 5	20	60
	15	Aft	3 to 5	20	60
	13	Aft	3 to 5	20	60
	22	Aft	3 to 5	20	60
	47	Aft	3 to 5	20	60
	46	Aft	3 to 5	20	60
	42	Aft	3 to 5	20	60
	47	Aft	3 to 5	20	60
	48	Aft	3 to 5	20	60
	50	Aft	3 to 5	20	60
	35	Aft	3 to 5	20	60
	12	Aft	3 to 5	20	60
	6	Aft	3 to 5	20	60
	28	Aft	3 to 5	20	60
	20	Aft	3 to 5	20	60
	9	Aft	3 to 5	20	60
	5	Aft	3 to 5	20	60
	67	Aft	1-3	20	60
	88	Aft	1-3	20	60
	80	Aft	1-3	20	60
	44	Aft	1-3	20	60
	84	Aft	1-3	20	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	31	Fwd	1-3	20	60
	39	Fwd	1-3	20	60
	34	Fwd	1-3	20	60
	22	Fwd	1-3	20	60
	22	Fwd	1-3	20	60
	14	Fwd	1-3	20	60

Worksheet
 Combined Test Data
 2 feet above waterline

	24	Port	0-2	20	60
	17	Port	0-2	20	60
	24	Port	0-2	20	60
	32	Port	0-2	20	60
	35	Port	0-2	20	60
	22	Port	0-2	20	60
	29	Port	0-2	20	60
	17	Port	0-2	20	60
	5	Port	0-2	20	60
	15	Port	0-2	20	60
	56	Various	0-2	20	60
	49	Various	0-2	20	60
	22	Various	0-2	20	60
	40	Various	0-2	20	60
	37	Various	0-2	20	60
	30	Stbd	0-2	20	60
	35	Stbd	0-2	20	60
	45	Stbd	0-2	20	60
	34	Stbd	0-2	20	60
	28	Stbd	0-2	20	60
	31	Stbd	0-2	20	60
	34	Stbd	0-2	20	60
	17	Stbd	0-2	20	60
	21	Stbd	0-2	20	60
	22	Stbd	0-2	20	60
	10	Stbd	0-2	20	60
	8	Stbd	0-2	20	60
	7	Stbd	0-2	20	60
	2	Stbd	0-2	20	60
	28	Stbd	0-2	20	60
Av	31				
Max	88				
	37	Fwd	5	20	80
	37	Fwd	5	20	80
	28	Fwd	5	20	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	30	Fwd	5	20	80
	31	Fwd	5	20	80
	35	Fwd	5	20	80
	34	Aft	5+	20	80
	54	Aft	5+	20	80
	47	Aft	5+	20	80
	44	Aft	5+	20	80

Worksheet
 Combined Test Data
 2 feet above waterline

	22	Aft	1-3	20	80
	26	Aft	1-3	20	80
	25	Aft	1-3	20	80
	18	Aft	1-3	20	80
	32	Fwd	1-3	20	80
	32	Fwd	1-3	20	80
	34	Fwd	1-3	20	80
	35	Fwd	1-3	20	80
	34	Fwd	1-3	20	80
	47	Port	0-2	20	80
	52	Port	0-2	20	80
	54	Port	0-2	20	80
	53	Port	0-2	20	80
	44	Port	0-2	20	80
	21	Port	0-2	20	80
	14	Port	0-2	20	80
	22	Port	0-2	20	80
	17	Port	0-2	20	80
	3	Port	0-2	20	80
	0	Port	0-2	20	80
	38	Various	0-2	20	80
	38	Various	0-2	20	80
	33	Various	0-2	20	80
	33	Various	0-2	20	80
	33	Various	0-2	20	80
	33	Various	0-2	20	80
	29	Stbd	0-2	20	80
	29	Stbd	0-2	20	80
	41	Stbd	0-2	20	80
	39	Stbd	0-2	20	80
	35	Stbd	0-2	20	80
	36	Stbd	0-2	20	80
	32	Stbd	0-2	20	80
	33	Stbd	0-2	20	80
	10	Stbd	0-2	20	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	4	Stbd	0-2	20	80
	3	Stbd	0-2	20	80
	1	Stbd	0-2	20	80
	35	Various	0-2	20	80
	44	Various	0-2	20	80
	39	Various	0-2	20	80
	42	Various	0-2	20	80
	40	Various	0-2	20	80

Worksheet
 Combined Test Data
 2 feet above waterline

	3	Aft	3 to 5	25	60
	44	Aft	3 to 5	25	60
	66	Aft	3 to 5	25	60
	66	Aft	3 to 5	25	60
	69	Aft	3 to 5	25	60
	66	Aft	3 to 5	25	60
	66	Aft	3 to 5	25	60
	40	Aft	3 to 5	25	60
	30	Aft	3 to 5	25	60
	22	Aft	3 to 5	25	60
	14	Aft	3 to 5	25	60
	13	Aft	3 to 5	25	60
	17	Aft	3 to 5	25	60
	26	Aft	3 to 5	25	60
	31	Aft	3 to 5	25	60
	19	Aft	3 to 5	25	60
	6	Aft	3 to 5	25	60
	4	Aft	3 to 5	25	60
	3	Aft	3 to 5	25	60
	3	Aft	3 to 5	25	60
	93	Aft	1-3	25	60
	84	Aft	1-3	25	60
	62	Aft	1-3	25	60
	19	Fwd	1-3	25	60
	16	Fwd	1-3	25	60
	18	Fwd	1-3	25	60
	19	Fwd	1-3	25	60
	17	Fwd	1-3	25	60
	27	Port	0-2	25	60
	16	Port	0-2	25	60
	22	Port	0-2	25	60
	25	Port	0-2	25	60
	24	Port	0-2	25	60
	25	Port	0-2	25	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	20	Port	0-2	25	60
	17	Port	0-2	25	60
	6	Port	0-2	25	60
	3	Port	0-2	25	60
	8	Port	0-2	25	60
	9	Port	0-2	25	60
	7	Stbd	0-2	25	60
	5	Stbd	0-2	25	60
	4	Stbd	0-2	25	60

Worksheet
 Combined Test Data
 2 feet above waterline

	0	Stbd	0-2	25	60
	0	Stbd	0-2	25	60
	1	Stbd	0-2	25	60
	1	Stbd	0-2	25	60
	0	Stbd	0-2	25	60
Av	22				
Max	93				
	37	Fwd	5	25	80
	36	Fwd	5	25	80
	35	Fwd	5	25	80
	34	Fwd	5	25	80
	41	Aft	5+	25	80
	19	Aft	1-3	25	80
	22	Aft	1-3	25	80
	25	Aft	1-3	25	80
	25	Aft	1-3	25	80
	37	Fwd	1-3	25	80
	35	Fwd	1-3	25	80
	31	Fwd	1-3	25	80
	13	Fwd	1-3	25	80
	2	Fwd	1-3	25	80
	23	Fwd	1-3	25	80
	28	Fwd	1-3	25	80
	33	Fwd	1-3	25	80
	17	Fwd	1-3	25	80
	9	Fwd	1-3	25	80
	2	Fwd	1-3	25	80
	11	Fwd	1-3	25	80
	22	Fwd	1-3	25	80
	15	Fwd	1-3	25	80
	48	Fwd	1-3	25	80
	32	Port	0-2	25	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	45	Port	0-2	25	80
	48	Port	0-2	25	80
	46	Port	0-2	25	80
	39	Port	0-2	25	80
	19	Port	0-2	25	80
	16	Port	0-2	25	80
	49	Port	0-2	25	80
	54	Port	0-2	25	80
	37	Port	0-2	25	80
	11	Various	0-2	25	80

Worksheet
 Combined Test Data
 2 feet above waterline

	29	Stbd	0-2	25	80
	48	Stbd	0-2	25	80
	49	Stbd	0-2	25	80
	47	Stbd	0-2	25	80
	51	Stbd	0-2	25	80
	51	Stbd	0-2	25	80
	50	Stbd	0-2	25	80
	27	Stbd	0-2	25	80
	14	Stbd	0-2	25	80
	8	Stbd	0-2	25	80
	4	Stbd	0-2	25	80
	2	Stbd	0-2	25	80
Av	31				
Max	58				
	20	Various	5+	6	40
	7	Various	5+	6	40
	14	Various	5+	6	40
	36	Various	5+	6	40
	45	Various	5+	6	40
	50	Various	5+	6	40
	34	Various	5+	6	40
	16	Various	5+	6	40
	37	Various	5+	6	40
	41	Various	5+	6	40
	33	Various	5+	6	40
	37	Various	5+	6	40
	44	Various	5+	6	40
	43	Various	5+	6	40
	39	Various	5+	6	40
	44	Various	5+	6	40
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	48	Various	5+	6	40
	43	Various	5+	6	40
	40	Various	5+	6	40
	41	Various	5+	6	40
	51	Various	5+	6	40
	50	Various	5+	6	40
	36	Various	5+	6	40
	43	Various	5+	6	40
	42	Various	5+	6	40
	42	Various	5+	6	40
	20	Various	5	6	80

Worksheet
 Combined Test Data
 2 feet above waterline

	8	Various	5+	6.5	40
	18	Various	5+	6.5	40
	20	Various	5+	6.5	40
	9	Various	5+	6.5	40
	29	Various	5+	6.5	40
	40	Various	5+	6.5	40
	24	Various	5+	6.5	40
	28	Various	5+	6.5	40
	35	Various	5+	6.5	40
	36	Various	5+	6.5	40
	13	Various	5+	6.5	40
	21	Various	5+	6.5	40
	51	Various	5+	6.5	40
	49	Various	5+	6.5	40
	43	Various	5+	6.5	40
	26	Various	5+	6.5	40
	32	Various	5+	6.5	40
	33	Various	5+	6.5	40
	24	Various	5+	6.5	40
	24	Various	5+	6.5	40
	33	Various	5+	6.5	40
	31	Various	5+	6.5	40
	10	Various	5+	6.5	40
	4	Various	5+	6.5	40
	3	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	3	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	3	Various	5+	6.5	40
	3	Various	5+	6.5	40
	3	Various	5+	6.5	40
	3	Various	5+	6.5	40
	3	Various	5+	6.5	40
	4	Various	5+	6.5	40
	3	Various	5+	6.5	40
	3	Various	5+	6.5	40
	3	Various	5+	6.5	40
	2	Various	5+	6.5	40

Worksheet
 Combined Test Data
 2 feet above waterline

	3	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	1	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	2	Various	5+	6.5	40
	6	Various	5+	6.5	40
	27	Various	5+	6.5	40
	38	Various	5+	6.5	40
	17	Various	5+	slow	
	7	Various	5+	slow	
	5	Various	5+	slow	
	18	Various	5+	slow	
	20	Various	5+	slow	
	9	Various	5+	slow	
	21	Various	5+	slow	
	31	Various	5+	slow	
	24	Various	5+	slow	
	0	various	3	various	various
	1	various	3	various	various
	0	various	3	various	various
	0	various	3	various	various
	1	various	3	various	various
	1	various	3	various	various
	4	various	3	various	various
	4	various	3	various	various
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	1	various	3	various	various
	0	Various	0-2	Various	20
	-1	Various	0-2	Various	20
	0	Various	0-2	Various	20
	-1	Various	0-2	Various	20
	0	Various	0-2	Various	20
	0	Various	0-2	Various	20
	-1	Various	0-2	Various	20
	0	Various	0-2	Various	20
	0	Various	0-2	Various	20
	0	Various	0-2	Various	20
	0	Various	0-2	Various	20
	86	Various	0-2	Slow	20

