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SOUTHERN REGION TSUNAMI WARNING PROGRAM OPERATIONS FOR WFO SAN JUAN

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/.

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SUMMARY OF REVISIONS: This Supplement supersedes SR Supplement 04-2007 dated September 8, 2014, filed with NWSI 10-701.

1. Removed references to the EQI and EQR products.
2. Changed all occurrences of West Coast / Alaska Tsunami Warning Center to Pacific Tsunami Warning Center.
3. Replaced detailed definition, break points, dissemination avenues, and criteria sections with links to overarching Directive (10-701) and/or websites.
4. Updated servicing Tsunami Warning Center from NTWC to PTWC.

<signed> March 12, 2019

Steven G. Cooper, Date
Regional Director

Table of Contents

1 Introduction

This Regional Supplement describes responsibilities and provides guidance to the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) Weather Forecast Office (WFO) in San Juan (SJU) as it relates to tsunami services. Detailed procedures regarding the Southern Region (SR) CONtinental United States (CONUS) coastal Weather Forecast Offices (WFO) and River Forecast Centers (RFC) with coastal responsibility along the Gulf of Mexico and Atlantic Ocean are contained in a separate supplement.

2 Tsunami Program Overview

2.1 Weather Forecast Office (WFO) San Juan (SJU)

WFO San Juan is responsible for planning and taking appropriate action when there is a threat of a tsunami for their area, including dissemination of Tsunami Warnings, Advisories, and Watches. They are also responsible for ensuring the readiness of office staff and systems through routine operational drills, coordinating community outreach activities to increase tsunami hazard awareness, and assisting in emergency preparedness for tsunami events (e.g., promotion of the TsunamiReady® program). The office sometimes coordinates with the leadership of the Caribbean Tsunami Warning Program (CTWP) and the Puerto Rico Seismic Network (PRSN) in these outreach efforts. Emergency Management Agencies in Puerto Rico (PR) and the United States Virgin Islands (USVI) have the responsibility for developing warning procedures and emergency plans (along with help from WFO SJU), and for making evacuation decisions for local communities. The Station Duty Manual (SDM) will document specific (localized) procedures.

2.2 Pacific Tsunami Warning Center (PWTC)

The PTWC provides tsunami warning services to PR and the USVI. The PTWC is the backup for the National Tsunami Warning Center (NTWC).

2.3 National Tsunami Warning Center (NTWC)

The NTWC is the backup for the PTWC. Additionally, NTWC provides services for potential tsunami events that may affect the U.S. coastline, including the Gulf of Mexico and Canada.

2.4 Caribbean Tsunami Warning Program (CTWP)

The CTWP supports both US Territories in the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Intergovernmental Oceanographic Commission **(**IOC) Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (CARIBE-EWS) Member States. CTWP supports (1) establishing and strengthening their national and regional systems, (2) training and capacity building to ensure timely delivery and understanding of products to countries and communities, (3) supporting TsunamiReady® and TsunamiReady® implementation and (4) supporting the delivery of earthquake and tsunami data to the Tsunami Warning Centers (TWC)s. CTWP is administratively overseen by the NWS Pacific Region.

2.5 Puerto Rico Seismic Network (PRSN)

The PRSN is part of the Department of Geology of the University of Puerto Rico in Mayagüez, Puerto Rico. It monitors the Atlantic basin, Caribbean, and Gulf of Mexico for seismic events. PRSN contacts WFO San Juan and emergency officials of PR and the USVI and relays tsunami/earthquake information for seismic events.

3 Tsunami Program Procedures

PTWC and PRSN monitor the Atlantic basin and Caribbean for tsunami events. If a seismic event occurs in these areas and meets the seismic magnitude and location criteria listed in Section 3.2 of NWSI 10-701 (also found on the tsunami.gov website), the PTWC will issue the corresponding tsunami products listed here: https://tsunami.gov/?page=product_list. PRSN may also contact WFO San Juan and emergency officials in PR and the USVI concerning the seismic events.

