K. TYPHOON KATE 15 OCT 0500Z-25 OCT 1100Z

1. STATISTICS

   a. Number of Warnings Issued - 42

   b. Number of Warnings with Typhoon Intensity - 34

   c. Distance Traveled During Warning Period - 2,317 MI

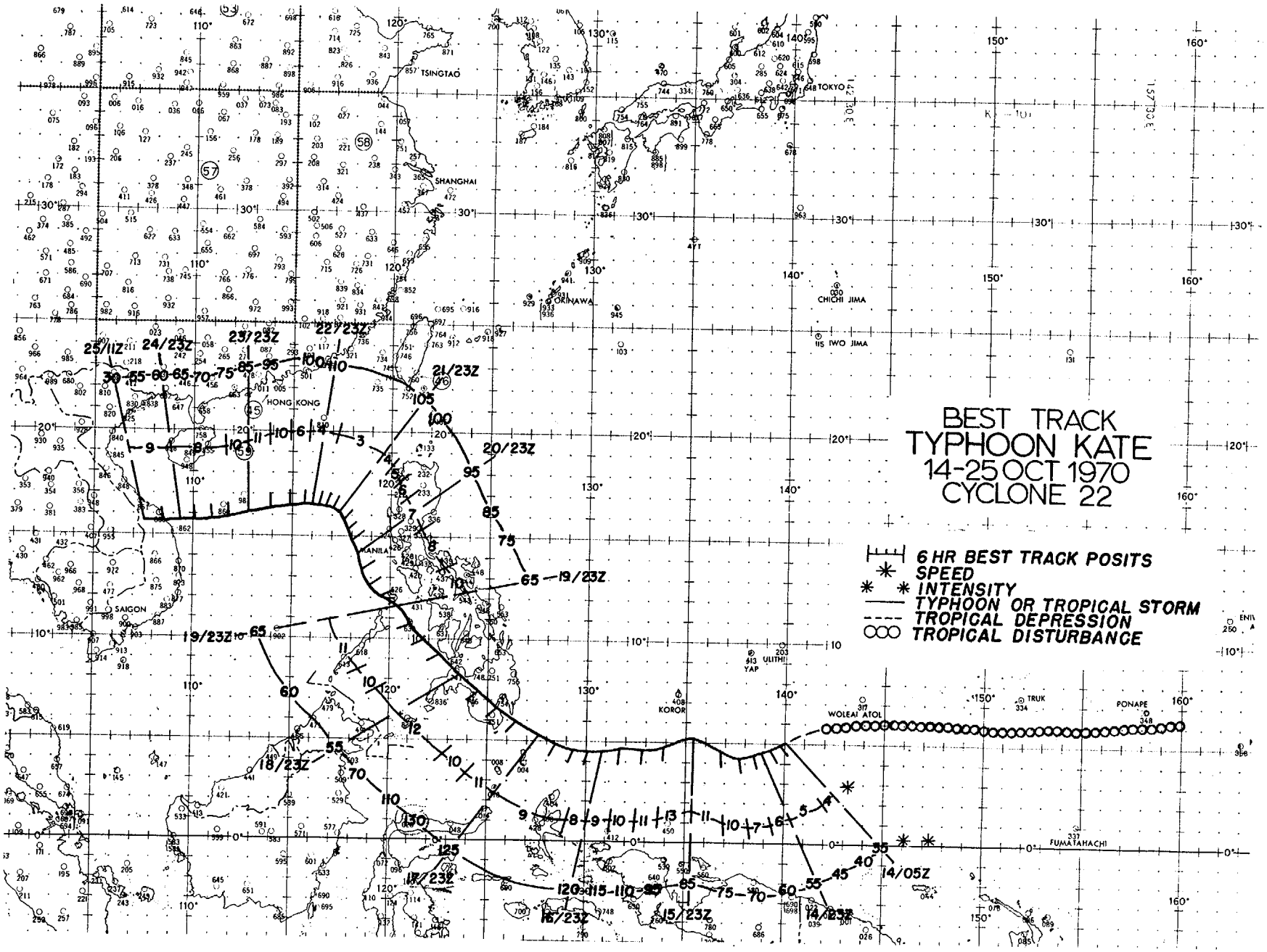
2. CHARACTERISTICS AS A TYPHOON

   a. Minimum Observed SLP - 938 MBS at 16/2100Z

   b. Minimum Observed 700 MB Height - 2554 M at 22/2100Z

   c. Maximum Surface Wind - 130 KTS (From Best Track)

