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SPECIAL OPERATIONS: TSUNAMI RESPONSES, STANDARD INSTRUCTION 02, SECTION 21

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I. PURPOSE

These Standard Operating Policies are intended to provide the framework in which the San Diego Fire-Rescue Department can respond and operate effectively and safely to destructive tsunamis. These events have the potential to take the lives of citizens and San Diego Fire-Rescue Department personnel.

These policies also will enable personnel of the San Diego Fire-Rescue Department to identify and respond to the threat of a tsunami. Safety of San Diego Fire-Rescue Department personnel must be a primary concern during a tsunami event as well as to ensure effective emergency operations.

SEE APPENDIX (A) FOR COMPLETE LIST OF DEFINITIONS AND ADDITIONAL TSUNAMI INFORMATION

II. SCOPE

This Standard Instruction shall apply to all emergency service personnel including: all Chief Officers, Captains, Engineers, Firefighters, Single Role Paramedics and Emergency Medical Technicians.

Individual sections or divisions of the Department may vary from this policy subject to the approval of the Fire Chief or his/her designee. These units include, but are not limited to: Lifeguard Services, Metro Arson Strike Team, Fire and Hazard Prevention, Fire Communications, Hazardous Materials Incident Response Team, and Special Trauma and Rescue Team.

III. PREPARATION LEVELS

Preparation levels are a pre-designated alerting system. This system is utilized by the West Coast and Alaska Tsunami Warning Center. These warnings are issued as far in advance as possible of a tsunami event. San Diego Fire-Rescue Department personnel can utilize these warnings in preparation of a tsunami event. See Appendix A for expanded Tsunami Warning definitions.

A. LEVEL I

1. Tsunami Watch - Issued for possible Tele-Tsunamis from distant places.
2. These are defined as arriving from a location over three hours away (1,000 miles or more).

B. LEVEL II

1. Tsunami Warning - Issued for possible near-source or confirmed Tele-Tsunami.

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2. These are defined as arriving from a location less than three hours away.

C. LEVEL III

1. Local Earthquake 6.5 or greater, with Potential for Locally-Generated Tsunami.

D. Level IV

1. Actual Tsunami Impact Occurs.

IV. Tsunami Procedures

Tsunami Watches to Tsunami Deployments require actions to prepare. Additionally these preparations require timely movement and staging of resources to assist with coastal evacuations and responses. All of these may be made in anticipation of a tsunami impact or actual impact in the City of San Diego or surrounding areas. The following items outlined in this policy may be activated to an alerted level or deployed based on the needs of the incident.

A. FCC

1. FCC shall initiate an All-Call to notify all operations units, staff personnel, and Chief Officers of a potential Tsunami.
2. Advisory shall include:
 - a. Pertinent information regarding the Tsunami Watch level.
 - b. Any messages pertaining to the incident.
 - c. Potential cause of the tsunami.
 - d. Direction of travel of the tsunami.
 - e. Possible ETA of the impact.
3. If tsunami(s) is/are observed
 - a. Lookouts shall notify FCC of any important information regarding the tsunami.
 - b. FCC shall then initiate the Emergency Traffic protocols and announce the incoming tsunami.
 - c. Direct field units in tsunami impact zone(s) to move to established escape or safe zones.

B. Establish look outs

1. Affected Battalion Chiefs should consider establishing Look-outs on high ground with increased visibility and improved communications abilities.
2. If impacts occur, look outs should also be utilized to watch for secondary tsunamis.

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3. Officers should utilize locations that are elevated and less likely to flood.
4. The following are points that may be utilized to establish a look out point:
 - a. Point Loma, Cabrillo National Monument
 - b. Mount Soledad, War Memorial Site
 - c. Torrey Pines Glider Port
 - d. South Bay, Wing Park
 - e. Fire Station 11

C. Operations

1. Fire Stations should gather information relative to the level of activation.
2. Personnel shall assist in posting watches.
3. Ensure personnel conduct operations in such a manner to optimize crew safety.
4. Assist in evacuation plans.
5. Provide feedback to the IC regarding pre and post impact information.
6. Establish Multiple Casualty Incident (MCI) or Multiple Patient Incident (MPI) plans.
7. Activate Annex D.
8. Conduct Searches.
9. Establish recon for access into impacted areas.
10. Request Rescue 4 to assist in water rescue needs.

D. Emergency Medical Services

1. Activation of Medical Mass Casualty response.
2. Request EMS Stations to respond.
3. Request Duty Medical Services (DMS) response.
4. Request San Diego County Disaster Services and resources.

E. Air Operations

1. Can be utilized as a tsunami watch.
2. Air Operations Branch can respond to the coast to give evacuation warning to harbors and coastline areas.
3. Can be utilized in rescue or air lift situations.
4. Recon impact areas

F. Public Information Officer

1. Activation of a Code N incident can be utilized to inform the public of:
 - a. Activation of a Tsunami Level I-IV.
 - b. Actions to be taken by the public.
 - c. Potential tsunami impact zones.

