

TAB A (NON-TROPICAL METEOROLOGICAL, OCEANOGRAPHIC, SEISMIC AND HYDROLOGICAL HAZARDS) TO APPENDIX 1 (NATURAL DISASTERS) TO ANNEX C (OPERATIONS)

1. General. Destructive physical, meteorological and oceanographic events pose a significant threat to personnel, aircraft, equipment, installations and other resources. Extensive damage may be caused by flying debris, flooding, storm surge, squalls, tornadic activity, lightning and hail. As an example, during 2006, one persistent rain event led to property damage due to flooding on Oahu and a second event resulted in seven people losing their lives when a dam failed on Kauai. On the morning of April 1, 1946, an earthquake with a reported magnitude of 7.8 occurred in the Aleutian Islands. Approximately five hours later, the resultant Tsunamis struck Hawaii, killing 159 people.

2. This document deals with the definitions of non-tropical meteorological, hydrological and geophysical events; and the definitions of both National Weather Service (NWS) and Pacific Tsunami Warning Center (PTWC) warnings and advisories. Its intent is to clarify operational environmental parameters, identify responsible agencies and their associated warnings and advisories, define warning and advisory parameters, and describe warning and advisory dissemination procedures.

3. Definitions

a. Imminent. The situation where hazardous or destructive weather is occurring and adversely impacting, or is forecast to occur and will adversely impact on-station.

b. Storm. Any disturbed state of the atmosphere, especially affecting the Earth's surface and strongly implying destructive and otherwise unpleasant weather. Storms range in scale from tornadoes and thunderstorms to tropical cyclones to synoptic-scale, extra-tropical cyclones.

c. Thunderstorm. A storm emitting thunder and lightning that may be accompanied by strong wind gusts, heavy rainfall and hail. Thunderstorms are classified in the following categories of intensity:

(1) Non-severe Thunderstorm. A thunderstorm accompanied by wind gusts less than 50 knots and or hail less than three-quarters of an inch in diameter at the surface.

(2) Severe Thunderstorms. A thunderstorm accompanied by wind gusts of 50 knots or greater, tornados, funnel clouds, water spouts and or hail three-quarters of an inch or greater in diameter at the surface.

(a) Tornado. A violent rotating column of air usually in the form of a "pendant" or funnel protruding from a cumulonimbus cloud where the funnel touches the ground.

(b) Funnel Cloud. Identical to a tornado except that the funnel does not touch the ground.

(c) Water Spout. Identical to a tornado except that it occurs over a body of water and the funnel touches the surface of the water.

d. Squall Line. A line of thunderstorms associated with a fast moving cold front, can be severe, and may extend for several hundred miles.

e. Earthquake. A series of vibrations induced in the earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating.

f. Tsunami. A series of ocean waves generated by sudden displacements in the sea floor, landslides or volcanic activity.

g. Flood Watch. A statement issued by the NWS to inform the public and cooperating agencies that current and developing hydro-meteorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent.

h. Flood Warning. A statement issued by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage forecasts.

i. Flood Statement. A statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.

j. Flash Flood. A rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g. intense rainfall, dam failure, ice jam). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.

k. Flash Flood Watch. A statement issued by the NWS to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent.

l. Flash Flood Warning. A statement issued by the NWS to inform the public, emergency management and other cooperating agencies that flash flooding is in progress, imminent or highly likely.

m. Flash Flood Statement. A statement by the NWS which provides follow-up information on flash flood watches and warnings.

4. Non-tropical Storms. There are three major reasons for major non-tropical storms experienced in the Hawaiian Islands. These are cold front passages, cutoff lows and upper level disturbances not associated with either of the cold front passage or cutoff lows that typically occur during Hawaii's winter season - October through March; but major non-tropical storms may occur at other times of the year too. No matter the time of year, these storms are usually associated with localized heavy rains and winds. In rare cases, some of these storms can be violent enough to produce tornadoes, water spouts and hail. Typical winter storm scenarios entail cold front passages and cut off lows - also known as Kona Lows. Upper level disturbances not associated with cold front passages and cut off lows provide for other major non-tropical storm occasions. The duration of these events varies from between hours to days, depending on the dynamics involved.