Worksheet
 Combined Test Data
 2 feet above waterline

	41	Various	0-2	Slow	20
	119	Various	0-2	Various	20
	121	Various	0-2	Various	20
	53	Various	0-2	Various	20
	23	Various	0-2	Various	40
	23	Various	0-2	Various	40
	10	Various	0-2	Various	40
	25	Various	0-2	Various	40
	8	Various	0-2	Various	40
	3	Various	0-2	Various	40
	3	Various	0-2	Various	40
	48	Various	0-2	Various	40
	48	Various	0-2	Various	40
	38	Various	1-3	Various	40
	26	Various	1-3	Various	40
	16	Various	1-3	Various	40
	16	Various	1-3	Various	60
	6	Various	1-3	Various	60
	4	Various	1-3	Various	60
	48	Various	1-3	Various	60
	30	Various	1-3	Various	60
	11	Various	1-3	Various	60
	7	Various	1-3	Various	60
	5	Various	1-3	Various	60
	16	Various	1-3	Various	60
	14	Fwd	1-3	Various	60
	34	Fwd	1-3	Various	60
	40	Fwd	1-3	Various	60
	11	Fwd	1-3	Various	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	9	Fwd	1-3	Various	60
	17	Fwd	1-3	Various	60
	15	Fwd	1-3	Various	60
	27	Fwd	1-3	Various	60
	19	Fwd	1-3	Various	60
	17	Various	1-3	Various	60
	12	Various	1-3	Various	60
	37	Various	1-3	Various	60
	34	Various	1-3	Various	60
	21	Various	1-3	Various	80
	5	Various	1-3	Various	80
	0	Various	1-3	Various	80
	19	Various	1-3	Various	80
	9	Various	1-3	Various	80

Worksheet
 Combined Test Data
 2 feet above waterline

	20	Various	1-3	Various	80
	37	Various	1-3	Various	80
	59	Various	1-3	Various	80
	67	Various	1-3	Various	20
	74	Various	1-3	Various	20
	58	Various	1-3	Various	20
	41	Various	1-3	Various	20
	71	Various	1-3	Various	20
	66	Various	1-3	Various	20
	66	Various	1-3	Various	20
	71	Various	1-3	Various	20
	70	Various	1-3	Various	20
	22	Various	1-3	Various	20
	28	Various	1-3	Various	20
	16	Various	1-3	Various	20
	1	Various	5	Various	80
	-1	Various	5	Various	80
	-2	Various	5	Various	80
	-2	Various	5	Various	80
	30	Various	5	Various	80
	95	Various	5	Various	80
	49	Various	5	Various	80
	6	Various	5	Various	80
	3	Various	5	Various	80
	-1	Various	5	Various	80
	7	Various	5	Various	80
	8	Various	5	Various	80
	84	Various	5	Various	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	86	Various	5	Various	80
	43	Various	5	Various	80
	7	Various	5	Various	80
	3	Various	5	Various	80
	1	Various	5	Various	80
	16	Various	5	Various	80
	5	Various	5	Various	80
	-1	Various	5	Various	80
	2	Various	5	Various	80
	13	Various	5	Various	80
	23	Various	5	Various	80
	35	Various	5	Various	80
	21	Various	5	Various	80
	6	Various	5	Various	80
	15	Various	5	Various	80

Worksheet
 Combined Test Data
 2 feet above waterline

	30	Fwd	5	Various	80
	22	Fwd	5	Various	80
	16	Fwd	5	Various	80
	4	Fwd	5	Various	80
	-1	Various	5	Slow	80
	0	Various	5	Slow	80
	7	Various	5	Slow	80
	12	Various	0-1	Slow	80
	-3	Various	0-1	Slow	80
	-3	Various	0-1	Slow	80
	-2	Various	0-1	Slow	80
	7	Various	0-1	Slow	80
	17	Various	0-1	Slow	80
	21	Various	0-1	Slow	80
	20	Various	0-1	Slow	80
	20	Various	0-2	Slow	80
	40	Various	0-2	Slow	80
	39	Various	0-2	Slow	80
	39	Various	0-2	Slow	80
	32	Various	0-2	Slow	80
	43	Various	0-2	Slow	80
	2	Various	0-2	Slow	80
	1	Various	0-2	Slow	80
	5	Various	0-2	Slow	80
	115	Various	0-2	Slow	80
	80	Various	0-2	Slow	80
	13	Various	0-2	Slow	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	
		Relative	MPH	MPH	Feet
	8	Various	0-2	Slow	80
	30	Various	0-2	Slow	80
	15	Various	0-2	Slow	80
	4	Various	0-2	Slow	80
	4	Various	0-2	Slow	80
	8	Various	0-2	Slow	80
	14	Various	0-2	Slow	80
	27	Various	0-2	Slow	80
	40	Various	0-2	Slow	80
	33	Various	0-2	Slow	80
	18	Various	0-2	Slow	80
	18	Various	0-2	Slow	80
	11	Various	0-2	Slow	80
	20	Various	0-2	Slow	80
	23	Various	0-2	Slow	80
	29	Various	0-2	Slow	60

Spreadsheet
 Combined Test Data
 5 feet above waterline

	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	-1	-1	N/A		3		
	0	-1	N/A		3		
	0	0	N/A		3		
	0	0	N/A		3		
	0	0	N/A		3		
	0	0	N/A		3		
	-1	0	N/A		3		
	0	0	N/A		3		
	0	0	N/A		3		
	0	0	N/A		3	7.5	20
	0	0	N/A	port	3	7.5	20
	0	0	N/A	port	3	7.5	20
	0	0	N/A	port	3	7.5	20
	-1	0	N/A	port	3	7.5	20
	-1	0	N/A	port	3	7.5	20
	0	0	N/A	port	3	7.5	20
	-1	0	N/A	port	3	7.5	20
	-1	0	N/A	port	3	7.5	20
	0	0	N/A	port	3	7.5	20
	-1	0	N/A	port	3	7.5	20
	0	0	N/A	port	3	7.5	20
	0	0	N/A	port	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	9	0	N/A	stbd	3	7.5	20
	4	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	0	0	N/A	stbd	3	7.5	20
	-1	0	N/A	stbd	3	7.5	20
	-1	0	N/A	aft	3	7.5	20
	-1	0	N/A	aft	3	7.5	20
	-1	0	N/A	aft	3	7.5	20

Spreadsheet
 Combined Test Data
 5 feet above waterline

	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	10	5	N/A	aft	3	7.5	20
	-1	5	N/A	aft	3	7.5	20
	-1	4	N/A	aft	3	7.5	20
	-1	4	N/A	aft	3	7.5	20
	-1	4	N/A	aft	3	7.5	20
	0	4	N/A	aft	3	7.5	20
	27	5	N/A	aft	3	7.5	20
	10	5	N/A	aft	3	7.5	20
	1	5	N/A	aft	3	7.5	20
	4	5	N/A	aft	3	7.5	20
	4	5	N/A	fwd	3	7.5	20
	5	5	N/A	fwd	3	7.5	20
	7	5	N/A	fwd	3	7.5	20
	8	5	N/A	fwd	3	7.5	20
	12	5	N/A	fwd	3	7.5	20
	8	5	N/A	fwd	3	7.5	20
	16	5	N/A	fwd	3	7.5	20
	16	5	N/A	fwd	3	7.5	20
	11	5	N/A	fwd	3	7.5	20
	16	5	N/A	fwd	3	7.5	20
	11	6	N/A	fwd	3	7.5	20
	9	6	N/A	fwd	3	7.5	20
	8	6	N/A	fwd	3	7.5	20
	2	6	N/A	fwd	3	7.5	20
	1	5	N/A	fwd	3	7.5	20
	5	5	N/A	fwd	3	7.5	20
	7	6	N/A	fwd	3	7.5	20
	32	6	N/A	fwd	3	7.5	20
	-1	0	N/A	Aft	0-2	7.5	20
	-1	0	N/A	Aft	0-2	7.5	20
	0	0	N/A	Aft	0-2	7.5	20
	13	0	N/A	Aft	0-2	7.5	20
	14	1	N/A	Aft	0-2	7.5	20
	12	1	N/A	Aft	0-2	7.5	20
	12	2	N/A	Aft	0-2	7.5	20
	2	2	N/A	Aft	0-2	7.5	20
	0	2	N/A	Aft	0-2	7.5	20
	15	4	N/A	Fwd	0-2	7.5	20
	18	4	N/A	Fwd	0-2	7.5	20
	15	5	N/A	Fwd	0-2	7.5	20
	10	5	N/A	Fwd	0-2	7.5	20
	10	5	N/A	Fwd	0-2	7.5	20
	7	5	N/A	Fwd	0-2	7.5	20
	16	6	N/A	aft	3	10	20

Spreadsheet
 Combined Test Data
 5 feet above waterline

				Relative	MPH	MPH	
	3	7	N/A	aft	3	10	20
	11	7	N/A	aft	3	10	20
	26	7	N/A	aft	3	10	20
	38	8	N/A	aft	3	10	20
	8	8	N/A	aft	3	10	20
	1	8	N/A	aft	3	10	20
	0	8	N/A	aft	3	10	20
	0	7	N/A	stbd	3-5	10	20
	1	7	N/A	stbd	3-5	10	20
	1	7	7	stbd	3-5	10	20
	1	7	7	stbd	3-5	10	20
	1	7	7	stbd	3-5	10	20
	1	7	7	stbd	3-5	10	20
	1	7	7	stbd	3-5	10	20
	0	7	7	stbd	3-5	10	20
	0	7	7	stbd	3-5	10	20
	-1	7	7	stbd	3-5	10	20
	-1	7	7	stbd	3-5	10	20
	-1	7	7	stbd	3-5	10	20
	-1	7	7	stbd	3-5	10	20
	-1	7	7	stbd	3-5	10	20
	-1	6	7	stbd	3-5	10	20
	1	6	7	stbd	3-5	10	20
	9	6	8	stbd	3-5	10	20
	20	7	8	stbd	3-5	10	20
	21	7	8	stbd	3-5	10	20
	10	7	8	fwd	3-5	10	20
	4	7	8	fwd	3-5	10	20
	2	7	8	fwd	3-5	10	20
	14	7	8	fwd	3-5	10	20
	23	7	9	fwd	3-5	10	20
	10	7	9	port	3-5	10	20
	2	7	9	port	3-5	10	20
	22	7	9	port	3-5	10	20
	21	7	9	port	3-5	10	20
	5	7	9	port	3-5	10	20
	3	7	9	port	3-5	10	20
	0	7	9	port	3-5	10	20
	-1	7	9	port	3-5	10	20
	-1	7	9	port	3-5	10	20
	-1	7	9	port	3-5	10	20
	5	7	9	port	3-5	10	20
	6	7	9	port	3-5	10	20
	-1	7	9	port	3-5	10	20
	0	7	9	port	3-5	10	20

Spreadsheet
 Combined Test Data
 5 feet above waterline

	0	7	9	port	3-5	10	20
	0	6	9	port	3-5	10	20
	-1	6	9	port	3-5	10	20
	-1	6	9	port	3-5	10	20
	-1	6	9	port	3-5	10	20
	0	6	9	port	3-5	10	20
	6	6	9	port	3-5	10	20
	3	6	8	port	3-5	10	20
	8	6	7	port	3-5	10	20
	3	6	7	port	3-5	10	20
	0	6	7	port	3-5	10	20
	-1	6	7	port	3-5	10	20
	-1	6	7	port	3-5	10	20
	0	6	7	port	3-5	10	20
	0	6	7	port	3-5	10	20
	-1	6	7	port	3-5	10	20
	0	6	7	port	3-5	10	20
	0	6	7	port	3-5	10	20
	6	2	N/A	Aft	0-2	10	20
	5	2	N/A	Aft	0-2	10	20
	3	2	N/A	Aft	0-2	10	20
	0	2	N/A	Aft	0-2	10	20
	0	2	N/A	Aft	0-2	10	20
	0	2	N/A	Aft	0-2	10	20
	1	2	N/A	Aft	0-2	10	20
	0	2	N/A	Aft	0-2	10	20
	7	5	N/A	Fwd	0-2	10	20
	4	5	N/A	Fwd	0-2	10	20
	9	5	N/A	Fwd	0-2	10	20
	10	5	N/A	Fwd	0-2	10	20
	6	5	N/A	Fwd	0-2	10	20
	3	5	N/A	Fwd	0-2	10	20
	4	5	N/A	Fwd	0-2	10	20
	4	5	N/A	Fwd	0-2	10	20
	3	5	N/A	Fwd	0-2	10	20
	0	6	7	stbd	3-5	7.5	40
	0	6	6	stbd	3-5	7.5	40
	0	6	6	stbd	3-5	7.5	40
	-1	6	6	stbd	3-5	7.5	40
	0	6	6	stbd	3-5	7.5	40
	-1	6	6	stbd	3-5	7.5	40
	-1	6	6	stbd	3-5	7.5	40
	0	5	6	stbd	3-5	7.5	40
	-1	5	6	stbd	3-5	7.5	40
	-1	5	5	sthd	3-5	7.5	40

