Wilkens Weather Technologies, Inc.

ESTIMATES OF EXTREME WIND AND WAVE CONDITIONS FOR FOUR LOCATIONS IN THE INVESTIGATOR STRAIT, OFFSHORE ADELAIDE, AUSTRALIA, FOR 10 AND 50 YEAR RETURN PERIODS.

WIND AND WAVE FREQUENCY OF OCCURRENCE DATA, ANALYZED MONTHLY FOR THE INVESTIGATOR STRAIT.

TIDAL RANGES, TIDAL CURRENTS, TIDAL STREAMS AND CURRENT DATA FOR THE INVESTIGATOR STRAIT.

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ESTIMATES OF EXTREME CONDITIONS FOR FOUR LOCATIONS IN THE INVESTIGATOR STRAIT, OFFSHORE ADELAIDE, AUSTRALIA, FOR 10 AND 50 YEAR RETURN PERIODS, DONE QUARTERLY; INCLUDING TIDE RANGE, TIDE CURRENT, TIDE STREAM AND CURRENT DATA.

LOCATION 1)	35.2091 SOUTH	137.8084 EAST	(75 FEET DEPTH)
LOCATION 2)	35.2740 SOUTH	137.9340 EAST	(120 FEET DEPTH)
LOCATION 3)	35.2800 SOUTH	137.9180 EAST	(130 FEET DEPTH)
LOCATION 4)	35.3040 SOUTH	137.7700 EAST	(90 FEET DEPTH)

GENERAL DISCUSSION:
MOST OF THE DATA REVIEWED IN THE PREPARATION OF THIS STUDY DEPICTS A TYPICAL PROGRESSION OF THE SEASONS. HOWEVER, THE DATA ALSO SHOWS THE OCCURRENCE OF A RARE WIND GUST OR TWO OF STORM FORCE OR HIGHER IN JUST ABOUT ANY OF THE MONTHS. IN THE WAVE DATA THAT WAS AVAILABLE, THE HIGHEST REPORTED WIND WAVES WERE IN APRIL AND OCTOBER, WHEN HEAVY TO INTENSE THUNDERSTORMS AND/OR VERY INFREQUENT, SYNOPTIC-SCALE STORMS (ONES THAT AFFECT AN AREA OF 1000 KM ACROSS OR GREATER) CAN OCCUR.

TROPICAL STORMS OF ALL INTENSITIES APPARENTLY DO NOT AFFECT THIS REGION OF AUSTRALIA. THIS IS LIKELY TO BE DUE TO AT LEAST THE FOLLOWING TWO FACTORS: THE LARGE, DRY LAND MASS TO THE NORTH AND THE COOL WATERS TO THE SOUTH. SEA SURFACE TEMPERATURES IN THE SOUTH AUSTRALIA REGION TYPICALLY ARE 20-24 DEGREES CELSIUS DURING THE WARMEST SUMMERS AND ARE MOST OFTEN COOLER THAN THIS. THIS RANGE IS TOO MUCH BELOW THE NECESSARY 27 DEGREES OR WARMER THAT IS NECESSARY FOR THE DEVELOPMENT OR MAINTAINANCE OF TROPICAL STORMS.

THERE HAVE NOT BEEN VERY MANY DIRECT OBSERVATIONS OF TIDES AND CURRENTS IN THE INVESTIGATOR STRAIT. DR. JOHN BYE OF FLINDERS UNIVERSITY OF SOUTH AUSTRALIA, USED COMPUTER MODELLING OF TIDES AND CURRENTS IN THE STRAIT, BASED ON THE DATA THAT WAS AVAILABLE AND MATHEMATICAL FORMULAE THAT BEST DESCRIBED THE BEHAVIOR OF THEM. HE DISCUSSED MUCH OF THIS IN HIS ARTICLE IN THE 'NATURAL HISTORY OF THE ADELAIDE REGION', TITLED "THE PHYSICAL OCEANOGRAPHY OF GULF ST. VINCENT AND INVESTIGATOR STRAIT."

THE 10 AND 50 YEAR RETURN PERIOD DATA IS BASED ON OBSERVATIONS FROM AREAS AS CLOSE TO THE FOUR LOCATIONS OF INTEREST AS POSSIBLE. THE WIND AND SIGNIFICANT WAVE FIGURES ARE CONSIDERED LIKELY TO OCCUR, BUT THE EXTREME VALUES OF THE WAVES ARE STRICTLY STATISTICAL IN NATURE. A MULTIPLE OF 1.3 TO 1.4 TIMES THE SIGNIFICANT WAVE HEIGHT IS CONSIDERED REALISTIC.

THE PERCENT FREQUENCY OF OCCURRENCE TABLES HAVE BEEN INCLUDED TO GIVE A FAIRLY BROAD VIEW OF WHAT CAN TYPICALLY BE EXPECTED TO OCCUR THROUGHOUT THE YEAR. NOT ALL OBSERVATIONS USED FOR THESE TABLES WERE IN THE IMMEDIATE VICINITY OF THE FOUR LOCATIONS SPECIFIED ABOVE, BUT, ALL WERE CLOSE ENOUGH TO GIVE A FAIRLY GOOD IDEA OF WHAT CAN HAPPEN AT THE FOUR SITES IN THE NORTHEASTERN PART OF INVESTIGATOR STRAIT.

PART ONE) TIDES AND CURRENTS...

TIDAL RANGES:
THE LOCATIONS CLOSEST TO THE AREA OF CONCERN FOR WHICH TIDE DATA ARE AVAILABLE ARE HOG BAY, KANGAROO ISLAND AND EDITHBURG, GULF OF ST. VINCENT.

LOCATION	MEAN RANGE BETWEEN HIGH AND LOW WATER (FT, M)	SPRING RANGE AVERAGE SEMI-DIURNAL (LUNAR) (FT, M)	MEAN TIDE LEVEL ABOVE SEA LEVEL OR CHART DATUM (FT, M)
HOG BAY	2.2, 0.67	3.1, 0.94	3.8, 1.15
EDITHBURG	3.7, 1.12	5.2, 1.58	3.8, 1.15

TIDAL STREAMS:
1 TO 2 METERS PER SECOND OR 2 TO 4 KNOTS IN BACKSTAIRS PASSAGE.
1 METER PER SECOND OR 2 KNOTS NEAR TROUBRIDGE SHOALS.