5. Non-tropical Wind Storms. As with major non-tropical storms, major non-tropical winds essentially occur during the winter season and are usually the product of major non-tropical storms - periodic sustained one-minute wind speeds have been recorded at Honolulu International Airport exceeding 52 knots with wind gust speeds of up to 70 knots. An increase in the surface-based pressure gradient can also generate significant winds. Contractions of the pressure gradient, not necessarily associated with migratory pressure systems, can occur during any time of the year and have a temporal value of between hours and days. Finally, high wind events can be spatially defined as either micro or macro-scale; therefore, it is not unusual to have maximum speeds of

only 30 to 35 knots in one location while another location reports significantly higher wind speed values.

6. Types of Non-tropical Marine Corps Base (MCB) Hawaii Warnings and Advisories

a. The types of Marine Corps Air Station (MCAS) Meteorology and Oceanography (MetOc) issued warnings and advisories as well as the criteria for each are derived from the current editions of OPNAVINST 3140.24, "Warnings and Conditions of Readiness Concerning Hazardous or Destructive Weather Phenomena", and MCASO P3710.1, "Air Operations Manual". The following descriptions contain the requirements for each weather phenomena potentially affecting on-station and the local flying area.

(1) Thunderstorm Advisory. A thunderstorm advisory is issued for thunderstorms occurring or are forecast to occur in the local flying area and pose no potential threat on-station but do pose a threat to aircraft and surface ships operating in the local flying area.

(2) Thunderstorm/Tornado Condition II. This advisory is issued when thunderstorm or tornadic activity is occurring or is forecast to occur within 180 nautical miles of MCB Hawaii and poses a possible threat on-station within six hours.

(3) Thunderstorm/Tornado Condition I. This warning will be issued when thunderstorm or tornadic activity is occurring or is forecast to occur in the local area and is imminent on-station within one hour, is occurring on-station, or is forecast to develop on-station within one hour.

(4) Local Wind Warning. A local wind warning will be issued when sustained winds are observed to be or are forecast to be between 20 and 33 knots or for wind gusts, forecast or observed to be, equal to or exceeding 30 knots.

(5) Small Craft Warning. A small craft warning will be issued for surface winds over Kaneohe Bay observed or forecasted to be between 18 and 33 knots.

(6) Gale Warning. This warning will be issued when observed winds are between or are forecast to become between 34 and 47 knots.

(7) Storm Warning. This warning will be issued when observed winds are or forecast to become 48 knots or greater.

b. Call out procedures for MCB Hawaii warnings and advisories. Where one or more of the above parameters is forecast to occur in the MCB Hawaii Area of Command (AOC)/Area of Operations (AOO), is presently occurring on-station or in the AOC, or is forecast to develop in the MCB Hawaii AOC/AOO and pose a possible threat on-station, enclosure (1) will be used to describe the threat and disseminate the threat information.

c. Call out procedures for NWS warnings and advisories. Where a pertinent NWS warning or advisory is issued and not covered by a MCB Hawaii warning or advisory, the MCAS MetOc Department will retransmit the warning or advisory to the Command Watch Officer via Non-Secure Internet Protocol Router Network (NIPRNet) electronic mail (E-mail).

7. Earthquakes

a. In Hawaii, the majority of earthquakes experienced are associated with volcanic activity. The seismic waves generated produce hazards whose influence in a given area can be exacerbated by local topography. Rockfalls and

landslides are two of the potential hazards to be experienced here on Oahu. Another associated, although rare, hazard is an earthquake or volcanic eruption induced tsunami.

b. Reporting procedures for earthquakes felt on MCB Hawaii. In accordance with NAVMETOCCOMINST 3141.1, "Earthquake Observation and Reporting Program", when an earthquake is felt aboard MCB Hawaii, MCAS MetOc will provide the United States Geological Survey (USGS) an earthquake report. This is a time critical document and will be filled out utilizing the most reliable information available. Any person reporting an earthquake will provide the following information to the MCAS MetOc Department immediately:

(1) Specify the characterization of the intensity (Moderately, Strongly, Very Strongly).

