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Weather

AIR AND SPACE WEATHER OPERATIONS

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This manual implements Air Force (AF) Policy Directive (AFPD) 15-1, *Weather Operations*. This publication applies to all civilian employees and uniformed members of the Regular Air Force, United States Space Force (USSF), the Air Force Reserve, the Air National Guard, the Civil Air Patrol when conducting missions as the official Air Force Auxiliary, and those who are contractually obligated to comply with Department of the Air Force publications. This publication is subject to the Paperwork Reduction Act of 1995. This publication may be supplemented at any level, but all supplements that directly implement this publication must be routed to the Officer of Primary Responsibility (OPR) for coordination prior to certification and approval. Refer recommended changes and questions about this publication to the OPR using the DAF Form 847, Recommendation for Change of Publication; route DAF Forms 847 from the field through the appropriate functional chain of command. The authorities to waive wing/organization level requirements in this publication are identified with a Tier ("**T-0, T-1, T-2, T-3**") number following the compliance statement. See DAFMAN 90-161, *Publishing Processes and Procedures*, for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the requestor's commander for non-tiered compliance items. Ensure all records generated as a result of processes prescribed in this publication adhere to AFI 33-322, *Records Management and Information Governance Program*, and are disposed in accordance with (IAW) the Air Force Records Disposition Schedule, which is in the Air Force Records Information Management System. The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the DAF. Compliance with this publication and its attachments is mandatory.

SUMMARY OF CHANGES

This document has been substantially revised and must be completely reviewed. Changes include expansion of overall roles and responsibilities for HAF, MAJCOMs and weather units, update to the SAR procedures to match current 557th Weather Wing processes, a reduction in tier ratings to allow commanders more flexibility, and clarification on hazard charts, airfield support, RPA procedures, FWBs, and ANG support to address common issues across the weather career field.

Chapter 1

OVERARCHING PRINCIPLES

1.1. General. This publication describes how weather operators collect, analyze, predict, tailor, and integrate environmental information into commanders' decision cycles. Weather operations support kinetic and non-kinetic operations at the strategic, operational, and tactical levels of war. Weather forces, as part of the joint team, deliver accurate, coherent, comprehensive, consistent, relevant, timely and standardized environmental information, products and services across the air, land, sea, space, and cyberspace domains to gain and maintain an informational advantage. Commanders leverage this advantage to integrate, synchronize, and direct operations, and outmaneuver the adversary more effectively. Air Force Doctrine Publication (AFDP) 3-59, *Weather Operations*, and Air Force Tactics, Techniques and Procedures (AFTTP) 3-4.15, *Weather Operations* further define how weather operators effectively collect, analyze, predict, tailor, and integrate environmental information.

Chapter 2

ROLES AND RESPONSIBILITIES

2.1. Air Force Director of Weather. The Director of Weather will:

2.1.1. Manage weather services for the DAF and Army.

2.1.2. Provide Air Force Weather (AFW) functional expertise to coordinate and advocate for applicable Intelligence Community (IC) weather priorities and requirements.

2.1.3. Provide guidance and develop doctrine, policy, and standards for U.S. weather support to the DAF, Army, unified commands, North Atlantic Treaty Organization (NATO), other allies, coalition partners, national programs, and emergency response operations.

2.1.4. Serve as the Functional Area Manager (FAM) for the AFW enterprise IAW DAFI 10-401, *Operations Planning and Execution.*

2.1.5. Evaluate the effectiveness and readiness of weather forces by maintaining oversight of Weather Technical Readiness program's most critical processes through analysis of readiness reporting data.

2.1.6. Develop, coordinate, and approve interservice, intra-service, interagency, and international support agreements.

2.1.7. Provide policies and procedures and tools to measure and evaluate the operational effectiveness and technical performance of selected atmospheric and space environmental weather products (WPs).

2.1.8. Develop and implement mid- and long-range strategy and vision for the organization, equipment, manpower, and technology necessary to meet future DAF and Army weather requirements. Act as advocate for all weather requirements.

2.1.9. Engage with service, interagency, international, industry, and academic partners to advance programs and initiatives including numerical weather modeling, climate monitoring, arctic forecasting, hydrology, artificial intelligence, information warfare, electromagnetic spectrum and space weather, environmental sensing, and space-based environmental monitoring (SBEM).

2.1.10. Serve as Functional Manager for officer, enlisted and civilian career fields delegated by the Functional Authority, the HQ AF Deputy Chief of Staff, Operations.

2.1.11. Provide training products and technical services to the field.

2.1.12. Oversee Training Requester Quota Identifier management responsibilities for the Army Weather Support Course allocating seats to Major Commands (MAJCOMs).

2.1.13. Oversee and advocate for the Air Force Weather Weapons System (AFWWS) financial portfolio.

2.1.14. Lead Strategy, Design, Planning, Programming and Budget (SDPPBE) processes and advocate to the Air Force Corporate Structure for AFWWS development, fielding, and sustainment.

2.1.15. Liaise with Department of Army HQ, Training and Doctrine Command, Army Futures Command and Army Materiel Command (AMC), and Army Installation Management Command (IMCOM) for weather support to U.S. Army operations.

2.1.16. Liaise with USSF HQ, Space Operations Command (SpOC), Space and Systems Command (SSC) and Space Training and Readiness Command, for weather support to USSF operations.

2.1.17. Serve as a member of the Global Integrated Intelligence and Reconnaissance Council of Colonels, Enterprise Information Technology (IT) Advisory Council and Centralized Asset Management Advisory Council

2.1.18. Advise the Department of Defense (DoD) lead agent for the Next Generation Weather Radar (NEXRAD) program, pursuant to tri-agency Memorandum of Agreement with DoD, Department of Commerce and Department of Transportation, Interagency Operation of the Weather Surveillance Radar-1988, Doppler (WSR-88D).

2.1.19. Serve as the Security Controls Assessor Representative for AFWWS National Security System to work with the Program Manager, Information System Security Manager, Information System Security Officer, and Risk Management Framework (RMF) team to assess security controls for the Security Control Assessor per AFI 17-101, *Risk Management Framework (RMF) for Air Force Information Technology (IT)*.

2.1.20. Serve as the AFWWS Lead in the implementation of DoD/DAF cyber policy and USCYBERCOM/AFCYBER order compliance oversight.

2.1.21. Serve as the Functional Data Officer to develop data policies, guidance, procedures, and standards related to AFW and establish related training. Manage and oversee compliance to these data policies to protect and manage data as a strategic asset. Serves as senior advisor to the AF Chief Data and Artificial Intelligence Office for all data matters within the weather enterprise, per *DoD Data Stewardship Guidebook* Section 2.2, AFI 17-140, *Cybersecurity Architecting,* section 2.5, and DAFI 90-7001, *Enterprise Data Sharing and Data Stewardship.*

2.2. Major Command (MAJCOM), Component MAJCOM (C-MAJCOM), Component Numbered Air Force (C-NAF), and Army Service Component Command (ASCC) weather staffs.

2.2.1. MAJCOM Weather Staffs. In addition to the requirements in AFPD 15-1, *Weather Operations*, MAJCOM weather staffs:

2.2.1.1. Manage deployment taskings for weather resources within its MAJCOM IAW DAFI 10-401 and AFI 10-403, *Deployment Planning and Execution.*

2.2.1.2. Provide weather inputs applicable to the development/revision of weather support plans and other documents for their command.

2.2.1.3. Engage in planning, programming, and budgeting for MAJCOM weather resources IAW AFI 65-601, Volume 1, *Budget Guidance and Procedures*.

2.2.1.4. Coordinate with applicable contract offices to ensure contracted weather support is appropriately defined IAW AFI 64-102, *Installation Contracting*.

2.2.1.5. Manage execution of MAJCOM weather programs.

2.2.1.6. Provide staff assistance, technical training assistance, and technical consultant assistance to assigned weather organizations upon request.

2.2.1.7. Provide weather subject matter expertise to the MAJCOM Inspector General, serve as pertinent oversight authority for inspection deficiencies against aligned weather organizations, and assist with evaluations of aligned weather organizations upon request IAW DAFI 90-302, *The Inspection System of the Department of the Air Force*.

2.2.1.8. Develop and cross feed technical training materials throughout their command.

2.2.1.9. Oversee the accuracy and currency of equipment accountability and readiness reporting in authoritative databases.

2.2.1.10. Coordinate with and/or serve as Weather Data Steward(s) to establish weather data protection, sharing, and governance guidelines; maintain data names, definitions, data integrity rules, and domain values within the command; ensure compliance with legal and policy requirements, and conformance to data policies and standards; ensure application of appropriate security controls; and analyze and improve data quality. Appoint Data Managers and Data Custodians as required. Provide guidance to AFW Data Manager(s) per the per *DoD Data Stewardship Guidebook* Section 2.3 and DAFI 90-7001.

2.2.2. C-MAJCOM, C-NAF, and ASCC weather staffs will:

2.2.2.1. Coordinate with the Combatant Command (CCMD)/Joint Force Commander staff, Senior Meteorological and Oceanographic (METOC) Officer (SMO), Joint METOC Officer (JMO), and service component staffs as necessary to provide weather inputs applicable to the development/revision of war, exercise, and contingency plans.

2.2.2.2. Coordinate with applicable contract offices to ensure contracted weather support is appropriately defined IAW AFI 64-105, *Contingency Contracting Support*, and that contracted weather capabilities are consistent with the theater weather Concept of Operations (CONOPS).

2.3. 557th Weather Wing (557 WW). The 557 WW is the DAF's only special mission weather wing composed of two operational groups that deliver information on the past, current, and predicted state of the natural environment across all warfighting domains, to include the electromagnetic operational environment. The 557 WW enables multi-domain decision advantage for weather and non-weather warfighters and decision makers throughout the United States Government, allied, and partner nations at all levels of warfare. The 557 WW will:

2.3.1. Generate and provide environmental products (terrestrial, space, information warfare, climate) to the DoD, military Services, all unified commands, the IC, interagency, and Allied and coalition partners across multiple security domains as directed or as requested IAW **Chapter 10**.

2.3.2. Operate applications and conduct Forecaster-in-the-loop (FITL) processes to generate operational data and information IAW **Chapter 7**. Operate applications to generate numerical weather prediction (NWP) output as first look for airfield weather services, mission forecasts, specialized modeling, and automated weather products. **Note:** 557 WW data provides forecasters with an initial first look to assist in developing mission weather products (MWP). 557 WW data and information may be designated as controlling weather products (CWP) by a lead weather unit (LWU).

2.3.2.1. Operate enterprise services to disseminate products and data via DoD Information Network core services, as well as leverage alternate operational data transmission options to mitigate communication outages, as coordinated for supported operations.

2.3.2.2. Operate enterprise applications to conduct data operations to provide trusted data and products collected from other sources (e.g., space products, coalition/allied products, etc.) at security domains to meet end user requirements.

2.3.3. Conduct documentation functions IAW **Chapter 3**.

2.3.4. Conduct Weather Integration and Mission Execution Forecast Process (MEFP) IAW **Chapter 4**.

2.3.5. Provide Installation and Airfield Weather services IAW **Chapter 5**.

2.3.6. Provide Aviation Weather Forecasting services IAW **Chapter 6**.

2.3.7. Conduct Forecast and Analysis Production functions as described in **Chapter 7**.

2.3.8. Provide weather data to agencies processing DoD-approved Chemical, Biological, Radiological, and Nuclear (CBRN) dispersion models for CBRN consequence assessment, consequence management, and contamination avoidance IAW AFI 10-2501, *Emergency Management Program* and AFMAN 10-2503, *Operations in a Chemical, Biological, Radiological, and Nuclear (CBRN) Environment*. Maintain the capability to provide chemical downwind messages (CDM)/effective downwind messages (EDM) upon request from installation emergency management (EM), the installation emergency operations center or other disaster response/management personnel.

2.3.9. Provide backup capability for the National Weather Service's (NWS) Storm Prediction Center and Aviation Weather Center IAW established support agreements.

2.3.10. Plan, coordinate and accomplish operational test and evaluation as the AFWWS Principle Operational Test Organization IAW DODI 5000.89_DAFI 99-103, *Capabilities-based Test and Evaluation*.

2.3.11. Operate and maintain the Solar Electro-Optical Network (SEON). **Note:** SSC is the Sponsored Projects Officer (SPO) for SEON, providing sustainment and maintenance of the program.

2.3.12. Provide global merged cloud, snow, and ice analysis and forecasts for the IC.

2.3.13. Provide mission-tailored terrestrial, Electro-magnetic spectrum (EMS), space weather analyses and forecasts, indications, and warnings at appropriate security domain to meet documented requirements of commanders, planners, or operators and the IC.

2.3.14. Provide unclassified worldwide public weather planning forecasts to the Defense Media Agency per current support agreement.

2.3.15. Develop, secure, and operate applications to collect, quality control, and archive terrestrial weather and climate data to assess the state of the climate and characterize current conditions within historical context to power the unit's applied climatology mission spanning the past, present, and future climate system.

2.3.16. Develop and provide risk assessments, forensic meteorological analyses, and climate services.

2.3.17. Provide climate and hydro-climatology (including historical data, climate predictions, and climate projections), analysis, and analyst-in-the-loop services, and subject matter expertise.

2.3.18. Develop, secure, operate, and exploit high-resolution NWP capabilities, specialized modeling applications, tailored applications, and automated graphical depictions of environmental conditions to support DAF, DoD, Inter-agency, and international partners. Act as an NWP subject matter expert.

2.3.19. Monitor analyses, forecasts, and tailored warfighter effects for quality, ensuring modeling and to ensure software applications and environmental products meet warfighter and IC requirements.

2.3.20. Provide operational modeling and simulation (M&S) support for training, acquisition and testing as required by DoD and act as the subject matter expert for operational M&S support.

2.3.21. Collect, authenticate, validate, and secure METOC data and information published to trusted DAF data layers and archives in all security domains.

2.3.22. Make available observations and forecasts of volcanic ash for DoD and intelligence community operations at multiple classification levels.

2.4. Weather Organizations supporting Space Launch, Missile, and Test Operations. Weather organizations supporting Space Launch, Missile, and Test Operations provide weather observations, forecasts, watches, observed weather warnings/advisories, specialized weather information for launch sites, specified ranges, and abort landing sites. These units will:

2.4.1. Conduct Documentation functions IAW **Chapter 3**.

2.4.2. Conduct Weather Integration and MEFP IAW **Chapter 4**.

2.4.3. Provide Installation and Airfield Weather services IAW **Chapter 5**.

2.4.4. Provide Aviation Weather Forecasting services IAW **Chapter 6**.

2.4.5. Provide operational, mission specific, and Launch Weather Officer support to DoD, National Aeronautics and Space Administration (NASA), other US government and commercial customers performing space launch, landing, recovery, or ballistic missile test operations at the Eastern or Western Range, to include generating and disseminating customer-specific WPs as organizational resources permit.

2.4.6. Coordinate with program support managers, range safety, and range coordinators, at a minimum, for determination of weather requirements for all phases of launch.

2.4.7. Provide weather "GO/NO GO" determinations for Launch Agency constraints and Lightning Launch Commit Criteria per Space Systems Command Manual (SSCMAN) 91-710V6, *Range Safety User Requirements Manual-Ground and Launch Personnel Equipment, Systems and Material Operations Safety Requirements* and NASA-STD- 4010, *NASA Standard for Lightning Launch Commit Criteria for Space Flight*, for each launch/test mission.

2.4.8. Provide METOC support to Human Space Flight (HSF) operations per applicable Operation Orders (OPORDs) and in coordination with the HSF JMO and United States Space Force Command (USSPACECOM) SMO as required.

2.5. Combat Weather Units Supporting Army Operations. See AR 115-10/AFI 15-157, *Weather Support and Services for the US Army*, for further information. In addition to roles and responsibilities outlined in **paragraph 2.14**, these units, (to include Expeditionary Combat Weather Squadrons (ECWS) and ANG Combat Weather Flights (CWFs), where applicable) will:

2.5.1. Train and posture forces and equipment to provide Staff Weather Officer (SWO) support to aligned ASCC, supported land force commander(s), and aligned units, both in garrison and in tactical environments.

2.5.2. As applicable, perform Personnel Parachute Program Management duties for completion and documentation of personnel parachute/airborne training as defined in AFI 10-3503, *Personnel Parachute Operations*.

2.5.3. Manage unit supply accounts and Army Modification Table of Organizational Equipment (MTOE) equipment, wherever possible, as defined in DoDI 5000.64_DAFI 23-111, *Accountability and Management of DoD Equipment and other Accountable Property* and to ensure required UTC and Army-provided support equipment is on-hand and deployable.

2.5.4. As applicable, coordinate with local Central Issue Facility (CIF) and Rapid Fielding Initiative (RFI) provider to equip unit personnel with personal tactical/deployment equipment.

2.5.5. Coordinate deployment posturing, logistic requirements, and readiness exercise support through appropriate channels (e.g., Weather FAM, Unit Deployment Manager, Logistics Squadron, Army G-4/S-4, or G-2/S-2) and IAW the Weather Functional Area Prioritization and Sequencing Guide.

2.6. 23d Special Operations Weather Squadron (23 SOWS). The 23 SOWS provides Geographic Combatant Commands (GCC) with weather support tailored to meet deployed Air Force and Army Special Operations Force (AFSOF/ARSOF) mission requirements and ensure horizontal consistency with other weather units within the GCC Area of Operations. The 23 SOWS will:

2.6.1. Provide centralized weather analysis and forecasting products, and data in support of the 160th Special Operations Aviation Regiment, AFSOC Special Operations Task Groups, and deployed AFSOF/ARSOF without organic support.

2.6.2. Conduct Documentation functions IAW **Chapter 3**.

2.6.3. Conduct Weather Integration and MEFP IAW **Chapter 4**.

2.6.4. Provide Installation and Airfield Weather services IAW **Chapter 5**.

2.6.5. Provide Aviation Weather Forecasting services IAW **Chapter 6**.

2.7. 53d Weather Reconnaissance Squadron (WRS). The 53 WRS (Air Force Reserve Command (AFRC)) provides weather reconnaissance (WR) aircraft and crews, command, and control (C2), support equipment and personnel capabilities in support of CCMD requirements. IAW AFMAN 11-202V3, *Flight Operations*, and AFMAN 11-2WC-130JV3, *WC-130J Operations Procedures*, FCM Publication 12, *National Hurricane Operations Plan*, and FCM Publication 13, *National Winter Season Operations Plan*. These operations are managed as three different types of missions: Defense Support to Civil Authorities (DSCA), DoD support, and other outside agency support. The 53d WRS will:

2.7.1. Support missions for the Department of Commerce are considered DSCA missions with the National Oceanic and Atmospheric Administration (NOAA) identified as the lead federal agency. These operations are conducted under Chairman of the Joint Chiefs of Staff DSCA Execution Order authority and are conducted under the tactical control of either USNORTHCOM or USINDOPACOM. AFI 10-801, *Defense Support to Civil Authorities*, identifies the AFRC Commander as the force provider of WR forces.

2.7.2. Support DoD missions include environmental information collection requiring either airborne collection or deployment of collection sensors to support DoD research or operations.

2.7.3. Support other outside agency missions to include any agencies outside of the DoD requesting WR capabilities primarily for research purposes. These operations must be funded by the requesting organization and should provide a benefit to the DoD. Requests for support should be submitted for vetting to AFRC weather branch via email at **HQAFRC.A3.OW@us.af.mil**.

2.7.4. As Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH), 53 WRS OL-A, Miami, FL provide command and control and liaison support for WR DSCA operations. In this role, the CARCAH will:

2.7.4.1. Plan, organize, and coordinate all WR DSCA activities to meet interagency strategic and operational objectives to include the coordination of any WR requests for assistance (RFA) for publishing in a WR Plan of the Day (POD). The POD is considered the validated and approved RFA.

2.7.4.2. Provide oversight of WR DSCA operations to include mission planning and execution, to include real-time adjustment of reconnaissance patterns based on the dynamic meteorological scenario, coordinating foreign overflight clearance, and a metrics program to measure operational demand and effectiveness.

2.7.4.3. Support data collection and dissemination operations through ensuring aircraft have threat situational awareness, data quality assurance, and act as the focal point for interagency data sharing.

2.7.4.4. Represent the WR functional capability on interagency working groups to align research and sensor integration programs as well as lead federal agency requirements with operational needs.

2.8. Air Operations Center (AOC) Weather Specialty Teams (WST). AOC WSTs integrate weather information into the full spectrum of operations and intelligence, providing environmental situational awareness and enabling decision advantage for commanders IAW DAFMAN13-1AOCV3. WSTs will:

2.8.1. Use analyzed weather information and data provided by other weather organizations to build a 4-D picture of the battlespace and the environmental threats affecting it, in addition to

2.8.2. Provide Weather Operations C2 for Air Component supporting units within the theater of operations and coordinate with MAJCOM Staff and SMO for multi-unit operations and exercises.

2.9. Air Combat Command Air Operations Squadron Weather Flight (ACC AOS/WX). The ACC AOS/WX provides tailored weather support to AOS-controlled missions and may also be called upon to support other non-AOS controlled missions as required (e.g., ACC GLOBAL POWER, E-3 AWACS/E-8 JSTARS). ACC AOS/WX will:

2.9.1. Determine and document weather support requirements for all aircraft movements under control of the ACC AOS.

2.9.2. Assume LWU role and inherent responsibilities for all AOS-controlled missions, including all CORONET movements.

2.10. Air Force Operations Group (AFOG) Weather Branch. IAW Air Force Mission Directive 23 (AFMD 23), *Air Force Operations Group*, the AFOG Weather Branch provides and/or arranges for global weather support to Headquarters Department of the Air Force (HQ DAF), Headquarters Department of the Army (HQDA), National Joint Operations Intelligence Center (NJOIC), U.S. Air Force and U.S. Army Crisis Action Teams, and Headquarters U.S. Army Corps of Engineers (HQ USACE) supporting HQ AFW policy, and other supporting agreements. The AFOG Weather Branch is also responsible for providing and/or arranging situational awareness weather products and briefings to senior DoD and U.S. government leaders as well as arranging for dissemination of local weather alerts for the Pentagon Reservation. The AFOG Weather Branch will:

2.10.1. Tailor and integrate air, space, land, and oceanographic environmental information into situational awareness products in support of HQ DAF, HQDA, DoD Joint Staff, HQ USACE and other senior Pentagon staff organizations as required.

2.10.2. Provide staff weather support to the Air Force Crisis Action Team and Army Crisis Action Team during contingencies, emergencies, and exercises.

2.10.3. Provide climatology data/products, planning weather and other staff weather support as required.

2.10.4. Coordinate with and assist 557 WW with weather watch, warning, and advisory support as required for the Pentagon.

2.10.5. Arrange for dissemination of local weather watches, warning and advisories for the Pentagon Reservation and the National Capital Region in support of HQ DAF, HQDA, and Pentagon Building Management Office.

2.11. Contingency Response Force (CRF). CRF weather personnel perform functions and responsibilities consistent with AFI 10-202, *Contingency Response Forces*.

2.12. Remotely Piloted Aircraft (RPA) support. For the purposes of this publication, the terms RPA, and Unmanned Aircraft System (UAS) are synonymous. When applicable, units will provide direct (tailored) weather support to Group 3-5 RPA and general weather support (regional forecast) to Group 1-2 RPA (direct support may be provided, resources permitting) IAW **Chapter 6**. **NOTE:** Refer to JP 3-30, *Command and Control of Joint Air Operations*, for definitions of unmanned aircraft groups.

2.13. Joint Typhoon Warning Center. The Joint Typhoon Warning Center (JTWC) is a joint United States Navy (USN) – Air Force weather forecast organization located in Joint Base Pearl Harbor-Hickam Hawaii and reports to USN's Fleet Weather Center in San Diego. The JTWC issues and disseminates tropical cyclone advisories and warnings in the North-West Pacific Ocean, South Pacific Ocean, and Indian Ocean for the DoD and other U.S. government agencies. Specific forecaster responsibilities regarding JTWC tropical cyclone warnings and forecasts are described in **Chapter 5**.

2.14. WFs/Detachments (Dets). WF/Dets primary purpose is to integrate environmental impacts into every phase of end-user operations, from planning to execution. WFs/Dets assess the mission environment to determine environmental threats and opportunities, and where possible, identify alternatives to enable mission execution. Though each unit has unique characteristics and functions based on its parent/host unit's mission, geographic location and level of command, core roles, responsibilities, processes, and procedures are largely the same. As required, WFs/Dets will:

2.14.1. Conduct Documentation functions IAW **Chapter 3**.

2.14.2. Conduct Weather Integration and MEFP IAW **Chapter 4**.

2.14.3. Provide Installation and Airfield Weather Services IAW **Chapter 5**.

2.14.4. Provide Aviation Weather Forecasting services IAW **Chapter 6**.

2.14.5. Provide space weather impacts to supported agencies utilizing products and services outlined in **Chapter 8**.

2.14.6. Develop and implement severe weather action plan (SWAP) operations to ensure sufficient personnel are available during potential/actual severe weather events or during meteorological/operational events critical to mission success (does not apply to all ANG managed U.S.C. Title 5 and contract weather sites which perform limited weather services (observing, eyes-forward, observed Watch, Warning and Advisory (WWA) support). Conduct and document annual SWAP exercises and ensure validity of plans to respond to severe weather. Real world events meet this requirement if properly evaluated and documented, to include lessons learned.

2.14.7. If equipped with upper air observing equipment, provide upper air observations as defined in Federal Meteorological Handbook No. 3 (FMH-3), *Rawinsonde and Pilot Balloon (Pibal) Observations* to support garrison/deployed operations.

2.14.8. Meet the operational requirements of the installation supervisor of flying program or Army equivalent.

2.14.9. Assist installation/garrison commanders in assessing the effects of severe weather and a changing climate on existing and planned infrastructure and facilities, and natural infrastructure using provided DOD products, services, and assessments (e.g., *Air Force Severe Weather/Climate Hazard Screening and Risk Assessment Playbook*, *Army Climate Resilience Handbook, DOD Climate Assessment Tool (DCAT), 14WS Installation Threat Assessments*, etc.).

2.15. ANG WFs. As applicable, ANG WFs are assigned roles and responsibilities outlined in **paragraph 2.5** (ANG CWFs), **paragraph 2.12** (ANG RPA WFs) and **paragraph 2.14** (ANG WFs). The primary mission of ANG WFs while in IDT (Inactive-Duty Training) or Title-32 (Active-Duty Training) status is to train all assigned weather personnel to support aligned ANG and/or Army National Guard (ARNG) customers upon their federal mobilization. ANG personnel may support rotational taskings on a volunteer basis. Deployable ANG personnel must be trained and equipped to the same level as their RegAF counterparts. ANG personnel must train and keep current with readiness requirements to support steady state, backfill or sustainment and mobilization requirements as formally tasked by the RegAF component.