WFO SJU relays the tsunami information on NOAA Weather Radio All Hazards (NWR) broadcasts. WFO SJU provides updates via localized products to customers and partners during and after events. The WFO conducts outreach and education, including collaboration with Emergency Managers and partners, for a successful tsunami program and awareness.

4 PTWC Products

4.1 Definitions

Tsunami product definitions are located in Section 2.1 of NWSI 10-701.

4.2 Tsunami Text Products

All products issued by both the PTWC and NTWC can be found here: http://tsunami.gov/?page=product_list.

The following are the products specific to both PR and the USVI:

Puerto Rico, Virgin Islands	WECA40 PHEB	TSUCAR	Tsunami Warnings, Watches, and Advisories
	WECA50 PHEB	TSUSP1	Spanish Tsunami Warnings, Watches, and Advisories
	WECA60 PHEB	TSUCA1	Segmented Tsunami Warnings, Watches, and Advisories
	WECA42 PHEB	TIBCAR	Tsunami Information Statements
	WECA52 PHEB	TIBSP1	Spanish Tsunami Information Statements

5 PTWC Dissemination

PTWC disseminates tsunami products over numerous dissemination routes. Details and specifics are located in Section 2.7 of NWSI 10-701.

6 Criteria for Tsunami Products

The criteria used to determine product issuance from both the PTWC and NTWC can be found at these two links:

http://ntwc.arh.noaa.gov/images/procChartLargeAtlantic.gif and
http://ntwc.arh.noaa.gov/images/procChartLargePacific.gif

7 Break Points

PTWC uses “Warning and Threat Zones” in lieu of break points, due to the islands in the Caribbean. These are listed in Section 2.4.2.4 of NWSI 10-701.

8. WFO Communication and Dissemination

WFO San Juan will follow the procedures below if they are in the affected area of a Tsunami Warning, Advisory, or Watch. Critical actions by WFO SJU are necessary for public and partner notification. A checklist to be utilized during a tsunami event is provided in Appendix A.

8.1 WFO Communication

1. Advanced Weather Interactive Processing System
   WFO SJU *must* ensure all of the products listed in Sections 4.2. are *alarmed* in AWIPS. In addition, WFO SJU must ensure after each AWIPS build (or crash) that the products are reconfigured to be alarmed.

2. Contact Logs
   WFO SJU will likely receive numerous calls from the media, public, emergency managers, etc. during earthquake and tsunami events. The office will log all calls initiated or received, as well as subsequent actions.

3. Emergency Phones
   Emergency office cellular and/or satellite phones should be charged and easily accessible to all staff. In addition, staff must know exactly where these phones are located and how to use them.

4. Decision Support Services
   Provide Impact-based Decision Support Services (IDSS) to core partners. Provide information and interpretative services to directly support tsunami event information that may have a direct impact on the protection of lives/livelihoods.

5. Social Media
   Use social media, when appropriate, to pass on warnings and information to the public related to tsunami events.

6. Configure NWRWaves for proper Emergency Alert System (EAS) Notification
   It is *imperative* that the appropriate WFO staff (usually the Warning Coordination Meteorologist (WCM)) coordinate with the NWR Focal Point, Observing Program Leader (OPL), or Electronic Technician (ET) staff to configure NWRWaves for the proper Emergency Alert System (EAS) code for Tsunami Warnings, Advisories, and Watches for the County Warning Area (CWA).

   WFO SJU will need to do an initial set-up to ingest the TSUCA1. At that point, the Broadcast Message Handler (BMH) will handle the process of EAS codes and

tone alerting.

The office will use the NWRWaves Product Configuration GUI to either set up or verify the correct configuration for tone alerts. When properly configured, the tone alert would then set off the EAS activation.

7. EAS Codes for Tsunami Watches and Warnings
Use TSW for Tsunami Warning messages
Use TSA for Tsunami Watch messages

8. EAS Codes for Tsunami Advisories
A Tsunami Advisory EAS code is not available. When a Tsunami Advisory is issued, use the TSW EAS code on NWR and then broadcast the Tsunami Advisory text.