THESE APPROXIMATIONS WERE SUGGESTED FROM SHIPS LOGS AND DIVERS OBSERVATIONS FROM WITHIN THE INVESTIGATOR STRAIT.

TIDAL CURRENTS:

MAXIMUM TIDAL CURRENTS OF 0.7 METERS PER SECOND OR 1.4 KNOTS ARE INDICATED FOR BACKSTAIRS PASSAGE, AND ABOUT 0.25 METERS PER SECOND OR 0.5 KNOTS IN INVESTIGATOR STRAIT. THE MEAN FLOOD TIDE CURRENT DIRECTION IS FROM THE WSW TO SW AT THE FOUR LOCATIONS.

GENERAL TIDAL INFORMATION:

THE GEOGRAPHIC ORIENTATION OF INVESTIGATOR STRAIT AND THE NEARBY LAND MASSES NECESSITATES THE ENTRANCE OF WATER INTO THE STRAIT FROM ONLY TWO LOCATIONS; FROM THE GREAT AUSTRALIAN BIGHT THROUGH THE WESTERN ENTRANCE OR THROUGH THE BACKSTAIRS PASSAGE FROM THE OCEAN TO THE SOUTH. TIDES IN THE INVESTIGATOR STRAIT REGION ARE BROKEN DOWN INTO TWO PRIMARY TIDES, THE DIURNAL TIDE AND THE SEMI-DIURNAL TIDE.

THE FOLLOWING ARE APPROXIMATE AMPLITUDE AND PHASE OF THE PRINCIPAL SEMI-DIRUNAL LUNAR AND DIURNAL LUNI-SOLAR TIDE COMPONENT FOR ALL FOUR LOCATIONS:

TIDE COMPONENT	AMPLITUDE (METERS)	HARMONIC PHASE (DEGREES)
SEMI-DIURNAL LUNAR	0.30	75
DIURNAL LUNI-SOLAR	0.22	8

IN HIS ARTICLE "PHYSICAL OCEANOGRAPHY OF GULF ST. VINCENT AND INVESTIGATOR STRAIT", WHICH WAS INCLUDED IN `THE NATURAL HISTORY OF THE ADELAIDE REGION', DR. JOHN BYE OF FLINDERS UNIVERSITY OF SOUTH AUSTRALIA, IN BEDFORD PARK, HELPS TO DEFINE AMPLITUDE FROM THE PHASE BY THE DIFFERENT MOVEMENT OF THE TWO TIDES...

"THE DIURNAL TIDE TRAVELS TOWARDS THE WEST. THE SEMI-DIURNAL TIDE, ON THE OTHER HAND, TRAVELS TOWARDS THE EAST, BUT" APPROACHES THE COAST AT A PERPENDICULAR ANGLE." DR. JOHN A.T. BYE, PAGE 145.

LATER IN HIS ARTICLE, DR. BYE ADDS THAT "THE FOLLOWING PATTERN EMERGES: THE SEMI-DIURNAL TIDE ENTERS AS A PROGRESSIVE WAVE (HIGH WATER AND MAXIMUM FLOOD OCCURRING ALMOST SIMULTANEOUSLY) THROUGH BOTH ENTRANCES TO INVESTIGATOR STRAIT, AND IS SUBSEQUENTLY RETARDED BY BOTTOM FRICTION ON ENTERING GULF ST. VINCENT... THERE IS NO APPRECIABLE OUTWARD PROPAGATION OF SEMI-DIURNAL TIDAL ENERGY THROUGH THE ENTRANCES TO INVESTIGATOR STRAIT, SO THAT THE INTERIOR DISSIPATION PROCESS IS COMPLETE. ON THE OTHER HAND, THE DIURNAL TIDE IS DISSIPATED TO A MUCH LESSER EXTENT." PAGE 147.

"MATHEMATICAL COMPUTATION INDICATES THAT THE FUNDAMENTAL RESONANCE OF GULF OF ST. VINCENT WITH INVESTIGATOR STRAIT IS 9.4 HOURS." PAGE 145.

CURRENTS:

"THERE IS A SEASONAL VARIATION OF CURRENTS IN THE SECTOR, ALMOST ENTIRELY DUE TO THE SOUTHWARD MOVEMENT OF THE SUB-TROPICAL ANTI-CYCLONE (HIGH PRESSURE AREA) IN SUMMER. THE CURRENTS ARE FAIRLY WEAK; 1/2 KNOT IS THE MOST COMMON RATE EXPERIENCED. THE PREDOMINANT CURRENT DIRECTIONS ARE TO THE EAST-SOUTHEAST FROM JANUARY TO MARCH AND TO THE WEST-NORTHWEST FROM APRIL TO DECEMBER. " FROM PUBLICATION 175, SAILING DIRECTIONS FOR THE WEST COASTS OF AUSTRALIA, PAGE 234.

FOLLOWING ARE SIMULATED SEASONAL CIRCULATION PARAMETERS FOR THE CIRCULATION IN THE INVESTIGATOR STRAIT. VOLUME TRANSPORT IN CUBIC METERS (TIMES 1/1000) PER SECOND (POSITIVE VALUES ARE TOWARD THE EAST):

JANUARY	APRIL	JULY	OCTOBER	ANNUAL
-6	8	53	26	17

THE MEAN ANNUAL CIRCULATION IN THE PORTION OF THE INVESTIGATOR STRAIT WHERE THE FOUR SITES ARE LOCATED HAS BEEN SHOWN BY DR. JOHN BYE TO HAVE AN AVERAGE HORIZONTAL VELOCITY IN THE WATER COLUMN FROM THE WSW TO SW AT 5 CENTIMETERS PER SECOND, AS PRODUCED BY THE WIND. EFFECTS ON THE CIRCULATION BY THE DENSITY GRADIENT IN THE WATER IS NEGLIGIBLE AT THE FOUR LOCATIONS. THE DENSITY GRADIENTS ONLY HAVE A SIGNIFICANT EFFECT AT THE HEAD OF GULF ST. VINCENT. SEASONALLY, THIS FIGURE IS WSW AT 4 CM/S IN JANUARY, W-WSW AT 3 CM/S IN APRIL, WSW-SW AT 5 CM/S IN JULY AND SW AT 5 CM/S IN OCTOBER.