2.16. White House Military Office (WHMO) Operations. The WHMO weather unit provides essential service to the President and helps maintain the continuity of the Presidency. They provide weather observations, mission specific forecasts, watches, observed weather warnings/advisories, specialized weather information for White House functions and WHMO operational units to include the White House Communications Agency, Presidential Airlift Group, White House Medical Unit, Camp David, Marine Helicopter Squadron One, Presidential Food Service, and the White House Transportation Agency.

2.17. Research, Development, Test, and Evaluation Meteorologists (RDT&E Mets). Personnel serving as RDT&E Mets provide specialized air and space weather/environmental science support focused on DAF research, technology development, acquisition, and sustainment activities. RDT&E Mets integrate with requirements managers, program managers, and other system experts to ensure successful identification and mitigation of weather and environmental threats during the acquisition lifecycle of DAF and Joint/Allied/Coalition systems, subsystems, or end items. Support is provided during all phases of a system's lifecycle to ensure effective acquisition and sustainment of systems to satisfy valid warfighter capability needs. Weather organizations supporting DAF acquisition activities will conduct the following tasks, IAW their assigned unit's mission and available resources:

2.17.1. Identify and document, in coordination with program/project/work unit offices, environmental thresholds of systems and programs undergoing RDT&E and procurement.

2.17.2. Assist AF RDT&E projects/programs with identification and mitigation of any effects the atmospheric and space environments may have on systems, subsystems, or components.

2.17.3. Support AF development planning, capability development, and acquisition projects/programs through the identification and mitigation of any effects the atmospheric and space environments may have on the performance and/or employment of systems, subsystems, or components.

2.17.4. Provide consultation services to program managers, engineers, and MAJCOM requirements managers for inclusion of weather support and environmental threat mitigation requirements in program/system requirements documents as needed/requested.

2.17.5. Provide meteorological analysis on system performance and employment for the life cycle of any weather-sensitive programs or basing activities.

2.17.6. Provide weather support for RDT&E activities occurring at test sites and specified ranges.

2.17.7. Coordinate test criteria and environmental support for systems undergoing testing with RDT&E projects/programs; provide or arrange for support (unique or tailored weather services/products) to those projects/programs; and monitor progress of those projects/programs for changes affecting that support.

2.17.8. Provide on-site support for test operations when required and within available resources and capabilities.

2.17.9. Assist AFW and environmental science community in identifying and developing weather support requirements for emerging technologies and weapon systems, to include modeling and simulation requirements.

2.17.10. Provide input to development of support concepts, CONOPS, and weather tactics, techniques, and procedures to inform weather support and integration for new and emerging technology.

2.17.11. When tasked, serve as SME to Sponsor Point of Contact and Technical Point of Contact (TPOC), develop or assist TPOC in authoring Small Business Innovation Research (SBIR) and/or Small Business Technology Transfer (STTR) topic solicitations, and assist TPOC in evaluating proposals.

2.17.12. Provide documentation of current/future environmental support to RDT&E efforts to AFMC weather branch, annually.

2.17.13. When required, complete initial and continuation training to include completing ACQ 101 Fundamentals of Systems Acquisition Management course and/or earning certifications in Program Management, Test and Evaluation, and/or Science and Technology Manager level 1 through Defense Acquisition University (**www.dau.mil**).

2.17.14. Operate specialized or nonstandard weather systems (e.g., surface and upper-air data collection sensors/systems, models, data acquisition and processing tools, etc.) required to support RDT&E projects/programs.

2.18. Units assigned weather equipment (Fixed-base and tactical). Weather units will:

2.18.1. Coordinate and establish outage reporting procedures for equipment with their aligned garrison/deployed maintenance unit. Radar, Airfield, and Weather Systems (RAWS) work centers have maintenance responsibility of weather sensing equipment (garrison or deployed) as defined in AFMAN 13-204v4, *Radar, Airfield, and Weather Systems* and applicable RAWS career field guidance memorandum.

2.18.2. Report outages and maintenance actions on equipment not maintained by RAWS work centers. Guidance is provided in DAFI 21-103, *Equipment Inventory, Status and Utilization Reporting*, DAFMAN 17-1203, *Information Technology (IT) Asset Management (ITAM)*.

2.18.3. Maintain accountability of equipment as Defense Property Accountability System (DPAS) Property Custodian as defined in DAFMAN 17-1203 and DoDI 5000.64_DAFI 23-111.

Chapter 3

DOCUMENTATION

3.1. General. Weather leadership will interface with their supported and supporting agencies to ensure planning and execution processes for their applicable weather services are documented in respective supported unit operations plans, contingency plans, MOUs/Memorandum of Agreements (MOAs), host-tenant support agreements, Emergency Management (EM) plan(s), airfield local operating procedures, Weather Support Document (WSD), and the Installation Development Plan (IDP). Additional IDP guidance is provided in AFI 32-1015, *Integrated Installation Planning*.

3.2. Forms of Documentation. As applicable, weather unit leadership will develop, document, and/or manage the following:

3.2.1. WSD. Parent/host and tenant organization support requirements to include, but not limited to: aviation selected special weather report (SPECI)/amendment criteria, WWA criteria, required lead-times, and notification requirements. **(T-3)**

3.2.2. EM Plans. As applicable, assist in the creation of the Installation Emergency Management Plan IAW AFI 10-2501 or Army Regulation (AR) 525-27, *Army Emergency Management Program*.

3.2.3. Forecast Reference Material (FRM). Units with Airfield Services responsibilities will develop FRM that, at a minimum, include parent-unit mission, location, topography, local weather effects, Rules of Thumb (ROT), and assigned weather sensors. **(T-2)**

3.2.4. ROTs are locally developed forecast techniques and product tailoring tools. Air Force Handbook (AFH) 15-101, *Meteorological Techniques,* provides additional guidance on effective employment of ROTs. Units will:

3.2.4.1. Designate ROTs as experimental until validated. **(T-2)** Units will validate ROTs by using them with other forecast tools and techniques for at least one season to determine forecast accuracy. **(T-2) Note:** ROTs developed by machine learning applications that employ historical weather data are validated at inception.

3.2.4.2. Document, evaluate, and review all forecast techniques and ROTs biennially. **(T-2)**

3.2.4.3. Integrate validated forecast techniques and ROT into forecast processes and procedures. **(T-2)**

3.2.4.4. Forward validated ROTs through MAJCOM functional staff to the AFW Chief Scientist and the 557 WW, who will evaluate the ROT for integration into the Air Force Weather Technical Library and Tactics, Techniques, and Procedures (TTPs).

3.2.5. Duty Priority List. Refer to **Table 3.1** for an example of a duty priorities list. Actual priorities may differ by location. When developing the duty priority list, weather unit leadership will consider risk management (RM) principles and processes found in AFI 90-802, *Risk Management,* consistent with the RM processes of supported operational units and unique mission needs of their end-user organizations. **(T-1)** Weather personnel will apply RM principles while managing weather analysis and integration activities IAW their posted duty priorities.

Table 3.1. Example Duty Priority List.

Priority	Duty
1	Wartime defense of the duty site/location
2	Perform Emergency War Order Tasks (e.g., Deploy Personnel)
3	Execute Evacuation / Continuity of Operations Plan
4	Issue/Disseminate Imminent Hazardous Weather Warnings
5	Respond to Aircraft/Ground Emergencies
6	Issue/Disseminate Imminent Weather Advisories
7	Respond to PMSV calls
8	Supplementation/backup procedures
9	Publish and Disseminate weather observation
10	Disseminate Urgent Upper Air (UUA) Pilot Reports (PIREPs)/Special Aircraft Reports (AIREPs)
11	Generate and publish airfield forecasts/Disseminate Terminal Aerodrome Forecasts
12	Provide Flight Weather Briefings
13	Collaborate WPs with Supported Units
14	Meteorological Watch (METWATCH)/MISSIONWATCH Amend Weather Products/Briefs
15	Respond to Requests for Information
16	Provide Staff Briefings / Non-Standard WPs
17	Accomplish Weather Functional Training
18	Accomplish Administrative Tasks

3.2.6. Standard Operating Procedures (SOPs) describe step-by-step instruction for daily/routine operations. Refer to **Table 3.2** for a list of suggested/common SOPs or plans. Units will:

3.2.6.1. Review all SOPs and ensure all weather personnel review SOPs applicable to the areas for which they are position-qualified annually, at a minimum, or as changes occur. **(T-2)** Document SOP reviews. **(T-2)** Ensure SOPs are horizontally consistent with applicable plans and annexes, installation weather support document, airfield local operating procedures, installation data page, etc. **(T-2)**

3.2.6.2. Develop and maintain SOPs for the areas in **Table 3.2** if applicable to their mission. **(T-2)**

Table 3.2. Example SOP List.

SOP Examples:
Open/close procedures (may be in a checklist form)
SWAP procedures
Fixed base weather observing systems (FBWOS) procedures to take, augment, and disseminate surface weather observations
Manual observing and dissemination procedures
SPECI and LOCAL criteria
ATC cooperative weather watch procedures. Guidance can be found in AFMAN 13-204v3, *Air Traffic Control* and AFMAN 15-111, *Surface Weather Operations.*
PIREP/AIREP procedures
Disseminating weather decision aids / forecast products procedures
MISSIONWATCH procedures
Post-mission analysis procedures
Procedures to arrange for supported unit(s) to receive weather support from another weather unit
Continuity of Operations Procedures (COOP) / AOL procedures to include weather equipment outage and backup procedures, communications outage and backup procedures, and COOP procedures as identified in the wing/post COOP plan.
Aircraft / ground mishap response procedures, including space-lift or on-orbit space-craft mishap, if required
CBRN support procedures
Before and after-the-fact quality assurance procedures for non-automated products
Resource protection (RP) and emergency actions procedures resulting from weather events / natural disasters
Watch, warning, and advisory criteria, lead times, areas of coverage, numbering, and dissemination processes / procedures (e.g., Command and Control Incident Management Emergency Response Application (C2IMERA), Pyramid alert scheme (primary, alternate,

contingency, and emergency))
Tropical weather support and tropical storm notification requirements / procedures
Pilot-to-metro service (e.g., radio frequency, number for phone patches, limitations, and outage procedures)
Emergency / crisis action response procedures to include OPREP procedures. Units should coordinate OPREP reporting requirements with their parent organizations. Guidance can be found in AFMAN 10-206, *Operational Reporting*.
Complete after-action reports (AAR) following major exercises and deployments and forward all AARs to the lead MAJCOM weather functional (for exercises) or Senior METOC Officer (for deployments) for inclusion into the Joint Lessons Learned Information System (JLLIS)

3.2.7. Flight Information Publication (FLIP) Review. Weather units with, or supporting, an airfield services mission will have procedures to review each new edition of applicable DoD FLIPs as soon as possible after publication, including the Terminal Procedures to include but not limited to Radar Instrument Approach Minimums, local Notice to Airmen (NOTAMs), and applicable directives. **(T-2).** Coordinate updates or changes to DoD FLIPs through the local airfield management office or responsible agency using the standardized procedures and formats found in the General Planning FLIP. **(T-1)** Changes include:

3.2.7.1. Airfield minima affecting SPECI/LOCAL observation criteria (reference Radar Instrument Approach Minimums).

3.2.7.2. PMSV contact information (reference Instrument Flight Rules (IFR) Supplement).

3.2.7.3. Weather unit contact information.

3.2.7.4. Airfield weather services hours, if different from airfield hours (reference IFR Supplement).

3.2.8. Plans Review. Weather unit leadership will review applicable Weather Support Plan (WSP)/Installation Development Plan (IDP), Operation Plans (OPLANs), Concept Plans (CONPLANs), Tasking Orders (TASKORDs), campaign plans, MOUs/MOAs, and Host-Tenant Support Agreements within 90 days of assuming a leadership position. **(T-2)** Unit leadership will document all plan reviews. **(T-2)** Guidance on how support agreements are reviewed can be found in DoDI 4000.19, *Support Agreements*. Leadership should coordinate with host wing's Plans and Programs Office (XP/A5), aligned Army unit's Plans Directorate (S5/G5), or MAJCOM Functional to review relevant plans. If updates are required to reflect changed capabilities/requirements, initiate an out-of-cycle formal review with the annex plan/owner to accurately reflect operational changes resulting from supported unit mission changes, equipment upgrades or significant changes in overarching guidance. **(T-2)**

3.2.9. Lessons Learned/Best Practices. Units will cross-feed best practices, lessons learned and proposed tactics improvements through the MAJCOM functional manager for standardization across the weather functional community. **(T-2)**

3.2.10. After Action Reports (AAR). Units will complete AARs following major exercises and deployments. **(T-2)** Forward all AARs to the lead MAJCOM weather functional for exercises, or the supported Air Force or Army component SWO for deployments, for inclusion

into the Joint Lessons Learned Information System (JLLIS) **https://www.jllis.mil/apps/**. **(T-2)** Further guidance can be found in AFI 10-1302, *Air Force Lessons Learned Program.*

3.2.11. Forecast Reviews. Forecast reviews focus on specific weather events at a single location or region and examine the effectiveness of forecast reasoning, tools, and methods employed. Weather unit leadership will:

3.2.11.1. Establish parameters, WPs to be reviewed, monitor the quality/performance of the products, and assign the reviews as required. **(T-2)**

3.2.11.2. Develop a consistent approach to conduct and document forecast reviews. **(T-2)** Forecast reviews should include pertinent input from all sources used in WP production. **(T-2)**

3.2.11.3. Ensure reviews describe potential improvements or best practices to incorporate into the forecast process. **(T-2)**

3.2.11.4. Forward all forecast reviews to MAJCOM functional or Air Force/Army component SWO for distribution across command.

Chapter 4

WEATHER INTEGRATION, PLANNING AND THE MISSION EXECUTION FORECAST PROCESS

4.1. General. Weather personnel should understand all aspects of weather's effect on operations and relay these effects to commanders at all echelons. Commanders leverage and integrate accurate, consistent, timely, and relevant weather information to anticipate, exploit, and mitigate weather effects and enable their situational understanding of the operational environment, decision-making, and risk management. Weather personnel must understand their supported commander's requirements and integrate weather capabilities to achieve mission success. This chapter identifies multiple concepts that need to be executed to ensure proper integration of weather personnel and information into the planning, execution, and assessment phases of operations. Weather leadership will:

4.1.1. Organize personnel to support operations that maximize the unit's ability to reliably inject the right information at the right time every time into their supported organizations' decision-making process. **(T-3)**

4.1.2. If possible, pattern duties at home station to mirror those described in Mission Capability Statements for UTCs postured at that unit. **(T-2)**

4.1.3. As applicable, familiarize themselves with the weather functional community Prioritization and Sequencing Guidance and the weather supplement to the War Mobilization Plan (Volume 1).

4.1.4. Establish and actively maintain working relationships with supported organizations' key operational decision makers, operators, information specialists, tactical-level mission planners, schedulers, and weapons and tactics experts. **(T-3)**

4.1.5. Maintain operational situational awareness through active participation in operational end-users' battle rhythms which include, but are not limited to, planning group(s); threat working group(s); mission planning; rehearsals; mission execution; battle update briefs; commanders update briefs; and operations updates. **(T-3)**

4.1.6. Understand weather and supported unit(s) TTPs, mission essential tasks (MET), and environmental sensitivities/limitations of weapon systems and their associated missions. **(T-1)** Use information obtained from supported units or derived from authoritative sources, such as technical orders and AFMAN 11-202v3, on the mission design series (MDS) specific aircraft operations procedures, MDS AFTTP (NIPR: **https://intelshare.intelink.gov/sites/561jts/SitePages/Home.aspx** or SIPR: **https://intelshare.intelink.sgov.gov/sites/561jts**), and AR 95-1, *Aviation Flight Regulations*. **(T-1)**

4.1.7. Leverage knowledge of historical, current, and forecast state of the environment to provide operators with the opportunity to exploit favorable environmental conditions for mission execution. **(T-3)** Inject environmental subject matter expertise, as appropriate, throughout the planning, execution, and assessment phases of the continuous operations cycle. **(T-3)** This is the opportunity for weather Airmen to offer value-added options to commanders during mission planning and execution.

4.1.8. Coordinate with supported units, including tenant organizations, to provide or arrange for WPs. **(T-3)** These include, but are not limited to, mission execution forecasts (MEFs), intelligence preparation of the battlefield (IPB), environmental inputs to mission planning/analysis, environmental staff estimates, and any other WPs to meet supported unit needs or information to attain domain awareness and meet supported unit needs.

4.1.9. Coordinate with host/parent and supporting units on required environmental inputs to tactical decision aids (TDAs). **(T-3)** This includes, but is not limited to, working proactively with the installation Civil Engineering, Intelligence units or IMCOM / Directorate of Public Works to ensure that the most accurate meteorological data is input into program of record TDAs. **(T-3)**

4.1.10. Use locally available C2 / mission planning systems / advanced battle management systems to integrate decision-grade weather information into supported unit(s) decision-making processes to the maximum extent possible (personnel tempo and operational tempo permitting). **(T-3)**

4.2. Coordinated Weather Operations. Coordinated weather operations ensure planners and decision-makers at every level receive consistent, comprehensive, standardized, and relevant weather information. Weather organizations will coordinate weather information with all supporting weather units for missions involving more than one unit or service. **(T-1)** Coordinated weather operations encompass LWU, CWP, METOC Production Center (MPC), METWATCH, MISSIONWATCH, and the MEFP.

4.3. MEFP. The MEFP is an organized and systematic process to provide decision-quality environmental information to mitigate risks and exploit asymmetric capabilities in the Military Decision-Making Process (MDMP). The MEFP specifies how to apply environmental information to mitigate mission limitations and meet operational requirements. Weather units develop processes and procedures to establish meteorological situational awareness and apply environmental weather for the parent/host unit's decision cycle. Weather units will:

4.3.1. Utilize the MEFP to provide environmental information to mitigate risks and exploit asymmetric capabilities throughout the MDMP. **(T-2)**

4.3.2. Develop internal processes to continuously adapt and improve the MEFP based on coordination/feedback from supported unit(s). **(T-1)** Formally review and document these processes annually. **(T-1)**

4.3.3. The MEFP consists of two primary components, Administrative and Operational.

4.3.3.1. Administrative Process. These are steps within the MEFP which are accomplished by weather unit leadership to maximize the effectiveness of military operations. **Table 4.1** details administrative processes.

Table 4.1. Example MEFP Administrative Process.

1. Define/document Weather Thresholds
a. Identify critical terrestrial and space weather thresholdvalues (e.g., airframe, mission types, weapon systems, decision timelines).
b. Identify critical resource protection thresholds (e.g., maintenance, security forces,logistics, emergency response, etc.).
c. Know where these parameters are applied (e.g., airfields, ranges, DZs, ARs, low-flyroutes, etc.).
d. Identify training requirements to ensure all assigned weather Airmen qualified to mitigate mission-impacting environmental hazards.
2. Attain and Maintain Situational Awareness
a. Identify logical process for obtaining situational awareness to identify trends and state of the atmosphere to others (e.g., shift change, shift duty checklist).
b. Leverage analysis products from DoD, and U.S. Government (USG) sources. Use of non-DoD or USG products should be done only as a matter of necessity, not convenience. Whenever possible, utilize only those products that will be available during contingency or conflict situations.
c. Determine best products to use (primary and back-up) for each step including purpose of the product utilized and value to the MEFP.
d. Collaborate with other METOC organizations as appropriate.
e. Include review of centrally or locally established C2 systems (e.g., Global DecisionSupport System (GDSS), unit flying schedules).
3. Coordinate Operations
a. Identify times, criteria, and delivery format of environmental information for established supported units (e.g., LAN/webpage, mass briefing, flight weather briefing, crisis action briefing, etc.).
b. Provide or arrange for support for units when away from home station.
c. Request special terrestrial, climatic, and space WPs IAW **Chapter 10** of this publication, if required.
4. Mission Verification/MISSIONWATCH
a. Determine parameters, timelines, and critical thresholds for MISSIONWATCH.
b. Standardize mission/products utilized to report WP MEF Verification (MEFVER)IAW

MAJCOM guidance.

c. Identify products, frequency, and communication in the MISSIONWATCH process.

d. Establish parameters for forecast reviews.

e. Develop feedback performance mechanisms to incorporate seasonal training or specific forecast parameter improvement

4.3.3.2. Operational process. This is the executable phase of the MEFP. **Table 4.2** details the operational processes.

4.3.3.2.1. Define a methodology to incorporate analysis products, forecast techniques, and a logical, verifiable process to conduct weather operations. The process identifies data sources, documents forecast methods, and describes methods of obtaining environmental situational awareness. **(T-1)**

4.3.3.2.2. Ensure all sources, processes, and procedures for refining environmental information and WPs are derived from trusted DoD, U.S. government, coalition/allied military/government, or academic sources, then non-government civilian sources, in that order. **(T-1)** Incorporate AFH 15-101 and validated local area rules of thumb into the MEFP. **(T-3)**

4.3.3.2.3. Weather units will alert supporting weather organizations (e.g., LWU) to locally developing situations not encoded in meteorological reports that potentially drive amendments to forecast products or pose a risk to flight safety. **(T-1)**

4.3.3.2.4. Maintain consistency with LWU guidance during execution. **(T-1)**

Table 4.2. MEFP Operational Process.

1. Obtain Situational Awareness
a. Identify mission types (e.g., air, ground, change of command, maintenance).
b. Utilize pre-established procedures (e.g., shift change, shift duty checklist, open/close procedures).
c. Review relevant operational weather products.
2. Determine Environmental Threat(s) and Opportunities of the Day
a. Identify potential threats to or opportunities for alternate/modified mission execution.
b. Prioritize support based on mission priority and threat to mission execution.
c. Identify WPs best utilized to mitigate weather impacts.
3. WP Generation/Dissemination
a. Conduct appropriate-scale review of global and theater-level products to identify state of the atmosphere affecting a particular mission.
b. Analyze real-time data (e.g., PIREPs, AIREPs, radar, satellite imagery, surface observations).
c. Apply specific forecast techniques (e.g., icing, turbulence, contrails, ROT).
d. Integrate geographic, terrain, urbanization, and vegetation influences on the environment and the mission.
e. Include EM/space weather conditions and effects on the mission.
f. Generate forecast in proper format employing critical (or Go/No- Go) thresholds. Generate TDA output, as required.
g. Evaluate product for accuracy and disseminate IAW established guidelines (e.g., C2 system, LAN/webpage) to appropriate customers, decision-makers, and other weather units.
h. Retain WPs IAW the records disposition schedule, which is located in Air Force Records Information Management System.
4. MISSIONWATCH/Mission Verification
a. Conduct MISSIONWATCH utilizing real-time WPs.
b. If capability exists, notify mission C2 element if thresholds cross-critical event parameters.
c. Gather feedback from supported units and review weather products, as necessary, to verify WP MEF.
d. Develop weather product review based on established guidelines if necessary.

4.4. LWU. When two or more military units operate together and share the same air/battlespace (e.g., air refueling routes, military operating areas, drop zones), the LWU, identified using the rules in **Table 4.3**, coordinates overall weather services for the supported mission(s) and is the liaison between supporting weather units. **(T-2)** When possible, the LWU for a given supported mission should be identified in an applicable OPLAN, fragmentary order (FRAGO), or TASKORD. LWU responsibilities lie with the weather unit providing weather support to the overall mission C2 element. The LWU will:

4.4.1. Coordinate with all units involved in the supported mission(s) to identify and obtain point of contact (POC) information (e.g., secure/non-secure telephone numbers, fax numbers, email addresses) for each organization. **(T-2)**

4.4.2. Collect information to define supported mission schedule(s), types (e.g., aerial refueling, airdrops, combat sorties and ground tactics), weapon systems and critical weather thresholds from the supported C2 element and supporting unit POCs. **(T-2)**

4.4.3. Determine WPs, data, and service requirements for the supported mission(s). **(T-2)**

4.4.4. Determine the CWP format (e.g., text, graphics), content, delivery method/times and amendment criteria. **(T-2)**

4.4.5. Coordinate CWP issue times and delivery methods with the supported C2 element and supporting weather organizations involved in the mission(s). **(T-2)**

4.4.6. Coordinate with supporting weather organizations to METWATCH the CWP and amend it as required based on mission critical weather thresholds. **(T-2)**

Table 4.3. Prioritized Rules for Determining the LWU.

Rule	*Type of Mission*	*Designated LWU*
1.	**Joint Missions**	JMO-designated LWU for a Joint Operation in an OPORD / Exercise Directive, or FRAGO.
2.	**Global Power** – ability to hold at risk or strike any target anywhere, assert national sovereignty, safeguard joint freedom of action, and create swift, decisive, precise effects (i.e., fighters, bombers)	Weather unit providing the overall mission C2 element with weather information. **Note:** The C2 element for GLOBAL POWER missionis typically delegated to the wing-level.
3.	**CORONET** - group of fighters assigned one or multiple tankers	Weather unit providing the ACC C2 element with weather information. **Note:** Normally the ACC AOS/WX
4.	**Global Reach** - ability to project military capability responsively–with unsurpassed velocity and precision–anywhere, and provide mobility to rapidly supply, position, or reposition joint forces.	Weather unit integrated with the AMC C2 Element **Note:** Normally the 618 AOC (TACC)/WXD
5.	**Air Refueling** (Training)	Weather unit servicing the lead receiving aircraftunit.
6.	**Unmanned Aircraft**	Weather unit assigned to the Unmanned Aircraft Operational-Level C2 element (e.g., 432d Wing Operations Center, Global Hawk Operations Center). See **Chapter 6** for more details.
7.	**Joint Airborne/Air Transportability Training(JA/ATTs) & Drop Zone(DZ)**	Weather unit servicing the lead airlift aircraft unit.
8.	**Landing Zones (LZ) & Land Maneuver**	Weather unit attached to the lead Army unit.
9.	**Special Operations**	LWU depends on nature of the operation as directed by the appointed JMO.

10.	**Multinational**	Missions with multiple alliance/coalition METOC units should follow multinational doctrine and procedures ratified by the U.S.
11.	**Other**	For missions not defined above, units will coordinate between each other to determine the LWU. If units are unable to come to a consensus, elevate to the MAJCOM or component staff, as appropriate, to resolve.

4.5. Control Weather Products (CWPs). CWPs represent the official mission forecast and are defined by the LWU. All weather units supporting a mission as defined in **Table 4.3** will utilize CWPs to ensure mission forecast consistency. **(T-1)** Supporting units will not deviate from the mission-specific, critical weather thresholds specified in CWPs without prior coordination with the LWU. **(T-1)**

4.6. METOC Production Centers (MPC). MPCs (**Table 4.4**) are service-retained, reach-back organizations that provide trusted METOC data and information to fulfill CCMD and component requirements. Weather personnel will coordinate MPC support IAW **Chapter 10**. **(T-1)**

Table 4.4. MPCs.