   d. Maximum Radius of Surface Circulation - 540 MI


BEST TRACK
TYPHOON KATE
14-25 OCT 1970
CYCLONE 22
6 HR BEST TRACK POSITS
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
TSINGTAO
SHANGHAI
TOKYO
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIGON
YAP
ULITHI
KOROR
WOLEAI ATOL
TRUK
PONAPE
FUMATAHACHI
25/11Z
24/23Z
23/23Z
22/23Z
21/23Z
20/23Z
19/23Z
18/23Z
17/23Z
16/23Z
15/23Z
14/23Z
14/05Z

3. TYPHOON KATE NARRATIVE

While Joan was making headway in the South China Sea, Kate appeared on the scene developing south of Yap and commencing on an unusually low latitude track.

The initial impulse that later became Kate first revealed itself on the Majuro upper air sounding in the Marshalls with winds showing a cyclonic shift in the 700 mb and 500 mb levels on October 7th. The perturbation continued westward but realigned along a lower latitude apparently in response to the building heights to the rear of Joan. The ITOS-1 picture on the 13th showed a marked flare up in convective activity as the system moved under considerable difluent flow generated by equatorward outflow from Typhoon Joan some 1,300 miles to the northeast.

An organized pattern of clouds was apparent 300 miles south of Yap the following day. By the time a reconnaissance aircraft reached the area the afternoon of the 15th, Kate was near typhoon intensity with a wall cloud in process of forming, a central pressure of 986 mb and winds estimated near 60 knots.

During its westward journey in the following 3 days the typhoon remained small but concentrated. Shifting course slightly northwest the afternoon of the 17th (Figure 5-21), the storm aimed for the Davao Gulf of Mindanao reaching super typhoon strength some 24 hours later. The following evening its center arrived ashore 30 miles south of Davao City being the second typhoon to strike the Philippines in 4 days. Evidence of the highly concentrated nature of Kate at this time could be testified to by Davao not reporting a wind higher than 25 knots! Over 5,000 houses and other structures were lost in the accompanying storm surge, heavy rains and flooding in Southern Mindanao. Kate proved to be the most costly typhoon of the season as she struck an area unaccustomed to the effects of tropical cyclones and where light housing materials are common. A total of 631 persons perished with an additional 284 still counted as missing. Damage estimates were close to 50 million dollars (U.S.) The death toll counted surpassed all other typhoons on record in the Philippines and ranked Kate as the greatest killer cyclone experienced by that country.

Once over the Sulu Sea the storm was surprisingly intact after passing through the mountainous terrain of Mindanao. Kate slowly regained strength reaching typhoon strength just before passage over Busuanga Island. The Talampolan U. S. Coast Gurad LORAN station on the island reported gusts to 76 knots and a barometer reading of 989.9 mb.

Kate swung to a northward heading paralleling the western Luzon coast and slowing in forward speed as she approached the

ridge line (Figure 5-22). As height rises to the north blocked any further advancement, she slowly turned on a westward course on the 22nd setting sights for the Indochina coastline. Increasing in forward speed to 10 knots, the storm started to weaken on its west southwesterly track. Kate arrived onshore on the 25th just south of DaNang reduced to tropical storm force and bringing gale winds to the coast. The DaNang airfield reported winds 40 knots gusting to 66 knots. The storm lost intensity and later dissipated inland over the plateau region.

