



Draft v1.0:

Grenada Adapted Model Warning Information Dissemination SOP

Development of Tsunami and Other Coastal Hazards Warning Dissemination Protocols for the
Caribbean Disaster Emergency Response Agency (CDERA) Participating States

For the
Tsunami and Other Coastal Hazards Warning Systems Project
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March, 2009

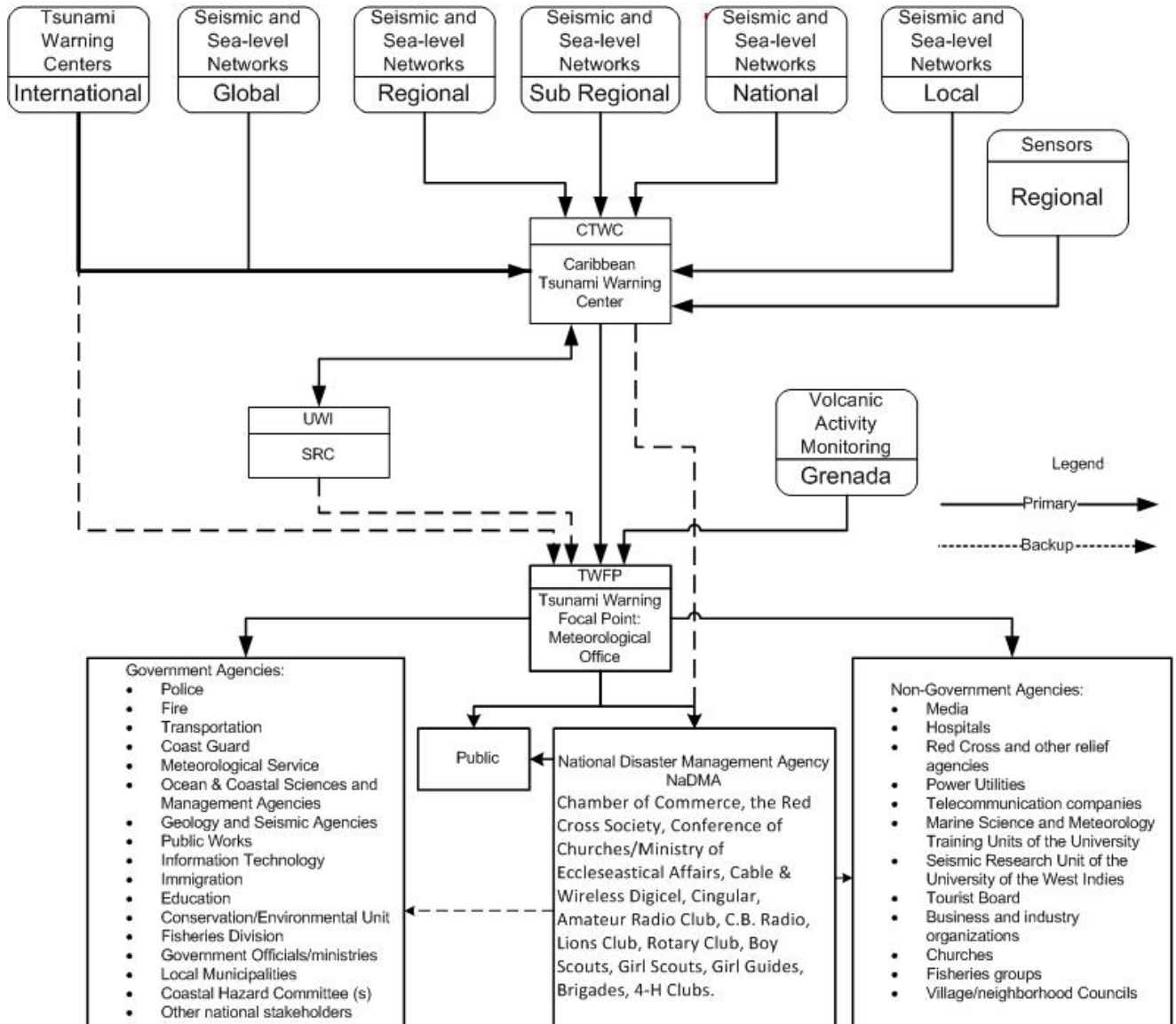
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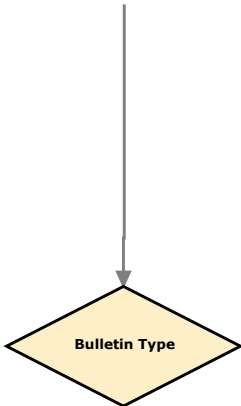
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Background