8.2 NOAA Weather Radio All Hazards (NWR) and Emergency Alert System (EAS) Activation

8.2.1 When a Tsunami Warning, Advisory, or Watch is Issued

1. Broadcast on NWR

a. Tsunami Watches and Warnings

Tsunami Watches and Warnings (TSUCA1) are configured to go to the pending side of NWRWaves. Forecasters should Quality Check (QC) the product to ensure it's not a test message and/or if the wording is what you want broadcast over NWR for your area. When ready to be sent to NWR, select "send to CRS."

As a reminder: Do not issue a Tsunami Warning message (TSW) or Tsunami Watch message (TSA) product from AWIPS (they do not exist in AWIPS, only as EAS codes on NWR).

b. Tsunami Advisories

Tsunami Advisories (TSUCA1) are configured to go to the pending side of NWRWaves. As a reminder, the EAS code will be for Tsunami Warning, but the text will be of the Tsunami Advisory product. Forecasters should QC the product to ensure it's not a test message and/or if the wording is what you want broadcast over NWR for your area. When ready to be sent to NWR, select "send to CRS."

2. Issue Special Weather Statements for Updates
If a Tsunami Warning, Advisory, and/or Watch is issued by PTWC for any part of the CWA, WFO San Juan should issue Special Weather Statements (SPS) at intervals between the PTWC tsunami products. Issue the SPS products via AWIPS and broadcast over NWR. Similar to Hurricane Local Statements, these SPS issuances are intended to provide timely updates to customers and partners while the Tsunami Warning/Advisory/Watch is in effect and PTWC collects, reviews, and diagnoses data. In most cases, the SPS will reemphasize the information in the PTWC products while adding additional local impact information such as flooding and any messages relayed by emergency managers or the CTWP, if available.

3. If NWR is Off the Air
If NWR is off the air (or out of service), contact the Principle Entry Point (PEP) station and request EAS activation for the appropriate product above (Tsunami Warning, Advisory, or Watch).

The SDM will note where all the PEP information is located in your office.

8.2.2 When a Tsunami Information Statement (TIB) is Issued

If a TIB is issued for an earthquake that has occurred OUTSIDE the vicinity of the PR/USVI area of responsibility (AOR), then the earthquake would likely not be felt and therefore the TIB should not be disseminated on NWR.

However, if a TIB is issued for an earthquake WITHIN the PR/VI AOR or that IS felt by PR/USVI residents, then WFO SJU should be disseminated the TIB on NWR. Earthquakes of this size that are felt may result in an increase in the number of phone calls or activities at an office. Further, at forecaster discretion, an SPS product may be issued from AWIPS and/or disseminated on NWR to help minimize media/public concerns. The SPS will restate the information from the TIB product.

8.2.3 When the Tsunami Warning, Advisory, or Watch is Cancelled

If the PTWC cancels the Tsunami Warning, Advisory, or Watch, the TSUCA1 product will go to pending side of NWRWaves. QC the product and then when ready to be sent to NWR, select "send to CRS."

Issue a final SPS to relay the information that a Tsunami Warning, Advisory, or Watch was cancelled.

Additionally, a Cancellation Checklist is provided on page A-2 that lists tasks to be

completed when a Tsunami Warning, Advisory, or Watch has been cancelled.

9 Local Earthquakes

An SPS may be issued for earthquakes that occur across the CWA to inform the public about the potential of a tsunami.

Create both English and Spanish SPS templates in AWIPS for quick editing.

There are three types of scenarios:

Earthquake Strength	Information Received yet from PTWC or PRSN?	Procedure to Follow
Any felt earthquakes	Yes	Section 8.2.1.2
Strong* earthquakes	No ***	Section 9.1
Light to moderate** earthquakes	No ***	Section 9.2

* For purposes of this Instruction, strong earthquakes are defined as those that produce intense tremors lasting 20 seconds or more.

** For purposes of this Instruction, light/moderate earthquakes are defined as those that produce tremors lightly or moderately for less than 20 seconds.

*** If information about the earthquake has not been disseminated by PTWC or PRSN yet, the office will try to contact them before issuing any local products.