NOTEABLE STORMS:

ON 30 AUGUST, 1992 A STRONG STORM DEVELOPED AND MOVED INTO THE REGION IMMEDIATELY SOUTH OF SOUTH AUSTRALIA, BRINGING SEVERE WIND AND SEA CONDITIONS TO INVESTIGATOR STRAIT AND THE SURROUNDING WATERS AND LAND AREAS. A BAND OF HEAVY SQUALLS PASSED THROUGH THE NORTHERN PART OF INVESTIGATOR STRAIT AND WEST TO SOUTHWEST WINDS IN EXCESS OF 40 KNOTS WITH GUSTS TO 60 KNOTS WERE EXPERIENCED OVER THE SOUTHERN EYRE PENINSULA AND PARTS OF YORKE PENINSULA BETWEEN 2300CST ON 29 AUGUST AND 0500CST ON 30 AUGUST, 1992. THIS INDICATES THE POSSIBILITY OF AT LEAST A BRIEF PERIOD OF SUSTAINED WINDS NEAR 60 KNOTS FROM THE WEST TO SOUTHWEST AT THE FOUR LOCATIONS SHOWN ABOVE. A WIND OF THIS MAGNITUDE CAN GENERATE WEST TO SOUTHWEST SEAS IN THE RANGE OF 15 TO 20 FEET, WITH THE POSSIBILITY OF BRIEFLY HIGHER SEAS, WITHIN THE INVESTIGATOR STRAIT.

ON SATURDAY, 13 APRIL, 1985 A LOW PRESSURE CENTER DEVELOPED RAPIDLY OFF THE COAST OF SOUTH AUSTRALIA, GENERATING STORM-FORCE WINDS OVER THE REGION NEAR AND WEST TO SOUTHWEST OF INVESTIGATOR STRAIT. A REPORT REPAIRED BY MARTIN CROWE OF THE REGIONAL FORECASTING CENTRE, BUREAU OF METEOROLOGY, ADELAIDE, ENTITLED "THE JEDDA II STORM" INDICATES THAT EARLY ON THE MORNING OF 13 APRIL, 1985 THE PASSAGE OF A PRESSURE TROUGH BROUGHT SOUTHWEST WINDS OF UP TO 40KTS AT NEPTUNE ISLAND. A VESSEL NAMED THE ALPHA CENTAUR WAS HEADED OUT OF ANTECHAMBER BAY FOR PORTLAND AND THEY REPORTED EXPERIENCING WINDS OF AT LEAST 60 KNOTS FOR SEVERAL HOURS DURING THE MIDDLE PORTION OF THE DAY.

PART TWO) 10 AND 50 YEAR RETURN PERIOD DATA, BY SEASON FOR THE INVESTIGATOR STRAIT.

LOCATION 1) 35.2091 SOUTH 137.8084 EAST (75 FEET DEPTH)
LOCATION 2) 35.2740 SOUTH 137.9340 EAST (120 FEET DEPTH)
LOCATION 3) 35.2800 SOUTH 137.9180 EAST (130 FEET DEPTH)
LOCATION 4) 35.3040 SOUTH 137.7700 EAST (90 FEET DEPTH)

THE SIGNIFICANT WAVES INDICATED IN THE TABLES BELOW ARE LIKELY TO BE GENERATED BY MAXIMUM WINDS WITHIN THE INVESTIGATOR STRAIT. SWELLS ENTERING THE STRAIT FROM THE GREAT AUSTRALIAN BIGHT ARE EXPECTED TO BREAK NEAR THE WESTERN ENTRANCE TO THE STRAIT DUE TO THE FAIRLY STEEP RISE IN THE OCEAN FLOOR AT THAT POINT. THIS MEANS THAT THE LONGER PERIOD SWELLS MOVING THROUGH THE STRAIT ARE NOT LIKELY TO BE AS HIGH AS THE EXTREME WAVE HEIGHTS SHOWN BELOW.

SUMMER (DECEMBER, JANUARY, FEBRUARY)
LOCATION NUMBER 1

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	50	65
MAX GUSTS, KTS	65	80
MAX SIGN WAVE HEIGHT, FT	18	24
MAX EXTREME WAVE HEIGHT, FT	24	32
MAX WAVE PERIOD, SEC	12.5	14.0
MAX ASTRONOMICAL AND STORM TIDE, FT	5.5	6.2
MAX WIND DRIVEN CURRENT, KTS	1.0	1.3

LOCATIONS NUMBER 2, 3, 4.

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	50	65
MAX GUSTS, KTS	65	80
MAX SIGN WAVE HEIGHT, FT	22	25
MAX EXTREME WAVE HEIGHT, FT	29	33
MAX WAVE PERIOD, SEC	13.0	14.5
MAX ASTRONOMICAL AND STORM TIDE, FT	5.0	5.7
MAX WIND DRIVEN CURRENT, KNOTS	1.0	1.3

AUTUMN (MARCH, APRIL, MAY)
LOCATION NUMBER 1

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	60	70
MAX GUSTS, KTS	70	85
MAX SIGN WAVE HEIGHT, FT	20	26
MAX EXTREME WAVE HEIGHT, FT	27	35
MAX WAVE PERIOD, SEC	12.0	14.0
MAX ASTRONOMICAL AND STORM TIDE, FT	6.0	7.0
MAX WIND DRIVEN CURRENT, KNOTS	1.2	1.4

LOCATIONS NUMBER 2, 3, 4.

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	60	70
MAX GUSTS, KTS	70	85
MAX SIGN WAVE HEIGHT, FT	24	29
MAX EXTREME WAVE HEIGHT, FT	32	39
MAX WAVE PERIOD, SEC	13.0	14.5
MAX ASTRONOMICAL AND STORM TIDE, FT	5.5	6.5
MAX WIND DRIVEN CURRENT, KNOTS	1.2	1.4

WINTER (JUNE, JULY, AUGUST)
LOCATION NUMBER 1

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	65	75
MAX GUSTS, KTS	75	90
MAX SIGN WAVE HEIGHT, FT	22	28
MAX EXTREME WAVE HEIGHT, FT	29	37
MAX WAVE PERIOD, SEC	13.0	15.0
MAX ASTRONOMICAL AND STORM TIDE, FT	6.5	7.5
MAX WIND DRIVEN CURRENT, KNOTS	1.3	1.5

LOCATIONS NUMBER 2, 3, 4.