MPC	Force Provider	METOC Capabilities and Support
557 WW (Operational Weather Squadron (OWS), 2d Weather Squadron (WS), 16 WS, and 14 WS)	USAF	Global and regional graphical weather forecast, airfield, and installation (TAF and RP), aviation forecasts, specialized environmental information, space weather and EMS products and services, climatology products and services, numerical weather modeling and visualization products and services, data collection and dissemination services.
23 SOWS	USAF	Global and regional weather forecasts, airfield, and installation support (TAF and RP), aviation forecast products and services for deployed USAF/Army/USSOCOM SOF support
Fleet Numerical Meteorology and Oceanography Center	USN	Global and regional METOC, ensemble model, wave, sea surface temperature, sea anomaly forecast products
JTWC	USN	Tropical cyclone forecast products for INDOPACOM
Naval Oceanographic	USN	Global Tailored global oceanographic,

Office		hydrographic, bathymetric, geophysical, and acoustic products and services

4.7. METWATCH. This is a deliberate process for monitoring environmental conditions in the land, air, and space domains. METWATCH identifies when and where sensed conditions significantly diverge from forecast conditions which may drive the need to update or amend forecasts and notify end users (as necessary). Units will:

4.7.1. Establish and maintain a prioritized threat-based METWATCH process for all locations for which it is responsible for characterizing environmental conditions or issuing products (e.g., WWAs), and employ RM steps to identify weather threats impacting operations and maximize effectiveness of resources. **(T-1)**

4.7.2. Monitor and identify changes in weather conditions that cross critical weather thresholds and evaluate forecast products/reasoning when conditions are not occurring as forecast. **(T-1)**

4.7.3. Amend forecasts based on specification and amendment criteria IAW established procedures. **(T-1)**

4.7.4. Develop METWATCH procedures to include the following:

4.7.4.1. Identify primary METWATCH data sources, document forecast methods, and standardize methods of obtaining weather situational awareness. **(T-1)**

4.7.4.2. Identify WPs and services affected by unexpected changes to forecast conditions at points, areas, and routes where the unit is directed or tasked as issuance authority. At a minimum, units that have METWATCH responsibilities prioritize procedures for WWAs, TAFs, Joint Operational Area Forecast (JOAFs), and flight hazards. **(T-1)**

4.7.4.3. Outline the actions to take when forecast conditions change during the METWATCH. **(T-1)** Specify the units to contact using primary and backup contact methods (e.g., telephone, e-mail, phone patch). **(T-1)**

4.8. MISSIONWATCH. MISSIONWATCH is the deliberate process for monitoring terrestrial weather or the space environment for specific mission-limiting environmental factors or exploitable opportunities. Weather units integrated with supported end-users should have a keen understanding of mission-critical thresholds and mission profiles. This understanding allows forecasters to continuously monitor ongoing missions for any potential threshold-crossing weather parameters and allow forecasters to quickly notify C2 elements of these changes. The MISSIONWATCH process identifies and alerts decision makers to changes that will enable mission success. Weather units will:

4.8.1. Develop procedures to determine critical thresholds requiring intensified MISSIONWATCH and update supported unit(s) on changes to environmental conditions critical to the mission. **(T-1)**

4.8.2. Maintain a MISSIONWATCH tailored to the mission(s) of the day. **(T-1)**

4.8.3. Employ sound RM techniques to assign risk, allocate resources, and direct activities to conduct MISSIONWATCH for supported unit(s) missions. **(T-1)**

4.8.4. Inform the issuing weather unit when WPs do not accurately reflect observed conditions and may impact mission execution. **(T-1)**

Chapter 5

INSTALLATION AND AIRFIELD WEATHER SERVICES

5.1. General. Installation and airfield weather services consists of weather observing, TAF generation, METWATCH, and RP. For Collocated Weather Organizations, the Senior Airfield Authority (SAA) coordinates airfield weather services support responsibilities when weather organizations supporting flying organizations from multiple Services (e.g., Navy and Air Force) are located at a base.

5.2. Weather Observing. Units responsible for the airfield observation evaluate conditions, prepare, and disseminate routine, local, and special weather observations. Guidance on recording and disseminating observations can be found in AFMAN 15-111, and MAJCOM supplements, as applicable.

5.3. TAFs. A TAF provides official meteorological information for flight planning and C2 activities for a specific aerodrome. These processes focus on uniformity, production, and quality assurance of final products according to locally developed guidance. AFMAN 15-124, *Meteorological Codes*, defines compliance and dissemination guidance.

5.3.1. TAF Roles and Responsibilities.

5.3.1.1. Weather units at assigned DAF and Army airfields responsible for airfield weather services will produce, disseminate, amend, and verify TAFs during published air-traffic controlled (ATC) hours of operation. **(T-1)**

5.3.1.2. The 557 WW will:

5.3.1.2.1. Produce, disseminate, amend, and verify TAFs during published ATC hours of operation or as required for airfields where the DAF or Army is assigned airfield weather services responsibilities and there are no weather personnel assigned. **(T-1)**

5.3.1.2.2. Produce, disseminate, amend, and verify TAFs during published ATC hours of operation or as required for airfields where ANG managed U.S.C. Title 5 and/or contract weather sites performing limited weather services. **(T-1)**

5.3.1.2.3. Produce, disseminate, amend, and verify TAF products for exercises, contingencies, or defense support to civil authority as tasked to fulfill CCMD requirements IAW **Chapter 10**. **(T-1)**

5.3.2. TAF Processes and Procedures. Units producing a TAF will:

5.3.2.1. Employ risk management practices when using a model (e.g., Global Air-Land Weather Exploitation Model (GALWEM)) based automated aerodrome forecasts as a tool to create first-look TAF products. **(T-1)** First-look TAFs issued without forecaster adjustments are required to meet specification criteria requirements and be amended IAW **Table 5.1**. **(T-1)**

5.3.2.2. Develop a TAF production cycle for locations and coordinate TAF issue times with supported units. **(T-1)**

5.3.2.3. Issue forecasts valid for a 30-hour period. **(T-1)**

5.3.2.4. Issue TAFs during controlled airfield hours, at a minimum of every 8 hours and within 15 minutes of the issue times that were previously coordinated with supported units. **(T-1)**

5.3.2.5. Disseminate all TAF-coded forecast products (including amendments) via weather enterprise operational production applications. **(T-1)**

5.3.2.6. Disseminate TAF-coded forecasts for limited operation airfields IAW local unit requirements. **(T-3)**

5.3.2.7. Coordinate with base operations leaders to issue NOTAMs for temporary changes to TAF services at an airfield (e.g., switching to limited duty TAF due to personnel shortages). **(T-1)**

5.3.2.8. Specify the onset, duration, and intensity for the standard criteria in **Table 5.1** throughout the valid period of the forecast. During airfield-controlled hours, amend TAFs when conditions do not match specified conditions within **Table 5.1**. **(T-1)**

5.3.2.9. Specify and amend ceiling and visibility categories for Army or Air Force flight planning criteria throughout the valid period of the forecast. **(T-2)** Use the lower of the two conditions to determine the ceiling and visibility amendment category. **(T-2)**

5.3.2.9.1. Use ceiling and visibility specification criteria in **Table 5.2** for TAF-coded forecasts issued for Army airfields. **(T-2)**

5.3.2.9.2. Use ceiling and visibility specification criteria in **Table 5.3** for TAF-coded forecasts issued for Air Force operating locations. **(T-2)**

5.3.2.10. Establish TAF trend data from standard display systems (e.g., Airfield Sensor Displays) to determine prevailing conditions. **(T-1)** Prevailing conditions are those that persist for at least 30 consecutive minutes. Conditions occurring once during a specified time-period for less than 30 consecutive minutes or occurring for an aggregate total of less than 30 minutes of every hour are temporary. During periods of rapidly changing ceilings or visibilities crossing multiple categories, consider conditions occurring for the greatest aggregate total during the full hour the predominant condition for that hour.

5.3.2.11. Coordinate and document unit back up TAF production and dissemination procedures in the Continuity of Operations (COOP)/ Primary, Alternate, Contingency, and Emergency (PACE) plans. **(T-2)** Establish plans to provide temporary assumption of METWATCH, to include TAF issue/amend authorities in the enterprise production applications during transition to or from an Alternate Operating Location (AOL) or for other unforeseen/emergency circumstance that precludes the local weather unit from performing their assigned duties. **(T-2)** Non-COOP transfers of TAF responsibilities will require coordination through MAJCOMs and/or component functionals, as appropriate. **(T-2)**

Table 5.1. Standard Specification and Amendment Criteria.

Rule	Phenomena	Criteria	Source	Notes, Examples
1	Surface Winds	**Wind Speed**: The difference between the predominant wind speed and the forecast wind speed is ≥ 10 knots **Wind Gusts**: The difference between observed gusts and the forecast is ≥ 10 knots **Wind Direction**: A change > 30 degrees when the predominant wind speed or gusts are expected to be 15 knots or greater		IF: Forecast winds 23018G25KT THEN: Amend if predominant winds equal or exceed 28 knots, or if observed gusts equal or exceed 35 knots Amend if predominant winds are 8 knots or less or gusts do not meet 15 knots Amend for prevailing wind directions outside of the arc extending from 200 through 260 degrees
2	Icing, not associated with thunderstorms, from the surface to 10,000ft Above Ground Level (AGL)	The beginning or ending of icing first meets, exceeds, or decreases to less than moderate (or greater) thresholds and was not specified in the forecast	AFMAN 11-202 Vol. 3, AR 95-1, and AFH11-203v 1	

3	Turbulence (for weather category II aircraft), not associated with thunderstorms from the surface to 10,000 ft AGL	The beginning or ending of turbulence first meets, exceeds, or decreases below moderate or greater thresholds and was not specified in the forecast	AFMAN 11-202 Vol. 3, AR 95-1, and AFH11-203v 1	
4	Weather Warning Criteria	Occur, or are expected to occur during the forecast period, but were not specified in the forecast Specified in the forecast but are no longer expected to occur during the forecast period		**Note:** Watches are exempt from this requirement. Forecasters may specify watch criteria in the TAF when, in their judgment, the specific nature of the threat dictates
5	Altimeter Setting	Altimeter setting meets or exceeds 31.00 INS and was not specified in the forecast Altimeter setting, if above, drops below 31.00 INS and was not specified during the forecast period Altimeter setting drops below 28.00 INS and was not specified in the forecast Altimeter setting, if below 28.00 INS, increases above 28.00 INS and was not specified in the forecast	AFMAN 11-202 Vol. 3	

6	Forecast Weather Advisory Criteria	Occur, or are expected to occur during the forecast period, but were not specified in the forecast Specified in the forecast but are no longer expected to occur during the forecast period		**Note:** Advisories issued for an area not including the terminal aerodrome forecast area are exempt from this policy
7	Thunderstorms	Incorrect forecast start or end time	AFMAN 11-202 Vol. 3 and AR95-1	
8	Specification of Temporary Conditions	Forecast conditions specified as temporary become predominant conditions Forecast conditions specified as temporary do not occur during the hour as forecast Forecast conditions specified as temporary are no longer expected to occur	AFMAN 11-202 Vol. 3 and AR95-1	
9	Changes to Predominant Conditions (BECMG or FM group)	Forecast change conditions occur before the beginning of the specified period of change and are expected to persist Forecast change conditions do not occur within 30 minutes after the specified time Forecast change conditions are no longer expected to occur		
10	Representative Conditions	Forecast conditions are not considered representative of existing or forecast conditions and amending the forecast improves safety, flight planning, operations efficiency, or assistance to in-flight aircraft		

Table 5.2. Army Airfield Ceiling and Visibility Specification and Amendment Criteria.

Rule	Category	Ceiling	Visibility	Source
1	D	Greater Than or Equal to (GTE) 1500ft	Visibility GTE 4800 meters (M) (3 statute miles [SM])	Aircrew must file for an alternate if conditions are less than 1500M/3SM IAW AR 95-1
2	C	Less Than (LT) 1500ft but GTE lowest published landing minimum plus 400ft	Visibility LT 4800M (3SM) but GTE lowest published landing minimum plus 1600M/1SM	Airfield weather conditions must equal or exceed these criteria to qualify as an alternate when flight filing IAW AR 95-1
3	B	LT lowest published landing minimum plus 400ft but GTE lowest published landing minimum	LT lowest published landing minimum plus 1SM (1600M) but GTE lowest published airfield landing minimum	Airfield does not qualify as an alternate for flight planning but is still suitable for arrival providing a suitable alternate is available IAW AR 95-1
4	A	LT lowest published airfield landing minimum	LT lowest published airfield landing minimum	Airfield is not a suitable destination IAW AR 95-1

Note 1. Forecasts specify when conditions decrease to less than, or if below, increase to equal or exceed the categories in the table.

Note 2. Forecast category is determined by the lower of the ceiling or visibility value.

Note 3. Use predominant conditions to determine forecast category (i.e., not tempo or varying).

Note 4. For locations Outside the Continental United States (OCONUS), 5000M and 1500M may be substituted for 4800M and 1600M respectively, based on the host-nation practice. Substitutions should be documented in local support plans and operating procedures.

Table 5.3. DAF Airfield Ceiling and Visibility Specification and Amendment Criteria.

Rule	Category	Ceiling	Visibility	Source:
1	E	GTE 2000ft	GTE 4800M (3SM)	Aircrew must file for an alternate if forecast conditions are less than 2000/3 IAW AFMAN 11-202 Vol 3
2	D	LT 2000ft but GTE 1000ft	LT 4800M (3SM) but GTE 3200M (2SM) or lowest published visibility minima, whichever is greater	Airfield qualifies as an alternate IAW AFMAN 11-202 Vol 3
3	C	LT 1000ft and GTE lowest published landing minimum plus 500ft	LT 4800M (3SM) but GTE 3200M (2SM) or lowest published visibility minima, whichever is greater	Airfield qualifies as an alternate IAW AFMAN 11-202 Vol 3
4	B	LT the lowest published landing minimum plus 500 ft and GTE the lowest published landing minimum	LT 3200M (2SM) but GTE the lowest published airfield landing minimum	Airfield does not qualify as an alternate for flight planning but is still suitable for arrival provided a suitable alternate is available IAW AFMAN 11-202 Vol 3
5	A	LT the lowest published airfield landing minimum	LT the lowest published airfield landing minimum	Airfield is not a suitable destination IAW AFMAN 11-202 Vol 3

Note 1. Forecasts specify when conditions decrease to less than, or if below, increase to equal or exceed the categories in the table.

Note 2. Forecast category is determined by the lower ceiling or visibility value.

Note 3. Use prevailing surface visibility to determine forecast category.

Note 4. For OCONUS locations, 5000M and 3000M may be substituted for 4800M and 3200M respectively, based on the host-nation practice.

Note 5. For DAF operations, Category A minima may be replaced with pilot weather categories in MAJCOM supplements to AFMAN 11-202v3.

Note 6. Air Force rotary wing criteria may be substituted when rotary wing aircraft are the primary aircraft assigned at the TAF location as stated in AFMAN 11-202v3.

5.4. RP/WWAs. The weather organizations listed below perform local area METWATCH and produce, disseminate, amend, and verify WWAs to inform key decision makers and personnel of potential and observed weather conditions that require protective actions.

5.4.1. WF/Dets will:

5.4.1.1. Issue all required WWAs for their host installation/aerodrome complex and supported parent/tenant unit missions and resources (See **Table 5.4** for exceptions). **(T-2)** WWA support for ANG/ARNG dual-use military/civilian airfields will be documented IAW **Chapter 3**. **(T-2)**

5.4.1.1.1. For limited-duty locations, WF/Dets will attempt to develop or arrange alternative solutions (e.g., Cooperative Weather Watch, Commercial or Government Off-the Shelf solutions) to perform local area METWATCH and issue host installation/aerodrome WWAs outside of regular duty hours. **(T-2)**

5.4.1.1.1.1. WF/Dets will coordinate with their applicable component SWO or MAJCOM functional to attempt to resolve the shortfall if no practical alternative local solution(s) exist. **(T-2)**

5.4.1.1.1.2. If component SWO or MAJCOM functional cannot provide a solution, WF/Det leadership should submit a support request IAW **Chapter 10** to establish RP recall/backup procedures. WF/Dets will document their recall procedures in their WSD and/or IDP. **(T-2)**

5.4.1.1.2. Determine and document host/parent unit requirements for NOAA flash flood, river/coastal flood, and fire warnings IAW **paragraph 5.6.2**. Coordinate and document requirements and dissemination processes with the 557 WW in local support agreements and the IDP. **(T-1)**

5.4.1.2. 557 WW will:

5.4.1.2.1. Produce, issue, amend and verify WWAs for DAF or Army locations (e.g., airfields, high use ranges, drop zones, missile fields) where there are no weather personnel are assigned to provide RP/WWA services. **(T-2)**

5.4.1.2.2. Produce, issue, amend and verify forecast WWAs for ANG-managed locations staffed by U.S.C. Title 5 and contracted personnel that only perform "eyes forward" and observed WWA functions. **(T-2)**

5.4.1.2.3. Produce, disseminate, and amend WWAs for adversary point, aerodrome complexes and military operating areas using latitude/longitude, International Civil Aviation Organization (ICAO), or basic encyclopedia (BE) designations as requested. **(T-2)**

5.4.1.2.4. Produce, issue, amend and verify WWAs for emergency, contingency, or forward deployed operating locations as coordinated and validated in OPLANs, EXPLANs, and Defense Security Cooperation Agency Plans as requested IAW **Chapter 10**. **(T-2)**

5.4.1.2.5. Produce, issue, amend and verify WWAs outside of established hours of operations for installations manned exclusively by DAF and Army civilian or contract weather support and for foreign bases where neither the DAF or Army are designated as the SAA, but DAF or Army assets are operating or located. **(T-1)**

5.4.1.2.6. Establish and employ procedures to recall standby WF/Det forecaster(s), upon request, to provide operational or RP weather support at limited-duty locations. **(T-2)**

5.4.1.2.7. Collect and display NOAA issued fire and flood WWA products for U.S. locations and territories using enterprise program of record capabilities. **(T-1)**

5.4.1.2.8. Coordinate with installation/garrison emergency management centers to relay available and trusted flood, fire, and tsunami warnings using enterprise data services for locations requiring RP without weather personnel assigned to perform RP support. **(T-1) Note:** For joint installations where the DAF has the lead for WWAs, emergency management personnel may be from another service.

5.4.1.3. 23 SOWS will produce, disseminate, amend, and verify WWAs for deployed AFSOF/ARSOF operations without organic weather personnel. **(T-1)**

5.4.1.4. When sufficient time does not exist to communicate a change in weather, weather units not responsible for WWAs may, under PACE (primary, alternate, contingency, and emergency) conditions, without prior coordination, facilitate RP actions. When time permits, weather units will forward pertinent information to the responsible unit and transfer responsibility for the WWA. **(T-1)**

Table 5.4. Dual-use Civilian/Military Airfield, Observation, and WWA Responsibilities.

Location	Airfield Observation	Airfield Forecast	Observed WWA	Forecast WWA
Albuquerque International Sunport Airport/Kirtland AFB	FAA	NWS	OWS	OWS
Charleston IAP/JB Charleston AFB	FAA	NWS	WF/Det (during duty hours; OWS when closed)	OWS
Colorado Springs Municipal Airport/Peterson AFB	FAA	NWS	WF/Det	WF/Det
Eglin AFB/Destin-Ft Walton General Airport	WF/Det	WF/Det	WF/Det	WF/Det
Killeen-Ft Hood Regional Airport	WF/Det	WF/Det	WF/Det	WF/Det
Joint Base Pearl Harbor-Hickam/Honolulu IAP	NWS	NWS	WF/Det	WF/Det
Rickenbacker IAP/Rickenbacker JRB	FAA	NWS	OWS	OWS
Scott AFB – Mid America Regional Airport	WF/Det	WF/Det	WF/Det	WF/Det
Wichita Falls Regional Airport/Sheppard AFB	WF/Det	WF/Det	WF/Det	WF/Det

5.4.2. RP/WWA Processes and Procedures. Units providing RP will:

5.4.2.1. Coordinate annually with each supported unit and maintain documented WWA thresholds, desired lead time (DLT), and mission impacts (this may be accomplished in concert with review of WSD, or equivalent). **(T-3)** Units will use the default minimum

desired lead-times in **Table 5.5** if the supported organization does not specify a minimum DLT. **(T-1)**

5.4.2.2. Ensure WWAs maintain horizontal consistency with TAF, and other forecast products. **(T-1)** Watches are not required to be horizontally consistent with the TAF, except for lightning watches. **(T-1)**

5.4.2.3. Notify the 557 WW and/or LWU if their products are inconsistent with locally issued WWAs to maintain horizontal consistency throughout all WPs. **(T-1)**

5.4.2.4. Maximize the use of watches within their affected area of operations until conditions warrant issuing a warning to meet desired lead-time requirements for supported organizations. **(T-1)**

5.4.2.5. Issue WWAs in a standard format and numbering scheme through the AFWWS enterprise application (primary) or local dissemination systems. **(T-1) Note:** Units may enable automated functions to issue observed advisories if fixed base weather observation systems are fully functional.

5.4.2.6. Issue WWAs in Coordinated Universal Time (UTC) and/or Local Time. **(T-3) Note:** Local time is changed for Daylight Saving and does not always correspond to Local Standard Time.

5.4.2.7. Issue WWAs with a separate valid time for each criterion when warranted. **(T-1)** The beginning valid time for observed WWAs is when the criteria are first observed. An ending valid time is not used for observed WWAs. In place of and ending valid time, the following statement is used: "Valid until further notice." **(T-1)**

5.4.2.8. Specifically state the area affected when issuing WWAs. **(T-1)** Watches may be issued for an area larger than the corresponding warning (e.g., Watch for high winds for Random AFB and surrounding local flying area. Warning for high winds for Random AFB [applicable to the aerodrome]). **Note:** Warnings normally affect an area no larger than a 5NM radius of the airfield. WWAs for Military Operating Areas (e.g., training areas, ranges, and missile complexes) may cover larger areas. Document deviations in supported agency data pages or applicable plans or instructions. **(T-2)**

5.4.2.9. Include the maximum expected hail size, rain/snow accumulation, or wind speed as applicable in warnings and advisories. **(T-1)** Include additional criteria IAW local support agreements (IDP, WSD, etc.). **(T-1)**

5.4.2.10. Issue watches for phenomena other than lightning a minimum of one hour prior to issuing a warning for the same phenomena. Issue lightning watches at least 30 minutes prior to issuing a lightning warning or IAW the desired lead time of the supported unit/installation, whichever is longer.

5.4.2.11. Issue lightning watch and the observed lightning warning as stand-alone criteria as they do not supersede WWAs previously issued for other criteria.

5.4.2.12. Issue warnings, as required, regardless of whether a watch had previously been issued. **Note**: A watch is not a substitute for a warning. Do not issue a forecast WWA for a single, un-forecast event that is not expected to persist or reoccur.

5.4.2.13. Issue a completely new warning or advisory with a new number when a WWA no longer adequately describes the phenomenon's occurrence. WWAs may be extended provided the extension is issued prior to the expiration of the original notice.

5.4.2.14. Issue only one weather forecast warning or advisory for the same criteria when in effect at any given time. **(T-1)** This does not prohibit the use of a watch, a forecast warning, and an observed advisory being valid at the same time for different thresholds of the same criteria (e.g., A watch for GTE 50kts, a warning for 35-49kts, and an observed advisory for GTE 25kts all valid at the same time).

5.4.2.15. Clearly state how amended, extended, or cancelled WWAs affects any other issued notices for the same criteria (e.g., "This upgrades warning XX-XXX" or "This extends advisory XX- XXX" or when canceling "Watch XX-XXX for lightning within 5NM remains in effect" etc.).

5.4.2.16. Cancel WWAs when conditions are no longer occurring and are not expected to reoccur within the DLT of the WWA. **(T-1) Note:** Cancel observed WWAs at the discretion of the responsible agency. This is typically 15 minutes after the last occurrence of the criteria is no longer forecast to take place.

5.4.2.17. Cancel lightning watches only when the potential for lightning within the next 30 minutes is no longer forecast. Do not cancel if there is potential for another thunderstorm withing 30 minutes. **(T-1)**

5.4.2.18. Upgrade WWAs when adding phenomena or crossing to a higher threshold. Downgrade WWAs when removing a phenomenon or crossing to a lower threshold. Use the default wording for upgrading/downgrading in the AFWWS enterprise application. **(T-1)**

5.4.2.19. Notify ATC and the C2 authority responsible for the Installation Notification and Warning System (per AFI 10-2501 or AR 525-27) along with other supported units when the WWA notification system is inoperable. **(T-1)** Utilize an DAF Form 3807, *Watch/Warning Notification and Verification*, or on an DAF Form 3806, *Weather Watch Advisory Log*, as applicable, until the WWA notification capability is restored. **(T-2).** Instructions for completing the DAF Form 3807 and 3806 are found in **Attachment 4** and **Attachment 5** respectively.

5.4.2.20. If responsibility for WWAs is transferred to another unit, that unit is responsible for conducting verification and entering data into the AFW enterprise dissemination system until the service disruption is over and WWA responsibility is transferred back to the original unit. **(T-1)**

5.4.2.21. Document sound meteorological reasoning used in determining the need for all forecast WWAs in the appropriate spaces provided in AFW enterprise dissemination system. **(T-1)**

5.4.3. WWA Verification. WWAs fall into one of five verification categories (see **Figure 5.1**.).

Figure 5.1. Weather Warning and Advisory Verification Process.

