ANNEX

A

SUMMARY OF TROPICAL CYCLONES

IN THE

NORTHEAST PACIFIC
(180 DEGREES TO NORTH AMERICAN COAST)

FOR

1965

Fleet Weather Central Alameda and Fleet Weather Central Pearl Harbor issued a total of 244 tropical warnings on 1 hurricane, 9 tropical storms and 2 tropical depressions in the Eastern Pacific in 1965.

The following summary for the Fleet Weather Central Alameda and Fleet Weather Central Pearl Harbor areas is presented for comparison:

SUMMARY OF EASTERN PACIFIC TROPICAL CYCLONE DATA

	1960	1961	1962	1963	1964	1965	
TOTAL NUMBER OF WARNINGS*	147	80	122	80	60	241	(3)**
CALENDAR DAYS OF WARNINGS*	44	25	35	26	21	71	(2)
TROPICAL DEPRESSIONS*						2	(0)
TROPICAL STORMS	2	9	6	5	4	9	(1)
HURRICANES	6	2	2	4	2	1	(0)
TOTAL TROPICAL CYCLONES*	8	11	8	9	6	12	(1)

*Tropical Depression information not available 1960-1964
**Numbers in parentheses indicate FLEWEACEN Pearl Harbor's data. Data for previous years not available.

Hurricane EMILY was the most intense storm in the FLEWEACEN Alameda area of responsibility during 1965. Maximum winds of 90 knots were estimated based on surface reports.

Tropical Storm DOREEN developed in FLEWEACEN Alameda's area of responsibility and was first located by surface reports at 13.4N 109.0W on 20 August 1965. DOREEN was the only Tropical Cyclone in 1965 to pass into FLEWEACEN Pearl Harbor's area of responsibility. Tropical Storm HAZEL was the most destructive tropical cyclone in the Northeast Pacific. HAZEL moved ashore at Mazatlan, Mexico, on the 26th of September. Numerous lives were lost and extensive damage to property was reported.

Mexico was the only land area affected by hurricanes during the 1965 season.

The 12, 24 and 48 hour mean forecast error was computed by two methods. The standard mean vector forecast error and the closest distance error from best track. Computations are shown in the table below.

Operational positions were based on rather sparse surface reports with frequent assists from satellite reports and pilot debriefs. As a matter of interest one astronaut fix (T.S. DOREEN) was received during the season. Aerial reconnaissance was limited to three flights during Hurricane EMILY.

1965 FORECAST VECTOR ERRORS*

	12 HR FORECASTS		24 HR FORECASTS		48 HR FORECASTS	
HURRICANE	NO. OF CASES	MEAN ERROR	NO. OF CASES	MEAN ERROR	NO. OF CASES	MEAN ERROR
EMILY	21	40.4	19	66.4	14	107.2

1965 FORECAST ERRORS*
(IN TERMS OF CLOSEST DISTANCE TO BEST TRACK)

	12 HR FORECASTS		24 HR FORECASTS		48 HR FORECASTS	
HURRICANE	NO. OF CASES	MEAN ERROR	NO. OF CASES	MEAN ERROR	NO. OF CASES	MEAN ERROR
EMILY	21	23.9	19	50.8	11	62.1