The **Grenada Adapted Tsunami Warning Protocol** upon which the Grenada Standard Operating Procedures (SOPs) is developed is shown following. It provides a high level view that graphically illustrates the requirements for alert and notification. unami Warning Protocol identifies many of the national organizations that operate within the Caribbean States presently and that may need to be included when the protocol is adapted to assure that each country's the alert and notification process is the full operational response to any tsunami warning or disaster.



The Grenada Tsunami Warning SOPs are the implementation procedures to be followed in the event of a Tsunami Warning by the Tsunami Warning Focal Point (TWFP)/Tsunami Warning Contact Point (TWCP). The following graphic illustrates the requirements of the Grenada SOP to address seven (7) different bulletins that may presently be received by Tsunami Warning Focal Point (TWFP) or the Tsunami Warning Contract Point (TWCP) from the Pacific Tsunami Warning Center (PTWC).



1 Guiding Principles

1.1 PURPOSE:

The SOP aim is to provide procedural guidance for the Grenada Tsunami Warning Focal Point (TWFP) staff in responding to the Caribbean Tsunami Warning Center (CTWC) issued Tsunami Bulletins of the various types. CTWC tsunami bulletins are provided presently, and on an interim basis, by the Pacific Tsunami Warning Center (PTWC) until such time as the CTWC is built and operational.

1.2 GENERAL:

Grenada is part of a volcanically and tectonically active ridge formed along the Lesser Antilean island arc system. The island has only one potentially active volcanic center, Mt. St. Catherine, with most of the geothermal activity being associated with it. Grenada is threatened by the presence of a submarine volcano, 'Kick 'em Jenny' located 9km North of Grenada. Volcanoes, earthquakes, and therefore tsunamis are potential disaster issues facing Grenada, given the fact that most of the population lives on the coast.¹

An earthquake generated Tsunami is the main focus of this SOP. A locally generated tsunami can occur in the Caribbean Sea (potential sources for tsunami generation include earthquakes, sub-aerial and submarine landslides and underwater volcanic explosions)². Arrival of damaging tsunami waves from the time of the seismic event can occur almost immediately (within 5 minutes) depending on the distance of the shoreline from the earthquake epicenter.

PTWC will issue a *Tsunami Watch Bulletin* for the CDERA Participating States about a "potential for a destructive" tsunami under the following conditions:

- An earthquake occurs with a preliminary 7.1 to 7.8 or greater magnitude in the Caribbean.
- An earthquake occurs with a preliminary 7.9 or greater magnitude in the Atlantic.

PTWC will issue a *Tsunami Information Statement* about a very small potential for a tsunami under the following conditions:

- An earthquake occurs with a preliminary 6.0 to 7.0 magnitude in the Caribbean.
- An earthquake occurs with a preliminary 6.5 to 7.8 in the Atlantic Ocean.

PTWC will issue a *Tsunami Information Statement* about earthquakes with no potential for a tsunami under the following conditions:

¹ Reported by CDERA, Inventory of Disaster Early Warning Systems in the Caribbean, Grenada Country Report, March 2006.

² Reported by Aurelio Mercado-Irizarry (Department of Marine Sciences, University of Puerto Rico at Mayagüez) and Philip L.-F. Liu (Department of Civil and Environmental Engineering, Cornell University), at the NSF Caribbean Tsunami Workshop, March 30-31, 2004, San Juan Beach Hotel, San Juan, P.R.