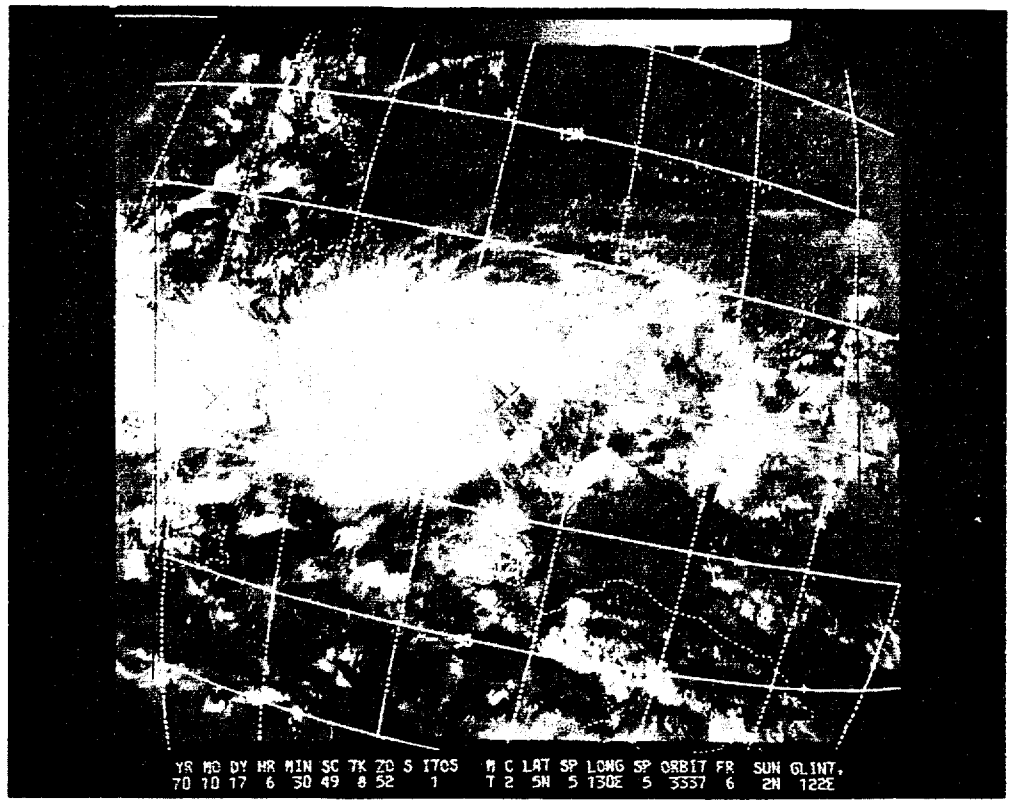


FIGURE 5-21 ITOS-1 DEPICTS TYPHOON KATE ON 17 OCTOBER DURING ITS LOW LATITUDE TRACK TOWARDS MINDANAO.