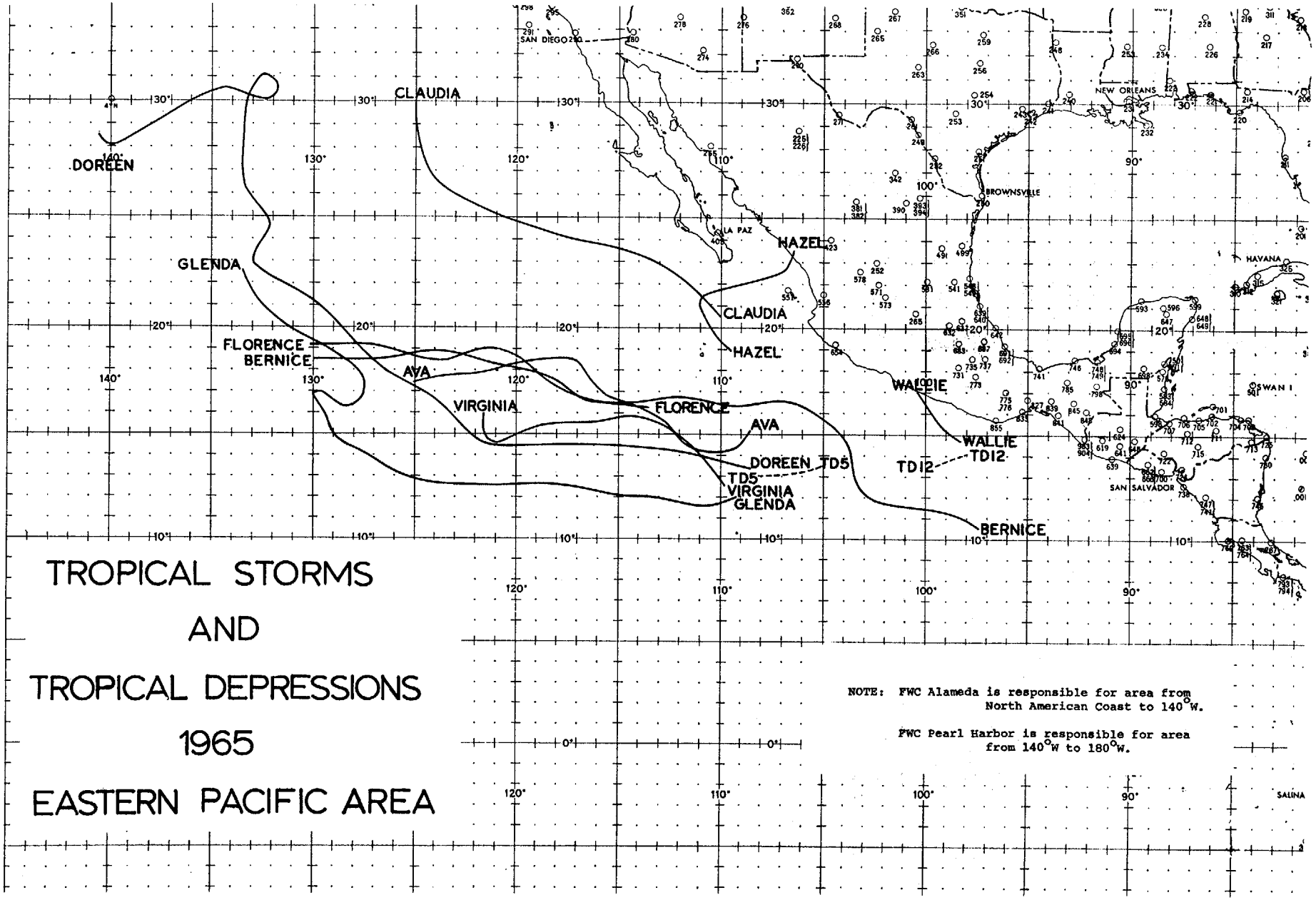
*Includes forecast errors during tropical storm intensity as well as hurricane intensity.

DISTANCE BETWEEN OPERATIONAL WARNING
POSITIONS AND BEST TRACK POSITIONS

HURRICANE	CASES	AVERAGE	MAX	MIN
EMILY	23	7.6	33	00

TROPICAL CYCLONES OF 1965

CYCLONE	PERIOD
01. Tropical Storm VIRGINIA	14 JUNE - 17 JUNE
02. Tropical Storm WALLIE	16 JUNE - 18 JUNE
03. Tropical Storm AVA	28 JUNE - 03 JULY
04. Tropical Storm BERNICE	29 JUNE - 08 JULY
05. Tropical Depression	17 JULY - 18 JULY
06. Tropical Storm CLAUDIA	07 AUG - 11 AUG
07. Tropical Storm DOREEN	20 AUG - 31 AUG
08. Hurricane EMILY	29 AUG - 04 SEP
09. Tropical Storm FLORENCE	08 SEP - 14 SEP
10. Tropical Storm GLENDA	13 SEP - 22 SEP
11. Tropical Storm HAZEL	23 SEP - 26 SEP
12. Tropical Depression	21 OCT - 22 OCT


