



Oregon

Theodore R. Kulongoski, Governor

Department of State Police
Oregon Emergency Management
Salem, OR 97309
(503) 239-2911
FAX: (503) 373-7833

Oregon Senate Bill 557
Uniform Tsunami Warning Signal Working Team
Review of Background Materials and Team Objectives

July 31, 2006

Team Members

Al Aya,	Cannon Beach Fire District , Board of Directors
Don Baker	North Lincoln County Fire District
John Buchanan	Siuslaw Valley Fire District
Dan Malin	Oregon Emergency Response System
Tom Manning	Tillamook Emergency Manager
Mark Metcalf	Curry County Sheriff's Office
George Priest	Dept. of Geology and Mineral Industries
Ryan Sandler	National Weather Service, Medford Office
Steve Scibelli	North Bend Police Department
Wayne Stinson	Douglas County Emergency Manager
Tyree Wilde	National Weather Service, Portland Office
Jay Wilson	Oregon Emergency Management

Dear Work Team Members,

Thank you for volunteering to participate on the work team for developing the Oregon uniform tsunami warning signal and related tsunami warning/notification practices. The mandate of this team builds off of many years of deliberation from multiple jurisdictions to provide timely and accurate tsunami warning/notification to residents, employees and visitors along Oregon's coast.

The purpose of this work team is to review existing research and best practices on tsunami warning systems and decide on a uniform state standard that provides the necessary consistency to reduce potential conflicts and confusion while improving credibility and public trust of emergency communication networks and authorities. Based on the requirements from Oregon Senate Bill 557, Section 2 (Attachment 1) the uniform tsunami warning signal administrative rules must specify type of signal, duration of signal, volume of signal and location of delivery device.

Prior reviews and discussion on tsunami warning systems were conducted during the June 1998 Tsunami Workshop in Florence, by the Tsunami Warning Systems Sub-committee formed later that same year, and by a multi-state tsunami warning workshop held in Portland in May 2001. Recommendations from these groups were compiled and published in 2001 as DOGAMI Special Paper 35, Tsunami Warning Systems and Procedures: Guidance for Local Officials. A follow up 2002 Tsunami Warning Workshop was held in Lincoln City and these recommendations are summarized on Attachment 2. Additionally, the March 1, 1980 publication, FEMA CPG 1-17, Outdoor Warning Systems Guide is still the only official Federal reference and it is the basis for the majority of emergency notification systems currently employed in the United States. For the sake of focusing our work to a specific set of objectives, I recommend we employ

these documents and the 2002 Workshop Summary as our primary sources of information. I have included the DOGAMI and FEMA publications in your materials and provided critical sections as attachments in this document. If there are exceptionally relevant newer references available, please bring them to my attention and we can discuss them. Similarly, I expect that many of you have personal experiences with your local and regional tsunami warning systems and procedures that would be beneficial, so please consider sharing them with the work team.

To achieve a more comprehensive uniform tsunami notification system, we should also consider additional emergency notification standards not specifically called for in the SB 557 language:

- What does the tsunami warning signal instruct the public to do (Attachment 3)?
 - Immediately tune in for emergency information?
 - Immediately evacuate to higher ground?
- Warning intervals prior to estimated arrival (Attachment 4)
- Tsunami notification for events outside of the basic local vs. distant scenarios (Attachment 5a)
- All Clear Notification (Attachment 5b)
- Uniform Testing Procedure (Attachment 6)
- Working Team Contact Information (Attachment 7)

Senate Bill 557 (Section 1) has a requirement for developing rules for tsunami warning information and evacuation plans for distribution to transient lodging and to facilitate and encourage broad distribution of this information and plans to lodging facilities and visitors within the tsunami inundation zones. Oregon Emergency Management and DOGAMI are responsible for this Section, but welcome your comments and suggestions to help us best fulfill the legislation requirements and meet the needs of your city and county constituents.

Understanding that we all are very busy, email and conference calls will be the primary means of discussing our objectives and we will schedule one or two formal meetings. Oregon Emergency Management is named as the responsible State Agency for carrying out the Administrative Rule development and I will act as the chair of this group, with my primary role being to provide informational content, meeting facilitation, and administrative support. The Work Team goal is to arrive at our conclusions by consensus. Our objectives are to decide on the SB 557 required minimum standards for uniform tsunami signal type, duration, volume, and device location and to consider establishing additional standards for tsunami notification and test procedures.

