

# **Exercise Manila Trench 2009**

## **21 May 2009**

### **Exercise Manual**

#### **Philippines**

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# 1. EXERCISE GENERAL INSTRUCTION

## 1.1 Background

***Project Description.*** UNESCO/IOC has received funding from the UNESCAP Multi-donor Trust Fund to conduct a project designed to strengthen national tsunami warning and emergency response capability in four countries (Pakistan, Philippines, Myanmar, Vietnam). Each country will receive three 1-week missions focused on the strengthening of their end-to-end tsunami Standard Operating Procedures (SOP). For the Country Workshops, Workshop 1 will be a training workshop to provide guidance, templates and best practices, Workshop 2 will focus on reviewing and improving their existing SOPs and on planning an exercise to practice their SOPs, and Workshop 3 will conduct a real-time Functional Exercise and Post-exercise evaluation.

***Tsunami Early Warning.*** For an effective Tsunami Early Warning and Mitigation System (TEWS) National or Sub-National Tsunami Warning Centres (TWC) need to quickly disseminate consistent and reliable tsunami threat information in an understandable and concise manner. Disaster Management Organizations (DMO), or their Emergency Operations Centres, that are responsible for public safety during natural or man-made disasters, then need to assess the threat to their local populations based on all available information including local knowledge, and when appropriate disseminate safety information and instructions, and initiate public coastal evacuations. These actions comprise an “End-to-End” TEWS response (monitoring and warning, alert dissemination, emergency response, public action). In order to implement a successful TEWS, Tsunami Warning Centres and Disaster Management Organizations at all levels of government (national, provincial, district and local levels) require pre-event development of protocol and procedures documents describing their roles, responsibilities, responses, and actions. These responses and actions should be well coordinated and practiced within their organizations, in conjunction with external agencies.

TWC and DMO Emergency Response Plans, and their accompanying Standard Operating Procedures (SOP) and Checklists are used to describe procedures, protocols, and expected actions for tsunami emergencies. Responses must be carried out by a 24x7 duty staff. DMO SOPs coordinate and execute rapid and massive public coastal evacuations in response to a Tsunami Warning Center’s notification of an approaching tsunami on a 24x7 basis.

A Standard Operating Procedure (SOP):

- Is a set of written instructions describing a routine, or repetitive activity followed by an organization. The instructions are stakeholder agreed-upon steps that will be used in coordinating the Who, What, When, Where, and How aspects of the Tsunami Emergency Response Plan.
- Is a mechanism for operating effective and reliable warning systems and disaster management systems. The TWC SOPs must be linked at all levels from international to national to local warning institutions, and must be simultaneously connected to the corresponding DMO SOPs, and vice versa.

- Should cover a number of Concept-of-Operations activities to enable an End-to-End response process. SOPs can range from data processing, analysis and warning communication procedures to action checklists for conducting public coastal evacuations, coordinating stakeholders organizations, and establishing the roles and jurisdictions for government, non-government, and the private sector agencies.
- Should facilitate good decision-making by describing in detail the actions taken by an agency to carry out its responsibilities, as defined in the system's Concept of Operations document. The existence and use of SOPs are especially essential for rapid, efficient tsunami response since tsunamis are rapid-onset disasters for which there is little time to prepare. Because of this, all responses need to be pre-planned, well practiced, and automatically enacted to minimize loss of life through quick public notification.

## **1.2 Aim**

The aim of Exercise Manila Trench 2009 is to provide participants to the training workshops with the opportunity to demonstrate the knowledge obtained in a practical manner, and identify areas for improvement.

## **1.3 Objectives**

Participants will

- Apply a tsunami warning scenario to pre-developed time lines, flowcharts, activity checklists, and templates that constitute their SOPs
- Identify and describe the individual actions taken by each respective stakeholder in response to the tsunami warning, noting any problems
- Validate the PHIVOLCS and OCD dissemination process of issuing tsunami messages to relevant Philippine agencies and the public
- Validate the organizational decision-making process for public warnings and evacuations
- Demonstrate the above through plenary report-back and evaluation of SOP performance
- Receive comment from lecturers and peers on their SOPs
- Identify gaps in SOPs
- Increase operational readiness for tsunami events
- Become familiar with the mechanics of conducting a Functional Exercise

## **1.4 Significant Dates**

- Monday, 18 May, 1000 – 1230: Exercise Coordination meeting with representatives of key stakeholder agencies, PHIVOLCS auditorium.
- Wednesday, 20 May, 0830 - 1700: General Stakeholder Exercise Workshop, Tsunami Warning and Emergency Response SOPs, Exercise Manila Trench 2009 preparations, PHIVOLCS auditorium
- Thursday, 21 May, 1000 - 1230: Functional Exercise period: each Agency (PHIVOLCS, OCD Central and Regional) at its operations centers. After lunch, Agencies conduct internal “hot wash” debriefs.
- Friday, 22 May, 0830 - 1600: Post Exercise Evaluation and SOP Summary Discussion, PHIVOLCS auditorium. Philippine agencies share a timeline log of events, actions, and communications, identify problems and next steps action.

### **1.5 Scope and Type of Exercise**

The Exercise will be conducted in a real time Functional Exercise format. Participant agencies will be located at their respective operation centres.

Participants will be presented with a scenario simulation and a flow of simulated exercise ‘injects’ to which they will respond through use of their SOPs. Participants will be required to take into account and apply the knowledge and preparation they have developed in the course of the workshop to demonstrate an appropriate response to the scenario.