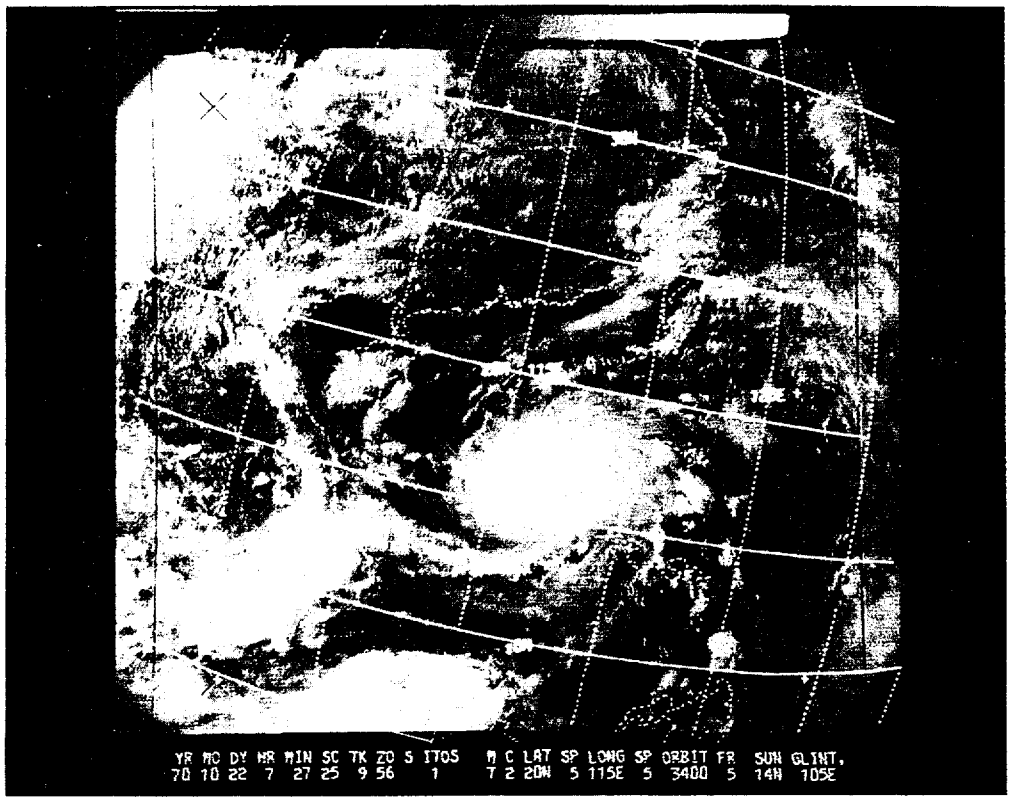


FIGURE 5-22 KATE WEST OF LUZON AS SEEN BY ITOS-1 ON 22 OCTOBER.

