Chapter 7

Warnings and Other Products

National Tsunami Warning Centers (NTWC) and Regional Tsunami Watch Providers (RTWP) should strive to adhere to internationally agreed-upon public products. If these public products are similar in name and content from one center to the next, confusion among users will be minimized. This is especially relevant for tourists and other visitors to coastal areas. As noted in Chapter 6, the basic public product suite consists of:

- **WARNING:** A tsunami was or may have been generated, which could cause damage; people in the warned area are strongly advised to evacuate.
- **WATCH:** A tsunami was or may have been generated, but is at least 2 hours travel time to the area in watch status. Local officials should prepare for possible evacuation if their area is upgraded to a warning.
- **ADVISORY:** An earthquake has occurred in the area of responsibility (AOR) basin, which might generate a tsunami. The tsunami watch center should issue hourly bulletins updating the situation.
- **INFORMATION STATEMENT:** An earthquake that is not expected to generate a tsunami has been recorded; a bulletin with information regarding the event is issued. Usually only one bulletin is issued.

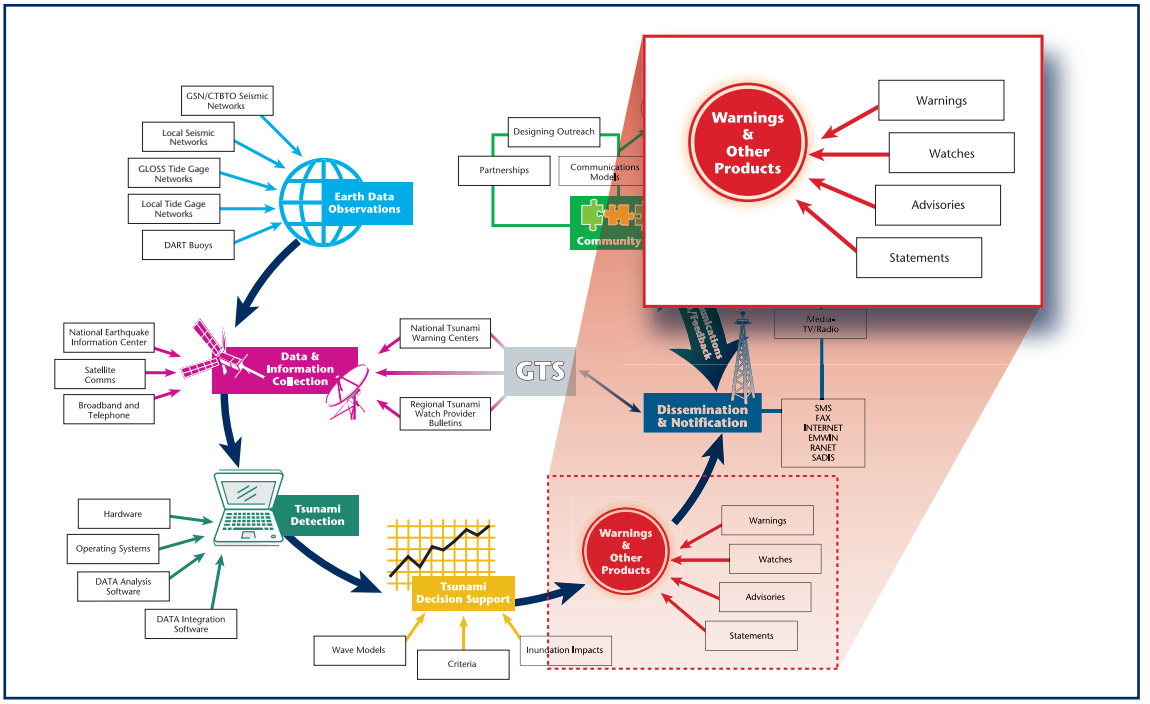

Figure 7-1. Warnings and Other Products in the End-to-End Chain

Tsunami bulletins should be issued by NTWCs and RTWPs when an earthquake with a magnitude of 6.5 or greater occurs. To prevent unnecessary local evacuations, information statements should also be issued for lower magnitude events that may have been felt near the coast.