### **1.6 Exercise Format**

A Functional Exercise is a planned activity designed to test and evaluate individual capacities, multiple activities within a function, or interdependent groups of functions among various agencies. It is based on a simulation of a realistic emergency situation that includes a description of the situation (narrative) with communications between players and simulators. The Functional Exercise gives the players (decision-makers) a fully simulated experience of being in a major disaster event. It should take place at the appropriate coordination location (i.e. warning and emergency operations centers, command center or post, master control center, etc.) and activate all the appropriate members designated by the plan. For a tsunami exercise, organizations should test their SOPs using real time simulation tsunami bulletins. Both internal and external agencies (government, private sector, and volunteer agencies) should be involved. It requires players, controllers, simulators, and evaluators. Message traffic will be simulated and inserted by the control team for player response/actions, under real time constraints. It may or may not include public evacuations. A Functional Exercise should have specific goals, objectives, and a scenario narrative.

### **1.7 Exercise Scenario and Communications**

For Exercise Manila Trench 2009, the tsunami source will be in the Manila trench, southwest of Luzon. The earthquake will occur at 0200Z or 1000 local time, 21 May 2009. An earthquake of this size would be likely to generate a tsunami with destructive effects. Bulletins will be issued for approximately 2.5 hrs, at which time the tsunami will have impacted the Philippines.

Discussion of the scenario and exercise injects, and response will be conducted by groups representing tsunami warning centres or tsunami emergency response agencies.

The groups will react, based on their pre-planned SOPs, to international/national/other information starting immediately after the earthquake and continuing as a tsunami is confirmed and attacks coastlines. The same scenario (earthquake parameters, tsunami predictions and observations) will be available and used by all groups.

Groups will be made up of Tsunami Warning Center (TWC) and Tsunami Emergency Response (TER) agencies so as to be able to cover all considerations (end-to-end response).

PTWC and JMA NWPTAC messages will be provided, and response groups will represent and issue tsunami warning and safety information.

Communications between agencies and/or with other entities will be simulated in a pre-determined manner, and documented in writing using agency timeline logs. Communications details are:

- Except for 1-dedicated line for actual events, PHIVOLCS communication methods will use 'live' communications lines.
- PHIVOLCS and OCD will communicate by Fax, Email, Voice, Single Side Band (SSB) radio.
- Controllers or Simulators will issue injects by various methods as appropriate.

Verbal and written communications should clearly state "This is an Exercise ..."

Written communications should use large print or bold capitals for "This is an Exercise ..."

### **1.8 Earthquake Impact Reduction Study for Metropolitan Manila (JICA, MMDA, PHIVOLCS, 2004)**

A study was completed in 2004 to assess the possible impacts of eighteen major earthquakes to Metropolitan Manila. This includes an event occurring along the Manila Trench (Model 13) with magnitude 7.9. Human casualties and damages to buildings, water supply pipes, telecommunication cables and electrical power supply cables were estimated in the study.

### **1.9 Participants**

All participants in the training workshop will take part in the exercise. Participants will be divided into groups representing the TWC and TER agencies, or serve as Observers.

Observers are able to observe all components of the Exercise. Each principal agency has appointed an Exercise Coordinator. The Exercise Coordinator is responsible for planning, organizing, and overseeing the conduct of the Exercise, and is responsible for leading the "hot wash" debrief. The Exercise Coordinators are Augusto Lorenzo (OCD), and Ishmael Narag (PHIVOLCS).

The level of national, regional, local participation determined by Philippine agencies will be: PHIVOLCS Main Office and Field Stations, and OCD Central and Regional Offices for Regions III, IVA, and IVB, and National Capital Region (NCR, Metropolitan Manila) will participate

### **1.10 Exercise Control**

Exercise Control will be conducted by Controllers Charles McCreery and Laura Kong stationed at PHIVOLCS; and Tony Elliott and Brian Yanagi stationed at OCD. The Controllers will control the pace of the Functional Exercise, and can suspend the exercise in case of a real-world crisis.

Moreover, there will be in house agency Simulators or "actors" in a scripted situation that will inject pre-written telephone calls or written messages.

*The Controllers and Simulators act as outside agencies and individuals not physically present in the auditorium. All inquiries, questions and clarifications sought during the Exercise must be directed to the Controllers and Simulators. Simulators and Controllers have knowledge of all exercise injects.*

### **1.11 Actions in Case of a Real Event**

All documentation and correspondence relating to this exercise should be clearly identified with “This is an Exercise...” In the case of an actual crisis occurring during the exercise, PHIVOLCS and OCD will advise the Controllers whether or not to halt the Exercise. Be aware that smaller earthquakes may occur during the Exercise, and will be responded to by the PHIVOLCS Duty Officers.

### **1.12 Exercise Assumptions and Artificialities**

- The Manila Trench Earthquake is felt strongly along coastal provinces in southwest Luzon. Damage to structures, roadways, critical facilities is possible from this earthquake.
- Operational centers should assume that their power and communications are still functioning after earthquake ground shaking.
- PTWC and JMA messages are available prior to start of exercise.
- Artificial simulation of hundreds of phone calls from general public and media.

### **1.13 Post Exercise Evaluation**

*On Thursday, 21 May after lunch, agencies will conduct an internal “hot wash” debrief with their respective staff. A “hot wash” debrief is a performance review conducted immediately following the conclusion of an exercise. It is recommended that each participant (observer) fill out the Post-Exercise Evaluation Questionnaire prior to the commencement of the “hot wash.” The Post-Exercise Evaluation Questionnaire (Appendix 3) allows individual feedback on the learning experience.*

*On Friday, 22 May, a Post-Exercise Evaluation Workshop will take place at the PHIVOLCS auditorium. Agency will present their evaluations taking into account*

- Exercise Objectives
- Whether they were met or not,
- Next steps for action.

The Evaluation will be in the form of PHIVOLCS and OCD groups reporting:

- 1) Timeline of events, actions, and communications undertaken, and reporting on problems requiring improvements to their SOPs;
- 2) Brief summary of “hot wash” comments and results from the Post Exercise Evaluation Questionnaire.

Participants and Controllers will provide comments and recommendations to the report-backs provided by discussion groups. The quality and comprehensiveness of the report-backs will provide an over-all impression on the level of achievement by the groups. Finally, participants will fill out an IOC SOP Workshop Training Evaluation form.