An earthquake occurs more than or equal to 100 km from the surface for all locations and is less than or equal to 6.0 magnitude in the Caribbean or 6.5 magnitude in the Atlantic.

The PTWC notifies the Grenada TWFP/TWCP (on call unless during business hours) who in turn initiates Tsunami Alert Procedures according to the Tsunami Warning SOP.

1.3 FUNCTIONS AND RESPONSIBILITIES:

All Grenada TWFP/TWCP staff receive a Caribbean TSUNAMI WATCH BULLETIN or TSUNAMI INFORMATION STATEMENT via pager or cell phone for any location in the Caribbean or Atlantic from the PTWC. The TWFP/TWCP Duty Officer will follow the Tsunami Warning SOP.

In the event of a TSUNAMI WATCH BULLETIN:

All other TWFP/TWCP staff (non duty officers) will immediately and as safely as possible report to the Emergency Operating Center (EOC) in their area. If unable to SAFELY respond to the EOC, they will proceed to an alternate location (*Grenada to identify alternate location/s*). TWFP/TWCP staff that are unable to respond to EOC should communicate their alternate location to the EOC.

TWFP/TWCP staff will use discretion during off duty hours. If an TWFP/TWCP staff member is with family and within close proximity to the EOC, proceed to EOC with the family.

At a minimum, TWFP/TWCP staff should be aware as to whether primary driving routes from residence/location to EOC traverse published tsunami evacuation routes.

1.4 ADMINISTRATION AND SUPPORT:

The TWFC/TWCP Duty Officer is responsible for maintaining a copy of the TSUNAMI BULLETIN/INFORMATION STATEMENT SOP in the SOP Operations Manual. All TWFC/TWCP staff should be provided a copy.

The TWFC/TWCP will ensure all staff are familiar with the SOP and that appropriate training about the SOP is conducted and that all are drilled and prepared to respond quickly during a Tsunami Event.

Recommendations for additions, deletions or modifications to the SOP will be submitted TWFC/TWCP for final approval.

The Grenada National Disaster Management Agency (NaDMA) Director will report to the TWFC/TWCP any changes in alert and notification equipment or procedures or status of equipment that might affect procedures for executing this SOP.

APPROVED: _____ DATE: _____

2 SOP for Tsunami Watch

2.1 PURPOSE

To provide procedural guidance and action steps to be followed in responding to a Pacific Tsunami Warning Center (PTWC) issued TSUNAMI WATCH BULLETIN due to a local seismic event **to determine whether the Tsunami Watch Bulletin identifies Grenada as threatened.**

2.2 GENERAL

Pacific Tsunami Warning Center (PTWC) will issue a TSUNAMI WATCH BULLETIN under the following conditions in the Caribbean:

An earthquake occurs with a preliminary 7.1 to 7.8 or greater magnitude in the Caribbean

An earthquake occurs with a preliminary 7.9 or greater magnitude in the Atlantic

At a future date this information will include, when the CTWC is built and operational, coastal tide stations and recorder information about the tsunami waves and their likely size.

2.3 IMMEDIATE ACTIONS CHECKLIST

[] A.

TWFP/TWCP Duty Officer must review the message from the PTWC and learn if the tsunami is forecast to arrive at Grenada and if so, which specific locations are vulnerable. See example of location information from the PTWC which follows:

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES. ACTUAL ARRIVAL TIMES
MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME
BETWEEN SUCCESSIVE TSUNAMI WAVES CAN BE FIVE MINUTES TO ONE HOUR.
LOCATION COORDINATES ARRIVAL TIME

ANTIGUA SAINT JOHNS 17.2N 62.0W 1326Z 24 APR
MONTSERRAT PLYMOUTH 16.7N 62.2W 1329Z 24 APR
BARBUDA PALMETTO POINT 17.6N 61.9W 1331Z 24 APR
GUADELOUPE BASSE-TERRE 16.0N 61.8W 1337Z 24 APR
SAINT KITTS BASSETERRE 17.3N 62.7W 1341Z 24 APR
DOMINICA ROSEAU 15.3N 61.5W 1348Z 24 APR
ANGUILLA THE VALLEY 18.3N 63.1W 1349Z 24 APR

SAINT MAARTEN SIMPSON BAAI 18.0N 63.1W 1354Z 24 APR
SAINT MARTIN BAIE BLANCHE 18.1N 63.0W 1354Z 24 APR

[] B.