9.1 Special Weather Statement (SPS) for Strong Earthquakes

An SPS should be utilized after strong earthquakes to pass on information to the public about earthquakes and potential tsunamis during the time WFO SJU is waiting to receive Tsunami messages from PTWC. When a strong earthquake occurs and no information is available from PTWC or PRSN and they also cannot be reached, the office should issue an SPS as described below.

SPSs can be issued for strong, felt earthquakes for several reasons:

a. WFO SJU may not hear from PRSN or PTWC because the earthquake is so strong that communication lines are down.
b. SPS can alert the public that a tsunami is possible if WFO SJU has not yet heard from PRSN or PTWC but the earthquake is strong enough that a tsunami may be imminent.
c. Issuing an SPS before tsunami messages are received from PTWC may be prudent because strong earthquakes can create numerous media and public inquiries.

In the SPS product, the forecaster may wish to use the following examples to express that a tsunami may be produced from strong earthquakes, but no notification has been received yet:

1. Example 1: SPS Wording for Strong Earthquake (without damage reports)

A strong earthquake was felt in Puerto Rico (and/or the U.S. Virgin Islands) at about _____ (AM / PM). The exact location and magnitude are unknown at this time.

Anyone in low lying coastal areas should move immediately inland or to high ground due to the possibility of a tsunami. A tsunami can present itself as a noticeable rise or fall of sea level along the coast. A tsunami is a series of waves that could be dangerous for several hours after the initial wave arrives.

Continue to monitor NOAA Weather Radio or your local news source for more information. Updated information will be issued later by emergency management officials, the Puerto Rico Seismic Network, the Pacific Tsunami Warning Center, and/or WFO San Juan.

2. Example 2: SPS Wording for Strong Earthquake (with damage reports)

A strong earthquake was felt in Puerto Rico (and/or the U.S. Virgin Islands) at about _____ (AM / PM). The exact location and magnitude are unknown at this time but {scattered, widespread, considerable} damage {falling objects, cracked buildings, collapsed structures, etc.} has been reported.

Anyone in low lying coastal areas should move immediately inland or to high ground due to the possibility of a tsunami. A tsunami can present itself as a noticeable rise or fall of sea level along the coast. A tsunami is a series of waves that could be dangerous for several hours after the initial wave arrives.

Continue to monitor NOAA Weather Radio or your local news source for more information. Updated information will be issued later by emergency management officials, the Puerto Rico Seismic Network, the Pacific Tsunami Warning Center, and/or WFO San Juan.

9.2 SPS for Light/Moderate Earthquakes

An SPS can be utilized after a light/moderate earthquake that is felt widely by the population and has generated numerous media and public inquiries, but information neither has been received from the PRSN or PTWC, nor has contact been made with any center. In this case, the public would be informed that there is NO tsunami threat. In the SPS product, the forecaster may use the following wording to express that there is NO tsunami threat from the earthquake:

Example: SPS Wording for Light/Moderate Earthquakes

A { light/moderate } earthquake occurred at _____ (AM / PM) in _____ (location).

Given the reported intensity of the earthquake, at this time it is believed there is NO tsunami threat for Puerto Rico and the U.S. Virgin Islands.

Continue to monitor your local news source for more information. Updated information will be issued by emergency management officials and the Puerto Rico Seismic Network.

9.3 Earthquake Reporting

When an earthquake is felt but not strong enough for an SPS, the WFO may want to report the felt earthquake for public awareness. If so, please confirm with the USGS Earthquake Hazards Official website first and then issue a local PNS, if desired.

10 Dissemination Tests for WFO SJU

Dissemination tests will be conducted for tsunami products by PTWC to ensure products are received by the NWS and its partners. The PTWC strives to disseminate a test TSTMSG product quarterly (sometimes more) to WFOs, RFCs, the FAA, and Federal and State emergency managers.

After receipt of the PTWC tsunami test product, WFO SJU will respond immediately by disseminating a local Tsunami Acknowledgement Message (TMA) from AWIPS, as specified below. The TMA product is received at PTWC to validate operation of the communication system.

Because some customers can receive the TMA, it is important to add "**THIS IS A ONLY TEST**" to the body of the product.