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	65	75
MAX GUSTS, KTS	75	90
MAX SIGN WAVE HEIGHT, FT	26	32
MAX EXTREME WAVE HEIGHT, FT	34	42
MAX WAVE PERIOD, SEC	13.0	15.0
MAX ASTRONOMICAL AND STORM TIDE, FT	6.0	7.0
MAX WIND DRIVEN CURRENT, KNOTS	1.3	1.5

SPRING (SEPTEMBER, OCTOBER, NOVEMBER)
LOCATION NUMBER 1

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	60	66
MAX GUSTS, KTS	70	78
MAX SIGN WAVE HEIGHT, FT	20	25
MAX EXTREME WAVE HEIGHT, FT	29	36
MAX WAVE PERIOD, SEC	12.5	14.0
MAX ASTRONOMICAL AND STORM TIDE, FT	6.0	7.0
MAX WIND DRIVEN CURRENT, KNOTS	1.2	1.3

LOCATIONS NUMBER 2, 3, 4.

	10 YEAR STORM	50 YEAR STORM
MAX SUSTAINED WINDS, (1 MIN), KTS	60	66
MAX GUSTS, KTS	70	78
MAX SIGN WAVE HEIGHT, FT	23	29
MAX EXTREME WAVE HEIGHT, FT	31	38
MAX WAVE PERIOD, SEC	12.5	14.0
MAX ASTRONOMICAL AND STORM TIDE, FT	5.5	6.5
MAX WIND DRIVEN CURRENT, KNOTS	1.2	1.3

PART THREE) PERCENT FREQUENCY OF OCCURRENCE FOR WIND, DIRECTION VERSUS SPEED (KTS)...

LOCATION 1) 35.2091 SOUTH 137.8084 EAST (75 FEET DEPTH)
LOCATION 2) 35.2740 SOUTH 137.9340 EAST (120 FEET DEPTH)
LOCATION 3) 35.2800 SOUTH 137.9180 EAST (130 FEET DEPTH)
LOCATION 4) 35.3040 SOUTH 137.7700 EAST (90 FEET DEPTH)

VALID FOR ALL LOCATIONS...

0900 HOURS LOCAL STANDARD TIME

MONTH OF JANUARY

CALM 1	SPEED (KNOTS)							
DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	*	1	*	1	*	*	*	4
NORTHEAST	1	2	5	1	*	0	0	9
EAST	1	5	11	5	2	*	*	24
SOUTHEAST	3	8	10	4	2	1	*	28
SOUTH	2	4	5	2	1	*	*	14
SOUTHWEST	1	2	5	3	3	1	1	16
WEST	*	*	1	*	1	1	0	3
NORTHWEST	0	*	0	*	*	*	*	1
TOTALS	9	23	37	16	10	3	1	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF FEBRUARY

CALM 1	SPEED (KNOTS)							
DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	*	1	1	*	1	*	0	4
NORTHEAST	1	2	3	1	*	0	0	7
EAST	2	6	11	4	3	*	*	26
SOUTHEAST	3	8	13	8	1	*	0	33
SOUTH	1	4	5	3	*	*	0	13
SOUTHWEST	1	3	3	3	2	1	*	13
WEST	1	1	*	*	0	*	*	2
NORTHWEST	*	*	*	0	0	0	0	1
TOTALS	10	25	36	19	7	2	*	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF MARCH

CALM 1	SPEED (KNOTS)							
DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	1	1	2	1	1	*	0	6
NORTHEAST	1	3	3	2	0	0	0	9
EAST	2	5	8	4	1	*	*	20
SOUTHEAST	3	7	8	5	1	*	*	24
SOUTH	2	4	5	2	1	*	*	14
SOUTHWEST	3	4	4	3	2	2	1	19
WEST	*	*	1	1	1	1	*	4
NORTHWEST	*	1	1	*	0	0	0	3
TOTALS	13	25	32	16	7	4	2	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF APRIL

CALM 1	SPEED (KNOTS)							
DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	2	3	3	3	2	*	*	13
NORTHEAST	2	4	4	2	1	*	*	13
EAST	1	5	5	2	*	0	0	13
SOUTHEAST	4	6	4	1	1	*	*	16
SOUTH	2	3	3	1	*	*	0	9
SOUTHWEST	2	3	3	4	3	1	1	17
WEST	1	2	2	1	3	1	*	10
NORTHWEST	1	2	2	2	*	0	0	7
TOTALS	15	28	26	16	10	2	1	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF MAY

CALM 1 DIRECTION	SPEED (KNOTS) 1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	1	5	4	4	1	1	1	17
NORTHEAST	2	6	5	3	1	*	*	17
EAST	1	3	2	2	*	0	0	8
SOUTHEAST	1	3	2	1	*	0	0	7
SOUTH	1	3	2	1	*	1	*	8
SOUTHWEST	1	3	3	4	5	3	2	21
WEST	1	1	2	3	2	1	*	10
NORTHWEST	1	2	3	3	2	*	0	11
TOTALS	9	26	23	21	11	6	3	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF JUNE

CALM 1 DIRECTION	SPEED (KNOTS) 1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	1	4	5	4	3	1	*	18
NORTHEAST	1	4	3	3	1	*	0	12
EAST	1	3	2	1	*	0	0	7
SOUTHEAST	2	4	3	*	0	*	0	9
SOUTH	2	2	3	1	*	*	0	9
SOUTHWEST	1	2	4	4	3	3	1	18
WEST	1	2	3	2	2	1	1	12
NORTHWEST	1	2	3	5	2	1	*	14
TOTALS	10	23	26	20	11	7	2	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF JULY

SPEED (KNOTS)

CALM 1 DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	2	4	8	5	2	1	1	23
NORTHEAST	*	3	3	3	1	*	0	10
EAST	1	2	1	1	0	*	0	5
SOUTHEAST	2	1	1	*	0	0	0	4
SOUTH	1	2	2	1	*	*	0	6
SOUTHWEST	1	2	5	4	6	5	2	25
WEST	1	2	3	3	2	2	1	14
NORTHWEST	*	2	4	3	2	1	*	12
TOTALS	8	18	27	20	13	9	4	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF AUGUST

SPEED (KNOTS)