TYPHOON KATE

EYE FIXES CYCLONE 22

FIX NO.	TIME	POSIT	UNIT-METHOD-ACCY	FLT LVL	FLT LVL WND	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN-TATION	EYE DIA	CHARACTER WALL CLOUD
1	140536Z	05.0N 140.0E	SLTLS	STG B	DIA -- CAT -								----------
2	150555Z	04.5N 138.1E	54-P-06---	700MB	050	055	986	3018	19/14	----			W/C FORMG E-S
3	150633Z	04.0N 137.0E	SLTLS	STG B	DIA -- CAT -								----------
4	150737Z	04.3N 137.9E	54-P-06---	700MB	070	070	986	2984	16/11	----			W/C N-E-SE
5	151502Z	04.2N 136.8E	VW-P-05---		---	---	---	---	--/--	ELIP	NW-SE	30X17	7-10NM THK
6	162100Z	05.2N 135.7E	54-P-05---	700MB	075	075	976	2896	17/08	CIRC	----	25	CLSD, 10NM THK
7	160300Z	05.1N 134.8E	54-P-02---	700MB	075	085	971	2856	17/11	CIRC	----	20	CLSD, 10NM THK
8	160534Z	04.5N 133.5E	SLTLS	STG X	DIA 04 CAT 3								--------
9	161210Z	04.6N 132.3E	VW-P-05---		110	095	960	---	27/23	CIRC	----	17	ROTATG RAPIDLY
10	161405Z	04.7N 132.0E	VW-P------	700MB	---	---	959	2746	23/09	ELIP	N-S	15X13	10-12NM THK
11	161445Z	04.7N 131.9E	VW-P------		---	---	---	---	--/--	----			----------
12	162100Z	04.5N 131.2E	54-P-05---	700MB	103	120	938	2591	23/13	CIRC	----	10	CLSD, 4NM THK
13	170300Z	04.4N 130.3E	54-P-10---	700MB	104	100	938	2600	27/11	CIRC	----	10	CLSD, 3-4NM THK
14	170631Z	04.7N 129.7E	SLTLS	STG X	DIA 03 CAT 4								----------
15	170830Z	04.8N 129.5E	VW-P-15---	0300M	---	050	---	---	--/--	ELIP	NW-SE	12X10	CLSD, 10-12NM THK
16	172100Z	05.3N 127.9E	54-P-06---	700MB	120	---	949	2664	21/09	CIRC	----	20	CLSD, 4-5NM THK
17	180300Z	05.9N 126.6E	54-P-05---	700MB	075	130	941	2621	23/11	CIRC	----	20	CLSD, 7NM THK
18	180727Z	06.0N 125.0E	SLTLS	STG X	DIA 05 CAT 3								------
19	180900Z	06.4N 125.8E	VW-P-10---	0300M	---	---	---	---	--/--	----			CLSD, BUT BRKG UP
20	181200Z	06.8N 125.3E	VW-P-20---		---	---	---	---	--/--	----			BARELY DISCRNBL
21	181418Z	07.2N 124.9E	VW-P-20---		---	---	---	---	--/--	----			APRNT W/C N QUAD
22	182100Z	07.2N 123.6E	54-P-05---	500MB	030	---	---	---	-3/-8	CIRC	----	04	NEG W/C
23	190040Z	11.6N 119.9E	LND RDR		---	---	---	---	--/--	----			----------
24	190140Z	11.9N 119.7E	LND RDR		---	---	---	---	--/--	----			----------
25	190300Z	09.1N 123.0E	54-P-10---	500MB	045	---	---	---	-2/-5	CIRC	----	10	NEG W/C
26	190600Z	09.8N 122.5E	54-P-20---	500MB	045	---	---	---	-4/-6	----			NEG W/C
27	190628Z	10.0N 121.5E	SLTLS	STG X	DIA 0[illegible] CAT 2								----------
28	190851Z	09.7N 122.1E	VW-P-05---	0300M	---	065	992	---	25/22	CIRC	----	14	CLSD
29	191152Z	10.1N 121.5E	VW-P-05---	0360M	---	065	988	---	25/22	CIRC	----	25	CLSD, WK S QUAD
30	191515Z	10.4N 121.1E	VW-P-05---	700MB	060	---	---	---	18/12	CIRC	----	20	CLSD
31	192100Z	11.5N 120.9E	54-P-02---	700MB	040	---	978	2905	18/12	CIRC	----	10	CLSD, 7NM THK
32	192340Z	11.7N 120.0E	LND RDR		---	---	---	---	--/--	----			----------
33	200000Z	11.8N 120.1E	54-P-02---	700MB	050	060	980	2908	16/12	CIRC	----	10	CLSD
34	200300Z	12.0N 119.5E	54-P-02---	700MB	040	070	976	2877	18/12	CIRC	----	15	CLSD, 5NM THK
35	200600Z	12.3N 119.2E	54-P-02---	700MB	050	090	972	2853	17/10	CIRC	----	10	CLSD
36	200721Z	12.5N 119.2E	SLTLS	STG X	DIA 02 CAT 4								----------
37	200900Z	12.7N 119.3E	VW-P-05---		---	---	---	---	--/--	CIRC	----	12	7NM THK, OPEN SW
38	201200Z	12.9N 119.0E	VW-P-05---		---	---	---	---	--/--	CIRC	----	16	5NM THK, OPEN SW
39	201447Z	13.2N 118.6E	VW-P-05---		---	---	---	---	--/--	CIRC	----	13	7NM THK, OPEN SW
40	201500Z	13.2N 118.7E	LND RDR		---	---	---	---	--/--	CIRC	----	40	----------
41	201530Z	13.4N 118.9E	LND RDR		---	---	---	---	--/--	CIRC	----	30	----------
42	202100Z	14.0N 118.4E	54-P-01---	700MB	065	---	958	2755	22/12	CIRC	----	07	8-10NM THK, OPEN S QUAD
43	210000Z	14.5N 118.2E	LND RDR		---	---	---	---	--/--	----			----------
44	210310Z	14.8N 118.0E	54-P-01---	700MB	070	125	958	2737	21/10	CIRC	----	15	5-8NM THK, OPEN SE
45	210631Z	14.7N 117.5E	SLTLS	STG X	DIA 0[illegible] CAT 3								----------
46	210845Z	15.3N 117.8E	VW-P-05---	0500M	110	115	961	---	27/23	CIRC	----	20	CLSD
47	211517Z	15.8N 117.5E	VW-P-05---	700MB	097	---	960	2781	18/10	CIRC	----	20	CLSD, WK SE QUAD
48	212100Z	16.1N 117.5E	54-P-05---	700MB	100	---	952	2698	18/11	ELIP	NW-SE	20X--	CLSD, 6NM THK

