



TONGA METEOROLOGICAL SERVICE

TROPICAL CYCLONE PROCEDURES

SECOND EDITION
AUGUST 2007

TMS-Doc. 002

Ministry of Transport – Kingdom of Tonga

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1. DEFINITIONS

- (a) **Tropical Disturbance ('Alotamaki)** – A non-frontal system of synoptic scale (>2000km) originating over the tropics with persistent enhanced convection and/or some indication of cyclonic wind indication.
- (b) **Tropical Depression ('Alotamaki Fakatalopiki)** – A tropical disturbance with a clearly defined cyclonic wind circulation in which the central position can be estimated, and maximum 10-minute average winds speed of less than 34 knots (63km/hr i.e. gale force) near the centre. There may be gale force winds in one or more quadrants but not near the centre. A tropical depression is normally identified by a number followed by the letter F in the area of responsibility of RSMC Nadi. E. g. Tropical Depression 09F, means the 9th tropical depression in the Fiji area of responsibility.
- (b) **Tropical Cyclone (Saikolone Fakatalopiki)** – A non-frontal low pressure system of synoptic scale (>2000km) developing over warm waters and having a definite organized wind circulation with a maximum 10-minute wind average wind speed of 34 knots (63 km/hr, i.e. gale force) or greater near the centre. Tropical cyclones are usually identified with a name. The list of names are appended in Annex 1 to this document as agreed to by the Tropical Cyclone Committee for the South Pacific and South East Indian Ocean.
- (c) **Tropical Cyclone Alert (Fakatokanga ke tokateu ki ha saikolone fakatalopiki)** – A warning providing information on the progress of a tropical cyclone still some distance away with a significant probability of giving winds of 34 knots or stronger to a community within the next 24 to 48 hours.
- (d) **Tropical Cyclone Warning (Fakatokanga saikolone)** - A warning associated with expected 34 knots winds or stronger occurring within the next 24 hours.
- (e) **Special Weather Bulletin (Fakamatala'ea makehe)** – Weather Bulletins issued whenever the need arises to issue a tropical cyclone alert or tropical cyclone warning.
- (f) **Routine Weather Bulletin** – A bulletin issued at designated times to give weather information and forecasts to the general public or marine interests

2. ACTIVATION OF THE TROPICAL CYCLONE EMERGENCY RESPONSE PLAN (TCERP)

Whenever there is threat of a tropical cyclone affecting any part of Tonga within 48 hours or a tropical depression or tropical cyclone is located within the area bounded by 10S 175E, 25S 175E, 25S 165W, 10S 165W (area bounded by blue in Annex 1), the Tongan Meteorological Service (TMS) will activate its TCERP.

On the event of a tropical cyclone, TMS will provide Special Weather Bulletins (SWB) in the format laid out in Annex 4 to these procedures. A SWB will contain either a TROPICAL CYCLONE ALERT OR TROPICAL CYCLONE WARNING.

On the event of a tropical depression, warnings will be issued in the normal routine weather bulletins.

3. SPECIAL WEATHER BULLETINS

All Tropical cyclone "Alerts" or "Warnings" for Tonga will be contained in SPECIAL WEATHER BULLETINS (SWBs) as opposed to Routine Weather Bulletins issued all the year round. All SWB's will be issued in both English and Tongan language.

All SWBs will be numbered sequentially, starting from SPECIAL WEATHER BULLETIN NUMBER ONE.

Where a system is already a Tropical Cyclone, its name shall be included in the heading of the SWB, e.g. "SPECIAL WEATHER BULLETIN NUMBER THREE ISSUED FOR TONGA ON TROPICAL CYCLONE "HETA"

A Category will be assigned to each SWB with the strongest wind gusts estimated and potential damage in accordance with the category system laid out in Annex 3. e.g. "SPECIAL WEATHER BULLETIN NUMBER THREE ISSUED FOR TONGA ON TROPICAL CYCLONE "HETA" (CATEGORY 4).....