Spreadsheet
 Combined Test Data
 5 feet above waterline

	-1	5	5	port	3-5	7.5	40
	-1	5	5	port	3-5	7.5	40
	0	5	5	port	3-5	7.5	40
	0	5	5	port	3-5	7.5	40
	0	5	4	port	3-5	7.5	40
	0	5	4	port	3-5	7.5	40
	0	5	3	port	3-5	7.5	40
	0	5	3	port	3-5	7.5	40
	0	5	3	port	3-5	7.5	40
	0	5	3	port	3-5	7.5	40
	0	5	3	port	3-5	7.5	40
	0	5	3	port	3-5	7.5	40
	0	5	3	fwd	3-5	7.5	40
	0	5	2	fwd	3-5	7.5	40
	0	5	2	fwd	3-5	7.5	40
	0	5	2	fwd	3-5	7.5	40
	0	5	2	fwd	3-5	7.5	40
	-1	5	2	fwd	3-5	7.5	40
	0	5	2	fwd	3-5	7.5	40
	0	4	2	fwd	3-5	7.5	40
	0	4	2	fwd	3-5	7.5	40
	0	4	1	fwd	3-5	7.5	40
	0	4	1	fwd	3-5	7.5	40
	0	4	1	fwd	3-5	7.5	40
	-1	4	1	aft	3-5	7.5	40
	0	4	1	aft	3-5	7.5	40
	14	4	2	aft	3-5	7.5	40
	9	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	2	aft	3-5	7.5	40
	0	4	1	aft	3-5	7.5	40
	0	4	1	aft	3-5	7.5	40
	0	4	1	aft	3-5	7.5	40
	1	4	1	aft	3-5	7.5	40
	0	4	N/A	Aft	0-2	7.5	40
	0	4	N/A	Aft	0-2	7.5	40
	-1	4	N/A	Aft	0-2	7.5	40
	-1	4	N/A	Aft	0-2	7.5	40
	-1	4	N/A	Aft	0-2	7.5	40
	-1	4	N/A	Aft	0-2	7.5	40
	-1	4	N/A	Aft	0-2	7.5	40
	-1	4	N/A	Aft	0-2	7.5	40
	0	4	N/A	Aft	0-2	7.5	40

Spreadsheet
 Combined Test Data
 5 feet above waterline

	0	3	4	Fwd	1-2	7.5	40
	-1	3	4	Fwd	1-2	7.5	40
	0	3	4	Fwd	1-2	7.5	40
	1	3	4	Fwd	1-2	7.5	40
	3	4	1	fwd	3-5	10	40
	9	4	1	fwd	3-5	10	40
	12	4	1	fwd	3-5	10	40
	4	4	1	fwd	3-5	10	40
	2	4	1	fwd	3-5	10	40
	3	4	1	fwd	3-5	10	40
	1	4	0	fwd	3-5	10	40
	4	4	0	fwd	3-5	10	40
	8	4	0	fwd	3-5	10	40
	4	4	0	aft	3-5	10	40
	6	4	0	aft	3-5	10	40
	15	4	0	aft	3-5	10	40
	9	4	1	aft	3-5	10	40
	-1	4	1	aft	3-5	10	40
	-1	4	0	aft	3-5	10	40
	-1	4	0	aft	3-5	10	40
	-1	4	0	aft	3-5	10	40
	-1	4	0	aft	3-5	10	40
	0	4	0	aft	3-5	10	40
	-1	4	0	aft	3-5	10	40
	-1	4	0	aft	3-5	10	40
	0	4	0	aft	3-5	10	40
	0	4	0	stbd	3-5	10	40
	9	4	0	stbd	3-5	10	40
	6	4	0	stbd	3-5	10	40
	-1	4	0	stbd	3-5	10	40
	-1	4	0	stbd	3-5	10	40
	-1	4	0	stbd	3-5	10	40
	-1	4	0	stbd	3-5	10	40
	-1	4	0	stbd	3-5	10	40
	0	4	0	stbd	3-5	10	40
	0	4	0	stbd	3-5	10	40
	0	4	0	stbd	3-5	10	40
	0	4	0	stbd	3-5	10	40
	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	4	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40

Spreadsheet
 Combined Test Data
 5 feet above waterline

	0	4	0	port	3-5	10	40
	0	4	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	0	3	0	port	3-5	10	40
	-1	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	-1	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	0	4	N/A	Aft	0-2	10	40
	11	4	N/A	Aft	0-2	10	40
	0	3	4	Fwd	1-2	10	40
	0	3	4	Fwd	1-2	10	40
	4	3	4	Fwd	1-2	10	40
	5	3	4	Fwd	1-2	10	40
	2	3	4	Fwd	1-2	10	40
	5	3	4	Fwd	1-2	10	40
	6	3	4	Fwd	1-2	10	40
	10	3	4	Fwd	1-2	10	40
	13	4	N/A	Aft	0-2	20	40
	3	4	N/A	Aft	0-2	20	40
	0	4	N/A	Aft	0-2	20	40
	0	4	N/A	Aft	0-2	20	40
	23	3	4	Fwd	1-3	20	40
	20	3	4	Fwd	1-3	20	40
	9	4	4	Fwd	1-3	20	40
	0	3	0	fwd	3-5	7.5	60
	0	3	0	fwd	3-5	7.5	60
	0	3	0	fwd	3-5	7.5	60
	-1	3	0	fwd	3-5	7.5	60
	4	3	0	fwd	3-5	7.5	60
	0	3	0	fwd	3-5	7.5	60
	-1	3	0	fwd	3-5	7.5	60
	0	3	0	fwd	3-5	7.5	60
	-1	3	0	fwd	3-5	7.5	60
	C.O	Average	STEL	Wind	Wind	Boat	Distance

Spreadsheet
 Combined Test Data
 5 feet above waterline

	0	3	0	aft	3-5	7.5	60
	-1	3	0	aft	3-5	7.5	60
	0	3	0	aft	3-5	7.5	60
	0	3	0	aft	3-5	7.5	60
	0	3	0	aft	3-5	7.5	60
	0	3	0	aft	3-5	7.5	60
	0	3	0	aft	3-5	7.5	60
	0	3	0	aft	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	stbd	3-5	7.5	60
	0	3	0	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	3	3	-1	port	3-5	7.5	60
	3	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	3	-1	port	3-5	7.5	60
	0	2	-1	port	3-5	7.5	60
	0	4	4	Aft	1-3	7.5	60
	0	4	4	Aft	1-3	7.5	60
	0	4	4	Aft	1-3	7.5	60
	0	4	4	Aft	1-3	7.5	60
	1	4	4	Aft	1-3	7.5	60
	1	4	4	Aft	1-3	7.5	60
	4	4	3	Aft	1-3	7.5	60
	1	4	3	Aft	1-3	7.5	60
	0	4	3	Aft	1-3	7.5	60
	15	5	6	Fwd	1-3	7.5	60
	15	5	6	Fwd	1-3	7.5	60
	16	5	6	Fwd	1-3	7.5	60
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet

Spreadsheet
 Combined Test Data
 5 feet above waterline

	11	6	7	Fwd	1-3	7.5	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	-1	port	3-5	10	60
	0	2	0	port	3-5	10	60
	0	2	0	port	3-5	10	60
	0	2	0	fwd	3-5	10	60
	3	2	0	fwd	3-5	10	60
	4	2	0	fwd	3-5	10	60
	2	2	0	fwd	3-5	10	60
	4	2	0	fwd	3-5	10	60
	4	2	0	fwd	3-5	10	60
	11	2	0	fwd	3-5	10	60
	12	2	0	fwd	3-5	10	60
	3	2	0	stbd	3-5	10	60
	3	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	stbd	3-5	10	60
	0	2	-1	aft	3-5	10	60
	0	2	-1	aft	3-5	10	60
	0	2	-1	aft	3-5	10	60
	0	2	-1	aft	3-5	10	60
	0	2	-1	aft	3-5	10	60
	0	2	-1	aft	3-5	10	60
	24	4	3	Aft	1-3	10	60
	19	4	3	Aft	1-3	10	60
	2	4	3	Aft	1-3	10	60
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	

Spreadsheet
 Combined Test Data
 5 feet above waterline

	16	4	4	Aft	1-3	10	60
	4	6	7	Fwd	1-3	10	60
	13	6	7	Fwd	1-3	10	60
	11	6	7	Fwd	1-3	10	60
	8	6	7	Fwd	1-3	10	60
	1	6	7	Fwd	1-3	10	60
	7	6	7	Fwd	1-3	10	60
	0	2	-1	aft	3-5	20	60
	8	2	0	aft	3-5	20	60
	15	2	0	aft	3-5	20	60
	3	2	-1	aft	3-5	20	60
	0	2	-1	aft	3-5	20	60
	7	2	-1	aft	3-5	20	60
	8	2	-1	aft	3-5	20	60
	17	2	-1	aft	3-5	20	60
	16	2	-1	aft	3-5	20	60
	-1	2	-1	various	3-5		
	-1	2	-1	various	3-5		
	1	2	-1	various	3-5		
	0	2	-1	various	3-5		
	16	2	-1	fwd	3-5	20	60
	24	2	0	fwd	3-5	20	60
	14	2	0	fwd	3-5	20	60
	16	2	0	fwd	3-5	20	60
	16	2	0	fwd	3-5	20	60
	15	2	0	fwd	3-5	20	60
	11	2	1	fwd	3-5	20	60
	13	4	4	Aft	1-3	20	60
	8	4	4	Aft	1-3	20	60
	30	4	4	Aft	1-3	20	60
	40	5	5	Aft	1-3	20	60
	34	5	5	Aft	1-3	20	60
	9	6	7	Fwd	1-3	20	60
	7	6	8	Fwd	1-3	20	60
	5	6	8	Fwd	1-3	20	60
	3	6	8	Fwd	1-3	20	60
	2	6	8	Fwd	1-3	20	60
	12	6	8	Fwd	1-3	20	60
	5	2	1	fwd	3-5		
	1	2	1	various	3-5		
	3	2	1	various	3-5		
	2	2	1	various	3-5		
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	0	2	1	various	3-5		

Spreadsheet
 Combined Test Data
 5 feet above waterline

	20	3	2	aft	3-5	25	60
	18	3	2	aft	3-5	25	60
	14	3	2	aft	3-5	25	60
	11	3	2	aft	3-5	25	60
	3	3	3	aft	3-5	25	60
	22	5	5	Aft	1-3	25	60
	12	5	5	Aft	1-3	25	60
	10	5	6	Aft	1-3	25	60
	2	6	8	Fwd	1-3	25	60
	2	6	8	Fwd	1-3	25	60
	2	6	8	Fwd	1-3	25	60
	6	6	8	Fwd	1-3	25	60
	6	6	8	Various	1-3	25	60
	4	3	3		3-5		
	3	3	3		3-5		
	3	3	3		3-5		
	2	3	3		3-5		
	0	3	3		3-5		
	18	3	3		3-5		
	22	3	3		3-5		
	4	3	3		3-5		
	-1	3	3		3-5		
	0	3	3		3-5		
	-1	3	3		3-5		
	-1	3	3		3-5		
	-1	3	3	fwd	3-5	7.5	80
	0	3	3	fwd	5	7.5	80
	0	3	3	fwd	5	7.5	80
	8	3	4	fwd	5	7.5	80
	7	3	4	fwd	5	7.5	80
	6	3	4	fwd	5	7.5	80
	14	3	4	fwd	5	7.5	80
	15	3	4	fwd	5	7.5	80
	11	3	4	fwd	5	7.5	80
	16	3	5	fwd	5	7.5	80
	12	3	5	fwd	5	7.5	80
	6	3	5	fwd	5	7.5	80
	6	3	5	port	5	7.5	80
	7	3	5	port	5	7.5	80
	2	3	5	port	5	7.5	80
	0	3	5	port	5	7.5	80
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	0	3	5	port	5	7.5	80
	-1	3	5	port	5	7.5	80