CALM 1 DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	1	4	6	4	3	1	*	19
NORTHEAST	1	2	3	2	1	0	0	9
EAST	1	2	1	1	*	0	0	5
SOUTHEAST	1	2	2	1	*	0	0	6
SOUTH	1	2	3	1	1	1	0	9
SOUTHWEST	2	2	5	2	6	5	2	24
WEST	1	1	3	2	2	2	1	12
NORTHWEST	*	2	4	4	3	1	0	14
TOTALS	8	17	27	17	16	10	3	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF SEPTEMBER

CALM 1	SPEED (KNOTS) 1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
DIRECTION								
NORTH	1	3	5	2	2	1	0	14
NORTHEAST	1	3	4	2	1	1	0	12
EAST	1	3	2	2	*	1	0	9
SOUTHEAST	2	3	2	*	1	*	0	8
SOUTH	1	2	2	1	1	*	0	7
SOUTHWEST	2	4	5	5	5	3	2	26
WEST	1	1	3	3	2	2	1	13
NORTHWEST	*	2	5	1	1	1	0	10
TOTALS	9	21	28	16	13	9	3	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF OCTOBER

CALM 1	SPEED (KNOTS) 1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
DIRECTION								
NORTH	1	2	2	2	3	1	1	12
NORTHEAST	1	5	6	1	1	*	0	14
EAST	1	4	5	3	2	0	0	15
SOUTHEAST	3	3	3	1	*	0	0	10
SOUTH	1	2	4	2	1	*	0	10
SOUTHWEST	3	3	7	4	4	3	2	26
WEST	*	1	1	1	2	1	1	7
NORTHWEST	1	1	1	1	1	*	0	5
TOTALS	11	21	29	15	14	5	4	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF NOVEMBER

CALM 1	SPEED (KNOTS)							
DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	1	2	1	1	*	*	0	5
NORTHEAST	1	3	5	3	1	0	0	13
EAST	1	6	7	3	2	*	0	19
SOUTHEAST	3	7	5	2	1	0	0	18
SOUTH	2	4	4	1	*	*	0	11
SOUTHWEST	2	5	5	3	4	3	2	24
WEST	*	1	1	1	1	1	1	6
NORTHWEST	1	*	1	1	*	0	0	3
TOTALS	11	28	29	15	9	4	3	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

0900 HOURS LOCAL STANDARD TIME

MONTH OF DECEMBER

CALM 2	SPEED (KNOTS)							
DIRECTION	1 TO 6	7 TO 12	12 TO 18	18 TO 24	25 TO 30	31 TO 39	40+	TOTAL
NORTH	2	1	2	*	1	1	*	7
NORTHEAST	1	2	4	1	*	0	0	8
EAST	1	3	8	5	1	*	*	18
SOUTHEAST	2	5	6	2	1	0	0	16
SOUTH	2	4	4	1	1	*	*	12
SOUTHWEST	2	3	6	6	5	2	1	25
WEST	1	1	1	2	1	1	*	7
NORTHWEST	2	*	1	1	*	*	0	5
TOTALS	13	19	32	18	10	5	1	

* = OCCURRED BUT WAS LESS THAN 0.5 PERCENT.

PART FOUR) PERCENT FREQUENCE OF OCCURRENCE
WAVES HEIGHTS

LOCATION 2) 35.2740 SOUTH 137.9340 EAST (120 FEET DEPTH)
LOCATION 3) 35.2800 SOUTH 137.9180 EAST (130 FEET DEPTH)
LOCATION 4) 35.3040 SOUTH 137.7700 EAST (90 FEET DEPTH)

MONTH OF JANUARY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	39.4
GREATER OR EQUAL TO 3	60.6
GREATER OR EQUAL TO 4	56.1
GREATER OR EQUAL TO 5	34.8
GREATER OR EQUAL TO 6	19.7
GREATER OR EQUAL TO 7	12.1
GREATER OR EQUAL TO 8	6.1
GREATER OR EQUAL TO 9	5.3
GREATER OR EQUAL TO 10	4.5
GREATER OR EQUAL TO 12	1.5
GREATER OR EQUAL TO 16	0.0

DIRECTION	% FREQUENCY
NORTH	9
NORTHEAST	16
EAST	12
SOUTHEAST	10
SOUTH	18
SOUTHWEST	18
WEST	11
NORTHWEST	5
CALM OR INDETERMINATE	1

MONTH OF FEBRUARY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	35.6
GREATER OR EQUAL TO 3	64.4
GREATER OR EQUAL TO 4	56.3
GREATER OR EQUAL TO 5	25.9
GREATER OR EQUAL TO 6	14.4
GREATER OR EQUAL TO 7	7.5
GREATER OR EQUAL TO 8	4.6
GREATER OR EQUAL TO 9	1.7
GREATER OR EQUAL TO 10	1.1
GREATER OR EQUAL TO 12	0.6
GREATER OR EQUAL TO 16	0.0

DIRECTION	% FREQUENCY
NORTH	2
NORTHEAST	13
EAST	10
SOUTHEAST	7
SOUTH	12
SOUTHWEST	45
WEST	7
NORTHWEST	1
CALM OR INDETERMINATE	3

MONTH OF MARCH

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	42.9
GREATER OR EQUAL TO 3	57.1
GREATER OR EQUAL TO 4	43.5
GREATER OR EQUAL TO 5	29.9
GREATER OR EQUAL TO 6	12.2
GREATER OR EQUAL TO 7	8.8
GREATER OR EQUAL TO 8	4.8
GREATER OR EQUAL TO 9	3.4
GREATER OR EQUAL TO 10	2.7
GREATER OR EQUAL TO 12	1.4
GREATER OR EQUAL TO 16	*

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	11
EAST	4
SOUTHEAST	3
SOUTH	12
SOUTHWEST	52
WEST	8
NORTHWEST	2
CALM OR INDETERMINATE	3

MONTH OF APRIL

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	44.9
GREATER OR EQUAL TO 3	55.1
GREATER OR EQUAL TO 4	40.9
GREATER OR EQUAL TO 5	26.1
GREATER OR EQUAL TO 6	17.6
GREATER OR EQUAL TO 7	7.7
GREATER OR EQUAL TO 8	4.8
GREATER OR EQUAL TO 9	3.8
GREATER OR EQUAL TO 10	3.1
GREATER OR EQUAL TO 12	1.0
GREATER OR EQUAL TO 16	0.6

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	10
EAST	4
SOUTHEAST	3
SOUTH	9
SOUTHWEST	46
WEST	16
NORTHWEST	2
CALM OR INDETERMINATE	5