SWBs containing Tropical Cyclone "Alerts" or "Warning" shall be headed "TROPICAL CYCLONE ALERT" OR "TROPICAL CYCLONE WARNING" as appropriate.

On the event a Tropical Cyclone Warning is issued for Tonga, an authorisation to all media outlets to utilise the approved warning sound (siren) shall be included in the SWBs e.g. "ALL MEDIA OUTLETS ARE AUTHORISED TO USE THE APPROVED TROPICAL CYCLONE WARNING SOUND.

Special Weather Bulletins, subject to the availability of satellite and synoptic data, shall be issued every 3 hours. An example of a full SWB is included in Annex 4.

If information becomes available which points to a substantial change in the situation, thus invalidating the current warning, a SWB will be issued as soon as possible to inform users of the sudden change in the situation. Such an intermediate SWB will be brief and contain essential information including, for

example, new areas threatened or changed movement of the cyclone. The numbering sequence for SWBs will be retained. All intermediate bulletins will be identified for emphasis by the prefix "FLASH" e.g. "FLASH SPECIAL WEATHER BULLETIN NUMBER 10 FOR TONGA ON TROPICAL CYCLONE KINI ISSUED AT"

It is the responsibility of users to inform the TMS of the receipt of the 1st SWB. Failure to do so may result in the cessation of the issue of further bulletins.

(4) TROPICAL CYCLONE LOCATION AND MOVEMENT

The location of a Tropical Cyclone is usually determined with respect to its centre which is given in Latitude and Longitude coordinates (to one-tenth of a Degree) plus the distance (in Kilometers) and the general direction from an island or place. The general direction of movement of the cyclone centre is indicated together with the speed at which it (the centre) is moving. For example, TROPICAL CYCLONE WAKA HAD ITS CENTRE LOCATED NEAR 15 DECIMAL 5 SOUTH 175 DECIMAL 0 EAST OR 370 KM NORTHWEST OF NADI AT 9 AM TODAY MOVING SOUTH AT 20 KM/HR.

(5) TROPICAL CYCLONE INTENSITY AND SIZE

The intensity and size of a Tropical Cyclone is usually given in terms of maximum (10-minute) average winds and momentary gusts close to its centre (within the eye wall) and the distribution or extent of winds of 34 KNOTS (GALE FORCE) and above from the cyclone centre. These are generally estimated. All winds are stated in Kilometers per Hour (KM/HR) and distances in Kilometers (KM) (except in the case of information for Mariners which is stated in KNOTS and Nautical Miles (NM) respectively). Where possible the estimated central pressure may be given usually corresponding with the maximum estimated winds. For example, THE CYCLONE IS ESTIMATED TO HAVE MAXIMUM AVERAGE WINDS OF 150 KM/HR WITH MOMENTARY GUSTS TO 220 KM/HR CLOSE TO ITS CENTRE. VERY DESTRUCTIVE HURRICANE FORCE WINDS EXTEND TO ABOUT 50 KM FROM THE CENTRE AND DESTRUCTIVE STORM FORCE WINDS TO ABOUT 100 KM FROM THE CENTRE. DAMAGING GALE FORCE WINDS EXTEND TO ABOUT 200 KM FROM THE CENTRE.

(6) BROADCAST OF WARNINGS BY RADIO TONGA

The TMS will require the National Radio (A3Z) to remain on air and issue SWB's and/or weather bulletins if the following criteria are met:

- (a) If SWB's have been issued for any part of Tonga and have not been cancelled.
- (b) If a SWB has not been issued but a tropical depression or tropical cyclone has been located within the area bounded by 12S 180W, 23S 180W, 23S 170W, 12S 170W.
(area bounded by red in Annex 2)

(7) DISTRIBUTION OF TROPICAL CYCLONE ALERTS AND WARNINGS

The TMS will distribute SWB's containing Tropical Cyclone Alerts and/or Warning to all members of the National Disaster Committee. See Annex 6 for contact details.