Spreadsheet
 Combined Test Data
 5 feet above waterline

	1	3	5	aft	5	7.5	80
	-1	3	5	aft	5	7.5	80
	0	3	5	aft	5	7.5	80
	0	3	5	aft	5	7.5	80
	0	3	5	aft	5	7.5	80
	-1	3	5	aft	5	7.5	80
	4	3	5	stbd	5	7.5	80
	8	3	5	stbd	5	7.5	80
	3	3	5	stbd	5	7.5	80
	0	3	5	stbd	5	7.5	80
	1	3	5	stbd	5	7.5	80
	-1	3	5	stbd	5	7.5	80
	0	3	5	stbd	5	7.5	80
	-1	3	5	stbd	5	7.5	80
	0	3	5	stbd	5	7.5	80
	20	6	8	Aft	1-3	7.5	80
	2	6	8	Aft	1-3	7.5	80
	0	6	8	Aft	1-3	7.5	80
	1	6	8	Aft	1-3	7.5	80
	32	6	8	Aft	1-3	7.5	80
	33	6	8	Aft	1-3	7.5	80
	1	6	8	Fwd	1-3	7.5	80
	0	6	8	Fwd	1-3	7.5	80
	0	6	8	Fwd	1-3	7.5	80
	0	6	8	Fwd	1-3	7.5	80
	-1	6	8	Fwd	1-3	7.5	80
	0	6	7	Fwd	1-3	7.5	80
	0	6	7	Fwd	1-3	7.5	80
	0	6	6	Fwd	1-3	7.5	80
	-1	3	5	fwd	5	10	80
	9	3	5	fwd	5	10	80
	7	3	5	fwd	5	10	80
	1	3	6	fwd	5	10	80
	6	3	6	fwd	5	10	80
	6	3	5	fwd	5	10	80
	6	3	5	fwd	5	10	80
	12	3	6	fwd	5	10	80
	9	3	6	fwd	5	10	80
	25	6	8	Aft	1-3	10	80
	21	6	9	Aft	1-3	10	80
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	6	6	9	Aft	1-3	10	80
	0	6	9	Aft	1-3	10	80
	0	6	9	Aft	1-3	10	80

Spreadsheet
 Combined Test Data
 5 feet above waterline

	1	5	6	Fwd	1-3	10	80
	0	5	6	Fwd	1-3	10	80
	8	5	6	Fwd	1-3	10	80
	18	6	6	Fwd	1-3	10	80
	12	3	6	fwd	5	20	80
	11	3	6	fwd	5	20	80
	13	3	6	fwd	5	20	80
	14	3	6	fwd	5	20	80
	12	3	6	fwd	5	20	80
	18	3	6	fwd	5	20	80
	5	6	9	Aft	1-3	20	80
	6	6	9	Aft	1-3	20	80
	5	6	9	Aft	1-3	20	80
	6	6	9	Aft	1-3	20	80
	7	6	9	Aft	1-3	20	80
	7	6	9	Aft	1-3	20	80
	18	6	6	Fwd	1-3	20	80
	21	6	6	Fwd	1-3	20	80
	19	6	7	Fwd	1-3	20	80
	20	6	7	Fwd	1-3	20	80
	20	6	7	Fwd	1-3	20	80
	19	6	7	Fwd	1-3	20	80
	17	3	6	fwd	5	25	80
	17	3	6	fwd	5	25	80
	16	3	6	fwd	5	25	80
	10	3	6	fwd	5	25	80
	4	6	9	Aft	1-3	25	80
	7	6	9	Aft	1-3	25	80
	6	6	9	Aft	1-3	25	80
	5	6	9	Aft	1-3	25	80
	18	6	7	Fwd	1-3	25	80
	12	6	7	Fwd	1-3	25	80
	6	6	7	Fwd	1-3	25	80
	3	6	7	Fwd	1-3	25	80
	9	6	7	Fwd	1-3	25	80
	9	6	7	Fwd	1-3	25	80
	8	6	7	Fwd	1-3	25	80
	2	6	7	Fwd	1-3	25	80
	2	6	6	Fwd	1-3	25	80
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	1	6	6	Fwd	1-3	25	80
	4	6	6	Fwd	1-3	25	80
	3	6	6	Fwd	1-3	25	80
	1	6	6	Fwd	1-3	25	80

Spreadsheet
 Combined Test Data
 5 feet above waterline

	28	3	6	aft	5	10	80
	22	3	6	aft	5	10	80
	18	3	6	aft	5	10	80
	16	3	7	aft	5	10	80
	8	3	7	aft	5	10	80
	9	3	7	aft	5	10	80
	3	3	7	aft	5	10	80
	0	3	7	aft	5	10	80
	12	3	7	aft	5	20	80
	12	3	7	aft	5	20	80
	11	3	7	aft	5	20	80
	16	3	7	aft	5	20	80
	15	3	7	aft	5	20	80
	15	3	7	aft	5	25	80
	15	3	7	aft	5	25	80
	10	3	7	aft	5	25	80
	11	3	7	aft	5	25	80
	5	3	7		5		
	1	3	7		5		
	4	3	7		5		
	9	3	7		5		
	5	3	7		5		
	8	3	7		5		
	11	4	7		5		
	10	4	7		5		
	11	4	7		5		
	4	4	7	various	5	6	40
	3	4	7	various	5	6	40
	3	4	7	various	5	6	40
	6	4	7	various	5	6	40
	7	4	7	various	5	6	40
	4	4	7	various	5	6	40
	1	4	7	various	5	6	40
	9	4	7	various	5	6	40
	16	4	7	various	5	6	40
	16	4	7	various	5	6	40
	5	4	7	various	5	6	40
	7	4	7	various	5	6	40
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	13	4	7	various	5	6	40
	16	4	7	various	5	6	40
	16	4	7	various	5	6	40
	14	4	7	various	5	6	40
	17	4	7	various	5	6	40

Spreadsheet
 Combined Test Data
 5 feet above waterline

	15	4	8	various	5	6	40
	14	4	8	various	5	6	40
	6	4	8	various	5	6	40
	4	4	8	various	5	10	40
	0	4	8	various	5	10	40
	4	4	8	various	5	10	40
	8	4	9	various	5	10	40
	7	4	9	various	5	10	40
	8	4	9	various	5	10	40
	6	4	9	various	5	10	40
	7	4	9	various	5	10	40
	6	4	9	various	5	10	40
	5	4	9	various	5	10	40
	9	4	9	various	5	10	40
	7	4	9	various	5	10	40
	8	4	9	various	5	10	40
	2	4	9	various	5	10	40
	6	4	9	various	5	10	40
	10	4	9	various	5	10	40
	8	4	9	various	5	10	40
	9	4	9	various	5	10	40
	10	4	10	various	5	10	40
	7	4	10	various	5	10	40
	8	4	10	various	5	10	40
	15	4	10	various	5	10	40
	14	4	10	various	5	10	40
	5	4	10	various	5	10	40
	8	4	10	various	5	7.5	40
	12	4	10	various	5	7.5	40
	13	4	10	various	5	7.5	40
	3	4	10	various	5	7.5	40
	1	4	9	various	5	7.5	40
	1	4	9	various	5	7.5	40
	-1	4	9	various	5	6.5	40
	-1	4	9	various	5	6.5	40
	10	4	9	various	5	6.5	40
	6	4	9	various	5	6.5	40
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	-1	4	9	various	5	6.5	40
	3	4	9	various	5	6.5	40
	3	4	9	various	5	6.5	40
	0	4	8	various	5	6.5	40
	1	4	8	various	5	6.5	40
	6	4	8	various	5	6.5	40

Spreadsheet
 Combined Test Data
 5 feet above waterline

	5	4	8	various	5	6.5	40
	7	4	8	various	5	6.5	40
	4	4	7	various	5	6.5	40
	3	4	7	various	5	6.5	40
	4	4	7	various	5	6.5	40
	3	4	7	various	5	6.5	40
	0	4	7	various	5	6.5	40
	0	4	7	various	5	6.5	40
	1	4	7	various	5	6.5	40
	0	4	7	various	5	6.5	40
	0	4	7	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	6	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	5	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	4	various	5	6.5	40
	0	4	3	various	5	6.5	40
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	0	4	3	various	5	6.5	40
	0	4	3	various	5	6.5	40
	0	4	3	various	5	6.5	40
	0	4	3	various	5	6.5	40
	0	4	3	various	5	6.5	40
	0	4	3	various	5	6.5	40
	29	4	3		5		10

Spreadsheet
 Combined Test Data
 5 feet above waterline

	5	4	N/A	Various	0-2	Slow	20
	15	4	N/A	Various	0-2	Slow	20
	0	5	N/A	Various	0-2	Slow	20
	0	5	N/A	Various	0-2	Slow	20
	3	5	N/A	Various	0-2	Slow	20
	3	5	N/A	Various	0-2	Slow	40
	0	5	N/A	Various	0-2	Slow	40
	0	5	N/A	Various	0-2	Slow	40
	0	3	3	Various	0-2	Slow	40
	0	3	3	Various	0-2	Slow	40
	2	3	4	Various	0-2	Slow	40
	5	3	4	Various	0-2	Slow	40
	0	3	4	Various	0-2	Slow	40
	0	3	4	Various	0-2	Slow	40
	2	4	5	Various	1-3	Slow	40
	2	4	5	Various	1-3	Slow	40
	1	4	5	Various	1-3	Slow	40
	0	4	5	Various	1-3	Slow	60
	1	4	5	Various	1-3	Slow	60
	0	4	4	Various	1-3	Slow	60
	6	5	6	Various	1-3	Slow	60
	2	5	6	Various	1-3	Slow	60
	1	5	6	Various	1-3	Slow	60
	1	5	6	Various	1-3	Slow	60
	3	5	6	Various	1-3	Slow	60
	4	5	6	Various	1-3	Slow	60
	10	6	8	Fwd	1-3	Slow	60
	4	6	8	Fwd	1-3	Slow	60
	0	6	8	Fwd	1-3	Slow	60
	2	6	8	Fwd	1-3	Slow	60
	4	6	8	Fwd	1-3	Slow	60
	6	6	8	Fwd	1-3	Slow	60
	8	6	8	Fwd	1-3	Slow	60
	5	6	8	Fwd	1-3	Slow	60
	3	6	8	Fwd	1-3	Slow	60
	CO	Average	STEL	Wind	Wind	Boat	Distance
	Peak			Direction	Speed	Speed	Feet
				Relative	MPH	MPH	
	9	6	8	Various	1-3	Slow	60
	6	6	8	Various	1-3	Slow	60
	0	6	8	Various	1-3	Slow	60
	0	6	8	Various	1-3	Slow	60
	0	5	8	Various	1-3	Slow	80
	2	5	8	Various	1-3	Slow	80
	23	6	8	Various	1-3	Slow	80
	2	6	9	Various	1-3	Slow	80

Spreadsheet
Combined Test Data
5 feet above waterline

	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
	-1	6	6	Various	1-3	Various	20
	0	6	6	Various	1-3	Various	20
Average	5		5				
Maximum	94		10				
Count	845						

Worksheet
 Combined Test Data
 5 feet above waterline

	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	0	port	3	7.5	20
	0	port	3	7.5	20
	0	port	3	7.5	20
	0	port	3	7.5	20
	-1	port	3	7.5	20
	-1	port	3	7.5	20
	0	port	3	7.5	20
	-1	port	3	7.5	20
	-1	port	3	7.5	20
	0	port	3	7.5	20
	-1	port	3	7.5	20
	0	port	3	7.5	20
	0	port	3	7.5	20
	-1	stbd	3	7.5	20
	0	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	9	stbd	3	7.5	20
	4	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	0	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	0	stbd	3	7.5	20
	0	stbd	3	7.5	20
	0	stbd	3	7.5	20
	0	stbd	3	7.5	20
	0	stbd	3	7.5	20
	0	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	0	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	0	stbd	3	7.5	20
	-1	stbd	3	7.5	20
	-1	aft	3	7.5	20
	-1	aft	3	7.5	20
	-1	aft	3	7.5	20
	-1	aft	3	7.5	20
	8	aft	3	7.5	20
	33	aft	3	7.5	20
	94	aft	3	7.5	20
	85	aft	3	7.5	20
	10	aft	3	7.5	20
	-1	aft	3	7.5	20
	-1	aft	3	7.5	20
	-1	aft	3	7.5	20