TROPICAL STORMS
AND
TROPICAL DEPRESSIONS
1965
EASTERN PACIFIC AREA
NOTE: FWC Alameda is responsible for area from North American Coast to 140°W.
FWC Pearl Harbor is responsible for area from 140°W to 180°W.
DOREEN
CLAUDIA
GLENDA
FLORENCE
BERNICE
AVA
VIRGINIA
HAZEL
WALLIE
TD12
TD5
SAN DIEGO
LA PAZ
BROWNSVILLE
NEW ORLEANS
HAVANA
SWAN I
SAN SALVADOR
SALINA

TROPICAL STORMS 1965
POSITION DATA

TROPICAL STORM VIRGINIA
14 JUN-17 JUN

DTG	LAT	LONG	DTG	LAT	LONG
141200Z	12.6N	109.8W	160000Z	15.5N	117.3W
141800Z	12.8N	110.8W	160600Z	15.5N	118.5W
150000Z	15.0N	112.0W	161200Z	15.1N	119.6W
150600Z	15.7N	113.1W	161800Z	14.7N	120.7W
151200Z	15.9N	114.5W	170000Z	16.0N	120.5W
151800Z	15.6N	116.0W			

TROPICAL STORM WALLIE
16 JUN-18 JUN

161800Z	14.8N	98.2W	171200Z	15.9N	99.6W
170000Z	15.0N	98.7W	171800Z	16.5N	100.0W
170600Z	15.4N	99.2W	180000Z	17.1N	100.4W

TROPICAL STORM AVA
28 JUN-03 JUL

281800Z	15.2N	108.5W	010600Z	18.3N	116.8W
290000Z	14.5N	109.0W	011200Z	18.5N	111.6W
290600Z	14.2N	110.0W	011800Z	18.5N	118.5W
291200Z	14.3N	111.3W	020000Z	18.3N	119.6W
291800Z	15.5N	112.5W	020600Z	18.1N	120.7W
300000Z	16.4N	114.1W	021200Z	17.9N	121.8W
300600Z	16.7N	115.3W	021800Z	17.8N	123.0W
301200Z	17.1N	115.9W	030000Z	17.6N	124.0W
301800Z	17.5N	116.2W	030600Z	17.4N	125.0W
010000Z	17.9N	116.5W			

TROPICAL STORM BERNICE
29 JUN-08 JUL

291800Z	10.5N	97.4W	020000Z	11.6N	101.0W
300000Z	10.7N	97.6W	020600Z	11.7N	101.3W
300600Z	10.9N	97.9W	021200Z	11.7N	101.6W
301200Z	11.1N	98.2W	021800Z	11.7N	101.9W
301800Z	11.2N	98.6W	030000Z	11.8N	102.3W
010000Z	11.3N	99.1W	030600Z	12.0N	102.7W
010600Z	11.4N	99.6W	031200Z	12.4N	103.2W
011200Z	11.4N	100.2W	031800Z	13.2N	103.6W
011800Z	11.5N	100.7W	040000Z	14.2N	103.7W

TROPICAL STORM BERNICE (CONT'D)