## 2 EXERCISE PREPARATIONS: SOPs, Checklists, Messages and Communications

The Exercise should test the capabilities of earthquake and tsunami stakeholder agencies to respond to a damaging earthquake and/or tsunami. Agencies can ask themselves the following questions to judge their operational readiness.

### *Overall Questions:*

- *When an earthquake and tsunami occurs, are you prepared to respond immediately? Do you have written SOPs for Duty Staff to follow?*
- *Do you have templates, or other pre-scripted communications to make your response faster and standardized?*
- *Have you educated your customers on what they should expect, when, and what they should do with the information you provide?*

### *Specific Questions:*

1. What will you do when an earthquake occurs?  
How will you know how big it was and whether there was damage?  
Who will you notify, how, and with what info?
2. How will you know if there is a tsunami?  
If there is, what will you do?  
Who will you notify, how, and with what info?
3. For PHIVOLCS, after you issue a tsunami warning or alert, what will you do?  
When will you cancel the warning?  
Who will you notify, how, and with what info?

For OCD and Other Agencies,  
After you receive a tsunami warning or alert, what will you do?  
Who will you notify, how, and with what info?

4. What will you do if the public / media asks for information?  
Who will handle this, and what information will be given (or not given)?
5. What will you do if high-level government officials ask for information?  
Who will handle this, and what information will be given (or not given)?



### 3 MASTER SCENARIO EVENTS LIST (MSEL) TIMELINE

#### 3.1 Scenario Timeline - International Messages

The initial bulletin will be issued by the PTWC followed closely by the NWPTAC because the earthquake is located in the immediate vicinity of the Philippines. Initial bulletins from PTWC and NWPTAC will follow, using the earthquake parameters from the PTWC. To avoid any possible misinterpretation, bulletins issued by the warning centers will be in clearly labeled to be “Exercise only”. The schedule of bulletins is given in Table 1, and the actual messages are given in Appendix 2.

Additionally, local injects will be provided to different stakeholder agencies starting after the earthquake’s occurrence. Depending on the inject information, agencies should respond accordingly.

Table 1. International Exercise Messages Timeline

<i>Inject No</i>	<i>UTC</i>	<i>Local Time</i>	<i>Event</i>	<i>To whom</i>
1	0200	1000	Earthquake	Both
2	0214	1014	PTWC Message 1: M7.9, warning based on EQ evaluation; estimated arrival times	TWC
3	0216	1016	JMA Message 1: M7.9, Possibility of destructive ocean-wide tsunami, estimated arrival times, wave amplitude	TWC
4	0240	1040	PTWC Message 2: M8.3, magnitude increase	TWC
5	0242	1042	JMA Message 2: M8.3, destructive ocean-wide tsunami possible	
6	0330	1130	PTWC Message 3; reports tsunami at 0316Z 2.5m @ Subic Bay, RP	TWC
7	0355	1155	PTWC Message 4: reports tsunami at 0322Z 4.0m (16 min period) @ Manila, RP; 0321Z 4.5m (18 min period) @ Subic Bay, RP	TWC
8	0430	1230	PTWC Message 5: reports tsunami at 0325Z 2.5M (20 min period) @ Qui Nhon, VN	TWC
9	0530	1330	PTWC Message 6: Cancellation	TWC

## **4 POST-EXERCISE EVALUATION**

### **4.1 Evaluation and Debriefing**

All participants are asked to provide brief feedback on the exercise through participation in the debrief, or “hot wash,” and through the filling out of the Post-Exercise Evaluation Questionnaire. This feedback will greatly assist in the evaluation of Exercise Manila Trench 2009 and assist in the development of subsequent exercises.

### **4.2 Evaluation Instruments**

The goal of exercise evaluation is to validate strengths and identify opportunities for improvement within the participating organizations. This is to be accomplished by comparing the exercise’s effectiveness against an agency’s operational requirements; and determining what changes might need to be made to enable more effective tsunami warning and decision-making.

Evaluation of this exercise will focus on the adequacy of plans, policies, procedures, assessment capabilities, communication, resources and inter-agency/inter-jurisdictional relationships that support effective tsunami warning and decision-making at the different levels of government. A necessary part of the evaluation is the effectiveness of the SOPs.

It is suggested that an exercise “hot wash” debrief include all participants in the respective agencies. *The agency-appointed Exercise Coordinator should lead the “hot wash.”* The “hot wash” should allow the Controllers and key agency staff members to briefly comment on what activities went well and what needs improvement. Emphasis should focus on agency actions. Agencies evaluation compilations should summarize the “hot wash” comments. In completing the questionnaire, participating organizations should have the ability to note areas for improvement and actions that they plan to take without concern that the information carries political or operational risks.

### **4.3 Post-Exercise Evaluation Questionnaire**

A Questionnaire, such as provided in Appendix 3, can be used as an evaluation instrument. The Questionnaire provides guidance on topics to consider and questions to answer when evaluating an Agency’s performance during an event or exercise. It can be modified further, or used as-is, to provide feedback and serve as a review agenda when conducting a post-event agency “hot wash” debriefing and/or preparing an agency exercise evaluation for a multi-agency debriefing.

## APPENDIX 1. EARTHQUAKE IMPACT REDUCTION STUDY FOR METROPOLITAN MANILA (JICA, MMDA, PHIVOLCS, 2004)

### SUMMARY OF IMPACTS OF MODEL 13, MMEIRS, 2004

#### Building Damage

The earthquake motion in Metropolitan Manila is not relatively large because the source region is far from Metropolitan Manila. Therefore, the building damage is much smaller than Model 08 (West Valley Fault System). Damage ratio is less than 5% in all of the Metropolitan Manila. About 1,900 buildings will be heavily damaged and 6,600 will be partially damaged. From North Port to Navotas along Manila Bay shows relatively heavy damage. In addition, the damage by flooding is expected along Manila Bay if tsunami occurs. Low-rise wooden or half-wooden buildings may be swept off by tsunami.