Example of a TMA message sent to PTWC

SECA42 TJSJ 231410
TMASJU

This is only a test. (add)

TSTMSG RCVD AT **231305** (this is the time you received the product, not the time this test message is transmitted)

$$

Important Note: The TMA product is NOT to be sent during actual events. It is only disseminated during monthly tests.

11 WFO San Juan to Notify Southern Region Headquarters

Anytime the PTWC issues a Tsunami Warning, Advisory, or Watch for the area or a local earthquake of intensity 5.0 or greater occurs in the CWA, WFO San Juan will notify SRH by calling the Southern Region Regional Operations Center (ROC) at 682-703-3747. Furthermore, if a tsunami event occurs that has a significant impact on the population within the CWA and is quickly gaining national media attention, please call the SR ROC at 682-703-3747.

If WFO San Juan is down, WFO Miami will call SRH.

12 Drills

Because earthquakes do not occur regularly, completion of drills is critical to maintaining operational proficiency. WFO SJU will conduct at least one annual drill related to tsunami program procedures and will notify the SRH Tsunami Program Manager when the drill is completed by the staff members. SRH will keep a record of the annual drills WFO San Juan conducts.

Appendix A: Sample WFO Checklist to use when a Tsunami Warning, Advisory, or Watch is Issued by PTWC for Your Area.

TSUNAMI WARNING / ADVISORY / WATCH
(circle one)

Criteria: By direction of the Pacific Tsunami Warning Center

Issued: Date _____ Time_____

Valid until: Date _____ Time_____

Initials of Warning Coordinator_____

Area Affected _____

Time Completed/Initials	WARNING/ADVISORY/ WATCH CHECKLIST
_____/_____	**Put the warning, advisory, or watch information immediately on NWR** as follows: □ Tsunami Warnings, Advisories, and Watches (TSUCA1 and TSUSP1) are configured to go to the pending side of NWRWaves. Forecasters should QC the product to ensure it's not a test message and/or if the wording is what you want broadcast over NWR for that transmitter. When ready to be sent to NWR, select "send to CRS." □ Log in your office shift log the time your message was initially broadcast on NWR.
_____/_____	If other weather warnings are in effect during the tsunami event, after a short period of time that the tsunami message has played alone, play the additional warning messages in the interest of protecting lives and property. Keep Broadcast Message Handler (BMH) programming at an absolute minimum. This should all be programmed to happen automatically on BMH.
_____/_____	Issue an SPS product at intervals between the PTWC product and broadcast on NWR. The SPS product should provide updates and/or local information (see Section 8.2.1.2 for details).
_____/_____	Consider any additional actions that may enhance community response to this watch/warning. These may include additional phone calls to local emergency managers, law enforcement, fire departments, etc., where impact may be particularly damaging. Additional actions include using social media where appropriate. Record all of these actions.

_____/_____ Continue to record updates from the PRSN and PTWC to BMH as well as SPS products issued from your local office.

_____/_____ Log all additional incidents or actions that pertain to this event. Any verification information received should be recorded as well.

_____/_____ Contact the MIC and WCM if they are not on station.

_____/_____ Contact the SRH ROC by calling 682-703-3747.

_____/_____ Contact PREMA.

_____/_____ Contact VITEMA.

_____/_____ Contact USGS.

_____/_____ Contact the Manager of the CTWP in Mayaguez, PR (note the number in your SDM and/or Google Site).

_____/_____ Gather pertinent documents and review evacuation/safety procedures if the office is threatened by the tsunami.

Time Completed

CANCELLATION CHECKLIST

_____/_____ **Put the cancellation on NWR as follows:**
□ Cancellation messages are configured to go to the pending side of NWRWaves. Forecasters should QC the product to ensure it's not a test message and/or if the wording is what you want broadcast over NWR for that transmitter. When ready to be sent to NWR, select "send to CRS."
□ Log in your office shift log the time your message was initially broadcast on NWR.
□ Set expiration to one hour.

_____/_____ Update the MIC and WCM.

_____/_____ Retain <u>all</u> records of this event and provide to the WCM.