Please review the materials provided and prepare your comments/suggestions/questions for an upcoming kickoff conference call. I will coordinate a date, time, and agenda with a target for sometime in the last three weeks of August.

I look forward to working with all of you in the following months.

Best Regards,

Jay Wilson
Earthquake, Tsunami and Volcano Programs Coordinator

Cc: Dave Cassel
Chris Jonientz-Trisler

Enclosures

73rd OREGON LEGISLATIVE ASSEMBLY–2005 Regular Session

**Enrolled
Senate Bill 557**

Sponsored by Senator MORRISETTE; Senators KRUSE, RINGO, SHIELDS, C STARR, VERGER,
Representatives BOONE, KRIEGER, ROBLAN

CHAPTER

AN ACT

Relating to tsunami warning system; and prescribing an effective date.

Be It Enacted by the People of the State of Oregon:

SECTION 1. (1) As used in this section:

(a) “Transient lodging facility” means a hotel, motel, inn, condominium, any other dwelling unit or a public or private park that is made available for transient occupancy or vacation occupancy as those terms are defined in ORS 90.100.

(b) “Tsunami inundation zone” means an area of expected tsunami inundation, based on scientific evidence that may include geologic field data and tsunami modeling, determined by the governing board of the State Department of Geology and Mineral Industries, by rule, as required by ORS 455.446 (1)(b) and (c).

(2) The Office of Emergency Management, in consultation and cooperation with the State Department of Geology and Mineral Industries, shall:

(a) Develop and adopt by rule tsunami warning information and evacuation plans for distribution to transient lodging facilities located in a tsunami inundation zone; and

(b) Facilitate and encourage broad distribution of the tsunami warning information and evacuation plans to transient lodging facilities and other locations within tsunami inundation zones frequented by visitors to the area.

(3) The office is not required to carry out the duties assigned under subsection (2) of this section if sufficient moneys are not available under section 4 of this 2005 Act.

SECTION 2. (1) The Office of Emergency Management, in consultation with the State Department of Geology and Mineral Industries, shall establish by rule a uniform tsunami warning signal, including rules specifying the type, duration and volume of the warning signal and the location of warning signal delivery devices, for use on the Oregon coast.

(2) The office is not required to carry out the duties assigned under subsection (1) of this section if sufficient moneys are not available under section 4 of this 2005 Act.

SECTION 3. Except as provided in sections 1 (3) and 2 (2) of this 2005 Act, the Office of Emergency Management shall adopt the rules required by sections 1 (2)(a) and 2 (1) of this 2005 Act not later than March 1, 2006.

SECTION 4. The Office of Emergency Management or the State Department of Geology and Mineral Industries may seek and accept gifts, grants and donations from any source to finance all or part of the duties assigned under sections 1 and 2 of this 2005 Act.

SECTION 5. This 2005 Act takes effect on the 91st day after the date on which the regular session of the Seventy-third Legislative Assembly adjourns sine die.

The Tsunami Warning Workshop, held from April 30-May 2, 2002, was sponsored by Oregon Emergency Management and the Oregon Department of Geology and Mineral Industries. The workshop was hosted by North Lincoln Fire and Rescue in Lincoln City. The goal of the workshop was to look at the present state of tsunami warning (and evacuation) on the Oregon coast, discuss what is needed, and come up with recommendations. Results of the workshop are summarized below.

Recommendations from the break out groups (adopted by consensus)