040600Z	15.1N	104.2W	061200Z	16.6N	116.7W
041200Z	15.8N	105.0W	061800Z	17.4N	117.8W
041800Z	16.4N	106.0W	070000Z	18.0N	119.4W
050000Z	16.6N	107.3W	070600Z	18.2N	121.4W
050600Z	16.4N	108.7W	071200Z	18.7N	122.4W
051200Z	16.5N	110.5W	071800Z	19.0N	124.1W
051800Z	16.8N	112.0W	080000Z	18.6N	126.0W
060000Z	16.5N	113.7W	080600Z	18.5N	128.0W
060600Z	16.5N	115.2W	081200Z	18.5N	130.0W

TROPICAL STORM CLAUDIA
07 AUG-11 AUG

070000Z	20.5N	110.0W	090600Z	24.9N	120.0W
070600Z	21.5N	111.0W	091200Z	25.2N	121.2W
071200Z	22.2N	111.9W	091800Z	25.7N	122.2W
071800Z	22.8N	112.9W	100000Z	26.1N	123.2W
080000Z	23.3N	113.9W	100600Z	26.7N	124.1W
080600Z	23.7N	115.1W	101200Z	27.7N	124.6W
081200Z	23.8N	116.2W	101800Z	28.8N	124.9W
081800Z	24.0N	117.4W	110000Z	30.0N	125.0W
090000Z	24.5N	118.5W			

TROPICAL STORM DOREEN (FWC ALAMEDA)
20 AUG-30 AUG

201200Z	13.4N	109.0W	251800Z	23.0N	133.0W
201800Z	13.9N	110.4W	260000Z	24.1N	132.2W
210000Z	14.1N	111.9W	260600Z	25.4N	132.7W
210600Z	14.3N	113.1W	261200Z	26.2N	133.4W
211200Z	14.4N	114.3W	261800Z	27.0N	133.5W
211800Z	14.5N	115.4W	270000Z	27.8N	133.5W
220000Z	14.5N	116.5W	270600Z	28.8N	133.3W
220600Z	14.5N	117.5W	271200Z	29.8N	133.2W
221200Z	14.5N	118.5W	271800Z	30.5N	133.0W
221800Z	14.5N	119.5W	280000Z	31.2N	132.5W
230000Z	14.5N	120.5W	280600Z	30.4N	131.8W
230600Z	14.6N	121.5W	281200Z	30.1N	132.9W
231200Z	15.3N	122.7W	281800Z	30.6N	133.7W
231800Z	16.5N	123.6W	290000Z	30.7N	134.7W
240000Z	17.3N	125.0W	290600Z	30.4N	135.4W
240600Z	18.0N	126.7W	291200Z	30.0N	136.1W
241200Z	19.2N	127.9W	291800Z	29.6N	136.9W
241800Z	19.9N	128.5W	300000Z	29.0N	138.0W
250000Z	20.7N	129.3W	300600Z	28.6N	138.9W
250600Z	21.3N	130.0W	301200Z	28.1N	139.7W
251200Z	22.0N	131.7W			

TROPICAL STORM DOREEN (FWC PEARL HARBOR)
30 AUG-31 AUG

301800Z	28.1N	140.2W	310000Z	28.5N	140.5W

TROPICAL STORM FLORENCE
09 SEP-14 SEP

081800Z	16.3N	113.5W	111800Z	18.9N	120.2W
090000Z	16.4N	114.3W	120000Z	19.0N	120.7W
090600Z	16.5N	115.1W	120600Z	19.1N	121.4W
091200Z	16.6N	115.9W	121200Z	18.9N	122.1W
091800Z	16.8N	116.6W	121800Z	18.6N	123.0W
100000Z	16.9N	117.1W	130000Z	18.5N	124.0W
100600Z	17.1N	117.6W	130600Z	18.8N	125.0W
101200Z	17.3N	118.1W	131200Z	19.0N	126.0W
101800Z	17.6N	118.5W	131800Z	19.2N	127.0W
110000Z	17.9N	118.9W	140000Z	19.2N	128.0W
110600Z	18.3N	119.3W	140600Z	19.2N	129.0W
111200Z	18.7N	119.7W	141200Z	19.2N	130.0W