In the event that the TMS is unable to function during a cyclone event, arrangement will be made where possible for Radio New Zealand International (RNZI) to broadcast warnings. See Annex 5 for the schedule and frequency details

Warnings for Marine vessels will be available from the Coastal Watch Station at VHF Channel 12, SSB 2080 and 6230 kHz at regular intervals as issued by the TMS.

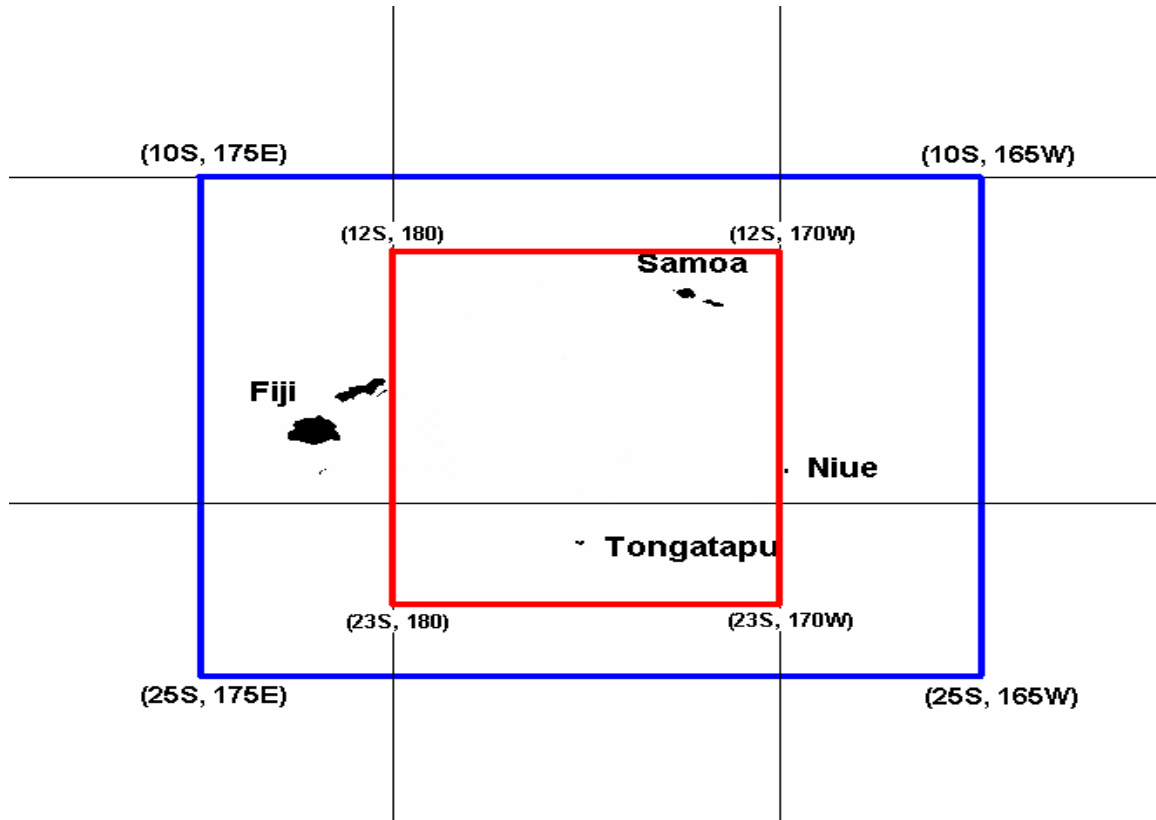
(8) TONGA METEOROLOGICAL SERVICE CONTACT

The Tonga Meteorological Service Headquarters is located at the Domestic Airport Terminal premises at Fua'amotu and may be contacted 24 hours during tropical cyclone operations at:

Telephone: 35 123 (*Direct*), 35 355 (*Direct*)
Facsimile: 35 123
Satellite phone: 00872 7629 41139 (*Contingency*)
Email: fmt_met@met.gov.to
TMS Web Site: <http://www.met.gov.to>

ANNEX 1

**TMS TROPICAL CYCLONE EMERGENCY RESPONSE PLAN (TCERP) AND A3Z
ACTIVATION BOUNDARIES**



Blue – area for activation of TCERP
Red – area required for A3Z to remain on air.