Worksheet
 Combined Test Data
 5 feet above waterline

	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	1	aft	3	7.5	20
	4	aft	3	7.5	20
	4	fwd	3	7.5	20
	5	fwd	3	7.5	20
	7	fwd	3	7.5	20
	8	fwd	3	7.5	20
	12	fwd	3	7.5	20
	8	fwd	3	7.5	20
	16	fwd	3	7.5	20
	16	fwd	3	7.5	20
	11	fwd	3	7.5	20
	16	fwd	3	7.5	20
	11	fwd	3	7.5	20
	9	fwd	3	7.5	20
	8	fwd	3	7.5	20
	2	fwd	3	7.5	20
	1	fwd	3	7.5	20
	5	fwd	3	7.5	20
	7	fwd	3	7.5	20
	32	fwd	3	7.5	20
	-1	Aft	0-2	7.5	20
	-1	Aft	0-2	7.5	20
	0	Aft	0-2	7.5	20
	13	Aft	0-2	7.5	20
	14	Aft	0-2	7.5	20
	12	Aft	0-2	7.5	20
	12	Aft	0-2	7.5	20
	2	Aft	0-2	7.5	20
	0	Aft	0-2	7.5	20
	15	Fwd	0-2	7.5	20
	18	Fwd	0-2	7.5	20
	15	Fwd	0-2	7.5	20
	10	Fwd	0-2	7.5	20
	10	Fwd	0-2	7.5	20
	7	Fwd	0-2	7.5	20
Av	7				
Max	94				
	16	aft	3	10	20
	56	aft	3	10	20
	34	aft	3	10	20
	20	aft	3	10	20
	10	aft	3	10	20
	3	aft	3	10	20

Worksheet
 Combined Test Data
 5 feet above waterline

		Relative	MPH	MPH	
	8	aft	3	10	20
	1	aft	3	10	20
	0	aft	3	10	20
	0	stbd	3-5	10	20
	1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	0	stbd	3-5	10	20
	0	stbd	3-5	10	20
	-1	stbd	3-5	10	20
	-1	stbd	3-5	10	20
	-1	stbd	3-5	10	20
	-1	stbd	3-5	10	20
	-1	stbd	3-5	10	20
	1	stbd	3-5	10	20
	9	stbd	3-5	10	20
	20	stbd	3-5	10	20
	21	stbd	3-5	10	20
	10	fwd	3-5	10	20
	4	fwd	3-5	10	20
	2	fwd	3-5	10	20
	14	fwd	3-5	10	20
	23	fwd	3-5	10	20
	10	port	3-5	10	20
	2	port	3-5	10	20
	22	port	3-5	10	20
	21	port	3-5	10	20
	5	port	3-5	10	20
	3	port	3-5	10	20
	0	port	3-5	10	20
	-1	port	3-5	10	20
	-1	port	3-5	10	20
	-1	port	3-5	10	20
	5	port	3-5	10	20
	6	port	3-5	10	20
	-1	port	3-5	10	20
	0	port	3-5	10	20
	4	port	3-5	10	20
	6	port	3-5	10	20
	0	port	3-5	10	20
	0	port	3-5	10	20

Worksheet
 Combined Test Data
 5 feet above waterline

	-1	port	3-5	10	20
	-1	port	3-5	10	20
	0	port	3-5	10	20
	6	port	3-5	10	20
	3	port	3-5	10	20
	8	port	3-5	10	20
	3	port	3-5	10	20
	0	port	3-5	10	20
	-1	port	3-5	10	20
	-1	port	3-5	10	20
	0	port	3-5	10	20
	0	port	3-5	10	20
	-1	port	3-5	10	20
	0	port	3-5	10	20
	0	port	3-5	10	20
	0	port	3-5	10	20
	6	Aft	0-2	10	20
	5	Aft	0-2	10	20
	3	Aft	0-2	10	20
	0	Aft	0-2	10	20
	0	Aft	0-2	10	20
	0	Aft	0-2	10	20
	1	Aft	0-2	10	20
	0	Aft	0-2	10	20
	7	Fwd	0-2	10	20
	4	Fwd	0-2	10	20
	9	Fwd	0-2	10	20
	10	Fwd	0-2	10	20
	6	Fwd	0-2	10	20
	3	Fwd	0-2	10	20
	4	Fwd	0-2	10	20
	4	Fwd	0-2	10	20
	3	Fwd	0-2	10	20
Av	5				
Max	56				
	0	stbd	3-5	7.5	40
	0	stbd	3-5	7.5	40
	0	stbd	3-5	7.5	40
	-1	stbd	3-5	7.5	40
	0	stbd	3-5	7.5	40
	-1	stbd	3-5	7.5	40
	-1	stbd	3-5	7.5	40
	0	stbd	3-5	7.5	40
	-1	stbd	3-5	7.5	40
	-1	stbd	3-5	7.5	40

Worksheet
 Combined Test Data
 5 feet above waterline

	0	Fwd	1-2	7.5	40
	-1	Fwd	1-2	7.5	40
	0	Fwd	1-2	7.5	40
	-1	Fwd	1-2	7.5	40
	0	Fwd	1-2	7.5	40
	1	Fwd	1-2	7.5	40
	8	various	5	7.5	40
	12	various	5	7.5	40
	13	various	5	7.5	40
	3	various	5	7.5	40
	1	various	5	7.5	40
	1	various	5	7.5	40
Av	1				
Max	14				
	3	fwd	3-5	10	40
	9	fwd	3-5	10	40
	12	fwd	3-5	10	40
	4	fwd	3-5	10	40
	2	fwd	3-5	10	40
	3	fwd	3-5	10	40
	1	fwd	3-5	10	40
	4	fwd	3-5	10	40
	8	fwd	3-5	10	40
	4	aft	3-5	10	40
	6	aft	3-5	10	40
	15	aft	3-5	10	40
	9	aft	3-5	10	40
	-1	aft	3-5	10	40
	-1	aft	3-5	10	40
	-1	aft	3-5	10	40
	-1	aft	3-5	10	40
	-1	aft	3-5	10	40
	0	aft	3-5	10	40
	-1	aft	3-5	10	40
	-1	aft	3-5	10	40
	0	aft	3-5	10	40
	0	stbd	3-5	10	40
	9	stbd	3-5	10	40
	6	stbd	3-5	10	40
	-1	stbd	3-5	10	40
	-1	stbd	3-5	10	40
	-1	stbd	3-5	10	40
	-1	stbd	3-5	10	40
	-1	stbd	3-5	10	40
	CO	Wind	Wind	Boat	Distance

Worksheet
 Combined Test Data
 5 feet above waterline

	0	stbd	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	4	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	-1	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	0	port	3-5	10	40
	-1	Aft	0-2	10	40
	0	Aft	0-2	10	40
	0	Aft	0-2	10	40
	0	Aft	0-2	10	40
	-1	Aft	0-2	10	40
	0	Aft	0-2	10	40
	0	Aft	0-2	10	40
	0	Aft	0-2	10	40
	11	Aft	0-2	10	40
	0	Fwd	1-2	10	40
	0	Fwd	1-2	10	40
	4	Fwd	1-2	10	40
	5	Fwd	1-2	10	40
	2	Fwd	1-2	10	40
	5	Fwd	1-2	10	40
	6	Fwd	1-2	10	40
	10	Fwd	1-2	10	40
	4	various	5	10	40
	0	various	5	10	40
	4	various	5	10	40
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet

Worksheet
 Combined Test Data
 5 feet above waterline

	7	various	5	10	40
	6	various	5	10	40
	5	various	5	10	40
	9	various	5	10	40
	7	various	5	10	40
	8	various	5	10	40
	2	various	5	10	40
	6	various	5	10	40
	10	various	5	10	40
	8	various	5	10	40
	9	various	5	10	40
	10	various	5	10	40
	7	various	5	10	40
	8	various	5	10	40
	15	various	5	10	40
	14	various	5	10	40
	5	various	5	10	40
Av	3				
Max	15				
	13	Aft	0-2	20	40
	3	Aft	0-2	20	40
	0	Aft	0-2	20	40
	0	Aft	0-2	20	40
	23	Fwd	1-3	20	40
	20	Fwd	1-3	20	40
	9	Fwd	1-3	20	40
Av	10				
Max	23				
	0	fwd	3-5	7.5	60
	0	fwd	3-5	7.5	60
	0	fwd	3-5	7.5	60
	-1	fwd	3-5	7.5	60
	4	fwd	3-5	7.5	60
	0	fwd	3-5	7.5	60
	-1	fwd	3-5	7.5	60
	0	fwd	3-5	7.5	60
	-1	fwd	3-5	7.5	60
	-1	aft	3-5	7.5	60
	-1	aft	3-5	7.5	60
	-1	aft	3-5	7.5	60
	0	aft	3-5	7.5	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	

Worksheet
 Combined Test Data
 5 feet above waterline

	0	aft	3-5	7.5	60
	0	aft	3-5	7.5	60
	0	aft	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	stbd	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	3	port	3-5	7.5	60
	3	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	port	3-5	7.5	60
	0	Aft	1-3	7.5	60
	0	Aft	1-3	7.5	60
	0	Aft	1-3	7.5	60
	0	Aft	1-3	7.5	60
	1	Aft	1-3	7.5	60
	1	Aft	1-3	7.5	60
	4	Aft	1-3	7.5	60
	1	Aft	1-3	7.5	60
	0	Aft	1-3	7.5	60
	15	Fwd	1-3	7.5	60
	15	Fwd	1-3	7.5	60
	16	Fwd	1-3	7.5	60
	18	Fwd	1-3	7.5	60
	15	Fwd	1-3	7.5	60
	9	Fwd	1-3	7.5	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	12	Fwd	1-3	7.5	60

Worksheet
 Combined Test Data
 5 feet above waterline

	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	port	3-5	10	60
	0	fwd	3-5	10	60
	3	fwd	3-5	10	60
	4	fwd	3-5	10	60
	2	fwd	3-5	10	60
	4	fwd	3-5	10	60
	4	fwd	3-5	10	60
	11	fwd	3-5	10	60
	12	fwd	3-5	10	60
	3	stbd	3-5	10	60
	3	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	stbd	3-5	10	60
	0	aft	3-5	10	60
	0	aft	3-5	10	60
	0	aft	3-5	10	60
	0	aft	3-5	10	60
	0	aft	3-5	10	60
	0	aft	3-5	10	60
	24	Aft	1-3	10	60
	19	Aft	1-3	10	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	2	Aft	1-3	10	60
	4	Aft	1-3	10	60

Worksheet
 Combined Test Data
 5 feet above waterline

	16	Aft	1-3	10	60
	4	Fwd	1-3	10	60
	13	Fwd	1-3	10	60
	11	Fwd	1-3	10	60
	8	Fwd	1-3	10	60
	1	Fwd	1-3	10	60
	7	Fwd	1-3	10	60
Av	4				
Max	29				
	0	aft	3-5	20	60
	8	aft	3-5	20	60
	15	aft	3-5	20	60
	3	aft	3-5	20	60
	0	aft	3-5	20	60
	7	aft	3-5	20	60
	8	aft	3-5	20	60
	17	aft	3-5	20	60
	16	aft	3-5	20	60
	16	fwd	3-5	20	60
	24	fwd	3-5	20	60
	14	fwd	3-5	20	60
	16	fwd	3-5	20	60
	16	fwd	3-5	20	60
	15	fwd	3-5	20	60
	11	fwd	3-5	20	60
	13	Aft	1-3	20	60
	8	Aft	1-3	20	60
	30	Aft	1-3	20	60
	40	Aft	1-3	20	60
	34	Aft	1-3	20	60
	9	Fwd	1-3	20	60
	7	Fwd	1-3	20	60
	5	Fwd	1-3	20	60
	3	Fwd	1-3	20	60
	2	Fwd	1-3	20	60
	12	Fwd	1-3	20	60
Av	13				
Max	40				
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	28	aft	3-5	25	60
	40	aft	3-5	25	60
	20	aft	3-5	25	60