The Intergovernmental Oceanographic Commission's Intergovernmental Coordination Group (IOC/ICG) has agreed that warning, watch, advisory, and information statement products should contain at least the following information:

- **World Meteorological Organization (WMO) Headers**
  This is crucial for transmission on WMO's Global Telecommunications System (GTS) because:
  - The heading provides a means by which communication data managers recognize a bulletin for telecommunication "switching" purposes.
  - The heading permits a uniqueness for a bulletin, which is sufficient enough to control the data for selective transmission required to meet the needs of the receiving end.
  - The heading is for accountability in the transmission delivery process by the switching system for data management purposes.
  - The heading is **not** intended for the data **processing systems**, as the first few lines of the text (bulletin content) further defines it for processing. (ref. *WMO Codes* Manual 306)

- **Earthquake information**
  a) Origin time (in Coordinated Universal Time [UTC])
  b) Coordinates (latitude and longitude) of the epicenter
  c) Location (name of geographical area)
  d) Magnitude (M)
  e) Depth (only for an earthquake occurring at a depth of 100 kilometers [km] or more) below the ocean floor

- **Tsunami information**
  a) Evaluation of tsunamigenic potential based on the empirical relationship between magnitude (M) of earthquake and generation/nongeneration of tsunami in the tsunami warning center's AOR basin(s)
  b) Estimated tsunami travel times to reach the respective coasts in the center's AOR (only for earthquakes of M greater than 7.0). This is best handled by specifying forecast points that are well known to emergency managers and the populace.

It is also suggested that definitions, call-to-action statements, and other pertinent information be included in bulletins if time allows.

How Do Warnings and Other Products Fit into an End-to-End Tsunami Warning System?

Once an earthquake has occurred and been analyzed, and a decision has been made on its potential impact on a center's AOR, information must be provided to government agencies, the media, the public, and other persons and groups that will be affected by the event. Information, especially that contained in life-saving warning messages, will have a much better chance of being understood if it is conveyed in concise, easy-to-understand language, in a predictable (and hence, familiar) format. Based upon many years of experience, the established NTWCs and RTWPs have settled on several standardized products, all with somewhat standardized structure and content.

These products issued by a tsunami warning center are crucial to the success of that center's end-to-end system. If the information presented is not understood, it is less likely that the proper actions will be taken by recipients.

Thus, both incoming data collection communications systems and outgoing communication of critical information are crucial to the success of the warning system for those affected by an event.

What Is in this Chapter?

This chapter contains sections that discuss the following topics:

- Definition and example of a **warning** product.
- Definition and example of a **watch** product.
- Definition and example of an **advisory** product.
- Definition and example of an **information statement**.

What Are the Most Important Points to Remember about Tsunami Product Requirements for NTWCs and RTWPs?

- NTWCs and RTWPs should strive to adhere to internationally agreed-upon names and contents for public products.
- If the information that a product contains is not understood then it is less likely that the proper actions will be taken by recipients.
- The core NTWC product suite should consist of:
  - Warning products
  - Watch products
  - Advisory products
  - Information statements

Warnings: The Highest Level of Tsunami Alert

A tsunami warning is issued by tsunami warning centers when a potential tsunami with significant widespread inundation is imminent or expected to occur in the center's AOR. Warnings alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas, and the repositioning of ships to deep waters when there is time to do so safely. Warnings may be updated, adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information. The following is an example of a tsunami warning product:

WEAK51 PAAQ 030202
TSUNAMI BULLETIN NUMBER 004
PACIFIC TSUNAMI WARNING CENTER
0902 PM HST 03 SEP 2005

TO - CIVIL DEFENSE IN THE STATE OF HAWAII

SUBJECT - TSUNAMI WARNING BULLETIN

A TSUNAMI WARNING IS ISSUED FOR THE STATE OF HAWAII EFFECTIVE AT 0902 PM HST.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0112 PM HST 03 SEP 2005