1. Develop standardized outreach education program that includes
 - a. Powerpoint presentation
 - b. Video
 - c. Brochures
 - d. Signs
 - e. Standardized procedures
2. Develop regulation/rule to post tsunami hazards materials in lodging facilities
3. Promote and Increase NWR coverage/utilization
 - a. Move NWR frequencies to AM/FM band frequencies
 - b. Education campaign about NWR and its messages (insert in utility bills, promote to chambers of commerce)
Purchase NWR and distribute to specific high traffic buildings. Use private/public partnerships to raise money and bulk purchases to reduce the costs. Display NWR stickers in businesses that have the radio
 - c. Develop specific messages to be sent to NWS to go out over NWR
 - d. Request that NWS include the following in the NWR warning/watch message "Stay tuned for further instructions.
 - e. Expand EAS to include specific instructions to NWS that goes out over NWR
4. NWS should notify a broader audience about their services (911, fire/police, etc.)
5. Conduct reverse 911 feasibility study
6. Develop protocol for sirens: **When you hear the three minute steady siren blast move away from the shore and tune to local media or NOAA weather radio for more information. Remain in a tsunami safe location until local authorities issue an official all clear**
7. Investigate how to get additional resources for traffic control (National Guard following governor's declaration)
8. Encourage coastal county and/or cities to purchase own EWMIN and EAS equipment in order to receive messages in a timely and uninterrupted manner and to send out messages with local input.
9. Resources
 - a. Investigate funding resources using an all hazards approach.
 - b. Tap into domestic preparedness funds and the federal excise tax on phone bills. Contact congressional representatives.

- c. Coordination between state and locals to come up with specific proposals/plan of action to be submitted to state legislators
 - d. Pool resources to minimize cost (COGs, regional groups, states)
10. Have warning coverage of all risk areas by at least one system (encourage redundancy)
 11. Develop consistency within systems (sirens with three minute tone that prompts people to turn on radio). Develop radio coverage on coast to insure everyone can hear important information. User of each system should meet to establish standards within the system
 12. Determine which system is most cost effective/efficient (i.e. that will notify the most people in the shortest period of time)
 13. Develop all clear guidance
 14. Education campaign for all the evacuation notification systems (what the system is and what the sound or message means)
 15. Work with state parks/forest service to develop an education program for state/federal parks (powerpoint, brochures, interpretive signs)
 16. Develop a public relations program that provides consistent tsunami mitigation message in presentations to schools. OEM and DOGAMI would develop perhaps in coordination with other states.
 17. OEM evaluate options for improving the emergency communications system for an all hazard statewide application that is related to domestic preparedness
 18. Explore Legislation or rules that would require overnight facilities to have tsunami evacuation plans, educational materials if in inundation zone.
 19. Adopt state policy/rule/guideline for sirens that says that the three minute siren blast is the state standard for tsunami evacuation but not a siren blast for all clear
 20. All vulnerable coastal towns develop an evacuation plan and identify weak spots that need to be fixed. Develop recommendations to fix weaknesses.

Other recommendations that came up in the plenary session

1. Educate people to not call 911
2. Promote CERT/NET to various groups.
3. Encourage inclusion of tsunamis in Oregon Shore Management Plan.
4. All hazard education in schools should be a coordinated effort between fire/police, USCG, etc. using a developed curriculum and knowledgeable trainers.

Source: Outdoor Warning Systems Guide (pages 4-5)
FEMA CPG 1-17, March 1, 1980

E. Warning Signals - Different cities and towns use their outdoor warning systems in different ways. Most local governments, however, follow the Federal Emergency Management Agency (FEMA) guidance and use a certain signal to warn people of an enemy attack, and a different signal to notify them of a peacetime disaster. These warning signals are:

- Attack Warning - This is a 3- to 5-minute wavering (warbling in pitch) tone on sirens, or a series of short blasts on horns or other devices. The Attack Warning signal shall mean that an actual attack against the country has been detected and that protective action should be taken immediately. The Attack Warning signal shall be repeated as often as warnings are disseminated over the National Warning System or as deemed necessary by local government authorities to obtain the required response by the population, including taking protective action related to the arrival of fallout. The meaning of the signal "protective action should be taken immediately" is appropriate for the initial attack warning and any subsequent attacks. This signal will also be used for accidental missile launch warnings.

- Attention or Alert Warning - This is a 3- to 5-minute steady signal from sirens, horns, or other devices. This signal may be used as authorized by local government officials to alert the public to peacetime emergencies. In addition to any other meaning or requirement for action as determined by local government officials, the Attention or Alert signal shall mean to all persons in the United States, "Turn on radio or TV. Listen for essential emergency information."

