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Thunderstorms and Weather Events

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/***TRF/E** This annual refresher of thunderstorms and weather events, associated with convective activity, prepares air traffic controllers for the correct application of weather-related procedures and changes to weather intensity phraseology. The development of these standardized intensities was based on a safety recommendation, dated August 4, 2005, from the Office of Accident Investigation. As a result, a workgroup was formed. It was decided standardized weather intensity phraseology could be developed based on radar return dBZ levels that would accommodate the en route Weather and Radar Processor (WARP) display, terminal displays having required capabilities, and the Next-Generation Weather Radar (NEXRAD) displays for flight service station (FSS) specialists.

The revised radar precipitation intensity areas are described as “LIGHT,” “MODERATE,” “HEAVY,” and “EXTREME.” It is important to review the description of precipitation intensity to ensure application of the terminology is consistent between controllers and pilots. The standardization of these descriptions provides a common knowledge of the precipitation intensity and possible hazards associated with convective or thunderstorm activity. Federal Aviation Administration Order 7110.65, Air Traffic Control, paragraph 2-6-4, FAA Order 7110.10, Flight Services, paragraphs 9-10-2, 9-11-2, and 14-1-11, and the Aeronautical Information Manual (AIM) have changed to reflect the new standardized weather intensity phraseology.

As a result of differences in the automation and radar systems used in en route, terminal and flight service, there are some differences in how those systems support the standardized intensities.

The en route automation systems display weather information received from WARP in three precipitation intensity levels. They are: “MODERATE,” “HEAVY,” and “EXTREME.” WARP does not display light intensity weather. When issuing precipitation intensity from Air Route Surveillance Radar (ARSR), use “MODERATE” to describe the lowest displayable precipitation intensity and “HEAVY to EXTREME” to describe the highest displayable precipitation intensity.

Currently, the automation systems in various terminal facilities (Common Automated Radar Terminal System (ARTS), ARTS Color Display, Standard Terminal Automation Replacement System, and Micro-En Route Automated Tracking System) provide up to six levels of precipitation intensity. Those facilities capable of displaying the six levels will describe level 1 as “LIGHT,” level 2 as “MODERATE,” levels 3 and 4 as “HEAVY,” and levels 5 and 6 as “EXTREME.” The system displays at these facilities will be changed from six levels to the standardized four precipitation levels.

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The six levels previously used by FSS specialists for radar precipitation intensity have been consolidated into four. FSS specialists now use the standardized terms “LIGHT,” “MODERATE,” “HEAVY,” and “EXTREME” to describe radar precipitation intensity. The terms previously used to describe “HEAVY” and “VERY HEAVY” will now be stated as “HEAVY.” The terms “INTENSE” and “EXTREME” will now be stated as “EXTREME.” These changes also reflect modifications to aviation weather products by the National Weather Service.

Another valuable source to obtain weather information is through pilot reports (PIREP). The responsibility for soliciting and issuing PIREPs for automated flight service station (AFSS)/FSS is contained in FAA Order 7110.10, paragraph 9-2-3, and, for controllers at airport traffic control towers, terminal radar approach control facilities, and air route traffic control centers, this information is contained in FAA Order 7110.65, paragraph 2-6-3.

In addition, Hazardous Inflight Weather Advisory Service (HIWAS) provides weather advisories including summarized aviation weather warning, Significant Meteorological Information (SIGMET), convective SIGMETs, Center Weather Advisory (CWA), Airmen’s Meteorological Information, and Urgent Pilot Weather Reports. Controllers shall advise pilots of hazardous weather that may impact operations within 150 nautical miles of their sector or area of jurisdiction. Facilities shall review alert messages to determine the geographical area and operational impact for hazardous weather information broadcasts. The broadcast is not required if aircraft on the facility's frequency(s) are not affected. HIWAS procedures are contained in FAA Order 7110.10, chapter 2, section 4, and FAA Order 7110.65, paragraph 2-6-2.

The procedure to notify pilots of hazardous weather via the Automated Terminal Information Service (ATIS) is contained in FAA Order 7110.65, paragraph 2-9-3. This paragraph addresses how the information is obtained and the instructions for the pilot to acknowledge receipt of the ATIS message. This ATIS message includes, if appropriate, hazardous weather information with an example of phraseology.

Additional weather-related information is in FAA Order 7110.65, chapter 2, section 6; FAA Order 7110.10, chapter 9; and the AIM for refresher training. The information contained in the AIM includes the various newer weather detection technology and the products they provide. Specific references from the AIM include paragraphs 4-3-7, 7-1-29, and 7-1-30.

Pilots can also obtain weather information from onboard systems, either directly from airborne weather radars or from ground-based weather radar systems through satellite or ground-based stations.

As we approach thunderstorm season, a review of thunderstorm weather is required. Thunderstorms form when unstable atmospheric conditions exist. A classic example is when cold dry air overlays a layer of warm moist air. As cold air sinks, the warmer air is displaced upward, bringing with it the necessary moisture for a thunderstorm to develop. With sufficient meteorological data, a weather forecaster can objectively determine stability and moisture content; judging the *lifting mechanism* possesses a greater challenge. Meteorologists evaluate all conditions to decide whether convective SIGMETs should be issued. These data are also used to prepare an Aviation Terminal Forecast, and a CWA. One of the greatest tools available to all aviation interests (pilots, controllers, and meteorologists) to detect, measure, and follow thunderstorms is weather radar. Weather radar can show where thunderstorms are, how widespread they may be, and how tall they are. Observing thunderstorms over a period of time allows an opportunity to determine their movements and trends. A thunderstorm trend refers to its development and dissipation. All thunderstorms have a life cycle: formation, development, maturation, and dissipation. NEXRAD is best known to provide thunderstorm coverage, movement, trend, and height information.

Pilots obtaining information about thunderstorms directly from airborne capabilities, or from controllers and specialists, is a key factor to avoid hazardous thunderstorm encounters and ensure inflight safety.

In this publication, the option(s) for which a briefing is required are indicated by an asterisk (*) followed by one or more letter designators, i.e., ****T*** *= Tower, combined tower/approach control,* ****R*** *= TRACON,* ****E*** *= ARTCC (En route), or* ****F*** *= AFSS/FSS. (Reference 7210.3, para. 2-2-8.)*

This table lists Air Traffic Bulletins published since 2002. They can also be found on the Internet at http://www.faa.gov/airports_airtraffic/air_traffic/publications/.

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