COORDINATES - 16.0 SOUTH 73.3 WEST

LOCATION - NEAR COAST OF PERU

MAGNITUDE - 8.2 MOMENT

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
Arica, Chile	18.1S	178.4W	0050Z	0.88M	12MIN
Antofagasta, Chile	17.8S	168.3E	0220Z	0.91M	10MIN

TIME - TIME OF THE MEASUREMENT

AMPL - AMPLITUDE IN METERS FROM MIDDLE TO CREST OR MIDDLE TO TROUGH OR HALF OF THE CREST TO TROUGH

PER - PERIOD OF TIME FROM ONE WAVE CREST TO THE NEXT

EVALUATION

A TSUNAMI HAS BEEN GENERATED THAT COULD CAUSE DAMAGE ALONG COASTLINES OF ALL ISLANDS IN THE STATE OF HAWAII. URGENT ACTION SHOULD BE TAKEN TO PROTECT LIVES AND PROPERTY.

A TSUNAMI IS A SERIES OF LONG OCEAN WAVES. EACH INDIVIDUAL WAVE CREST CAN LAST 5 TO 15 MINUTES OR MORE AND EXTENSIVELY FLOOD COASTAL AREAS. THE DANGER CAN CONTINUE FOR MANY HOURS AFTER THE INITIAL WAVE AS SUBSEQUENT WAVES ARRIVE. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVES EFFICIENTLY WRAP AROUND ISLANDS. ALL SHORES ARE AT RISK NO MATTER WHICH DIRECTION THEY FACE. THE TROUGH OF A TSUNAMI WAVE MAY TEMPORARILY EXPOSE THE SEAFLOOR BUT THE AREA WILL QUICKLY FLOOD AGAIN. EXTREMELY STRONG AND UNUSUAL NEARSHORE CURRENTS CAN ACCOMPANY A TSUNAMI. DEBRIS PICKED UP AND CARRIED BY A TSUNAMI AMPLIFIES ITS DESTRUCTIVE POWER. SIMULTANEOUS HIGH TIDES OR HIGH SURF CAN SIGNIFICANTLY INCREASE THE TSUNAMI HAZARD.

THE ESTIMATED ARRIVAL TIME IN HAWAII OF THE FIRST TSUNAMI WAVE IS

0221 AM HST 04 SEP 2005

BULLETINS WILL BE ISSUED HOURLY OR SOONER AS CONDITIONS WARRANT.

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Note in the example that all of the following recommended pieces of information are readily apparent in the product:

Earthquake information

a) Origin time (UTC)

b) Coordinates (latitude and longitude) of the epicenter

c) Location (name of geographical area)

d) Magnitude (M)

Tsunami information

a) Evaluation of tsunamigenic potential based on the empirical relationship between magnitude (M) of earthquake and generation/nongeneration of tsunami in the tsunami warning center's AOR basin(s).

b) Estimated tsunami travel times to reach the respective coasts in the center's AOR (only for earthquakes of M greater than 7.0).

Watches: The Second Level of Tsunami Alert

A Tsunami Watch is issued by RTWPs and NTWCs to alert other centers, emergency management officials, and the public of an event that may later impact the watch area. The watch may be upgraded to a warning or advisory (or canceled) based on updated information and analysis. Therefore, emergency management officials and the public should prepare to take action. Watches are normally issued based on

seismic information without confirmation that a destructive tsunami is under way. The following is an example of a tsunami watch product:

WEAK51 PAAQ 030159
TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER
0859 PM HST 03 SEP 2005

TO - CIVIL DEFENSE IN THE STATE OF HAWAII

SUBJECT - TSUNAMI WATCH BULLETIN

A TSUNAMI WATCH IS ISSUED FOR THE STATE OF HAWAII EFFECTIVE AT 0859 PM HST.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0112 PM HST 03 SEP 2005

COORDINATES - 16.0 SOUTH 73.3 WEST

LOCATION - NEAR COAST OF PERU

MAGNITUDE - 8.2 MOMENT

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
Arica, Chile	18.1S	178.4W	0250Z	0.88M	12MIN
Antofagasta, Chile	17.8S	168.3E	0420Z	0.91M	10MIN