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G. SDPD

1. Establish a liaison with San Diego Police Department (SDPD)
 - a. SDPD could be utilized for coordinating evacuation efforts should they be necessary.

H. Additional Resources to consider

1. United States Coast Guard
2. Military Assets
3. Swift water teams
4. Office of Emergency Services (OES) and Urban Search & Rescue (US&R)

APPENDIX A: Tsunami Response Definitions

Tsunami: A series of traveling waves of extremely long length and period, usually generated by disturbances associated with earthquakes occurring below or near the ocean floor. (Also called seismic sea wave and, popularly, tidal wave.) Also, a series of ocean waves produced by a submarine earthquake, landslide, or volcanic eruption. These waves may reach enormous dimensions and travel across entire ocean basins with little loss of energy. They proceed as ordinary gravity waves with a typical period between 5 and 60 minutes. Tsunamis become steeper and increase in height on approaching shallow water (creating one or more waves that sweep inland like a flash flood), inundating low-lying areas. Tsunamis have no connection with tides; the popular name is entirely misleading.

Tsunami Information Bulletin: Message issued by the West Coast Alaska Tsunami Warning Center (WCATWC) to advise participants of the occurrence of a major earthquake in the Pacific or near-Pacific area, with the evaluation that a potentially destructive Pacific-wide tsunami was not generated.

Tsunami Warning Bulletin: The National Weather Service will issue a Tsunami Warning when a potential tsunami with significant widespread inundation is imminent or expected. Warnings alert the public that widespread...dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas and repositioning ships to deep waters when there is time to safely do so. Warnings may be updated, adjusted geographically, downgraded or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information.

Tsunami Watch Bulletin: A Tsunami Watch is issued to alert emergency management officials and the public of an event that may later impact the watch area. The watch area may be upgraded to a warning or downgraded to an advisory - or canceled - based on updated information and analysis. Therefore, emergency management officials and the public should prepare to take action. Watches are normally issued based on seismic information without confirmation that a destructive tsunami is underway.

Pacific-wide tsunami: A tsunami capable of widespread destruction, not only in the immediate region of its generation, but across the entire Pacific Ocean. These occur when the disturbance that generates the tsunami is sufficiently great. Usually starting as a local tsunami that causes extensive destruction near the source, these waves continue to travel across the entire ocean basin with sufficient energy to cause additional casualties and destruction on shores more than a thousand km from the source. In the last two hundred years, there have been at least seventeen destructive Pacific-wide tsunamis.

The most destructive Pacific-wide tsunami of recent history was generated by a massive earthquake off the coast of Chile on May 22, 1960. All Chilean coastal towns between the 36th and 44th parallels were either destroyed or heavily damaged by the action of the tsunami and the quake. The combined tsunami and earthquake toll included 2,000 killed, 3,000 injured, 2,000,000 homeless, and \$550 million damage. Off the coastal town of Corral, Chile, the waves

were estimated to be 20 meters (67 feet) high. The tsunami caused 61 deaths in Hawaii, 20 in the Philippines, and 100 or more in Japan. Estimated damages were US\$50 million in Japan, US\$24 million in Hawaii and several more millions along the west coast of the United States and Canada. Distant wave heights varied from slight oscillations in some areas to 12 meters (40 feet) at Pitcairn Island; 11 meters at Hilo, Hawaii; and 6 meters at some places in Japan. A Pacific-wide tsunami today, similar in size to the May 1960 event, could easily have catastrophic consequences.

Near-field Tsunami (Also Known As Local Tsunami): A tsunami from a nearby source, generally less than 200 km away. A local tsunami is generated by a small earthquake, a landslide or a pyroclastic flow. This is the most serious tsunami hazard for San Diego County, because the wave heights are likely to be highest and the forces are likely to be the strongest (due to proximity to the precipitating event), because these tsunami waves can arrive in as little as 3 to 15 minutes of the event, and because they may occur after a disastrously damaging coastal earthquake, creating another layer of disaster, threatening the public and personnel responding to the earthquake, and complicating search, rescue, treatment, firefighting, and hazardous materials management.

Tele-tsunami (also known as distant-source Tsunami): A tsunami originating from a distant source, generally more than 1000 km away.

Estimated time of arrival (ETA) of Tsunami: Time of tsunami arrival at some fixed location, as estimated from modeling the speed and refraction of the tsunami waves as they travel from the source. ETA is estimated with very good precision if the bathymetry (measurement of water depth) and source are well known (less than a couple of minutes).

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

Tsunami Evacuation Map: A drawing or representation that outlines danger zones and designates limits beyond which people must be evacuated to avoid harm from tsunami waves.

Tsunami Travel Time: Time required for the first tsunami wave to propagate from its source to a given point on a coastline.

Inundation Line: Inland limit of tsunami inundation, measured horizontally from the mean sea level (MSL) line.

Run-up: Difference between the elevation of maximum tsunami penetration (inundation line) and the sea-level at the time of the tsunami event.