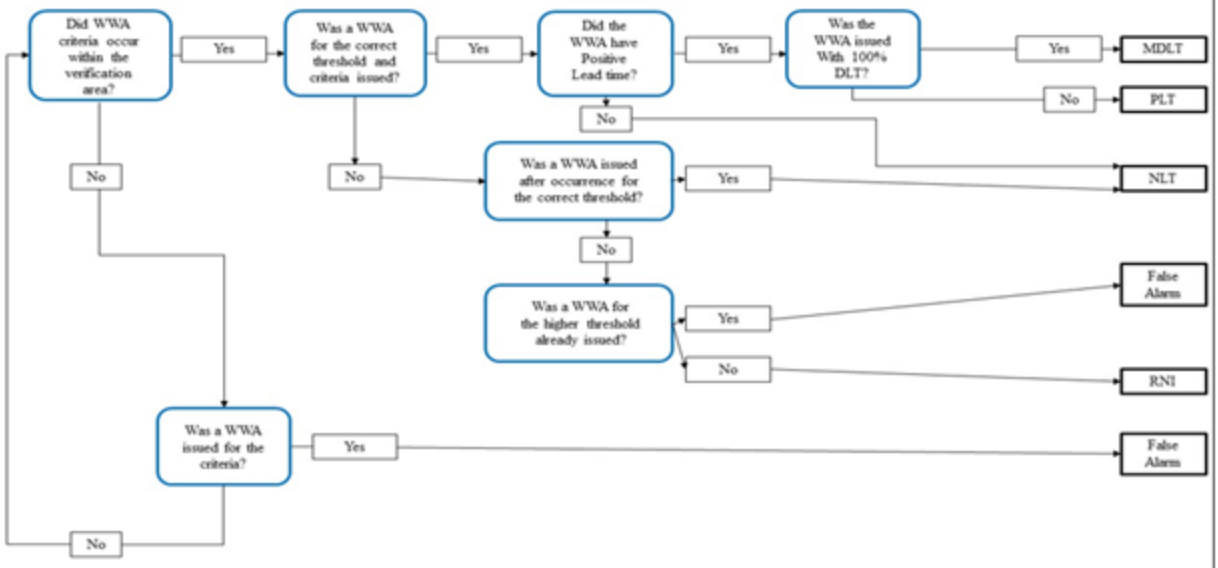
Met DLT: Issued and verified the threshold criteria within the specified verification area and met (or exceeded) the desired lead-time.

Positive Lead Time: Issued and verified with positive lead time but did not meet the full DLT.

Negative Lead Time: Issued and verified with negative lead-time; negative lead time is not used when the event is deemed to be a one-time occurrence.

Required, Not Issued (RNI): Not issued but event occurred within the verification area. RNIs are intended for use during one-time occurrences or when an entire event is missed, for example, a one-time gust of 38kts or multiple reports of large hail discovered after the fact (e.g., storm reports).

False Alarm: Issued but event did not occur within the verification area.



5.4.3.1. Verify all issued WWAs based on the desired lead-time (DLT) and area specified in the criteria. For example, issue and verify a warning for lightning within 5NM of an airfield based on lightning strikes or radar returns within the verification area, or when reported as occurring on station in a surface observation. Verify a forecast advisory for lightning within 25NM based on lightning strikes or radar returns within the verification area, or when reported as occurring (within 25NM) in a surface observation. When performing WWA verification, units will:

5.4.3.1.1. Omit reporting locations within the verification radius that are not representative of the location receiving WWA products and document these sites in forecast reference material or SOPs. **(T-2)**

5.4.3.1.2. Employ all data available from representative sources of sensed or observed data within the verification area to objectively verify warnings and advisories. **(T-2)** Consider data sensed from radars, mesonets, environmental monitoring systems, tactical ATC systems, forward armament and refueling points, or other sensing systems objective data for evaluating and verifying WWA products. Use unofficial reports from credible sources (e.g., Storm Prediction Center Storm Reports, NWS Citizen Weather Observation Program (CWOP) and Community Collaborative Rain, Hail and Snow Network (CoCoRaHS), off-duty AFW personnel, storm spotter reports, etc.) within the verification area of the warned location to verify warnings and advisories when unit leadership determines the reports are credible based on corroborating objective weather data or subjective analysis of relevant weather data (e.g., a weather Airman lives within a verification area and notifies the unit performing verification that they observed 3/4" hail; unit leadership determines whether this report is credible and can be used for verification).

5.4.3.1.3. When objective verification is not possible, inadequate, or misrepresentative, use subjective analysis of available data to determine if an event occurred. **(T-2)** In situations where units use subjective verification, unit leadership will take responsibility for a missed occurrence of the weather threat if these phenomena are reported with no WWAs in effect at that time. MAJCOM or component weather staffs serve as approval authority for subjective verification. **(T-2)**

5.4.3.1.4. Verify each phenomenon separately. **(T-2)**

5.4.3.1.5. Verify severe thunderstorm and moderate thunderstorm warnings upon first occurrence of either wind or hail threshold at the warned location. Occurrence of either of the specified criteria in severe thunderstorm and moderate thunderstorm warnings verifies these warnings; "bundle" the criteria for verification purposes.

5.4.3.1.6. Verify a lightning watch as if it were a forecast WWA product with a 30-minute desired lead-time. Base the lead-time on the issued time of the watch subtracted from the time of first occurrence of the lightning within specification distance of the warned location.

5.4.3.1.7. Verify heavy precipitation warnings using measurements from the airfield observing system, radar precipitation measurements, other rain gauges, or storm reports in the verification radius for the warned location. **(T-2)**

5.4.3.1.8. Verify heavy rain warnings specifying an accumulation in a specified time period by using a summation of the one-hour precipitation measurements from the airfield observing system. **(T-2)** Collect the one-hour amounts reported by the airfield observing system commencing with the hour that the warning was issued and indicate on a weather warning verification tracker when the specified precipitation total was reached. **(T-2)** Continue to collect the one-hourly accumulations during the valid period of the warning and enter the total liquid precipitation received during the valid period of the warning into the verification database in the AFW enterprise dissemination system. **(T-2)**

5.4.3.1.9. Use accumulated reports of 6-hourly, 12-hourly, or summary of the day during the valid period of the warning for verifying heavy rain warnings at locations where the unit does not have access to the hourly rain gauge data from an airfield observing system. **(T-2)** If necessary, estimate actual time of occurrence based on interpolations from the rate of accumulation in METAR or Synoptic reports.

5.4.3.1.10. May use radar generated precipitation total products to supplement direct measurements from a rain gauge and verify precipitation accumulation warnings. Evaluate radar-generated precipitation products for accuracy against reliable rain gauges (military or NWS sites) for at least one season to account and correct for high reflectivity phenomena such as hail or bright band contamination of the data. **(T-2)**

5.4.3.1.11. Verify heavy snow warnings using manually observed snowfall totals from Air Force, sister service, coalition partners, or host nation sources where the capability exists. **(T-2)**

5.4.3.1.12. In the absence of manual snowfall totals, the unit conducting verification of a heavy snow warning converts one-hour liquid precipitation measurements into hourly snow equivalent according to procedures in AFMAN 15-111. **(T-2)** Collect the one-hour amounts reported by the airfield observing system commencing with the hour that the warning was issued and indicate on a weather warning verification tracker when the specified snowfall total was reached. **(T-2)** Continue to collect the one-hourly accumulations during the valid period of the warning and enter the total snowfall and liquid precipitation received during the valid period of the warning into the verification database. **(T-2)**

5.4.3.1.12.1. Weather radar data is unreliable for determining snowfall and cannot be used to objectively verify heavy snow warnings. **(T-2)** Units may use radar reflectivity returns or NWS CWOP to subjectively evaluate heavy snowfall warnings to justify warnings that do not verify by other means.

5.4.3.1.12.2. Use accumulated reports of 6-hourly, 12-hourly, or summary of the day during the valid period of a heavy snow warning at locations where the unit does not have access to hourly data from an airfield observing system. **(T-2)** If necessary, estimate actual time of occurrence based on interpolations from the rate of accumulation in METAR or synoptic reports. Use the observation date/time group on METAR reports with snow increasing rapidly remarks (SNINCR s/tt) to verify heavy snow warnings when either value in the remark meets or exceeds the warning threshold. **(T-2)**

5.4.3.2. WWA Lead-time Computation.

5.4.3.2.1. Actual lead-time is the time elapsed between the issue time of the warning/advisory and the first time of occurrence.

5.4.3.2.2. Base actual lead-time computation for warnings and advisories that are downgrades from an existing warning or advisory on the issue time of the first warning/advisory lead-time calculation. Calculate upgrades based on the time the WWA was upgraded, NOT the initial issue time, provided there is no break in coverage. Ensure there is no break in coverage and a “DOWNGRADE” remark is appended to the new warning or advisory. If a break in coverage does occur, actual lead-time is

computed from the new issue time. Upgrades are calculated based on the time the WWA was upgraded, NOT the initial issue time, provided there is no break in coverage. Ensure there is no break in coverage and an "UPGRADE" remark is appended to the new warning or advisory. If a break in coverage does occur, compute actual lead-time from the new issue time.

5.4.4. WWA Criteria**.**

5.4.4.1. Warnings take precedence over forecast advisories for the same phenomena. Forecast advisories and warnings for the same phenomena will not be valid for the same time. **(T-1)** Conversely, observed advisories and forecast warnings for same phenomena may be valid at the same time (e.g., a forecast warning for 35-49kts may be valid while an observed advisory for GTE 25kts is valid).

5.4.4.2. Watches are standalone products based upon potential and are unaffected by warnings or advisories for the same phenomena.

5.4.4.2.1. Mandatory watch criteria include tornados, severe thunderstorms, damaging winds, lightning, freezing precipitation, blizzards, heavy rain, sandstorms, dust storms, and heavy snow as the potential warrants. **(T-1)**

5.4.4.2.2. Additional watch criteria may exist based upon supported customer requirements.

5.4.4.3. **Table 5.5** provides default thresholds and desired lead-times for use when the supported unit/agency does not specify a DLT or state a specific threshold.

Table 5.5. Weather Warning Defaults.

Weather Threat	Threshold	Impact	**Default Lead-time** (See **Note 1**)
Tornado	Tornado, Waterspout, or Funnel cloud (detected by radar or visually observed) AND threatening warned location / aerodrome complex	Immediate threat of catastrophic damage to personnel and property	15-minute advance notice of onset and duration of tornadic thunderstorm activity See **Note 2**
Severe Thunderstorm	Damaging Wind GTE the specified thresholds and associated with thunderstorms AF: 50 kts Army: 45 kts -AND/OR- Damaging Hail GTE the specified thresholds at the warned location/aerodrome AF: ¾” Army: ½”	Immediate threat to exposed personnel High risk of damage to facilities and exposed aircraft and equipment	1 hour advance notice of severe thunderstorm onset, duration, and intensity See **Note 2**
Moderate Thunderstorm	<u>Strong Winds</u> GTE 35 kts and LT severe criteria associated with thunderstorms -AND/OR- <u>Large Hail</u> GTE ¼” and LT severe criteria at the warned location/aerodrome	Increased risk to exposed personnel Increased risk of damage to unsecured property Increased risk to flight line activities and damage to exposed aircraft or vehicles	1 hour advance notice of thunderstorm onset, duration, and intensity See **Note 3**

Strong Winds	Surface Winds not associated with Thunderstorms GTE 35 kts and LT severe threshold	Increased risk to exposed personnel Increased risk of damage to unsecured property Increased risk to flight line activities and damage to exposed aircraft or vehicles	1 hour advance notice of onset, duration, and intensity
Damaging Winds	Surface winds not associated with thunderstorms GTE the specified thresholds. AF: 50 kts Army: 45 kts	Immediate threat to exposed personnel Increased risk of damage to facilities and equipment	1 hour advance notice of onset, duration, and intensity of wind event See **Note 3**
Freezing Precipitation	Liquid precipitation of any type and intensity that freezes on contact and produces a glaze ice on exposed surfaces	Range of impacts dependent on precipitation type and intensity Examples: Light freezing drizzle increases risk of unsafe driving conditions and disrupts flight line or maneuver activities Effects can be mitigated Moderate or greater intensity freezing rain (ice storm) poses significant risk of damage to facilities and rapidly creates hazardous conditions for personnel and vehicle movement that cannot easily be mitigated	1 hour advance notice of onset See **Note 3**

Heavy Snow	2” of new snowfall accumulating in LT 12 hours	Disrupts personnel movement or flight line activities	1 hour advance notice of the period meeting or exceeding the heavy snow threshold Ex: It is determined that 2” in a 6-hour period poses a threat to the installation. The responsible unit provides 1-hour advance notice of the onset for a snow event(s) meeting the threshold. (e.g., Issue the warning at 11Z when snow is expected to start falling at 12Z and accumulate GTE 2” by 18Z.) The warning text indicates maximum expected snowfall accumulation during the period specified in the warning.
Blizzard	All the following must occur: a) Surface visibility less than or equal to (LTE) ¼SM (400M) b) Falling and/or blowing snow c) Wind (sustained or gusts) GTE 30 kts d) Duration GTE 3 hours	Imposes significant risk to personnel movement Significant risk to maneuver or flight line activities	1 hour advance notice of onset, duration, and character (persistent or intermittent) of conditions meeting or exceeding threshold

Heavy Rain	2” of liquid precipitation accumulating in LT 12 hours	Increased threat of flash flooding or systemic flooding posing credible threat to unprotected resources and personnel Disrupts flight line and maneuver activities Imposes increased risk on personnel movement	1 hour advance notice of the start of the period meeting or exceeding the heavy rain threshold The warning indicates onset, duration, and anticipated maximum rainfall accumulation
Sandstorm	Winds carrying sand particles from the surface up to 50 feet above the surface, prevailing visibility GTE 5/16 but LT 5/8SM (500 to 1000M). For prevailing visibility of LT 5/16SM (500M), the storm is considered a heavy sandstorm	Disrupts personnel movement and aviation operations	1 hour advance notice of the period meeting or exceeding threshold
Dust storm	Winds carrying dust particles from the surface to approximately ten thousand feet above the surface, prevailing visibility GTE 5/16 but LT 5/8SM (500 to 1000M). For prevailing visibility of LT 5/16SM (500M), the storm is considered a heavy dust storm	Disrupts personnel movement and aviation operations	1 hour advance notice of the period meeting or exceeding threshold
Lightning	Lightning within 5NM or locally defined.	Immediate threat to exposed personnel	As observed
Note 1. Lead-time requirement is determined by the affected installation. Use default lead-times when a local requirement is not specifically stated or researched. **Note 2.** Mandatory installation SWAP criteria. **Note 3.** Installation policy directs SWAP activities.			

5.5. Installation and Airfield Management.

5.5.1. Airfield Operations Board (AOB). Units/WF will participate as a member of the AOB as requested IAW AFMAN 13-204v1, *Management of Airfield Operations*.

5.5.2. Unit Radar Committee (URC). DAF Weather organizations designated as the DoD/DAF URC voting member will attend, either in person or virtually, the URC meetings to address requirements and operational concerns as directed in the tri-agency NEXRAD Memorandum of Agreement IAW the following procedures. **(T-0)** For AF-owned DoD NEXRAD sites:

5.5.2.1. The DAF weather organization that owns the DoD NEXRAD and has responsibility for issuing host installation WWAs is the designated DAF representative/voting member of the URC for the NEXRAD site. **(T-1)** If the DAF weather organizations that owns the DoD NEXRAD is not responsible for issuing host installation WWAs, then the designated DAF representative/voting member of the URC for the DoD NEXRAD site is the nearest using installation-level DAF Weather organization with responsibility for issuing host installation-level WWAs. **(T-1)** If none of the above exist, the 557 WW/CC will designate the DAF representative/voting member for the URC. **(T-1)**

5.5.2.2. If the Unit also controls the Master System Control Function of an AF-owned NEXRAD, that unit will coordinate the URC meetings, as required, per the Tri-Agency NEXRAD memorandum of agreement. **(T-0)**

5.5.2.3. For non-DoD NEXRAD sites, the using installation-level DAF weather organization that operates 24 hours, 7 days a week and has responsibility for host installation WWAs will be the designated DAF representative/voting member of the URC for the NEXRAD site. **(T-0)** If no 24/7 installation-level DAF weather organization with host installation WWA responsibility exists, then DAF representative/voting member of URC for non-DoD NEXRADs will be the installation-level DAF Weather organization with responsibility for issuing host installation WWAs that is located nearest to the non-DoD NEXRAD site. **(T-1)**

5.5.2.4. If no installation-level DAF weather organization with host installation WWA responsibility exists, then the DAF representative / voting member of the URC for non-DoD NEXRAD will be designated by the 557 WW. **(T-1)**

5.6. Emergency Management and Response. AFW forces will integrate and routinely collaborate with installation staffs (EM, Fire Emergency Services, and Bioenvironmental Engineering (BEE) to serve as weather SMEs. **(T-1)** At the installation level, units will:

5.6.1. Perform CBRN operations IAW AFI 10-2501 and AFMAN 10-2503, and for Army installations IAW AR 525-27 and Field Manual (FM) 3-11, *Chemical Biological, Radiological, and Nuclear Operations*.

5.6.1.1. Gain familiarization with the CBRN plume models utilized by these emergency support functions (ESF) (e.g., Joint Effects Model, Area Locations of Hazardous Atmosphere, Computer Aided Management of Emergency Operations, etc.), their TDA outputs, and integrate into installation commanders' decision cycles.

5.6.1.2. Understand the variety of possible weather input options within each model for each type of CBRN event.

5.6.1.3. Recommend and provide the most appropriate weather data type for EM and other ESFs to use to run their chosen CBRN model. The staff integration function's familiarity with EM and other ESF CBRN models helps determine the optimal weather data type. **(T-1)**

5.6.1.4. Provide a region-specific model data utilizing GALWEM. In most cases, transport models can be configured to automatically pull observed or forecast gridded model data from Defense Threat Reduction Agency. **(T-1)**

5.6.1.5. Ensure that observations and forecasts provided are representative of the location/time of the CBRN event. **(T-1)**

5.6.1.6. Provide CDM/EDM upon request from installation emergency management (EM), the installation emergency operations center or other disaster response/management personnel. **(T-1)**

5.6.2. Coordinate with installation EM personnel on their needs for river flood, flash flood, fire weather (red flag), coastal flood, and tsunami watches and warnings and provide expert advice to connect C2IMERA with trusted data from AFW enterprise data services. **(T-1) Note:** Typically, these warnings/forecasts are provided via NOAA or the local country weather services. For joint installations where the DAF has the lead for WWAs, the EM personnel may be from another service.

5.6.3. Provide tropical cyclone (TC) forecasts and impacts to commanders in supported organizations, as required, for mission execution decisions and to determine or declare a Tropical Cyclone Condition of Readiness (TCCOR) and/or Hurricane Conditions of Readiness (HURCON). **(T-3)**

5.6.3.1. Units will fully exploit official forecast resources provided by tropical cyclone forecast centers (e.g., National Hurricane Center (NHC), Central Pacific Hurricane Center (CPHC), and JTWC. **(T-1)**

5.6.3.2. Units will not deviate from the official track and intensity but have leeway to depict weather impacts to their supported installations based on localized effects expected. **(T-1)**

5.6.3.3. Tropical Cyclone Threat Assessment Product (TC-TAP). The purpose of the TC-TAP is to provide a standardized product for units to use in assisting installation commanders and EM personnel in making decisions on the evacuation and sheltering of aircraft and personnel, and other mitigation actions. TC-TAP is generated directly from the storm track and intensity data provided in the official forecast from the designated agency. 557 WW collaborates with supported units to identify and communicate potential variances from the TC-TAP output. Deviations from the TC-TAP output are included in theater forecasts, threat assessments, TAFs and other forecast products as necessary. TC-TAP information is prepared and disseminated using standardized software for producing TC threat assessments contained in the baseline 557 WW Production System. TC-TAP is valid through a minimum of 96 hours and updated as new information is received from the NHC, CPHC, or JTWC. In support of installation EM for tropical cyclone forecasts, the 557 WW will:

5.6.3.3.1. Develop procedures to expeditiously disseminate the TC-TAP information to all applicable organizations to include ensuring TC-TAP information is consistent from initial dissemination through actual posting of the information on the webpage. **(T-1)** At a minimum, the following criteria will be included:

5.6.3.3.1.1. Time and date the product was produced and the NHC/CPHC/JTWC bulletin number/identifier used to create the product. **(T-1)**

5.6.3.3.1.2. Onset and duration of sustained 35-knot and 50-knot winds. **(T-1)**

5.6.3.3.1.3. Peak wind and time of occurrence, including gusts. **(T-1)**

5.6.3.3.1.4. Onset and duration of operationally significant (locally determined) crosswinds, including gusts for the primary instrumented runway. **(T-1)** Use 25-knot crosswinds as the default unless specified differently for the installation. **(T-1)** **Note:** Wet runways may change the crosswind factor as well.

5.6.3.3.1.5. Closest point of approach of the storm relative to the installation. **(T-1)**

5.6.3.3.1.6. Probable track of the center of the tropical storm (forecast cone product). **(T-1)**

5.7. Aircraft/Ground Mishap Data Save. When notified of any aircraft or ground mishaps (weather-related or not) requiring a weather data save as determined by AFI 51-307, *Aerospace and Ground Accident Investigations*, weather units will:

5.7.1. Save all applicable and available terrestrial and space weather data. **(T-2)** Coordinate with applicable units (e.g., 557 WW, 618 AOC (TACC)/WXD) to ensure required data is saved. **(T-2)**

5.7.2. Ensure all data used in the development of any weather information, product, or service provided to a supported unit are saved, including but not limited to: **(T-2)**

5.7.2.1. Meteorological Satellite (METSAT) imagery (e.g., Visible, Infrared, Water Vapor).

5.7.2.2. Radar data files or images if available (e.g., Base Reflectivity, Velocity-Azimuth Display Winds, Echo Tops, Composite Reflectivity, Base Velocity).

5.7.2.3. Upper air package.

5.7.2.4. Aviation hazard charts and information (e.g., thunderstorm, lower and upper-level turbulence, icing, etc.).

5.7.2.5. PIREPs, AIREPs, significant meteorological information (SIGMETs).

5.7.2.6. TAFs and observations for departure point, destination, and any alternate(s).

5.7.2.7. Weather warnings, watches, and advisories.

5.7.2.8. Upper air soundings enroute and nearest the mishap site.

5.7.2.9. Briefing material provided to the mishap aircrew (e.g., DD Form 175-1, *Flight Weather Briefing*, mesoscale tailored graphics).

5.7.3. Gather and retain the saved data until requested. **(T-2)** Send the data to the valid requesting organization (accident investigation board, safety investigation board, etc.). **(T-2**

5.7.4. Organization initiating the data save will maintain and dispose of the data IAW the DAF Records Disposition Schedule and will provide disposition instructions to respective organizations involved. **(T-2)**

Chapter 6

AVIATION WEATHER FORECASTING

6.1. General. Aviation Weather Forecasting encompasses flight weather briefings to aircrews (in all formats), MISSIONWATCH, PMSV, and PIREP/AIREP functions.

6.2. Flight Weather Briefing (FWB) Responsibilities. Units providing FWB support need to be familiar with LWU roles and responsibilities as applicable. Units responsible for FWB support should utilize all means available to ensure proper MISSIONWATCH is provided to aircrews with the understanding some missions lack the capability to communicate between aircrews and forecasters.

6.2.1. The WHMO weather team provides FWBs for WHMO operational units/missions.

6.2.2. Integrated Flight Management (IFM) Missions. IFM is a Mobility Air Force (MAF) core process designed to provide dynamic, proactive mission management and near real-time C2. flight managers act as virtual crew members, using electronic flight planning/filing, flight following, maintenance, transportation, and weather resources to centrally plan and aid aircrews in the execution of MAF sorties/missions. Fused flight management information, shared situational awareness, collaborative decision making, and dynamic planning/adjustment enable the Flight Manager to act as the primary POC for real-time weather operations for global mobility forces, regardless of location. Designated weather support units for IFM missions are in **Table 6.1**. Specific duties and responsibilities of weather units providing weather information to theater AOC Air Mobility Division-controlled IFM missions should be documented in MAJCOM-level instructions as required.

Table 6.1. Designated Weather Support Units for IFM missions.

MAF C2 Agency	Weather Support Unit	Mission Type / (Location)
618 AOC (TACC)	618 AOC (TACC)/WXD	Strategic Airlift / Air Refueling (Global)
603 AOC/AMD (USAFE-AFAFRICA)	86th Operational Support Squadron (OSS)/OSW 100 OSS/OSW 557 WW (as applicable)	Theater Airlift / Air Refueling (EUCOM / AFRICOM)
613 AOC/AMD (PACAF)	3 OSS/OSW, 15 OSS/OSW, 18 OSS/OSW, 354 OSS/OSW, 374 OSS/OSW, 557 WW (as applicable)	Theater Airlift / Air Refueling (INDOPACOM)

6.2.3. ANG/AFRC MAF without collocated weather support. 618 AOC (TACC)/WXD is the designated FWB provider for AMC-gained ANG and AFRC MAF flying units without a collocated weather team for non-IFM sorties. In this context the term "AMC-gained" refers to those units that would be gained by AMC if activated.

6.2.4. Joint Base Weather Teams. DAF weather flights on Joint Bases, where the DAF/Army is the supporting Service, will provide FWB support to DoD missions IAW the Joint Base MOA/MOU or an inter-Service agreement. **(T-0)**

6.2.5. ACC AOS Controlled Missions. Units supporting launch, alternate, abort and destination bases for ACC AOS-controlled mission will:

6.2.5.1. Brief aircrews using ACC AOS/WX CWPs. **(T-1)**

6.2.5.2. Coordinate deviations from CWPs with ACC AOS/WX. **(T-1)**

6.2.5.3. Debrief arriving aircrews at destination bases and report any deviations from the CWP to ACC AOS/WX. **(T-1)**

6.2.6. DAF WF/Dets responsible for aviation weather services at airfields operated by DAF/Army (garrison and deployed) will:

6.2.6.1. Provide or arrange FWB support to DAF/Army aircrews based on their installation as defined in applicable WSD, IDP, support agreements, MOAs/MOUs, etc. **(T-1)** For deployed operations, weather units deployed with their aircrew units (i.e., 3-series UTC or aligned Army unit) are responsible for providing FWB support. **(T-1)**

6.2.6.2. Provide or arrange for FWB support, when requested, to DAF/Army (Active, Guard and Reserve) transient aircrews taking off from the local airfield. Coordinate with the aircrew's designated/aligned weather unit to coordinate MISSIONWATCH responsibilities. **(T-1)**

6.2.6.3. Provide flight weather briefings to Civil Air Patrol (CAP) members while on Title 10 orders or non-Title 10 training status during controlled airfield hours. **(T-1)** Advise CAP members performing official flight duties outside of normal operating hours of remote and self-briefing capabilities. **Note:** WFs/Dets are not required to have personnel on duty solely to provide briefings for CAP flying activities.

6.2.7. 557 WW will:

6.2.7.1. Provide FWB support to all DAF/Army (Active, Guard, Reserve, CAP) units without a designated or aligned weather support organization (i.e., documented in IDP, WSD, MOAs/MOUs, support agreements, etc.). **(T-1)**

6.2.7.2. Guidance on how to provide FWB support to any DAF/Army aircrew when their designated FWB provider is unavailable can be found in AFH 11-203V2, *Weather for Aircrews – Products and Services* and ARMY TC 3-04.4, *Fundamentals of Flight*.