Source: State of Hawaii Civil Defense Tsunami Warning Protocol Memo

2. **Siren Sounding.** Tsunami Warnings are accompanied by sounding of sirens, and disseminated over the Statewide Emergency Alert System (EAS) as soon as practicable.
 - a. SCD coordinates initial statewide siren sounding with all counties for a distant tsunami.
 - b. Evacuation siren soundings are made as determined by County Civil Defense Administrators.
 - i. Each sounding is accompanied by a "live" EAS broadcast clearly specifying the area for which the broadcast is applicable.
 - ii. Sounding of siren by each county will be closely coordinated, when possible, with other counties and SCD over the State HAWAS.
 - iii. Siren evacuation soundings are generally made at the following intervals:
 1. Three hours from first estimated tsunami wave arrival.
 2. Two hours from first estimated tsunami wave arrival.
 3. One hour from first estimated tsunami wave arrival.
 4. Thirty minutes from first estimated tsunami wave arrival.

Page 5 of 6, July 2003

Source: Tsunami Warning Systems and Procedures: Guidance for Local Officials
DOGAMI Special Paper 35, 2001

Local vs. distant (Page 15-16)

If the tsunami were local, the notification to evacuate would come from the strong shaking of the ground or rapid draw down or sudden rise of the ocean. The evacuation must be immediate. Local notification systems, normally designed for distant tsunamis, would probably not be functional and should not be relied upon. If communities would like functional notification systems that survive the ground shaking, then it would be necessary to strengthen the system hardware (towers, power lines, generators, etc.) and provide uninterrupted power sources. If operational, the local notification system should be triggered quickly as an additional reminder that evacuation is necessary. The system is also useful for the all clear notification.

However, there are four types of earthquakes that create problems as far as using only “strong shaking” as the trigger for evacuation: slow earthquakes, smaller subduction zone earthquakes, inland earthquakes, and earthquake-induced submarine landslides.

1. Slow subduction zone earthquakes could produce a devastating tsunami but not shake the coastal region much. A good example is the 1992 M7.2 Nicaragua earthquake. However, a tsunami warning will be issued by the warning centers within 15 minutes of the earthquake origin time. In the case of the Nicaragua earthquake and tsunami, it took about 45 minutes for the damaging waves to reach shore. So the warning center messages should be timely for an event like this. Nevertheless, detecting these types of earthquakes and determining their tsunami potential will be a challenge.

2. An earthquake along one short segment of a subduction zone would be smaller in magnitude and shorter in duration than an earthquake from a longer segment or the complete subduction zone. It might not be felt as strongly in adjacent regions, but the tsunami would still arrive relatively all along the coastline. Time of arrival in adjacent areas would vary from minutes to 1-2 hours depending on distance to the segment. There would be loss of life if evacuation were based only on strong ground shaking. Once again a warning from the centers will go out within 15 minutes of the earthquake origin time and thus arrive in those areas, 1-2 hours away, in a meaningful time frame for evacuation.

3. Local ground shaking does not necessarily indicate that a tsunami is approaching. The earthquake focus could be onshore miles from the coastline, but still be felt. Examples are the 1993 Scotts Mills earthquake in Oregon and the 1999 Satsop earthquake in Washington. The Satsop earthquake triggered evacuation by 50-100 people.

The local notification systems would probably function and the halting of evacuation could be accomplished quickly. These earthquakes would require advanced rapid earthquake detection systems that would notify coastal areas immediately that evacuation is not necessary or halt evacuation in progress. Public notification would then go out via the established system. The RACE system in Oregon and Washington and CUBE and REDI in California are systems that automatically provide a preliminary earthquake location and magnitude. They could be important in the decision to stop evacuation already in progress. Subsequent bulletins from the West Coast/Alaska Warning Center would also indicate that evacuation should be halted. However, there is no notification system that will set off an alarm immediately following a felt earthquake that would notify coastal communities that evacuation is not necessary. Existing systems can halt evacuations in progress once they are officially notified of no tsunami threat.