TROPICAL STORM GLENDA
13 SEP-18 SEP

130000Z	12.0N	109.2W	180000Z	15.9N	129.2W
130600Z	11.6N	110.4W	180600Z	16.5N	129.8W
131200Z	11.8N	111.8W	181200Z	17.0N	130.0W
131800Z	12.0N	113.0W	181800Z	17.0N	129.5W
140000Z	12.0N	114.3W	190000Z	16.7N	129.2W
140600Z	12.2N	115.5W	190600Z	16.2N	128.6W
141200Z	12.4N	116.7W	191200Z	16.5N	127.9W
141800Z	12.6N	117.9W	191800Z	17.1N	127.4W
150000Z	12.7N	119.0W	200000Z	17.8N	127.5W
150600Z	12.7N	120.0W	200600Z	18.3N	128.0W
151200Z	12.7N	121.0W	201200Z	18.7N	128.6W
151800Z	12.7N	122.2W	201800Z	19.1N	129.3W
160000Z	12.7N	123.5W	210000Z	19.4N	130.0W
160600Z	12.8N	124.5W	210600Z	19.7N	130.7W
161200Z	13.0N	125.4W	211200Z	20.1N	131.4W
161800Z	13.3N	126.0W	211800Z	20.5N	132.0W
170000Z	13.7N	126.6W	220000Z	21.0N	132.5W
170600Z	14.1N	127.3W	220600Z	21.5N	132.8W
171200Z	14.5N	128.3W	221200Z	22.0N	133.1W
171800Z	15.0N	129.0W	221800Z	22.6N	133.4W

TROPICAL STORM HAZEL
23 SEP-26 SEP

231800Z	19.0N	109.5W	251200Z	21.7N	110.3W
240000Z	19.4N	109.8W	251800Z	21.9N	109.6W
240600Z	19.7N	110.2W	260000Z	22.1N	108.7W
241200Z	20.0N	110.5W	260600Z	22.3N	107.7W
241800Z	20.3N	110.8W	261200Z	22.7N	106.9W
250000Z	20.8N	111.0W	261800Z	23.5N	106.3W
250600Z	21.4N	110.9W			

TROPICAL DEPRESSIONS 1965

POSITION DATA

TROPICAL DEPRESSION 05
17 JUL-18 JUL

DTG	LAT	LONG	DTG	LAT	LONG
171800Z	13.5N	105.0W	180600Z	13.0N	107.0W
180000Z	13.1N	105.9W	181200Z	13.0N	108.0W

TROPICAL DEPRESSION 12
21 OCT

210600Z	13.5N	99.5W	211200Z	14.0N	98.0W

HURRICANE EMILY - 291800Z AUGUST TO 040600Z SEPTEMBER

I. DATA

A. Statistics
1. Number of warnings issued - 25
2. Number of warnings with hurricane intensity - 2
3. Total distance traveled during tropical warning period - 1122 mi.

B. Characteristics as a hurricane
1. Minimum observed SLP - 980mb, 311500Z
2. Minimum observed 700mb height - 3100m, 030000Z
3. Maximum surface wind - 90 kts
4. Max radius of surface circulation - 540 mi