6.3. FWB Procedures. Units providing FWB support will:

6.3.1. Use MAJCOM-approved briefing systems (AFW enterprise Mission Management, Electronic Flight Bag (**Note:** ForeFlight® is a component of the military electronic flight bag), GDSS, Flight Weather Briefer, etc.), DD Form 175-1, computerized equivalent, or verbal briefings as the standard tool for delivering flight weather briefings. **(T-2).** Complete the DD Form 175-1 IAW procedures outlined in **Attachment 2** of this manual.

6.3.2. Provide current and forecast departure weather (including flight hazards and SIGMETs/Airmen's Meteorological information (AIRMETs). **(T-1)** For Army missions include forecasts for the max pressure altitude and temperature at the departure location. **(T-1)**

6.3.3. Provide forecast enroute weather (including flight hazards and SIGMETs/AIRMETs). **NOTE:** At a minimum, brief flight hazards within 25 miles either side of the route and within 5,000 feet above and below the planned flight level. **(T-1)**

6.3.4. Provide forecast conditions at destinations and alternate airfields. **Note:** At a minimum, brief destination/alternate hazards within a 25-mile radius of the airfield and from the surface to 5,000 feet above the planned flight level for take-off and landing. **(T-1)** For Army missions include forecasts for the max pressure altitude and temperature at the departure location. **(T-1)**

6.3.5. Provide satellite and radar imagery, as applicable. **(T-1)**

6.3.6. When producing any mission execution weather product, such as a verbal brief, MEF, or FWB, clearly annotate the type of altitude used, above ground level (AGL) or mean sea level (MSL). **(T-1)** If only one type of altitude is used, clearly state "All heights in AGL (or MSL)". If using AGL for ceilings and MSL for hazards, clearly state "AGL" or "MSL" as appropriate next to the height given or in each applicable section of the product or brief. **(T-1)**

6.3.7. Relay applicable weather watches, warnings, and advisories for departure, enroute, destination and alternate airfield(s). **(T-1)**

6.3.8. Provide and annotate the briefing time. **(T-1)**

6.3.9. Provide and annotate the briefer initials. **(T-1)**

6.3.10. Annotate the aircraft call sign or mission number. **(T-1)**

6.3.11. Provide and annotate the void time (as applicable, see **Attachment 2**). **(T-1)**

6.3.12. Request aircrews provide PIREP/AIREPs during takeoff, landing, enroute, and indicate the means of providing them (e.g., PMSV, ATC, phone patch). **(T-1)**

6.3.13. Provide the briefing via the MAJCOM or aligned service component approved delivery method to the aircrew and retain a duplicate copy. **(T-2)**

6.3.14. Only use those TDAs (e.g., Target Acquisition Weapons Software or Builder) developed, certified, and approved by DoD, AFW, or coalition sources. **(T-1)**

6.3.15. When available, provide access to information and procedures for aircrews to request/schedule online weather briefings using web-based application(s). **(T-2)**

6.3.16. Procedures on how to document, maintain, and retain FWBs can be found in the DAF Records Disposition Schedule and AFI 33-322.

6.4. RPA Missions. Units aligned with RPA C2 activities, may be requested to conduct METWATCH of Remote Split Operations (RSO) satellite up-link/down-link locations for mission-impacting land, air, and space domain environmental conditions with the potential to disrupt or degrade on-orbit communications links IAW **Chapter 10**. Weather personnel supporting RSO missions may be requested to issue specialized notifications of observed or forecast impacts to operations as agreed upon with the C2 authority IAW **Chapter 10**. RPA Support Roles and Responsibilities:

6.4.1. Weather units aligned with RPA C2 center activities will provide or arrange for RPA weather support during the planning, execution, and assessment phases of supported operations. **(T-1)**

6.4.2. The 557 WW will:

6.4.2.1. Provide RPA weather support to all Group 3-5 aircraft without a designated weather support organization. **(T-1)**

6.4.2.2. Generate predictive impact assessments of land, air, and space domain effects on RSO satellite communications capabilities. **(T-1)**

6.4.2.3. Generate impact assessments for Group 1-2 operations for thresholds and operating areas designated in combatant command letters of instruction or plans (e.g., OPLANs, EXPLANs, CONPLANs). **(T-1)**

6.4.2.4. Serve as subject matter experts on post event examination of lost-link events. **(T-1)**

6.4.3. MQ-9 Weather Support.

6.4.3.1. The Persistent Attack and Reconnaissance Operations Center (PAROC) is designated the LWU for conventional MQ-9s operating via RSO, regardless of where the RPA is physically operating; see **Table 4.3**., Prioritized Rules for Determining the LWU. PAROC weather personnel will:

6.4.3.1.1. Generate impact assessments based on MQ-9 mission-limiting weather thresholds applied to trusted environmental characterizations to identify Criteria Event/No Criteria Event weather recommendations affecting mission planning, weather recall, or dynamic re-tasking of an airborne RPA. **(T-1)**

6.4.3.1.2. Use real-time data (e.g., pilot reports, full motion video, high resolution satellite imagery, weather radar data, lightning data, current observations and forecasts for Launch and Recovery Elements (LREs)) to ensure decision makers have the most current, accurate, and consistent information available. **(T-1)**

6.4.3.1.3. Conduct METWATCH of RSO satellite up-link/down-link locations for mission-impacting land, air, and space domain environmental conditions with potential to disrupt or degrade on-orbit communications links. **(T-1)**

6.4.3.1.4. Provide operational expertise and coordinate with the 557 WW to assess the potential impact of the environment on lost-link events. **(T-1)**

6.4.3.1.5. Coordinate forecasts with WFs providing tactical-level support to mission control elements (MCEs), 557 WW, WFs supporting LREs, and AOC WSTs. **(T-1)** In addition, the PAROC will inform all weather organizations involved in the mission when RPA operations are affected by weather as soon as practical to ensure combat forces at all echelons receive and disseminate consistent information. **(T-1)**

6.4.3.2. WFs supporting MQ-9 MCEs will:

6.4.3.2.1. Have knowledge of complete mission profiles (e.g., current, planned, and contingency ground tracks and target/collection areas) and generate route specific (location, time, flight level) information for local commanders using trusted data and information from the PAROC and supporting 557 WW unit(s). **(T-1)**

6.4.3.2.2. Integrate output from electromagnetic and electro-optical tactical decision aids for all weapons and/or sensors based on planned employment TTPs into decision briefings to mission commanders. **(T-1)**

6.4.3.2.3. Integrate trusted environmental characterizations and current information (e.g., high resolution satellite imagery, weather radar data, and lightning data) with Tactical Situation displays to enhance pilot environmental situational awareness. **(T-1)**

6.4.3.2.4. Conduct MISSIONWATCH for RPA in their supported area(s) of operation and detect weather conditions that exceed flight-manual limits. If mission-limiting weather is occurring or forecast to occur, provide RPA pilots with weather mitigation strategies, and contact the PAROC to notify them of the weather impacts to the affected mission. **(T-1)**

6.4.3.3. If requested, WFs supporting MQ-9 LRE will:

6.4.3.3.1. Include critical MQ-9 mission-limiting weather thresholds as determined by the PAROC on all MWPs for LRE and divert locations. **(T-1)** If there are no direct/dedicated LRE weather personnel (i.e., weather personnel collocated with the LRE whose primary duty is to support RPA), support will be provided by 557 WW as coordinated and requested by the PAROC. **(T-1)**

6.4.3.3.2. Provide airfield support, LRE forecasts, observed advisories, and "eyes forward" support in the terminal area for other weather organizations supporting RPA operations. The MQ-9 terminal area typically extends out to 25 nautical miles (nm). If an LRE pilot requests weather beyond this distance, consult current WPs, MCE/WF, or the PAROC for conditions outside the terminal area. **(T-1)**

6.4.4. RQ-4 Support.

6.4.4.1. The Global Hawk Operations Center (GHOC) is designated the LWU for worldwide RQ-4 operations; see **Table 4.3**., Prioritized Rules for Determining the LWU. WFs supporting the GHOC will:

6.4.4.1.1. Integrate within the GHOC to support mission commander decision making, mission planning, mission execution forecast production, and MISSIONWATCH. Weather personnel will be integrated with decision makers and RQ-4 pilots in command during all phases of flight. **(T-1)**

6.4.4.1.2. Generate impact assessments for RQ-4 routes containing mission specific environmental impacts to RQ-4 operations based on trusted data. **(T-1)**

6.4.4.1.3. Use real-time data (e.g., pilot reports, full motion video, high resolution satellite imagery, weather radar data, lightning data, current observations for LREs) to ensure decision makers have the most current, accurate, and consistent information available. **(T-1)**

6.4.4.1.4. Conduct METWATCH of RSO satellite up-link/down-link locations for mission-impacting land, air, and space domain environmental conditions with potential to disrupt or degrade on-orbit communications links. Weather operators may issue alerts, watches, warnings, or advisories as agreed upon with the C2 authority. **(T-1)**

6.4.4.1.5. Provide operational expertise and coordinate with the 557 WW to assess the potential impact of the environment on lost-link events. **(T-1)**

6.4.4.1.6. Coordinate forecasts with WFs supporting LREs, 557 WW, and AOC WSTs. **(T-1)** In addition, the GHOC will inform all weather organizations involved in the mission when RPA operations are affected by weather as soon as practical to ensure combat forces at all echelons receive and disseminate consistent information. **(T-1)**

6.4.4.1.7. Integrate trusted environmental characterizations and current information (e.g., high resolution satellite imagery, weather radar data, and lightning data) with pilot situational displays to enhance environmental situational awareness. **(T-1)**

6.4.4.1.8. Conduct MISSIONWATCH and detect weather conditions that exceed flight-manual limits. If mission-limiting weather is occurring or forecast to occur, provide pilots with weather mitigation strategies. **(T-1)**

6.4.4.2. If requested, WFs supporting RQ-4 LREs will:

6.4.4.2.1. Include critical RQ-4 mission-limiting weather thresholds as determined by the GHOC on all WPs for LRE and divert locations. **(T-1)** If there are no direct/dedicated LRE weather personnel (i.e., weather personnel collocated with the LRE whose primary duty is to support RPA), support will be provided by 557 WW as coordinated and requested by the GHOC. **(T-1)**

6.4.4.2.2. Provide airfield support, LRE forecasts, observed advisories, and "eyes forward" support in the terminal area for other weather organizations supporting RPA operations. The RQ-4 terminal area typically extends out to 150-250 nm. If an LRE pilot requests weather beyond this distance, consult current WPs, MCE/WF, or the GHOC for conditions outside the terminal area. **(T-1)**

6.4.5. Army UAS Support.

6.4.5.1. Army weather support units are organized to provide capabilities from echelon above corps down to the aviation battalion level. Guidance on how SWOs aligned to echelons with UAS capabilities will provide support can be found in AR 115-10/AFI 15-157 (IP). **(T-1)**

6.4.5.2. SWOs will coordinate with respective Army G-2/3 and S-2/3 sections to determine environmental impacts to UAS operations and methods of delivery for generated WPs. WPs provided will be consistent with procedures identified in **Chapter 3**. **(T-1)**

6.4.6. ANG MQ-9 Weather Flights (WFs). The primary mission of ANG RPA WFs while in IDT (Inactive-Duty Training) or Title-32 (Active-Duty Training) status is to train all assigned weather personnel to support aligned ANG Attack Squadrons upon their federal mobilization. ANG RPA WF's will:

6.4.6.1. Maintain and follow a Memorandum of Understanding (MOU) to coordinate RPA MISSIONWATCH responsibilities between ANG OSS/OSW units. **(T-2)**

6.4.6.2. Coordinate mission impacting weather with LWU prior to launch or early return-to-base. **(T-2)**

6.4.6.3. Units aligned with Field Training Units (FTUs) and/or Launch Recovery Elements (LREs) will be LWUs for associated aircraft and provide support to aligned MQ-9 assets as outlined in **paragraph 6.4.3.3.1**. **(T-2)**

6.5. PMSV. All contacts with airborne aircrews, including phone patches, High Frequency (HF)/Ultra High Frequency (UHF) radio contacts, aircrew generated computer messages, satellite communications equipment, and cell phones are considered PMSV contacts. Weather units with PMSV equipment will:

6.5.1. Use proper radio discipline and standard phraseology found in FAA JO 7110.10CC, *Flight Services*, always when operating PMSV.

6.5.2. Respond to all PMSV contacts IAW unit duty priorities. **(T-3)** Weather organizations monitoring common PMSV radio frequencies will respond if another weather organization does not answer an aircrew request after two contact attempts. **(T-3)**

6.5.3. Pass only current, complete, and relevant information to aircrews. **(T-3)** Warn aircrews of weather hazards along their flight route and relay the position and movement of any weather hazards to the aircrew. **(T-3)**

6.5.4. NOT vector aircraft around hazards, such as thunderstorms. **(T-3)**

6.5.5. Solicit a PIREP/AIREP at the conclusion of every airborne contact. **(T-3)**

6.5.6. Log all PMSV contacts (including phone calls) with the following information, at a minimum, for each contact:

6.5.6.1. Aircraft call sign or number.

6.5.6.2. Brief summation of the information passed to the aircrew.

6.5.6.3. Date Time Group (DTG) of the contact.

6.5.7. Log one PMSV radio equipment check each day (an operational or ATC contact meets this requirement). **(T-3)** Record any discrepancies, such as weak transmission strength, weak reception, distortion, static, etc., on the PMSV log to assist maintenance personnel in correcting the problem.

6.5.8. Log out PMSV contact equipment (e.g., radio, telephone) IAW locally developed procedures or as specified by MAJCOM/higher headquarters directives. **(T-2)** Request base/airfield operations personnel include PMSV outages in Airfield Advisories and NOTAMs. **(T-3)**

6.6. PIREPs/AIREPs. All PIREP/AIREPs, regardless of delivery format, will be documented, maintained, and retained as determined by the DAF Records Disposition Schedule and AFI 33-322. Weather personnel will:

6.6.1. Develop and implement procedures to request timely PIREPs/AIREPs from aircrew. **(T-1)** Collect meteorological elements of operational significance to flying or surface activities, and assist local flying operations (e.g., turbulence, icing, cloud bases or tops when departing/arriving, in-flight visibility at low levels, upper winds, valley fog, etc.) and assist local flying operations. **(T-1)**

6.6.2. Encode PIREPs per AFMAN 15-124.

6.6.3. Encode AIREPs IAW local procedures. **(T-3)**

6.6.4. Disseminate all urgent PIREPs/Special AIREPs locally and longline IAW duty priorities. **(T-3)**

6.6.5. Disseminate all routine PIREPs/AIREPs locally and longline unless two or more reports have substantially the same information. **(T-1)** In this case, disseminate only the most recent. Remarks section will indicate the number of reports of the same phenomena and the time interval in which they were received (e.g., "3 RPTS last five minutes," "NUMEROUS ACFT"). **(T-3)**

Chapter 7

GRAPHICAL ANALYSIS AND FORECAST PRODUCTS

7.1. General. Graphical analysis and forecast products are generated by user-defined processes based on FITL objects in the Operational Data Layer (ODL) to provide visual products to aid in the decision-making processes. Products generated from the ODL objects are provided as two- or three-dimensional representations of sensed and forecast conditions across the User Defined Operational Picture.

7.2. Operational Production. The 557 WW will develop procedures to analyze and predict the environmental conditions for weather products listed in this chapter. **(T-1)** All meteorological symbols, isopleths, and color representations used in the production of graphical analysis/forecast products should be compliant with World Meteorological Organization (WMO) and the ICAO standards or the current Military Standard (MIL-STD) 2525, *Joint Military Symbology* (see **Attachment 3**). In the event standards conflict, units will follow MIL-STD 2525. **Note:** Graphical products may also be available as high-resolution products with non-MIL-STD depictions. These products employ color filled regions and a legend to facilitate ease of use. 557 WW will establish local procedures to ensure the horizontal consistency between all FITL products. **(T-1)**

7.3. Surface Analysis Products.

7.3.1. **The 557 WW, at a minimum, will:**

7.3.1.1. Generate ODL objects and operate applications to produce and make available to operational users, a twice-daily synoptic scale analysis of the 0000Z and 1200Z surface data. **(T-1)** These products will be available via standard dissemination systems not later than 90 minutes from valid time. **(T-1)**

7.3.1.2. Generate ODL objects depicting the minimum required surface weather parameters identified in **Table 7.1** and **Table 7.2**. **(T-1)**

Table 7.1. Polar/Mid-Latitude Analysis Parameters.

Polar/Mid-Latitude Parameters
- Plotted surface data - Isobars, base value 1000 millibars (mb) at 4-mb intervals - Positions of fronts and troughs - Locations of closed pressure systems with central values and an appropriate H/L symbol - Air mass type and source region (optional) - Tropical cyclones - 12-hour continuity of front, troughs, closed pressure systems and other significant weather features.

Table 7.2. Tropical/Sub-Tropical Analysis Parameters.

Tropical/Sub-Tropical Parameters
-Streamlines - Confluent & diffluent asymptotes - Cyclonic and anticyclonic circulation centers - Cusps and neutral points - Tropical cyclones - Other significant weather features (e.g., equatorial trough, monsoon troughs, axes of tropical waves, shear lines) 12-hour continuity of cyclonic and anticyclonic circulation centers, tropical cyclones, and other significant weather features

7.3.2. JTWC produces low-level streamline tropical analysis products and are the CWPs for their area of responsibility.

7.4. Upper Air Analysis.

7.4.1. The 557 WW, at a minimum, will:

7.4.1.1. Generate ODL objects and operate applications to produce and make available to operational users, a twice-daily synoptic scale graphical analysis of 0000Z and 1200Z upper air data. **(T-1)** These products will be available via standard dissemination systems no later than 90 minutes from valid time. **(T-1)**

7.4.1.2. Generate ODL objects depicting the minimum required upper air (from the earth's surface up to and including the first layer above the troposphere) parameters identified in **Table 7.3**. **(T-1)**

7.4.1.3. Use the 00Z and 12Z plotted rawinsonde data to depict synoptic and mesoscale weather features at 200 (optionally 250 or 300), 500, 700, 850, and 925 mb levels (see exceptions in **Table 7.3**). **(T-1)**

7.4.1.4. Provide ODL objects to enable tracking of 12 and 24-hour continuity of closed circulation centers. **(T-1)**

Table 7.3. Air Force Weather Standard Upper Air Analysis Parameters.

Level	Minimum Parameters
200 mb, 250 mb or 300 mb	- Height contours using a base value of 9,000 meters (300 mb), 10,560 meters (250 mb), or 12,000 meters (200 mb) at 120-meter intervals - Closed Highs and Lows with center height values in Polar/Mid-latitude regions, Cyclones and Anticyclones in Tropical/Sub-tropical regions - Color fill (purple) wind speed maxima using a base value of 70 knots (in 20 knot intervals) - Areas of upper tropospheric divergence (isopleth in blue for values greater than >1.95 radians/sec 10^{-4} s^{-1}) **Exception:** May omit if above lowest layer in stratosphere
500 mb	- Height contours using a base value of 5,400 meters at 60-meter intervals - Closed Highs and Lows with center height values - Isotherms at 5°C intervals - Moisture areas. Color fill areas with dew point depressions (DPD) of 5°C or RH 70% or greater
700 mb	- Height contours using a base value of 3,000 meters at 30-meter intervals - Closed Highs and Lows with center height values - Isotherms at 5°C intervals - Moisture areas. Color fill areas with DPD 5°C or RH 70% or greater
850 mb & 925 mb	- Height contours using a base value of 1,500 meters (750 meters for 925 mb) at 30- meter intervals (or as required by season and documented in an Analysis and Forecast Program) - Fronts aloft - Closed Highs and Lows with center height values - Isotherms at 5°C intervals (highlight 0°C isotherm) - Moisture areas. Color fill areas with DPD 5°C or RH 70% or greater - Low level jet with wind speeds $\geq$ 35kts - Streamlines and circulation centers may be used instead of height contours and height centers in tropical regions **Exceptions:** May omit analysis for regions within the area of responsibility (AOR) with surface elevations reaching into these mandatory levels

7.5. Severe Weather Analysis. Units identify and assess imminent and emerging severe weather threats to military operations around the world. Severe weather threat assessments apply to a broad range of combatant command and IC activities not confined to resource protection at fixed installations and main operating locations. To characterize these threats, the 557 WW will:

7.5.1. Identify, assess, and generate ODL objects characterizing global severe weather threats with emphasis on areas where conditions impact supported units. **(T-1)**

7.5.2. Generate ODL objects depicting minimum required the severe weather parameters identified in **Table 7.4** to provide a twice-daily graphical depiction of 0000Z and 1200Z severe weather analysis. Augment and supplement the severe weather parameters as necessary. **(T-1)**

7.5.3. Severe weather analysis objects may be combined with the standard surface and upper air analysis as user defined layers.

Table 7.4. Standard Severe Weather Analysis Parameters.

Chart	Standard Parameters
200 mb, **250 mb** **or** **300 mb**	Streamlines and axes of diffluent winds Isotachs in red with a minimum value of 70 knots in 20-knot intervals; label all speed maxima - Height falls (300 mb only) using same procedures as 500 mb - Stratospheric warm sinks/cold domes - Circulation centers (cyclones **C**, anticyclones **A**)
500 mb	- Axes of maximum wind flow >50 kts; label all speed maxima - Closed Highs and Lows with center height values - 12-hr. height falls every 30m. If the center exceeds 180m, draw height fall isopleths every 60m. Label center with an **X** and the maximum value - Isotherms every 2°C - Warm and cold pockets
700 mb	Flow streamlines Axes of maximum wind flow >30 kts, label all speed maxima Isotherms 2°C intervals; highlight 0°C isotherm (if applicable) Circulation centers (cyclones **C**, anticyclones **A**) Dry air intrusions ($\geq$ 10°C dew point difference) intruding into a significant moisture field (DPD < 6°C or RH $\geq$70%)

850 mb **925 mb**	Streamlines and axes of confluent winds Axes of maximum wind flow > 25 kts; label all speed maxima Isotherms every 2°C; highlight 0°C isotherm (if applicable) Thermal ridges and warm/cold pockets. Axes of Equivalent Potential Temperature (Theta-E) Ridges Isodrosotherms every 2°C for values 10°C at 925mb and 6°C at 850mb Circulation centers (cyclones **C,** anticyclones **A)** Dry air intrusions (≥ 10C dew point difference) intruding into a significant moisture field (DPD < 6C or RH ≥70%)
Surface	Fronts, troughs, and confluent zones. Track fronts until no longer discernible Dry lines, meso-highs, outflow boundaries, and squall lines Moisture ridges and axes of maximum moisture advection Thermal ridges Isallobars; highlight anallobars (pressure rises) and katallobars (pressure falls) Tropical depressions and tropical cyclones, as required Isotherms every 2°C; highlight 0°C isotherm (if applicable) Surface Standard snow cover and depth, and ground state (frozen/unfrozen, mud)

7.6. NWP and Ensemble Models.

7.6.1. NWP. NWP output is evaluated via an objective process to identify model deviations from the sensed environment and evaluate the run-to-run consistency of meteorological models employed in the forecast process. Model verification products are used, along with subjective techniques such as continuity and extrapolation, as a guide for adjusting forecasts.

7.6.2. Ensembles. Units employ 557 WW's Air Force Weather Ensemble Prediction System (AFWEPS) and other Ensemble Prediction Suites (EPS) as a tool to assess a spectrum of possible environmental predictions to quantify the uncertainty inherent in a single model forecast. Inclusion of EPS output enhances the MDMP by providing objective data describing most dangerous and most likely environmental predictions.

7.6.3. GALWEM is the Air Force's trusted meteorological model for characterization of future terrestrial environmental conditions. Forecasters should use GALWEM from the trusted data source as the primary NWP tool.

7.6.4. The 557 WW will:

7.6.4.1. Develop, secure, operate, deploy, and exploit global and regional numerical weather model software and tailored models and applications at speed and scale to meet operational needs. **(T-1)**

7.6.4.2. Generate ODL objects and operate AFW enterprise applications that depict parameters and significant features on the representative model. Default parameters are found in **Table 7.5** and **Attachment 3**. **(T-1)**

7.6.4.3. Operate AFW enterprise applications to generate visualizations of forecast model output at 12-hour intervals starting at the base hour (e.g., 00Z or 12Z) through the 144-hour point for parameters listed in **Table 7.4**. **(T-1)**

Table 7.5. Default Weather Parameters Depicted in Model Output.

Chart	Parameters
300, 250 or 200 mb Package	Height contours (same as **Table 7.3**) Isotachs – Minimum value of 70kts with a 20-kt interval Closed Highs and Lows with center height values Areas of divergence. (Isopleth in blue dashed lines for areas $\geq$1.95 radians/sec 10^{-4} s^{-1})
500 mb Package	Height contours and temperatures (same as **Table 7.3**) Seasonal representative contour; maintain continuity to determine significant weather changes Closed Highs and Lows with center height values Vorticity isopleths Areas of Vorticity advection (positive advection shaded red, negative advection shaded blue) Significant areas of RH (isopleth in green or green color shade areas of 70% / 90%)
700 mb Package	Height contours and temperatures (same as **Table 7.3**) Closed Highs and Lows with center height values Isopleth in green or color shade in green areas of RH (70%/90%) Contour upward vertical velocity values – Base 0 interval $\pm$3 microbars/sec Qualitative Precipitation Forecast (QPF) output 0.25 inches (other values may be included as required based on season)
850 mb Package	Height contours and temperatures (same as **Table 7.3**) High and low centers. Closed Highs and Lows with center height values Identify areas of RH (70% / 90%) Wind Barbs Highlight the 0°C isotherm in blue
925 mb Package	Height contours and temperatures (same as **Table 7.3**) Closed Highs and Lows with center height values Areas of convergence Isopleth in green or green color shade RH (area of 70% / 90%) High and low centers Highlight the 0°C isotherm in blue
Surface Package	Isobars at 4 mb intervals Fronts, troughs, pressure centers, and tropical cyclones Areas of precipitation

7.7. 557 WW FITL Standard Forecast Graphics Products.

7.7.1. 557 WW will:

7.7.1.1. Generate FITL ODL objects for graphical product suite in **Table 7.6** valid at 3-hour intervals out to 30 hours. **(T-1)** 557 WW will utilize and apply forecast processes and procedures outlined in AFH 15-101, when generating FITL graphical products. **(T-1)** All graphical products, except theater thunderstorm forecast, are valid at a point in time and consistent with the spatial resolution of the model and clearly labeled with the spatial resolution of the depicted weather parameters.