ANNEX 2

TROPICAL CYCLONE NAMES IN THE SOUTH PACIFIC (THESE NAMES WILL BE USED FOR SYSTEMS LOCATED WITH IN THE AREA BOUNDED BY LATITUDE 0S – 25S AND LONGITUDE 160E – 120W)

The name of a new cyclone is determined by sequentially cycling through lists A, B, C, and D, then starting list A again. Names from the standby list E are used as replacements when necessary. Only the Regional Specialized Meteorological Centre has the authority to name a tropical cyclone with in this region.

LIST A	LIST B	LIST C	LIST D	LIST E
Ana	Arthur	Atu	Amos	Alvin
Bina	Becky	Bune	Bart	Bela
Cody	Cliff	Cyril	Colin	Chip
Dovy	Daman	Daphne	Donna	Denia
Eva	Elisa	Evan	Ella	Eden
Fili	Funa	Freda	Frank	Fotu
Gina	Gene	Garry	Gita	Glean
Hagar	Hettie	Haley	Hali	Hart
Irene	Innis	Ian	Iris	Isa
Judy	Joni	June	Jo	Julie
Kerry	Ken	Kofi	Kala	Kevin
Lola	Lin	Lusi	Leo	Luise
Meena	Mick	Mike	Mona	Mal
Nancy	Nisha	Nute	Neil	Nat
Olaf	Oli	Odile	Oma	Olo
Percy	Pat	Pam	Pami	Pita
Rae	Rene	Reuben	Rita	Rex
Sheila	Sarah	Solo	Sarai	Suki
Tam	Tomas	Tuni	Tino	Troy
Urmil		Ula		
Vaianu	Vania	Victor	Vicky	Vanessa
Wati	Wilma	Winston	Wiki	Wano
Xavier				
Yani	Yasi	Yalo	Yolanda	Yvonne
Zita	Zaka	Zena	Zazu	Zidane

ANNEX 3

Tongan tropical cyclone category system		
CATEGORY (KALASI)	WIND GUST AND DESCRIPTORS (TO TAKUTAKU)	POTENTIAL DAMAGE (MAUMAU 'E MALAVA KE HOKO)
CATEGORY 1 <i>(e.g. TC Cilla)</i>	Gusts up to 125km/hr Gales and strong gales <i>(Damaging Winds)</i>	Negligible house damage. Damage to some crops and trees. Boats may drag anchor.
CATEGORY 2 <i>(e.g. TC Hina)</i>	Gusts between 125 and 170km/hr Storm, violent storm <i>(Destructive winds)</i>	Minor house damage. Significant damage to trees,. Heavy damage to crops. Risk of power failure. Small boats may break anchor.
CATEGORY 3 <i>(e.g. TC Kina)</i>	Gusts between 170 and 225km/hr Hurricane <i>(Very destructive winds)</i>	Some roof and structural damage. Power failure likely
CATEGORY 4 <i>(e.g. TC Waka)</i>	Gusts between 225-280km/hr Hurricane <i>(Very destructive winds)</i>	Significant roofing loss and structural damage, Dangerous airborne debris
CATEGORY 5 <i>(e.g. TC Heta)</i>	Gusts above 280km/hr Hurricane <i>(Very destructive winds)</i>	Extremely dangerous with widespread destruction

ANNEX 4

EXAMPLE OF A SPECIAL WEATHER BULLETIN

SPECIAL WEATHER BULLETIN NUMBER 1 ISSUED FOR TONGA AT 8:30PM (31/12/04).