TYPHOON KATE

EYE FIXES CYCLONE 22

FIX NO.	TIME	POSIT	UNIT-METHOD -ACCY	FLT LVL	FLT LVL WND	OBS SFC WND	OBS MIN SLP	MIN 700MB HGT	FLT LVL TT/TD	EYE FORM	ORIEN-TATION	EYE DIA	CHARACTER WALL CLOUD
49	220315Z	16.4N 117.1E	54-P-02---	700MB	090	---	953	2701	16/09	CIRC	----	20	6NM THK, WK SE
50	220727Z	16.0N 117.0E	SLTLS	STG X	DIA 04	CAT 4							----------
51	220805Z	16.6N 116.8E	VW-P-05---	0500M	115	115	947	---	23/20	ELIP	N-S	19X17	CLSD, 7NM THK, WK SE
52	221200Z	16.8N 116.4E	VW-P-12---		---	---	---	---	--/--	CIRC	----	17	CLSD, 7NM THK
53	221407Z	16.7N 116.5E	VW-P-12---		---	---	---	---	--/--	CIRC	----	17	CLSD, 7NM THK
54	222100Z	16.5N 116.2E	54-P-05---	700MB	105	---	941	2554	17/11	CIRC	----	17	CLSD, 5-7NM THK, WK SE
55	230315Z	16.7N 115.7E	54-P-02---	700MB	110	100	956	2707	16/12	CIRC	----	18	CLSD, 4NM THK
56	230600Z	16.7N 115.4E	54-P-02---	700MB	110	100	955	2698	16/12	CIRC	----	18	CLSD, 4NM THK
57	230629Z	16.5N 114.8E	SLTLS	STG X	DIA 03	CAT 4							----------
58	230910Z	16.5N 115.1E	VW-P-05---		125	125	950	---	22/24	CIRC	----	20	CLSD, 5-18NM THK
59	231130Z	16.5N 114.6E	VW-P-05---	700MB	105	---	952	2722	19/10	CIRC	----	20	CLSD, HVY S QUAD
60	231445Z	16.4N 114.1E	VW-P-05---	700MB	110	---	955	2777	19/11	CIRC	----	20	CLSD, 10NM THK
61	232100Z	16.1N 113.0E	54-P-02---	700MB	080	---	968	2822	13/10	ELIP	NE-SW	24X16	DEGENRTG, OPEN NW
62	240252Z	16.0N 112.0E	54-P-02---	700MB	070	065	991	2905	17/10	CIRC	----	30	WK W/C S QUAD
63	240725Z	16.0N 111.1E	SLTLS	STG X	DIA 03	CAT 3							----------
64	240855Z	15.9N 111.2E	VW-S-02---		---	060	---	---	--/--	CIRC	----	24	8NM THK, OPEN NW-NE
65	240910Z	15.9N 112.0E	LND RDR		---	---	---	---	--/--	----			----------
66	241045Z	15.9N 111.7E	LND RDR		---	---	---	---	--/--	----			----------
67	241157Z	15.6N 110.2E	VW-C-02---		---	---	---	---	--/--	CIRC	----	25	OPEN NNW-N-E-SE
68	241527Z	15.9N 110.3E	VW-P-05---	0500M	070	060	988	---	24/23	----			NEG W/C
69	241545Z	15.9N 109.6E	LND RDR		---	---	---	---	--/--	----			----------
70	242100Z	15.9N 109.5E	54-P-05---	700MB	050	---	989	2981	12/12	----			----------
71	250300Z	15.7N 108.4E	54-P-02---	500MB	055	---	995	---	-1/-5	CIRC	----	28	APRNT W/C W-N-SE