TIME - TIME OF THE MEASUREMENT

AMPL - AMPLITUDE IN METERS FROM MIDDLE TO CREST OR MIDDLE TO TROUGH OR HALF OF THE CREST TO TROUGH

PER - PERIOD OF TIME FROM ONE WAVE CREST TO THE NEXT

EVALUATION

BASED ON ALL AVAILABLE DATA A TSUNAMI MAY HAVE BEEN GENERATED BY THIS EARTHQUAKE THAT COULD BE DESTRUCTIVE ON COASTAL AREAS EVEN FAR FROM THE EPICENTER. AN INVESTIGATION IS UNDER WAY TO DETERMINE IF THERE IS A TSUNAMI THREAT TO HAWAII.

IF TSUNAMI WAVES IMPACT HAWAII THE ESTIMATED EARLIEST ARRIVAL OF THE FIRST TSUNAMI WAVE IS

0221 AM HST 04 SEP 2005

BULLETINS WILL BE ISSUED HOURLY OR SOONER AS CONDITIONS WARRANT.

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The following is an example of a product containing a watch for one area and a warning for another area:

WEAK51 PAAQ 011310
BULLETIN
PUBLIC TSUNAMI MESSAGE NUMBER 1
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
510 AM AKDT SAT JUL 1 2006

...A TSUNAMI WARNING IS IN EFFECT WHICH INCLUDES THE ALASKA

COASTAL AREAS FROM CORDOVA ALASKA TO ATTU ALASKA...

...A TSUNAMI WATCH IS IN EFFECT FOR THE CALIFORNIA -– OREGON

- WASHINGTON - BRITISH COLUMBIA AND ALASKA COASTAL AREAS FROM THE CALIFORNIA-MEXICO BORDER TO CORDOVA ALASKA...

A TSUNAMI WARNING MEANS... ALL COASTAL RESIDENTS IN THE WARNING AREA WHO ARE NEAR THE BEACH OR IN LOW-LYING REGIONS SHOULD MOVE IMMEDIATELY INLAND TO HIGHER GROUND AND AWAY FROM ALL HARBORS AND INLETS INCLUDING THOSE SHELTERED DIRECTLY FROM THE SEA. THOSE FEELING THE EARTH SHAKE... SEEING UNUSUAL WAVE ACTION... OR THE WATER LEVEL RISING OR RECEDING MAY HAVE ONLY A FEW MINUTES BEFORE THE TSUNAMI ARRIVAL AND SHOULD EVACUATE IMMEDIATELY. HOMES AND SMALL BUILDINGS ARE NOT DESIGNED TO WITHSTAND TSUNAMI IMPACTS. DO NOT STAY IN THESE STRUCTURES.

ALL RESIDENTS WITHIN THE WARNED AREA SHOULD BE ALERT FOR INSTRUCTIONS BROADCAST FROM THEIR LOCAL CIVIL AUTHORITIES. THIS TSUNAMI WARNING IS BASED SOLELY ON EARTHQUAKE INFORMATION—THE TSUNAMI HAS NOT YET BEEN CONFIRMED.

A TSUNAMI WATCH MEANS...ALL COASTAL RESIDENTS IN THE WATCH AREA SHOULD PREPARE FOR POSSIBLE EVACUATION. A TSUNAMI WATCH IS ISSUED TO AREAS WHICH WILL NOT BE IMPACTED BY THE TSUNAMI FOR AT LEAST THREE HOURS. WATCH AREAS WILL EITHER BE UPGRADED TO WARNING STATUS OR CANCELED.

AT 500 AM ALASKAN DAYLIGHT TIME ON JULY 1 AN EARTHQUAKE WITH PRELIMINARY MAGNITUDE 7.9 OCCURRED 70 MILES SOUTHEAST OF NIKOLSKI ALASKA.

THIS EARTHQUAKE MAY HAVE GENERATED A TSUNAMI. IF A TSUNAMI HAS BEEN GENERATED THE WAVES WILL FIRST REACH NIKOLSKI ALASKA AT 540 AM ADT ON JULY 1.