4. Local onshore or offshore earthquakes could cause a submarine landslide that could generate a very localized tsunami. The tsunami would arrive in minutes. A rapid earthquake detection system would need to take this into account. Off southern California, several submarine landslide blocks have been identified. There is concern there that local onshore earthquakes could induce submarine landslides and tsunamis. Local tsunamis in southern California have occurred in the past. A submarine landslide triggered by a M5.2 earthquake near Santa Monica Bay in 1930 generated a tsunami with up to 6 meters (19.5 feet) of run-up in the bay. This is not just a California problem. Earthquake-induced landslides, no matter the earthquake source, could conceivably occur off the coasts of Oregon, Washington, Alaska, and Hawaii.

Defining “strong shaking” and minutes of shaking for coastal residents and tourists could also be a challenge. These descriptors are highly subjective. One possibility is to use “shaking” as the trigger for evacuation to account for these types of tsunamis and err on the side of caution. If all clear notifications are rapid enough, the disruption caused by false alarms should be reduced. Another possibility is to leave the descriptor up to local government, so areas with more background seismicity could choose a higher threshold than those with a lower background. Distant tsunamis arrive hours after they are produced. Local notification systems and procedures should be operational and can be activated.

Attachment 5b All Clear Notification

Source: Tsunami Warning Systems and Procedures: Guidance for Local Officials
DOGAMI Special Paper 35, 2001

Conclusions (Page 27)

The all clear should be distinct from the warning cancellation by the tsunami warning centers. Locals should have control over who returns to low-lying areas and when. The all clear should probably be considered part of the emergency public information function rather than the evacuation notification system. EAS and other methods may be a more appropriate avenue for disseminating an all-clear message than a distinct siren tone designated for that purpose.

Recommendations (Page 41)

4. All clear
 - a. Standardized language
 - b. Establish criteria/procedures for when it will be issued (separate criteria for local and distant tsunamis)
 - c. Add definition to glossary in brochure

Source: Outdoor Warning Systems Guide (pages 14 and 17)
FEMA CPG 1-17, March 1, 1980

VII. SYSTEM TESTING AND USE

Once an outdoor warning system is installed, civil preparedness officials must ensure that the system does indeed alert residents of the community. A system is successful only if:

- Residents of the community know how the signal sounds and why it is being sounded
- Residents can differentiate between system testing and a true alert
- Each device is operating as it should

A. Knowledge of Warnings - Americans are almost two generations removed from the days of World War II, when the voice of the air raid siren, the information it carried, and the proper reaction to it were familiar to everyone in the community. Though the potential of enemy attack remains, the usefulness of outdoor warning systems may have dwindled. If so, civil preparedness officials can turn the situation around, primarily through a controlled program of testing and a well-planned public information campaign.

B. Testing/Alert - Detailed information on the testing of outdoor warning systems is given in CPG 1-14 which includes recommendations that local officials:

- Test the outdoor warning system approximately once a month.
- Publicize the testing day and time each month.
- Test by sounding the "Attention" or "Alert" signal (the steady sound) for no more than 1 minute.
- Follow with 1 minute of silence.
- Finish by sounding the "Attack Warning" (rising/falling signal or series of short blasts) for no more than 1 minute.
- Emphasize, in all public announcements, that testing signals are sounded for less than 1 minute only, while in an actual emergency, all warnings would be sounded for 3 to 5 minutes and would probably be repeated.

When sirens are used, and must be tested more frequently than once a month, a "growl test" is acceptable. In a growl test, the siren is sounded for so short a time that it never produces significant sound output, yet long enough so that officials can determine that it is working.

Al Aya,	Cannon Beach Fire District, Board of Directors
Don Baker Chief	North Lincoln County Fire and Rescue District
John Buchanan Chief	Siuslaw Valley Fire and Rescue District
Dan Malin OERS Manager	Oregon Emergency Response System
Tom Manning Emergency Manager	Tillamook Emergency Manager
Mark Metcalf Sheriff	Curry County Sheriff's Office
George Priest Geologist	Dept. of Geology and Mineral Industries
Ryan Sandler Meteorologist	National Weather Service, Medford Weather Forecast Office
Steve Scibelli Chief	North Bend Police Department
Wayne Stinson Emergency Manager	Douglas County Emergency Services
Tyree Wilde Meteorologist	National Weather Service, Portland Weather Forecast Office
Jay Wilson	Oregon Emergency Management PO Box 14370 Salem, Oregon 97309-5062 Phone: 503-378-2911 x22237 Email: jmwilson@oem.state.or.us