ALL MEDIA OUTLETS ARE ADVISED TO ACTIVATE THE NATIONAL TROPICAL CYCLONE WARNING SOUND.

TROPICAL CYCLONE WARNING

TROPICAL CYCLONE WAKA, **CATEGORY 4**, WAS LOCATED NEAR 17.2 SOUTH 175.0 WEST OR ABOUT 190KM SOUTH-SOUTHEAST OF NIUAFO'OU OR 189KM SOUTH-SOUTHWEST OF NIUATOPUTAPU OR 186KM NORTHWEST OF VAVA'U AT 6:00PM TODAY.

CLOSE TO ITS CENTRE THE CYCLONE IS EXPECTED TO HAVE AVERAGE WINDS UP TO 165KM/H WITH MOMENTARY GUSTS TO 230KM/H, POSSIBLY INCREASING TO 175 KM/H WITH MOMENTARY GUSTS TO 250 KM/H BY 2:00AM TOMORROW MORNING (1/1/02). THE CYCLONE IS MOVING SOUTH-SOUTHEAST ABOUT 20KM/H AND EXPECTED TO GRADUALLY TURN SOUTHEAST, ACCELERATING FURTHER. ON ITS CURRENT TRACK THE CENTRE IS EXPECTED TO BE UPON VAVA'U OR 150 KM NORTH-NORTHWEST OF HA'APAI BY 2:00AM TOMORROW MORNING (1/1/02). VERY DESTRUCTIVE WINDS ARE EXPECTED TO BEGIN A FEW HOURS BEFORE THE CYCLONE PASSES NEARBY OR OVERHEAD.

FOR VAVA'U AND HA'APAI GROUPS :

WINDS GRADUALLY INCREASING TO VERY DESTRUCTIVE WITH AVERAGE SPEEDS TO 165KM/H AND GUSTS TO 230KM/H, POSSIBLY INCREASING TO 175KM/H WITH MOMENTARY GUSTS TO 250KM/H FROM EARLY TOMORROW MORNING. FREQUENT HEAVY RAIN WITH SQUALLY THUNDERSTORMS. PHENOMENAL SEAS. VERY DAMAGING HEAVY SWELLS.

FOR NIUAFO'OU :

DESTRUCTIVE WINDS WITH AVERAGE SPEEDS TO 80KM/H WITH GUSTS TO 200KM/H GRADUALLY DECREASING. FREQUENT HEAVY RAIN WITH SQUALLY THUNDERSTORMS. VERY HIGH SEAS. VERY DAMAGING HEAVY SWELLS.

FOR NIUATOPUTAPU :

DAMAGING WINDS WITH AVERAGE SPEEDS TO 75KM/H WITH GUSTS TO 90KM/H. FREQUENT HEAVY RAIN WITH SQUALLY THUNDERSTORMS. VERY HIGH TO PHENOMENAL SEAS. VERY DAMAGING HEAVY SWELLS.

FOR TONGATAPU GROUP :

WINDS GRADUALLY INCREASING TO AVERAGE SPEEDS TO 75KM/H AND GUSTS TO 90KM/H FROM EARLY TOMORROW MORNING. PERIODS OF HEAVY RAIN WITH SQUALLY THUNDERSTORMS. HIGH SEAS. VERY DAMAGING HEAVY SWELLS.

FLOODING, INCLUDING SEA FLOODING EXPECTED.

THE NEXT SPECIAL WEATHER BULLETIN FOR TONGA WILL BE ISSUED AROUND 11:00PM THIS EVENING.

PLEASE ADVISE THE NATIONAL METEOROLOGICAL SERVICE OF THE RECEPTION OF THIS BULLETIN.