#### Human Casualty Estimation

The major cause of human casualties during earthquakes is building collapse. People in collapsed buildings are assumed to die either instantaneously or within a few days of the initial collapse. After large earthquakes, people may die from diseases in refugee camps, but these deaths are not included in the estimation. The death toll is estimated to be 100 people and the number of injured people is 300. One-third of human casualties will be concentrated in Manila.

#### Damage to Lifelines

For Model 13, there are no expected damage to water pipelines, electric power supply cables and telecommunication cables (due to collapsed or leaning poles, cuts along the cables)

#### Summary of Building Damage

Model	Heavily Damaged		Partially Damaged	
13	700 (by Vibration)	(0.1%)	4,100	(0.5%)
	1,300 (by Liquefaction)		2,600	

Heavily damaged: Collapsed or heavy structural damage, structures are considered dangerous and unusable for evacuation and cannot be used without significant repairs. Rebuilding the structure may be necessary. Partially damaged: Moderate structural damage, structures are usable for evacuation but repairs are still necessary.

#### Summary of Human Casualties

Model	Death		Injured	
13	100	(0.0%)	300	(0.0%)

Deaths: instant death under collapsed building structure, suffocation under collapsed roofs or walls, trapped in collapsed building and not rescued promptly. Injured: Bone fracture, rupture of internal organs, crush syndrome, etc.; needs hospitalization

## APPENDIX 2. PTWC and JMA NWPTAC EXERCISE MESSAGES

The following messages are for Exercise Manila Trench 2009. The content and format are representative of what would be issued by the Pacific Tsunami Warning Center and Northwest Pacific Tsunami Advisory Center.

### PTWC MESSAGES

#### PTWC MESSAGE 1

\*\*\*\*\*  
\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
\*\*\*\*\*

TSUNAMI BULLETIN NUMBER 001  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0214Z 21 MAY 2009

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC  
OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...  
WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

PHILIPPINES / CHINESE TAIPEI / VIETNAM / BRUNEI

A TSUNAMI WATCH IS IN EFFECT FOR

MALAYSIA / CHINA

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR  
INFORMATION ONLY AT THIS TIME.

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 - 0200Z 21 MAY 2009  
COORDINATES - 14.0 NORTH 119.0 EAST  
DEPTH - 20 KM  
LOCATION - LUZON PHILIPPINES  
MAGNITUDE - 7.9

\*\*\*\*\*  
\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
\*\*\*\*\*

EVALUATION

IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WARNING IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AN EARTHQUAKE OF THIS SIZE HAS THE POTENTIAL TO GENERATE A DESTRUCTIVE TSUNAMI THAT CAN STRIKE COASTLINES NEAR THE EPICENTER WITHIN MINUTES AND MORE DISTANT COASTLINES WITHIN HOURS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL MONITOR SEA LEVEL DATA FROM GAUGES NEAR THE EARTHQUAKE TO DETERMINE IF A TSUNAMI WAS GENERATED AND ESTIMATE THE SEVERITY OF THE THREAT.

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
-----	-----	-----	-----
PHILIPPINES	SAN FERNANDO	16.6N 120.3E	0240Z 21 MAY
	LAOAG	18.2N 120.6E	0250Z 21 MAY
	MANILA	14.6N 121.0E	0314Z 21 MAY
CHINESE TAIPEI	KAOSIUNG	22.5N 120.3E	0330Z 21 MAY
	HOMEL	24.2N 120.4E	0450Z 21 MAY
VIETNAM	QUI NHON	13.7N 109.2E	0318Z 21 MAY
	VINH	18.6N 105.7E	0618Z 21 MAY
BRUNEI	MUARA	5.0N 115.1E	0402Z 21 MAY
MALAYSIA	BINTULU	3.2N 113.0E	0559Z 21 MAY
CHINA	HONG KONG	22.3N 114.2E	0452Z 21 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE JAPAN METEOROLOGICAL AGENCY MAY ALSO ISSUE TSUNAMI MESSAGES FOR THIS EVENT TO COUNTRIES IN THE NORTHWEST PACIFIC AND SOUTH CHINA SEA REGION. IN CASE OF CONFLICTING INFORMATION... THE MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

\*\*\*\*\*  
 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
 \*\*\*\*\*

## PTWC MESSAGE 2

\*\*\*\*\*  
 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
 \*\*\*\*\*

TSUNAMI BULLETIN NUMBER 002  
 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
 ISSUED AT 0240Z 21 MAY 2009

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...

WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

PHILIPPINES / CHINESE TAIPEI / VIETNAM / BRUNEI

A TSUNAMI WATCH IS IN EFFECT FOR

MALAYSIA / CHINA

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR  
INFORMATION ONLY AT THIS TIME.

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 - 0200Z 21 MAY 2009  
COORDINATES - 14.0 NORTH 119.0 EAST  
DEPTH - 20 KM  
LOCATION - LUZON PHILIPPINES  
MAGNITUDE - 8.3 (NOTE MAGNITUDE INCREASE)

\*\*\*\*\*  
\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
\*\*\*\*\*

#### EVALUATION

IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WARNING IS  
BASED ONLY ON THE EARTHQUAKE EVALUATION. AN EARTHQUAKE OF THIS  
SIZE HAS THE POTENTIAL TO GENERATE A DESTRUCTIVE TSUNAMI THAT CAN  
STRIKE COASTLINES NEAR THE EPICENTER WITHIN MINUTES AND MORE  
DISTANT COASTLINES WITHIN HOURS. AUTHORITIES SHOULD TAKE  
APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER  
WILL CONTINUE TO MONITOR SEA LEVEL DATA FROM GAUGES NEAR THE  
EARTHQUAKE TO DETERMINE IF A TSUNAMI WAS GENERATED AND ESTIMATE  
THE SEVERITY OF THE THREAT.