MONTH OF MAY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	45.0
GREATER OR EQUAL TO 3	55.0
GREATER OR EQUAL TO 4	42.6
GREATER OR EQUAL TO 5	29.5
GREATER OR EQUAL TO 6	14.0
GREATER OR EQUAL TO 7	10.0
GREATER OR EQUAL TO 8	5.4
GREATER OR EQUAL TO 9	4.7
GREATER OR EQUAL TO 10	3.9
GREATER OR EQUAL TO 12	1.6
GREATER OR EQUAL TO 16	0.7

DIRECTION	% FREQUENCY
NORTH	9
NORTHEAST	4
EAST	2
SOUTHEAST	1
SOUTH	10
SOUTHWEST	43
WEST	21
NORTHWEST	6
CALM OR INDETERMINATE	4

MONTH OF JUNE

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	42.1
GREATER OR EQUAL TO 3	57.9
GREATER OR EQUAL TO 4	40.8
GREATER OR EQUAL TO 5	24.8
GREATER OR EQUAL TO 6	16.0
GREATER OR EQUAL TO 7	11.8
GREATER OR EQUAL TO 8	4.7
GREATER OR EQUAL TO 9	3.0
GREATER OR EQUAL TO 10	1.8
GREATER OR EQUAL TO 12	1.2
GREATER OR EQUAL TO 16	0.5

DIRECTION	% FREQUENCY
NORTH	10
NORTHEAST	9
EAST	4
SOUTHEAST	3
SOUTH	7
SOUTHWEST	28
WEST	27
NORTHWEST	7
CALM OR INDETERINATE	5

MONTH OF JULY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	32.4
GREATER OR EQUAL TO 3	67.4
GREATER OR EQUAL TO 4	47.2
GREATER OR EQUAL TO 5	32.4
GREATER OR EQUAL TO 6	23.3
GREATER OR EQUAL TO 7	10.8
GREATER OR EQUAL TO 8	6.3
GREATER OR EQUAL TO 9	4.5
GREATER OR EQUAL TO 10	4.0
GREATER OR EQUAL TO 12	1.8
GREATER OR EQUAL TO 16	0.8

DIRECTION	% FREQUENCY
NORTH	6
NORTHEAST	3
EAST	2
SOUTHEAST	1
SOUTH	4
SOUTHWEST	41
WEST	29
NORTHWEST	8
CALM OR INDETERMINATE	6

MONTH OF AUGUST

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	44.0
GREATER OR EQUAL TO 3	56.0
GREATER OR EQUAL TO 4	41.5
GREATER OR EQUAL TO 5	26.9
GREATER OR EQUAL TO 6	18.1
GREATER OR EQUAL TO 7	13.0
GREATER OR EQUAL TO 8	6.5
GREATER OR EQUAL TO 9	4.7
GREATER OR EQUAL TO 10	3.9
GREATER OR EQUAL TO 12	2.2
GREATER OR EQUAL TO 16	0.8

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	6
EAST	3
SOUTHEAST	4
SOUTH	9
SOUTHWEST	40
WEST	22
NORTHWEST	7
CALM OR INDETERMINATE	4

MONTH OF SEPTEMBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	39.1
GREATER OR EQUAL TO 3	60.9
GREATER OR EQUAL TO 4	49.8
GREATER OR EQUAL TO 5	39.1
GREATER OR EQUAL TO 6	23.7
GREATER OR EQUAL TO 7	17.3
GREATER OR EQUAL TO 8	10.9
GREATER OR EQUAL TO 9	8.3
GREATER OR EQUAL TO 10	1.8
GREATER OR EQUAL TO 12	1.2
GREATER OR EQUAL TO 16	0.6

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	3
EAST	4
SOUTHEAST	3
SOUTH	10
SOUTHWEST	53
WEST	17
NORTHWEST	3
CALM OR INDETERMINATE	2

MONTH OF OCTOBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	38.2
GREATER OR EQUAL TO 3	61.8
GREATER OR EQUAL TO 4	53.8
GREATER OR EQUAL TO 5	35.5
GREATER OR EQUAL TO 6	25.1
GREATER OR EQUAL TO 7	14.1
GREATER OR EQUAL TO 8	9.5
GREATER OR EQUAL TO 9	7.2
GREATER OR EQUAL TO 10	3.5
GREATER OR EQUAL TO 12	1.2
GREATER OR EQUAL TO 16	0.6

DIRECTION	% FREQUENCY
NORTH	4
NORTHEAST	11
EAST	7
SOUTHEAST	5
SOUTH	13
SOUTHWEST	38
WEST	13
NORTHWEST	3
CALM OR INDETERMINATE	6

MONTH OF NOVEMBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	38.0
GREATER OR EQUAL TO 3	62.0
GREATER OR EQUAL TO 4	50.6
GREATER OR EQUAL TO 5	36.7
GREATER OR EQUAL TO 6	25.9
GREATER OR EQUAL TO 7	17.3
GREATER OR EQUAL TO 8	14.3
GREATER OR EQUAL TO 9	11.3
GREATER OR EQUAL TO 10	6.5
GREATER OR EQUAL TO 12	2.4
GREATER OR EQUAL TO 16	0.6

DIRECTION	% FREQUENCY
NORTH	3
NORTHEAST	7
EAST	6
SOUTHEAST	4
SOUTH	10
SOUTHWEST	46
WEST	16
NORTHWEST	1
CALM OR INDETERMINATE	7

MONTH OF DECEMBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	42.4
GREATER OR EQUAL TO 3	57.6
GREATER OR EQUAL TO 4	43.8
GREATER OR EQUAL TO 5	30.0
GREATER OR EQUAL TO 6	17.7
GREATER OR EQUAL TO 7	12.3
GREATER OR EQUAL TO 8	6.9
GREATER OR EQUAL TO 9	3.9
GREATER OR EQUAL TO 10	2.5
GREATER OR EQUAL TO 12	1.0
GREATER OR EQUAL TO 16	*

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	1
NORTHEAST	8
EAST	8
SOUTHEAST	8
SOUTH	17
SOUTHWEST	39
WEST	12
NORTHWEST	2
CALM OR INDETERMINATE	5