The TWFP/TWCP Duty Officer must identify the location coordinates on the map (available for this purpose on the wall of their office—to be addressed in Grenada National Workshop). Once vulnerable locations are identified, they should be listed using the following form:

(INSERT VULNERABLE LOCATION BY AREA NAME INFORMATION)

[] _____

[] _____

[] _____

And the

THE OUTLYING ISLANDS OF (fill in the blanks)

[] _____

[] _____

[] _____

[] C.

TWFP/TWCP Duty Officer must IMMEDIATELY activate all public alerting tools in the vulnerable areas:
Grenada to complete this section identifying any available alerting systems.

Sirens

Church Bells

Vehicle Loud Speakers

Automated Telephone Call System

Public Address Systems

Following is a table where information concerning who to contact and how in the event there is no easily single point automation for the public alerting tools.

Activation Type	Emergency Contact Name	24x7 Telephone Number	24x7 Cell Phone Number	SMS Text Number	Check mark <input type="checkbox"/> when completed.
Sirens					
Church Bells					
Automated Telephone Dialing System					
Public Address Systems					
Vehicle Loud Speakers					

D.

TWFP/TWCP Duty Officer must participate in CTWC Conference Call (this will only be possible once the CTWC is built and operational)

Conference Call in Number: _____

Participant Code: _____

E.

TWFP/TWCP Duty Officer must contact the primary broadcast stations and provide the Tsunami Alert message:

Grenada to complete this section identifying any available broadcast stations (including cable) operating in or serving Grenada.

a. Call "xyz" radio station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By_____

[] b. Call “xyz” radio station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

[] c. Call “xyz” radio station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

[] d. Call “xyz” TV station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

[] e. Call “xyz” TV station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

URGENT LOCAL TSUNAMI WARNING
BROADCAST SCRIPT

A TSUNAMI WARNING HAS BEEN ISSUED. THIS IS AN
URGENT TSUNAMI WARNING FOR (complete all that are needed, using local names to identify vulnerable
locations):

[] _____

[] _____

[] _____

And the

THE OUTLYING ISLANDS OF (fill in the blanks)

[] _____

[] _____

[] _____

A LOCAL TSUNAMI HAS BEEN GENERATED. IMMEDIATELY
EVACUATE ALL BEACHES AND ALL LOW LYING COASTAL AREAS.
MOVE INLAND TO HIGHER GROUND OR MOVE TO THE 3RD FLOOR
AND ABOVE IN STEEL AND CONCRETE BUILDINGS.

[] F.

TWFP/TWCP Duty Officer must contact Coast Guard and provide the following message:

URGENT LOCAL TSUNAMI WARNING
MARINERS WARNING SCRIPT

A TSUNAMI WARNING HAS BEEN ISSUED. THIS IS AN
URGENT TSUNAMI WARNING FOR (complete all that are needed, using local names to identify vulnerable
locations):

[] _____

[] _____

[] _____

And the

THE OUTLYING ISLANDS OF (fill in the blanks)

[] _____.

[] _____

[] _____

A LOCAL TSUNAMI HAS BEEN GENERATED. DO NOT APPROACH HARBORS UNTIL THE TSUNAMI ALL CLEAR
HAS BEEN ANNOUNCED. STAY TUNED FOR FURTHER INFORMATION.

[] G.

TWFP/TWCP Duty Officer must contact the Civil Authorities.