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
PHILIPPINES	SAN FERNANDO	16.6N 120.3E	0240Z 21 MAY
	LAOAG	18.2N 120.6E	0250Z 21 MAY
	MANILA	14.6N 121.0E	0314Z 21 MAY
CHINESE TAIPEI	KAHHSIUNG	22.5N 120.3E	0330Z 21 MAY
	HOMEL	24.2N 120.4E	0450Z 21 MAY
VIETNAM	QUI NHON	13.7N 109.2E	0318Z 21 MAY

	VINH	18.6N 105.7E	0618Z 21 MAY
	BAC LIEU	9.3N 105.8E	0818Z 21 MAY
BRUNEI	MUARA	5.0N 115.1E	0402Z 21 MAY
MALAYSIA	BINTULU	3.2N 113.0E	0559Z 21 MAY
CHINA	HONG KONG	22.3N 114.2E	0452Z 21 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT.  
THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL  
FURTHER NOTICE.

THE JAPAN METEOROLOGICAL AGENCY MAY ALSO ISSUE TSUNAMI MESSAGES  
FOR THIS EVENT TO COUNTRIES IN THE NORTHWEST PACIFIC AND SOUTH  
CHINA SEA REGION. IN CASE OF CONFLICTING INFORMATION... THE  
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS  
FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

\*\*\*\*\*  
\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
\*\*\*\*\*

### PTWC MESSAGE 3

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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TSUNAMI BULLETIN NUMBER 003  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0330Z 21 MAY 2009

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC  
OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...  
WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

PHILIPPINES / CHINESE TAIPEI / VIETNAM / BRUNEI / MALAYSIA /  
CHINA

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR  
INFORMATION ONLY AT THIS TIME.

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 - 0200Z 21 MAY 2009  
COORDINATES - 14.0 NORTH 119.0 EAST  
DEPTH - 20 KM  
LOCATION - LUZON PHILIPPINES  
MAGNITUDE - 8.3

# MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LO	TIME	AMPL	PER
SUBIC BAY PH	14.8N	120.3E	0316Z	2.5M / 8.1FT	***

LAT - LATITUDE (N-NORTH, S-SOUTH)  
 LO - 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.

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 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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## EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER AND COULD ALSO BE A THREAT TO MORE DISTANT COASTS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL 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.

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
PHILIPPINES	SAN FERNANDO	16.6N 120.3E	0240Z 21 MAY
	LAOAG	18.2N 120.6E	0250Z 21 MAY
	MANILA	14.6N 121.0E	0314Z 21 MAY
CHINESE TAIPEI	KAHHSIUNG	22.5N 120.3E	0330Z 21 MAY
	HOMEL	24.2N 120.4E	0450Z 21 MAY
VIETNAM	QUI NHON	13.7N 109.2E	0318Z 21 MAY
	VINH	18.6N 105.7E	0618Z 21 MAY
	BAC LIEU	9.3N 105.8E	0818Z 21 MAY
BRUNEI	MUARA	5.0N 115.1E	0402Z 21 MAY
MALAYSIA	BINTULU	3.2N 113.0E	0559Z 21 MAY
CHINA	HONG KONG	22.3N 114.2E	0452Z 21 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL



FURTHER NOTICE.

THE JAPAN METEOROLOGICAL AGENCY MAY ALSO ISSUE TSUNAMI MESSAGES FOR THIS EVENT TO COUNTRIES IN THE NORTHWEST PACIFIC AND SOUTH CHINA SEA REGION. IN CASE OF CONFLICTING INFORMATION... THE MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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#### PTWC MESSAGE 4

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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TSUNAMI BULLETIN NUMBER 004  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0355Z 21 MAY 2009

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

PHILIPPINES / CHINESE TAIPEI / VIETNAM / BRUNEI / MALAYSIA /  
CHINA / INDONESIA / SINGAPORE / CAMBODIA / THAILAND

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR  
INFORMATION ONLY AT THIS TIME.

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 - 0200Z 21 MAY 2009  
COORDINATES - 14.0 NORTH 119.0 EAST  
DEPTH - 20 KM  
LOCATION - LUZON PHILIPPINES  
MAGNITUDE - 8.3

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
MANILA PH	14.6N	121.0E	0322Z	4.0M / 13.1FT	16 MIN
SUBIC BAY PH	14.8N	120.3E	0321Z	4.5M / 14.8FT	18 MIN

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.

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 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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#### EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL 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.

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
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PHILIPPINES	SAN FERNANDO	16.6N 120.3E	0240Z 21 MAY
	LAOAG	18.2N 120.6E	0250Z 21 MAY
	MANILA	14.6N 121.0E	0314Z 21 MAY
CHINESE TAIPEI	KAOHSIUNG	22.5N 120.3E	0330Z 21 MAY
	HOMEL	24.2N 120.4E	0450Z 21 MAY
VIETNAM	QUI NHON	13.7N 109.2E	0318Z 21 MAY
	VINH	18.6N 105.7E	0618Z 21 MAY
	BAC LIEU	9.3N 105.8E	0818Z 21 MAY
BRUNEI	MUARA	5.0N 115.1E	0402Z 21 MAY
MALAYSIA	BINTULU	3.2N 113.0E	0559Z 21 MAY
	K TERENGGANU	5.3N 103.2E	1105Z 21 MAY
CHINA	HONG KONG	22.3N 114.2E	0452Z 21 MAY
INDONESIA	SINGKAWANG	1.0N 109.0E	1032Z 21 MAY
	PANGKALPINANG	2.1S 106.1E	1459Z 21 MAY
SINGAPORE	SINGAPORE	1.2N 103.8E	1252Z 21 MAY
CAMBODIA	SIHANOUKVILLE	10.6N 103.6E	1506Z 21 MAY