TYPHOON KATE

TROPICAL CYCLONE 22 -- 10/14/0500Z TO 10/25/1100Z
POSITION AND FORECAST VERIFICATION DATA

WARN NO.	DTG	WARNING POSIT LAT	WARNING POSIT LONG	BEST TRACK LAT	BEST TRACK LONG	24 HR FCST LAT	24 HR FCST LONG	24 HR ERROR DEG DIST	48 HR FCST LAT	48 HR FCST LONG	48 HR ERROR DEG DIST	72 HR FCST LAT	72 HR FCST LONG	72 HR ERROR DEG DIST
01	15/0500Z	4.4N	138.2E	4.4N	138.1E	5.6N	136.1E	066-0144	7.2N	132.8E	046-0228	-----	------	--------
02	15/1100Z	4.6N	137.6E	4.3N	137.4E	5.9N	135.3E	064-0174	7.4N	132.0E	044-0228	8.7N	128.2E	054-0198
03	15/1700Z	4.2N	136.6E	4.7N	136.5E	4.9N	133.5E	078-0108	6.5N	130.3E	049-0144	-----	------	--------
04	15/2300Z	5.4N	135.3E	5.1N	135.2E	8.3N	131.5E	011-0234	10.3N	128.1E	007-0300	12.0N	124.4E	016-0228
05	16/0500Z	5.3N	134.5E	4.6N	133.8E	6.9N	131.1E	023-0156	8.7N	128.0E	031-0186	-----	------	--------
06	16/1100Z	4.6N	132.5E	4.6N	132.6E	5.6N	127.7E	305-0102	6.5N	123.4E	264-0114	7.5N	119.6E	220-0186
07	16/1700Z	4.7N	131.5E	4.5N	131.6E	5.7N	127.2E	306-0078	6.6N	123.3E	229-0078	-----	------	--------
08	16/2300Z	4.5N	130.8E	4.4N	130.7E	4.9N	127.5E	165-0024	5.7N	124.8E	151-0174	6.7N	122.2E	160-0318
09	17/0500Z	4.5N	130.0E	4.5N	130.0E	5.0N	126.8E	158-0060	5.9N	124.2E	153-0228	-----	------	--------
10	17/1100Z	4.8N	129.1E	4.6N	129.2E	5.6N	125.9E	160-0066	6.6N	123.4E	154-0216	7.8N	120.8E	159-0312
11	17/1700Z	5.0N	128.0E	4.9N	128.4E	5.9N	124.9E	165-0096	7.1N	122.4E	160-0234	-----	------	--------
12	17/2300Z	5.3N	127.7E	5.3N	127.4E	6.2N	124.6E	150-0144	7.3N	121.5E	165-0270	8.8N	118.7E	176-0318
13	18/0500Z	6.0N	126.3E	6.0N	126.3E	7.5N	122.5E	176-0108	9.4N	118.9E	189-0162	-----	------	--------
14	18/1100Z	6.5N	125.4E	6.7N	125.4E	8.5N	121.4E	189-0084	10.8N	117.7E	211-0126	13.3N	114.3E	238-0234
15	18/1700Z	7.1N	124.3E	7.5N	124.4E	9.3N	120.5E	195-0090	11.7N	117.0E	220-0132	-----	------	--------
16	18/2300Z	7.6N	123.4E	8.3N	123.3E	9.9N	119.5E	202-0114	12.4N	116.0E	233-0162	15.0N	112.9E	253-0258
17	19/0500Z	9.3N	122.6E	9.3N	122.4E	12.8N	119.2E	351-0042	14.7N	115.6E	268-0132	-----	------	--------
18	19/1100Z	10.1N	121.8E	9.9N	121.7E	13.5N	118.3E	327-0054	15.8N	114.9E	278-0162	19.1N	113.2E	309-0246
19	19/1700Z	10.8N	120.7E	10.8N	121.0E	13.4N	116.8E	270-0096	16.1N	113.8E	273-0210	-----	------	--------
20	19/2300Z	11.6N	120.6E	11.7N	120.3E	14.5N	117.5E	299-0048	17.4N	115.3E	300-0126	20.2N	114.8E	344-0216