AGENCY NAME	Emergency Contact Name	24x7 Telephone Number	24x7 Cell Phone Number	SMS Text Number	Check mark <input type="checkbox"/> when completed.
Disaster Management Agency					
Police					
Fire					
Port Authority					
Airport Authority					
Met Services					
Red Cross Society					
Conference of Churches / Ministry of Ecclesiastical Affairs					
Cable and Wire					
Digicel					
Cingular					
Amateur Radio Club					

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C.B. Radio					
Lions Club					
Rotary Club					
Boy Scouts, Girl Scouts, Girl Guides, Brigades, & 4H Clubs-					

[] H.

TWFP/TWCP Duty Officer reports to the NaDMA Director to provide continuing assistance throughout the remainder of the alert.

3 SOP for Tsunami Information Statement (Small Potential for Tsunami)

3.1 PURPOSE

To provide procedural guidance and action steps to be followed in responding to a Pacific Tsunami Warning Center (PTWC) issued TSUNAMI INFORMATION STATEMENT due to a local seismic event to determine whether the Tsunami Information Statement identifies Grenada as threatened.

3.2 GENERAL

Pacific Tsunami Warning Center (PTWC) will issue a Tsunami Information Statement under the following conditions in the Caribbean:

An earthquake occurs with a preliminary 6.0 to 7.0 magnitude in the Caribbean.

An earthquake occurs with a preliminary 6.5 to 7.8 in the Atlantic Ocean.

3.3 IMMEDIATE ACTIONS CHECKLIST

[] A.

TWFP/TWCP Duty Officer must review the message from the PTWC and learn if the tsunami is forecast to arrive at their State and if so, what areas in Grenada are vulnerable. See example of location information from the PTWC which follows:

TSUNAMI STATEMENT NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1343Z 24 APR 2006
THIS STATEMENT IS FOR ALL AREAS OF THE CARIBBEAN EXCEPT PUERTO RICO AND THE VIRGIN ISLANDS. A SEPARATE PRODUCT WILL BE ISSUED BY THIS CENTER FOR THOSE AREAS.
... TSUNAMI INFORMATION STATEMENT ...
THIS MESSAGE IS FOR INFORMATION ONLY.
AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 1310Z 24 APR 2006
COORDINATES - 17.2 NORTH 61.6 WEST
LOCATION - LEEWARD ISLANDS
MAGNITUDE - 6.6
EVALUATION
A DESTRUCTIVE WIDESPREAD TSUNAMI THREAT DOES NOT EXIST BASED ON HISTORICAL EARTHQUAKE AND TSUNAMI DATA.
HOWEVER - THERE IS A VERY SMALL POSSIBILITY OF A LOCAL TSUNAMI THAT COULD AFFECT COASTS LOCATED USUALLY NO MORE THAN A HUNDRED

KILOMETERS FROM THE EARTHQUAKE EPICENTER. AUTHORITIES IN THE REGION NEAR THE EPICENTER SHOULD BE MADE AWARE OF THIS POSSIBILITY.

[] B.

If the event

Does not threaten their states coastline then the TWFP/TWCP should continue to monitor information about the event but take no further action.

If the event (even if it only has a small potential for a destruction tsunami) threatens Grenada's coastline, the TWFP/TWCP Duty Officer must identify the location coordinates on the map (available for this purpose on the wall of their office). Once vulnerable locations are identified, they should be listed using the following form:

(INSERT VULNERABLE LOCATION BY AREA NAME INFORMATION)

[] _____

[] _____

[] _____

And the

THE OUTLYING ISLANDS OF (fill in the blanks)

[] _____

[] _____

[] _____

[] C.

TWFP/TWCP Duty Officer must IMMEDIATELY activate all public alerting tools in the vulnerable areas:

Grenada to complete this section identifying any available alerting systems

Sirens

Church Bells

Vehicle Loud Speakers

Automated Telephone Call System

Public Address Systems

Following is a table where information concerning who to contact and how in the event there is no easily single point automation for the public alerting tools.