Worksheet
 Combined Test Data
 5 feet above waterline

	12	Aft	1-3	25	60
	10	Aft	1-3	25	60
	2	Fwd	1-3	25	60
	2	Fwd	1-3	25	60
	2	Fwd	1-3	25	60
	6	Fwd	1-3	25	60
	6	Various	1-3	25	60
Av	13				
Max	40				
	-1	fwd	3-5	7.5	80
	0	fwd	5	7.5	80
	0	fwd	5	7.5	80
	8	fwd	5	7.5	80
	7	fwd	5	7.5	80
	6	fwd	5	7.5	80
	14	fwd	5	7.5	80
	15	fwd	5	7.5	80
	11	fwd	5	7.5	80
	16	fwd	5	7.5	80
	12	fwd	5	7.5	80
	6	fwd	5	7.5	80
	6	port	5	7.5	80
	7	port	5	7.5	80
	2	port	5	7.5	80
	0	port	5	7.5	80
	0	port	5	7.5	80
	-1	port	5	7.5	80
	-1	aft	5	7.5	80
	0	aft	5	7.5	80
	0	aft	5	7.5	80
	-1	aft	5	7.5	80
	3	aft	5	7.5	80
	0	aft	5	7.5	80
	1	aft	5	7.5	80
	-1	aft	5	7.5	80
	0	aft	5	7.5	80
	0	aft	5	7.5	80
	0	aft	5	7.5	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	-1	aft	5	7.5	80
	4	stbd	5	7.5	80
	8	stbd	5	7.5	80
	3	stbd	5	7.5	80

Worksheet
 Combined Test Data
 5 feet above waterline

	0	stbd	5	7.5	80
	20	Aft	1-3	7.5	80
	2	Aft	1-3	7.5	80
	0	Aft	1-3	7.5	80
	1	Aft	1-3	7.5	80
	32	Aft	1-3	7.5	80
	33	Aft	1-3	7.5	80
	1	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
	-1	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
	0	Fwd	1-3	7.5	80
Av	4				
Max	33				
	-1	fwd	5	10	80
	9	fwd	5	10	80
	7	fwd	5	10	80
	1	fwd	5	10	80
	6	fwd	5	10	80
	6	fwd	5	10	80
	6	fwd	5	10	80
	12	fwd	5	10	80
	9	fwd	5	10	80
	25	Aft	1-3	10	80
	21	Aft	1-3	10	80
	6	Aft	1-3	10	80
	0	Aft	1-3	10	80
	0	Aft	1-3	10	80
	0	Aft	1-3	10	80
	0	Aft	1-3	10	80
	1	Aft	1-3	10	80
	4	Aft	1-3	10	80
	1	Fwd	1-3	10	80
	3	Fwd	1-3	10	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	1	Fwd	1-3	10	80
	0	Fwd	1-3	10	80
	8	Fwd	1-3	10	80
	18	Fwd	1-3	10	80
	28	aft	5	10	80

Worksheet
 Combined Test Data
 5 feet above waterline

	3	aft	5	10	80
	0	aft	5	10	80
Av	8				
Max	28				
	12	fwd	5	20	80
	11	fwd	5	20	80
	13	fwd	5	20	80
	14	fwd	5	20	80
	12	fwd	5	20	80
	18	fwd	5	20	80
	5	Aft	1-3	20	80
	6	Aft	1-3	20	80
	5	Aft	1-3	20	80
	6	Aft	1-3	20	80
	7	Aft	1-3	20	80
	7	Aft	1-3	20	80
	18	Fwd	1-3	20	80
	21	Fwd	1-3	20	80
	19	Fwd	1-3	20	80
	20	Fwd	1-3	20	80
	20	Fwd	1-3	20	80
	19	Fwd	1-3	20	80
	12	aft	5	20	80
	12	aft	5	20	80
	11	aft	5	20	80
	16	aft	5	20	80
	15	aft	5	20	80
Av	13				
Max	21				
	17	fwd	5	25	80
	17	fwd	5	25	80
	16	fwd	5	25	80
	10	fwd	5	25	80
	4	Aft	1-3	25	80
	7	Aft	1-3	25	80
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	6	Aft	1-3	25	80
	5	Aft	1-3	25	80
	18	Fwd	1-3	25	80
	12	Fwd	1-3	25	80
	6	Fwd	1-3	25	80
	3	Fwd	1-3	25	80

Worksheet
 Combined Test Data
 5 feet above waterline

	1	Fwd	1-3	25	80
	4	Fwd	1-3	25	80
	3	Fwd	1-3	25	80
	1	Fwd	1-3	25	80
	5	Fwd	1-3	25	80
	3	Fwd	1-3	25	80
	15	aft	5	25	80
	15	aft	5	25	80
	10	aft	5	25	80
	11	aft	5	25	80
Av	8				
Max	18				
	4	various	5	6	40
	3	various	5	6	40
	3	various	5	6	40
	6	various	5	6	40
	7	various	5	6	40
	4	various	5	6	40
	1	various	5	6	40
	9	various	5	6	40
	16	various	5	6	40
	16	various	5	6	40
	5	various	5	6	40
	7	various	5	6	40
	13	various	5	6	40
	16	various	5	6	40
	16	various	5	6	40
	14	various	5	6	40
	17	various	5	6	40
	14	various	5	6	40
	9	various	5	6	40
	10	various	5	6	40
	4	various	5	6	40
	2	various	5	6	40
	9	various	5	6	40
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	15	various	5	6	40
	14	various	5	6	40
	6	various	5	6	40
	-1	various	5	6.5	40
	-1	various	5	6.5	40
	10	various	5	6.5	40
	6	various	5	6.5	40

Worksheet
 Combined Test Data
 5 feet above waterline

	0	various	5	6.5	40
	29		5		10
	61		5		
	41	Various	0-2	Slow	20
	27	Various	0-2	Slow	20
	4	Various	0-2	Slow	20
	4	Various	0-2	Slow	20
	4	Various	0-2	Slow	20
	5	Various	0-2	Slow	20
	15	Various	0-2	Slow	20
	0	Various	0-2	Slow	20
	0	Various	0-2	Slow	20
	3	Various	0-2	Slow	20
	3	Various	0-2	Slow	40
	0	Various	0-2	Slow	40
	0	Various	0-2	Slow	40
	0	Various	0-2	Slow	40
	0	Various	0-2	Slow	40
	2	Various	0-2	Slow	40
	5	Various	0-2	Slow	40
	0	Various	0-2	Slow	40
	0	Various	0-2	Slow	40
	2	Various	1-3	Slow	40
	2	Various	1-3	Slow	40
	1	Various	1-3	Slow	40
	0	Various	1-3	Slow	60
	1	Various	1-3	Slow	60
	0	Various	1-3	Slow	60
	6	Various	1-3	Slow	60
	2	Various	1-3	Slow	60
	1	Various	1-3	Slow	60
	1	Various	1-3	Slow	60
	3	Various	1-3	Slow	60
	4	Various	1-3	Slow	60
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	10	Fwd	1-3	Slow	60
	4	Fwd	1-3	Slow	60
	0	Fwd	1-3	Slow	60
	2	Fwd	1-3	Slow	60
	4	Fwd	1-3	Slow	60
	6	Fwd	1-3	Slow	60
	8	Fwd	1-3	Slow	60
	5	Fwd	1-3	Slow	60
	3	Fwd	1-3	Slow	60

Worksheet
 Combined Test Data
 5 feet above waterline

	2	Various	1-3	Slow	80
	23	Various	1-3	Slow	80
	2	Various	1-3	Slow	80
	1	Various	1-3	Slow	80
	0	Various	1-3	Slow	80
	0	Various	1-3	Slow	80
	1	Various	1-3	Slow	80
	1	Various	1-3	Slow	80
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	0	Various	1-3	Various	20
	-1	Various	1-3	Various	20
	0	Various	1-3	Various	20
	-1	Various	3	Various	Various
	0	Various	3	Various	Various
	0	Various	3	Various	Various
	0	Various	3	Various	Various
	0	Various	3	Various	Various
	0	Various	3	Various	Various
	0	Various	3	Various	Various
	-1	Various	3	Various	Various
	0	Various	3	Various	Various
	0	Various	3	Various	Various
	CO	Wind	Wind	Boat	Distance
	Peak	Direction	Speed	Speed	Feet
		Relative	MPH	MPH	
	-1	various	3-5		
	-1	various	3-5		
	1	various	3-5		
	0	various	3-5		
	5	fwd	3-5		
	1	various	3-5		
	3	various	3-5		
	2	various	3-5		
	0	various	3-5		
	-1	various	3-5		

Worksheet
Stern Seat

	CO	Wind	Wind	Boat
	Peak	Direction	Speed	Speed
		Relative	MPH	MPH
	22	Aft	0-2	7.5
	7	Aft	0-2	7.5
	3	Aft	0-2	7.5
	60	Aft	0-2	7.5
	142	Aft	0-2	7.5
	110	Aft	0-2	7.5
	8	Aft	0-2	7.5
	2	Aft	0-2	7.5
	0	Aft	0-2	7.5
	0	Aft	0-2	7.5
	7	Fwd	0-2	7.5
	4	Fwd	0-2	7.5
	4	Fwd	0-2	7.5
	2	Fwd	0-2	7.5
	8	Fwd	0-2	7.5
	6	Fwd	0-2	7.5
	69	Fwd	0-2	7.5
	90	Fwd	0-2	7.5
	42	Fwd	0-2	7.5
	4	Fwd	0-2	7.5
	1	Fwd	0-2	7.5
	185	Port	0-2	7.5
	312	Port	0-2	7.5
	331	Port	0-2	7.5
	195	Port	0-2	7.5
	278	Port	0-2	7.5
	326	Port	0-2	7.5
	347	Port	0-2	7.5
	259	Port	0-2	7.5
	36	Port	0-2	7.5
	15	Port	0-2	7.5
	10	Port	0-2	7.5
	9	Port	0-2	7.5
	6	Stbd	0-2	7.5
	8	Stbd	0-2	7.5
	34	Stbd	0-2	7.5
	52	Stbd	0-2	7.5
	48	Stbd	0-2	7.5
	133	Stbd	0-2	7.5
	126	Stbd	0-2	7.5
	182	Stbd	0-2	7.5
	328	Stbd	0-2	7.5
	274	Stbd	0-2	7.5
	204	Stbd	0-2	7.5

Worksheet
Stern Seat

	CO	Wind	Wind	Boat
	Peak	Direction	Speed	Speed
		Relative	MPH	MPH
	254	Stbd	0-2	7.5
	163	Stbd	0-2	7.5
	103	Stbd	0-2	7.5
	97	Various	0-2	7.5
	90	Various	0-2	7.5
	41	Various	0-2	7.5
	434	Various	0-2	7.5
	418	Various	0-2	7.5
	307	Various	0-2	7.5
	318	Various	0-2	7.5
	314	Various	0-2	7.5
	201	Various	0-2	7.5
Average	135			
Maximum	434			
	0	Aft	0-2	10
	0	Aft	0-2	10
	-1	Aft	0-2	10
	0	Aft	0-2	10
	0	Aft	0-2	10
	236	Aft	0-2	10
	290	Aft	0-2	10
	175	Aft	0-2	10
	35	Aft	0-2	10
	34	Aft	0-2	10
	17	Aft	0-2	10
	41	Fwd	0-2	10
	34	Fwd	0-2	10
	22	Fwd	0-2	10
	79	Fwd	0-2	10
	102	Fwd	0-2	10
	98	Fwd	0-2	10
	151	Fwd	0-2	10
	199	Fwd	0-2	10
	107	Fwd	0-2	10
	18	Fwd	0-2	10
	6	Fwd	0-2	10
	7	Fwd	0-2	10
	5	Fwd	0-2	10
	3	Port	0-2	10
	2	Port	0-2	10
	0	Port	0-2	10
	0	Port	2-4	10
	-1	Port	2-4	10