ESTIMATED TSUNAMI ARRIVAL TIMES AND MAPS ALONG WITH SAFETY RULES AND OTHER INFORMATION CAN BE FOUND ON THE WEB SITE

WCATWC.ARH.NOAA.GOV

TSUNAMIS CAN BE DANGEROUS WAVES THAT ARE NOT SURVIVABLE. WAVE HEIGHTS ARE AMPLIFIED BY IRREGULAR SHORELINE AND ARE DIFFICULT TO PREDICT. TSUNAMIS OFTEN APPEAR AS A STRONG SURGE AND MAY BE PRECEDED

BY A RECEDING WATER LEVEL. MARINERS IN WATER DEEPER THAN 600 FEET SHOULD NOT BE AFFECTED BY A TSUNAMI. WAVE HEIGHTS WILL INCREASE RAPIDLY AS WATER SHALLOWS. TSUNAMIS ARE A SERIES OF OCEAN WAVES WHICH CAN BE DANGEROUS FOR SEVERAL HOURS AFTER THE INITIAL WAVE ARRIVAL. DO NOT RETURN TO EVACUATED AREAS UNTIL AN ALL CLEAR IS GIVEN BY LOCAL CIVIL AUTHORITIES.

THE PACIFIC TSUNAMI WARNING CENTER WILL ISSUE MESSAGES
FOR HAWAII AND OTHER AREAS OF THE PACIFIC OUTSIDE CALIFORNIA/ OREGON/ WASHINGTON/ BRITISH COLUMBIA AND ALASKA.

ADDITIONAL MESSAGES WILL BE ISSUED HALF-HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE. FOR FURTHER INFORMATION STAY TUNED TO NOAA WEATHER RADIO... YOUR LOCAL TV OR RADIO STATIONS... OR SEE THE WEB SITE WCATWC.ARH.NOAA.GOV.

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Advisories: The Third Level of Tsunami Alert

A tsunami advisory is issued by tsunami warning centers for the threat of a potential tsunami that may produce strong currents or waves dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents induced by tsunamis are at the greatest risk. The threat may continue for several hours after the arrival of the initial wave, **but significant widespread inundation is not expected for areas under an advisory**. Appropriate actions to be taken by local officials may include closing beaches, evacuating harbors and marinas, and the repositioning of ships to deep waters when there is enough time to do so safely. Advisories are normally updated to continue the advisory, expand or contract affected areas, upgrade to a warning, or cancel the advisory. The following is an example of an advisory product:

WEAK51 PAAQ 231516
TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER
11:16 AM HST 23 JUN 2001

TO: CIVIL DEFENSE IN THE STATE OF HAWAII

SUBJECT: TSUNAMI ADVISORY BULLETIN

A WATCH OR WARNING IS NOT IN EFFECT FOR THE STATE OF HAWAII AT THIS TIME. HOWEVER, THE PACIFIC TSUNAMI WARNING CENTER HAS ISSUED A TSUNAMI WATCH AND WARNING FOR OTHER PARTS OF THE PACIFIC, AND THERE IS THE POSSIBILITY THAT A WATCH OR WARNING MAY BE ISSUED FOR HAWAII IN THE NEAR FUTURE.

AN EARTHQUAKE HAS OCCURRED WITH THE FOLLOWING PRELIMINARY PARAMETERS:

ORIGIN TIME - 10:33 AM HST, 23 JUN 2001

COORDINATES - 16.0 SOUTH, 73.3 WEST

LOCATION - NEAR COAST OF PERU

MAGNITUDE - 8.0 (RICHTER)

MAGNITUDE - 8.2 (MOMENT)

EVALUATION: THIS ADVISORY IS BASED MAINLY ON EARTHQUAKE DATA. IT IS NOT KNOWN AT THIS TIME WHETHER A PACIFIC-WIDE DESTRUCTIVE TSUNAMI HAS BEEN GENERATED. AN INVESTIGATION IS UNDER WAY TO DETERMINE THE TSUNAMI THREAT.

IF A TSUNAMI HAS BEEN GENERATED, THE ESTIMATED EARLIEST TIME OF ARRIVAL IN HAWAII OF THE FIRST TSUNAMI WAVE IS:

11:52 PM HST, 23 JUN 2001

BULLETINS WILL BE ISSUED HOURLY OR SOONER AS CONDITIONS WARRANT.