Activation Type	Emergency Contact Name	24x7 Telephone Number	24x7 Cell Phone Number	SMS Text Number	Check mark \checkmark when completed.
Sirens					
Church Bells					
Automated Telephone Dialing System					
Public Address Systems					
Vehicle Loud Speakers					

[] D.

TWFP/TWCP Duty Officer must participate in CTWC Conference Call (this will only be possible once the CTWC is built and operational)

Conference Call in Number: _____

Participant Code: _____

[] E.

TWFP/TWCP Duty Officer must contact the primary broadcast stations and provide the Tsunami Alert message:

[] a. Call "xyz" radio station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By_____

[] b. Call “xyz” radio station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

[] c. Call “xyz” radio station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

[] d. Call “xyz” TV station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

[] e. Call “xyz” TV station, Broadcast Script follows.

24x7 Telephone Contact for Emergency Broadcast: _____

Time_____/By____

**URGENT LOCAL TSUNAMI WARNING
BROADCAST SCRIPT**

A TSUNAMI WARNING HAS BEEN ISSUED. THIS IS AN
URGENT TSUNAMI WARNING FOR (complete all that are needed, using local names to identify vulnerable
locations):

[] _____

[] _____

[] _____

And the

THE OUTLYING ISLANDS OF (fill in the blanks)

[] _____

[] _____

[] _____

A LOCAL TSUNAMI HAS BEEN GENERATED. IMMEDIATELY
EVACUATE ALL BEACHES AND ALL LOW LYING COASTAL AREAS.
MOVE INLAND TO HIGHER GROUND OR MOVE TO THE 3RD FLOOR
AND ABOVE IN STEEL AND CONCRETE BUILDINGS.

[] F.

TWFP/TWCP Duty Officer must contact Coast Guard and provide the following message:

URGENT LOCAL TSUNAMI WARNING
MARINERS WARNING SCRIPT

A TSUNAMI WARNING HAS BEEN ISSUED. THIS IS AN
URGENT TSUNAMI WARNING FOR (complete all that are needed, using local names to identify vulnerable
locations):

[] _____

[] _____

[] _____

And the

THE OUTLYING ISLANDS OF (fill in the blanks)

[] _____.

[] _____

[] _____

A LOCAL TSUNAMI HAS BEEN GENERATED. DO NOT APPROACH HARBORS UNTIL THE TSUNAMI ALL CLEAR HAS BEEN ANNOUNCED. STAY TUNED FOR FURTHER INFORMATION.

[] G.

TWFP/TWCP Duty Officer must contact the Civil Authorities.

AGENCY NAME	Emergency Contact Name	24x7 Telephone Number	24x7 Cell Phone Number	SMS Text Number	Check mark <input type="checkbox"/> when completed.
Disaster Management Agency					
Police					
Fire					
Port Authority					
Airport Authority					
Met Services					
Red Cross Society					
Conference of Churches / Ministry of Ecclesiastical Affairs					
Cable and Wire					
Digicel					
Cingular					

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Amateur Radio Club					
C.B. Radio					
Lions Club					
Rotary Club					
Boy Scouts, Girl Scouts, Girl Guides, Brigades, & 4H Clubs-					

[] H.

TWFP/TWCP Duty Officer reports to the Disaster Management Director to provide continuing assistance throughout the remainder of the alert.

4 SOP for Tsunami Information Statement (No Potential for Tsunami)

4.1 PURPOSE

To provide procedural guidance and action steps to be followed in responding to a Pacific Tsunami Warning Center (PTWC) issued TSUNAMI INFORMATION STATEMENT due to a local or regional seismic event.

4.2 GENERAL

Pacific Tsunami Warning Center (PTWC) will issue a Tsunami Information Statement under the following conditions in the Caribbean:

An earthquake occurs more than or equal to 100 km from the surface for all locations and is less than or equal to 6.0 magnitude in the Caribbean or 6.5 magnitude in the Atlantic.

4.3 IMMEDIATE ACTIONS CHECKLIST

[] A.

TWFP/TWCP Duty Officer must review the message from the PTWC but no other follow up is required.