Worksheet
Stern Seat

	CO	Wind	Wind	Boat
	Peak	Direction	Speed	Speed
		Relative	MPH	MPH
	-1	Port	2-4	10
	8	Port	2-4	10
	27	Port	2-4	10
	9	Port	2-4	10
	-1	Port	2-4	10
	3	Stbd	0-2	10
	2	Stbd	0-2	10
	1	Stbd	0-2	10
	2	Stbd	0-2	10
	5	Stbd	0-2	10
	6	Stbd	0-2	10
	14	Stbd	0-2	10
	3	Stbd	0-2	10
	265	Stbd	0-2	10
	287	Stbd	0-2	10
	45	Stbd	0-2	10
	7	Stbd	0-2	10
Average	47			
Maximum	290			
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-2	Aft	3-5	20
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-2	Aft	3-5	20
	-3	Aft	3-5	20
	-3	Aft	3-5	20
	-1	Fwd	3-5	20
	-1	Fwd	3-5	20
	-2	Fwd	3-5	20
	-2	Fwd	3-5	20
	-1	Fwd	3-5	20
	-1	Fwd	3-5	20
	-2	Fwd	3-5	20
	-3	Fwd	3-5	20
	-2	Fwd	3-5	20
	-2	Fwd	3-5	20
	-1	Port	2-4	20
	-1	Port	2-4	20

Worksheet
Stern Seat

	CO	Wind	Wind	Boat
	Peak	Direction	Speed	Speed
		Relative	MPH	MPH
	-3	Aft	3-5	25
	7	Aft	3-5	25
	26	Aft	3-5	25
	107	Aft	3-5	25
	47	Aft	3-5	25
	3	Aft	3-5	25
	0	Fwd	5+	25
	-1	Fwd	5+	25
	0	Fwd	5+	25
	0	Fwd	5+	25
	-1	Fwd	5+	25
	-1	Fwd	5+	25
	-1	Fwd	5+	25
	14	Fwd	5+	25
	34	Fwd	5+	25
	30	Fwd	5+	25
	1	Fwd	5+	25
	3	Fwd	5+	25
	73	Port	6-8	25
	5	Port	6-8	25
	-2	Port	6-8	25
	-2	Port	6-8	25
	110	Stbd	5+	25
	20	Stbd	5+	25
	5	Stbd	5+	25
Average	19			
Maximum	110			
	9	Stbd	6-8	Slow
	13	Stbd	6-8	Slow
	-1	Stbd	6-8	Slow
	-4	Stbd	6-8	Slow
	-3	Stbd	6-8	Slow
	2	Stbd	6-8	Slow
	211	Stbd	6-8	Slow
	-1	Various	0-2	Slow
	-2	Various	0-2	Slow
	-2	Various	0-2	Slow
	-2	Various	0-2	Slow
	0	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow

Worksheet
Stern Seat

	CO	Wind	Wind	Boat
	Peak	Direction	Speed	Speed
		Relative	MPH	MPH
	2	Various	0-2	Slow
	3	Various	0-2	Slow
	3	Various	0-2	Slow
	3	Various	0-2	Slow
	2	Various	0-2	Slow
	2	Various	0-2	Slow
	3	Various	0-2	Slow
	2	Various	0-2	Slow
	2	Various	0-2	Slow
	2	Various	0-2	Slow
	2	Various	0-2	Slow
	1	Various	0-2	Slow
	2	Various	0-2	Slow
	2	Various	0-2	Slow
	2	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	0	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	0	Various	0-2	Slow
	0	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	1	Various	0-2	Slow
	4	Various	0-2	Slow
	13	Various	0-2	Slow
	7	Various	0-2	Slow
	2	Various	0-2	Slow
	0	Various	0-2	Slow
	1	Various	0-2	Slow
	4	Various	0-2	Slow
	101	Various	0-2	Slow
	173	Various	0-2	Slow
	35	Various	0-2	Slow
	12	Various	0-2	Slow
	-2	Various	5+	Slow
	-3	Various	5+	Slow
	-4	Various	5+	Slow
	-4	Various	5+	Slow

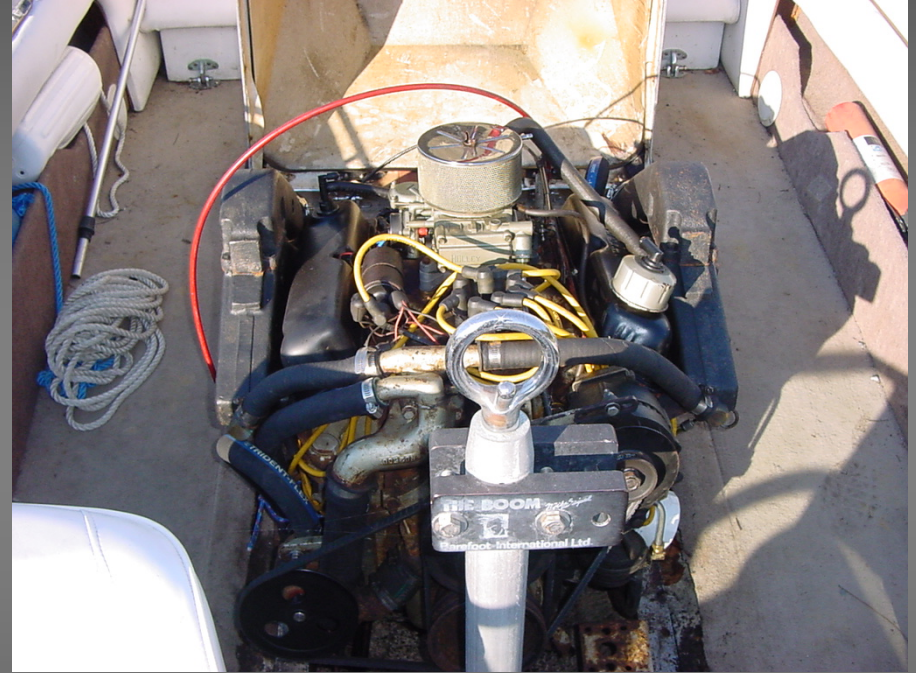
Worksheet
Stern Seat

	CO	Wind	Wind	Boat
	Peak	Direction	Speed	Speed
		Relative	MPH	MPH
	14	Various	5+	Slow
	94	Various	5+	Slow
	-2	Various	6-8	Slow
	-1	Various	6-8	Slow
	2	Various	6-8	Slow
	2	Various	6-8	Slow
	-2	Various	6-8	Slow
	-4	Various	6-8	Slow
	-3	Various	6-8	Slow
	-4	Various	6-8	Slow
	-4	Various	6-8	Slow
	-3	Various	6-8	Slow
	-3	Various	6-8	Slow
	-4	Various	6-8	Slow
	-5	Various	6-8	Slow
	-4	Various	6-8	Slow
	-5	Various	6-8	Slow
	-5	Various	6-8	Slow
	-5	Various	6-8	Slow
	-5	Various	6-8	Slow
	-6	Various	6-8	Slow
	-5	Various	6-8	Slow
	-6	Various	6-8	Slow
	-6	Various	6-8	Slow
Average	7			
Maximum	211			
	Average CO ppm			
	7.5 mph	135		
	10 mph	47		
	25 mph	19		
	Maximum CO ppm			
	7.5 mph	434		
	10 mph	290		
	25 mph	110		

ABYC/USCG
Safe Distance Study

Preliminary Report
IBEX 2003

EQUIPMENT: Tow Boat



1982 19.5 foot competition ski-boat, inboard drive

Engine – 350 cid V-8, carbureted

EQUIPMENT: Towed Boat



2001 BOSS Hard-Shell Tender

Weight: 264# (without outboard)

2003 Yamaha 6hp 4-Stroke Outboard, 15
inch shaft.

PVC/1x2 Monitor Mount

Monitors

- Toxi-Ultra Single Sensor Gas detector.
- Range to 1,000 ppm
- Set up for 10 second intervals
- Mounted at 2 and 5 feet above the water