PART FIVE) PERCENT FREQUENCE OF OCCURRENCE
WAVES HEIGHTS

LOCATION 1) 35.2091 SOUTH 137.8084 EAST (75 FEET DEPTH)

MONTH OF JANUARY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	42.5
GREATER OR EQUAL TO 3	57.5
GREATER OR EQUAL TO 4	53.9
GREATER OR EQUAL TO 5	31.8
GREATER OR EQUAL TO 6	17.7
GREATER OR EQUAL TO 7	10.3
GREATER OR EQUAL TO 8	4.6
GREATER OR EQUAL TO 9	3.3
GREATER OR EQUAL TO 10	2.5
GREATER OR EQUAL TO 12	0.5
GREATER OR EQUAL TO 16	0.0

DIRECTION	% FREQUENCY
NORTH	9
NORTHEAST	16
EAST	12
SOUTHEAST	10
SOUTH	18
SOUTHWEST	18
WEST	11
NORTHWEST	5
CALM OR INDETERMINATE	1

MONTH OF FEBRUARY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	38.1
GREATER OR EQUAL TO 3	61.9
GREATER OR EQUAL TO 4	54.3
GREATER OR EQUAL TO 5	23.7
GREATER OR EQUAL TO 6	12.4
GREATER OR EQUAL TO 7	4.8
GREATER OR EQUAL TO 8	3.6
GREATER OR EQUAL TO 9	1.0
GREATER OR EQUAL TO 10	0.5
GREATER OR EQUAL TO 12	*
GREATER OR EQUAL TO 16	0.0

DIRECTION	% FREQUENCY
NORTH	2
NORTHEAST	13
EAST	10
SOUTHEAST	7
SOUTH	12
SOUTHWEST	45
WEST	7
NORTHWEST	1
CALM OR INDETERMINATE	3

* = LESS THAN 0.5 PERCENT.

MONTH OF MARCH

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	44.1
GREATER OR EQUAL TO 3	55.9
GREATER OR EQUAL TO 4	40.5
GREATER OR EQUAL TO 5	25.3
GREATER OR EQUAL TO 6	11.5
GREATER OR EQUAL TO 7	4.7
GREATER OR EQUAL TO 8	2.8
GREATER OR EQUAL TO 9	1.9
GREATER OR EQUAL TO 10	0.7
GREATER OR EQUAL TO 12	*
GREATER OR EQUAL TO 16	0.0

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	11
EAST	4
SOUTHEAST	3
SOUTH	12
SOUTHWEST	52
WEST	8
NORTHWEST	2
CALM OR INDETERMINATE	3

MONTH OF APRIL

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	45.2
GREATER OR EQUAL TO 3	54.8
GREATER OR EQUAL TO 4	40.1
GREATER OR EQUAL TO 5	25.5
GREATER OR EQUAL TO 6	14.7
GREATER OR EQUAL TO 7	5.5
GREATER OR EQUAL TO 8	3.3
GREATER OR EQUAL TO 9	1.6
GREATER OR EQUAL TO 10	1.1
GREATER OR EQUAL TO 12	0.5
GREATER OR EQUAL TO 16	*

= LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	10
EAST	4
SOUTHEAST	3
SOUTH	9
SOUTHWEST	46
WEST	16
NORTHWEST	2
CALM OR INDETERMINATE	5

MONTH OF MAY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	47.0
GREATER OR EQUAL TO 3	53.0
GREATER OR EQUAL TO 4	41.6
GREATER OR EQUAL TO 5	27.7
GREATER OR EQUAL TO 6	12.4
GREATER OR EQUAL TO 7	8.1
GREATER OR EQUAL TO 8	5.0
GREATER OR EQUAL TO 9	3.7
GREATER OR EQUAL TO 10	2.1
GREATER OR EQUAL TO 12	0.7
GREATER OR EQUAL TO 16	*

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	9
NORTHEAST	4
EAST	2
SOUTHEAST	1
SOUTH	10
SOUTHWEST	43
WEST	21
NORTHWEST	6
CALM OR INDETERMINATE	4

MONTH OF JUNE

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	43.4
GREATER OR EQUAL TO 3	56.6
GREATER OR EQUAL TO 4	39.0
GREATER OR EQUAL TO 5	21.4
GREATER OR EQUAL TO 6	15.1
GREATER OR EQUAL TO 7	10.2
GREATER OR EQUAL TO 8	4.7
GREATER OR EQUAL TO 9	2.8
GREATER OR EQUAL TO 10	1.5
GREATER OR EQUAL TO 12	0.8
GREATER OR EQUAL TO 16	0.0

DIRECTION	% FREQUENCY
NORTH	10
NORTHEAST	9
EAST	4
SOUTHEAST	3
SOUTH	7
SOUTHWEST	28
WEST	27
NORTHWEST	7
CALM OR INDETERINATE	5

MONTH OF JULY

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	34.5
GREATER OR EQUAL TO 3	65.5
GREATER OR EQUAL TO 4	44.4
GREATER OR EQUAL TO 5	29.9
GREATER OR EQUAL TO 6	18.5
GREATER OR EQUAL TO 7	8.7
GREATER OR EQUAL TO 8	5.3
GREATER OR EQUAL TO 9	4.1
GREATER OR EQUAL TO 10	3.2
GREATER OR EQUAL TO 12	1.4
GREATER OR EQUAL TO 16	*

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	6
NORTHEAST	3
EAST	2
SOUTHEAST	1
SOUTH	4
SOUTHWEST	41
WEST	29
NORTHWEST	8
CALM OR INDETERMINATE	6

MONTH OF AUGUST

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	46.2
GREATER OR EQUAL TO 3	53.8
GREATER OR EQUAL TO 4	39.5
GREATER OR EQUAL TO 5	24.2
GREATER OR EQUAL TO 6	17.3
GREATER OR EQUAL TO 7	12.1
GREATER OR EQUAL TO 8	5.7
GREATER OR EQUAL TO 9	3.9
GREATER OR EQUAL TO 10	3.3
GREATER OR EQUAL TO 12	1.5
GREATER OR EQUAL TO 16	*

= LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	6
EAST	3
SOUTHEAST	4
SOUTH	9
SOUTHWEST	40
WEST	22
NORTHWEST	7
CALM OR INDETERMINATE	4