II. DEVELOPMENT

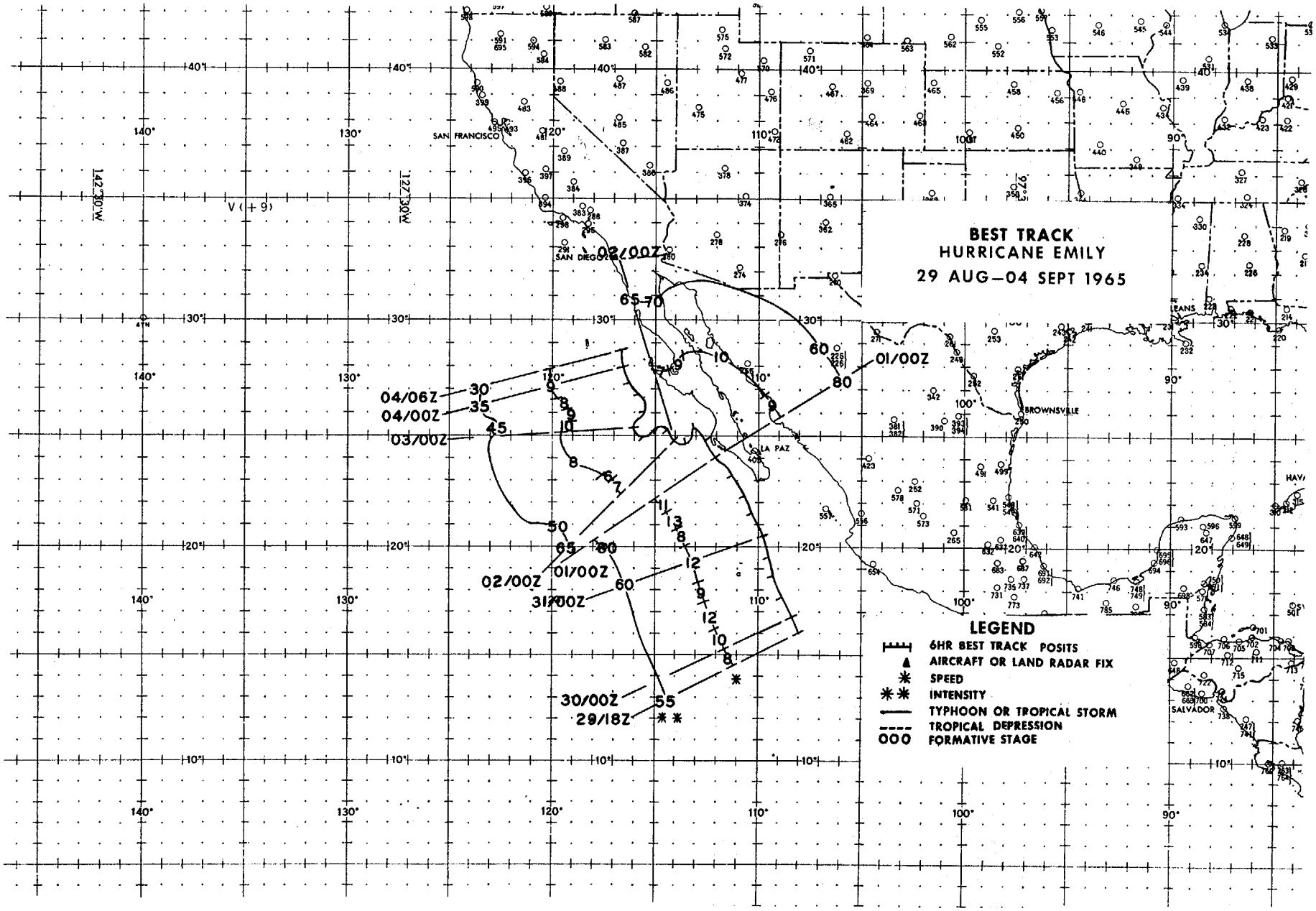
A. Initial impetus - ITCZ

B. Initial surface vortex
1. 291800Z
2. Surface pressure less than 1000mb

C. 200mb flow above surface vortex
1. No data available

III. FINAL DISPOSITION

A. Dissipated


BEST TRACK
HURRICANE EMILY
29 AUG–04 SEPT 1965
LEGEND
6HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
SALVADOR
142°30'W
122°30'W
02/00Z
01/00Z
04/06Z
04/00Z
03/00Z
31/00Z
30/00Z
29/18Z