ANNEX 5

RADIO NEW ZEALAND INTERNATIONAL FREQUENCY SCHEDULE

All broadcasts are done from a 100kW transmitter. Check the latest RNZI frequency schedule on website <http://www.rnzi.com>

ANNEX 6**DISTRIBUTION LIST FOR TROPICAL CYCLONE ALERTS AND WARNINGS**

TITLE	Telephone (Office)	Telephone (Home)	Fax
Hon. Minister of Works and Disaster Relief Activities (Chairman)	23 100	N/A	23 102
Director of Works	23 100	N/A	25 440
Commander, Tonga Defense Services	32149/23099	23 932	23 934
Commander, Police	23 233	29 208	23 226
Director of Health	23 200	22 464	24 291
Director of Agriculture	23 038	N/A	24 271
Director of Central Planning	23 900	23 425	24 260
Secretary for Civil Aviation	24 045	25 787	24 145
Secretary for Foreign Affairs	23 600	23 841	23 360
Secretary for Lands, Survey and Natural Resources	23 611	23 581	23 216
Secretary for Finance	23 066	41 053	26 011
Secretary Marine and Ports	22555/26233 26 235	N/A	26 234
Chairman TANGO	24 115	22 246	24 245
Director Education	23 511	25 090	23 866
Secretary General Red Cross	21360/22843	22 674	N/A
General Manager, TCC	24 225	23 180	24 800
General Manager, TEPB	23 311	22 172	23 362
General Manager, TBC	23 555	24 300	24 417
General Manager, TWB	23 299	21 641	23 518
Chief Secretary and Secretary to Cabinet	24 644		23 888
Deputy Director, NDMO	23100/26340	25 648	25 440

ANNEX 7

TONGA METEOROLOGICAL SERVICE TROPICAL CYCLONE EMERGENCY RESPONSE PLAN

Event	Meteorological Service Action
Tropical cyclone Alert (72-48 hours from expected impact)	<ul style="list-style-type: none">✓ Inform Minister for Transport✓ Inform National Emergency Management Office✓ Inform Public through media interview, news clips in routine weather forecast✓ Check communication systems and contingencies for the area(s) likely to be affected✓ Check standby generator and fuel✓ Contact RSMC Nadi and other regional meteorological centers for independent confirmation
Tropical cyclone Alert/Warning (48-24 hours from expected impact)	<ul style="list-style-type: none">✓ Obtain independent confirmation if possible✓ Activate TMS tropical cyclone operational procedures✓ Issue Special Weather Bulletin and authorization to activate the tropical cyclone warning sound to media✓ Notify Minister for Transport✓ Notify National Disaster Management Office✓ Distribute SWB to Members of the National Disaster Committee and agencies listed in the distribution list✓ Activate tropical cyclone duty roster✓ Brief the Central Control Group✓ Activate business continuity and emergency response plan✓ Maintain public information, through live broadcasts✓ Maintain collaboration with regional meteorological centers

<p>Tropical cyclone Warning (24-0 hours from expected impact)</p>	<ul style="list-style-type: none"> ✓ Continue to issue SWB as required ✓ Maintain relay of SWBs and/or briefings to Minister, NEMO, CCG and distribution list ✓ Maintain public information through live media interviews and presentations ✓ Maintain collaboration with regional meteorological centers
<p>Cyclone Impact</p>	<ul style="list-style-type: none"> ✓ Continue to issue SWB as required ✓ Maintain relay of SWBs and/or briefings to Minister, NEMO, CCG and distribution list ✓ Maintain public information through live media interviews and presentations ✓ Maintain collaboration with regional meteorological centers
<p>Post Impact (Within 24hrs)</p>	<ul style="list-style-type: none"> ✓ Cancellation of SWBs/operational stand down ✓ Return Meteorological Service to normal operations mode ✓ Maintain liaison with NEMO ✓ Prepare and complete meteorological report ✓ Confirmation check of equipment and damage assessment ✓ Prepare and complete meteorological report for Minister, NDMO and WMO ✓ Participate in Initial national damage assessment process