21	20/0500Z	12.4N	119.5E	12.1N	119.4E	15.1N	116.9E	288-0054	16.7N	115.7E	284-0072	-----	------	--------
22	20/1100Z	12.9N	119.1E	12.7N	118.9E	15.5N	117.3E	284-0024	17.3N	116.4E	352-0048	19.2N	115.8E	019-0168
23	20/1700Z	13.5N	118.5E	13.4N	118.5E	15.0N	117.0E	256-0024	17.7N	116.2E	360-0066	-----	------	--------
24	20/2300Z	14.1N	118.1E	14.1N	118.3E	16.6N	116.7E	300-0030	18.5N	116.0E	004-0108	20.5N	115.6E	032-0306
25	21/0500Z	15.0N	117.8E	14.8N	117.9E	17.8N	117.1E	005-0084	19.9N	116.9E	023-0204	-----	------	--------
26	21/1100Z	15.5N	117.7E	15.4N	117.8E	17.9N	117.1E	016-0084	19.9N	116.9E	031-0234	21.4N	116.8E	046-0468
27	21/1700Z	16.0N	117.5E	15.9N	117.5E	17.9N	117.1E	029-0084	19.5N	116.9E	043-0258	-----	------	--------
28	21/2300Z	16.2N	117.5E	16.3N	117.3E	17.8N	117.1E	046-0090	19.5N	116.9E	050-0312	21.0N	116.8E	005-0528
29	22/0500Z	16.5N	117.0E	16.4N	117.0E	18.1N	116.4E	030-0096	19.8N	116.2E	048-0336	-----	------	--------
30	22/1100Z	16.8N	116.7E	16.5N	116.6E	18.1N	115.6E	024-0102	19.6N	115.0E	048-0324	21.1N	114.6E	--------
31	22/1700Z	16.8N	116.3E	16.6N	116.3E	17.8N	115.0E	037-0108	19.2N	114.1E	050-0306	-----	------	--------
32	22/2300Z	16.5N	116.2E	16.7N	115.9E	16.8N	116.0E	078-0186	17.4N	114.4E	072-0306	18.0N	112.4E	--------
33	23/0500Z	16.8N	115.5E	16.5N	114.8E	17.3N	113.2E	048-0114	18.1N	110.3E	039-0180	-----	------	--------
34	23/1100Z	16.5N	114.9E	16.3N	113.8E	16.1N	112.3E	082-0084	15.9N	109.0E	--------	-----	------	--------
35	23/1700Z	16.4N	113.8E	16.1N	112.7E	16.0N	110.2E	064-0012	15.9N	106.2E	--------	-----	------	--------
36	23/2300Z	16.1N	112.6E	16.0N	111.7E	15.8N	108.1E	270-0060	-----	------	--------	-----	------	--------
37	24/0500Z	16.0N	111.6E	16.0N	111.7E	15.8N	107.2E	275-0060	-----	------	--------	-----	------	--------
38	24/1100Z	15.9N	110.9E	15.9N	110.8E	15.8N	106.7E	--------	-----	------	--------	-----	------	--------
39	24/1700Z	15.9N	110.1E	15.9N	110.0E	15.8N	106.4E	--------	-----	------	--------	-----	------	--------
40	24/2300Z	15.9N	109.2E	15.8N	109.2E	-----	------	--------	-----	------	--------	-----	------	--------
41	25/0500Z	15.9N	108.2E	15.7N	108.3E	-----	------	--------	-----	------	--------	-----	------	--------
42	25/1100Z	16.0N	107.3E	-----	------	-----	------	--------	-----	------	--------	-----	------	--------

AVERAGE 24 HOUR ERROR - 0089 MI.
AVERAGE 48 HOUR ERROR - 0192 MI.
AVERAGE 72 HOUR ERROR - 0284 MI.