HURRICANE EMILY 29 AUG - 4 SEP 1965
POSITION AND FORECAST VERIFICATION DATA

DTG	BEST TRACK STORM POSITION LAT	LONG	24 HR ERROR DEG. DISTANCE	48 HR ERROR DEG. DISTANCE
291800Z	16.0N	108.0W	------	------
300000Z	16.8N	108.3W	------	------
300600Z	17.7N	108.8W	------	------
301200Z	18.6N	109.2W	------	------
301800Z	19.5N	109.5W	284-48	------
310000Z	20.5N	109.8W	045-9	------
310600Z	21.5N	110.2W	315-16	------
311200Z	22.2N	110.5W	171-110	------
311800Z	23.2N	111.2W	236-22	265-120
010000Z	24.0N	112.0W	090-48	073-63
010600Z	24.7N	112.5W	055-121	300-35
011200Z	25.3N	113.1W	080-104	144-222
011800Z	24.7N	113.4W	053-158	357-108
020000Z	24.7N	114.0W	346-148	360-132
020600Z	25.3N	114.4W	020-210	004-180
021200Z	25.4N	114.9W	011-230	002-197
021800Z	25.0N	115.5W	343-102	054-370
030000Z	25.4N	116.0W	355-66	011-280
030600Z	26.0N	115.5W	355-132	------
031200Z	26.7N	115.7W	284-98	030-420
031800Z	27.2N	116.2W	210-153	329-148
040000Z	27.9N	116.4W	209-205	313-90
040600Z	28.6N	116.6W	119-89	023-168

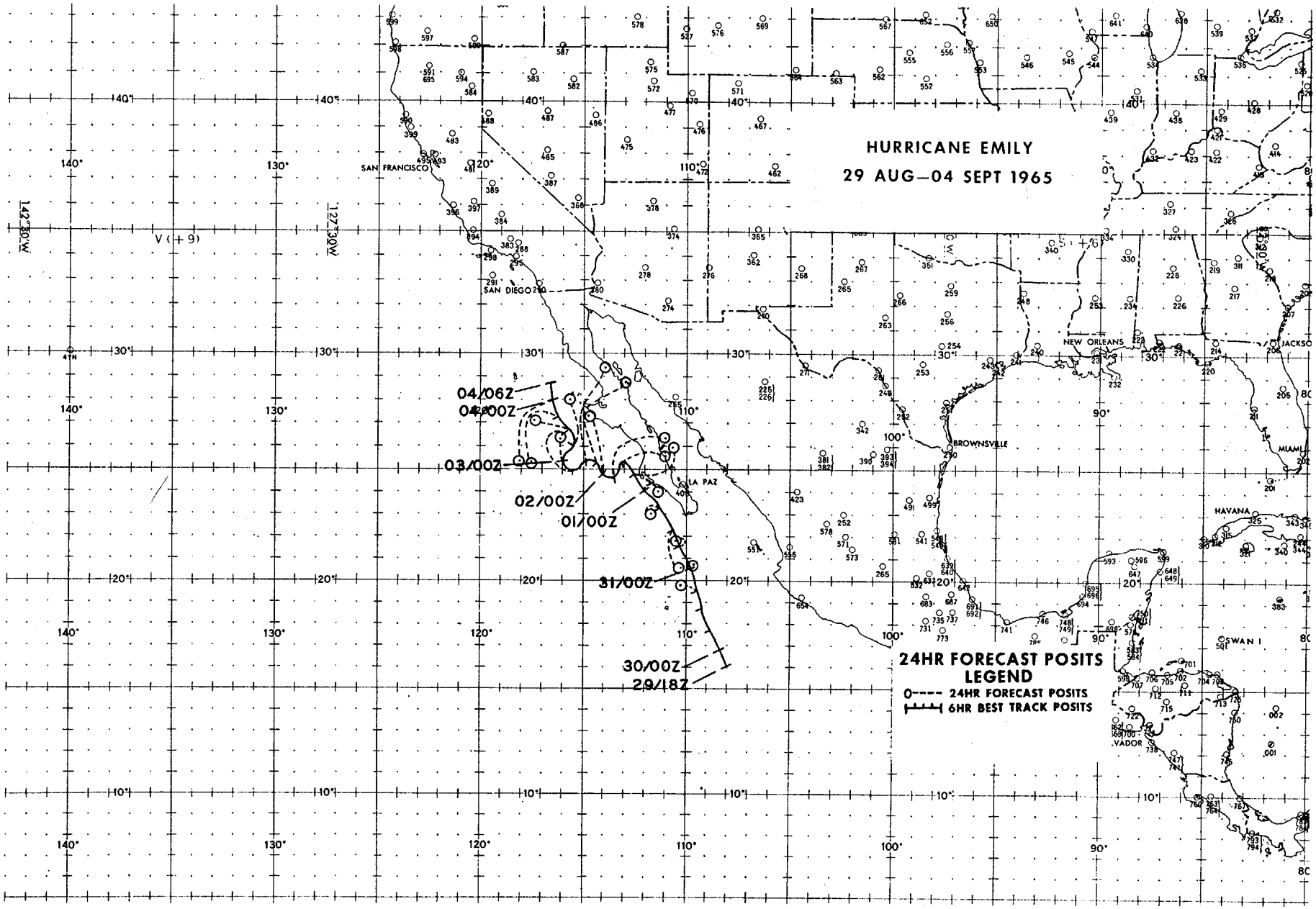
Two intermediate positions of interest.