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Information Statements

An information statement is issued to inform emergency management officials and the public that an earthquake has occurred. In most cases, information statements are issued to indicate there is no threat of a destructive tsunami affecting the issuing tsunami warning center's AOR and to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas. An information statement may, in appropriate situations, caution about the possibility of destructive local tsunamis. Information statements may be reissued with additional information, though normally these messages are not updated. However, a watch, advisory or warning may be issued for the area, if necessary, after analysis and/or updated information becomes available. The following is an example of an information statement:

WEAK53 PAAQ 011308
PUBLIC TSUNAMI INFORMATION STATEMENT NUMBER 1
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
608 AM PDT SAT JUL 1 2006

...A STRONG EARTHQUAKE HAS OCCURRED BUT A TSUNAMI IS NOT EXPECTED ALONG THE CALIFORNIA/ OREGON/ WASHINGTON/ BRITISH COLUMBIA OR ALASKA COASTS...

NO - REPEAT NO - TSUNAMI WARNING OR WATCH IS IN EFFECT FOR THESE AREAS.

BASED ON THE EARTHQUAKE MAGNITUDE AND HISTORIC TSUNAMI INFORMATION A DAMAGING TSUNAMI IS NOT EXPECTED ALONG THE CALIFORNIA/ OREGON/ WASHINGTON/ BRITISH COLUMBIA AND ALASKA COASTS. AT COASTAL LOCATIONS WHICH HAVE EXPERIENCED

STRONG GROUND SHAKING LOCAL TSUNAMIS ARE POSSIBLE DUE TO UNDERWATER LANDSLIDES.

AT 600 AM PACIFIC DAYLIGHT TIME ON JULY 1 AN EARTHQUAKE WITH PRELIMINARY MAGNITUDE 7.2 OCCURRED 300 MILES SOUTHWEST OF BERING I. KOMANDORSKI.

THE PACIFIC TSUNAMI WARNING CENTER WILL ISSUE MESSAGES
FOR HAWAII AND OTHER AREAS OF THE PACIFIC OUTSIDE CALIFORNIA/OREGON/
WASHINGTON/ BRITISH COLUMBIA AND ALASKA.

THIS WILL BE THE ONLY STATEMENT ISSUED FOR THIS EVENT BY THE WEST COAST AND ALASKA TSUNAMI WARNING CENTER UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

SEE THE WEB SITE WCATWC.ARH.NOAA.GOV FOR BASIC TSUNAMI INFORMATION - SAFETY RULES AND TSUNAMI TRAVEL TIMES.

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Cancellation of Tsunami Alert

Example of a cancellation of a Tsunami Watch bulletin that was issued for the Indian Ocean region on September 12th for the Southern Sumatra region earthquake:

WEIO21 PHEB 121505
TSUNAMI BULLETIN NUMBER 005
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1505Z 12 SEP 2007

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... FINAL INDIAN-OCEAN-WIDE TSUNAMI WATCH ...

THIS THE FINAL TSUNAMI WATCH FOR

INDONESIA / AUSTRALIA / INDIA / SRI LANKA / THAILAND /
UNITED KINGDOM / MALDIVES / MYANMAR / MALAYSIA / BANGLADESH /
MAURITIUS / REUNION / SEYCHELLES / MADAGASCAR / SOMALIA / OMAN /
PAKISTAN / IRAN / YEMEN / COMORES / CROZET ISLANDS /
MOZAMBIQUE / KENYA / TANZANIA / KERGUELEN ISLANDS /
SOUTH AFRICA / SINGAPORE

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1110Z 12 SEP 2007
COORDINATES - 4.5 SOUTH 101.3 EAST
LOCATION - SOUTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
SIBOLGA ID	1.7N	98.8E	1434Z	0.09M / 0.3FT	52MIN
PADANG ID	0.9S	100.4E	1348Z	0.98M / 3.2FT	34MIN
COCOS CC	12.1S	96.9E	1236Z	0.11M / 0.4FT	22MIN
DART 23401	8.9S	88.5E	1421Z	0.02M / 0.1FT	15MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER.