(2) How many people felt it (Few, Many, Base, etc.)?

(3) What was the location where the quake was felt?

(4) How much damage was observed (None, Slight, Moderate, Considerable)?

(5) Provide a brief description of damage (i.e., walls cracked, equipment fell, items shaken from walls, etc).

8. Tsunamis. Although infrequent, a tsunami is capable of causing considerable loss of life and property anywhere along the coastal areas. Populations, equipment, facilities and materials in and around coastal areas are considered at risk. Tsunami travel times can range from hours for a disturbance off a Pacific Rim coast to a matter of minutes for an earthquake in Hawaiian waters. The danger from a tsunami can last for several hours after the arrival of the first wave.

a. PTWC Warnings and Advisories. PTWC provides warnings and advisories for tsunamis affecting islands of the Pacific basin and its margins.

(1) Tsunami Alerting System. The tsunami alerting system is triggered by detection and location of major earthquakes around the Pacific Ocean. If conditions for generation of tsunami are favorable, the PTWC issues four basic types of messages:

(2) Tsunami Information Bulletin/Statement. A message issued to advise of the occurrence of a major earthquake in the Pacific or near-Pacific area with the evaluation that a potentially destructive tsunami was not generated. A supplemental Tsunami Information Bulletin may be issued if important additional information is received.

(3) Tsunami Advisory. Advisories are issued to coastal populations within areas not currently in either warning or watch status when a tsunami warning has been issued for another region of the same ocean. An Advisory indicates an area is either outside the current warning and watch regions or the tsunami poses no danger to that area.

(4) Tsunami Watch Bulletin. A message issued to alert of the probability of a tsunami and advise that a tsunami investigation is underway. The area placed in a Tsunami Watch status will encompass a six hour travel time from the earthquake epicenter. Those areas within a three hour tsunami travel time will be designated for possible urgent action. Watches are updated at least hourly to continue them, expand their coverage, upgrade them to a Warning or end the alert.

(5) Tsunami Warning Bulletin. A message issued after confirmation has been received that a tsunami has been generated posing a threat to the population in part or all of the Pacific. Warnings advise appropriate actions be taken in response to the tsunami threat. Such actions could include the evacuation of low-lying coastal areas and the movement of boats and ships out of harbors to deep water. Warnings are updated at least hourly or as conditions warrant.

b. Tsunami Siren Activation. Navy and Marine Corps sirens are sounded concurrently with those of the State of Hawaii Civil Defense Attention/Alert Signal System. Siren activation is based on the PTWC reported arrival time of a destructive wave. The siren alert is the notification to the local populous that a potentially destructive event threatens Hawaiian Island shorelines and they should turn on radios or televisions to get pertinent information on the event, what to do, and how much time they have to do it.

(1) First Signal. A steady three-minute siren tone sounds three hours prior to the first arrival time of the wave on state shores. This is the only state-wide coordinated sounding; all other siren alerts are sounded based on the timing of the arrival of the first wave to each islands shores.

(2) Second Signal. A steady three-minute siren tone sounds two hours prior to the first arrival time of the wave on state shores.

(3) Third Signal. A steady three-minute siren tone sounds one hour prior to the first arrival time of the wave on state shores.

(4) Fourth Signal. A steady three-minute siren tone sounds one half-hour prior to the first arrival time of the wave on state shores.

c. Call out procedures for PTWC warnings and advisories. Where a PTWC warning or advisory is issued affecting MCB Hawaii, the MCAS MetOc Department will immediately relay the information to the CWO via telephone with a back up via E-mail.