THAILAND                      NK SI THAMMARAT              8.4N 100.0E              1524Z 21 MAY  
                                 PRA KHIRI KHAN              11.8N 99.8E              1718Z 21 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT.  
THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE JAPAN METEOROLOGICAL AGENCY MAY ALSO ISSUE TSUNAMI MESSAGES  
FOR THIS EVENT TO COUNTRIES IN THE NORTHWEST PACIFIC AND SOUTH  
CHINA SEA REGION. IN CASE OF CONFLICTING INFORMATION... THE  
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS  
FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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## PTWC MESSAGE 5

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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TSUNAMI BULLETIN NUMBER 005  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0430Z 21 MAY 2009

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC  
OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...  
WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

PHILIPPINES / CHINESE TAIPEI / VIETNAM / BRUNEI / MALAYSIA /  
CHINA / INDONESIA / SINGAPORE / CAMBODIA / THAILAND

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR  
INFORMATION ONLY AT THIS TIME.

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 - 0200Z 21 MAY 2009  
COORDINATES - 14.0 NORTH 119.0 EAST  
DEPTH - 20 KM  
LOCATION - LUZON PHILIPPINES  
MAGNITUDE - 8.3

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
QUI NHON VN	13.8N	109.3E	0325Z	2.5M / 8.2FT	20 MIN
MANILA PH	14.6N	121.0E	0322Z	4.0M / 13.1FT	16 MIN
SUBIC BAY PH	14.8N	120.3E	0321Z	4.5M / 14.8FT	18 MIN

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.

\*\*\*\*\*  
 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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#### EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL 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.

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
PHILIPPINES	SAN FERNANDO	16.6N 120.3E	0240Z 21 MAY
	LAOAG	18.2N 120.6E	0250Z 21 MAY
	MANILA	14.6N 121.0E	0314Z 21 MAY
CHINESE TAIPEI	KAOHSIUNG	22.5N 120.3E	0330Z 21 MAY
	HOMEL	24.2N 120.4E	0450Z 21 MAY
VIETNAM	QUI NHON	13.7N 109.2E	0318Z 21 MAY
	VINH	18.6N 105.7E	0618Z 21 MAY
	BAC LIEU	9.3N 105.8E	0818Z 21 MAY
BRUNEI	MUARA	5.0N 115.1E	0402Z 21 MAY
MALAYSIA	BINTULU	3.2N 113.0E	0559Z 21 MAY

	K TERENGGANU	5.3N 103.2E	1105Z 21 MAY
CHINA	HONG KONG	22.3N 114.2E	0452Z 21 MAY
INDONESIA	SINGKAWANG	1.0N 109.0E	1032Z 21 MAY
	PANGKALPINANG	2.1S 106.1E	1459Z 21 MAY
SINGAPORE	SINGAPORE	1.2N 103.8E	1252Z 21 MAY
CAMBODIA	SIHANOUKVILLE	10.6N 103.6E	1506Z 21 MAY
THAILAND	NK SI THAMMARAT	8.4N 100.0E	1524Z 21 MAY
	PRA KHIRI KHAN	11.8N 99.8E	1718Z 21 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT.  
THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE JAPAN METEOROLOGICAL AGENCY MAY ALSO ISSUE TSUNAMI MESSAGES  
FOR THIS EVENT TO COUNTRIES IN THE NORTHWEST PACIFIC AND SOUTH  
CHINA SEA REGION. IN CASE OF CONFLICTING INFORMATION... THE  
MORE CONSERVATIVE INFORMATION SHOULD BE USED FOR SAFETY.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS  
FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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## PTWC MESSAGE 6

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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TSUNAMI BULLETIN NUMBER 006  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0530Z 21 MAY 2009

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC  
OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA...  
WASHINGTON...OREGON AND CALIFORNIA.

... TSUNAMI WARNING CANCELLATION ...

THE TSUNAMI WARNING AND/OR WATCH ISSUED BY THE PACIFIC TSUNAMI  
WARNING CENTER IS NOW CANCELLED FOR

PHILIPPINES / CHINESE TAIPEI / VIETNAM / BRUNEI / MALAYSIA /  
CHINA / INDONESIA / SINGAPORE / CAMBODIA / THAILAND

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 - 0200Z 21 MAY 2009  
COORDINATES - 14.0 NORTH 119.0 EAST  
DEPTH - 20 KM  
LOCATION - LUZON PHILIPPINES  
MAGNITUDE - 8.3

# MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	Lon	TIME	AMPL	PER
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LEGASPI PH	13.2N	123.8E	0515Z	0.1M / 0.3FT	16 MIN
NAHA OKINAWA JP	26.2N	127.7E	0458Z	0.2M / 0.7FT	18 MIN
QUI NHON VN	13.8N	109.3E	0325Z	1.5M / 4.9FT	20 MIN
MANILA PH	14.6N	121.0E	0322Z	4.0M / 13.1FT	16 MIN
SUBIC BAY PH	14.8N	120.3E	0321Z	4.5M / 14.8FT	18 MIN

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.

\*\*\*\*\*  
 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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## EVALUATION

SEA LEVEL DATA INDICATE THAT A WIDESPREAD DESTRUCTIVE TSUNAMI HAS OCCURRED. HOWEVER - ADDITIONAL DESTRUCTIVE TSUNAMI IMPACTS ARE NOT EXPECTED FOR COASTAL AREAS NOT ALREADY AFFECTED. FOR THOSE AFFECTED AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL 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.

NO TSUNAMI THREAT EXISTS FOR OTHER COASTAL AREAS IN THE REGION ALTHOUGH SOME OTHER AREAS MAY EXPERIENCE SMALL SEA LEVEL CHANGES. FOR ALL AREAS COVERED BY THIS CENTER...THE TSUNAMI WARNING IS CANCELLED.