7.7.1.1.1. One hour prior to each valid time, update the next two product sets (i.e., next valid "Current" and "Current+3-hour"). Update additional product sets per amendment and METWATCH criteria in **Table 7.7** and to eliminate temporal discontinuities between product sets. **(T-1)**

7.7.1.1.2. Create a new set of FITL objects for the 30-hour time step, every three hours. **(T-1)**

7.7.1.1.3. Operate applications to generate ODL objects and visualizations for time steps 33-120 hours or greater (as applicable) with the same temporal and spatial characteristics as FITL objects. **(T-1)**

7.7.1.2. Consider the geography changes in the AOR to prevent forecast MSL bases below general terrain heights. **(T-1)** This does not include the small-scale changes in terrain heights (e.g., differences between mountain peaks in close proximity), which units integrate into the mission execution forecast process to further refine forecasts.

Table 7.6. FITL Objects in ODL for Generating Graphics Suite.

Products	Weather Parameters	Threshold Values	Map Depictions
Icing **(Mean Sea Level (MSL))**	Mesoscale icing outside thunderstorms. Rime, clear (CLR) and mixed (MXD) Surface - 60,000ft (to the nearest 1,000ft)	Light (LGT) Moderate (MOD) Severe (SEV) **Note:** Forecasts specific for Category 2 aircraft (ref: AFH 15-101) in cruise attitude and airspeed taking no turbulence abatement actions.	As defined in **Attachment 3**
Turbulence (MSL)	Mesoscale turbulence outside thunderstorms. Mechanical, mountain wave (MTN Wave), and clear air turbulence (CAT) Surface - 60,000ft (to the nearest 1,000ft)	Light (LGT) (Surface to 18,000 only. **Note:** If no requirement exists, 557 WW may omit LGT) Moderate (MOD) Severe (SEV) Extreme (EXTRM) **Note:** Forecasts specific for Category 2 aircraft (ref: AFH 15-101) in cruise attitude and airspeed taking no turbulence abatement actions.	As defined in **Attachment 3**
Thunderstorms (MSL)	Theater-scale convective activity 3-hour period	Maximum instantaneous areal coverage Isolated (ISOL): 1-2% Few (FEW): 3-15% Scattered (SCT): 16-45% Numerous (NMRS):>45% **Note:** Abbreviations IAW Federal Meteorological	Maximum tops (MSL) Amount of coverage Thunderstorm symbol (optional stand-alone thunderstorm prognosis)

Horizontal Weather Depiction	Ceiling and Visibility	AGL Areas: < 1,500ft/3SM	As defined in **Attachment 3**
Surface Pressure, Fronts, and Weather	Mesoscale surface pressure centers and values, fronts, troughs Significant weather Tropical cyclone positions (as required, from official tropical cyclone forecast centers).	As displayed. Fronts maintained if air mass discontinuity exists	As defined in **Attachment 3**
Clouds	Mesoscale depiction of ceilings above 5,000ft AGL extending to the tropopause	Broken (BKN) or Overcast (OVC) cloud cover	As defined in **Attachment 3**
FL Winds	AGL: (005, 010, 015, 020, 030, 040, 050, 060, 080) MSL: (050, 100, 120, 140, 160, 180, 210, 240, 270, 300, 340, 390, 450, TROP)	Wind barbs every 5kts Temperature in Celsius every one degree Isotherm	As defined in **Attachment 3**

7.7.1.3. METWATCH and amend FITL aviation hazards information for the criteria listed in **Table 7.7** **(T-1)** Use perishable data (e.g., PIREPs/AIREPs, SIGMETs, AIRMETs, Automatic Dependent Surveillance-Broadcast, observations, radar data, and METSAT imagery) and NWP output available at forecast hours after the production cycle to METWATCH and amend products as required. **Note:** Units should coordinate with the 557 WW if they evaluate an amendment may be required. Due to the subjectivity of hazard reports, 557 WW has the decision authority on chart amendments. 557 WW products are intended to provide forecasters with an initial first look to assist in the MEFP process and are not the control weather products unless coordinated by the Lead Weather Unit (LWU).

Table 7.7. Amendment Criteria for 557 WW Standard FITL Graphics Products.

1. Moderate or greater icing incorrectly depicted in horizontal extent, vertical extent, type, intensity, or time of occurrence IAW AFH 15-101.
2. Moderate or greater turbulence incorrectly depicted in horizontal extent, vertical extent, intensity, or time of occurrence IAW AFH 15-101.
3. Lines or organized clusters of thunderstorms not easily circumnavigated (usually described as numerous thunderstorms) incorrectly depicted on the forecast IAW AFH 15-101.
4. Thresholds listed in **Table 7.6** incorrectly forecast IAW AFH 15-101.
5. Vertical extent incorrectly forecast by ≥2,000 ft below 10,000AGL, ≥5,000 ft above 10,000MSL. 6. Horizontal extent incorrectly forecast by ≥90 nautical miles.
7. Graphical depiction is not representative of existing or forecast conditions.

7.8. Automated/Real-Time Products. The 557 WW will operate applications to dynamically generate objects and/or graphical layers as listed in **Table 7.8** **(T-1)** The 557 WW may be requested to generate additional layers for display based on coordinated, validated, and supported user requirements IAW **Chapter 10**.

Table 7.8. The 557 WW Automated/Real-Time Product Layers.

Weather Parameters	Default Threshold Values/Parameters
Temperatures Aloft	Height of -20C, -35C, -40C. -60C surfaces in 1,000ft increments.
Surface Wind Speed	Wind displayed in 5-knot intervals. **Note:** May be displayed as wind barbs or, color fills, or moving streamlines
Surface Temperature	Base 0^{o}C, interval 2^{o}C and/or 5^{o}F. **Note:** May be displayed as isopleths, color fills, or threshold object

Surface Wind Chill Temperature	Base -5°C incremented every 5°C and/or Fahrenheit equivalent above that value. **Note:** The 557 WW may operate applications that generate additional heat stress products to meet mission requirements (e.g., Fighter Index of Thermal Stress, approximated Web Bulb Globe Temperature, etc.)
Heat Stress Index	Base 25°C incremented every 5°C above that value. **Notes:** The 557 WW may request additional heat stress products to meet mission requirements in the AOR (e.g., Fighter Index of Thermal Stress) Units may substitute equivalent Fahrenheit values provided the product legend clearly indicates units of measure
METEOGRAM/ TARP	FL Winds 1000-150mb, SLP 1000-500m thickness, Altimeter (inches HG), Pressure Altitude (ft), Wind speed and gusts (kts), 3-hr precipitation amounts (inches), Convective Gusts (kts), Hail size (inches), Temperature/Dewpoint (°F/C)
Flight Level Winds	See **Table 7.6.**
Skew-T	Temperature and dew point vertical profiles, wind directions and speeds at significant levels, tropopause height, height of the freezing level(s)height and speed of the maximum wind, Lifted Condensation Level (LCL), Lifted Index (LI), Total Totals (TT), Convective Available Potential Energy (CAPE), Convective Inhibition (CINH), Convective Condensation Level (CCL), Showalter Stability Index (SSI)
Meteorological/ Forecaster Calculators	Temperature Conversion, Heat Index, Humidity, Wind Chill, Altimeter Setting, Density/Pressure Altitude, D-Value, Distance, Speed, Cross/Tail Wind, Weight, Volume, Lat/Long, Standard Atmosphere, SLP, FITS, Solar/Lunar, Wind Vector, DCAPE
Special Weather Statement/Threat Tracker	Color Coded parameters for weathers threats, to include Tornados, Severe Thunderstorms, 50Kt+ winds, Moderate Thunderstorms, 35-49kt winds, Heavy rain, Heavy Snow/Blizzard, Freezing Precipitation, Dust/Sandstorm, Unsuitable Alternate (visibility/ceiling less than 1000m/2mi), Tropical Cyclones, Persistent Cold for over 96 hours, and Max Temperature less than or equal to –20°C
Verification Initialization Verification	Altimeter, Temperature, Dewpoint, Wind Direction, Wind Speed, Ceiling and Visibility parameters
Satellite	Global Water vapor, Infrared (IR), Visible

RADAR	Sensed mosaic and/or simulated RADAR Composite Reflectivity, Base reflectivity, Precipitation type, etc.
Lightning	Near real time lightning strikes Type: Cloud-to-Ground, Cloud-to-Air (includes in cloud-to-cloud) Strike polarity: positive / negative Visualize strike currency every 0-1, 1-3, 3-6, 6-10, 10-15 and 15-30 minutes **Note:** Lightning data may be post processed for employment in Artificial Intelligence / Machine Learning applications assessing near term threats based on character and trends

7.9. Joint Operational Area Forecast (JOAF). JOAFs are the official baseline METOC planning forecast that inform the Joint Force Commander coordinated battle plan. Components and individual units will use the JOAF as the point of departure to tailor METOC information and to develop tailored mission execution forecasts. The 557 WW or designated LWU produces a JOAF for new contingences or exercises when requested IAW **Chapter 10**. Development or cancellation of a JOAF is coordinated via the SMO, JMO, or designated LWU per **Table 4.3**.

7.10. Meteorological Discussions.

7.10.1. 557 WW will operate applications and generate standardized meteorological analysis and forecasts discussions based on the 00Z and 12Z synoptic analysis issued as soon as applicable model solutions are available. **(T-1)**

7.10.2. 557 WW will use, at a minimum, topics listed in **Table 7.9** in discussion products.

Table 7.9. Minimum Items Included in 557 WW Discussion Bulletins.

1. Current air masses 2. Current upper air pattern 3. Significant synoptic and regional weather features 4. Significant weather features in current meteorological satellite imagery 5. Departures/deviations and identification of the NWP model 6. Model Verification	7. Hazardous weather in the AOR to include severe weather, turbulence, icing, precipitation, winds, low ceilings/visibilities, and other items deemed significant to the 557 WW forecaster 8. Space weather impacts (if relevant to daily operations) 9. Pertinent 557 WW operations information (e.g., scheduled outages and product availability), if applicable

Chapter 8

SPACE WEATHER OPERATIONS

8.1. General. Space weather comprises a set of naturally occurring phenomena resulting from the behavior of the sun and its interaction with the earth's magnetic field and atmosphere. Extreme space weather events can degrade or damage critical infrastructures, which may result in direct or cascading failures across key services such as electric power, communications, water supply, healthcare, satellite operations, and transportation. Space weather can damage or disrupt space-based assets, jeopardize, or impair crewed and uncrewed space activities, and adversely affect the ability to track objects in space. Space weather effects on ground systems, such as radars, or space-, air-, and ground-based communication links, pose a risk to national and homeland security.

8.2. Unit Responsibilities.

8.2.1. 557 WW operates the DAF 24/7 Space Weather Operations Center that operates on all security domains. In this capacity, the 557 WW will:

8.2.1.1. Operate the Air Force's SEON.

8.2.1.1.1. Provide solar observations and observed radio bursts. **(T-0)**

8.2.1.1.2. Employ the solar observing network to maintain continuous situational awareness of solar conditions and activity.

8.2.1.1.3. Maintain a space weather catalog on the program of record space weather page, which describes all products issued. **(T-1)**

8.2.1.2. Employ space weather modeling capabilities using Space Domain Awareness Environmental Toolkit for Defense and other applications/tools. **(T-1)**

8.2.1.2.1. Monitor other space- and ground-based sensors for space domain awareness. **(T-1)**

8.2.1.2.2. Collect and analyze solar radio and optical data from the solar observing network to provide continuous space domain awareness and its impacts to orbital operations and the near-earth space environment. **(T-0)**

8.2.1.3. Generate and disseminate event level alerts and forecast and observed warnings impacting space operations and ground communications to DoD organizations, IC, and other government agencies. **(T-0)**

8.2.1.4. Serve as the lead analysis unit for the DoD and NATO by generating routine bulletins, forecasts, special notices, and data characterizing for the past, current, and future state of the natural environment in the space domain, as needed.

8.2.1.4.1. Execute tactics, techniques, and procedures to analyze the current state of the environment in the space domain. **(T-0)**

8.2.1.4.2. Analyze the current state of space weather using models, observations, and forecaster inputs, focusing on how space weather impacts the warfighter. **(T-0)**

8.2.1.4.3. Produce global and regional events and impact charts. These charts depict observed and forecast solar, charged particle and geomagnetic events, and their impact on communications, satellite operations, space object tracking, and high-altitude flight and over the horizon radars. **(T-1)**

8.2.1.5. Conduct space anomaly environmental assessments for the DoD and IC to determine the likelihood that the natural environment caused an anomaly. **(T-0)** Upon notification of a space anomaly, saves all pertinent space weather data still available to reconstruct the environmental picture at the time of the anomaly. **(T-1)**

8.2.1.6. Provide subject matter expertise to guide processing and responding to requests for specialized space domain weather data, products, or information, as requested. See **Chapter 10**. **(T-1)**

8.2.1.7. When notified of an incident, conduct aircraft/ground mishap procedures for all mishaps involving space-segment assets (including during space lift or on-orbit), as required. **(T-1)**

8.2.1.8. Conduct post-mission analysis, including space anomaly assessments, as required. **(T-1)**

8.2.2. Space Delta 5 Weather Support Team (WST). The Delta 5 WST is integrated with the Combat Operations Division of the Combined Space Operations Center (CSpOC) at Vandenberg Space Force Base (SFB), CA. They are responsible for providing space and terrestrial weather support to enable C2 of Combined Forces Space Component Command operations. Delta 5 WST will:

8.2.2.1. Integrate with all elements of the CSpOC to provide tailored terrestrial and space weather support. **(T-2)**

8.2.2.2. Deliver tailored space alert and warning notification to non-DoD space domain partners and the Commercial Integration Cell. **(T-2)**

8.2.2.3. Conduct initial anomaly assessments to determine the likelihood that the natural environment contributed to an anomaly. When required and as time allows, coordinates with 557 WW for assistance on initial assessments. Notify 557 WW of all anomaly assessments to facilitate 557 WW data save. When initial assessment determines a moderate to high likelihood of environmental factors contributing to the anomaly, requests 557 WW conduct a comprehensive anomaly assessment. **(T-2)**

8.2.2.4. Support additional elements of space domain C2 with routine and on-demand tailored terrestrial and space weather support. **(T-2)**

8.2.3. 21st Logistics Readiness Squadron (21 LRS)/OSW WF. The 21 LRS WF is responsible for weather support to the Peterson-Schriever Garrison. They fulfill the roles and responsibilities of a traditional WF outlined in **Chapter 2** and have additional roles and responsibilities in support of Space Operations Command (SpOC). In their role supporting SpOC, 21 LRS/OSW will:

8.2.3.1. Coordinate with SpOC operational Deltas and Squadrons that do not have assigned weather forces to provide tailored terrestrial and space weather support. **(T-2)** In situations where 21 LRS/OSW lacks required resources, training, or equipment to provide required support, coordinate with AFMC weather branch to address capability gaps and identify interim support solutions. **(T-1)**

8.2.3.2. Conduct initial anomaly assessments to determine the likelihood that the natural environment contributed to an anomaly. When required and as time allows, coordinates with 557 WW for assistance on initial assessments. Notify 557 WW of all anomaly assessments to facilitate 557 WW data save. When initial assessment determines a moderate to high likelihood of environmental factors contributing to the anomaly, requests 557 WW conduct a comprehensive anomaly assessment. **(T-2)**

Chapter 9

KQ TEMPORARY LOCATION IDENTIFIERS (KQ IDS)

9.1. General. The 557 WW assigns special use temporary location identifiers beginning with KQ, for use by deployed units supporting the following: real-world contingencies; deployed/in-garrison units providing support during exercises; classified operating locations; supplemental information at locations with an indigenous observation; and units that have requested, but not yet received a permanent location identifier. **(T-1)**

9.2. Requesting KQ IDs. Route KQ ID requests through the parent MAJCOM/Air Force component to the 557 WW KQ ID Manager.

9.2.1. Contact the KQ ID Manager:

9.2.1.1. During normal duty hours (non-holiday weekdays 0730L-1630L, U.S. Central Time):

9.2.1.1.1. ORG MAILBOX ADDRESSES (use to ensure quickest response):

9.2.1.1.1.1. NIPR Mail: **AFWAKQ@US.AF.MIL**.

9.2.1.1.1.2. SIPR Mail: **usaf.offutt.557-ww.mbx.afwakq@mail.smil.mil** (not monitored constantly – follow up with NIPR email and/or phone call).

9.2.1.1.2. Commercial Phone: (402) 294-1409 DSN Phone: 271-1409.

9.2.1.2. During non-duty hours (after 1600L/before 0700L, U.S. Central Time, weekends, and holidays), or in case of emergency:

9.2.1.2.1. 557 WW 24/7 Data Center Operations Contact Information:

9.2.1.2.1.1. NIPR: **2SYOS.SYO.DataCenterOps1@us.af.mil**.

9.2.1.2.1.2. SIPR: **usaf.offutt.557-ww-mbx.afwa-aspopc@mail.smil.mil**.

9.2.1.2.2. Commercial Phone: 402-294-2586, option 3 DSN Phone: (312) 271-2586, option 3.

9.2.2. Request KQ IDs as far in advance as possible to ensure timely issuance.

9.2.3. MAJCOMs/Air Components collate KQ requests from subordinate units and will relay these requests to the 557 WW KQ ID manager. The KQ ID manager will then provide the MAJCOM/Air Component with the KQ ID(s), as requested. **(T-1)**

9.2.4. KQ ID requests should include as much of the following information as possible:

9.2.4.1. Start and stop dates (if known).

9.2.4.2. Name, organizations, e-mail address, and DSN/commercial phone number of POC.

9.2.4.3. Classification of location and supported operation or exercise.

9.2.4.4. Name of exercise, test, contingency, etc.

9.2.4.5. Location name, latitude, longitude, and elevation; must be provided in degrees/decimal/meters.

9.2.5. If mission and time constraints limit the amount of information the requestor can provide or the ability to submit the request through the parent MAJCOM/DAF Component, the KQ ID manager issues the KQ ID(s) and follows up with the POC, when time permits.

9.3. Classified KQ Compromise. Immediately report compromised classified KQ IDs through appropriate channels to the 557 WW KQ ID manager via secure means, if possible. **(T-1)**

9.4. KQ ID Use. Units issuing surface observations and/or TAFs will:

9.4.1. If available and practical, use established ICAO location identifiers for enduring airfields, after coordination with the proper airfield authorities.

9.4.2. Control of KQ ID Information.

9.4.2.1. Unclassified KQ-information qualifies as operations sensitive and combat mission sensitive information, and access is controlled according to DoDI 8520.03, *Identity Authentication for Information Systems* and, at a minimum, protect as Controlled Unclassified Information (CUI).

9.4.2.2. Restrict non-DoD (e.g., allied/coalition) access to KQ-related information (locations, identifiers, and weather information) as directed. Make all efforts to restrict non-DoD member access to only the specific KQ-information for the operation in which they participate when used in support of allied/coalition operations. **(T-2)**

9.4.2.3. Protect unclassified documents, presentations, or reports based on TAFs or surface observations issued under KQ-identifiers as defined in AFI 10-701, *Operations Security*, when linked to a location identifier.

9.4.3. Due to their temporary nature, do not use KQ IDs in any permanent guidance such as SOPs, OPORDs, and FLIPs. This is to avoid the use of KQ IDs after they have been reclaimed and/or deactivated. If a placeholder needs to be in any of those types of documents, the following language is acceptable: "Coordinate KQ temporary location identifier (KQ ID) requirements/requests through the parent MAJCOM/Air Component to the 557 WW KQ ID Manager (**AFWAKQ@us.af.mil**)".

9.5. KQ ID Deactivation. Once a KQ site is no longer in operational use, the KQ-information, and reports (e.g., archived observations, climate summaries, etc.) for unclassified sites may be released unless otherwise directed. The information and reports should refer to the actual location and not the temporary/supplemental KQ-identifier. For KQ IDs and their information/reports for classified sites follow guidance set by the appropriate classification authority.

Chapter 10

REQUEST FOR WEATHER CAPABILITIES

10.1. General. Weather unit leadership employs internal resources and leverages existing weather products to fulfill mission requirements. When that leadership determines that organic capability and/or capacity is insufficient or otherwise unable to satisfy requirements, and the leadership is unable to mitigate the situation locally, that unit should engage with their appropriate chain of command for resolution. If the chain of command is unable to de-conflict or re-prioritize resources internally to meet mission requirements, they can leverage the following processes to meet mission weather requirements:

10.1.1. If attached or assigned to a CCMD and participating in a Joint or named operation, unit leadership communicates their situation to the Service component SWO. If the Service component SWO determines that the unit requires additional capability, the Service component SWO then works through the component's channels to request that the CCMD submit a Request for Forces (RFF) for capability that cannot otherwise be satisfied using assigned or allocated forces IAW CJCSM 3130-06C, *Global Force Management Allocation Policies and Procedures*. **NOTE:** All assigned and attached capabilities within the requesting unit's chain of command should be considered to provide support prior to submitting an RFF.

10.1.2. When participating in Joint Exercise Program-related events, the component weather staff submits an exercise Force Request (FR) to the appropriate MAJCOM/theater component exercise branch using the Joint Training Information Management System (JTIMS). **Note**: JTIMS is a planning tool and does not directly task a supporting organization; units making a JTIMS request, as well as those components or Services participating in component- or Service-level exercises (i.e., non-Joint Exercise Program events), should also accomplish the Support Assistance Request (SAR) process, discussed in **paragraph 10.1.3**. Also note that the Service HQ must approve all requests for Service-retained force participation in Joint exercise events IAW CJCSM 3130.06.

10.1.3. Support Assistance Requests (SAR). A SAR is a request for one-time, short-term specialized terrestrial, space, EMS, or climatological weather data, information, or product not already available and within the requested unit's capability and capacity. Requesting units use SARs when the RFF or FR process is not applicable, and the requesting unit lacks the capability to produce the needed data, information, products, or services to meet mission requirements. SARs generally entail a variation of an existing product or service such as a change in location, timing, or format. Units requiring support should refer to **Chapter 2** to determine the appropriate supporting weather organization. See **Table 10.1** for requested unit processing, prioritization, and response times (i.e., time allowed to inform requesting units if the capability exists to satisfy their request) for SARs.

10.1.3.1. If requesting a SAR from a non-557 WW unit, the requesting unit submits a weather SAR utilizing the requested unit's SAR process, as applicable for those units with a SAR process. Requesting units will info copy the requesting and requested unit's MAJCOM/C-NAF staffs, as applicable. **(T-2)**

10.1.3.2. For 557 WW SAR requests, contact 557 WW/A3 Wing Operations Center (WOC) at DSN 312-271-9727 or **557WW.A3.Workflow@us.af.mil**.

10.1.3.3. Requested units will provide a response to the requesting unit when it is unable to satisfy a SAR. **(T-1)** Requesting units should contact their chain of command and/or MAJCOM for assistance in resolving Service support needs. Units should contact their Service component weather staff, JMO, and/or SMO for Joint support needs.

Table 10.1. Prioritization, Processing, and Response Time for SARs.

Priority	Type	Level of Support	Duration	Required Response Time to Requestor
1	Wartime/ Contingency (OPLAN, HADR, Emergent Ops)	Joint / DAF / Army	Indefinite	3 hours
2	CCMD/ Intelligence Community	Joint / DAF / Army	<90 days	<24 hours
3	Emergency COOP	Home Station Airfield / Aircrew Support	<30 Days	<1 hour and implement COOP within 2 hours
4	Real World Operations / Training / Planned COOP	Joint / DAF / Army	<30 Days	<48 hours
5	Exercises	CCMD /Joint	Any	<72 hours
6	Exercises	DAF / Army Home Station Large Formation Exercise (LFE) –Named Exercise	Any	<72 hours
7	Exercises	DAF / Army Home Station LFE – not a Named Exercise	Any	<72 hours
8	Climatology	Any	Any	<72 hours

10.1.4. Weather Requirements Request (WRR). A WRR is for equipment, hardware and/or software capabilities not already available within the Weather Enterprise. Weather units at any level will submit these requests through the chain of command to the MAJCOM functional team for validation before submission the Lead Command Weather Requirements Division (HQ ACC/A5W). **(T-1) Note:** For space weather WRRs, HQ SpOC DCG-O/S36S Space Domain Awareness & Environmental Monitoring Mission Area Team execute the responsibilities as lead command. These requests must be established by, derived from, and

traceable to assigned roles, missions, functions, and operations codified in policy or understood in the context of associated Concepts of Operations. Lead Command will include validated WRRs in annual resourcing programs for prioritization and potential funding IAW established Joint Capabilities Integration and Development System (JCIDS) / Integrated Priority List (IPL) processes. **Note:** Submitting a WRR does not guarantee approval/funding. Service components submitting Joint Urgent Operational Needs and Joint Emergent Operational Needs statements will follow a separate process which ACC/A5W does not govern.

10.2. Foreign (Allied or Partner) Military Operations Support and Data Requests. Units receiving requests for support from foreign entities should direct those entities to request support from the Joint Staff or applicable CCMD.