MONTH OF SEPTEMBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	43.1
GREATER OR EQUAL TO 3	56.9
GREATER OR EQUAL TO 4	47.4
GREATER OR EQUAL TO 5	38.0
GREATER OR EQUAL TO 6	21.2
GREATER OR EQUAL TO 7	15.5
GREATER OR EQUAL TO 8	7.9
GREATER OR EQUAL TO 9	5.7
GREATER OR EQUAL TO 10	1.0
GREATER OR EQUAL TO 12	0.5
GREATER OR EQUAL TO 16	*

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	5
NORTHEAST	3
EAST	4
SOUTHEAST	3
SOUTH	10
SOUTHWEST	53
WEST	17
NORTHWEST	3
CALM OR INDETERMINATE	2

MONTH OF OCTOBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	40.5
GREATER OR EQUAL TO 3	60.5
GREATER OR EQUAL TO 4	50.2
GREATER OR EQUAL TO 5	33.6
GREATER OR EQUAL TO 6	22.3
GREATER OR EQUAL TO 7	11.6
GREATER OR EQUAL TO 8	8.1
GREATER OR EQUAL TO 9	6.4
GREATER OR EQUAL TO 10	2.5
GREATER OR EQUAL TO 12	0.5
GREATER OR EQUAL TO 16	*

= LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	4
NORTHEAST	11
EAST	7
SOUTHEAST	5
SOUTH	13
SOUTHWEST	38
WEST	13
NORTHWEST	3
CALM OR INDETERMINATE	6

MONTH OF NOVEMBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	41.1
GREATER OR EQUAL TO 3	58.9
GREATER OR EQUAL TO 4	48.4
GREATER OR EQUAL TO 5	34.7
GREATER OR EQUAL TO 6	22.6
GREATER OR EQUAL TO 7	15.7
GREATER OR EQUAL TO 8	11.1
GREATER OR EQUAL TO 9	8.5
GREATER OR EQUAL TO 10	5.7
GREATER OR EQUAL TO 12	2.0
GREATER OR EQUAL TO 16	*

* = LESS THAN 0.5 PERCENT.

DIRECTION	% FREQUENCY
NORTH	3
NORTHEAST	7
EAST	6
SOUTHEAST	4
SOUTH	10
SOUTHWEST	46
WEST	16
NORTHWEST	1
CALM OR INDETERMINATE	7

MONTH OF DECEMBER

HEIGHT (FT.)	% FREQUENCY
LESS THAN 3	44.8
GREATER OR EQUAL TO 3	55.2
GREATER OR EQUAL TO 4	41.7
GREATER OR EQUAL TO 5	28.4
GREATER OR EQUAL TO 6	16.0
GREATER OR EQUAL TO 7	11.1
GREATER OR EQUAL TO 8	5.9
GREATER OR EQUAL TO 9	3.0
GREATER OR EQUAL TO 10	1.8
GREATER OR EQUAL TO 12	0.5
GREATER OR EQUAL TO 16	0.0

DIRECTION	% FREQUENCY
NORTH	1
NORTHEAST	8
EAST	8
SOUTHEAST	8
SOUTH	17
SOUTHWEST	39
WEST	12
NORTHWEST	2
CALM OR INDETERMINATE	5

Wilkens Weather Technologies, Inc.

REFERENCE LIST:

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2) "PUBLICATION 175, SAILING DIRECTIONS (ENROUTE) FOR THE WEST COASTS OF AUSTRALIA." FIRST EDITION, 1978. SECTOR 8, PAGE 234, 235, 242-244.

3) "NATURAL HISTORY OF THE ADELAIDE REGION"; CHAPTER 11, PHYSICAL OCEANOGRAPHY OF GULF ST. VINCENT AND INVESTIGATOR STRAIT. BY DR. JOHN A.T. BYE. PUBLISHED BY THE ROYAL SOCIETY OF SOUTH AUSTRALIA. (PAGES 143-160).

4) "PRELIMINARY REPORT ON THE ADELAIDE HILLS FLASH FLOODS, SUNDAY, 30TH AUGUST 1992." PREPARED BY THE AUSTRALIAN BUREAU OF METEOROLOGY.

5) WIND PERCENT FREQUENCY OF OCCURRENCE DATA DERIVED FROM A SIMILAR DATA SET PREPARED FOR ALTHORPE ISLAND (1968 TO 1981). THIS WAS PROVIDED BY THE NATIONAL CLIMATE CENTRE OF AUSTRALIA'S BUREAU OF METEOROLOGY.

6) THE 10 AND 50 YEAR STORM WIND DATA WAS DERIVED, IN PART, FROM MAX WIND GUST DATA FROM ADELAIDE AIRPORT, AVAILABLE BETWEEN THE YEARS 1955 AND 1993, INCLUSIVE. THE PERCENT FREQUENCY OF OCCURRENCE WIND DATA INDICATED IN (5), ABOVE, ALSO AIDED IN THIS COMPUTATION. ALSO, DATA INDICATING THE NUMBER OF DAYS WITH WINDS OF GALE FORCE OR HIGHER FROM THE CAPE BORDA LIGHTHOUSE, ADELAIDE AIRPORT, ALTHORPE ISLAND AND NEPTUNE ISLAND WERE USED TO PRODUCE THE TABLES INDICATED ABOVE.

7) ADDITIONAL WAVE, TIDE AND CURRENT INFORMATION OBTAINED FROM "THE OCEANS; THEIR PHYSICS, CHEMISTRY AND GENERAL BIOLOGY." BY SVERDRUP, JOHNSON AND FLEMING. PAGES 394-396, AND 560-568. PUBLISHED BY PRENTICE-HALL, INC. NEW YORK, 1942.

8) "THE JEDDA II STORM", BY MARTIN CROWE, OF THE REGIONAL FORECASTING CENTER, BUREAU OF METEOROLOGY, ADELAIDE, AUSTRALIA.

9) "U.S. NAVY MARINE CLIMATIC ATLAS OF THE WORLD", VOLUME III, THE INDIAN OCEAN (REVISED MARCH 1976). PUBLISHED BY DIRECTION OF THE COMMANDER, NAVAL WEATHER SERVICE COMMAND.

10) "MARINERS WORLDWIDE CLIMATIC GUIDE TO TROPICAL STORMS AT SEA." BY H.L. CRUTCHER AND R.G. QUAYLE. PUBLISHED BY DIRECTION OF COMMANDER, NAVAL WEATHER SERVICE COMMAND. MARCH 1974.