FOR THOSE AREAS - WHEN NO MAJOR WAVES HAVE OCCURRED FOR AT LEAST TWO HOURS AFTER THE ESTIMATED ARRIVAL TIME OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

BASED ON AVAILABLE DATA THIS CENTER DOES NOT EXPECT MORE WIDESPREAD DESTRUCTIVE EFFECT. HOWEVER ...
DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT MAY NOT BE POSSIBLE FOR THIS CENTER TO RAPIDLY NOR ACCURATELY EVALUATE THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
INDONESIA	BENGKULU	3.9S 102.0E	1123Z 12 SEP
	SIBERUT	1.5S 98.7E	1203Z 12 SEP
	PADANG	0.9S 100.1E	1214Z 12 SEP
	BANDAR LAMPUNG	5.7S 105.3E	1242Z 12 SEP
	SIMEULUE	2.5N 96.0E	1243Z 12 SEP
	CILACAP	7.8S 108.9E	1307Z 12 SEP
	BANDA ACEH	5.5N 95.1E	1329Z 12 SEP
	BALI	8.7S 115.3E	1345Z 12 SEP

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
	KUPANG	10.0S 123.4E	1453Z 12 SEP
	BELAWAN	3.8N 99.0E	1703Z 12 SEP
AUSTRALIA	CHRISTMAS IS	10.4S 105.4E	1220Z 12 SEP
	COCOS ISLAND	12.1S 96.7E	1234Z 12 SEP
	NORTH WEST CAPE	21.5S 113.9E	1429Z 12 SEP
	CAPE INSPIRATIO	25.9S 113.0E	1526Z 12 SEP
	CAPE LEVEQUE	16.1S 122.6E	1542Z 12 SEP
	PERTH	32.0S 115.3E	1545Z 12 SEP
	AUGUSTA	34.3S 114.7E	1559Z 12 SEP
	GERALDTOWN	28.6S 114.3E	1603Z 12 SEP
	ESPERANCE	34.0S 121.8E	1726Z 12 SEP
	KINGSTON SOUTH	37.0S 139.4E	1906Z 12 SEP
	EUCLA MOTEL	31.8S 128.9E	1934Z 12 SEP
	DARWIN	12.1S 130.7E	1948Z 12 SEP
	HEARD ISLAND	54.0S 73.5E	1955Z 12 SEP
	HOBART	43.3S 147.6E	2015Z 12 SEP
INDIA	GREAT NICOBAR	7.1N 93.6E	1338Z 12 SEP
	LITTLE ANDAMAN	10.7N 92.3E	1421Z 12 SEP
	PORT BLAIR	12.0N 92.5E	1440Z 12 SEP
	NORTH ANDAMAN	13.3N 92.6E	1453Z 12 SEP
	CHENNAI	13.4N 80.4E	1540Z 12 SEP
	KAKINADA	17.2N 82.7E	1604Z 12 SEP
	TRIVANDRUM	8.3N 76.9E	1608Z 12 SEP
	BALESHWAR	21.6N 87.3E	1701Z 12 SEP
	MANGALORE	13.3N 74.4E	1732Z 12 SEP
	BOMBAY	18.8N 72.6E	2005Z 12 SEP
	GULF OF KUTCH	22.7N 68.9E	2019Z 12 SEP
SRI LANKA	DONDRA HEAD	5.8N 80.5E	1447Z 12 SEP
	TRINCOMALEE	8.7N 81.3E	1502Z 12 SEP
	COLOMBO	6.9N 79.8E	1515Z 12 SEP
	JAFFNA	9.9N 80.0E	1625Z 12 SEP
THAILAND	PHUKET	8.0N 98.2E	1508Z 12 SEP
	KO PHRA THONG	9.1N 98.2E	1554Z 12 SEP
	KO TARUTAO	6.6N 99.6E	1626Z 12 SEP
UNITED KINGDOM	DIEGO GARCIA	7.3S 72.4E	1526Z 12 SEP
MALDIVES	GAN	0.6S 73.2E	1528Z 12 SEP
	MALE	4.2N 73.6E	1544Z 12 SEP
	MINICOV	8.3N 73.0E	1614Z 12 SEP
MYANMAR	PYINKAYAING	15.8N 94.2E	1537Z 12 SEP
	CHEDUBA ISLAND	18.9N 93.4E	1554Z 12 SEP
	SITTWE	20.0N 92.9E	1629Z 12 SEP
	MERGUI	12.8N 98.4E	1647Z 12 SEP
	YANGON	16.2N 96.5E	1713Z 12 SEP
MALAYSIA	GEORGETOWN	5.4N 100.1E	1704Z 12 SEP
	PORT DICKSON	2.5N 101.7E	2048Z 12 SEP