10.3. Contractor Data Exchange Requests and Contractor-Owned, Contractor-Operated Mission Support. Requests for support that result in delivery of data, information, products, or services to contractor-owned/contractor-operated entities, or sent for contractor-operated mission support, must be staffed through the supported higher headquarters (e.g., CCMD, OSD, MAJCOM) and validated by the applicable contracting and legal offices. **(T-1)** Confirm the government's responsibility with the local contracting office before providing weather support to contractors **(T-3)** If the contract or associated documents do not directly specify the government will provide support, the supporting weather organization will not provide support unless the contract is modified. (**https://intelshare.intelink.gov/sites/afica-ocs-portal/SitePages/Home.aspx**). **(T-3)**

JAMES C. SLIFE, Lt Gen, USAF
Deputy Chief of Staff, Operations

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

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Abbreviations and Acronyms

ACC—Air Combat Command

AFAFRICA—Air Force Africa

AFI—Air Force Instruction

AFOG—Air Force Operations Group

AFMAN—Air Force Manual

AFPD—Air Force Policy Directive

AFSOF—Air Force Special Operations Force

AFW—Air Force Weather

AFWWS—Air Force Weather Weapons System

AGL—Above Ground Level

AIREP—Aircraft Report

AMC—Air Mobility Command, Army Materiel Command

ANG—Air National Guard

AOB—Airfield Operations Board

AOL—Alternate Operating Location

AOR—Area of Responsibility

AIRMET—Airmen's Meteorological Information

AR—Army Regulation

ARNG—Army National Guard

ARSOF—Army Special Operations Force

ASCC—Army Service Component Command

ATC—Air Traffic Control

C-MAJCOM—Component Major Command

C-NAF—Component Numbered Air Force

C2—Command and Control

C2IMERA—Command and Control Incident Management Emergency Response Application

CAP—Civil Air Patrol

CBRN—Chemical, Biological, Radiological, Nuclear

CCMD—Combatant Command

CDM—Chemical Downwind Message

CFP—computer flight plan

CONOPS—Concept of Operations

CONUS—Continental United States

COOP—Continuity of Operations Procedures

COP—Common Operating Picture

CPHC—Central Pacific Hurricane Center

CSpOC—Combined Space Operations Center

CWF—Combat Weather Flight

CWOP—Citizen Weather Observation Program

CWP—Control Weather Products

CWSS—Combat Weather Systems Squadron

Det—Detachment

DLT—Desired Lead Time

DoD—Department of Defense

DPD—Dew point Depression

DSCA—Defense Support to Civil Authorities

DZ—Drop Zone

EDM—Effective Downwind Message

EMS—Electro-magnetic spectrum

ESF—Emergency Support Function

FAA—Federal Aviation Administration

FITL—Forecaster in the Loop

FLIP—Flight Information Publication

FM—Field Manual

FRAGO—Fragmentary order

FRM—Forecast Reference Material

FWB—Flight Weather Brief

GALWEM—Global Air Land Weather Exploitation Model

GCC—Geographic Combatant Command

GDSS—Global Decision Support System

GHOC—Global Hawk Operations Center

HF—High Frequency

HQDA—HQ Department of the Army

HSF—Human Space Flight

IAW—in accordance with

ICAO—International Civil Aviation Organization

IDT—Inactive-Duty Training

IDP—Installation Development Plan

IMCOM—Army Installation Management Command

IFM—Integrated Flight Management

IPOE—Intelligence Preparation of the Operational Environment

JA—Joint Airborne

JMO—Joint Meteorological and Oceanographic Officer

JOAF—Joint Operational Area Forecast

JTIMS—Joint Training Information Management System

JTWC—Joint Typhoon Warning Center

KQ ID—"KQ" Temporary Location Identifier

LFE—Large Formation Exercise

LRE—Launch and Recovery Element

LWU—Lead Weather Unit

LZ—Landing Zone

M&S—Modeling and simulation

MAF—Mobility Air Forces

MAJCOM—Major Command

MCE—Mission control element

MDMP—Military Decision-Making Process

MEFP—Mission Execution Forecast Process

METOC—Meteorological and Oceanographic

METSAT—Meteorological Satellite

METWATCH—Meteorological Watch

MIL-STD—Military Standard

MOA—Memorandum of Agreement

MOU—Memorandum of Understandings

MSL—Mean Sea Level

NASA—National Aeronautics and Space Administration

NEXRAD—Next Generation Weather Radar

NHC—National Hurricane Center

NOAA—National Oceanic and Atmospheric Administration

NOTAM—Notice to Airmen

NWP—Numerical Weather Prediction

OCONUS—Outside of the Contiguous United States

ODL—Operational Data Layer

OI—Operating Instruction

OPLAN—Operation Plan

OPORD—Operation Order

OSS—Operational Support Squadron

OWS—Operational Weather Squadron

PACAF—Pacific Air Force

PAROC—Persistent Attack and Reconnaissance Operations Center

PIREP—Pilot Report

PMSV—Pilot to Metro Service

POC—Point of Contact

POD—Plan of the Day

RH—Relative Humidity

RAWS—Radar, Airfield and Weather Systems

RDT&E—Research, Development, Test, and Evaluation

RFA—Requests for assistance

RM—Risk Management

RMF—Risk Management Framework

ROT—Rule of Thumb

RP—Resource Protection

RPA—Remotely Piloted Aircraft

RSC—Runway Surface Condition

RCR—Runway Condition Reading

RSO—Remote Split Operations

SAA—Senior Airfield Authority

SAR—Support Assistance Request

SEON—Solar Electro-Optical Network

SIGMET—Significant Meteorological Information

SMO—Senior METOC Officer

SPO—Sponsored Projects Officer

SOP—Standard Operating Procedures

SPECI—Special Weather Observation Criteria

SpOC—Space Operations Command

SSC—Space and Systems Command

SWAP—Severe Weather Action Plan

SWO—Staff Weather Officer

TACC—Tanker Airlift Control Center

TAF—Terminal Aerodrome Forecast

TASKORD—Tasking Orders

TDA—Tactical Decision Aid

TEMPO—Temporary

TPOC—Technical Point of Contact

TTP—Tactics, Techniques, and Procedures

UHF—Ultra High Frequency

USAFE—United States Air Forces Europe & Air Force Africa

USN—United States Navy

USSF—United States Space Force

USACE—United States Army Corps of Engineers

UTC—Unit Type Code, Coordinated Universal Time

WF—Weather Flights

WHMO—White House Military Office

WMO—World Meteorological Organization

WP—Weather Product

WR—Weather Reconnaissance

WRR—Weather Requirements Request

WS—Weather Squadron

WSD—Weather Support Document

WST—Weather Specialty Team

WW—Weather Wing

WWA—Warning, Watch, Advisory

Terms

Aircraft Report—A routine, often automated report of in-flight weather conditions.

Climatology—In contrast to weather, which encompasses the state of the atmosphere over a brief period, climatology represents the statistics of day-to-day weather conditions averaged over a longer period. A location's climatology may be represented by quantities such as average (or mean) and extreme conditions that are often based on 10 or more years of measured or observed conditions. Within the DoD, climatology data and depictions can inform planning, design, basing, and strategy decisions.

Climate Prediction—Prediction of how large-scale atmospheric patterns will deviate from a base reference period (climate normal) on temporal scales ranging from weeks to one year.

Climate Projection—The simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases (GHGs) and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission / concentration / radiative forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized. Climate projections are generally applicable beyond 10 years, except in the Arctic where projections should be used beyond 5 years.

Continuity—The property of a field such that neighboring values of a parameter differ only by an arbitrarily small amount if they are close enough in space and/or time. In synoptic meteorology, continuity of a field is interpreted as requiring a certain smoothness of analysis and a similar adjustment in the time sequence of synoptic charts.

Coronet—Mission where airspace designated for refueling aircraft that need to travel large distances, either over land or oceans, moves with the group of aircraft i.e., a moving Air Refueling track.

Decision Cycles—Joint Operational Planning Process, MDMP, Joint Intelligence Preparation of the Operational Environment, Intelligence Preparation of the Operational Environment, RM process, and Common Operating Picture.

Desired Lead Time—Customer defined time (in minutes) the supported organization requires a WWA to be issued, to complete protective actions prior to the onset of hazardous weather phenomenon.

False Alarm—When a lightning watch, weather warning, or forecast weather advisory is issued and the specified criteria does not occur during the specified valid time.

Forecaster-In-the-Loop—Term covering a range of human activities to ensure forecast information is meteorologically sound. FITL activities span a broad spectrum from a basic review and editing of information to a detailed production process to create specific environmental information.

Forecast Weather Advisory—A weather advisory issued when the supported user requires advance notification of an impending weather condition with sufficient time to allow for protective actions.

General Weather Support—Support provided for points and areas not tailored to specific missions.

Global Power—AFGSC tasked bomber "out-of-CONUS" long-range missions.

Global Reach—The ability to place a military platform – for reconnaissance, humanitarian, or operational purposes – above any point on the Earth in a matter of hours and provide strategic mobility to rapidly position or reposition forces anywhere.

Horizontal Consistency—Weather data provided in one product that is consistent to data provided in another product for the same area and time. For example, TAFs must be consistent with all other products, including the current observation, weather warnings, weather advisories, lightning watches, etc. Elements within each TAF must also be consistent, for example, if heavy snow showers are forecast, the visibility will be restricted appropriately. Strong gusty winds or hail would generally be expected if severe thunderstorms were forecast. Product consistency prevents supported users from receiving conflicting information.

ICAO Identifier—A specifically authorized 4-letter identifier assigned to a location. The ICAO is not to be confused with the Routing Identifier used by the Automatic Digital Weather Switch to transmit addressed messages including Automated Response to Queries. Routing IDs may not always match a station ICAO and can have 5 characters.

Installation Data Page—A document defining the specific environmental support requirements, technical data, reference material, and contact information for each organization.

International Civil Aviation Organization—A United Nations organization specializing in international aviation and navigation.

Issue Time—The time when an agency is notified of a watch, warning, or advisory. When more than one agency is notified, the issue time is the time the last agency is notified. Follow-up notifications are not considered when determining issue time.

Joint Operational Area Forecast—The official baseline meteorological and oceanographic forecast for operational planning and mission execution within the joint operations area. Also called JOAF.

KQ Temporary Location Identifier—Location identifiers (similar but NOT ICAOs) beginning with KQ used by deployed units supporting real-world contingencies; deployed/in-garrison units providing support during exercises; classified operating locations; and units that have requested, but not yet received a permanent location identifier.

Launch and Recovery Element—Deployed personnel based at a forward location who are responsible for the launch, recovery, and ground support of an RPA.

Lead Weather Unit—The weather unit having overall responsibility for coordinating air and space weather support and providing or arranging forecasts for the CWP.

Mesonet—A network of automated weather, often including environmental monitoring stations, designed to observe mesoscale meteorological phenomena and/or microclimates.

Mesoscale—Systems which vary in size horizontally from 1 to 500 nautical miles (2 to 926 kilometers) and have a duration from tens of minutes to several hours (e.g., low level jets, squall lines, thunderstorms, clear air turbulence, or land-sea breezes).

METWATCH—This is a deliberate process for monitoring environmental conditions in the land, air, and space domains to identify when and where sensed conditions significantly diverge from forecast conditions to determine course(s) of actions to update or amend forecasts and notify end users (as necessary).

Military Hydrology—A specialized field of hydrology that deals with those characteristics of surface and subsurface water that may affect the planning and conduct of military operations.

Mission Execution Forecast Process—A systematic, repeatable process for tailoring WPs and forecasting mission-limiting meteorological parameters and providing decision quality environmental information for an operational end user. This process provides a basic framework for fusing perishable meteorological data, operational and strategic forecast products, and an understanding of the supported user's tactics which will be applied to any mission their supported user may undertake. The MEFP describes an end-to-end process incorporating management steps, forecast development, mission meteorological watch, and post- mission analysis of the information provided.

Mission Profile—describes a mission's operating platform(s), route, flight level(s), weapons systems, equipment, target(s), Tactics/Techniques/Procedures (TTPs), and timing.

MISSIONWATCH—A deliberate process of monitoring terrestrial weather or the space environment for specific mission-limiting environmental factors that may adversely impact missions in execution. WFs and WSTs perform the MISSIONWATCH process with the intent to identify previously unidentified environmental threats and alert decision-makers at the operational unit and/or airborne mission commanders, enabling dynamic changes to mission profiles that may mitigate the environmental threat and optimize the chance of mission success.

Numerical Weather Prediction—The processes involved in representing the atmospheric system with fundamental mathematical equations, which can be solved in discrete time steps to achieve a numerical forecast of the parameters (e.g., pressure, temperature, humidity) used to define the state of the atmosphere.

Object(s)—A self-describing data type containing state (data) and behavior (code) corresponding to things found in the real world. Objects are defined in terms of attributes they possess and operations they perform based on their relationship with other objects. For example, a hazards object interacting with a flight route corridor object generates an impact to flag a route leg for human interaction.

Objective Verification—A set of predetermined meteorological criteria used to determine the accuracy of a forecast product.

Observed Weather Advisory—A weather advisory issued when a particular weather event first occurs, and the supported user does not require advanced notification of the observed weather phenomenon.

Observed Weather Warning—A weather warning issued when a particular weather event first occurs, and the supported user does not require advanced notification of the observed weather phenomenon.

Operational Data Layer—The trusted and validated array of environmental data and information provided for direct consumption by decision makers and their systems. The ODL is a collection of objects presented in machine readable code formats for generation into products and visualizations or consumption by artificial intelligence / machine learning applications to facilitate rapid and effective decision making in advanced battle management systems.

Operational Weather Squadron—A multi-disciplined unit conducting operations to provide trusted environmental data and information in the land, air, and space domains to satisfy enterprise and combatant command mission needs.

Pilot Report—A report of in-flight weather provided by an aircrew member for use over the United States and Canadian airspace.

Risk Management—The systematic process of identifying hazards, assessing risks, analyzing risk control measures, making control decisions, implementing risk controls, and supervising and reviewing the process.

Remote Split Operations—Remote Split Operations refers to the geographical separation of the LRE crew from the mission crew who employ the aircraft at a location other than where the aircraft is based. Advantages of this construct are typically reduced forward footprint, more rapid deployment, and potential flexibility in asset allocation between other Joint Operational Areas. However, this construct also presents unique C2 challenges. Command relationships and tasking and support authorities must be clearly articulated and understood by all participating forces. (Ref JP-3-30, *Joint Air Operations*)

Severe Thunderstorm—A thunderstorm presenting a threat to lives or property that requires agencies to enhance resource protection measures. Generally, thunderstorms producing hail greater than or equal to ¾ inch (½ inch) diameter and/or surface wind greater than or equal to 50 knots (45 knots) on Air Force (Army) installations.

Severe Weather—Any weather condition that poses a hazard to property or life.

Severe Weather Action Plan—Actions taken by a weather unit to enhance the unit's response capability during a severe weather event. Actions include, but are not limited to, recalling personnel or reallocating resources from other tasks to provide focused support during a severe weather event.

Special Weather Statement—A 557 WW notice to supported customers of meteorological effects which could impact future operations. This notice is for situational awareness purposes only and does not require action by supported customers.

Subjective Verification—A review to determine meteorological soundness by comparing the product in question with other weather data and products.

Support Assistance Request—Within weather operations, a request for a specialized weather, space environmental, or climatological support product(s) from a weather production unit. A request for information (from a non-weather activity) may qualify as a SAR if the analysis and production is within the scope of production for the unit. **Note:** A SAR is not a mechanism or requirements document to request additional manpower, or products or capabilities that would drive a software or hardware baseline change to an existing system.

Synoptic Scale—Systems which vary in size horizontally from 100 to 1,000 nautical miles and have a duration of tens of hours to several days (e.g., migratory high- and low-pressure systems, frontal systems, or tropical cyclones).

Terminal Aerodrome Forecast—A coded weather bulletin providing the official forecast information for an aerodrome complex to facilitate flight planning and command and control activities.

Valid Time—Time in which weather watches, warnings, and/or advisories are in effect. Valid times start when meteorological phenomena are expected to begin. Valid times end when phenomena is/are expected cease.

Weather Advisory—A special WP to alert an end user of the occurrence of, or imminent occurrence of weather conditions impacting operations.

Weather Flight/Detachments—Weather flights, detachments, and operating locations whose primary purpose is to facilitate exploitation of the environment through integration at every step of the operations planning and execution process. The WF/Dets may be located with the supported unit on an Air Force base, Army post, remotely located in another weather unit, or at a deployed location.

World Meteorological Organization—The WMO is an intergovernmental organization with a membership of 193 Member States and Territories. WMO works to facilitate worldwide cooperation in the design and delivery of meteorological services, foster the rapid exchange of meteorological information, advance the standardization of meteorological data, build cooperation between meteorological and hydrological services, encourage research and training in meteorology, and expand the use of meteorology to benefit other sectors such as aviation, shipping, agriculture, and water management.

Weather Product—WPs are generated by weather personnel for weather personnel or for non-weather personnel to use for planning purposes. WPs include, but are not limited to, JOAFs, air refueling forecasts, air combat maneuver/training area forecasts, instrument flight rules (IFR) military training route forecasts, drop/landing zone (DZ/LZ) forecasts, training range forecasts, and control forecasts for an operation with multiple missions.

Weather Warning—A special WP to facilitate resource protection decisions. Weather Warnings alert designated agencies to the imminent or actual occurrence of weather conditions of such intensity as to pose a hazard to life or property for which the agency must take immediate protective actions.

Weather Watch—A special WP to facilitate resource protection decisions. Weather Watches provide advance notice to designated agencies of the existence of a potential for weather conditions of such intensity as to pose a hazard to life or property for which the agency should consider taking protective measures.

Attachment 2

DD FORM 175-1, FLIGHT WEATHER BRIEFING INSTRUCTIONS

A2.1. General Instructions. Unless directed by MAJCOMs, higher headquarters, or local operating procedures, all entries in the individual blocks are at the discretion of the briefer, based on aircrew requirements and the weather situation. Entries on the DD Form 175-1 or equivalent briefing form must be horizontally and vertically consistent and show sound meteorological reasoning. For example, if a weather warning or advisory for surface wind is indicated in block 11, the surface wind forecast in block 9 should reflect the warning or advisory wind criteria, along with the warning or advisory number entered in block 13. Enter all times in UTC, all winds in five digits (six for wind speeds over 99 knots) and record all heights in hundreds of feet with the surface level as "SFC."

A2.2. DD FORM 175-1; PART I - TAKEOFF DATA. Enter the general forecast for takeoff 1 hour either side of the estimated time of departure (ETD). See **Figure A2.1** for an example of Part I.

A2.2.1. Block 1. **DATE.** Enter the UTC departure date in the format needed for operational use and communication with C2 systems (e.g., DD MMM YYYY, YYYY MM DD).

A2.2.2. Block 2. **ACFT TYPE/NO.** Enter aircraft type (F22, B52, C5) and radio call sign, mission number, or the last three digits of the tail number.

A2.2.3. Block 3. **DEP PT/ETD.** Enter the departure location identifier (ICAO ID#) and estimated time of departure. Enter departure grid point or latitude/longitude for locations that do not have location identifiers.

A2.2.4. Block 4. **RWY TEMP.** Enter the runway temperature (prefixed with a —+‖ or —-‖ as applicable) and designate degrees Celsius or Fahrenheit used.

A2.2.5. Block 5. **DEW POINT.** Enter the runway dewpoint (prefixed with a —+‖ or —-‖ as applicable) and designate degrees Celsius or Fahrenheit used.

A2.2.6. Block 6. **TEMP DEV.** Enter in degrees Celsius unless requested in Fahrenheit. For USAF flights, enter "Temp Dev" as the difference between the forecast temperatures for climb and the US Standard Atmosphere temperature. For Navy/Marine flights, enter the difference between forecast runway temperature (prefixed with a —+‖ or —-‖ as applicable) and US Standard Atmosphere temperature corresponding to field elevation.

A2.2.7. Block 7. **PRES ALT.** Enter the pressure altitude in feet with algebraic sign. Primarily used by USAF aviators. Army aviators usually use density altitude.

A2.2.8. Block 8. **DENSITY ALT.** Enter in feet with algebraic sign. Primarily used for rotary wing operations.

A2.2.9. Block 9. **SFC WIND.** Enter the surface wind direction in magnetic for missions departing your airfield, and in true direction for missions departing another airfield. Designate "M" for magnetic or "T" for true. Enter surface wind direction to the nearest 10 degrees in three digits and surface wind speed (including gust) in two or three digits. Ensure wind entries use a minimum of 5 digits (3 digits for direction and 2 digits for speed). Surface winds will have 2 digits to represent gusts, while winds aloft will use 3 digits for speed when winds exceed 99 knots. Enter "VRB" for a forecast variable wind direction and "CALM" when the winds are forecast calm.

A2.2.10. Block 10. **CLIMB WINDS.** Enter the true direction. Enter a representative wind (or winds) from takeoff to cruise altitude. Enter wind direction to the nearest 10 degrees in three digits and wind speed in two or three digits to the nearest 5 knots. Enter climb winds in layers if there are significant differences (wind speed changes of greater than or equal to 20 knots and/or wind direction changes greater than or equal to 30 degrees and the wind speed is expected to be over 25 knots) from one stratum to another.

A2.2.11. Block 11. **LOCAL WEATHER WATCH/WARNING/ADVISORY.** Enter any known forecast/observed weather watch, warning, or advisory valid for ETD +/-1 hour. When watch, warning, and advisory information for a location are not available (e.g., remote briefing), enter "Check with local flight agencies." Inform the aircrew that the status of local weather watches, warnings, and/or advisories is undeterminable, and recommend they check with the local ATC or airfield operations for any weather watches, warnings, or advisories that may be in effect.

A2.2.12. Block 12. **Runway Surface Condition (RSC)/Runway Condition Reading (RCR).** Enter the latest reported RSC/RCR for the departure airfield, if available (e.g., WR//, RCRNR, IRPSR10, P DRY). When RSC/RCR is not available, enter "N/A."

A2.2.13. Block 13. **REMARKS/TAKEOFF ALTN FCST.** Enter remarks on weather that will affect takeoff and climb (e.g., inversions, icing, turbulence, low level wind shear). Ensure the contents of the briefing and the local TAF are consistent. If requested, enter a forecast for the specific takeoff alternate and time.

Figure A2.1. Example PART I - TAKEOFF DATA.

FLIGHT WEATHER BRIEFING							
PART I – TAKEOFF DATA							
1. DATE 20 Mar 02	2. ACFT TYPE/NO. C130/CATS01	3. DEP PT/ETD KOFF/1410 Z	4. RWY TMP -2 °F/C	5. DEWPOINT -3 °F/C	6. TEMP DEV	7. PRES ALT +1130 FT	8. DENSITY ALT FT
9. SFC WIND M 29012G18 T	10. CLIMB WINDS 24025 (SFC-060) 21035 (060-100)		11. LOCAL WEATHER WATCH/WARNING/ADVISORY 03-10 SNOW 4 – 6 INCHES VALID 20/1200Z TO 20/2000Z				12. RSC/RCR LSR15
13. REMARKS/TAKEOFF ALTN FCST MDT RIME ICG 005-140 DURGC KOFF TAKE OFF ALTN KSUX VALID 1410-1540Z 08012 4 –SN OVC018 ALSTG 29.95 TEMPO 1 SN OVC009							

A2.3. DD FORM 175-1; PART II – ENROUTE & MISSION DATA. Enter data for the duration of the specific mission and the entire route of flight. Brief hazards for the specific mission (if applicable) and enroute generally within 25 miles either side of the route and within 5,000 feet above and below the planned flight level. Insert or attach forecasts for drop zones, ranges, air-refueling areas, or low-level routes, etc., as applicable to the specific mission. See **Figure A2.2** for an example of Part II.

A2.3.1. Block 14. **FLIGHT LEVEL/WINDS/TEMP.** Enter planned flight level in hundreds of feet in three digits (e.g., "280" for 28,000 feet, "080" for 8,000 feet). Enter true wind direction at flight level in tens of degrees and speed to the nearest 5 knots. Enter forecast flight level temperature in degrees Celsius (prefixed with a ―+‖ or ―-‖ as applicable). If there are significant wind speed and direction changes, break the forecast into legs (e.g., BLV-MXF 27045/-45). Otherwise, brief a representative wind and temperature for the entire route (e.g., 32040/-38). If a computer flight plan (CFP) is available, review it for accuracy before briefing aircrews. If accurate, enter "See CFP" in this block. Check "See Attached" if providing a CFP or specific wind charts.

A2.3.2. Block 15. **SPACE WEATHER.** Check the appropriate block indicating the Frequency (FREQ), Global Positioning System (GPS), and Radiation (RAD) as applicable to the specific mission. Indicate the boundaries of the degradation in the space provided in block 15, (e.g., UHF 20N180W to Paya Lebar). When using the High-Altitude Radiation Dosage Chart, 10.0 to less than 100.0 milirems per hour constitute marginal and 100.0 milirems per hour and greater constitute severe. A second option is to simply check the appropriate blocks and attach the applicable Space Weather charts to the DD Form 175-1. Indicate there are attachments by writing ―SEE ATTACHED in block 15 and check ―Yes in block 34.

A2.3.3. Block 16. **SOLAR/LUNAR.** Enter the location specified by the aircrew, Beginning Morning Nautical Twilight (BMNT), Sunrise, Sunset, Ending Evening Nautical Twilight (EENT), Moonrise (MR), Moonset (MS), and Percent Moon Illumination (ILLUM).

A2.3.4. Block 17. **CLOUDS AT FLIGHT LEVEL.** Check appropriate block. "Yes" implies flight in cloud at least 45 percent of the time; "No" implies the flight will be in cloud less than 1 percent of the time; and "In and Out" implies the flight will be in cloud between 1 percent and 45 percent of the time.

A2.3.5. Block 18. **OBSCURATIONS AT FLIGHT LEVEL RESTRICTING VISIBILITY**. Check the appropriate block. If "Yes," enter the type of forecast obscurations that could potentially restrict the in-flight visibility along the planned route or mission flight level (e.g., fog, haze, smoke, etc.). Specify the intensity and location if applicable.

A2.3.6. Block 19. **MINIMUM CEILING.** Enter the lowest ceiling enroute and for the specific mission (if applicable) in hundreds of feet **AGL,** and the geographical location (e.g., "060 ft BLV-MXF"). If the minimum ceiling is over hilly or mountainous terrain, or in thunderstorms, so indicate; e.g., "010 feet BOSTON MTS," or "020 feet SW KY TSTMS."

A2.3.7. Block 20. **MAXIMUM CLOUD TOPS.** Enter maximum tops of cloud layers (exclusive of thunderstorm tops) with more than 4/8 coverage in hundreds of feet **MSL** and the geographical location.

A2.3.8. Block 21. **MINIMUM FREEZING LEVEL.** Enter the height and geographical location of the lowest freezing level enroute and for the specific mission (if applicable) in hundreds of feet **MSL**. If the lowest freezing level is at the surface, enter "SFC" and geographical location.

A2.3.9. Block 22. **THUNDERSTORMS.** Enter the name and DTG of the thunderstorm product used (e.g., ODLA dd/tttt), or FCSTR if supplementing trusted and trusted information from outside sources (e.g., A radar summary, satellite imagery, NWS, or foreign weather service In-Flight Weather Advisories). Enter the type, extent, maximum tops, and geographical location of thunderstorms affecting the route or specific mission. The extent percentages on the DD Form 175-1 directly correspond to the Maximum Instantaneous Coverage (MIC) depicted on 557 WW thunderstorm products. Never use the terms "cumulonimbus‖ or ―CB." Instead, use "thunderstorm."

A2.3.10. Block 23. **TURBULENCE** (independent of thunderstorms). Enter the name and DTG of the trusted turbulence forecast used (ODLA dd/tttt) or FCSTR if supplementing trusted and trusted data from outside sources. (e.g., NWS or foreign In-Flight Weather Advisories). Enter the type, intensity, levels, and locations of turbulence affecting the route or specific mission.

A2.3.11. Block 24. **ICING** (independent of thunderstorms). Enter the name and DTG of the trusted icing forecast used (ODLA dd/tttt) or FCSTR if supplementing trusted and trusted information from outside sources (e.g., NWS or foreign In-Flight Weather Advisories). Enter the type, intensity, levels, and locations of icing affecting the route or specific missions. **Note:** In-Flight Weather Advisories are advisory in nature and should be used as guidance when preparing the enroute forecast. They must be carefully evaluated and tempered with all available data (e.g., radar, PIREPs/AIREPs, upper air soundings, online resources) to determine the potential effects on the specific mission and aircraft. Even if not used as the basis for the forecast, weather personnel must alert aircrews to all existing In-Flight Weather Advisories that affect their mission. If the weather briefer disagrees with the advisory, annotate the fact in the "Remarks" section of the DD Form 175-1 or equivalent. Whether or not the condition described is potentially hazardous to a particular flight is for the pilot to evaluate based on experience, the mission, and the operational limits of the aircraft. See FAA *Aeronautical Information Manual* for detailed information on NWS In-Flight Weather Advisories.