Warning No. 9 311500Z 22.5N 110.5W 90KTS near center. Good based on surface reports.

Warning No. 14 011500Z 24.5N 113.7W 70 KTS near center. Based on surface reports.

HURRICANE EMILY OPERATIONAL TRACK

DTG(Z)	POSITION LAT	POSITION LONG	WARNING #	INTENSITY	INTENSITY COMPARISON 24 HR FORECAST	INTENSITY COMPARISON 48 HR FORECAST
291800Z	16.0N	108.0W	1	55KTS	---	---
300000Z	16.8N	108.3W	2	55	---	---
300600Z	18.0N	109.0W	3	55	---	---
301200Z	18.5N	109.5W	4	55	---	---
301800Z	19.5N	109.5W	5	55	55K	---
310000Z	20.5N	109.8W	6	60	55	---
310600Z	21.5N	110.2W	7	60	50	---
311200Z	22.2N	110.5W	8	60	55	---
311800Z	23.0N	110.7W	10	80	55	55
010000Z	24.0N	112.0W	11	80	60	55
010600Z	24.7N	112.5W	12	60	50	50
011200Z	25.5N	113.2W	13	60	50	55
011800Z	24.5N	113.5W	15	70	65	55
020000Z	24.7N	113.9W	16	65	65	60
020600Z	25.3N	114.4W	17	50	60	40
021200Z	25.7N	114.8W	18	50	35	40
021800Z	25.0N	115.5W	19	50	70	45
030000Z	25.0N	116.0W	20	50	60	50
030600Z	26.0N	115.5W	21	45	50	DISSIPATED
031200Z	26.3N	115.5W	22	45	40	DISSIPATED
031800Z	27.2N	116.2W	23	40	40	60
040000Z	27.5N	116.4W	24	35	40	50
040600Z	28.6N	116.6W	25	30	35	40


HURRICANE EMILY
29 AUG–04 SEPT 1965
24HR FORECAST POSITS
LEGEND
0---- 24HR FORECAST POSITS
6HR BEST TRACK POSITS
04/06Z
04/00Z
03/00Z
02/00Z
01/00Z
31/00Z
30/00Z
29/18Z
SAN FRANCISCO
SAN DIEGO
LA PAZ
BROWNSVILLE
NEW ORLEANS
HAVANA
MIAMI
SWAN I
V (+9)
142°30'W
127°30'W