ALL TESTS
WIND SPEED LESS THAN 5 MPH
CO MONITOR HEIGHT 2 FT & 5 FT
VARIABLES

Speed	7.5	10	20	25
Distance	20	40	60	80
Wind Direction	Fwd	Aft	Port	Stbd

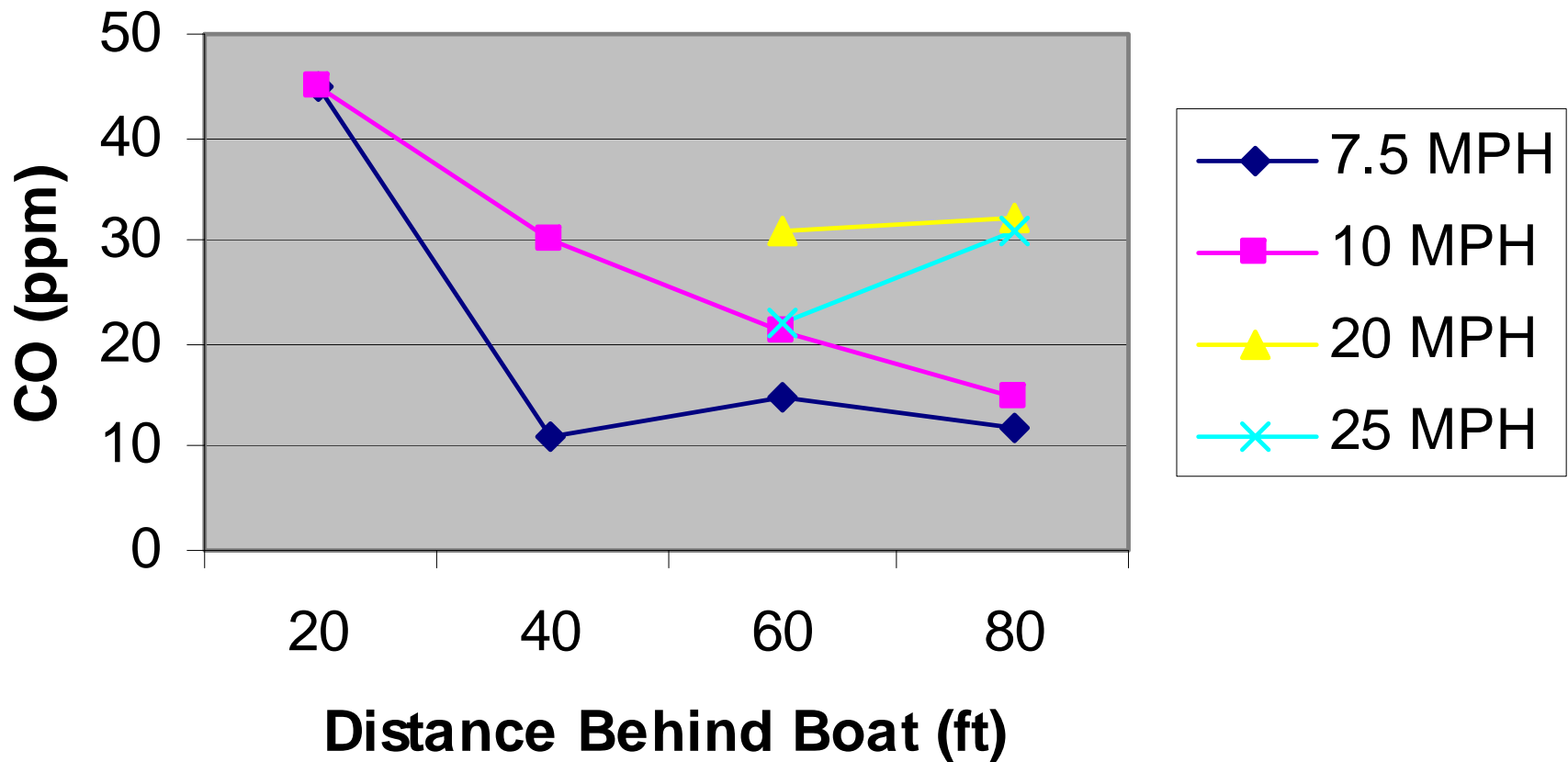
Data

200 Recorded Data Points Sorted by
Speed, Distance & Wind Direction

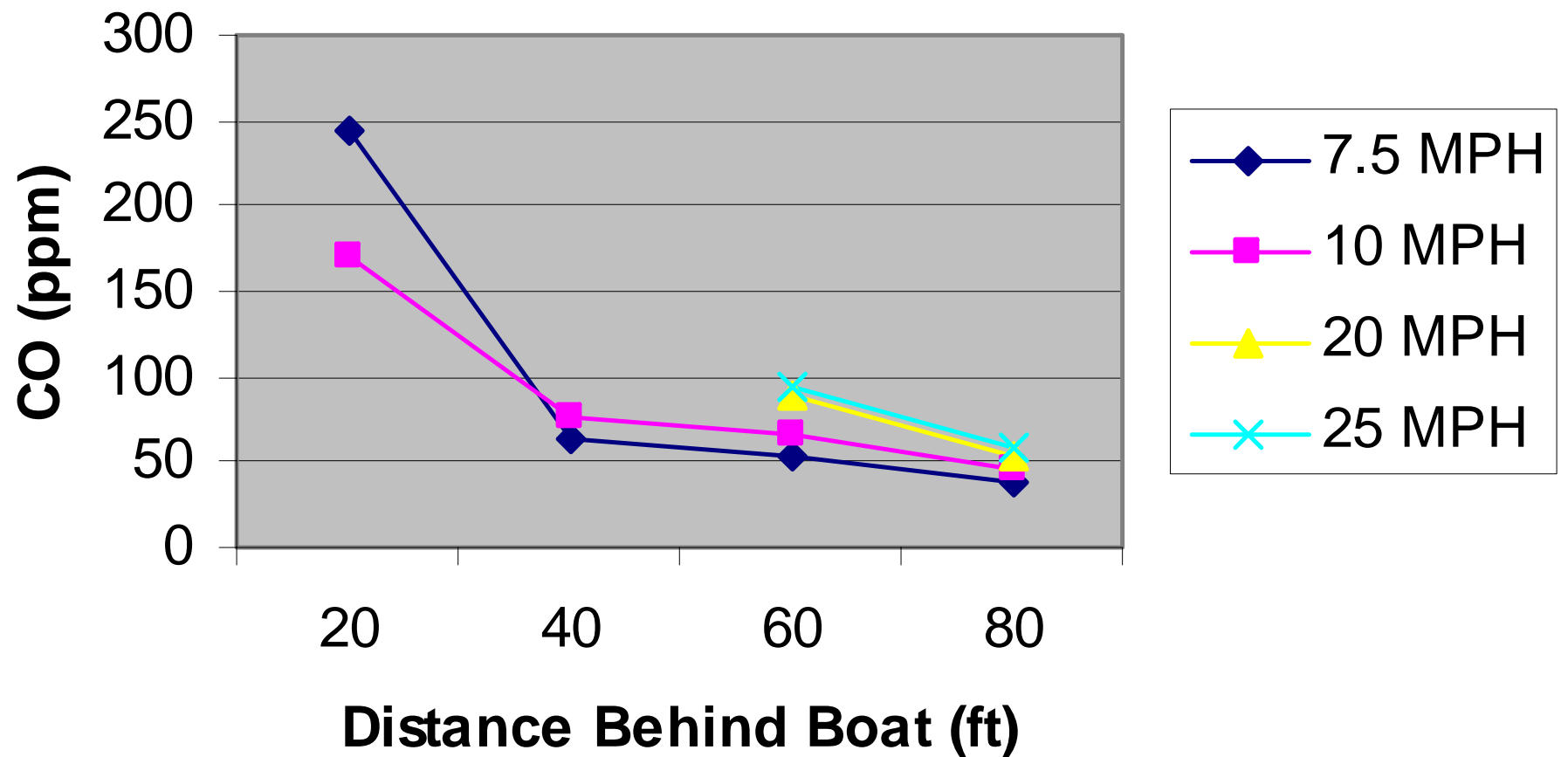
Results:

- CO Measured at all Speeds & Distances
- CO Highest
 - Upwind, Downwind
 - Slow Speeds, Close In

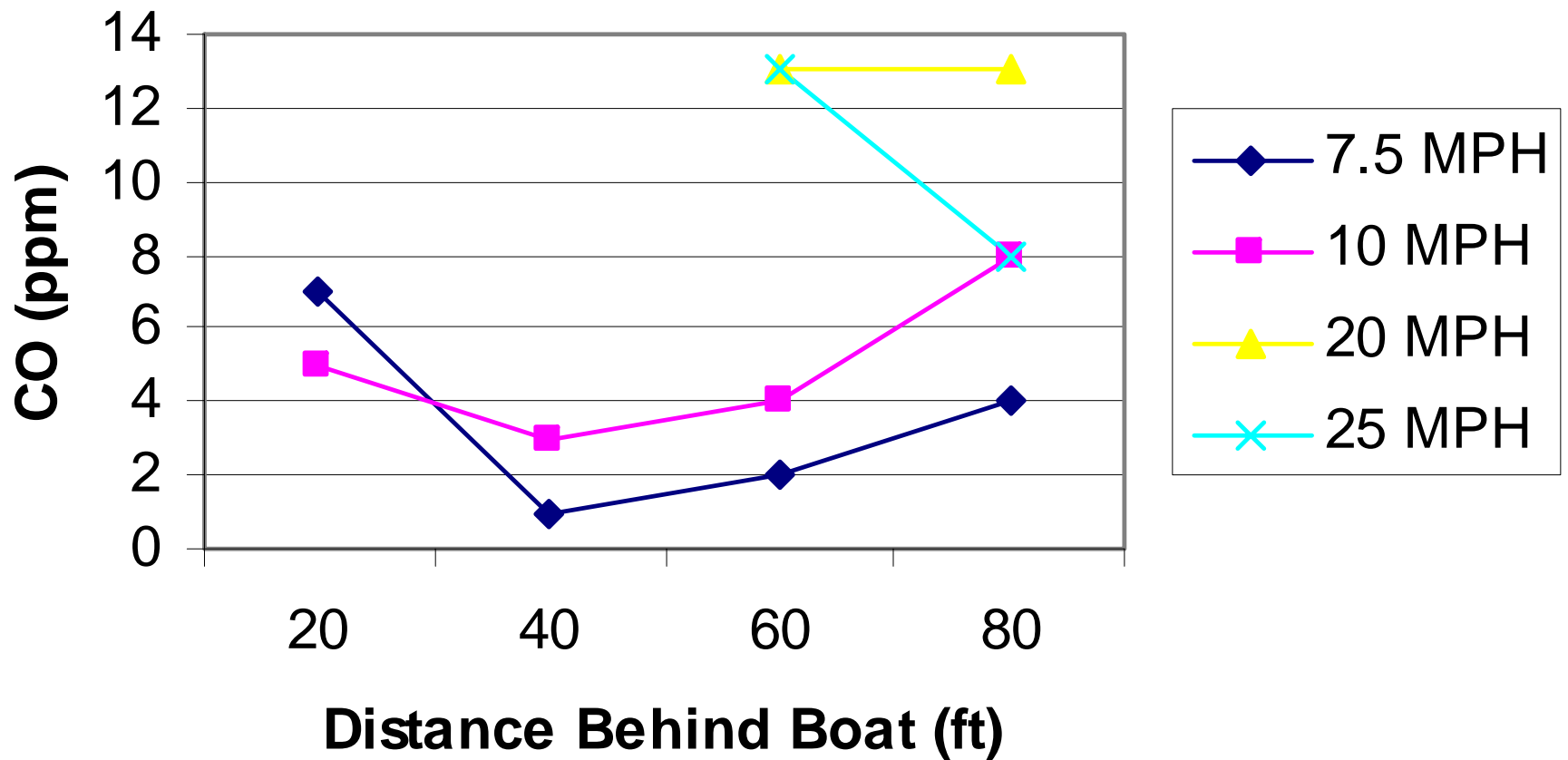
2 Feet Above Water Average CO (ppm)



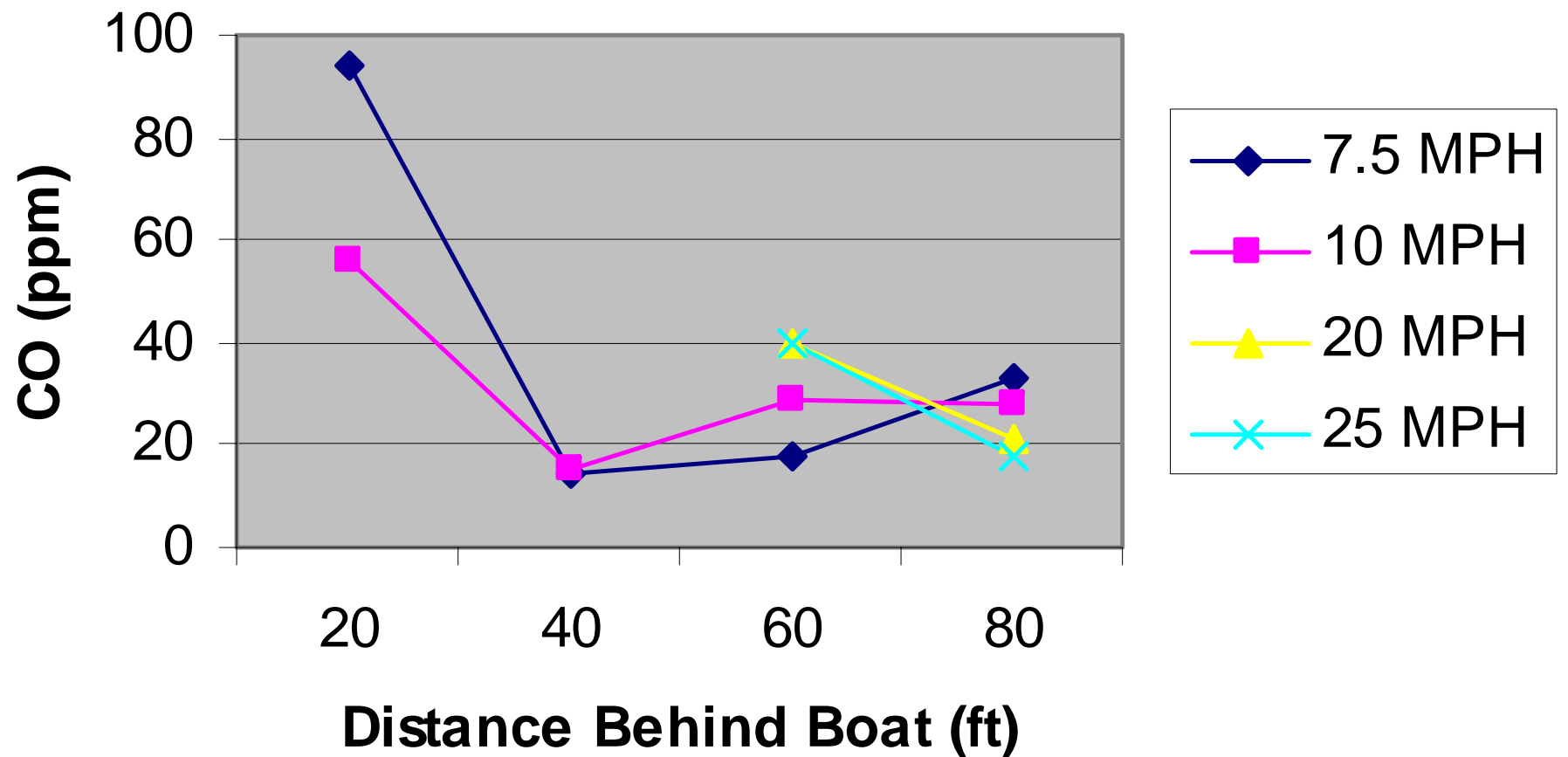
2 Feet Above Water Peak CO (ppm)



5 Feet Above Water Average CO (ppm)



5 Feet Above Water Peak CO (ppm)



Stern Seat

Average

Peak

7.5 mph	135 ppm
10 mph	47 ppm
25 mph	19 ppm

7.5 mph	434 ppm
10 mph	290 ppm
25 mph	110 ppm