A2.3.12. Block 25. **PRECIPITATION**. Enter the type, intensity, character, and geographical location of precipitation areas affecting the route or specific mission. This block is for precipitation encountered at flight level, not at the surface.

Figure A2.2. Example PART II – ENROUTE & MISSION DATA.

PART II - ENROUTE & MISSION DATA

14. FLT LEVEL/WINDS/TEMP ☐ SEE ATTACHED	15. SPACE WEATHER				16. SOLAR/ LUNAR			LOCATION		
100MSL 21035/-10	UHF 20N180W to Paya Lebar									
		NO IMPACT	MARGINAL	SEVERE	BMNT	0600	Z			
	FREQ		X		SR	0628	Z	MR	2023	Z
	GPS	X			SS	1836	Z	MS	0755	Z
	RAD	X			EENT	1904	Z	ILLUM	92	Z

17. CLOUDS AT FLT LEVEL	18. OBSCURATIONS AT FLT LEVEL RESTRICTING VISIBILITY
X YES ☐ NO ☐ IN AND OUT	☐ YES X NO TYPE

19. MINIMUM CEILING - LOCATION	20. MAXIMUM CLOUD TOPS - LOCATION	21. MINIMUM FREEZING LVL - LOCATION
003 Ern NE FT AGL	280 NE, IA, Srn SD FT MSL	SFC - RTE FT MSL

22. THUNDERSTORMS				23. TURBULENCE				24. ICING				25. PRECIPITATION				
ODLA 24/1500				FCSTR				15 OWS 20/12Z				FCSTR				
X NONE	☐ AREA	☐ LINE		☐ NONE	IN CLEAR	IN CLOUD		☐ NONE	RIME	MIXED	CLEAR	☐ NONE	DRIZZLE	RAIN	SNOW	PELLET
☐ ISOLATED 1 - 2%				LIGHT		X		TRACE				LIGHT				
☐ FEW 3 - 15%				MODERATE				LIGHT				MODERATE			X	
☐ SCATTERED 16 - 45%				SEVERE				MODERATE	X			HEAVY				
☐ NUMEROUS - MORE THAN 45%				EXTREME				SEVERE				SHOWERS				
HAIL, SEVERE TURBULENCE & ICING, HEAVY PRECIPITATION, LIGHTNING & WIND SHEAR EXPECTED IN AND NEAR THUNDERSTORMS.				LEVELS 080-120				LEVELS SFC - 140				FREEZING				
LOCATION				LOCATION NE, IA, Srn SD				LOCATION NE, IA, Srn SD				LOCATION NE, IA, Srn SD				

A2.4. DD FORM 175-1; PART III - AERODROME FORECASTS. Brief the worst conditions expected to prevail during the valid period for both destination and alternate. Ensure the aircrew is briefed on, and fully understand, the entire weather situation at the destination and alternates. The need for and the selection of an alternate is a pilot decision. However, weather technicians need to be familiar with the basic USAF, Army, and Navy/Marine provisions for alternate selection. Refer to AFMAN 11-202V3, 95-1, or OPNAVINST 3710.7, *NATOPS General Flight and Operating Instructions* for specific alternate requirements. Enter forecasts for subsequent stops and alternates on request, but advise the pilot that updates are necessary. Brief destination forecasts in terms the aircrew understands and prefers. See **Figure A2.3** for an example of Part III.

A2.4.1. Block 26. **DEST/ALTN.** Enter the appropriate station identifier (ICAO) for the destination (DEST) or alternate (ALTN) aerodrome forecast. Designate DEST or ALTN used. Place conditions described by a TEMPO group on the next line, line through DEST/ALTN, and enter TEMPO in the block. **Note:** PGS/S-developed briefings place TEMPO groups on the same line. Place local hazard forecasts from the TAF in the Remarks section. For Army multi-stop missions, where the forecast for all stops is similar, enter "A/S" (for "all stops"), enter the worst conditions expected along the route, and identify the location having the worst condition. These entries imply conditions at all other stops are the same, or better.

A2.4.2. Block 27. **VALID TIME.** For USAF and Navy/Marine missions, enter valid time as 1 hour either side of ETA. For flights less than 1 hour, the valid period will be ETD to ETA plus 1 hour. Briefings for Army missions require a valid time from ETA through 1 hour after ETA. For "A/S" entries, valid times are determined from original ETD to last stop ETA plus 1 hour.

A2.4.3. Block 28. **SFC WIND.** Enter true wind direction if the destination is an airfield other than your own. If the flight departs from and terminates at your own airfield with no intermediate stops, enter the wind direction magnetic. Designate "M" for magnetic" or "T" for true. Enter the wind direction to the nearest 10 degrees, and speed (including gusts) to the nearest whole knot. For "A/S" missions, enter the highest wind speed expected (including gusts) and the location.

A2.4.4. Block 29. **VSBY/WEA.** Enter the lowest prevailing visibility and weather expected during the valid period. Represent in statute miles for CONUS and overseas US locations, and in meters for other overseas locations, unless otherwise specified by the aircrew.

A2.4.5. Block 30. **CLOUD LAYERS.** Enter the lowest prevailing sky condition expected during the valid period. Weather briefers must fully evaluate all NWS probability groups (i.e., PROB30/40%) and indigenous variations of the TAF code. If necessary, use the Remarks section to record the briefer's assessment and translation of these conditions.

A2.4.6. Block 31. **ALTIMETER/RWY TEMP/PRES ALT.** Enter the lowest altimeter setting expected during the valid period in all cases except those in which it is impossible to obtain or determine. Enter the forecast temperature (RWY TMP) and designate degrees Celsius or Fahrenheit used (prefixed with a —+‖ or —-‖ as applicable). Enter the forecast pressure altitude (PRES ALT) for the arrival time at the destination. Replace Density Altitude (DA) upon request from the pilot in command.

Figure A2.3. Example PART III – AERODROME FORECASTS.

PART III – AERODROME FORECASTS							
26. DEST/ALTN	27. VALID TIME	28. SFC WIND	29. VSBY/WEA	30. CLOUD LAYERS	31. ALTIMETER	RWY TEMP	PRES ALT
~~DEST/ALTN~~ KOFF	ZTO Z 1705 – 1905	M 04012G18 T	1/2 SN	OVC005	INS 29.70	°F/C -1	FT +1150
DEST/ALTN	ZTO Z	M T			INS	°F/C	FT
~~DEST/ALTN~~ KSUX	ZTO Z 1735 – 1935	~~M~~ 06014 T	6 -SN	OVC012	INS 29.80	°F/C	FT
~~DEST/ALTN~~ TEMPO	ZTO Z	M T	1 -SN BR	OVC005	INS	°F/C	FT
DEST/ALTN	ZTO Z	M T			INS	°F/C	FT
~~DEST/ALTN~~ KRDR	ZTO Z 1800 – 2000	~~M~~ 06009 T	7	SCT060 BKN090	INS 30.04	°F/C	FT
DEST/ALTN	ZTO Z	M T			INS	°F/C	FT
DEST/ALTN	ZTO Z	M T			INS	°F/C	FT

A2.5. DD FORM 175-1; PART IV - COMMENTS/REMARKS. See **Figure A2.4** for an example of part IV.

A2.5.1. Block 32. **BRIEFED RSC/RCR.** Check the appropriate block and enter the latest available RSC/RCR value briefed to the aircrew for the destination and the alternate in the Remarks section. If unavailable, annotate "N/A".

A2.5.2. Block 33. **PMSV.** Enter the PMSV frequency and/or phone patch number of the weather unit providing the briefing. If PIREPs/AIREPs are requested for specific areas, enter the areas in Remarks (e.g., Request PIREP/AIREP DURGC).

A2.5.3. Block 34. **ATTACHMENTS.** Check the appropriate block indicating if attachments are provided with the briefing.

A2.5.3.1. Block 35. **REMARKS.** Enter any other significant data (e.g., data for which there was insufficient space in other blocks and specialized mission forecasts, such as low-level mission areas, air refueling, or gunnery/bombing ranges, etc.) Weather briefings provided electronically (e.g., faxed, posted on webpage, or e-mailed) must include the following statement: ***"Call (ICAO) at DSN ###-#### or commercial (###) ###-#### for a weather update."*** Also include information on how the aircrew can get weather support at the next location. For example: "For Wx updates/briefs at Eglin AFB, call DSN XX-XXX or toll free at 1-XXX-XXX-XXXX."

Figure A2.4. Example PART IV - COMMENTS/REMARKS.

PART IV – COMMENTS/REMARKS										
32. BRIEFED RSC/RCR	X	YES		NOT AVAILABLE	33. PMSV KOFF 342.5	34. ATTACHMENTS		YES	X	NO
35. REMARKS Request PIREP DURGC MDT RIME ICG 050-100 DURGD KOFF, KRDR DRY					Call Eglin AFB at DSN ###-#### or commercial (###) ###-#### for a weather update.					

A2.6. DD FORM 175-1; PART V - BRIEFING RECORD . See **Figure A2.5** for an example of Part V.

A2.6.1. Block 36. **WX BRIEFED TIME.** If briefed in person/verbally, enter time briefed. If sent electronically and not verbally briefed, enter time brief was faxed, posted on a webpage, local LAN, or passed to a central dispatch facility (618 AOC (TACC), 557 WW, etc.) and append an "E" in front of the time (e.g., E1015Z). If the crew calls later for a verbal briefing, put a solidus after the "E" time and enter the verbal brief time (e.g., E1015Z/1035Z).

A2.6.2. Block 37. **FLIMSY BRIEFING NUMBER.** If a flight weather briefing folder, flimsy, or CFP was prepared for this mission, enter the folder, flimsy, or CFP identification number.

A2.6.3. Block 38. **FORECASTER'S INITIALS.** Enter the initials of the weather briefer or the forecaster preparing and disseminating the briefing.

A2.6.4. Block 39. **NAME OF PERSON RECEIVING BRIEFING.** (Remote briefings only). If available, enter receiver's name and, if applicable, military grade.

A2.6.5. Block 40. **VOID TIME.** (Army and Navy/Marine Corps only). Army: Add 1:30 to the "Weather Briefed" time. For Army briefings sent electronically, calculate the void time from the "E" time. If the crew calls later for a verbal briefing, recalculate the void time from the verbal briefing time and enter the new void time after the first time (e.g., 1145Z/1205Z). Navy/Marines: Add 1/2 hour to ETD. **Note:** Navy and Marine Corps aircrews are required to receive a flight weather briefing within 3 hours of ETD. Adjust the void time if the ETD changes.

A2.6.6. Block 41. **EXTENDED TO/INITIALS.** (Army and Navy/Marine Corps Only). When an Army or Navy/Marine pilot asks for an extension, recheck all weather entries, re-brief, and indicate the required changes (i.e., highlight/bold if electronic, different colored ink if paper) and enter the initials of the forecaster providing the extension. Extensions follow the same rule as for void times.

A2.6.7. Block 42. **WX REBRIEFED TIME/INITIALS.** (Not required for Army, Army equivalent is "Extended To") If weather re-briefed is different than originally briefed, indicate the changes to original weather entries as specified in Block 41 and enter the re-briefing time and initials of the forecast providing the re-brief.

A2.6.8. Block 43. **WX DEBRIEF TIME/INITIALS.** Enter the time the aircrew debriefed and the initials of the forecaster receiving the debriefing.

Figure A2.5. Example PART V – BRIEFING RECORD.

PART V – BRIEFING RECORD			
36. WX BRIEFED TIME **E1329/M345** Z	37. FLIMSY BRIEFING NO.	38. FORECASTER'S INITIALS **LM**	39. NAME OF PERSON RECEIVING BRIEFING
40. VOID TIME **1459/M515** Z	41. EXTENDED TO / INITIALS Z	42. WX REBRIEFED TIME / INITIALS Z	43. WX DEBRIEF TIME / INITIALS **1930/SB** Z

DD Form 175-1, Revision Date (EG)

Attachment 3

STANDARD WEATHER REPRESENTATION AND SYMBOLS

A3.1. General Instructions . **Figure A3.1** depicts line types and colors for commonly used isopleths, **Figure A3.2** depicts bounded areas for specific weather parameters, and **Figure A3.3** depicts standard frontal zone symbols and other commonly weather symbols.

Figure A3.1. Recommended Line Types and Colors for Commonly Used Isopleths.

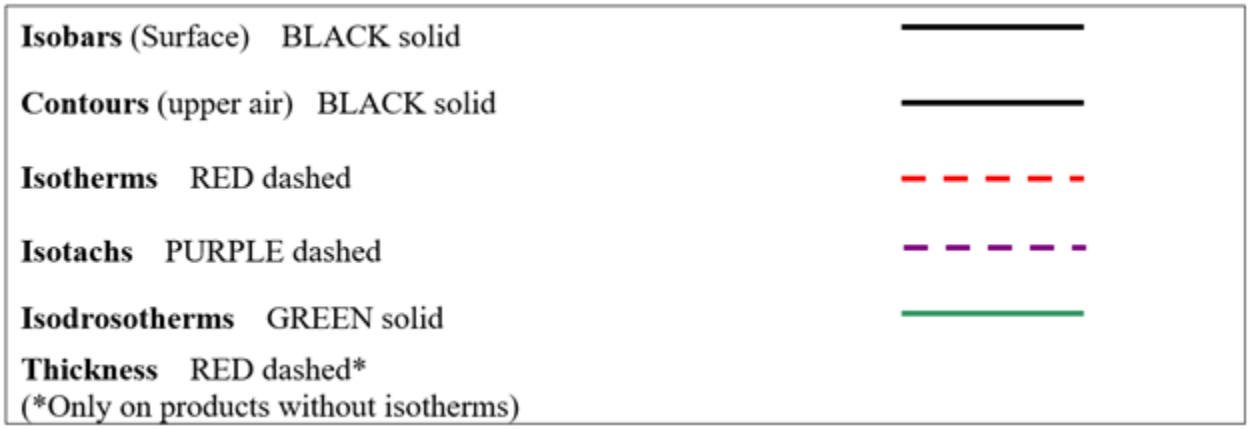


Figure A3.2. Standard Depictions for Bounded Areas of Weather.

(YELLOW solid line and optional shading)

Areas of Fog: Distribute the appropriate fog symbol over the zone.

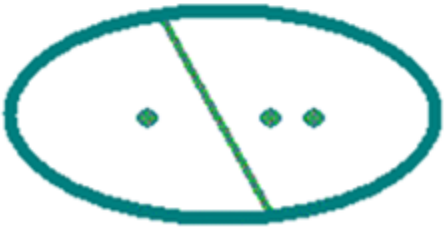
(BROWN solid line and optional shading)

Areas of Dust, Dust storms, Sandstorms, or Haze: Distribute the appropriate phenomena symbol over the zone.

(Thunderstorms—RED line with dash or dot)

(Rain/Snow Showers—GREEN line with dash or dot)

Thunderstorm-Convective Precipitation Areas: Distribute the appropriate convective weather symbol over the zone with the height of the thunderstorm top, if applicable.



(GREEN/RED solid line)

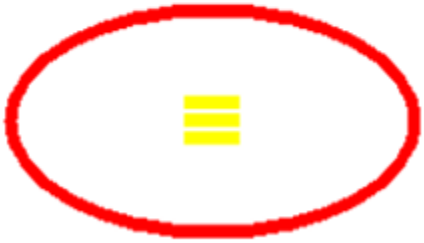
Non-Convective Continuous or Intermittent Precipitation Areas: Distribute the appropriate precipitation symbol over the zone. Color in RED for freezing precipitation. Optional: Cross hatch continuous and single hatch intermittent precipitation.

(BLUE dots or dashes: Clear Air Turbulence & Mechanical Turbulence)
(BLUE solid line: Mountain Wave Turbulence)

Turbulence Areas: Distribute the appropriate turbulence symbol over the zone with the height of the bases and tops (MSL).

(BROWN intersecting line segments)

Icing Areas: Distribute the appropriate icing symbol over the zone with the height of the bases and tops.



(RED solid line)

Areas of Ceilings less than 1500 feet and/or Visibility less than 3 miles: Distribute the appropriate weather symbol causing IFR visibility conditions over the zone.

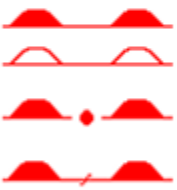
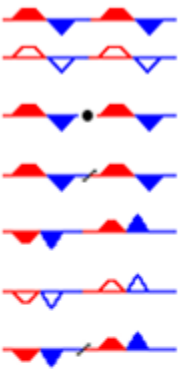
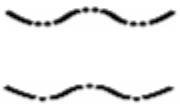
Cloud Forecasts greater than or equal to 1500 feet and above: Outline in BROWN scalloped line and place bases/tops inside cloud areas.

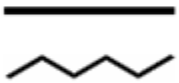
Upper-air/Severe Analysis moisture areas and of ≥ 70% RH on Model Charts: Bound in light GREEN scalloped line.

Areas of ≥ 90% RH on Model Charts: Color fill/shade in GREEN, border in darker GREEN scalloped line (optional).

Dry areas on upper-air/model charts: Bound in BROWN scalloped line.

Figure A3.3. Symbols for Frontal Zones and Other Weather Features.

Item	Symbol
(BLUE) Cold front at the surface Cold front above the surface Cold front frontogenesis Cold front frontolysis	
(RED) Warm front at the surface Warm front above the surface Warm front frontogenesis Warm front frontolysis	
(PURPLE) Occluded front at the surface Occluded front above the surface Occluded front frontolysis	
(ALTERNATE RED & BLUE) Quasi-stationary front at the surface Quasi-stationary front above the surface Quasi-stationary front frontogenesis Quasi-stationary front frontolysis Quasi-stationary occluded front at the surface Quasi-stationary occluded front above the surface Quasi-stationary occluded front frontolysis	
(RED or BLACK) Jet Stream maximum wind line	
(BLACK) Instability line Shear line	
(ORANGE) Near-Equatorial Trade Wind Convergence Zone, formerly called the Inter-Tropical Convergence Zone.	

Note: The separation of the two horizontal lines gives a quantitative representation of the width of the Near Equatorial Trade Wind Convergence. The diagonal lines may be added to indicate areas of activity.	
(ALTERNATE RED & GREEN) Inter-tropical discontinuity	
(BROWN) Sub-tropical discontinuity	
(BLACK) Axis of trough Axis of ridge	
(BLUE) Highs/Anticyclones	**H/A**
(RED) Lows/Cyclones	**L/C**
Positive Vorticity Advection/Convergence Vorticity troughs Positive Vorticity Centers	Shade RED RED trough symbol RED **X**
Negative Vorticity Advection/Divergence Vorticity ridges Negative Vorticity Centers	Shade BLUE BLUE ridge symbol BLUE **X**
(RED) Tropical Depression	
(RED) Tropical Storm	
(RED) Hurricane/Typhoon	
Tropical Storm Wind Areas and Date/Time Labels	

Attachment 4

INSTRUCTIONS FOR COMPLETING DAF FORM 3807, WATCH/WARNING NOTIFICATION AND VERIFICATION

A4.1. General Instructions. Unit leaders may use these instructions as guidance in preparing local procedures for logging weather watches and warnings. Enter all times in UTC.

A4.1.1. **Block 1. Number** . Enter the locally specified number, or numbers when a watch and corresponding warning have different numbers (e.g., Watch # A4-008, WW # 4-002).

A4.1.2. **Block 2. Location** . Enter the location (installation or area) for which the watch/warning is valid.

A4.1.3. **Block 3. Date** . Enter the issue date of the watch/warning.

A4.1.4. **Block 4. Issued By** . Enter the name or initials of the individual who issues the watch/warning.

A4.1.5. **Block 5. Verified By** . Enter the name or initials of the individual who verifies the warning.

A4.1.6. **Block 6. Criteria:**

A4.1.6.1. **Watches/Warnings Are Issued For The Following.** Enter the watch/warning criteria.

A4.1.6.2. **Desired Lead-Time.** Enter the desired lead-time.

A4.1.6.3. **Valid Period.** Enter the valid period of the watch/warning on the appropriate line (opposite the criteria for which the watch/warning is issued). The ending time for observed lightning will reflect the estimated duration.

A4.1.6.4. **Forecast.** Enter the specific value or category forecast if different than that listed in the watch/warning criteria block. For example, if the threshold is for winds greater than 35 knots, but the forecast is for 40 knots, specify 40 knots in this block.

A4.1.6.5. **Verification.** See **Chapter 5** for verification procedures.

A4.1.6.5.1. **Occurred.** Enter the time the weather element first occurred within the area covered by the warning. For WWs issued for winds 50 knots or greater, or hail 3/4 inch or greater that do not occur within the area covered by the warning but DO occur within 10 nautical miles, use the time the event occurred within 10 nautical miles. If the weather element did not occur, leave blank and indicate the nonoccurrence in the Did Not Occur block.

A4.1.6.5.2. **Did Not Occur.** Check those weather elements that did not occur.

A4.1.6.5.3. **Lead-Time.** Enter the actual lead-time of each verified weather element. In cases where a warning downgrades an earlier warning that did not verify (with no break in coverage), compute actual lead-time using the issue time of the earlier warning.

A4.1.6.5.4. **Timing Error.** Enter timing error when computing lead time.

A4.1.6.6. **Text.** Enter the text and valid period of the watch or warning as disseminated to customers. Overprinting the text of standardized watch warning criteria (with blanks for specific values) may improve relay times. For example, overprint:

Figure A4.1. Overprint Example.

THUNDERSTORMS WITH _____ WINDS AND _____ INCH HAIL OR

WINDS _____ KNOTS NOT ASSOCIATED WITH THUNDERSTORMS

This space may also be used to document extension information.

A4.1.6.7. **Block 7. Dissemination:**

A4.1.6.7.1. **Agency.** List all agencies notified of the watch or warning. Include the primary dissemination system and all agencies not on the primary dissemination requiring notification. Some agencies on the primary dissemination system may require a backup call to verify receipt (indicated by an *****); do not use the time of backup calls in verification statistics.

A4.1.6.7.2. **Contact.** List primary and secondary means of contacting the agencies, for example, N-TFS/x1234.

A4.1.6.7.3. **Agency Criteria.** Mark the watch/warning criteria for each agency.

A4.1.6.7.4. **Watch Issued.** Enter the dissemination/notification time, the initials of the forecaster issuing the watch, and the initials of the person receiving the watch if that agency requires a backup call or is not on the primary dissemination system.

A4.1.6.7.5. **Watch Cancelled.** Enter the dissemination/notification time, the initials of the forecaster cancelling the watch, and the initials of the person receiving the cancellation if that agency requires a backup call or is not on the primary dissemination system. If the watch runs full term, enter an appropriate remark such as "allowed to expire" or "ATE."

A4.1.6.7.6. **Warning Issued.** Enter the dissemination/notification time, the initials of the forecaster issuing the warning, and the initials of the person receiving the warning if that agency requires a backup call or is not on the primary dissemination system.

A4.1.6.7.7. **Warning Cancelled.** Enter the dissemination/notification time, the initials of the forecaster cancelling the warning, and the initials of the person receiving the cancellation if that agency requires a backup call or is not on the primary dissemination system. If the warning runs full term, enter an appropriate remark such as "allowed to expire" or "ATE."

A4.1.6.8. **Block 8. Remarks** . Use for miscellaneous information.

A4.1.6.9. **Block 9. Pertinent Observations** (back of form). List all pertinent observations or data points, both "official" and "unofficial," that aid in verification and/or justification of watches and warnings. Forecasters may include any observational data they deem relevant, that assisted in the issuance, verification, or cancellation process. Examples

include (but are not limited to) radar information, off-duty observer reports, and locally reported weather conditions.

A4.1.6.10. **Block 10. Forecast Review and Comments** (back of form). Forecast review section also referred to as weather product review in this publication, is used for forecast review information. AFW leaders can use this space to include written comments on weather watches and warnings.

Attachment 5

INSTRUCTIONS FOR COMPLETING DAF FORM 3806, WEATHER WATCH ADVISORY LOG

A5.1. General Instructions. Unit leaders may use these instructions as guidance in preparing local procedures for logging forecast and observed weather advisories (WA). Enter all times in UTC.

A5.1.1. **Date.** Enter the month and year.

A5.1.2. **Issued.** Enter the issue DTG.

A5.1.3. **Valid.** Enter the valid time of the WA. Leave blank for observed WAs.

A5.1.4. **Terminal or Area.** Enter the installation or area for which the advisory is being issued. Enter the locally assigned WA number (e.g., WA # 05-A05).

A5.1.5. **Text.** Enter the text of the advisory.

A5.1.6. **Dissemination.** Use this section to enter information for the initial issuance, extensions, and cancellations of WAs. If the WA is allowed to expire, enter a remark such as "allowed to expire" or "ATE" in one of the time blocks. Use the Remarks block or back of the form if needed.

A5.1.6.1. **Agency.** Enter the agencies notified of the WA. Include the primary dissemination system and all agencies not on the primary dissemination system that must be notified. **Note:** Minimize individual notification calls to no more than three.

A5.1.6.2. **Time.** Time agency is notified.

A5.1.6.3. **Initials.** Enter the initials of the individual receiving the WA information, if required. This is normally used for agencies not on the primary dissemination system and for follow-up calls.

A5.1.6.4. **Forecaster.** Enter the name or initials of the forecaster issuing, extending, or canceling the WA.

A5.1.7. **Remarks.** Use as required.

A5.1.8. **Verification.** Verify all forecast WAs either objectively or subjectively as determined by unit leaders. For WAs containing multiple phenomena, verify each phenomenon separately.

A5.1.8.1. **Occurred.** Check "Yes, No, or Not Applicable."

A5.1.8.2. **Lead-Time.** Enter the actual lead-time. Lead-time is not required for observed WAs, downgrades of previously verified WWs or WAs with no break in coverage, or extensions unless the WA has not yet verified. In cases where a WA downgrades an earlier warning or advisory that *DID NOT* verify (with no break in coverage), compute the lead-time using the issue time of the earlier warning or advisory.

A5.1.8.3. **Timing Error.** Enter the calculated timing error, if required.

A5.1.8.4. **Verified By.** Enter the initials of the individual verifying the advisory.

A5.1.8.5. **Comments/Remarks.** Enter enough meteorological reasoning and information, such as observations, radar reports, and PIREPs/AIREPs, to verify and/or justify the WA. This includes information to verify the WA objectively or subjectively.