THIS WILL BE THE FINAL BULLETIN ISSUED FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

\*\*\*\*\*  
 \*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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# NWPTAC MESSAGES

## NWPTAC MESSAGE 1

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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TSUNAMI BULLETIN NUMBER 001  
ISSUED BY NWPTAC (JMA)  
ISSUED AT 0216Z 21 MAY 2009  
PART 01 OF 01 PARTS

HYPOCENTRAL PARAMETERS  
ORIGIN TIME:0200Z 21 MAY 2009  
PRELIMINARY EPICENTER: LAT 14.0 NORTH LON 119.0 EAST  
LUZON, PHILIPPINE ISLANDS  
THE PHILIPPINES  
MAG:7.9

EVALUATION  
THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE TSUNAMI

THIS BULLETIN IS FOR  
EAST COASTS OF MALAY PENINSULA  
EAST COASTS OF INDO CHINA PENINSULA  
COASTS OF SOUTH CHINA SEA  
NORTHWEST COASTS OF KALIMANTAN  
WEST COASTS OF PHILIPPINES  
EAST COASTS OF PHILIPPINES

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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ESTIMATED TSUNAMI ARRIVAL TIME AND ESTIMATED TSUNAMI WAVE AMPLITUDE  
EAST COASTS OF MALAY PENINSULA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
KUALA TERENGGANU	05.3N 103.2E	1108Z 21 MAY	0.5M

EAST COASTS OF INDO CHINA PENINSULA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
QUI NHON	13.7N 109.2E	0316Z 21 MAY	2M
BAC LIEU	09.3N 105.8E	0811Z 21 MAY	0.5M

COASTS OF SOUTH CHINA SEA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
HONG KONG	22.3N 114.2E	0450Z 21 MAY	0.5M
SANYA	18.2N 109.5E	0422Z 21 MAY	1M

NORTHWEST COASTS OF KALIMANTAN

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
MUARA	05.0N 115.1E	0404Z 21 MAY	1M
BINTULU	03.2N 113.0E	0606Z 21 MAY	0.5M

WEST COASTS OF PHILIPPINES

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
LAOAG	18.2N 120.6E	0242Z 21 MAY	1M
SAN FERNANDO	16.6N 120.3E	0230Z 21 MAY	2M
MANILA	14.6N 121.0E	0312Z 21 MAY	4M

EAST COASTS OF PHILIPPINES

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
BASCO	20.4N 122.0E	0308Z 21 MAY	0.5M

AMPL - AMPLITUDE IN METERS FROM MIDDLE TO CREST

HOWEVER AT SOME COASTS, PARTICULARLY THOSE NEAR THE EPICENTER, HIGHER TSUNAMIS MAY ARRIVE EARLIER THAN OUR ESTIMATION AT THE NEARBY FORECAST POINTS  
AUTHORITIES SHOULD BE AWARE OF THIS POSSIBILITY

FURTHERMORE THE EVALUATION OF TSUNAMIGENIC POTENTIAL AND ESTIMATED ARRIVAL TIME OF TSUNAMIS MAY BE DIFFERENT FROM THOSE OF PTWC DUE TO DIFFERENCES IN THE ESTIMATED EARTHQUAKE PARAMETERS  
AUTHORITIES SHOULD USE THE EARLIEST ARRIVAL TIMES FOR GREATEST SAFETY

THIS WILL BE THE FINAL BULLETIN UNLESS THERE ARE CHANGES ABOUT THE POTENTIAL OF TSUNAMI GENERATION BY RE-EVALUATION OF THE EARTHQUAKE OR THERE ARE REPORTS ON TSUNAMI OBSERVATIONS

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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## NWPTAC MESSAGE 2

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\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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TSUNAMI BULLETIN NUMBER 002  
ISSUED BY NWPTAC(JMA)  
ISSUED AT 0242Z 21 MAY 2009  
PART 01 OF 01 PARTS

HYPOCENTRAL PARAMETERS  
ORIGIN TIME:0200Z 21 MAY 2009  
PRELIMINARY EPICENTER: LAT 14.0 NORTH LON 119.0 EAST  
LUZON, PHILIPPINE ISLANDS  
THE PHILIPPINES  
MAG:8.3

EVALUATION  
THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE TSUNAMI

THIS BULLETIN IS FOR  
EAST COASTS OF MALAY PENINSULA  
EAST COASTS OF INDO CHINA PENINSULA  
COASTS OF SOUTH CHINA SEA  
NORTHWEST COASTS OF KALIMANTAN  
WEST COASTS OF PHILIPPINES  
EAST COASTS OF PHILIPPINES

\*\*\*\*\*  
\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
\*\*\*\*\*



ESTIMATED TSUNAMI ARRIVAL TIME AND ESTIMATED TSUNAMI WAVE AMPLITUDE  
EAST COASTS OF MALAY PENINSULA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
KUALA TERENGGANU	05.3N 103.2E	1108Z 21 MAY	0.5M

EAST COASTS OF INDO CHINA PENINSULA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
QUI_NHON	13.7N 109.2E	0316Z 21 MAY	4M
BAC_LIEU	09.3N 105.8E	0811Z 21 MAY	1M

COASTS OF SOUTH CHINA SEA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
HONG_KONG	22.3N 114.2E	0450Z 21 MAY	1M
SANYA	18.2N 109.5E	0422Z 21 MAY	2M

NORTHWEST COASTS OF KALIMANTAN

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
MUARA	05.0N 115.1E	0404Z 21 MAY	2M
BINTULU	03.2N 113.0E	0606Z 21 MAY	1M

WEST COASTS OF PHILIPPINES

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
LAOAG	18.2N 120.6E	0242Z 21 MAY	2M
SAN_FERNANDO	16.6N 120.3E	0230Z 21 MAY	3M
MANILA	14.6N 121.0E	0312Z 21 MAY	8M