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
BANGLADESH	CHITTAGONG	22.5N 91.2E	1801Z 12 SEP
MAURITIUS	PORT LOUIS	20.0S 57.3E	1803Z 12 SEP
REUNION	ST DENIS	20.8S 55.2E	1820Z 12 SEP
SEYCHELLES	VICTORIA	4.5S 55.6E	1847Z 12 SEP
MADAGASCAR	TOAMASINA	17.8S 49.8E	1900Z 12 SEP
	ANTSIRANANA	12.1S 49.5E	1905Z 12 SEP
	MANAKARA	22.2S 48.2E	1919Z 12 SEP
	CAP STE MARIE	25.8S 45.2E	2009Z 12 SEP
	MAHAJANGA	15.4S 46.2E	2009Z 12 SEP
	TOLIARA	23.4S 43.6E	2034Z 12 SEP
SOMALIA	HILALAYA	6.5N 49.2E	1922Z 12 SEP
	CAPE GUARO	11.9N 51.4E	1933Z 12 SEP
	MOGADISHU	2.0N 45.5E	1938Z 12 SEP
	KAAMBOONI	1.5S 41.9E	2004Z 12 SEP
OMAN	SALALAH	17.0N 54.2E	1930Z 12 SEP
	DUQM	19.7N 57.8E	1939Z 12 SEP
	MUSCAT	23.9N 58.6E	1943Z 12 SEP
PAKISTAN	GWADAR	25.1N 62.4E	1937Z 12 SEP
	KARACHI	24.7N 66.9E	2031Z 12 SEP
IRAN	GAVATER	25.0N 61.3E	1943Z 12 SEP
YEMEN	AL MUKALLA	14.5N 49.2E	2003Z 12 SEP
	ADEN	13.0N 45.2E	2100Z 12 SEP
COMORES	MORONI	11.6S 43.3E	2006Z 12 SEP
CROZET ISLANDS	CROZET ISLANDS	46.4S 51.8E	2009Z 12 SEP
MOZAMBIQUE	CABO DELGADO	10.7S 40.7E	2034Z 12 SEP
	ANGOCHE	15.5S 40.8E	2044Z 12 SEP
	QUELIMANE	18.0S 37.1E	2213Z 12 SEP
	MAPUTO	25.9S 32.8E	2218Z 12 SEP
	BEIRA	19.9S 35.1E	2246Z 12 SEP
KENYA	MOMBASA	4.0S 39.7E	2039Z 12 SEP
TANZANIA	LINDI	9.8S 39.9E	2039Z 12 SEP
	DAR ES SALAAM	6.7S 39.4E	2047Z 12 SEP
KERGUELEN ISLAN	PORT AUX FRANCA	49.0S 69.2E	2049Z 12 SEP
SOUTH AFRICA	PRINCE EDWARD I	46.6S 37.6E	2146Z 12 SEP
	DURBAN	29.8S 31.2E	2205Z 12 SEP
	PORT ELIZABETH	33.9S 25.8E	2256Z 12 SEP
	CAPE TOWN	34.1S 18.0E	2359Z 12 SEP
SINGAPORE	SINGAPORE	1.2N 103.8E	0048Z 13 SEP

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION FOR THIS EVENT. IN THE CASE OF CONFLICTING INFORMATION...THE MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.