EAST COASTS OF PHILIPPINES

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
BASCO	20.4N 122.0E	0308Z 21 MAY	1M

AMPL - AMPLITUDE IN METERS FROM MIDDLE TO CREST

HOWEVER AT SOME COASTS, PARTICULARLY THOSE NEAR THE EPICENTER, HIGHER  
TSUNAMIS MAY ARRIVE EARLIER THAN OUR ESTIMATION AT THE NEARBY  
FORECAST POINTS

AUTHORITIES SHOULD BE AWARE OF THIS POSSIBILITY

FURTHERMORE THE EVALUATION OF TSUNAMIGENIC POTENTIAL AND ESTIMATED  
ARRIVAL TIME OF TSUNAMIS MAY BE DIFFERENT FROM THOSE OF PTWC  
DUE TO DIFFERENCES IN THE ESTIMATED EARTHQUAKE PARAMETERS  
AUTHORITIES SHOULD USE THE EARLIEST ARRIVAL TIMES FOR  
GREATEST SAFETY

THIS WILL BE THE FINAL BULLETIN UNLESS THERE ARE CHANGES ABOUT THE  
POTENTIAL OF TSUNAMI GENERATION BY RE-EVALUATION OF THE EARTHQUAKE  
OR THERE ARE REPORTS ON TSUNAMI OBSERVATIONS

\*\*\*\*\*  
\*\*\*\*\* THIS IS AN EXERCISE \*\*\*\*\*  
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## **APPENDIX 3. POST-EXERCISE EVALUATION QUESTIONNAIRE**

### **EXERCISE MANILA TRENCH 2009 POST-EXERCISE EVALUATION QUESTIONNAIRE**

#### **EXERCISE OBJECTIVES**

Participants will:

- Apply a tsunami warning scenario to pre-developed time lines, flowcharts, activity checklists, and templates that constitute their SOPs
- Identify and describe the individual actions taken by each respective stakeholder in response to the tsunami warning, noting any problems
- Validate the PHIVOLCS and OCD dissemination process of issuing tsunami messages to relevant Philippine agencies and the public
- Validate the organizational decision-making process for public warnings and evacuations
- Demonstrate the above through plenary report-back and evaluation of SOP performance
- Receive comment from lecturers and peers on their SOPs
- Identify gaps in SOPs
- Increase operational readiness for tsunami events
- Become familiar with the mechanics of conducting a Functional Exercise

#### **OVERALL**

Exercise Manila Trench '09 was designed to validate your agency's ability to respond to a local tsunami in the Philippines. Did you find this exercise useful?

Yes / No

***Comments:***

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#### **TSUNAMI MESSAGES – CONTENT AND TIMELINESS**

Were the tsunami messages received by your Agency understandable? Yes / No  
Stakeholders should also include the media and public.

Did your Agency receive tsunami messages in a timely manner? Yes / No

How much time (minutes) did PHIVOLCS take to issue its first official message to OCD Central and the media?

How much time (minutes) did OCD (Central, Regional) take to disseminate tsunami messages to its regional/provincial/local contact groups?

***Comments:***

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### **SOP – CONTENT AND USE**

Is your SOP clear and understandable? Yes / No  
If not, why?

Was the SOP followed in Exercise Manila Trench 2009? Yes / No  
If not, why?

Was the SOP effective? Yes / No  
If not, why?

Did you successfully contact key decision makers and Stakeholders at the national/provincial/local levels in a timely manner as part of your SOP? Yes / No  
If not, why?

Did your SOP successfully guide Stakeholders to take proper actions? Yes / No  
If not, why?

Were there any gaps in your SOP? Yes / No  
If yes, please describe:

Do you have recommendations to improve your SOP? Yes / No  
If yes, please list:

Does your SOP

- define staff positional responsibilities and duties? Yes / No
- include the filling of a time log of events? Yes / No
- address periodic briefings to key decision makers? Yes / No
- address periodic briefings to the media? Yes / No

Are you aware of other major Stakeholder's roles and responsibilities to implement an "end to end" Tsunami Early Warning and Mitigation System? Yes / No  
If yes, please elaborate:

***Comments:***

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### **CENTER OPERATIONS**

Was your agency operation center properly equipped? Yes / No

What type of equipment would you like to see added to your operations center?

Was the layout of your agency operation center properly designed? Yes / No

Were the status boards effective? Yes / No

How would you rate your agency's level of cooperation / coordination?

1 – Poor      2 – Fair      3 – Adequate      4 – Good      5 - Excellent

***Comments:***

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### **COMMUNICATIONS**

What methods of communication were used by your agency (phone/fax/email/SMS, dedicated/commercial)?

How was message receipt confirmed (phone/fax/email/SMS/other)?

How does your agency SOP address disruption of its communication lines?

How does your agency SOP address power failures and information technology disruptions?

How does your SOP address how to handle hundreds of phone calls to the operations center from other agencies/public/media?

***Comments:***

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### **POST-EXERCISE EVALUATION PROCESS**

Do you feel your agency “hotwash” immediately following the same day conclusion of the exercise was useful? In what way?

Yes / No

Do you feel your agency report-back to plenary and evaluation of their SOP performance was useful? In what way?

Yes / No

***Comments:***

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**EXERCISE MANILA TRENCH 2009**

Did you find Exercise Manila Trench a realistic test of your agency SOP?  
If yes, why? If no, how should it be improved?

Yes / No

Were the injects realistic?  
If not, why?

Yes / No

Are you better prepared to deal with a local tsunami?  
If yes, in what way? If no, what more should be done?

Yes / No

How would you rate this exercise?

1 – Poor      2 – Fair      3 – Adequate      4 – Good      5 - Excellent

***Comments:***

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**OTHER COMMENTS AND RECOMMENDATIONS**

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NAME \_\_\_\_\_ POSITION \_\_\_\_\_

AGENCY \_\_\_\_\_